T.L. SHIELD AND ASSOC., INC.

MODULAR ELEVATOR MANUAL

PROJECT:

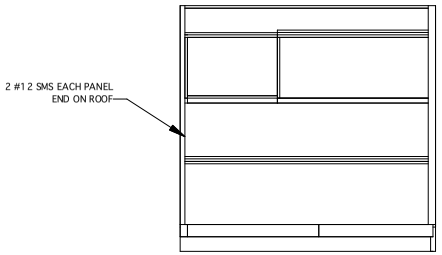
JOB NUMBER/SERIAL NUMBER:

14 24 00 Modular Elevator

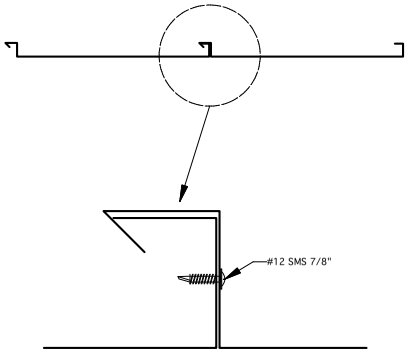
P.O. BOX 6845 THOUSAND OAKS, CA 91359-6845 Phone: (818) 509-8228 Fax: (818) 5098596
CA LIC # 605460 C-11 - AZ LIC # 099469 C-18 / #099470 L-05 – NV LIC # 0037116 C-7

Item	Description	
9	**Misc Mechanical Room Components**	
	9.1	Light (1ea)
	9.2	Photometrics
	9.3	Bulb Safety Shields
	9.4	GFCI Outlet
	9.5	Light Switch
10	**Doors & Misc Components**	
	10.1	Fire Rated Steel Doors
	10.2	Ramco BB Hinges
	10.3	Ramco 3000 Closer
	10.4	Cal Royal Lockset
11	**Manufacturer's Standard One Year Limited Warranty**	
	11.1	Standard One Year Limited Warranty

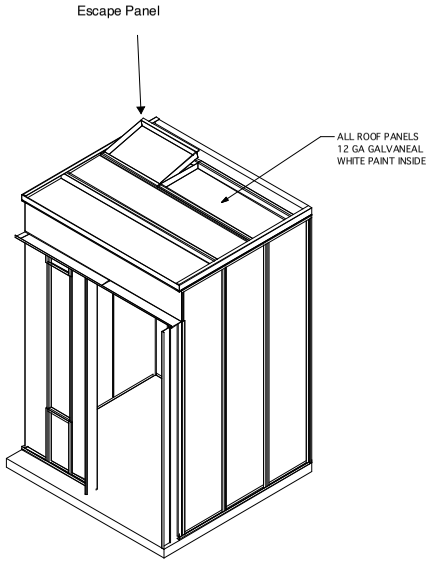
2.1 Cab Construction Diagram



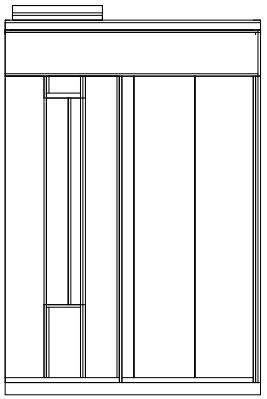
TOP VIEW



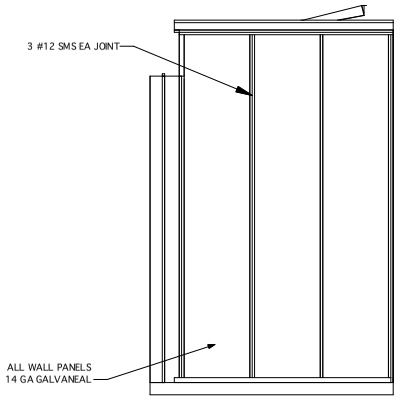
PANEL JOINT DETAIL



ISOMETRIC VIEW



FRONT VIEW



SIDE VIEW

** Alt materials available such as SS 304 brush finish (same GA)

ELEVATOR CAB

NO.	DATE	REVISION
1		

PROJECT NAME:

MODULAR ELEVATOR MANUFACTURING, INC.
P.O. BOX 3998
CHATSWORTH, CA. 91313
866-926-9083

PROJECT NO:

DATE: 10/29/10

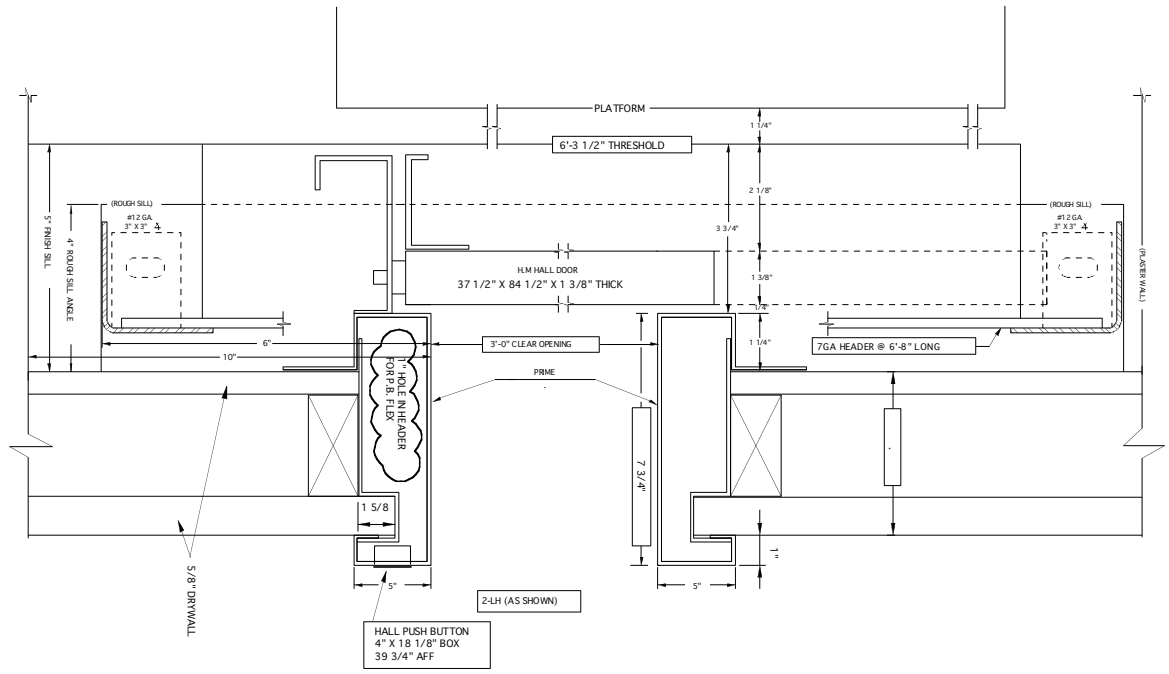
ENGINEERED BY:

DRAWN BY: KPM

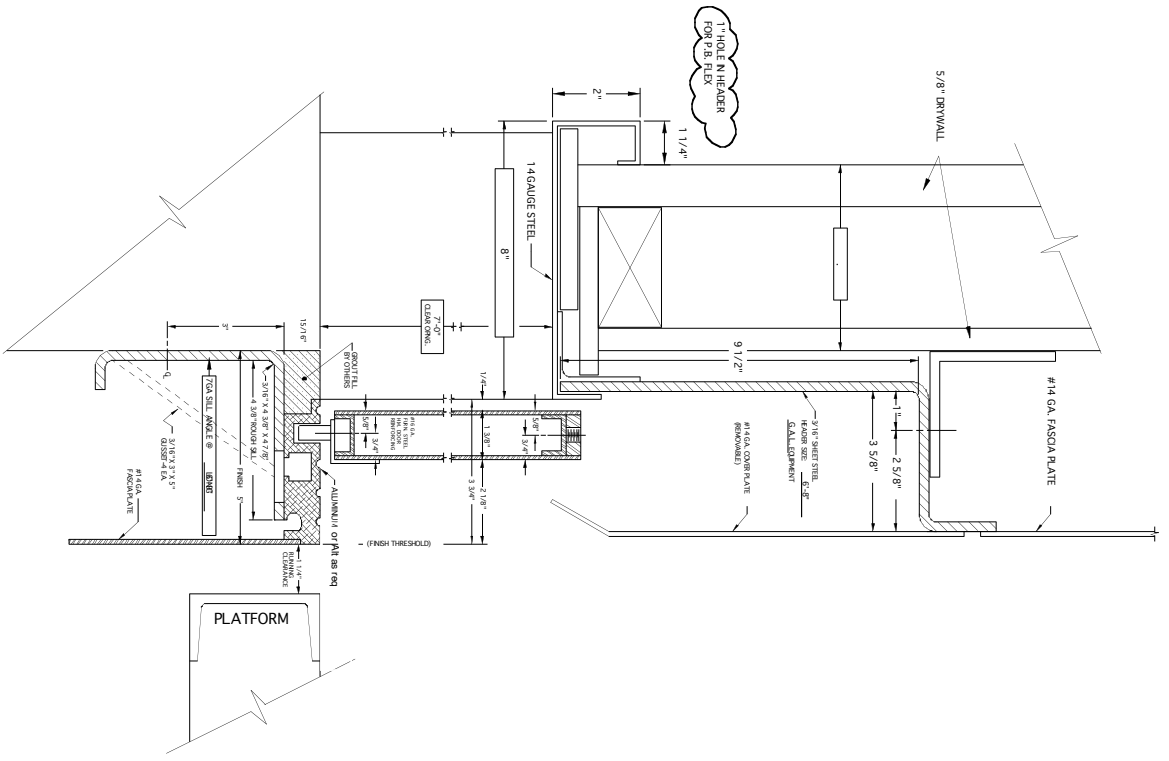
SHEET NAME:
Elevator Cab Detail

SHEET NO:

2.2 Door and Trim Diagram



PLAN VIEW



SIDE ELEVATION

DOORS & FRAMES
U.L. LABELED
DOORS - FILE NO. R7883
FRAMES - FILE NO. R13907

NOTES: UNLESS OTHERWISE SPECIFIED

1. WALL SIZE AND TYPE MUST BE VERIFIED PRIOR TO THE MANUFACTURING OF THE ENTRANCE FRAMES.

MATERIAL REQUIREMENTS:

2-LH #16 GA. FURN. SHEET STEEL H.M. DOORS
37 1/2" X 84 1/2" X 1 3/8"
2 SET(S) OF #14 GA. COLD ROLLED STEEL FRAMES

3 THRESHOLDS; SILL FINISH ALUMINUM

FINISH OF MATERIAL

DOORS: 16GA COLD ROLLED STEEL, PRIMED

FRAMES: 14GA COLD ROLLED STEEL w/A PRIME FINISH

SILLS: ALUMINUM

JOB: NEW PROTOTYPE

ADDRESS: .

CITY: .

CONTRACTOR: T.L. SHIELD AND ASSOC.

SHEET: 1 OF 1

DATE:

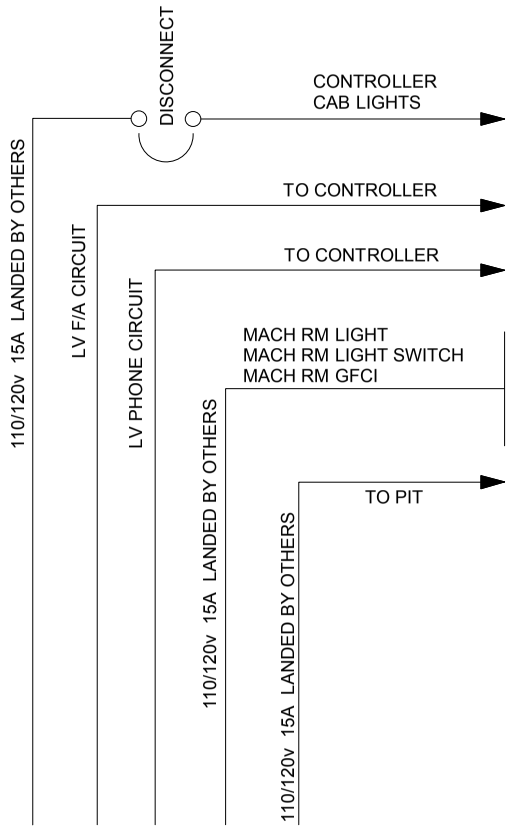
WINTER & RAIN MFG INC
1417 ELWOOD ST.
LOS ANGELES, CA 90021

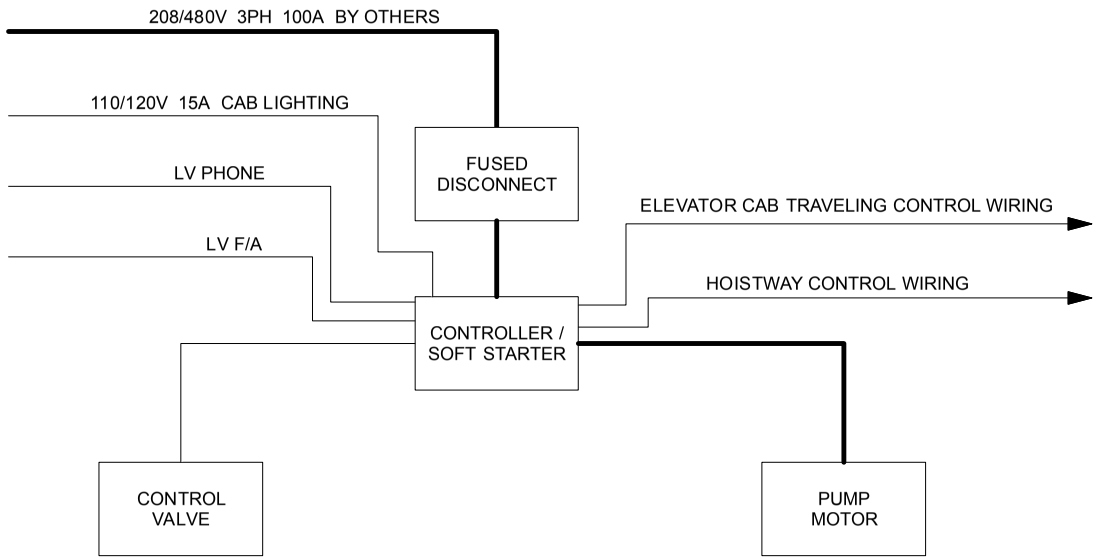
PHONE: (213) 749-3561

DRAWING NO. ENT-603

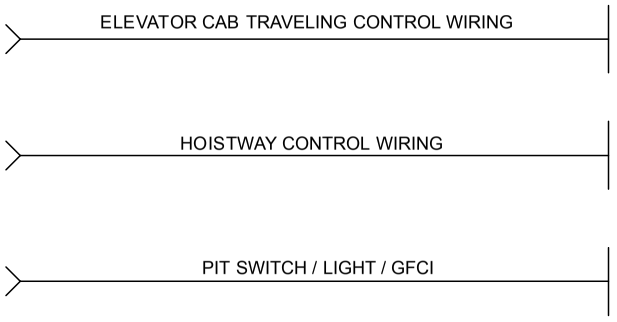
REV A

2.3 Single Line Diagram - Electrical





MECHANICAL ROOM (MR)

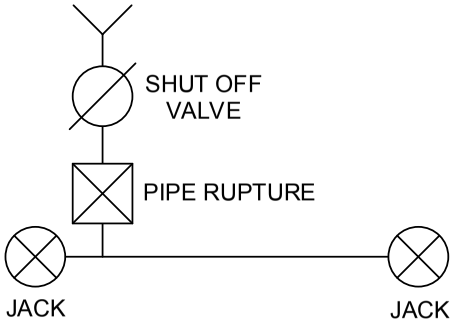


PIT / HOISTWAY

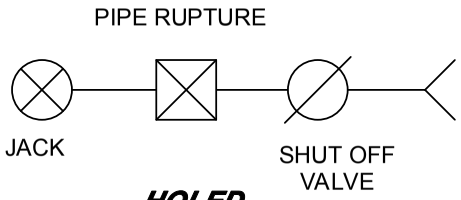
ELEVATOR ELECTRICAL LINE DIAGRAM

MODULAR ELEVATOR MANUFACTURING, INC.
P.O. BOX 3998
CHATSWORTH, CA. 91313
818-509-8228

2.4 Single Line Diagram - Hydraulic

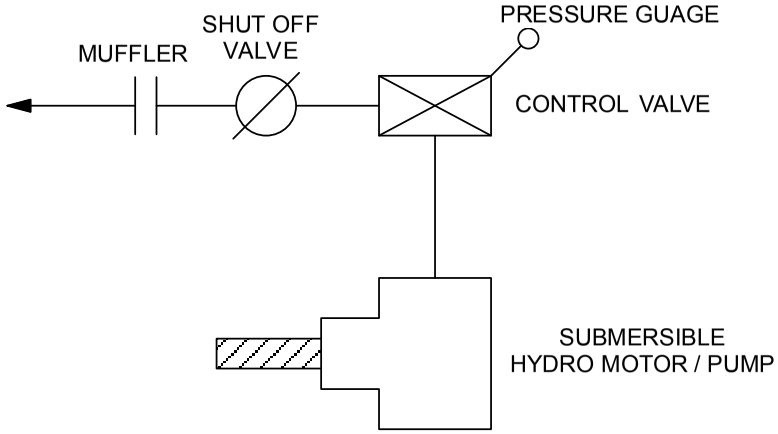


HOLELESS



HOLED

HOISTWAY



MACHINE ROOM

HYDRAULIC LINE DRAWING

MODULAR ELEVATOR MANUFACTURING, INC.
P.O. BOX 3998
CHATSWORTH, CA. 91313
818-509-8228

2.5 Final Drawing

3.1 Setting and Installation Procedures

MEM INC
MODULAR ELEVATOR MANUFACTURING

Setting & Installation Procedures

Thank you for the purchase of your MEM Inc. modular elevator. There is no doubt you have one of the highest quality elevators manufactured. All involved will be amazed at the speed at which the MEM elevator will be installed and completed.

It is imperative that you work closely with an experienced crane company. In order to determine the appropriate size crane they will need to know the weight of the elevator, total length of the elevator hoistway, and their proximity to the pit. It is recommended that the crane company survey the site prior to the day of the set.

If you should have any questions, don't hesitate to contact us at 866-926-9083.

Note, review all safety procedures, equipment and materials with your crane company prior to any off loading of equipment and structures.

OFF LOADING

- Dependent upon the exact specifications of the elevator that you are getting, off loading should be in the following order:
    - Prior to off loading the MER and hoistway, survey the site with the crane operator and trucking company to insure that the crane and truck can be place in the most strategic locations. Confirm prior to receipt of the elevator the approximate weight and height of the hoistway, so that a proper site survey can be done to insure the correct size crane is delivered on the day of the elevator set.
    - Hydraulic jack (if elevator is direct plunger type), off loaded and placed in borehole, and connected to pit channels.
    - Hydraulic pump unit to be set in the center of the Machine Equipment Room (MER) slab, or in the event that a MER is not supplied, in the general vicinity of where the pump unit will be going. Note, all MEM pump units WILL fit through a 3068 door.
    - MER to be set on MER slab in position of its final set position.
        - Prior to off loading MER, remove the shipping skids from the MER structure.
        - Remove 4 roof anchor bolts (one in each corner) and replace with appropriately sized swivel action eyebolt.
        - Connect cables to eyebolts and have MER hoisted in position.
    - Off loading of the hoistway.
        - IF WALKING ON THE SIDE OF THE HOISTWAY, MAKE SURE THAT YOU ONLY WALK ON THE EDGES, SO NOT TO BREAK THROUGH EXTERIOR DRYWALL. EXTRA CAUTION MUST BE USED WHEN WALKING ALONG THE EDGE AND APPROPRIATE SAFETY PERCAUTIONS MUST BE TAKEN.
        - Slide hoistway roof panel into place at the top of the hoistway, while hoistway is still on truck and in horizontal position
        - Bolt 2 swivel eyebolts into their upper prospective corner positions.
        - Bolt 2 swivel eyebolts into the upper bottom base plates.
        - Attached all 4 eyebolts via cables to the crane hook with like length cables, achieving appropriate angles from the hoistway up to the crane hook. (Discuss lengths with your crane operator)
        - Lift hoistway straight up, and allow truck to drive out from underneath.
        - Set hoistway onto ground, (insuring that shipping skids are still mounted in place)

P.O. BOX 3998, CHATSWORTH, CA 91313
Phone: (818) 509-8228 Fax: (818) 509-8596

MODULAR ELEVATOR MANUFACTURING

SETTING OF HOISTWAY

- Prior to setting of the hoistway, inspect the interior of the hoistway for loose parts and to insure that the shipping cab support brackets are securely in place.
- Make sure that the anchor bolts in the pit are of correct size, length, and position. Confirm that anchor bolt template, supplied by MEM was used for the setting of the anchor bolts.
- Set leveling nuts at appropriate height (3'9¾" below top of stem wall of entrance) and shoot with a laser to insure that they are all in a perfectly level plane with one another.
- Confirm that the pit is in the correct position in relationship to the upper landing, and that all clearances are appropriate, and as per plans.
- Measurements from the upper landing to the lower landing should be confirmed, and cross checked to the landing to landing dimension of the elevator.
- In the event that the elevator travel does not match the site conditions, there is limited flexibility in the upper landing position, with modifications to the hoistway. No significant welding is required.
- While hoistway is still on its side, slide open the lower landing hall door.
- Standing and setting the elevator
    - Secure all 4 swivel eyebolts into all top corners of the roof
    - Attach cables to lifting eyebolts and rigg the cables using Skuoum (two parts) blocks. Consult with your crane company for further clarification.
    - Disconnect shipping skids from hoistway. (Note: shipping skids are critical to the protection of the door entrances, and setting the elevator in a horizontal position without them in the proper position will result in damage).
    - Hoist shaft into place. Be familiar with all crane hand signals prior to starting any setting procedures.
    - When hoistway is almost all the way into the pit, enter into the pit through the lower landing door. Have crow bars and all necessary equipment to shift hoistway into position, such that it can be dropped down onto the anchor bolts and their leveling nuts.
    - AS HOISTWAY SLIPS INTO PIT KEEP EYE ON BOTTOM OF 1ST FLOOR DOOR JAMB. BOTTOM OF 1ST FLOOR DOOR JAM IS TO BE 0" TO +1/8" ABOVE TOP OF STEM WALL.
    - Secure elevator into place and confirm plumb of the rails.
    - Remove swivel eyebolts from roof, replace with supplied bolts and factory supplied washers.
    - Dry pack under each corner plates, and bottom rail brackets to the specifications of the grout.
    - Leave one machine room key in pit.
- Position MER into its final position, anchor as per plans.

SETTING OF MODULAR EQUIPMENT ROOM (MER)

- Prior to setting the MER check the site for level and confirm the placement of the electrical stub ups are in the proper position and the overall size of the slab is adequate.
- The MER will have to have been removed from its shipping skids.
- The pump unit needs to be placed within the MER space.
- Generally it is desired to set the hoistway prior to the MER, hence the hoistway is assumed for these instructions to already be in place.
- Install two swivel eyebolts into opposite roof corners.
    - Attach cables to eyebolts.
    - Hoist MER onto MER slab, and into place
        - Prior to final placement, make sure that MER door is open, for easy access.

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MODULAR ELEVATOR MANUFACTURING

CONNECTION OF EQUIPMENT ROOM TO HOISTWAY

If your project calls out for a 3-wall equipment room that is adjacent to the hoistway, the MER will be getting attached directly to the hoistway. Note: if you are intending on having a "curb" around the hoistway, then there can NOT be a curb between the hoistway and the machine room! See Detail 9, S3A Option #3.

- After setting both structures, with the MER pushed up against the hoistway, an angle will be supplied along with #12 self tapping screws for attachment at the roof of the equipment room to the hoistway.
- The hoistway drywall must be drilled, such that metal spacers can be put in place (every 12") where screws are to be screwed, attaching the angle to the hoistway.
- Screws will then be screwed into the roof structure, which will penetrate the plywood and go directly into the horizontal HSS.
- Anchor MER to slab.
    - Shim as necessary to maintain levelness both to slab and to hoistway.

Your modular elevator system is SET. The balance of the elevator start up, consists of relatively typical elevator trade work.

Upon finalization, proper adjustment and inspection of the elevator by the authority having jurisdiction, will give your client a first class mechanical piece of equipment. As with all mechanical pieces of equipment, elevators, the elevator should be maintained on a regular basis. This too will keep the warranty in place during that first year of operation.

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Phone: (818) 509-8228 Fax: (818) 509-8596

3.2 Installation Check Off

NEW ELEVATOR CHECK OFF / INSPECTION SHEET

Job Name: Job No:
Job Site Address:

Elevator Set:
Date: Elevator Serial #:
Set Crew Names: MMR Serial #:
Weather Conditions:

Initial each confirmation line item:
Hoistway rails plumb North South / East West:
Plain of MMR and Hoistway Wall the same:
Spacing b/t MMR and hoistway constant:
Grouting Complete:
IOR present during grouting: Y / N
Anchorage of MMR Complete:
Hydro Piping Complete and all fittings tight:
Hydro pipe stands installed:
Sump grate installed:
Electrial b/t hoistway and MMR Complete:
Hydro tank cleaned and filled with _____ gallons of oil:
MMR anchored in all locations:
IOR present during anchoring: Y / N
Vent mounted in MMR:
MMR Key left in pit:
Buffer stands anchored:
Note: Any item not completed above at time of elevator set must be circled!

Special Issues / Concerns:

Elevator Start Up & Adjustments
Jack vs. Rail aligned:
No hydro leaks in pipe system:
Cab sill and hatch sill parallel. With _____ running clearance:
Platform level North South / East West:
Stiles are plumb:
Car door plumb with consistant gap at jamb of ____ in open and _____ in closed positions:

Hatch door plumb with consistant gap at jamb of ____ in open and _____ in closed positions:

Check off prior to inspection

Static Load test ready:
Pressure relief set at 125% of working pressure:
Speed up and down w/n 10%:
Prep down speed at 125% of up for testing of pipe rupture valve and test:
Pit stop switch working:
All limit switches working as designed:
Dove tail is correct:
Pit outlet is hot:
Data tags on spring buffers:
Pit cans and hoses installed:
No holes in hoistway:
All electrical box covers installed:
Landing lighting:
Cab emergency lighting operational:
Stop switch in car operating:
Alarm button operating:
Door pressure checked:
Door speed checked:
Door restrictor checked:
Car and hatch door switches checked:
Top of car stop switch checked
Top of car cab access door switch checked:
Top over travel more than 3":
Car phone operating:
Phone number for where car phone is to call: _____
Check pressure switch in tank
Check low oil timer
Check 3-phase monitor switch:
Car stop key hung in machine room and marked:
Fire extingusher in machine room
Service log in machine room
Code data tag on disconnect
Pressure reading tags on tank
Down speed and piston wall thickness on car top crosshead
Phase 1 and 2 operating properly
Smoke detector operating properly
Machine room door self closing, self locking:
Machine room threshold installed:
Landing sills installed
Guards on light fixtures
Note: Circle any item not checked or operating correctly!

3.3 Installation Check List

TL SHIELD & ASSOCIATES, INC

MODULAR ELEVATOR INSTALLATION CHECK LIST

ITEMS TO BE COMPLETED BY OTHERS:

Equipment Room Corrections				
Smoke detector w/ correct contacts				
Heat sensor w/ proper shunting				
Eliminate flexible conduit				
Usage of Controller and or Disconnect as pull box				
Phone line				
Phone number of the line				
Phone number that the phone is to call monitored 24/7				
Vent				
Fire extinguisher				
Elimination of excess stub ups				
Maintenance of 7' overhead clearance				
Sprinkler and Heat sensor not within 24" of each other				
Sprinkler guarded				
Missing Fuses				
Exposed piping for other services				
Adequate lighting to equipment room				
Patching of drywall				
PVC piping				
3 phase power terminated at disconnect				
110v circuit terminated at equipment room light switch				
110v circuit terminated at junction box for hoistway circuit				
110v elevator lighting circuit terminated at single pole switch				
Hoistway Corrections				
Flooring in the Cab				
Equipment room key				
Access panel				
Proper Grate over access panel				
Grounding rod w/ ground wire to structure				
Smoke detector w/ correct contacts, and wires to controller				
Heat detector				
Sprinkler with in 24" of heat detector, and shunted @ top of HW				
Sprinkler at bottom of pit within 24" of pit floor				
Sprinkler guarded				
Exposed piping for other services				
Standing water in the pit				
Patching of drywall				
PVC piping				
Uneven/smooth pit floor				
Exterior of hoistway Corrections				
Proper thresholds				
24/7 Lighting at each landing				

4.1 Lubrication Maintenance & Spare Parts List

LUBRICATION AND MAINTENANCE CHECKLIST

Following is a list of suggestion lubrication, monthly maintenance items and spare parts which should be kept on hand.

LUBRICATION

- ☐ GUIDE RAILS AND GUIDE RAILS SHOES
- ☐ CAR DOOR GIBS AND TOLLERS
- ☐ HATCH DOOR GIBS AND ROLLERS
- ☐ LINKAGE AND CHAIN ON DOOR OERATOR

MONTHLY MAINTENANCE

- ☐ CAR DOOR(S)
- ☐ PHOTO EYE BAR OR INFRA-RED DOOR SCREE
- ☐ DOOR OPERATOR(S)
- ☐ HATCH DOORS
- ☐ HYDRAULIC CYLINDERS
- ☐ HYDRAULIC OIL LEVEL IN TANK
- ☐ VALVE ADJUSTMENTS TO MAINTEN CONTRACT SPEED

EQUIPMENT & PARTS REPLACEMENT LIST

Hydraulic Components

- ☐ Jack Units
- ☐ Power Units
- ☐ Pump Motor
- ☐ SEIM Pump
- ☐ EECO Control Valve
- ☐ Muffler
- ☐ Over-speed Rupture Valve
- ☐ Cut Off Ball Valve
- ☐ Schedule 80 Pipe and Fittings
- ☐ Victaulic Fittings and Seals

Controller

- ☐ Smartrise Controller
- ☐ Elevator Controls Controller
- ☐ Car Top Stations
- ☐ GAL MOVFR Door Operator
- ☐ WECO Door Sensor
- ☐ Elevator Cab & Hall Fixtures
- ☐ Phone Dialer
- ☐ Fused Disconnect
- ☐ Hoistway Cable
- ☐ Traveling Cable

Misc. Cab Components

- ☐ Ceiling Grid / Egg Crate Panels
- ☐ Lighting
- ☐ Bulb Protector
- ☐ Fan
- ☐ SS Grab Bar
- ☐ Swivel Guides

Misc Pit Components

- ☐ Light-Moisture Resistant
- ☐ GFCI Outlet
- ☐ Light Switch
- ☐ Pit Safety Switch

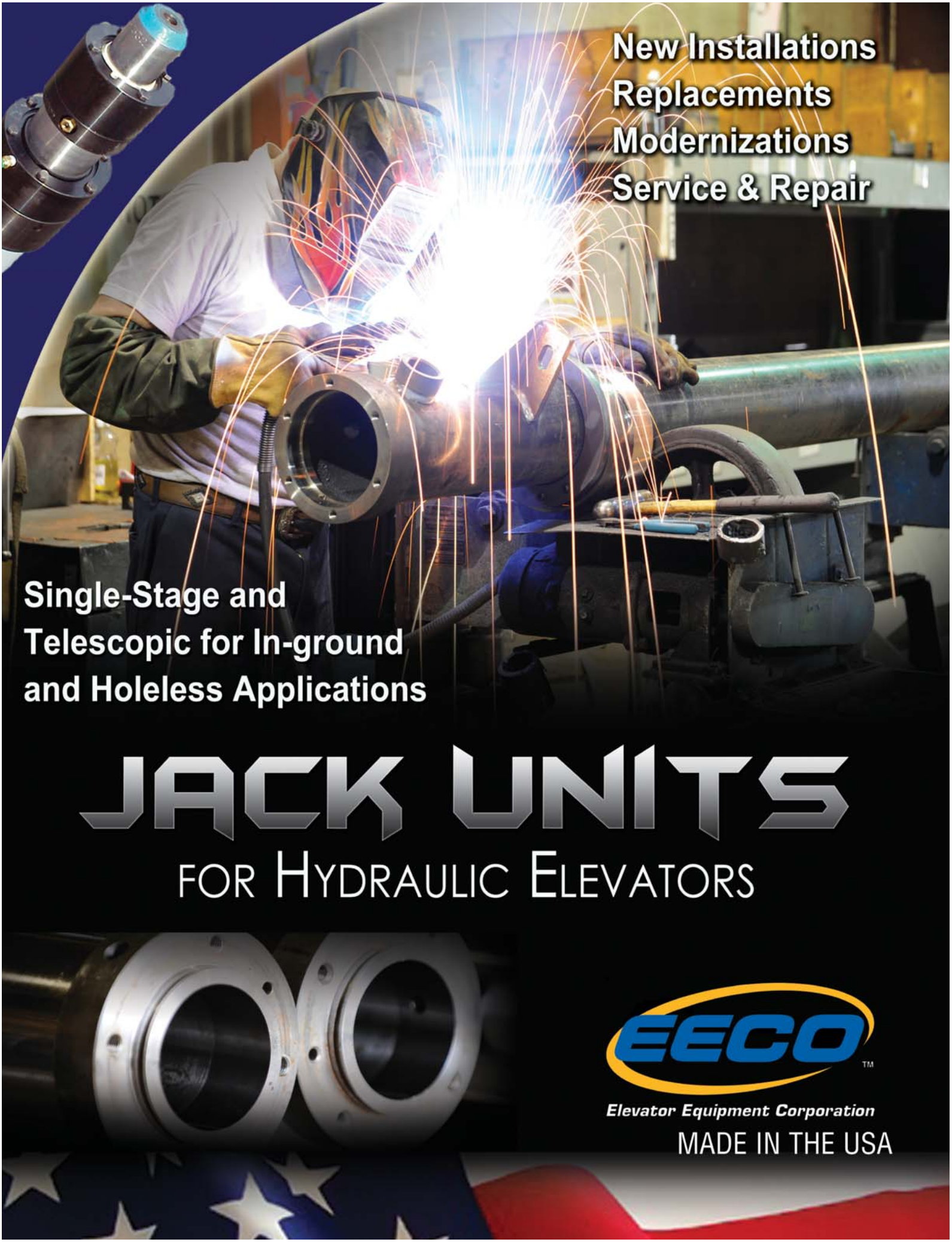
Misc Mechanical Room Components

- ☐ Light (1ea)
- ☐ Photometrics
- ☐ Bulb Safety Shields
- ☐ GFCI Outlet
- ☐ Light Switch

Doors & Misc Components

- ☐ Fire Rated Steel Doors
- ☐ Ramco BB Hinges
- ☐ Ramco 3000 Closer
- ☐ Cal Royal Lockset

5.1 Jack Units


New Installations
Replacements
Modernizations
Service & Repair
Single-Stage and
Telescopic for In-ground
and Holeless Applications
JACK UNITS
FOR HYDRAULIC ELEVATORS
EECO
Elevator Equipment Corporation
MADE IN THE USA

Hydraulic Elevator Jack Units from EECO

Elevator Equipment Corporation (EECO) has been manufacturing hydraulic elevator equipment since 1946, and is one of the leading suppliers in the industry for hydraulic jack units and replacement cylinders and pistons. EECO can provide jack units for any application, from small capacity residential to the largest freight elevators. EECO can furnish a standard model jack in accordance with your predetermined specifications, or we can perform the necessary calculations, based on your data, to select and recommend a jack unit to meet your requirements.

EECO manufactures jack units with precision equipment, skilled and experienced production personnel, and a knowledgeable engineering staff to comply with the standards required to produce a quality product. The latest CNC equipment and technology is utilized to assure strict adherence to essential dimensions and tolerances. All EECO products are designed and manufactured in accordance with the Safety Code for Elevators and Escalators, ASME A17.1. With years of testing and field study, EECO has designed jack units that are unparalleled in the industry for performance and reliability. The primary objective of Elevator Equipment Corporation is to provide a product that consistently meets or exceeds the contractual demands and expectations of our customers.

Please see back page for reproducible request for quote form.

EECO manufacturing facilities are strategically located on the west coast in Los Angeles, California, and in the mid-west in Richmond, Indiana to provide prompt coast to coast service and support. If you need technical support or assistance, we can be contacted between 8:00 AM Eastern time and 4:30 PM Pacific time, Monday through Friday at 1-888-577-EECO (3326). E-mail us at: sales@eecomail.com. Visit us on the web at: www.elevatorequipment.com.

Delivery & Lead Times

Consult EECO for current fabrication lead times. It is our goal to deliver a jack unit when needed. If rush delivery is required, EECO can manufacture and ship certain jack units in as little as 48 hours.

Specifications Of EECO Jack Units

Standard PJR Series

MODEL		Piston Wall Thickness	Piston Weight #/Ft.	Values For Allowable Load Calculations	
Piston Dia.	Cylinder Dia.				
Area of Piston Dia.	Piston Disp. Gal/Ft.			A	R
PJR2.75		.240	7.0	1.89	.89
2.750	4 1/2	.303	8.5	2.33	.87
5.940	.31	.365	9.9	2.73	.85
PJR3NET		.240	7.8	2.08	.98
3.000	4 1/2	.365	10.9	3.02	.94
7.060	.37				
PJR3R		.268	10.8	2.67	1.12
3.437	5 9/16	.568	19.2	5.12	1.03
9.280	.48				
PJR387		.256	13.0	2.91	1.28
3.875	6 5/8	.365	14.5	4.02	1.25
11.790	.61	.574	23.3	5.95	1.18
PJR4NET		.240	10.5	2.83	1.33
4.000	6 5/8	.303	12.8	3.51	1.31
12.500	.65	.365	15.0	4.17	1.29
PJR4		.275	16.7	3.54	1.45
4.375	6 5/8	.375	19.7	4.71	1.42
15.030	.78	.468	23.2	5.74	1.39
		.611	28.3	7.23	1.35
PJR5NET		.240	13.7	3.59	1.69
5.000	8 5/8	.303	16.6	4.47	1.66
19.640	1.02	.365	19.5	5.31	1.64
		.490	24.9	6.94	1.60
		.615	30.0	8.47	1.57
PJR5		.312	21.8	5.02	1.82
5.437	8 5/8	.437	28.0	6.86	1.77
23.220	1.20	.562	34.0	8.61	1.73
		.687	39.6	10.25	1.70
PJR6NET		.240	16.7	4.34	2.04
6.000	8 5/8	.365	23.9	6.46	2.00
28.280	1.47	.490	30.7	8.48	1.96
		.615	37.0	10.40	1.92
PJR6		.369	30.0	7.11	2.17
6.500	8 5/8	.499	37.8	9.41	2.13
33.190	1.73	.656	46.7	12.04	2.08
		.801	54.5	14.34	2.03
PJR6SPL		.369	30.0	7.11	2.17
6.500	10 3/4	.499	37.8	9.41	2.13
33.190	1.73	.656	46.7	12.04	2.08
		.801	54.5	14.34	2.03
PJR7NET		.240	19.8	5.10	2.39
7.000	10 3/4	.365	28.3	7.61	2.35
38.485	2.00	.490	36.5	10.02	2.31
PJR7		.240	21.2	5.47	2.57
7.500	10 3/4	.365	29.8	8.18	2.53
44.170	2.29	.490	38.7	10.79	2.48
PJR8NET		.240	23.0	5.85	2.75
8.000	10 3/4	.365	32.9	8.76	2.70
50.266	2.61	.490	42.2	11.56	2.66
PJR8		.260	30.9	6.73	2.91
8.500	10 3/4	.437	45.7	11.07	2.85
56.740	2.95	.656	63.1	16.17	2.78
		.844	77.0	20.30	2.72
PJR8SPL		.260	30.9	6.73	2.91
8.500	12 3/4	.437	45.7	11.07	2.85
56.740	2.95	.656	63.1	16.17	2.78
		.844	77.0	20.30	2.72

To determine the maximum allowable gross load on a jack unit, for a given total travel (per ASME A17.1, Rule 8.2.8.1.1):

$$W = \frac{95{,}000{,}000}{(L/R)^2} A$$

Where: **W** = Maximum allowable gross load including 1/2 piston weight (or 3/4 piston weight if follower guide is used).
L = Total travel, including over and under travel, in inches (1/2 travel if follower is used).
A & **R**: From specification charts above.

Note: Maximum working pressure of jack unit must not be exceeded.

((Capacity + Car Weight + Full Piston Weight) / Area) x 1.1 = PSI

Speed x Displacement (Gal/Ft) = GPM

Standard LJ Series

MODEL		Piston Wall Thickness	Piston Weight #/Ft.	Values For Allowable Load Calculations	
Piston Dia.	Cylinder Dia.				
Area of Piston Dia.	Piston Disp. Gal/Ft.			A	R
LJ9		.240	26.9	6.98	3.28
9.500	12 3/4	.365	38.8	10.48	3.23
70.870	3.68	.490	50.3	13.87	3.19
LJ10		.303	44.0	9.83	3.65
10.625	12 3/4	.437	58.3	13.99	3.61
88.590	4.60	.532	67.9	16.87	3.57
		.781	92.8	24.15	3.49
LJ10SPL		.303	44.0	9.83	3.65
10.625	14	.437	58.3	13.99	3.61
88.590	4.60	.532	67.9	16.87	3.57
		.781	92.8	24.15	3.49
LJ12		.437	70.8	16.73	4.31
12.625	16	.625	94.0	23.56	4.25
125.100	6.50	.939	130.8	34.47	4.15
LJ14		.437	78.4	18.45	4.75
13.875	16	.688	112.5	28.50	4.67
151.300	7.86				
LJ14SPL		.437	78.4	18.45	4.75
13.875	18	.688	112.5	28.50	4.67
151.300	7.86				
LJ16		.437	90.9	21.19	5.46
15.875	20	.594	115.6	28.52	5.41
198.050	10.29	.781	144.7	37.03	5.34
LJ18		.437	103.2	23.94	6.17
17.875	22	.500	114.4	27.29	6.15
251.080	13.04	.688	147.9	37.15	6.07

Gallons of Oil Required To Fill Jack Unit With Piston Completely Collapsed In Cylinder:

Cylinder	Piston Dia.	Gal./Ft.
4 1/2"	2.750	0.35
4 1/2"	3.000	0.30
5 9/16"	3.437	0.56
6 5/8"	3.875	0.92
	4.000	0.88
	4.375	0.75
8 5/8"	5.000	1.67
	5.437	1.49
	6.000	1.23
	6.500	0.97
10 3/4"	6.500	2.47
	7.000	2.19
	7.500	1.90
	8.000	1.58
	8.500	1.24
12 3/4"	8.500	3.02
	9.500	2.28
	10.625	1.36
14"	10.625	2.56
16"	12.625	2.99
	13.875	1.63
18"	13.875	4.28
20"	15.875	4.83
22"	17.875	5.38

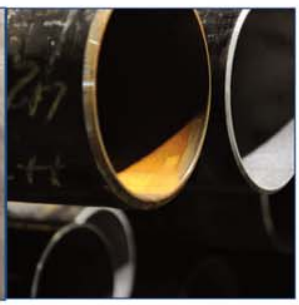
Standard TJ Series

MODEL		To Calculate System PSI (Including 10% allowance for friction) GL = Gross Load /Jack	Upper Piston Wall Thicknesses Available	To Calculate Holeless Collapsed Height (For In-ground Hole Depth Contact EECO Engineering)
Upper Piston Dia.	Cylinder Dia. / Disp./Jack in Gal/Ft			
TWO STAGE JACK UNIT				
TJR-160		GL / 2.0 x .66 = PSI	Solid Bar	Total Travel /2 + 20.00
1.60	3.60			
	0.20			
TJR-250		GL / 4.9 x .66 = PSI	0.375	Total Travel /2 + 18.00
2.50	5.00		0.500	
	0.41		0.625	
			0.750	
TJR-275		GL / 5.9 x .66 = PSI	0.375	Total Travel /2 + 18.00
2.75	5.75		0.500	
	0.51		0.625	
			0.750	
TJ-400		GL / 12.5 x .66 = PSI	0.375	Total Travel /2 + 31.00
4.00	7.50		0.500	
	1.00		0.625	
			0.750	
TJ-450		GL / 15.8 x .66 = PSI	0.375	Total Travel /2 + 31.00
4.50	8.00		0.500	
	1.14		0.625	
			0.750	
THREE STAGE JACK UNIT				
TJ3-160		GL / 2.0 x .35 = PSI	Solid Bar	Total Travel /3 + 26.00
1.60	3.60			
	0.31			
TJ3-250		GL / 4.9 x .35 = PSI	0.375	Total Travel /3 + 26.00
2.50	7.25			
	0.92			

Contact EECO Engineering to determine size required and maximum gross load versus travel.

Over and under travel requirements for TJ Series jack units are as shown at right. Contact EECO Engineering if different values are required.

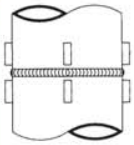
Speed FPM	Bottom Of Travel	Top Of Travel
To 100	7"	9"
125	9"	11"
150	10"	12"



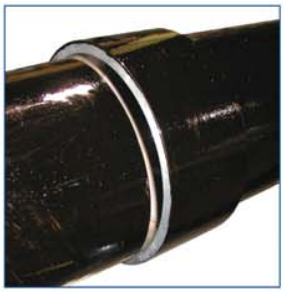
NOTE: All values and dimensions are subject to change without notice.

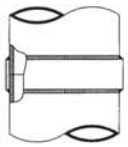
EECO Jack Manufacturing

Types Of Cylinder Joints

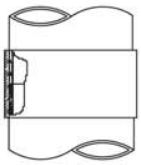


Butt Weld

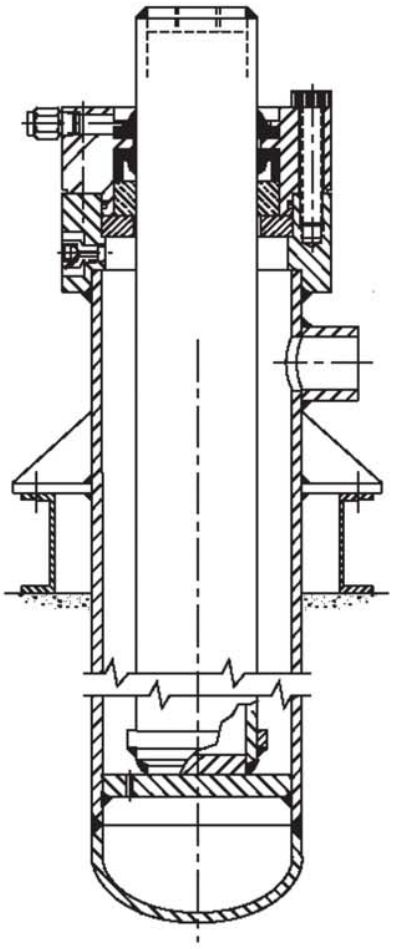




Slip Fit



Threaded



In-Ground PJR Series Jack Unit

Quality Assurance

Quality Control, is an essential and integral part of our manufacturing process. Every phase of production is monitored and checked to assure that each jack unit is built and assembled in accordance with engineering and shop order specifications, and meets the quality standards required by Elevator Equipment Corporation. From the initial process of material in the door, to the final process of placing the product on the truck, you can be assured that our high quality standards are met and that the finished product meets your requirements.

Optional Electronic Leak Monitor System

The EECO Electronic Leak Monitoring System is designed to detect the presence of a liquid in the space between the jack cylinder and the sealed PVC liner, and differentiates between oil and water which provides continual monitoring, 24 hours a day, 7 days a week. If a liquid is detected, a signal is sent to an alarm device, or can be tied into the controller to shut the system down, or sent to a phone system, to provide notice of a possible leak in the jack cylinder.

Jack and Cylinder Replacement

EECO specializes in Jack Unit and Cylinder Replacement. ASME A17.1-2000, Section 8.6.5.8, requires replacement of older in-ground cylinders that are not equipped with a pipe cap and safety bulkhead at the bottom end (jack units manufactured from approximately 1972 and before). We can provide an exact replacement, either cylinder or complete jack unit, regardless of original make or manufacturer.

Comparison of EECO Jack Units

Jack Types	SINGLE STAGE	TELESCOPIC	DOUBLE BEARING
Description Of Jack Unit	Single stage Jack units (PJR and LJ series) consist of a single piston in a cylinder with head bearing and packing gland at the upper end where the piston collapses into the cylinder. Single stage Jacks are designed for "guided" applications only, where the Jack unit is rigidly supported and guided through the use of guide rails and guide shoes.	Two stage telescopic jack units (TJ and TJR series) consist of upper and lower pistons, a cylinder, and a head bearing and packing gland for each piston. The lower piston is fitted with an additional packing gland at the lower end which rides against the internally honed cylinder. Three stage telescopic jack units (TJ3 series) consist of upper, intermediate, and lower pistons, a cylinder, and a head bearing and packing gland for each piston. The intermediate and lower pistons are fitted with additional packing glands at their lower ends which ride against the internally honed cylinder and lower piston. The telescopic jacks have a synchronous design where all pistons raise and lower at the same speed and at the same time. Telescopic jacks can be provided in one section only (no multi-section) and are designed for "guided" applications only where the frame to which the jack unit is attached is rigidly supported and guided. In some applications a guided stabilizer may be required on the upper head to meet code requirements. (Consult EECO Engineering).	Double bearing jack units consist of a single piston in a cylinder with a head bearing and packing gland at the upper end. An additional support bearing is located at a distance below the head bearing to allow the piston to carry an eccentric (off center) load without external guides. These jacks are normally used in applications that are not within the scope of ASME A17.1, however, EECO double bearing jack units are still designed in accordance with A17.1 guidelines.
Size	Available standards are from 2.75" to 20" piston diameter, in a wide range of wall thicknesses. They can be provided in one section up to 70 feet. Multi-section jack units can be provided in as many sections as required for the application.	Two stage telescopic jacks are available from 1.6" to 4.5" upper piston diameter, in a wide range of wall thicknesses. Three stage telescopic jacks are available from 1.6" to 2.5" upper piston diameter.	Standard sizes for double bearing jack units are from 8.5" to 12.625" piston diameter. Other piston sizes also are available.
Application	Single stage jacks are designed for in-ground and holeless applications, cantilever or dual systems, and can be used on residential and roped systems. **For in-ground installations**, the depth of the well hole required, as measured from the lower floor level, is approximately collapsed jack length + under travel + depth of platform, bolster and platen + 1'-0". **For holeless installations,** the total pit depth + distance from upper landing level to any overhead obstruction, must be approximately collapsed jack length + over travel + 1'-0" (overhead must be code compliant). If pit + overhead space is not sufficient, partial in-ground jacks can be provided as long as pockets in the pits are available.	Two stage telescopic jacks are designed for in-ground and holeless applications, cantilever or dual systems, and can be used on residential systems. Three stage telescopic jacks are designed for only holeless applications, cantilever or dual systems, and can be used on residential systems. **For in-ground installations**, the depth of the well hole required, as measured from the lower floor level is approximately collapsed jack length + under travel + depth of platform, bolster and platen + 1'-0", as measured from the lower floor level. **For holeless installations**, the total pit depth + distance from upper landing level to any overhead obstruction, must be approximately collapsed jack length + over travel + 1'-0" (overhead must be code compliant). If pit + overhead space is not sufficient, partial in-ground jacks can be provided on two stage only as long as pockets in the pits are available.	Double bearing jack units are normally used for platform lift applications where the frame to which the jack unit is attached is not guided. A non-rotation device is generally installed, to prevent the platform from rotating. Since EECO double bearing jack units are custom engineered, please contact EECO Sales to discuss your application.
Collapsed Length	For estimating purposes, the collapsed length of a single stage jack is approximately the total travel, including over and under travel + 1'-6".	Refer to TJ Series specification chart.	Contact EECO Engineering for dimensions.
Pressure Rating	For PJR series: 680 psi max. WP For LJ series: 500 psi max. WP	For TJ series: 1200 psi max. WP	Standard units are rated at 500 psi WP. Special high pressure units are available.
Temperature	Designed for operating temperatures up to 150°F (65°C) maximum. Recommended operating temperature is 65° to 95°F (18° to 35°C).		
Material & Welding	All EECO jack units are designed and manufactured in accordance with ASME A17.1. All steel parts are fabricated and machined from high strength carbon steel. All welding is in accordance with the requirements of Part 8 of ASME A17.1. EECO welding is CWB certified.		
Head Bearing & Packing Gland	The jack heads are designed for ease of disassembly when repacking. An oil collection groove is provided and arrangement is in cluded to connect an oil drain line to catch and reclaim oil that collects in the groove (it is necessary for the piston to carry a film of oil through the packing in order to provide smooth and quiet operation). The packing gland arrangement consists of a "pressure balanced" "U" type seal, a phenolic bearing and a wiper ring. Seals are designed for 150°F (65°C) maximum operating temperature. Recommended hydraulic fluid is 32 grade turbine oil, 150 SSU. A biodegradable oil is acceptable if it meets the same specifications.		
Piston	The upper end of the piston is fitted with a drilled and tapped plate, to receive a standard bolt for attachment to the platen plate (special mounting arrangements can be provided). The bottom of the piston is closed with a steel plate and is fitted with a stop ring to prevent the piston from leaving the cyl inder. The piston is ground and polished to a surface finish of 15 to 20 micro-inches. Allowable variation in diameter after polishing is ± .015". Multi-section pistons are joined with an internally threaded coupling, using Acme type thread for ease of assembly. All sections are assembled, sanded, and polished across the joints to ensure a matching surface.		
Cylinder	Jack units manufactured for in-ground, or partial in-ground, installations are furnished with a safety bulkhead and seamless steel pipe cap at the bottom of the cylinder. Holeless units include a flat steel mounting plate, all in accordance with ASME A17.1. Bleeder plugs are included to purge air from the jack unit. Standard pit supports are welded to the cylinder for mounting to pit channels when required (various designs can be provided to suit any requirement). A threaded or grooved oil line connection is provided. All cylinders are thoroughly cleaned, inspected, and tested for oil leaks; and then painted with a heavy coat of an anti-corrosive material.		
Cylinder Joints	EECO offers three types of cylinder joints: 1. Threaded coupling (up through 16" cylinder OD). 2. Slip-fit (slide together coupling, no threads). 3. Butt-weld (with beveled ends for welding in field and "knock-off" pipe couplings for bolting the sections together during assembly and welding). EECO ADVISES THAT ALL JOINTS MUST BE WELDED AFTER ASSEMBLY.		
Corrosion Protection	EECO can provide optional types of cylinder protection beyond the standard coating material, including: 1. Tapecoat (polyvinyl chloride tape), wrapped to a minimum of 20mm thickness, or more as required. 2. Special epoxy coating. 3. PVC pipe, sealed at the top by a special adapter ring, with inspection ports as required by ASME A17.1. PVC can be schedule 40 or schedule 80 and is furnished in the number of sections as required, with a pipe end cap for sealing the lower end. EECO can also provide a Electronic Leak Monitoring System for the sealed PVC cylinder protection.		

EECO can provide special size jack units to meet your requirements! Call EECO Sales today for a quote: (888) 577-EECO!

Elevator Equipment Corporation

West Coast, 4035 Goodwin Avenue, Los Angeles, California 90039 - Telephone: (323) 245-0147 ◆ Fax: (323) 245-9771

East Coast & Mid-West, 2230 N. W. 12th Street, Richmond, Indiana 47374 - Telephone: (765) 966-7761 ◆ Fax: (765) 966-7703

Request for Hydraulic Elevator Jack Unit Quotation

Fax this completed form to EECO at: (323) 245-9771 (Los Angeles, CA) or (765) 966-7703 (Richmond, IN)

Customer _____ Date _____

_____ Contact _____

Project _____ Telephone ( ) _____

_____ Fax ( ) _____

Provide data as complete as possible. Our ability to provide proper equipment depends upon the completeness and accuracy of the data that you furnish.

(A) For:

- ❑ Single Stage
- ❑ In-ground
- ❑ Telescopic
- ❑ Holeless
- ❑ Dual Jacks
- ❑ Cantilever
- ❑ Roped (2:1)
- ❑ Modernization
- ❑ Replacement
- ❑ Repair
- ❑ **Elevator is out of service**

Ship date requested (be specific): _____

Special requirements: _____

(B) Provide:

- ❑ Complete jack unit
- ❑ Cylinder only
- ❑ Cylinder with head
- ❑ Piston only

Number of sections required or longest possible section length to install: _____

Note: Telescopic Jacks are 1 section only.

Cylinder Joints

- ❑ Threaded ❑ Slip Weld
- ❑ Butt weld

All cylinder joints should be welded after assembly!

(C) Include Options:

- ❑ Tape Wrap ❑ Epoxy
- ❑ PVC ❑ sch40 ❑ sch80
- ❑ Electronic Leak Monitor System
- ❑ Provision for future travel
- ❑ Platen ❑ Isolated Platen
- ❑ Pit Channels ❑ Buffers
- ❑ Pipe Rupture Valve:
  - ❑ Threaded ❑ Grooved
- ❑ Shut Off Valve, Qty: _____
  - ❑ Threaded ❑ Grooved
- ❑ Scavenger System
- ❑ Provision for plunger gripper
- ❑ Spare repacking kit ❑ Biodegradable Oil

(D) Jack/Project Data

Capacity _____ lbs.

Car Weight _____ lbs.

Piston Weight _____ lbs.

Total Gross _____ lbs.

Speed _____ fpm

Floor to floor travel _____ ft. _____ in.

Top Over travel* _____

Bottom Under travel** _____

Overhead _____

* Over travel is with the piston against stop ring.
** Under travel includes run-by, spring compression and bottom clearance.

Piston O. D. _____

or Circumference _____

Piston Wall _____

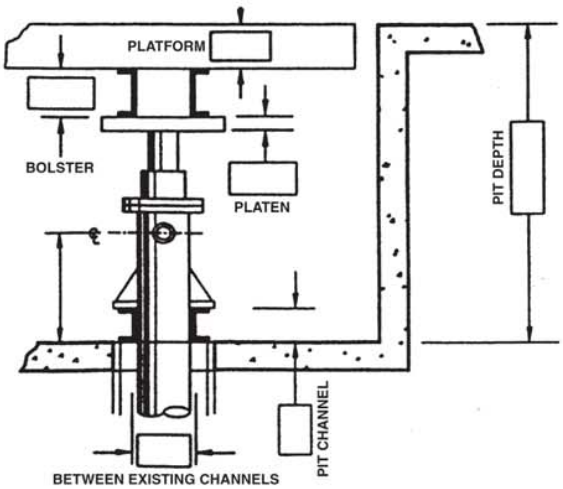
Cylinder O. D. _____

or Circumference _____

❑ Cylinder to fit within existing _____ inch I. D. casing.

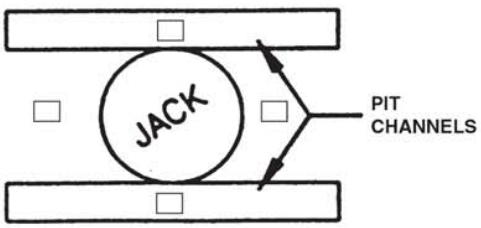
In-Ground Installation

Complete as applicable (these dimensions are not required for quotation).



Oil Line Outlet Size: _____

❑ Threaded or ❑ Grooved



Indicate location of oil line outlet.

Please photocopy this form as required.

Customer Service: (888) 577-EECO (3326) ◆ E-mail: sales@eecomail.com ◆ Web Sites: www.elevatorequipment.com & www.eecovalves.com

5.2 Power Units

Submersible
Belt Drive
& Custom
Applications

POWER UNITS

FOR HYDRAULIC ELEVATORS

EECO™

Elevator Equipment Corporation

MADE IN THE USA

Hydraulic Elevator Power Units From EECO

Elevator Equipment Corporation (EECO) has been manufacturing hydraulic elevator equipment since 1946, and is one of the leading suppliers in the industry of hydraulic elevator power units. EECO can provide power units for any application, from small capacity residential to the largest freight elevators. EECO can furnish a standard model power unit, in accordance with your specifications, or we can perform the necessary calculations, based on your data, to select and recommend a power unit to meet your requirements.

EECO manufactures power units with precision equipment, skilled and experienced production personnel, and a knowledgeable engineering staff to comply with the exacting standards required to produce a quality product. The primary objective of Elevator Equipment Corporation is to provide a product that consistently meets or exceeds the contractual demands and expectations of our customers. **Please see back page for reproducible request for quote form.**

EECO manufacturing facilities are strategically located on the West Coast in **Los Angeles, California** and in the Mid-West in **Richmond, Indiana** to provide prompt coast-to-coast service and support. With years of experience, our capacity to produce power units and their individual components to meet our customers hydraulic elevator system requirements, is unparalleled in the industry.

The latest CNC equipment and technology is utilized to assure strict adherence to essential dimensions and tolerances. All EECO products are designed and manufactured in accordance with the Safety Code for Elevators and Escalators, ASME A17.1.

With years of testing and field study, EECO has designed submersible and belt drive power units that are unequaled in the industry for performance and reliability.

EECO Power Unit Manufacturing

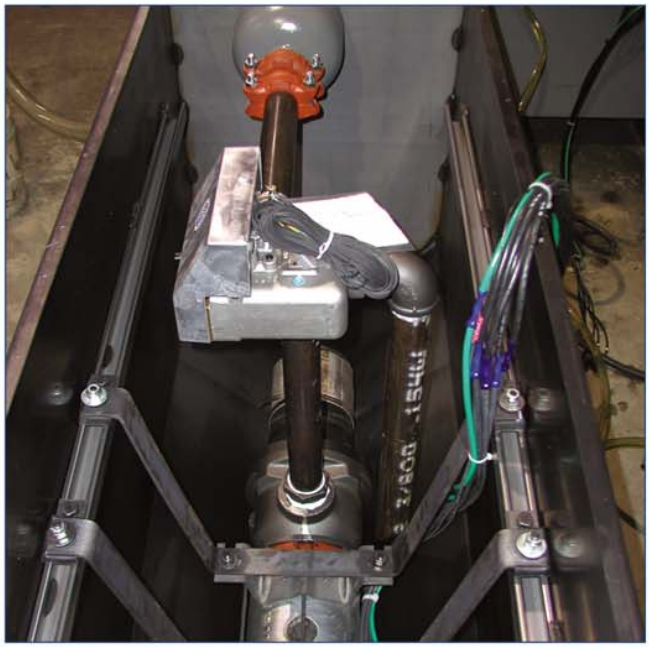
Quality Assurance

Quality Assurance is an essential and integral part of our manufacturing process. Every phase of production is monitored and checked to assure that each power unit is built and assembled in accordance with engineering and shop order specifications, and meets the quality standards required by Elevator Equipment Corporation.

From the initial process of material in the door, to the final process of placing the completed power unit on the truck for shipment, you can be assured that our high quality standards are met and that the finished product meets your requirements. All components are fully tested and checked prior to shipment.

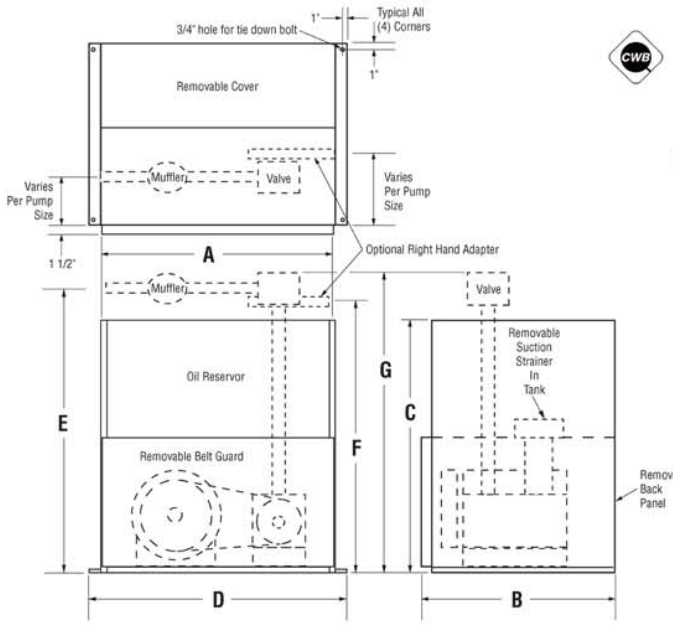
Delivery & Lead Times

Consult EECO for current fabrication lead times. It is our goal to deliver a power unit when needed.

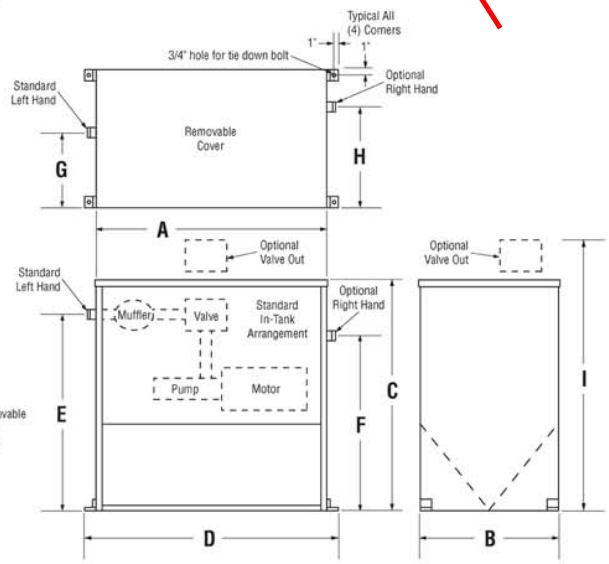


POWER UNIT SPECIFICATIONS

Belt Drive (Dry) - Pump & Motor Below Oil Reservoir



Submersible - Pump & Motor In Tank



All units are designed to be mounted on 3/4" thick isolation pads. Overall height when set is, therefore, 3/4" higher. Tank Size required is a function of space required for pump & motor assembly and amount of oil required for operation (contact EECO engineering for size requirements).

Belt Drive (Dry) Power Units

Model	Dimensions (In Inches)										Usable Oil (Gal.)	Oil Req. To Fill Tank (Gal.)	Gal. of Oil Per Inch of Tank Height [4]
		[5]			With UV-5A [1,6]			With UV-7B [1,6]					
	A	B	C	D	E	F	G	E	F	G			
48	48¼	35½	54½	52½	60¼	58¼	65½	60	60	67½	75	137	6.86
60	60¼	42	60½	64½	66¼	64¼	71½	66	66	73½	154	246	10.26
72	72¼	42	60½	76½	66¼	64¼	71½	66	66	73½	185	296	12.31
84	84¼	42	60½	88½	66¼	64¼	71½	66	66	73½	216	346	14.37

Submersible Power Units

Model	Dimensions (In Inches)															Usable Oil (In Gal.) [2]						Oil Required To Fill Tank (In Gal.)						Gal. of Oil Per Inch of Tank Height
					With UV-5A [6]					With UV-7B [6]						With UV-5A [6]			With UV-7B [6]			With UV-5A [6]			With UV-7B [6]			
																Valve In Tank		Valve Out	Valve In Tank		Valve Out	Valve In Tank		Valve Out	Valve In Tank		Valve Out	
	A	B	C	D	E	F	G	H	I [1,3]	E	F	G	H	I [1,3]		LH	RH		LH	RH		LH	RH		LH	RH		
36	36¼			40¼												54	43	82	N/A			95	84	123	N/A			3.74
48	48¼			52¼												72	51	110	N/A			126	111	164	N/A			4.98
60	60¼	24	44	64¼	38	34 7/8	10½	8½	56	35¼	35¼	9 5/8	9 5/8	58		91	71	137	71		137	159	139	205	139		205	6.23
72	72¼			76¼												109	86	165	86		165	190	167	246	167		246	7.48
84	84¼			88¼												127	100	192	100		192	222	195	287	195		287	8.72
96	96¼			100¼												145	114	220	114		220	253	222	328	222		328	9.97

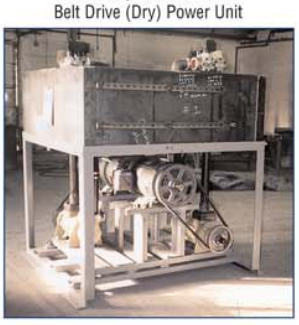
(1) Approximate dimension - May vary due to assembly tolerances and procedures.
(2) Actual usable oil - Allowance has been made for 10 Gal. reserve oil.
(3) LEFT HAND unit is STANDARD - For right hand unit, increase this dimension by 2".
(4) "Usable Oil" and "Oil Required to Fill Tank" are based on standard 44" high tank. If greater oil volume is required, tank height can be increased and "Usable Oil" and "Oil Required to Fill Tank" are also increased accordingly per values shown in the column "Gal. of Oil Per Inch of Tank Height.
(5) Removal of belt guard and rear access panel will reduce depth of unit by 1 5/8" to allow access through machine room door, if required.
(6) Power Units are furnished with an EECO valve as standard.

EECO can provide power units that include other manufacturers valves of your choice!

Standard
Belt Drive (Dry) Power Unit

Dual Pump & Motor With Single Valve
Belt Drive (Dry) Power Unit

Dual Pump Motor & Valve
Belt Drive (Dry) Power Unit



Power Unit
For Residential Applications

Comparison of EECO Power Units

Types	Submersible	Belt Drive (Dry)
Description Of Power Unit	EECO Submersible Power Units are designed with the directly connected pump and motor submerged in the oil reservoir. Standard arrangement is with the valve and muffler mounted in the tank above the max. oil level, designed to provide convenient access for valve adjustment. Valve and muffler can be located above the tank when greater oil capacity is required. Submersible pumps and motors, due to design characteristics, are less costly than comparable air cooled components, and design of the submersible power unit allows for quick and easy assembly. These combined factors result in a more economical system, without compromising quality or performance. The inclusion of the pump and motor in the oil helps to dampen noise generated during operation. Because the pump and motor are direct connected, and the flow of the pump is a function of the speed of the motor, the gallon per minute (gpm) output is a result of available pump sizes and ranges.	EECO Belt Drive (Dry) power units are designed with the pump and motor mounted on a sub base located below the oil reservoir tank. The exposed valve, located above the tank, allows for easy access to adjustments and complies with specifications that require the manual lowering feature on the valve to be accessible without removing any panels or covers The pump and motor are mounted below and the area is enclosed with sound isolation panels to limit transmission of noise during operation. A removable belt guard is provided to allow access to the pump and motor compartment for maintenance or adjustment of the drive system. Because the pump and motor are connected by means of "v"-belts and sheaves, the pump RPM can be adjusted, by selecting the proper ratio of pump and motor sheaves, to obtain the required flow. This system meets the specifications requiring that the motor and/or pump be mounted outside of the oil reservoir, and that the pump and motor compartment be enclosed with sound isolation panels.
General Specifications	The tank is constructed with a 12 Ga. steel body and ends (legs), a removable 16 Ga. steel cover, and is designed with a "V" bottom to increase surface area for improved heat dissipation. All standard tanks are 24"wide, to allow for ease of movement through standard doors and passageways. A means for checking oil level is provided. The pump and motor mounting brackets are fastened above the oil to allow for easy serviceability and are secured by means of isolation mounts to limit transmission of mechanically generated noise and vibration. Mounting feet, with holes to allow for securing to the floor, are provided, and isolation pads for installing under the unit, are included. A junction box and fittings are included to provide arrangement for wiring and connecting motor and valve leads.	The tank is constructed with a 12 Ga. oil reservoir and ends (legs), and removable 16 Ga. cover, belt guard, and rear panel. A means for checking oil level is provided. Units are designed to fit through a standard machine room door. (see dimensional charts). The pump and motor are mounted on a structural steel sub frame that is secured to the main frame by means of isolation mounts to limit transmission of mechanically generated noise and vibration. Provision is included to allow for easy adjustment of belt tension and alignment. The outlet in the tank is protected by a removable screen to allow for easy cleaning. A removable oil drip pan is provided. Mounting feet with holes to allow for securing to the floor are provided, and isolation pads for installing under the unit are included.
Pump & Motor	Pumps are industry standard, positive displacement, low slip, three screw design, arranged for direct connection to the motor. The pump is fitted with a built in strainer on the suction end, which is removable for cleaning. Motors are specially designed to operate submerged in oil and are rated at 80 starts/hr or 120 starts/hr . 3-Phase motors are 3600 rpm and include leads for Across-the-Line, Wye-Delta, or Solid State starting. Single-Phase motors are 1750 rpm and include the starting capacitors for Across-the-Line starting. Motors include a built in thermal detector and contact, which can be wired to the controller to shut the unit down in case of overheating.	Pumps are industry standard, foot mounted, positive displacement, low slip, three-screw design. Motors are 1800 RPM, squirrel cage construction, specially designed for oil hydraulic elevator service. They are rated at 80 starts/hr. or 120 start/hr (all except 100 HP) as required. All 3PH motors include leads for Across-The-Line, Wye-Delta, or Solid State starting.
Performance Characteristics	**Flow Rate:** 4 GPM through 255 GPM in increments as determined by pump output. **Motor Horsepower Range:** 2 ½ HP through 50HP for single pump/motor combinations; **Heat Output (Btu / hr) :** 440 x Motor Horsepower **Working Pressure:** (UL & CSA B44) Submersible units are designed for 800 PSI max. working pressure when an EECO valve is used. Use of another valve may reduce this maximum. (Some larger pump sizes are limited to 600 PSI - contact EECO Sales).	**Flow Rate:** 15 GPM through 500 GPM. **Motor Horsepower Range:** 5 HP through 100 HP. **Heat Output (Btu / hr) :** 440 x Motor Horsepower **Working Pressure:** Belt Drive (Dry) units are designed for 500 PSI max. (UL & CSA B44).
Specifications (All Units)	All units are designed and constructed in accordance with applicable requirements of ASME A17.1 Valves: All units include an EECO valve as standard. Down speed compensation can be furnished as an option. Other manufacturers valves can be furnished if required. Electrical: Operation is available on 208-240/440-480/575-600 V / 3PH / 60 HZ. Provision can be made for operation on 50HZ. Units can also be provided for operation on 208-230V, Single Phase (motor Horsepower is limited to10HP). An EECO standard muffler is included with each unit (can be omitted if desired). The optional EECO dampener is also available. Left hand arrangement is standard. Right hand arrangement is available. A grooved outlet is standard. A male threaded outlet is available. Recommended Operating Fluid: Use a good brand of grade 32 turbine oil with a viscosity of 150 SSU @ 100 degrees F (38 C). A minus pour point is recommended. A biodegradable oil is acceptable if it meets the same specifications. All units are factory painted with one prime spray coat of air dry enamel.	
Accessories & Optional Components	Many different accessories and options are available. A partial listing includes: In- tank oil heater with thermostat; Oil cooler - several types and options available in several size ranges to meet installation requirements; Low oil switch; Low-pressure switch; Pressure switches to tie-in to load weighing provision provided by others; Thermostat to activate viscosity control feature provided by others; Provision for mounting controller provided by others; Motor Starter, in enclosure, mounted (and prewired) if required; Shut off valve(s); Isolation coupling(s). See **EECO Hydraulic Elevator Control Valve Catalogue** for specifications, data, and adjustment and trouble shooting procedures for EECO valves.	
Custom Design & Special Application Power Units	Elevator Equipment Corporation can design and manufacture a power unit to meet any special requirement. Job site conditions may require that the unit be sized to fit through a narrow space or access opening; or the machine room may require a special design or size to fit within existing dimensions. **Dual Units:** A double pump motor combination can be supplied in both submersible and dry (belt drive) arrangements. This dual arrangement may be desired in facilities where the elevator is critical to the operation, as the system can be arranged so that the elevator will still operate at reduced speed if one pump or motor fails. This assures that elevator service will continue until repairs can be made. A dual unit may also be required when the amount of oil flow required to lift the car at the specified speed exceeds the output of a single pump / motor combination, Dual arrangements can be provided with the pump motor combinations in a single tank or in two separate tanks, manifolded together, if required. A dry (belt drive) unit, with more than two pumps and motors in one tank assembly, can be provided if required. **Split Units:** Special two-piece dry units can be furnished in any required size and arrangement. Access to the building, or into the machine room, may be such that the only way to install a unit is in pieces, with final assembly on the job. For any arrangement, EECO Engineering can design a solution and provide you with a "footprint" of the proposed unit for your use in verifying space requirements. **Special Environmental Conditions:** EECO can provide units for installation in hazardous or humid environments - moisture resistant or explosion proof. Our technical service representatives are always ready to assist you and answer any questions that you may have. **Call us at: (888) 577-EECO (3326)**	

EECO can provide specially designed power units to meet your unique requirements! Call EECO Sales today for a quote: (888) 577-EECO!
All values, dimensions, and specifications are subject to change without notice!

5.3 Pump Motor

AC Submersible Hydraulic Motors

Frame 217Z

Compact, open-frame construction delivers a light weight, high performance, submersible solution.

More than dependable, the Imperial Electric AC Submersible Hydraulic Motors are ruggedly built, highly efficient units. Open-construction, asynchronous motors are perfectly suited for wet operations. Hydraulic fluid cools the motors as they work. Motor leads are extra length, non-wicking for flexible unit positioning.

The Imperial Electric submersible motors are compatible with pump units from all major manufacturers. The motors offer the advantages of small size and light weight coupled with high starting torque and low starting current.

440 Series

80 Series

Durable, high-efficiency submersible motors

AC Submersible

Benefits

- High performance
- Stock availability
- Drop-in replacement
- Available through 50 HP

Features

- Rolled steel construction
- Submersible enclosure
- Stock motors dual rated for 80 or 120 starts per hour
- 10 through 50 HP
- 3,600 RPM
- Voltages: 200, 230/460, 575 AC 3-phase, 60 Hz
- Single ball bearing
- High starting torque
- Low starting current
- Adapter kits available for alternate pumps
- CSA listed

Applications

- Submersible hydraulic elevators

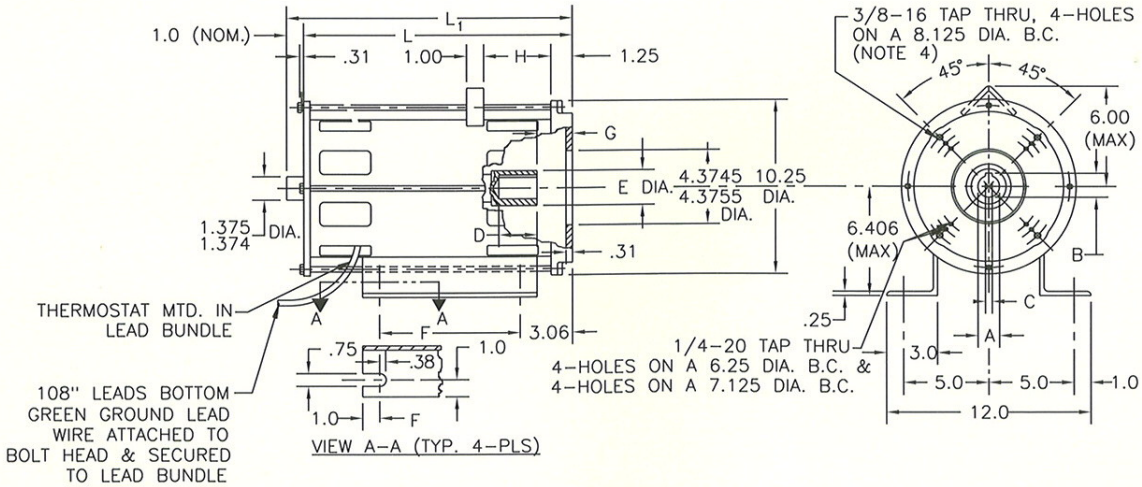
Performance data on following page

AC Submersible Hydraulic Motors duty table, 80 starts per hour

HP	Imperial Electric Part Number	Motor Loss BTU/HR	FL EFF (%)	FL PF (%)	FL RPM	Volts	Amps (A)				
							Delta				WYE
							Full Load	No Load	Locked Rotor	KVA Code	Locked Rotor
15	217EAS015C001	14,120	73	87	3400	200	51.0	27.0	242	F	82
	217EAS015C015	14,120	73	87	3400	230	44.6	23.0	204		68
						460	22.3	11.5	102		34
20	217EAS020C001	16,074	76	89	3395	200	65.4	31.2	311	F	104
	217EAS020C015	16,074	76	89	3395	230	56.2	25.5	270		90
						460	28.1	12.8	135		45
25	217EAS025C001	17,946	78	91	3400	200	78.2	34.5	391	F	130
	217EAS025C015	17,946	78	91	3400	230	67.8	30.0	340		113
						460	33.9	15.0	170		57
30	217EAS030C001	20,296	79	91	3390	200	90.0	36.0	471	F	157
	217EAS030C015	20,296	79	91	3390	230	78.2	31.0	410		136
						460	39.1	15.5	205		68
40	217EAS040C001	23,879	81	91	3410	200	120.0	46.0	671	G	224
	217EAS040C015	23,879	81	91	3410	230	104.0	40.0	584		195
						460	52.0	20.0	292		97
50	217EAS050C001	29,861	81	91	3380	200	142.0	42.7	920	G	307
	217EAS050C015	29,861	81	91	3380	230	123.0	37.5	800		268
						460	61.5	18.8	400		133

• 575 Volt Available

AC Submersible Hydraulic Motors dimensional diagrams



Frame	A	B	C	D	E	F	G	H	L	L_1	Ref. HP	(lbs.)
217Z	1.260 / 1.261	1.396 / 1.406	.394 / .395	2.25	2.050 / 2.045	8.25	2.06	3.94	13.72	14.63	15,20,25,30	100
L217Z	1.260 / 1.261	1.396 / 1.406	.394 / .395	2.25	2.050 / 2.045	8.25	2.06	3.94	15.72	—	40,50	130

5.4 SEIM Pump

SYSTEM CERTIFICATION
ISO 9001:2000 SGS
UKAS QUALITY MANAGEMENT 005

Quality Products for Mechanical & Fluid Power

01/04

SCREW PUMPS

jbj TECHNIQUES LIMITED

CONTENTS

The details contained within this catalogue are reproduced in accordance with the latest information at going to press E & OE

Our screw pumps are volumetric self-priming pumps suited to handle oils and liquids with a minimum lubricating quality. The simplicity of the design makes these pumps intrinsically reliable and efficient. Three screws rotate inside a casing with close tolerances, thus forming sealed chambers and provoking the axial displacement of the fluid. The idler spindles rotate without contact with the driving spindle because of the fluid itself, thus being free from radial forces.

The accurate hydraulic balance and the special profile of the screw thread guarantee a continuous flow with minimum pulsations and turbulance, thus enabling extremely low noise levels even at high rotational speed.

The screws epicycloidal profiling is developed through a complex computerized calculation which not only perfectly defines their shape, but also controls the production with continuous monitoring of the machining process, consequently assuring a high degree of repeatable quality.

The high quality level is guarenteed by a final testing on 100% of the manufactured products.

We place the highest value on quality and we certify it

All Seim products are manufactured and tested in accordance with our ISO 9001 Quality Standard. Our products are 100% tested either to Seim standards or customer requirements. Certification is available on request.

Installation and maintenance manuals along with spare parts lists are available in multilingual format.

Seim Industrial Division Manufacturing Program features:

- **Screw pumps:** std according to API 676, for mineral and lubricating oils also fluids with low lubricating properties (water+oil, HFC, LFO, HFO). Flows up to 5,000 lires per minute and pressure upto 130 bar (200 bar peak).
- **Motor pump sets:** close coupled, AC or DC electric motors.
- **Pre-assembled systems:** with bell-housing and coupling arrangements.
- **Skid mounted pumps:** with or without motor but suitable for horizontal or vertical mounting.
- **High efficiency Air/Oil Heat Exchangers:** upto 14,000 kCal/h (16kW)
- **Relief valves:** Flow rate from 50 to 1,200 litres per minute and pressure up to 40 bar

Lubrication Applications

- Lubricating system for: speed variators, turbines, gearboxes, papermill machines, hot forming machines
- Lubrication system for the petrochemical, iron and steel, and mining industries as well as shipbuilding.

Driving Applications

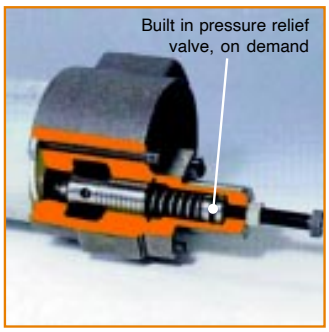
- Machine tools, bed traversing
- Hydraulic presses
- Hydraulic units for elevators
- Hydraulic supporting
- Rolling mills
- Test benches
- Sheet metal machines
- Plastic molding machines
- Medical Units

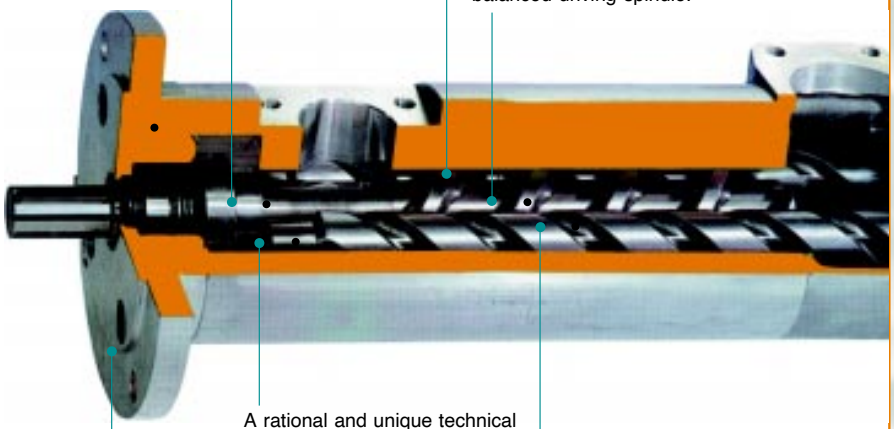
Recirculation and Filtering Applications

- COOLING LUBRICATION: deep hole drilling, pipe boring, chip conveyors.
- FILTERING: mobile filtering systems, off-line filtering systems for process machines and machine tools, hydrualic presses, textile machines, grinding machines
- HEAT EXCHANGING: injectors heating for plastic molding machines, heat exchangers.
- FLUSHING AND BOOSTING: piping systems washing, hydraulic systems flushing, boost circuits.

Fluids to be pumped

- Hydraulic oils
- Lubricating oils
- Diathermic oils
- Oil-in-water emulsions (min. oil percentage 5%)
- Light and heavy fuel oils
- Phosphoric esters





Characteristics

- Compatible with a wide range of viscosities from 1 to 12,000 cSt and above.
- Efficiently working also at very low temperatures (-20°C).
- High self-priming capacity.
- High rotation rates = minimizing the size and cost of the pump.
- Steady flow rate = maximum efficiency in heat exchange applications.
- Special design for systems with entrained air in the lubricant = minimizing the vibrations and noise caused by air.
- Minimum sensitivity to particle pollution = longest life of the pump and circuit.
- Continuous operating pressures up to 130 bar, peak 200 bar.
- Pulsation-free = maximum efficiency of filtering applications.
- Extremely quiet.

VISCOSITY CHART			
cSt	°E	SSU	SR1
5	1,39	42	37
10	1,83	58	51
20	2,87	97	85
30	4,07	141	123
40	5,33	185	163
50	6,62	230	203
75	9,89	343	304
100	13,17	456	405
150	19,74	683	608
200	26,3	910	810
250	32,9	1.137	1.012
300	39,4	1.364	1.215
400	52,6	1.819	1.620
500	65,8	2.273	2.024
600	78,9	2.727	2.429
800	105,3	3.637	3.239
1.000	131,6	4.546	4.049
1.250	164,5	5.682	5.061
1.500	197,4	6.818	6.073
2.200	290	10.000	8.460
4.400	590	20.000	16.920

Direction of rotation: clockwise for all pumps as seen from the driving side. Bi-directional and reverse rotation pump available depending on series.

SCREW PUMP PRODUCT RANGE												
Series	**PA**	**PC**	**PDA**	**PEA3**	**PE4**	**PF**	**PGA**	**PH**	**PO**	**PQJ**	**PU**	**PX**
Models (No.)	23	22	7	5	20	15	22	22	12	5	9	22
Delivery Flow (lpm)	3 - 950	10 - 1500	15 - 160	300/1500	10 - 950	10 - 390	10 - 1500	10 - 1500	10 - 280	3 - 30	500/5000	10 - 2400
Maximum Continuous Delivery Pressure (bar)	50	40	10	50	80	130	60	80	100	10	30	30
Viscosity (cSt) - (1)	10 - 400	10 - 400	20 - 400	10 - 400	10 - 400	10 - 400	1 - 400	5 - 400	1 - 400	10 - 400	10 - 400	10 - 400
Working Temperature (°C) - (1)	0 - 120	0 - 120	0 - 100	0 - 120	0 - 120	0 - 120	0 - 60	-20/+160	0 - 60	0 - 100	0 - 120	0 - 120
Rotating Speed (rpm minimum/ maximum)	750/3500	750/3500	750/3500	750/3500	750/3500	750/3500	1450/3500	750/3500	1450/3500	750/3500	750/1500	750/2900
MEDIA COMPATIBILITY												
Lube & Lubricating Oils	+	+	+	+	+	+	O	+	O	+	+	+
Diathermic Oils		+		+	+	+		+			+	+
Fuel Oils		O					+	+	+		O	O
Oil or Glycol Water Emulsion							+	O	+		O	O
SERIES MAIN CHARACTERISTICS												
Self-priming Capacity	+	+	+	+	+	+	+	+	+	+	+	+
Seal Type (M = mechanical - C = lip)	(2)	M	M	M	M	M	M	M	M	C	M	M
BUILT-IN RELIEF VALVE												
Internal Relief			O	O	O			O		O	O	O
External Relief				O	O		O		O		O	O
In-Line (VMP)	O	O	O	O	O		O	O	O	O	O	O
MOUNTING												
Horizontal		+	+	+	+	+	+	+	+	+	+	+
Vertical	+	+	+	+	+	+	+	+	+	+	+	+
Flanged	+	+	+	+	+	+	+	+	+	+	O	+
On Foot		O		O	O	O	O	O	O		+	O
Tripod		O		O	O	O	O	O	O		O	O
On Base-Plate		O		O	O	O	O	O	O		O	O
Direct Coupling Motor Pump			O							O		
MATERIALS												
Casing	A	A/G	A	A	A	A	H	G	H	A	G	G
External Casing		C										
Main/Idler Screws	N/G	N	N/G	N	N	N	N	N	N	N/G	N	N/G
O-rings		V	V	V	V	V	V	V	V	V	V	V
Seal (3) Shaft		Z	S	S	S	S	W (or T)	W (or T)	W (or T)	V	W	S (or T)
SUCTION/DELIVERY PORTS												
BSP	+ (4)		+	O	O	O	O	O		+		+
SAE				+	+	+	+	+	+			+
DIN		O		O	O	O	O	O			+	O
ANSI		+		O	O	O	O	O			O	O

+ - Standard execution **O** - Optional

(1) Viscosity range for standard built pumps, for different functional characteristics please contact the jbj Techniques Ltd. technical department tel: 01737 767493 or email: info@jbj.co.uk.
(2) Submerged pump.
(3) Other typologies/materials upon request
(4) Optional, with strainer on suction side

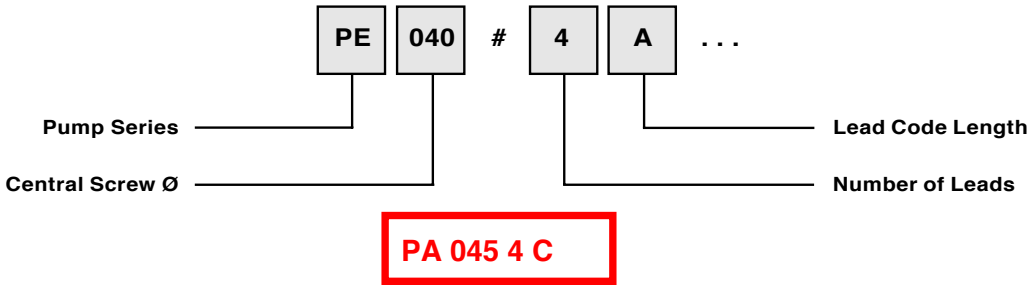
Materials

A: Aluminium alloy
C: Carbon steel
G: Cast iron
H: Cast iron + resin insert
N: Nitrided steel
S: AISI 630 Stainless steel/graphite
T: Teflon ®
V: Viton ®
W: Tungsten carbide/ Tungsten carbide
Z: Silicium carbide/graphite

Screw Pump displacement, series, number of leads, model code

Displacement (cm³/rev)	Inner Screw ø (mm)	Lead	Lead Code	Pump Series											
				PA	PC	PDA	PE3	PE4	PF	PGA	PH	PO	PQJ	PU	PX
				Number of Leads											
3.3	018	022	A	6									4		
4.8		032	B	6									4		
6.6		044	C	6									4		
9.6	025	034	A	6	4			4	6	4	4	6	3		4
11.8		042	B	6	4			4	6	4	4	6			4
14.1		050	C	6	4			4	6	4	4	6			4
15.9	029	042	A	6	4	2		4	6	4	4	6			
18.9		050	B	6	4	2		4	6	4	4	6			
22.1	032	048	A	4	4	2		4	6	4	4	6			4
29.5		064	B	4	4	2		4	6	4	4	6			4
40.4	040	056	A	4	4	2		4	6	4	4	6			4
49.0		068	B	4	4	2		4	6	4	4	6			4
57.7		080	C	4	4	2		4	6	4	4	6			4
69.4	045	076	A	4	4			4	6	4	4	6			4
82.1		090	B	4	4			4	6	4	4	6			4
98.2	055	072	A	4	4			4	6	4	4				4
117.2		086	B	4	4			4	6	4	4				4
139.1		102	C	4	4			4	6	4	4				4
165.5	060	102	A	4	4			4		4	4				4
194.7		120	B	4	4			4		4	4				4
233.6	072	100	A	4	3		3	4		4	4				4
280.4		120	B	4	3		3	4		4	4				4
336.4		144	C	4	3		3	4		4	4				4
434.7	083	140	A		3		3			4	4				3
527.8		170	B		3		3			4	4				3
638.0	102	136	A											3	3
788.0		168	B											3	3
975.0		208	C											3	3
1202.0	126	168	A											3	3
1488.0		208	B											3	3
1832.0		256	C											3	3
2281.0	156	208	A											3	
2807.0		256	B											3	
3421.0		312	C											3	

Example of ordering code



SCREW PUMPS

QUICK FLOW SIZE CHART

Quick Flow Size Chart										
Screw Diameter	**018**			**025**			**029**		**032**	
Code letter	A	B	C	A	B	C	A	B	A	B
Displacement (cm^3)	3.3	4.8	6.6	9.6	11.8	14.1	15.9	18.9	22.1	29.5
Q@1450 rpm (lpm)	5	7	10	14	17	20	23	27	32	43
Q@2900 rpm (lpm)	10	14	19	28	34	41	46	55	64	86

Screw Diameter	**040**			**045**		**055**			**060**	
Code letter	A	B	C	A	B	A	B	C	A	B
Displacement (cm^3)	40.4	49	57.7	60.4	82.1	98.2	117	139	165.5	194.7
Q@1450 rpm (lpm)	59	71	84	88	119	142	170	202	240	282
Q@2900 rpm (lpm)	117	142	167	175	238	285	340	403	480	565

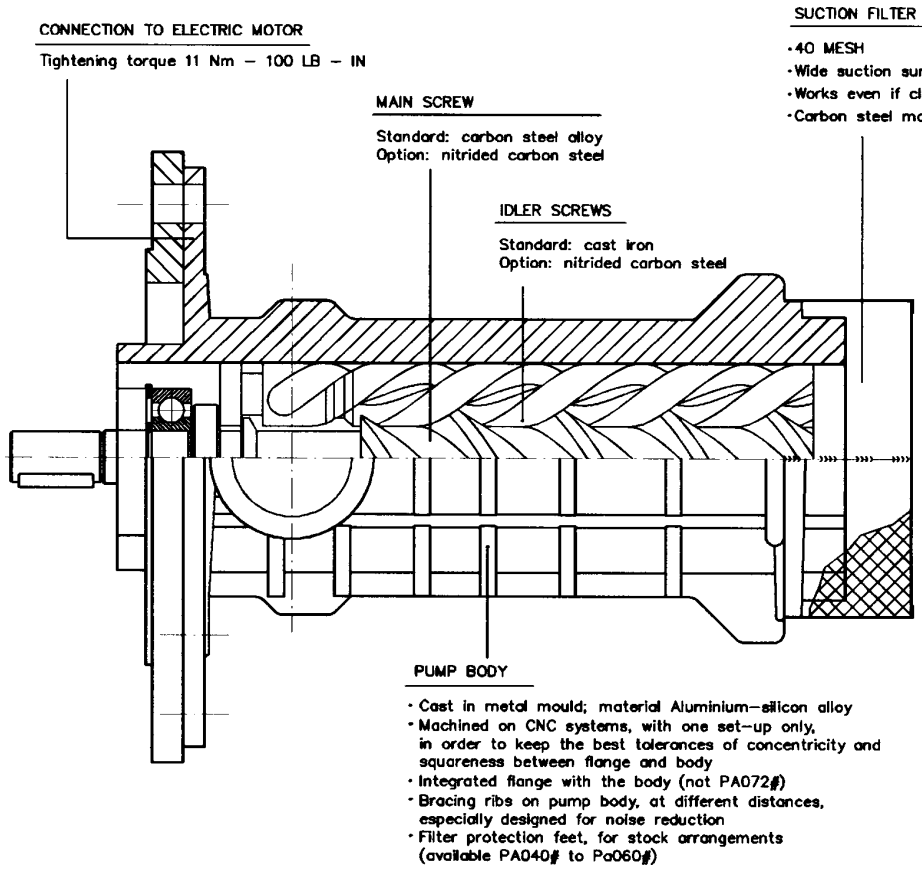
Screw Diameter	**072**			**083**		**102**			**126**			**156**		
Code letter	A	B	C	A	B	A	B	C	A	B	C	A	B	B
Displacement (cm^3)	234	280	336	434.7	527.8	438	788	975	1202	1488	1832	2281	2807	3421
Q@1450 rpm (lpm)	339	407	488	630	765	635	1143	1414	1743	2158	2656	3307	4070	4960
Q@2900 rpm (lpm)	677	813	976	1261	1531	-	-	-	-	-	-	-	-	-

See page IV for pressure ranges and page V for screw diameters and codes

SCREW PUMPS

PA SERIES with strainer

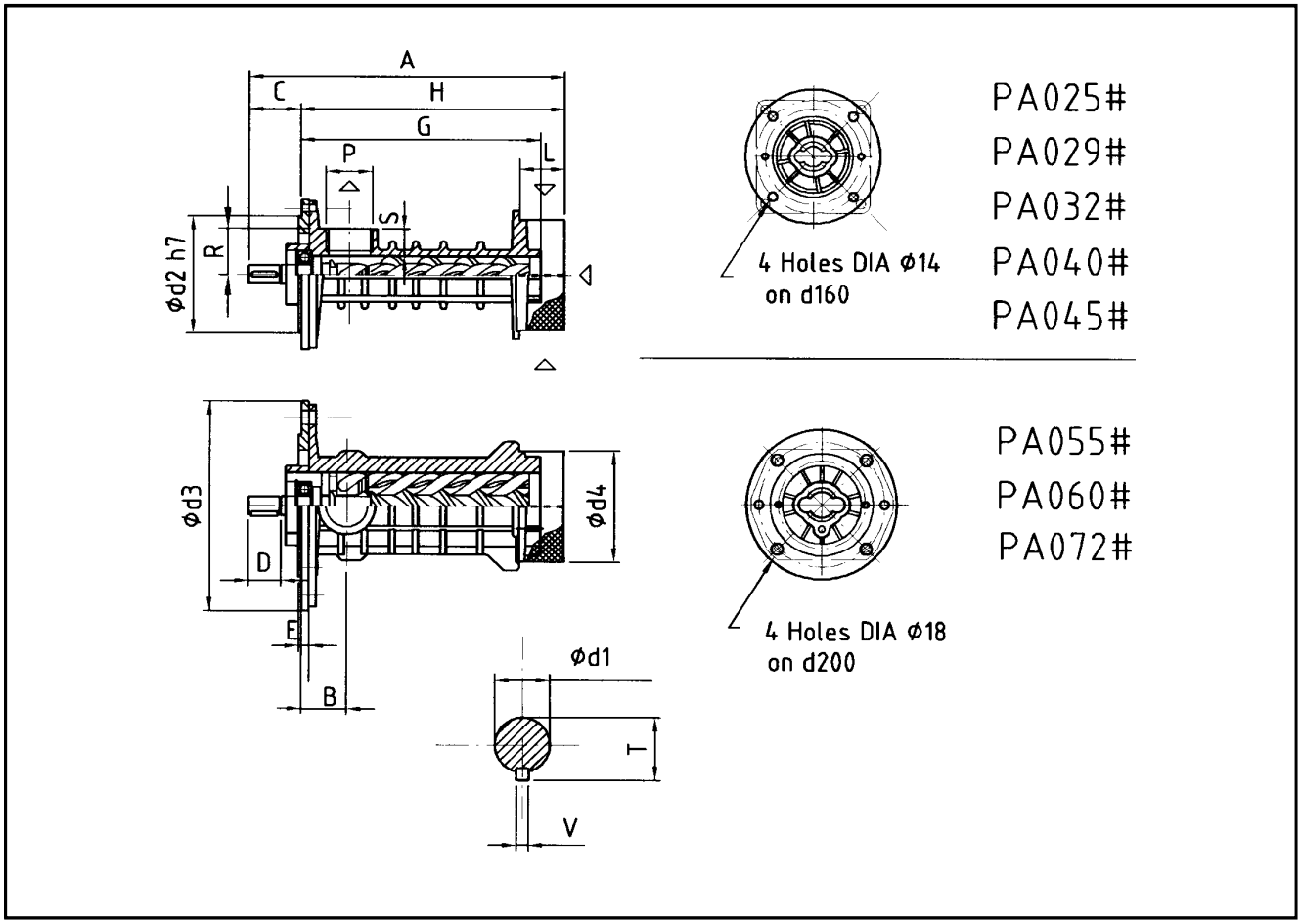
For hydraulic oils, lubricating oils. Admissible delivery pressure (continuous) = 50 bar at 2900 rpm. ISO 3019/2 motor connection.



Functional Characteristics, Standard Version		
Delivery flow	10 to 850 l/min	
Admissible delvery pressure*	up to 50 bar continuous, 75 bar peak at 2900 rpm	
Admissible suction pressure	submerged in oil	
Kinematics viscosity	10 to 400 cSt	For different values contact jbj tech. dept.
Admissible temperature	0° to 100°C	For different values contact jbj tech. dept.
Driving speed	750 to 3600 rpm	
Average noise level	58 - 68 dB(A) at 2900 rpm according to pump dimension	
Recommended filtration	60 micron max, suction side (not abrasive contaminant) ISO4406 19/16- NAS10	
Direction of rotation	clockwise, as seen from the driving side	
*** Reduced pressure limits apply due to fluid viscosity and driving speed. Consult the performance charts for the individual pump size**		

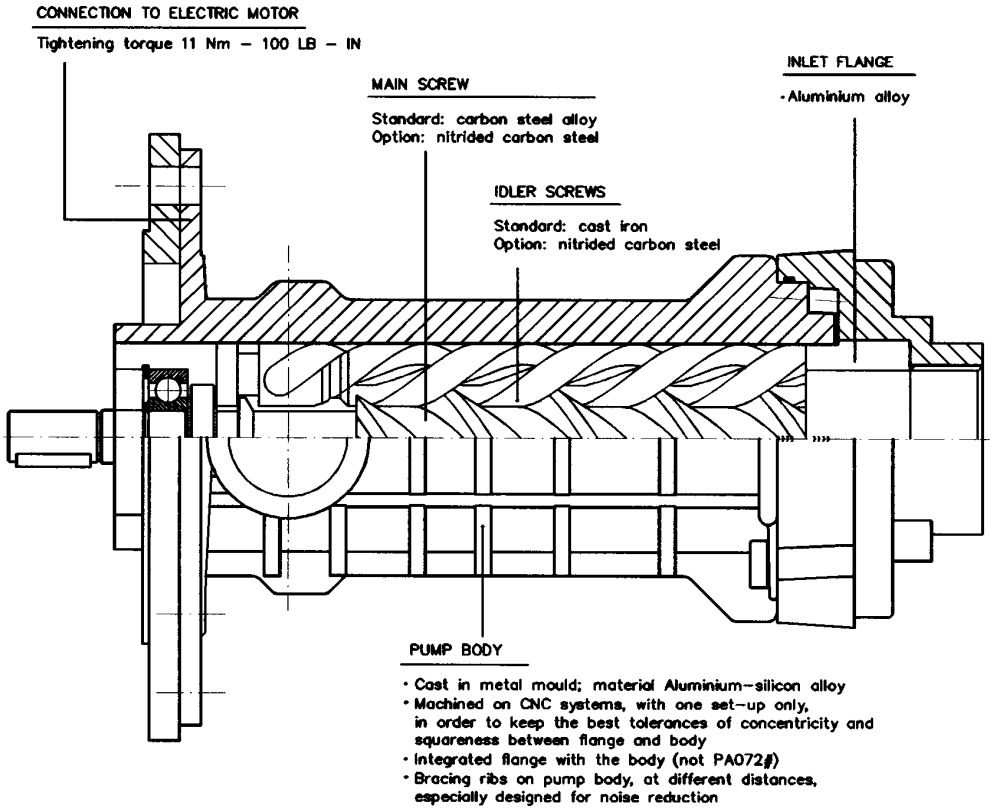
For different functional characteristics, please contact the jbj Techniques Ltd. technical department tel: 01737 767493 or email: info@jbj.co.uk.

Main field of application: Pump submersible into tank for lubrication systems, auxilary filtration system, cooling system.



Dimensions in mm (unless otherwise stated)																	
Size	A	B	C	D	E	G	H	L	P GAS	R	S	T	V	d1	d2	d3	d4
PA025#6.OM	299	68	42	35	22	229	256	30	1"	44	24	21.5	6	19			83
PA029#6.OM	299	68	42	35	22	229	256	30	1"	44	24	21.5	6	19			83
PA032#4.OM	299	68	42	35	22	229	256	30	1"	44	24	21.5	6	19	125	188	83
PA040#4.OM	342	68	42	35	22	272	299	50	1"	50	24	21.5	6	19			123
PA045#4.OM	363	68	48	40	22	297	314	65	1½"	50	20	27.0	10	24			123
PA055#4.OM	425	86	63	55	22	337	358	50	1½"	60	28	35.0	10	32			162
PA060#4.OM	464	86	63	57	22	390	401	50	2"	60	28	35.0	10	32	160	234	162
PA072#4.OM	563	112	63	63	22	452	500	130	2"	72	30	41.0	10	38			190

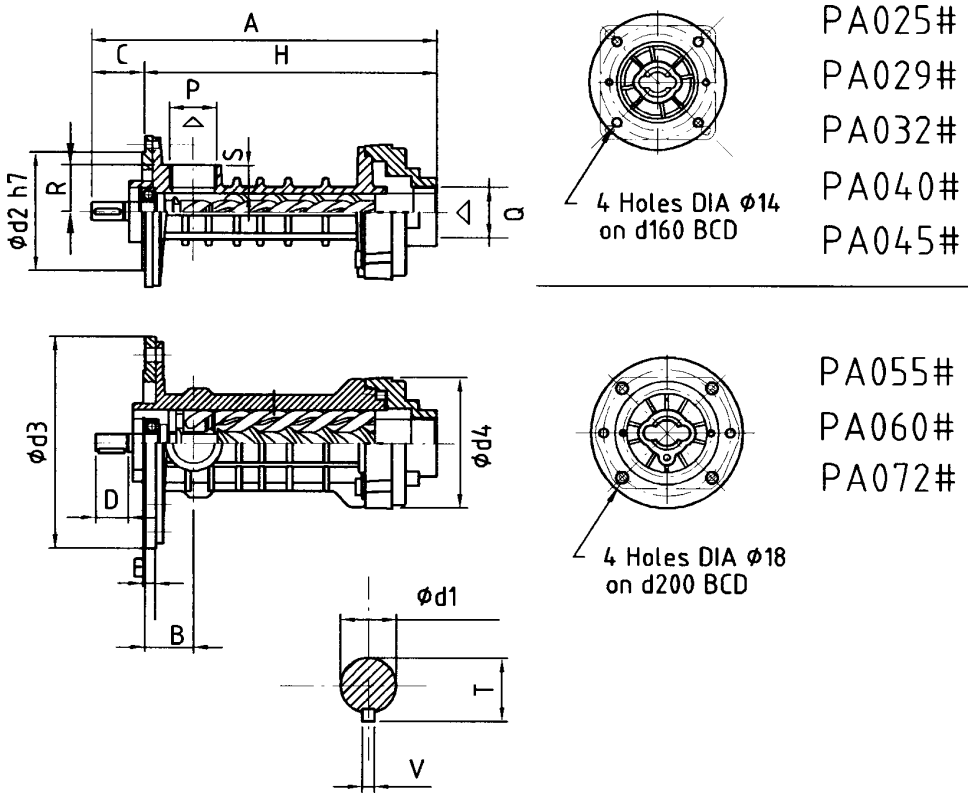
For hydraulic oils, lubricating oils. Admissible delivery pressure (continuous) = 50 bar at 2900 rpm. ISO 3019/2 motor connection.



Functional Characteristics, Standard Version		
Delivery flow	10 to 850 l/min	
Admissible delvery pressure*	up to 50 bar continuous, 75 bar peak at 2900 rpm	
Admissible suction pressure*	-0.4 to 2 bar	For different values contact jbj tech. dept.
Kinematics viscosity	10 to 400 cSt	For different values contact jbj tech. dept.
Admissible temperature	0° to 100°C	For different values contact jbj tech. dept.
Driving speed	750 to 3600 rpm	
Average noise level	56 - 68 dB(A) at 2900 rpm according to pump dimension	
Recommended filtration	60 micron max, suction side (not abrasive contaminant) ISO4406 19/16- NAS10	
Direction of rotation	clockwise, as seen from the driving side	
*** Reduced pressure limits apply due to fluid viscosity and driving speed. Consult the performance charts for the individual pump size**		

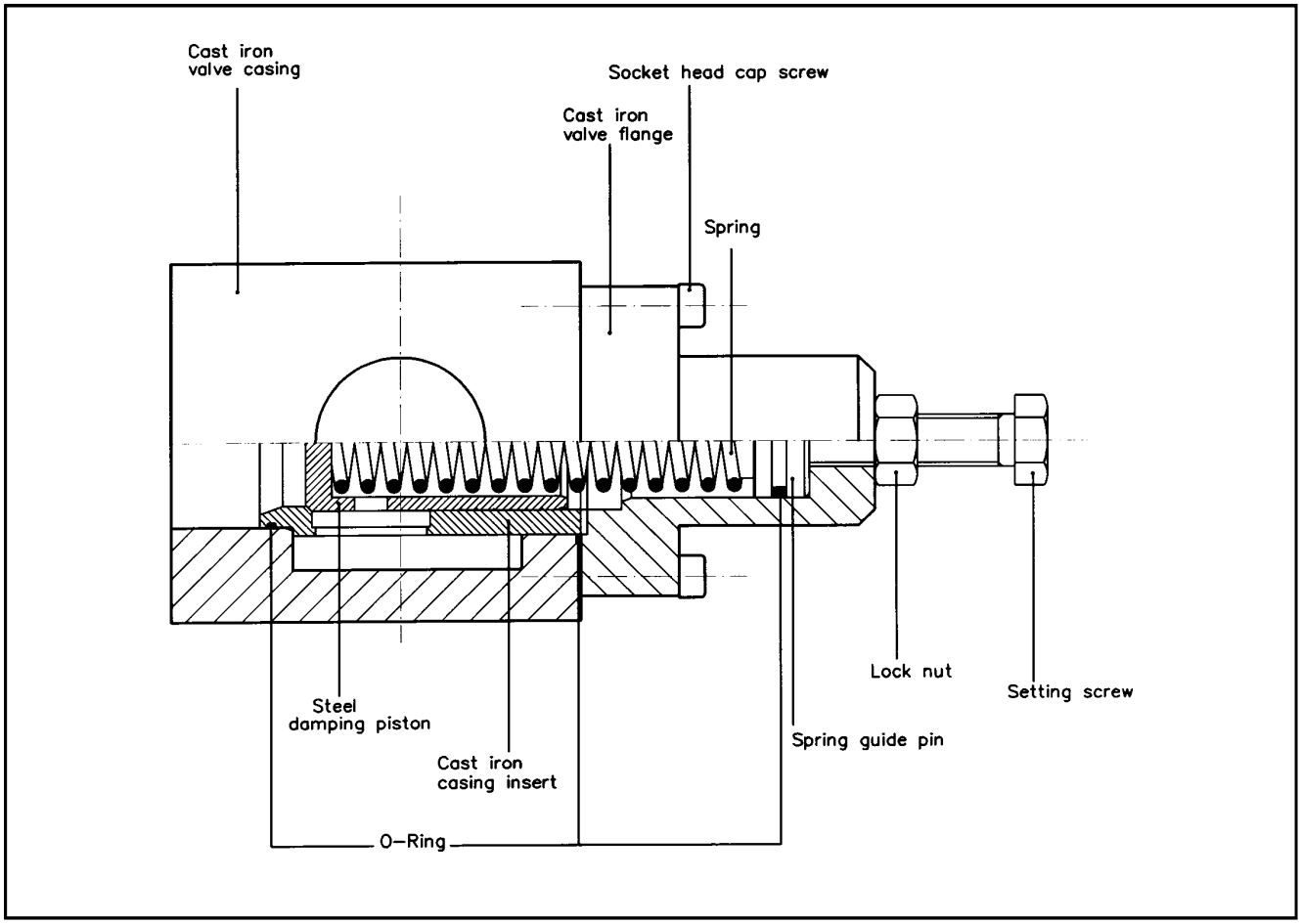
For different functional characteristics, please contact the jbj Techniques Ltd. technical department tel: 01737 767493 or email: info@jbj.co.uk.

Main field of application: Submersible pump for lubrication systems, auxilary filtration systems, cooling systems.



Dimensions in mm (unless otherwise stated)																
Size	A	B	C	D	E	H	P	Q	R	S	T	V	d1	d2	d3	d4
							GAS									
PA025#6.0T	318	68	42	35	22	276	1"	1¼"	44	24	21.5	6	19	125	188	81
PA029#6.0T	318	68	42	35	22	276	1"	1¼"	44	24	21.5	6	19			81
PA032#4.0T	318	68	42	35	22	276	1"	1¼"	44	24	21.5	6	19			81
PA040#4.0T	372	68	42	35	22	330	1"	2"	50	24	21.5	6	19			149
PA045#4.0T	378	68	48	40	22	330	1½"	2"	50	27	27.0	10	24			149
PA055#4.0T	470	86	63	55	22	407	1½"	3"	60	28	35.0	10	32	160	234	190
PA060#4.0T	514	86	63	57	22	451	2"	3"	60	30	35.0	10	32			190
PA072#4.0T	600	112	63	63	22	537	2"	4"	72	30	41.0	10	38			250

For hydraulic oils, lubricating oils, fuel oils and cooling lubricants emulsions.



Functional Characteristics, Standard Version		
Delivery flow	30 - 1200 l/min	
Maximum pressure*	see dimensional chart	
Kinematics viscosity	10 to 400 cSt	For different values contact jbj tech. dept.
Admissible temperature	0° to 100°C	For different values contact jbj tech. dept.
Recommended filtration	60 micron max, suction side (not abrasive contaminant) ISO4406 19/16- NAS10	

For different functional characteristics, please contact the jbj Techniques Ltd. technical department tel: 01737 767493 or email: info@jbj.co.uk.

5.5 EECO Control Valve

Control Valves
For Hydraulic Elevators
& Elevator Product Catalogue

UV-5AT & TC
UV-7B & BC
UV-4R

Temperature Compensation & Pressure Compensation

Products For New Installations, Replacements, Modernizations, Service & Repair

EECO™

Elevator Equipment Corporation

Revised 7-11-08
P/N 11.001191001200

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Elevator Equipment Corporation

Hydraulic Elevator Control Valve & Elevator Product Catalogue

For EECO Sales & valve technical support call: (888) 577-3326*

Revised 7-11-08

Note: This revision supersedes ***all*** previous revisions of this document.

*Monday through Friday, 8:00 AM Eastern time to 4:30 PM Pacific time, excluding holidays.

Please Note:

The following solenoid and adjuster designations were changed for simplification on all EECO valves since August 2003:

Solenoids:

U1 - Up Fast (Red wires) - (was ULS)
U2 - Up Slow (Yellow wires) - (was UDS)
D1 - Down Fast (Black wires) - (was DMS)
D2 - Down Slow (Blue wires) - (was DLS)

Adjuster:

US - Up Stop - (was UD)

These changes are reflected in this revision of the catalogue.

The following abbreviations are also used in this catalogue:

CW = Clockwise (IN) ↻

CCW = Counter Clockwise (OUT) ↺

Elevator Equipment Corporation

Equipment Warranty

Elevator Equipment Corporation products carry a **ONE YEAR** limited warranty (control valves carry a **TWO YEAR** limited warranty) from the date of shipment from our plant against any manufacturing defects in material and workmanship which develop in service for which they were intended or recommended. Any material which is returned to our plant with transportation charges **PREPAID**, and which after our inspection is found to be defective will be, at our discretion, either repaired or replaced free of charge. Call EECO Sales for details.

WE WILL NOT sustain any claim for consequential damages, loss of time or labor charges, or expense in making repairs or adjustments. Our liability is limited to defective material or defective repairs made in our plant in Los Angeles, California, or Richmond, Indiana.

Conditions Of Sale

All technical advice and recommendations are furnished by the seller gratis, and are believed by the seller to be reliable. They are intended for use by persons having skill and know how, at their own risk. Seller assumes **NO** responsibility for damages incurred from use by buyer.

From and after the date of shipment, the buyer assumes all liability and expense because of injury, sickness or death sustained by any person, or damage to or destruction of property arising from the use of the equipment sold hereunder.

West Coast: 4035 Goodwin Avenue, Los Angeles, California 90039
Mid-West & East Coast: 2230 N. W. 12th Street, Richmond, Indiana, 47374
EECO Sales & Valve Technical Support: (888) 577-3326*
E-mail: sales@eeco-mail.com - Visit us on the internet at: www.elevatorequipment.com & www.eecovalves.com

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Index

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For valve technical support call: (888) 577-3326

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About

Elevator Equipment Corporation

Elevator Equipment Corporation (EECO) was founded in 1946 by Mr. Alvin Conley, who manufactured and sold single function valves, jacks, power units, switches, and other components used in the installation of hydraulic elevators.

The industry standard UV-5AT/TC and UV-7B/BC hydraulic control valves are manufactured and assembled at our original plant in California, where jack units, hatchway switches, car slings and platforms as well as other hydraulic elevator components are produced.

Since its beginning in Los Angeles, California, EECO has expanded into facilities in Richmond, Indiana, where jacks, power units, car slings and platforms, and other mechanical and structural items are also manufactured in our modern high production plants.

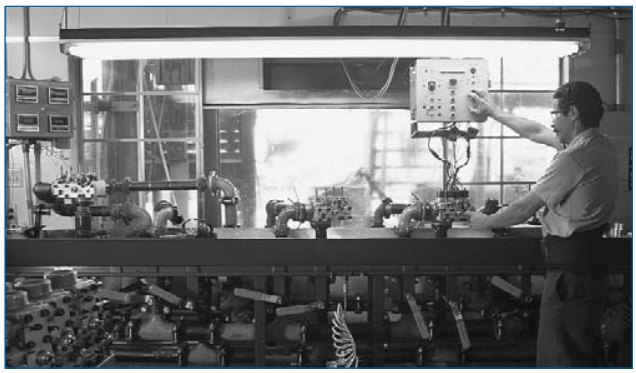
EECO is pleased to list all major elevator companies as customers. EECO valves and jack units have been furnished to these companies for installation in projects throughout the U.S. and Canada and in many European, South American, Asian and other foreign countries. The list of companies and facilities that we have been privileged to work with is extensive.

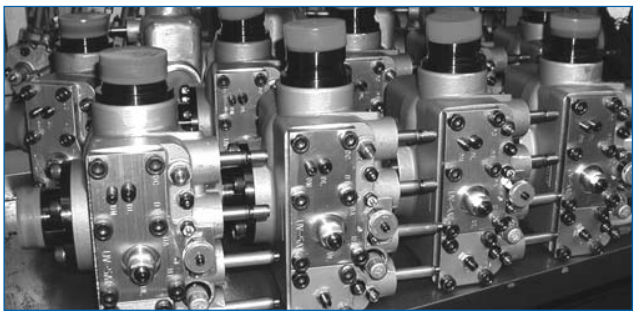
EECO's engineering, management and research staff is highly trained, with individuals who have many years experience in the manufacture and design of hydraulic elevator equipment. A number of these individuals hold undergraduate and advanced degrees in their field, including registered professional engineers.

EECO Elevator Products are designed and manufactured mainly for hydraulic elevators. These products include individual components to complete elevator systems.

Having served the elevator industry since 1946, EECO continues to supply quality hydraulic elevator products that are designed and manufactured in the USA. In addition, EECO continues to improve its products and expand its facilities to better server its customers needs. EECO now offers its customers access to product information and company news 24 hours a day, seven days a week via its internet web sites at: www.elevatorequipment.com and www.eecovalves.com.

Our commitment to innovative technology and customer support is second to none. EECO is a long time supplier member of both the U.S. NAEC and the Canadian CECA associations. Most EECO products are certified by both UL and CSA organizations.





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EECO Contact Information

Call toll free:

(888) 577-3326

NOTE: Valve technical support is available Monday through Friday (except holidays) between the hours of 8:00 AM Eastern time and 4:30 PM Pacific time.

Valve Technical Support:

Peter Aguirre, Ext. 128
Benny Vazquez, Ext. 124
Abe Salehpour, Ext. 141

Extended Hours Valve Support:**

at **(800) 428-6564** (Richmond, IN)
George Brown, Ext. 220
Gale Huntsman, Ext. 229

Quality Control:

Los Angeles - Mike Young, Ext. 129
Richmond, IN - Jim Snyder, Ext. 230*

Valve Sales:

Los Angeles - Peter Aguirre, Ext. 128
Richmond, IN - George Brown, Ext. 220*

*At (800) 428-6564 **Before 8:00 AM Pacific Time.

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Valve Exchange & Rebuild Programs

The "EECO Exchange Program"

Elevator Equipment Corporation has developed the EECO Exchange, to provide our customers a convenient alternative to sending their EECO valves into EECO to be rebuilt, which can cause unacceptable delays at the job site. The EECO Exchange offers an immediate, and economical alternative that allows our customers to receive a rebuilt valve, with a two-year limited warranty. EECO rebuilt valves come with all new internal parts, including the latest features now available on our standard valves.

HOW IT WORKS

The customer orders a rebuilt valve through the EECO Exchange. The EECO Exchange rebuilt valve can usually be shipped to the customer within one business day, subject to availability. The customer must then return the old, **undamaged**, valve that is being replaced to EECO Los Angeles within fifteen (15) business days (see below). Please retain your original coils as EECO rebuilt valves are not furnished with coils. If you need new coils please advise EECO Sales at the time of order.

NECESSARY INFORMATION

Prior to ordering a rebuilt valve through the EECO Exchange, the customer needs to have the following information ready:

- Old valve serial number (Required)
- Valve type (i.e. UV-5A, UV-5AT, UV-5ATC, UV-7B or UV-7BC)
- Line connections for UV-5A, T & TC = 2" NPT or 2" Grooved; UV-7B & UV-7BC = 2.5" NPT or 2.5" Grooved

Upon placing the order, and after the serial number is verified, the usual information will be required including a purchase order number, "ship to" address, and the method of shipment. Customers will not be able to exchange one valve model for a completely different model. For example, a UV-5AT valve will only be exchanged for a UV-5AT valve, not for a UV-7B valve.

EECO will then provide the customer with an Exchange Material Authorization (EMA) number. It is very important that the EMA number be included on the outside label and on all the documentation included with the valve being returned to EECO. The old valve must be received at EECO's Los Angeles facility NO LATER than fifteen (15) business days from the ship date of the rebuilt valve. The customer will be invoiced for a "core valve body" if EECO does not receive the old valve within 15 days or if it is determined that it is damaged (at EECO's discretion) in any way and cannot be reused. In addition, if the valve is returned late (or not returned at all), the customer will no longer be eligible to purchase a future EECO Exchange rebuilt valve. Please schedule shipment of the old valve prior to ordering the exchange valve to prevent late returns.

The EECO "Valve Rebuild Program"

EECO also offers our customers a **Valve Rebuild Program** (**VRP**) through the EECO **Factory Service Center**. Customers needing their valves rebuilt, should contact the EECO Sales Department for an RMA (Return Material Authorization) number. Please allow at least ten (10) business days for the valve to be checked, rebuilt, and tested before it can be shipped back. If a faster turnaround is required, you may wish to consider the EECO Exchange program mentioned above. The rebuild program only includes the cleaning of the valve and replacement of the adjusters, seals and solenoid components. If, upon inspection by EECO, it is determined that other major components of the valve must be replaced or the valve has missing components, the customer will be contacted and additional charges will apply. All EECO rebuilt valves carry a two year limited warranty.

NOTE: All older EECO brass valves and F series unit valves are exempt from the EECO Exchange and Rebuild Programs. EECO no longer manufactures nor supports these valves.

To order or to reach EECO valve technical support call:

(888) 577-3326

Elevator Equipment Corporation

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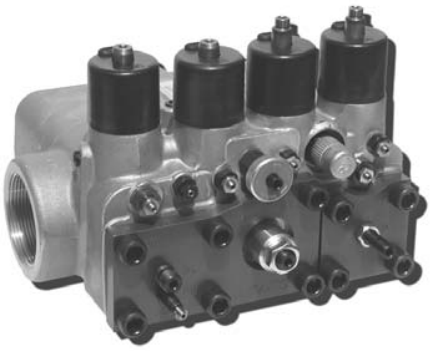
How To Size An EECO Valve



Sizing An EECO Valve

We encourage you to have EECO size your valve. This assures proper valve sizing for your specific application. To have EECO size your valve, please fill out the form on pages 18 (for the UV-5AT/TC) or page 20 (for the UV-7B/BC) and fax it to EECO.

A major consideration for proper operation of a hydraulic elevator system is proper sizing of the control valve in that system. By valve sizing, we are only referring to the proper selection of the internal components of the valve, not to the physical size of the valve or the size of its ports.

If **down contract speed** (full down speed with rated load on the car) is the same as the up, then the size of the standard valve (either the UV-5AT or UV-7B) is determined by the size of the bypass piston only. Sizing of the bypass piston requires only static pressure and flow rate. Locating the intersection of static pressure and flow rate on the sizing charts provided in Figure 1 and Figure 3 (on pages 13 and 15) provides the size of the valve. If Down contract speed is different from the Up, please contact EECO.

If the valve is for an existing installation, then the static pressure can be read from a pressure gage installed in the jack (ram) gage port of the existing valve when the empty car is resting at the bottom landing. However, if the valve is for a new installation or static pressure can not be physically measured, then empty car weight (weight of everything above the platen plate plus 1/2 of the piston weight) and jack piston diameter are required. With this information on hand, you can then calculate the static pressure by dividing the empty car weight by the cross sectional area of the piston, or use Table 1A (or 1B, metric), provided on pages 8 (or 9), to obtain the static pressure.

If the flow rate is known, the valve can now be sized. However, if the flow rate is not known, the car speed and jack piston diameter are required. Table 2A (or 2B, metric), provided on pages 10 (or 11), can then be used to obtain the flow rate. The flow rate can also be calculated by multiplying the car speed by the displacement factor for the specified piston diameter provided in Table 3 on page 12.

As mentioned before, down contract speed is down speed with full load on the car. Down speed with empty car is less than contract speed depending on the ratio of full-load to no-load pressures (approximately 25% less for a two to one pressure ratio). If constant down speed is required between no-load and full-load conditions, UV-5ATC or UV-7BC valves should be used. Again, statice pressure and flow rate are required to size the valve.

Size the Up (bypass) section of the **UV-5ATC** by using the sizing chart in Figure 1 (page 13). Then size the Down section of the **UV-5ATC** by using the sizing chart in Figure 2 (page 14).

Size the Up (bypass) section of the **UV-7BC** by using the sizing chart in Figure 3 (page 15). Then size the Down section of the **UV-7BC** by using the sizing chart in Figure 4 (page 16).

Sometimes changes in the system specification would make it necessary to modify the operating condition in the field. The change may require the size of an existing valve to be changed at the job. This means that the bypass, check and down pistons may have to be replaced. If the size of the valve is changed in the field, we recommend that you indicate the new valve size on top of the valve. This will prevent confusion when the valve is serviced in the future.

UV-7B - shown with optional 2.5" grooved connections.

If you still have questions on valve sizing, please call the

EECO Sales or Technical Support Departments

and we'll help get you the right size valve for your application.

(888) 577-3326

8:00 AM Eastern to 4:30 PM Pacific time, Monday through Friday, except holidays

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Table 1A - Pressure, PSI (for one jack)

Load Above Piston - Pounds

Piston Diameter (Inches)

Load Above Piston - Pounds	2	2 1/2	2 3/4	3	3 7/16	3 1/2	3 7/8	4	4 3/8	4 1/2	5	5 7/16	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9 1/2	10 5/8	12 5/8	13 7/8	15 7/8	Load Above Piston - Pounds
1000	318	204	168	141	108	104	85	80	67	63	51	43	42	35	30	26	23	20	18	14	11	8	7	5	1000
1500	477	306	253	212	162	156	127	119	100	94	76	65	63	53	45	39	34	30	26	21	17	12	10	8	1500
2000	637	407	337	283	216	208	170	159	133	126	102	86	84	71	60	52	45	40	35	28	23	16	13	10	2000
2500	796	509	421	354	269	260	212	199	166	157	127	108	105	88	75	65	57	50	44	35	28	20	17	13	2500
3000	955	611	505	424	323	312	254	239	200	189	153	129	126	106	90	78	68	60	53	42	34	24	20	15	3000
3500	1114	713	589	495	377	364	297	279	233	220	178	151	147	124	105	91	79	70	62	49	39	28	23	18	3500
4000		815	673	566	431	416	339	318	266	252	204	172	168	141	121	104	91	80	70	56	45	32	26	20	4000
4500		917	758	637	485	468	382	358	299	283	229	194	189	159	136	117	102	90	79	63	51	36	30	23	4500
5000		1019	842	707	539	520	424	398	333	314	255	215	210	177	151	130	113	99	88	71	56	40	33	25	5000
5500		1120	926	778	593	572	466	438	366	346	280	237	231	195	166	143	124	109	97	78	62	44	36	28	5500
6000			1010	849	647	624	509	477	399	377	306	258	253	212	181	156	136	119	106	85	68	48	40	30	6000
6500			1094	920	700	676	551	517	432	409	331	280	274	230	196	169	147	129	115	92	73	52	43	33	6500
7000				990	754	728	594	557	466	440	357	301	295	248	211	182	158	139	123	99	79	56	46	35	7000
7500				1061	808	780	636	597	499	472	382	323	316	265	226	195	170	149	132	106	85	60	50	38	7500
8000				1132	862	832	678	637	532	503	407	345	337	283	241	208	181	159	141	113	90	64	53	40	8000
8500					916	883	721	676	565	534	433	366	358	301	256	221	192	169	150	120	96	68	56	43	8500
9000					970	935	763	716	599	566	458	388	379	318	271	234	204	179	159	127	102	72	60	45	9000
9500					1024	987	806	756	632	597	484	409	400	336	286	247	215	189	167	134	107	76	63	48	9500
10000					1078	1039	848	796	665	629	509	431	421	354	301	260	226	199	176	141	113	80	66	51	10000
12000							1018	955	798	755	611	517	505	424	362	312	272	239	211	169	135	96	79	61	12000
14000								1114	931	880	713	603	589	495	422	364	317	279	247	198	158	112	93	71	14000
16000									1064	1006	815	689	673	566	482	416	362	318	282	226	180	128	106	81	16000
18000										1132	917	775	758	637	542	468	407	358	317	254	203	144	119	91	18000
20000											1019	861	842	707	603	520	453	398	352	282	226	160	132	101	20000
25000												1077	1052	884	753	650	566	497	441	353	282	200	165	126	25000
30000														1061	904	780	679	597	529	423	338	240	198	152	30000

Pressure (psi) = Load (lbs.) / (.7854 x (piston diameter in inches)^2)

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Table 1B - Pressure, BAR (for one jack)

Piston Diameter (Millimeters)

Load Above Piston - Kilograms

	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	
200	6.9	3.9	2.5	1.7	1.3	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	**200**
400	13.9	7.8	5.0	3.5	2.6	2.0	1.5	1.3	1.0	0.9	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	**400**
600	20.8	11.7	7.5	5.2	3.8	2.9	2.3	1.9	1.5	1.3	1.1	1.0	0.8	0.7	0.6	0.6	0.5	0.5	**600**
800	27.8	15.6	10.0	6.9	5.1	3.9	3.1	2.5	2.1	1.7	1.5	1.3	1.1	1.0	0.9	0.8	0.7	0.6	**800**
1000	34.7	19.5	12.5	8.7	6.4	4.9	3.9	3.1	2.6	2.2	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.8	**1000**
1200	41.7	23.4	15.0	10.4	7.7	5.9	4.6	3.8	3.1	2.6	2.2	1.9	1.7	1.5	1.3	1.2	1.0	0.9	**1200**
1400	48.6	27.3	17.5	12.2	8.9	6.8	5.4	4.4	3.6	3.0	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1.1	**1400**
1600	55.6	31.3	20.0	13.9	10.2	7.8	6.2	5.0	4.1	3.5	3.0	2.6	2.2	2.0	1.7	1.5	1.4	1.3	**1600**
1800	62.5	35.2	22.5	15.6	11.5	8.8	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.6	1.4	**1800**
2000	69.4	39.1	25.0	17.4	12.8	9.8	7.7	6.3	5.2	4.3	3.7	3.2	2.8	2.4	2.2	1.9	1.7	1.6	**2000**
2200	76.4	43.0	27.5	19.1	14.0	10.7	8.5	6.9	5.7	4.8	4.1	3.5	3.1	2.7	2.4	2.1	1.9	1.7	**2200**
2400		46.9	30.0	20.8	15.3	11.7	9.3	7.5	6.2	5.2	4.4	3.8	3.3	2.9	2.6	2.3	2.1	1.9	**2400**
2600		50.8	32.5	22.6	16.6	12.7	10.0	8.1	6.7	5.6	4.8	4.1	3.6	3.2	2.8	2.5	2.3	2.0	**2600**
2800		54.7	35.0	24.3	17.9	13.7	10.8	8.8	7.2	6.1	5.2	4.5	3.9	3.4	3.0	2.7	2.4	2.2	**2800**
3000		58.6	37.5	26.0	19.1	14.6	11.6	9.4	7.7	6.5	5.5	4.8	4.2	3.7	3.2	2.9	2.6	2.3	**3000**
3200		62.5	40.0	27.8	20.4	15.6	12.3	10.0	8.3	6.9	5.9	5.1	4.4	3.9	3.5	3.1	2.8	2.5	**3200**
3400		66.4	43.5	29.5	21.7	16.6	13.1	10.6	8.8	7.7	6.3	5.4	4.7	4.6	3.7	3.3	2.9	2.7	**3400**
3600		70.3	45.0	31.3	23.0	17.6	13.9	11.3	9.3	7.8	6.7	5.7	5.0	4.2	3.9	3.5	3.1	2.8	**3600**
3800		74.2	47.5	33.0	24.2	18.6	14.7	11.9	9.8	8.2	7.0	6.1	5.3	4.6	4.1	3.7	3.3	3.0	**3800**
4000		78.1	50.0	34.7	25.5	19.5	15.4	12.5	10.3	8.7	7.5	6.4	5.6	4.9	4.3	3.9	3.5	3.1	**4000**
4500			56.3	39.1	28.7	22.0	17.4	14.1	11.6	9.8	8.3	7.2	6.3	5.5	4.9	4.3	3.9	3.5	**4500**
5000			62.5	43.4	31.9	24.4	19.3	15.6	12.9	10.9	9.2	8.0	6.9	6.1	5.4	4.8	4.3	3.9	**5000**
5500			68.8	47.7	35.1	26.9	21.2	17.2	14.2	11.9	10.2	8.8	7.6	6.7	5.9	5.3	4.8	4.3	**5500**
6000			75.0	52.1	38.3	29.3	23.1	18.8	15.5	13.0	11.1	9.6	8.3	7.3	6.5	5.8	5.2	4.7	**6000**
7000				60.8	44.6	34.3	27.0	21.9	18.1	15.2	12.9	11.2	9.7	8.5	7.6	6.8	6.1	5.5	**7000**
8000				69.4	51.0	39.1	30.9	25.0	20.7	17.4	14.8	12.8	11.1	9.8	8.7	7.7	6.9	6.3	**8000**
9000				78.1	57.4	43.9	34.7	28.1	23.2	19.5	16.6	14.3	12.5	11.0	9.7	8.7	7.8	7.0	**9000**
10000					63.8	48.8	38.6	31.3	25.8	21.7	18.5	15.9	13.9	12.2	10.8	9.6	8.7	7.8	**10000**
15000						73.2	57.9	46.9	38.7	32.6	27.7	23.9	20.8	18.3	16.2	14.5	13.0	11.7	**15000**
20000							77.2	62.5	51.7	43.4	37.0	31.9	27.8	24.4	21.6	19.3	17.3	15.6	**20000**

Load Above piston - Kilograms

Pressure (BAR) = Load (kg) / (.008 x (piston diameter in mm)^2)

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Table 2A - Flow Rate (gallons per minute, gpm)

Car Speed - Feet Per Minute (fpm)

Jack Piston Diameter (Inches)

	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	2	3	5	7	8	10	11	13	15	16	18	20	21	23	24	26	28	29	31	33
2 1/2	3	5	8	10	13	15	18	20	23	25	28	31	33	36	38	41	43	46	48	51
2 3/4	3	6	9	12	15	19	22	25	28	31	34	37	40	43	46	49	52	56	59	62
3	4	7	11	15	18	22	26	29	33	37	40	44	48	51	55	59	62	66	70	73
3 7/16	5	10	14	19	24	29	34	39	43	48	53	58	63	67	72	77	82	87	92	96
3 1/2	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
3 7/8	6	12	18	25	31	37	43	49	55	61	67	74	80	86	92	98	104	110	116	123
4	7	13	20	26	33	39	46	52	59	65	72	78	85	91	98	104	111	117	124	131
4 3/8	8	16	23	31	39	47	55	62	70	78	86	94	102	109	117	125	133	141	148	156
4 1/2	8	17	25	33	41	50	58	66	74	83	91	99	107	116	124	132	140	149	157	165
5	10	20	31	41	51	61	71	82	92	102	112	122	133	143	153	163	173	184	194	204
5 7/16	12	24	36	48	60	72	84	96	109	121	133	145	157	169	181	193	205	217	229	241
5 1/2	12	25	37	49	62	74	86	99	111	123	136	148	160	173	185	197	210	222	234	247
6	15	29	44	59	73	88	103	117	132	147	162	176	191	206	220	235	250	264	279	294
6 1/2	17	34	52	69	86	103	121	138	155	172	190	207	224	241	259	276	293	310	327	345
7	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400
7 1/2	23	46	69	92	115	138	161	184	207	229	252	275	298	321	344	367	390	413	436	459
8	26	52	78	104	131	157	183	209	235	261	287	313	339	366	392	418	444	470	496	522
8 1/2	29	59	88	118	147	177	206	236	265	295	324	354	383	413	442	472	501	531	560	590
9 1/2	37	74	110	147	184	211	258	295	331	368	405	442	479	515	522	589	626	663	700	736
10 5/8	46	92	138	184	230	276	322	368	415	461	507	533	599	645	691	737	783	829	875	921
12 5/8	65	130	195	260	325	390	455	520	585	650	715	780	845	910	975	1040	1105	1170	1236	1301
13 7/8	79	157	236	314	393	471	550	628	707	785	864	942	1021	1100	1178	1257	1335	1414	1492	1571
15 7/8	103	206	308	411	514	617	720	823	925	1028	1131	1234	1337	1439	1542	1645	1748	1851	1953	2056
17 7/8	130	261	391	521	652	782	912	1043	1173	1304	1434	1564	1695	1825	1955	2086	2216	2346	2477	2607

NOTE: Flow rate (gallons per minute, gpm) = car speed (feet per minute, fpm) x displacement (gallons per foot, gpf)
Displacement (gallons per foot, gpf) = 0.0408 x (piston O. D. in inches)^2

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Table 2B - Flow Rate (liter per minute, lpm)

Car Speed - Meters Per Minute (Mpm)

Jack Piston Diameter (Millimeters)

	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40	45	50	55	60	65
60	3	6	10	13	16	19	22	25	29	32	48	63	79	95	111	127	143	158	174	190	206
80	4	8	12	15	19	23	27	31	35	38	58	77	96	115	134	153	173	192	211	230	249
100	5	9	14	18	23	27	32	36	41	46	68	91	114	137	160	182	205	228	251	273	296
120	5	11	16	22	27	33	38	44	49	55	82	109	137	164	191	218	246	273	300	328	355
140	6	12	19	25	31	37	43	50	56	62	93	124	155	186	217	248	279	310	341	372	403
160	8	15	23	30	38	46	53	61	69	76	114	152	190	228	266	305	343	381	419	457	495
180	8	16	24	32	41	49	57	65	73	81	122	162	203	243	284	324	365	406	446	487	527
200	10	19	29	39	48	58	68	78	87	97	145	194	242	291	339	388	436	485	533	582	630
220	10	21	31	41	51	62	72	82	92	103	154	205	256	308	359	410	462	513	564	615	667
240	13	25	38	51	63	76	89	101	114	127	190	253	317	380	443	507	570	633	697	760	823
260	15	30	45	60	75	90	105	120	135	150	225	300	374	449	524	599	674	749	824	899	974
280	15	31	46	61	77	92	107	123	138	153	230	307	383	460	563	613	690	766	843	920	996
300	18	36	55	73	91	109	128	146	164	182	274	365	456	547	639	730	821	912	1003	1095	1186
320	22	45	67	89	122	134	156	178	201	223	335	446	558	669	781	892	1004	1115	1227	1338	1450
340	25	50	74	99	124	149	174	199	223	248	372	497	621	745	869	993	1117	1241	1365	1490	1614
360	29	57	86	114	143	171	200	228	257	285	428	570	713	855	998	1140	1283	1425	1568	1710	1853
380	32	65	97	130	162	195	227	259	292	324	486	649	811	973	1135	1297	1459	1621	1783	1946	2108
400	37	73	110	146	183	220	256	293	329	366	549	732	915	1098	1281	1464	1647	1830	2013	2196	2379

NOTE: Flow rate (liters per minute, lpm) = car speed (meters per minute, Mpm) x displacement (liters per meter, lpM)
Displacement (liters per meter, lpM) = 0.0007854 x (piston O. D. in mm)^2

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Table 3 - Piston Data

PISTON DIAMETER		PISTON AREA		DISPLACEMENT	
INCHES	MILLIMETERS	IN^2	CM^2	GALLONS PER FOOT (gpf)	LITERS PER METER (lpM)
2	50.80	3.142	20.268	0.163	2.026
2 1/4	57.15	3.976	25.652	0.207	2.565
2 1/2	63.50	4.909	31.669	0.255	3.166
2 3/4	69.85	5.94.	38.320	0.309	3.831
3	76.20	7.069	45.604	0.367	4.559
3 7/16	87.31	9.28	59.87	0.482	5.986
3 1/2	88.90	9.621	62.072	0.500	6.206
3 3/4	95.25	11.045	71.256	0.574	7.124
3 7/8	98.43	11.793	76.085	0.613	7.607
4	101.60	12.566	81.073	0.653	8.106
4 1/4	107.95	14.186	91.524	0.737	9.150
4 3/8	111.13	15.033	96.987	0.781	9.697
4 1/2	114.30	15.904	102.608	0.826	10.259
4 3/4	120.65	17.721	144.326	0.921	11.430
5	127.00	19.635	126.677	1.020	12.665
5 1/4	133.35	21.648	139.661	1.125	13.963
5 7/16	138.11	23.221	149.815	1.206	14.978
5 1/2	139.70	23.758	153.279	1.234	15.325
5 3/4	146.05	25.967	167.530	1.349	16.749
6	152.40	28.274	182.415	1.469	18.238
6 1/4	158.75	30.680	197.933	1.594	19.789
6 1/2	165.10	33.183	214.084	1.724	21.404
6 3/4	171.45	35.785	230.869	1.859	23.082
7	177.80	38.485	248.287	1.999	24.823
7 1/2	190.50	44.179	285.023	2.295	28.496
7 3/4	196.85	47.173	304.341	2.451	30.428
8	203.20	50.265	324.293	2.611	32.422
8 1/2	215.90	56.745	366.096	2.948	36.602
8 3/4	222.25	60.132	387.948	3.124	38.787
9	228.60	63.617	410.433	3.305	41.035
9 1/2	241.30	70.882	457.303	3.682	45.721
9 3/4	247.65	74.662	481.689	3.879	48.159
10	254.00	78.540	506.707	4.080	50.660
10 1/4	260.35	82.516	532.360	4.287	53.225
10 1/2	266.70	86.590	558.645	4.498	55.853
10 5/8	269.88	88.664	572.025	4.606	57.190
10 3/4	273.05	90.763	585.564	4.715	58.544
11	279.40	95.033	613.116	4.937	61.299
11 1/4	285.75	99.402	641.302	5.164	64.117
11 1/2	292.10	103.869	670.121	5.396	66.998
11 3/4	298.45	108.434	699.573	5.633	69.942
12	304.80	113.097	729.659	5.875	72.950
12 1/4	311.15	117.859	760.378	6.123	76.022
12 1/2	317.50	122.718	791.730	6.375	79.156
12 5/8	320.68	125.185	807.644	6.503	80.747
13 7/8	352.43	151.201	975.491	7.855	97.528
15 7/8	403.23	197.933	1276.982	10.282	127.671
17 7/8	454.03	250.947	1619.010	13.036	161.867

NOTE: Gallons per Minute (gpm) or Liters per Minute (lpm) = Displacement (gpf or lpm) x Car Speed (fpm or Mpm)

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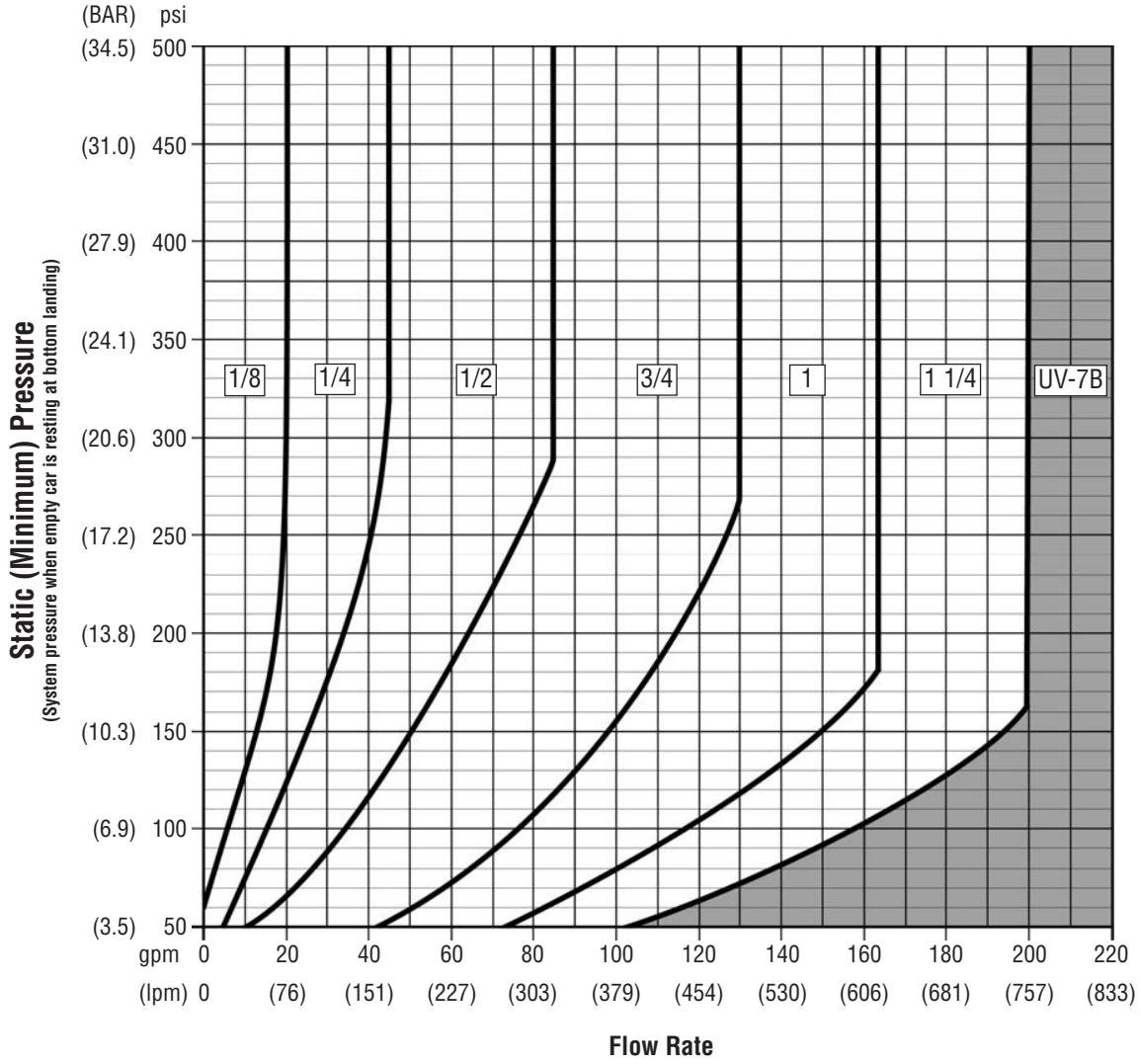
Figure 1
Sizing Chart for UV-5AT (Standard Valve)

Note: Also use this chart to size the "Up Section" of the UV-5ATC (Constant Down Speed valve) **only**. To size the "Down Section" of the UV-5ATC, please use Figure 2.



BP adjuster @ 12 turns open & 150 SSU oil @ 100° F (38° C).

NOTES:
1. The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.
2. It is assumed that Up and Down contract speeds are the same. If the Down contract speed is different from the Up, contact EECO.
3. **Down contract speed** is full down speed with rated load on the car.

CAUTION: When adjusting the **UV-5AT** valve, set the empty car down speed at 25% **LESS** than the down contract speed. If constant down speed is required between no-load and full-load conditions, use the **UV-5ATC** valve.

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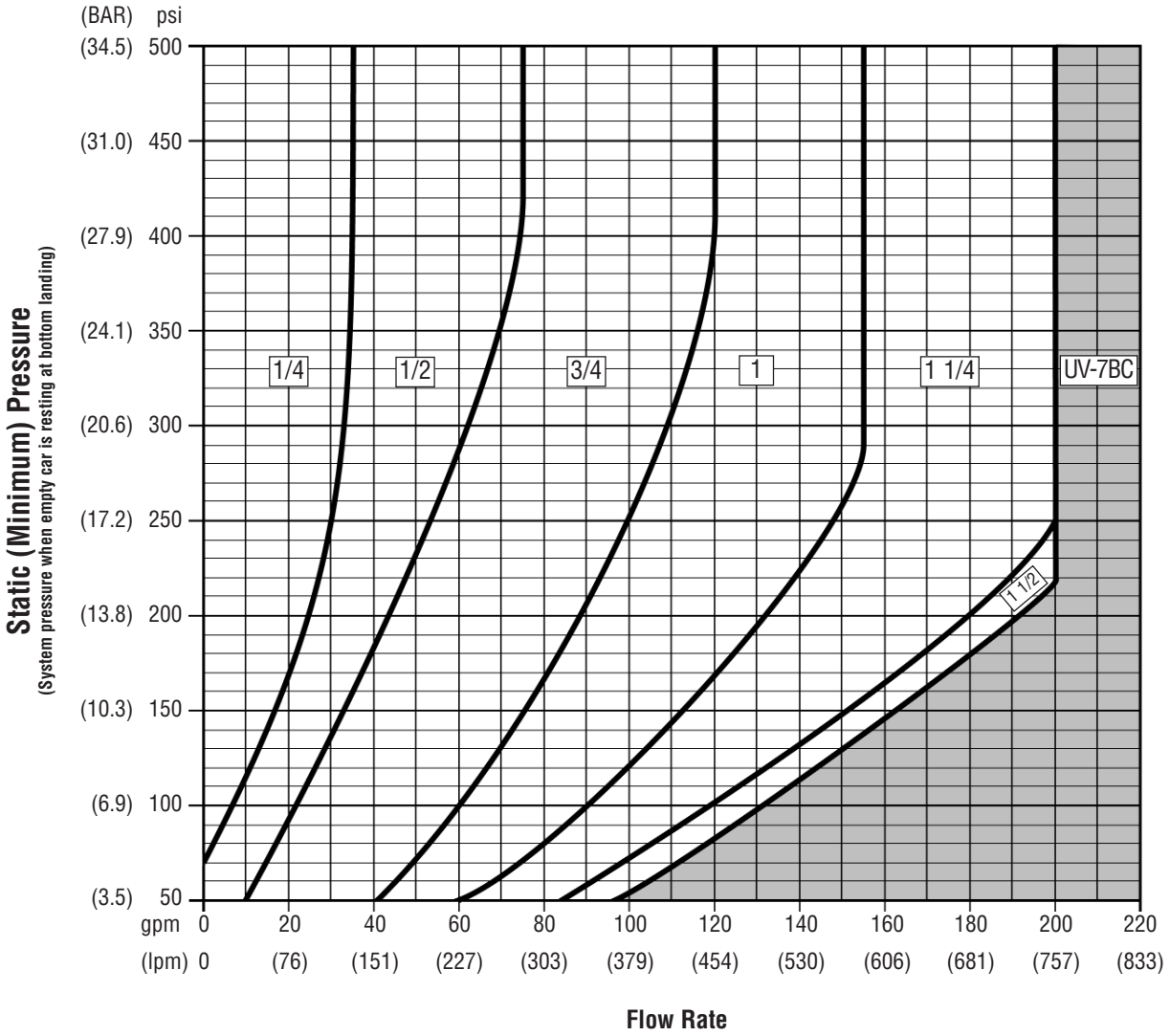
Figure 2
Sizing Chart for Down Section Of UV-5ATC Only (Constant Down Speed Valve)

Note: To Size UV-5AT (Standard Valve), or the "Up Section" of the UV-5ATC (Constant Down Speed Valve), please use Figure 1.



NOTE: The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.

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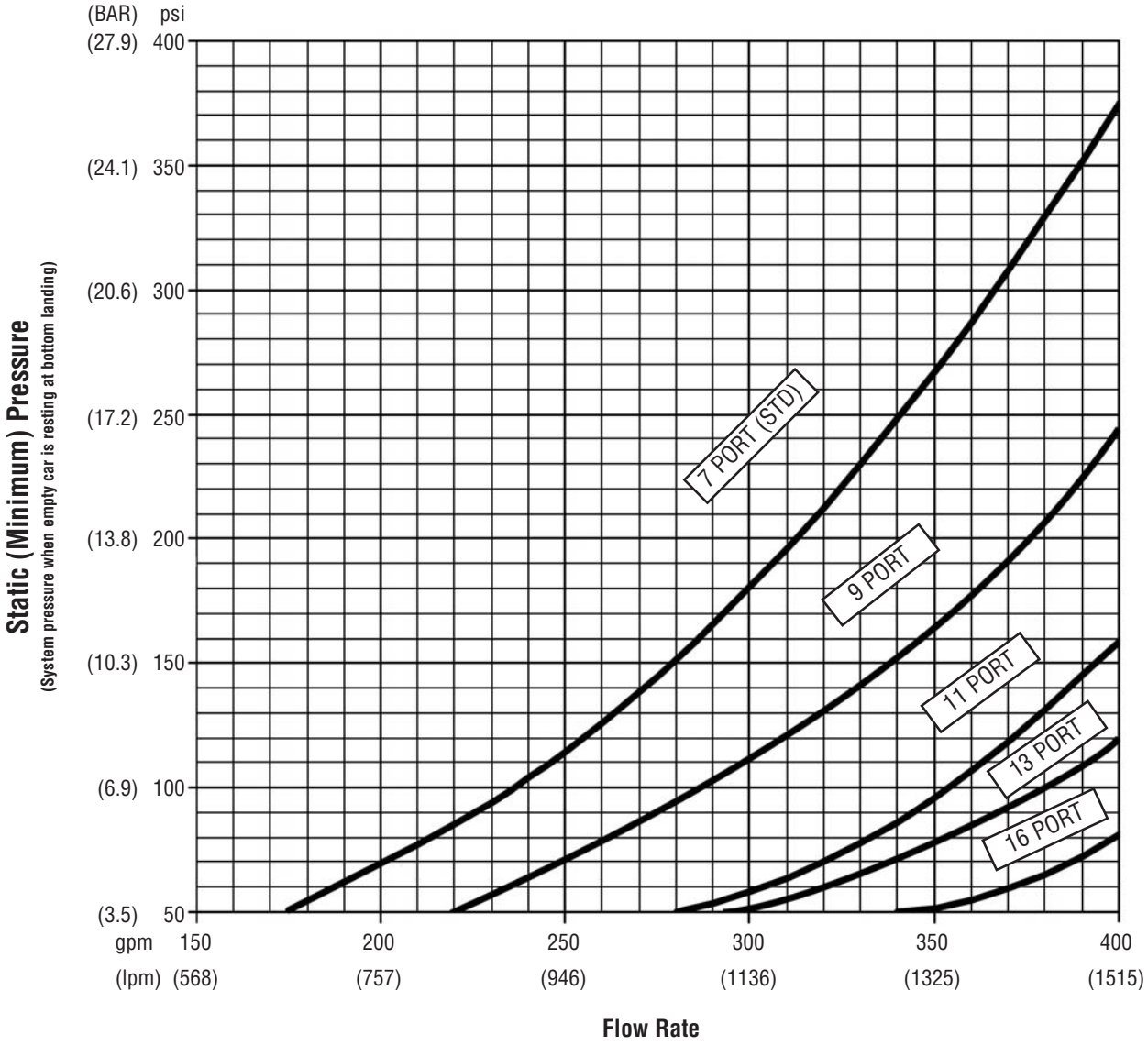
Figure 3
Sizing Chart for UV-7B (Standard Valve)

Note: Also use this chart to size the "Up Section" of the UV-7BC (Constant Down Speed Valve) **only**.
To size the "Down Section" of the UV-7BC, please use Figure 4.



BP Adjuster @ 10 Turns Open & 150 SSU Oil @ 100° F (38° C).

NOTES:
1. The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.
2. It is assumed that Up and Down contract speeds are the same. If the Down contract speed is different from the Up, contact EECO.
3. **Down contract speed** is full down speed with rated load on the car.

CAUTION: When adjusting the **UV-7B** valve, set the empty car down speed at 25% **LESS** than the down contract speed. If constant down speed is required between no-load and full-load conditions, use the **UV-7BC** valve.

Elevator Equipment Corporation

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2230 N.W. 12th Street, Richmond, IN 47374 - (800) 428-6564
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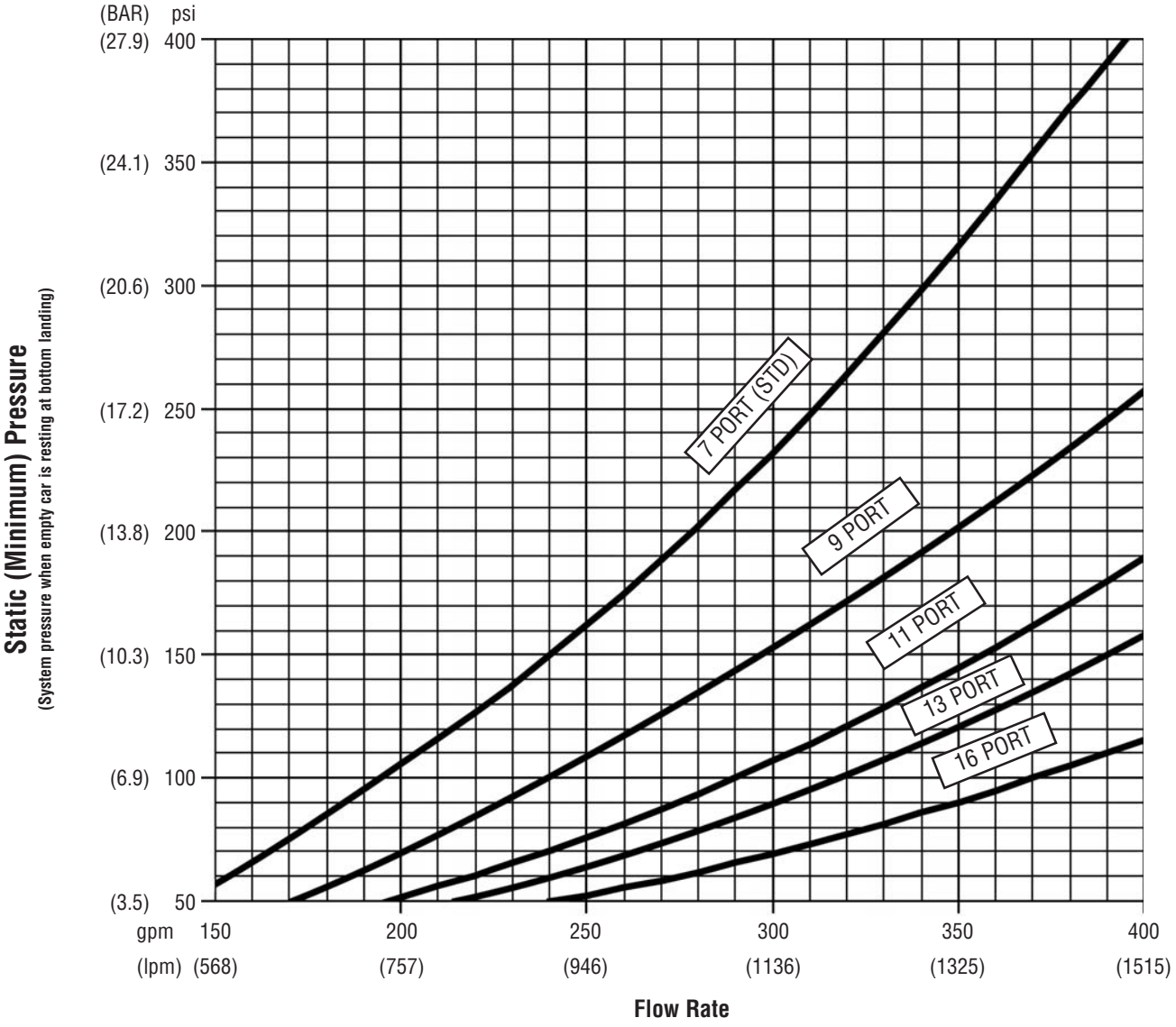
Figure 4
Sizing Chart for Down Side of UV-7BC Only (Constant Down Speed Valve)

Note: To Size UV-7B (Standard Valve), or the "Up Section" of the UV-7BC (Constant Down Speed Valve), please use Figure 3.



NOTE: The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.

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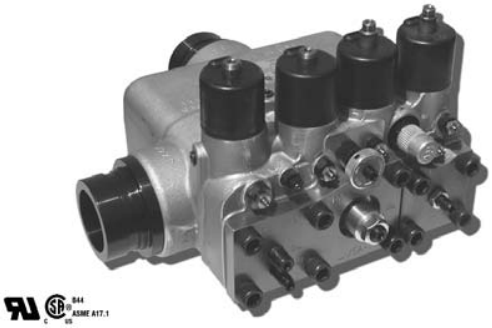
UV-5AT & UV-5ATC (Constant Down Speed) Control Valves

Continuing its tradition of providing the elevator industry with innovative quality products, EECO now offers a revolutionary improvement of our flagship UV-5A control valve. The Compensated UV-5AT is now available and comes equipped with full Temperature Compensation over its entire operational temperature range of 80° to 150° F (27° C to 65° C). It incorporates special components to compensate for variations of oil temperature and viscosity, therefore, maintaining consistent elevator operation regardless of oil temperature. In addition, all UV-5A valves manufactured since January 2001 are equipped with high temperature Viton seals throughout as a standard feature.

The optional UV-5ATC also offers Pressure Compensation for constant down speed control. This modification of the down piston assembly delivers constant Down Speed Control between no load and full load conditions.

EECO also offers owners of older UV-5A control valves the ability to upgrade their existing valves currently in service with both the temperature and pressure compensation features. This allows for a simple in-the-field retrofit of the valve with EECO supplied modification kits.

UV-5AT



UV-5ATC

Features

Smooth Up Start: Allows the pump motor to reach full running speed before load is applied to the motor. Provides a single adjustment for soft start and smooth acceleration.

Up Transition: Provides unvarying transition through a wide pressure range.

Up Leveling: Maintains leveling speed regardless of change of system pressure, oil viscosity or pump output.

Up Stop: Provides smooth up stop which is solenoid operated and adjustable.

Lowering Valve: Provides controlled down acceleration, precise contract down speed, down transition, adjustable leveling speed and soft stop. Tool-less manual lowering feature is standard.

Check Valve: Locks the elevator on a column of oil while the car is stopped.

Connections: 2 inch NPT standard with optional grooved connections for all three ports.
Left hand jack port connection standard. **NEW:** Right hand jack port connection adapter option!

Additional Features: Include a lightweight, heat-treated, high strength aluminum body. All control adjustments are made from the front of the valve. Moving parts are restricted to sliding sealed pistons. The valve has a fully adjustable pressure relief valve. Viton seals throughout.

Ratings

Certified by both UL (T) & CSA-B44 - ASME A17.1.

UL (T) and CSA-B44 rated at 90 psi (6.2 bar) minimum and 800 psi (55.2 bar) maximum. The temperature range is 80° F (27° C) minimum, 150° F (65° C) maximum.

For oil service, use of a good brand of grade 32 turbine oil with a viscosity of 150 ssu at 100° F (38° C) and a minus pour point is recommended.

Size all UV-5AT/TC valves to bypass the entire capacity of the pump at ***minimum*** pressure.

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UV-5AT & UV-5ATC Quotation & Order Form

❑ Request For Quote ❑ Order, PO # _____

Company _____ Telephone ( ) _____

Contact _____ Fax ( ) _____

Date _____ Date Required _____

1. Quantity Required [2] _____
2. Coil Voltage [2] _____
3. Existing valve (If any): EECO UV-5A (Size) _____
   Other (Mfg, model, size) _____
4. Static Pressure [1] (psi), Empty car at bottom landing. _____ or Empty Car Weight (lbs) _____
   Plunger Diameter (in) _____
   or Circumference (in) _____
5. Flow Rate (GPM) [1] _____ or Car Speed (FPM) Up _____
   Also need plunger info in #4 above. Down If different _____
6. Max Operating Pressure (psi) Required for UV-5ATC. _____ or Capacity (lbs) _____
   Also need empty car weight info in #4 above.
7. Total Travel (ft) _____

8. Line Connections [2]

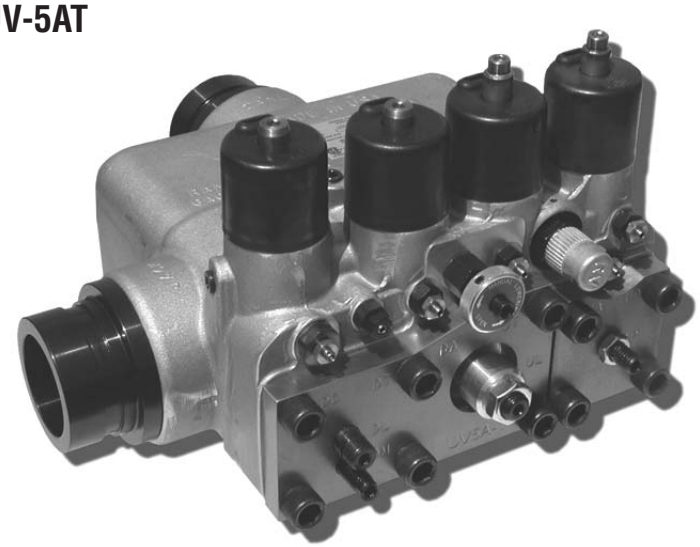
	Pump	Jack	Return
2" NPT [3]	❑	❑	❑
2" Grooved [4]	❑	❑	❑

9. Jack Port Left Hand [3] ❑ Right Hand [4] ❑ (Contact EECO)
10. Constant Down Speed (UV-5ATC) [4] Yes ❑ No ❑
11. Pressure Gage Quick Disconnect [4] Jack ❑ Pump ❑
12. 0-1000 psi Liquid Filled Pressure Gage [4] Yes ❑ No ❑
13. Low Pressure Switch [4] Yes ❑ No ❑
14. Modified Down Piston To Close At Low Pressure (less than 50 psi) [4] Yes ❑ No ❑
15. Dual voltage down leveling coil for emergency (battery backup) lowering [4] Yes ❑ No ❑

[1] Required for sizing, [2] Required, [3] Standard, [4] Optional

Please fax this form to EECO at (323) 245-9771

UV-5AT



B44
ASME 17.1

Elevator Equipment Corporation

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LA Fax: (323) 245-9771 - Richmond, IN Fax: (765) 966-7299
www.elevatorequipment.com and www.eecovalves.com

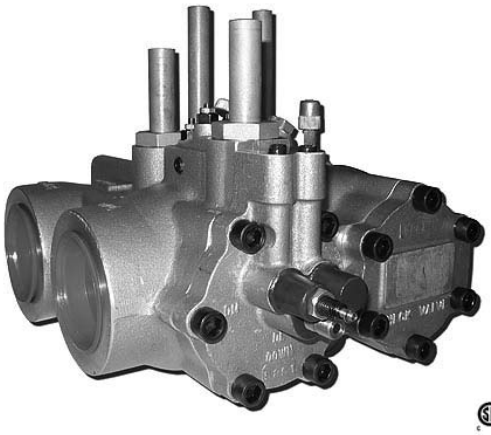
UV-7B & UV-7BC (Constant Down Speed) Control Valves

The EECO UV-7B hydraulic control valve performs all the necessary functions for the operation of a hydraulic elevator in both directions of travel. The UV-7B is the ideal solution for low pressure, high flow rate applications.

Also available is the Pressure Compensated UV-7BC which maintains Constant Down Speed between no load and full load conditions.

UV-7B

UV-7BC



Features

Smooth Start: Allows the pump motor to reach full running speed before load is applied to the pump. Provides a single adjustment for soft start and smooth acceleration.

Up Transition: Provides unvarying transition through a wide pressure range.

Up Leveling: Maintains leveling speed regardless of change of system pressure, oil viscosity or pump output.

Up Stop: Provides smooth up stop which is solenoid operated and adjustable.

Lowering Valve: Provides controlled down acceleration, precise contract down speed, down transition, adjustable leveling speed and soft stop. Tool-less manual lowering feature is standard.

Check Valve: Locks the elevator on a column of oil while the car is stopped.

Additional Features: A lightweight, heat-treated, high strength aluminum body. Moving parts are restricted to sliding sealed pistons. The valve has a fully adjustable pressure relief valve and optional 2 1/2" grooved connections.

Ratings

CSA-B44 - ASME A17.1 & UL (B) Certified.

UL and CSA-B44 rated at 50 psi (3.4 bar) minimum and 500 psi (34.5 bar) maximum. The temperature range is 80° F (27° C) minimum, 150° F (65° C) maximum.
Flow rate: minimum 75 gpm to maximum 400 gpm (284 -1514 l/min).

For oil service, use of a good brand of grade 32 turbine oil with a viscosity of 150 ssu at 100° F (38° C) and a minus pour point is recommended. Also compatible with grade 46 and biodegradable (vegetable) oil.

Size all UV-7B/BC valves to bypass the entire capacity of the pump at ***minimum*** pressure.

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www.elevatorequipment.com and www.eecovalves.com

UV-7B & UV-7BC Quotation & Order Form

❑ Request For Quote ❑ Order, PO # _____

Company _____ Telephone ( ) _____

Contact _____ Fax ( ) _____

Date _____ Date Required _____

1. Quantity Required [2]

2. Coil Voltage [2]

3. Existing valve (If any): EECO UV-7B (Size)

Other (Mfg, model, size)

4. Static Pressure [1] (psi), Empty car at bottom landing.

or **Empty Car Weight** (lbs)

Plunger Diameter (in)

or **Circumference** (in)

5. Flow Rate (GPM) [1]

or **Car Speed** (FPM) Also need plunger info in #4 above. **Up** / **Down** If different

6. Max Operating Pressure (psi) Required for UV-7BC.

or **Capacity** (lbs) Also need empty car weight info in #4 above.

7. Total Travel (ft)

8. Line Connections [2]

	Pump	Jack	Return
2.5" NPT [3]	❑	❑	❑
2.5" Grooved [4]	❑	❑	❑

9. Constant Down Speed (UV-7BC) [4] Yes ❑ No ❑

10. Pressure Gage Quick Disconnect [4] Jack ❑ Pump ❑

11. 0-1000 psi Liquid Filled Pressure Gage [4] Yes ❑ No ❑

12. Low Pressure Switch [4] Yes ❑ No ❑

[1] Required for sizing, [2] Required, [3] Standard, [4] Optional

Please fax this form to EECO at (323) 245-9771

UV-7B

B44 ASME 17.1 C US — UL LISTED

2.5" NPT ports standard

UV-7B with optional 2.5" grooved connections.

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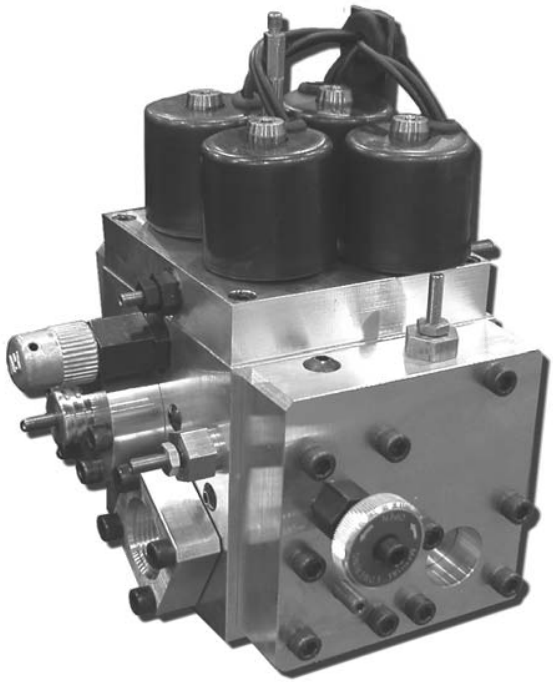
UV-4R Residential Control Valve



A Four Coil Valve For *Residential* & *LULA* Applications!

Continuing our tradition of providing the elevator industry with innovative quality products, EECO now offers a small, compact hydraulic elevator control valve for residential, LULA & handicapped applications.

The UV-4R has all the performance qualities of larger commercially available hydraulic control valves. Qualities like full leveling in the up and down directions and pressure regulation to maintain constant down speed. Jack ports are provided on both the right and left sides of the valve for easy installation. The UV-4R is capable of handling flow rates of 3 to 35 GPM.

Features

Smooth Up Start:	Allows the pump motor to reach full running speed before load is applied to the motor. Provides a single adjustment for soft start and smooth acceleration.
Up Transition:	Provides consistent transition through the full pressure range.
Up Leveling:	Maintains leveling speed regardless of change of system pressure, oil temperature & viscosity or pump output.
Up Stop:	Provides smooth up stop which is solenoid operated and adjustable.
Lowering Valve:	Provides controlled down acceleration and deceleration and maintains contract down and leveling speeds.
Check Valve:	Locks the elevator on a column of oil while the car is stopped.
Additional Features:	High temperature Viton seals are standard in this valve. Moving parts are restricted to sliding sealed pistons. The valve has a fully adjustable pressure relief valve. Uses solenoid coils that are UL and CSA listed.

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www.elevatorequipment.com and www.eecovalves.com

UV-4R Quotation & Order Form

❑ Request For Quote ❑ Order, PO # _____

Company _____ Telephone ( ) _____

Contact _____ Fax ( ) _____

Date _____ Date Required _____

1. **Quantity Required** [2] _____
2. **Coil Voltage** [2] _____
3. **Existing valve (If any):** **EECO UV-4R (Size)** _____
   Other (Mfg, model, size) _____
4. **Static Pressure** [1] _____ **(psi), Empty car at bottom landing.** or **Empty Car Weight (lbs)** _____
   Plunger Diameter (in) _____
   or Circumference (in) _____
5. **Flow Rate (GPM)** [1] _____ or **Car Speed (FPM)** **Up** _____
   Also need plunger info in #4 above. **Down** **If different** _____
6. **Max Operating Pressure (psi)** _____ or **Capacity (lbs)** _____
   Also need empty car weight info in #4 above.
7. **Total Travel (ft)** _____
8. **Line Connections**
   3/4" NPT [3] **is the only option for all three ports**
9. **0-1000 psi Liquid Filled Pressure Gage** [4] **Yes** ❑ **No** ❑
10. **Low Pressure Switch** [4] **Yes** ❑ **No** ❑
11. **Dual voltage down leveling coil for emergency (battery backup) lowering** [4] **Yes** ❑ **No** ❑

[1] Required for sizing, [2] Required, [3] Standard, [4] Optional

Please fax this form to EECO at (323) 245-9771

The EECO UV-4R four coil residential control valve.

UV-4R shown on the EECO residential power unit.

Elevator Equipment Corporation

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www.elevatorequipment.com and www.eecovalves.com

UV-5AT (Standard Valve) Adjustment Procedure

Notes:

1. **This information is to be used only by qualified hydraulic elevator professionals.**
2. The optimum oil temperature to adjust the valve is between 80° to 100°F (27° to 38°C). If oil temperature exceeds 100°F (38°C), make down stop firmer.
3. The following instructions are for adjusting the valve starting with adjusters on preset. However, each new valve is adjusted to a set of standard conditions at the factory and **you do not have to preset adjusters**. You only need to adjust **DM** and **BP**. Other adjusters may require fine-tuning to suit your application.
4. Hand tighten the seal nuts on the adjusters - **DO NOT** over tighten.
5. Valve must be mounted with solenoids in vertical position. Five (5) inches (127mm) minimum clearance is required to remove valve cover for service.
6. When disconnecting solenoids, do it electrically, not physically.
7. Both **UA** and **DC** adjusters have screened inputs and must be kept clean. **EECO** recommends use of a 5-micron filtration system.
8. If **DC** requires further fine-tuning after **DA** is adjusted, first open **DA** 3 turns, fine-tune **DC** and then readjust **DA**.
9. Down contract speed is full down speed with rated load on the car. Down speed with empty car is less than contract speed depending on the ration of full-load to no-load pressures, approximately 25% less for a 2 to 1 pressure ratio (i.e., empty car down speed = full load (contract) down speed x .75). If constant down speed is required between no-load and full-load conditions, use **UV-5ATC** valve.
10. **DO NOT** adjust the valve to suit switches. Adjust the switches (vanes / magnets) to suit the valve.

U1 - Up Fast solenoid — **Up Adjustments (From Preset)** — **U2 - Up Slow solenoid**

1) **BP** **Bypass -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **BP** CW until car moves, then CCW until car stalls plus a minimum of 1/2 turn. Stop pump motor. Reconnect **U2**.

2) **UA** **Up Acceleration -** Car at lower floor with **no load**. Turn **UA** CCW 2 1/2 turns from fully closed position. Register an up call and observe up acceleration. Turn **UA** CCW for faster or CW for slower up acceleration. Car should reach full speed in no more than 2 1/2 feet (.8m). **DO NOT** drag out acceleration.

3) **UL** **Up Leveling -** Car at lower floor with **no load**. Disconnect **U1**. Register an up call. Turn **UL** CCW (faster) or CW (slower) to set up leveling speed at 10 to 13 fpm (.05 to .07 m/sec). Leave **U1** disconnected.

4) **UT** **Up Transition -** Car at lower floor with **no load**. Register an up call with **U2** energized only. Car will move up at leveling speed. Turn **UT** CW until car speeds up, then slowly CCW until car slows down again. Reconnect **U1**. Register an up call and observe up transition. Turn **UT** CW (slower) or CCW (faster) until up transition is satisfactory. Slowdown switch should be located to give 3 to 4 inches (75 to 100mm) of stabilized leveling **(see note 10)**.

5) **US** **Up Stop -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **US** CW until car moves, then CCW until car stops again. Reconnect **U2**. Register an up call and observe up stop. Turn **US** CW for softer stop or CCW for firmer stop. **NOTE:** Pump motor must run approximately 1 second after car has stopped.

D1 - Down Fast solenoid — **Down Adjustments (From Preset)** — **D2 - Down Slow solenoid**

1) **DL** **Down Leveling -** Car at upper floor with **no load**. Turn **DC** CW 8 1/2 turns from fully open position. Disconnect **D1**. Register a down call. Adjust **DL** to set down leveling speed at 7 to 9 fpm (.04 to .05 m/sec). Reconnect **D1**.

2) **DM** **Down Main -** Car at upper floor with **no load**. Register a down call. Turn **DM** CW (slower) or CCW (faster) to set down speed at 25% less than contract (full load) speed **(see note 9)**.

3) **DC** **Down Closing -** Cycle **empty** car and observe down stop. Turn **DC** CW (softer stop) or CCW (firmer stop) until down stop is satisfactory **(see note 8)**.

4) **DT** **Down Transition -** Cycle **empty** car and observe down transition. If **DT** requires adjustment, send empty car to upper floor. Disconnect **D1**. Register a down call. Car should come down at leveling speed. Turn **DT** CCW until car speeds up, then slowly CW until car slows down again. Reconnect **D1**. Cycle car and turn **DT** CCW (slower) or CW (faster) until down transition is satisfactory. Readjust **DL** to maintain down leveling at 7 to 9 fpm (.04 to .05 m/sec). Slowdown switch should be located to give 3 to 4 inches (75 to 100mm) of stabilized leveling **(see note 10)**.

5) **DA** **Down Acceleration -** Car at upper floor with **no load**. Turn **DA** CW to stop. Register a down call. Car should not move. Turn **DA** slowly CCW until car breaks away from the floor. Turn **DA** CW (slower) or CCW (faster) until down acceleration is satisfactory.

ML **Manual Lowering** - Turn **ML** out CCW to lower car at leveling speed. All electrical power **MUST** be off when using manual lowering!

Relief Valve (RV):

1. With fully loaded car and a pressure gage installed on the **pump gage** port, register an up call and record maximum pressure as car nears top landing.
2. Close main line valve and turn **RV** and **UA** out CCW to stop.
3. Register an up call. Turn **RV** CW to set relief pressure as required by local code (not to exceed 50% above maximum pressure recorded earlier).
4. Restart pump to check pressure relief setting. Seal **RV** as required. Open main line valve to the jack. Readjust **UA** for proper up acceleration.

CW = Clockwise (IN) ↻ — **Adjuster Presetting** — ↺ **CCW** = Counter Clockwise (OUT)

	ADJUSTER	PRESETTING	FUNCTION
Up	**BP Bypass**	CCW to stop, then CW 2 turns.	(CCW - Delays up start)
Up	**UA Up Acceleration**	CW to stop.	(CCW - Faster acceleration)
Up	**UL Up Leveling**	CW to stop.	(CCW - Faster speed)
Up	**UT Up Transition**	CCW to stop, then CW 7 1/2 turns.	(CW - Slower transition)
Up	**US Up Stop**	CCW to stop, then CW 7 1/2 turns.	(CW - Softer stop)
Up	**RV Relief Valve**	Factory set at 550 psi (38 bars).	(CW - Increase pressure setting)
Down	**DL Down Leveling**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
Down	**DM Down Main**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
Down	**DC Down Closing**	CCW to stop.	(CCW - Firmer stop)
Down	**DT Down Transition**	Closed flush with end of lock nut.	(CCW - Slower transition)
Down	**DA Down Acceleration**	CCW to stop.	(CCW - Faster acceleration)
Down	**ML Manual Lowering**	CW to stop.	(CCW - Opens valve)

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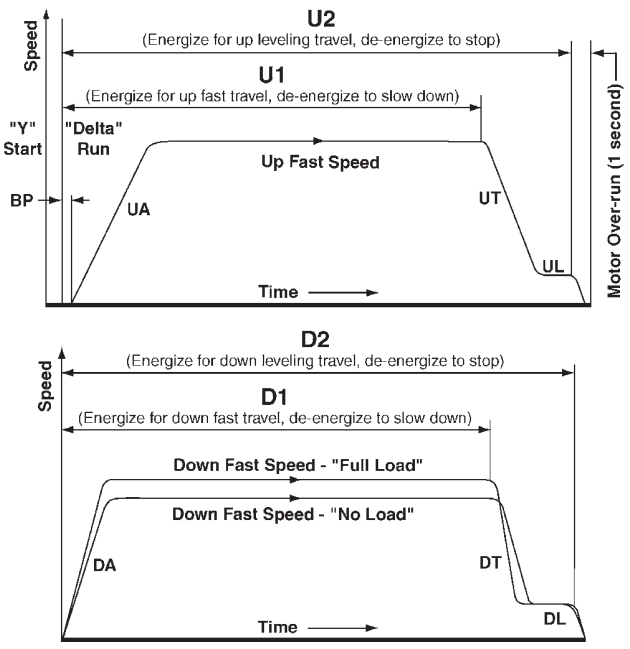
UV-5AT Operational Data

PERFORMANCE CHART FOR UV-5AT VALVES



PRESSURE

CSA-B44/UL Minimum/Maximum: 90 - 800 psi (6.2 - 55.2 bars). Standard pressure rating 50 psi minimum to 1150 psi maximum (3.4 - 79.3 bars).

FLOW RATE

Minimum 20 gpm to maximum 200 gpm (76 -836 l/min).

OPERATING TEMPERATURE

80ºF (27ºC) minimum to 150ºF (66ºC) maximum.

GAGE PORTS

"Ram"(jack) and "Pump" gage ports are 1/8" NPT and are provided on top of the valve. Optional quick connect/disconnect fittings as well as 0-1000 psi liquid filled pressure gages can be installed and/or supplied with the valve upon request.

OIL SPECIFICATIONS

Recommended oil: A good brand of 32 grade turbine oil with a viscosity of 150 SSU at 100ºF (38º C). **Other oils:** The UV-5AT is also compatible with 46 grade as well as biodegradable (vegetable) oil.

LINE CONNECTION

Factory standard for each of the three valve ports is 2" NPT, 2" grooved ports are optional.

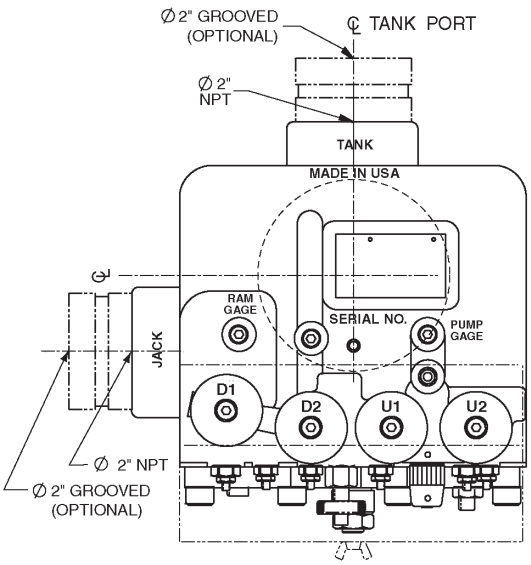
STANDARD CSA-B44/UL APPROVED SOLENOID COILS

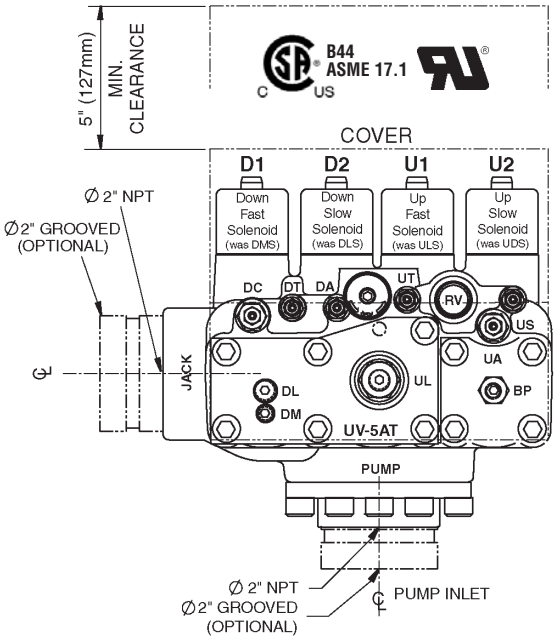
24 VDC, 110 VAC, 208 VAC, 220 VAC/110 VDC, 440 VAC/220 VDC. For emergency (battery backup) lowering: 110 VAC/12 VDC (dual voltage). For other coil options, please contact EECO.

PLEASE NOTE NEW SOLENOID LABELING (since August 2003):

Solenoids: **U1** - Up Fast (Red wires) - (was **ULS**)
U2 - Up Slow (Yellow wires) - (was **UDS**)
D1 - Down Fast (Black wires) - (was **DMS**)
D2 - Down Slow (Blue wires) - (was **DLS**)

Adjuster: **US** - Up Stop - (was **UD**)





SEQUENCE OF SOLENOID OPERATION

Up Start:

A) "ATL" (Across The Line) start: pump motor "ON".
Energize both **U2** and **U1** solenoids to run up at fast speed.

B) "Y" start: Pump motor "ON" (reduced voltage).
"Delta" run: Pump motor "ON" full voltage.
Energize both **U2** and **U1** solenoids to run up at fast speed.

De-energize **U1** to slowdown to leveling speed.
De-energize **U2** to stop at floor.

CAUTION: Never energize **U2** and **U1** during "Y" start, only after "Delta" run!

Down Start:

Energize **D1** and **D2** to lower car at fast speed.
De-energize **D1** to slowdown to leveling speed.
De-energize **D2** to stop at floor.

Note 1: For additional clarification on the sequence of operation please refer to the Performance Chart above.

Note 2: Pump motor must be timed to run approximately 1 second after car has stopped.

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UV-5ATC (Constant Down Speed Valve) Adjustment Procedure

Notes:

1. **This information is to be used only by qualified hydraulic elevator professionals.**
2. The optimum oil temperature to adjust the valve is between 80° to 100°F (27° to 38°C). If oil temperature exceeds 100°F (38°C), make down stop firmer.
3. The following instructions are for adjusting the valve starting with adjusters on preset. However, each new valve is adjusted to a set of standard conditions at the factory and **you do not have to preset adjusters**. You only need to adjust **DM** and **BP**. Other adjusters may require fine-tuning to suit your application.
4. Hand tighten the seal nuts on the adjusters - **DO NOT** over tighten.
5. Valve must be mounted with solenoids in vertical position. Five (5) inches (127mm) minimum clearance is required to remove valve cover for service.
6. When disconnecting solenoids, do it electrically, not physically.
7. Both **UA** and **DC** adjusters have screened inputs and must be kept clean. **EECO** recommends use of a 5-micron filtration system.
8. If **DC** requires further fine-tuning after **DA** is adjusted, first open **DA** 3 turns, fine-tune **DC** and then readjust **DA**.
9. **DO NOT** adjust the valve to suit switches. Adjust the switches (vanes / magnets) to suit the valve.

U1 - Up Fast solenoid — **Up Adjustments (From Preset)** — **U2 - Up Slow solenoid**

1) **BP** **Bypass -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **BP** CW until car moves, then CCW until car stalls plus a minimum of 1/2 turn. Stop pump motor. Reconnect **U2**.

2) **UA** **Up Acceleration -** Car at lower floor with **no load**. Turn **UA** CCW 2 1/2 turns from fully closed position. Register an up call and observe up acceleration. Turn **UA** CCW for faster or CW for slower up acceleration. Car should reach full speed in no more than 2 1/2 feet (.8m). **DO NOT** drag out acceleration.

3) **UL** **Up Leveling -** Car at lower floor with **no load**. Disconnect **U1**. Register an up call. Turn **UL** CCW (faster) or CW (slower) to set up leveling speed at 10 to 13 fpm (.05 to .07 m/sec). Leave **U1** disconnected.

4) **UT** **Up Transition -** Car at lower floor with **no load**. Register an up call with **U2** energized only. Car will move up at leveling speed. Turn **UT** CW until car speeds up, then slowly CCW until car slows down again. Reconnect **U1**. Register an up call and observe up transition. Turn **UT** CW (slower) or CCW (faster) until up transition is satisfactory. Slowdown switch should be located to give 3 to 4 inches (75 to 100mm) of stabilized leveling **(see note 9)**.

5) **US** **Up Stop -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **US** CW until car moves, then CCW until car stops again. Reconnect **U2**. Register an up call and observe up stop. Turn **US** CW for softer stop or CCW for firmer stop. **NOTE:** Pump motor must run approximately 1 second after car has stopped.

D1 - Down Fast solenoid — **Down Adjustments (From Preset)** — **D2 - Down Slow solenoid**

1) **DL** **Down Leveling -** Car at upper floor with **no load**. Turn **DC** CW 8 1/2 turns from fully open position. Disconnect **D1**. Register a down call. Adjust **DL** to set down leveling speed at 7 to 9 fpm (.04 to .05 m/sec).Reconnect **D1**.

2) **DM** **Down Main -** Car at upper floor with **no load** and **DSC** on preset (CCW to stop). Register a down call. Turn **DM** CW (slower) or CCW (faster) to set down speed at contract (full load) speed.

3) **DSC** **Down Speed Control -** Pressure compensation for down speed control is achieved automatically when **DSC** is completely out (CCW to stop). To close off **DSC**, relieve system pressure by landing car in pit, turn **DSC** CW until snap ring is flush with the end of **DM** adjuster. To reactivate down speed control, turn **DSC** adjuster CCW to stop.

4) **DC** **Down Closing -** Cycle **empty** car and observe down stop. Turn **DC** CW (softer stop) or CCW (firmer stop) until down stop is satisfactory **(see note 8)**.

5) **DT** **Down Transition -** Cycle **empty** car and observe down transition. If **DT** requires adjustment, send empty car to upper floor. Disconnect **D1**. Register a down call. Car should come down at leveling speed. Turn **DT** CCW until car speeds up, then slowly CW until car slows down again. Reconnect **D1**. Cycle car and turn **DT** CCW (slower) or CW (faster) until down transition is satisfactory. Readjust **DL** to maintain down leveling at 7 to 9 fpm (.04 to .05 m/sec). Slowdown switch should be located to give 3 to 4 inches (75 to 100mm) of stabilized leveling **(see note 9)**.

6) **DA** **Down Acceleration -** Car at upper floor with **no load**. Turn **DA** CW to stop. Register a down call. Car should not move. Turn **DA** slowly CCW until car breaks away from the floor. Turn **DA** CW (slower) or CCW (faster) until down acceleration is satisfactory.

ML **Manual Lowering** - Turn **ML** out CCW to lower car at leveling speed. All electrical power **MUST** be off when using manual lowering!

Relief Valve (RV):

1. With fully loaded car and a pressure gage installed on the **pump gage** port, register an up call and record maximum pressure as car nears top landing.
2. Close main line valve and turn **RV** and **UA** out CCW to stop.
3. Register an up call. Turn **RV** CW to set relief pressure as required by local code (not to exceed 50% above maximum pressure recorded earlier).
4. Restart pump to check pressure relief setting. Seal **RV** as required. Open main line valve to the jack. Readjust **UA** for proper up acceleration.

CW = Clockwise (IN) ↻ — **Adjuster Presetting** — ↺ **CCW** = Counter Clockwise (OUT)

	ADJUSTER	PRESETTING	FUNCTION
Up	**BP Bypass**	CCW to stop, then CW 2 turns.	(CCW - Delays up start)
	UA Up Acceleration	CW to stop.	(CCW - Faster acceleration)
	UL Up Leveling	CW to stop.	(CCW - Faster speed)
	UT Up Transition	CCW to stop, then CW 7 1/2 turns.	(CW - Slower transition)
	US Up Stop	CCW to stop, then CW 7 1/2 turns.	(CW - Softer stop)
	RV Relief Valve	Factory set at 550 psi (38 bars).	(CW - Increase pressure setting)
Down	**DL Down Leveling**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
	DM Down Main	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
	DSC Down Speed Control	CCW to stop.	(No adjustment required)
	DC Down Closing	CCW to stop.	(CCW - Firmer stop)
	DT Down Transition	Closed flush with end of lock nut.	(CCW - Slower transition)
	DA Down Acceleration	CCW to stop.	(CCW - Faster acceleration)
	ML Manual Lowering	CW to stop.	(CCW - Opens valve)

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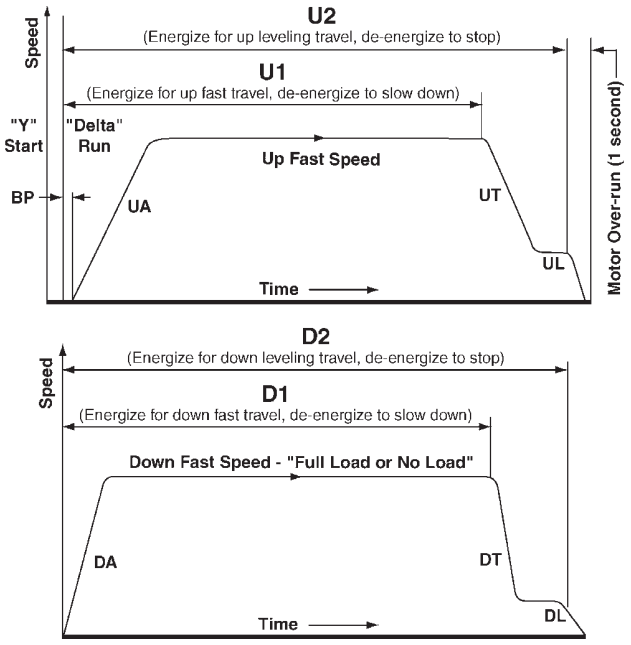
UV-5ATC Operational Data

PERFORMANCE CHART FOR UV-5ATC VALVES



PRESSURE

CSA-B44/UL Minimum/Maximum: 90 - 800 psi (6.2 - 55.2 bars). Standard pressure rating 50 psi minimum to 1150 psi maximum (3.4 - 79.3 bars).

FLOW RATE

Minimum 20 gpm to maximum 200 gpm (76 - 836 l/min).

OPERATING TEMPERATURE

80ºF (27ºC) minimum to 150ºF (66ºC) maximum.

GAGE PORTS

"Ram"(jack) and "Pump" gage ports are 1/8" NPT and are provided on top of the valve. Optional quick connect/disconnect fittings as well as 0-1000 psi liquid filled pressure gages can be installed and/or supplied with the valve upon request.

OIL SPECIFICATIONS

Recommended oil: A good brand of 32 grade turbine oil with a viscosity of 150 SSU at 100ºF (38º C). **Other oils:** The UV-5ATC is also compatible with 46 grade as well as biodegradable (vegetable) oil.

LINE CONNECTION

Factory standard for each of the three valve ports is 2" NPT, 2" grooved ports are optional.

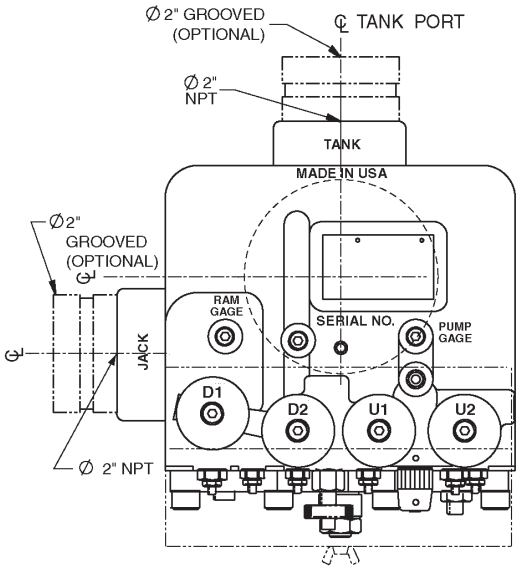
STANDARD CSA-B44/UL APPROVED SOLENOID COILS

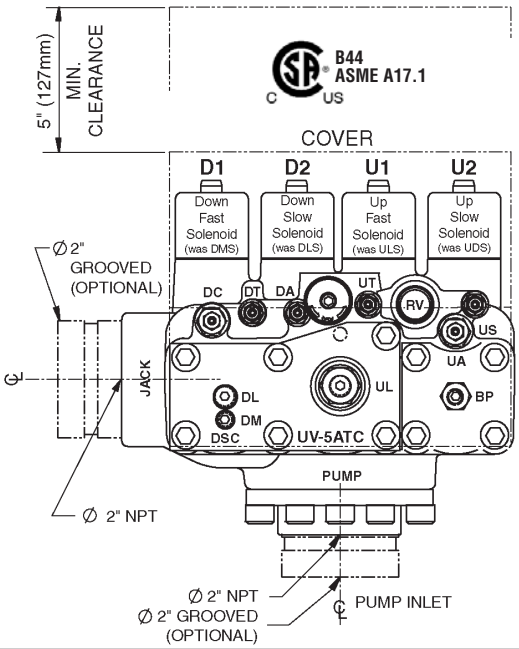
24 VDC, 110 VAC, 208 VAC, 220 VAC/110 VDC, 440 VAC/220 VDC. For emergency (battery backup) lowering: 110 VAC/12 VDC (dual voltage). For other coil options, please contact EECO.

PLEASE NOTE NEW SOLENOID LABELING (since August 2003):

Solenoids: **U1** - Up Fast (Red wires) - (was **ULS**)
U2 - Up Slow (Yellow wires) - (was **UDS**)
D1 - Down Fast (Black wires) - (was **DMS**)
D2 - Down Slow (Blue wires) - (was **DLS**)

Adjuster: **US** - Up Stop - (was **UD**)





SEQUENCE OF SOLENOID OPERATION

Up Start:

A) "ATL" (Across The Line) start: pump motor "ON".
Energize both **U2** and **U1** solenoids to run up at fast speed.

B) "Y" start: Pump motor "ON" (reduced voltage).
"Delta" run: Pump motor "ON" full voltage.
Energize both **U2** and **U1** solenoids to run up at fast speed.

De-energize **U1** to slowdown to leveling speed.
De-energize **U2** to stop at floor.

CAUTION: Never energize **U2** and **U1** during "Y" start, only after "Delta" run!

Down Start:

Energize **D1** and **D2** to lower car at fast speed.
De-energize **D1** to slowdown to leveling speed.
De-energize **D2** to stop at floor.

Note 1: For additional clarification on the sequence of operation please refer to the Performance Chart above.

Note 2: Pump motor must be timed to run approximately 1 second after car has stopped.

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UV-7B (Standard Valve) Adjustment Procedure

Notes:

1. **This information is to be used only by qualified hydraulic elevator professionals.**
2. The optimum oil temperature to adjust the valve is between 80° to 100°F (27° to 38°C). If oil temperature exceeds 100°F (38°C), make down stop firmer.
3. The following instructions are for adjusting the valve starting with adjusters on preset. However, each new valve is adjusted to a set of standard conditions at the factory and **you do not have to preset adjusters**. You only need to adjust **DM** and **BP**. Other adjusters may require fine-tuning to suit your application.
4. Hand tighten the seal nuts on the adjusters - **DO NOT** over tighten.
5. Valve must be mounted with solenoids in vertical position.
6. When disconnecting solenoids, do it electrically, not physically.
7. Both **UA** and **DC** adjusters have screened inputs and must be kept clean. **EECO** recommends use of a 5-micron filtration system.
8. If **DC** requires further fine-tuning after **DA** is adjusted, first open **DA** 3 turns, fine-tune **DC** and then readjust **DA**.
9. Down contract speed is full down speed with rated load on the car. Down speed with empty car is less than contract speed depending on the ration of full-load to no-load pressures, approximately 25% less for a 2 to 1 pressure ratio (i.e., empty car down speed = full load (contract) down speed x .75). If constant down speed is required between no-load and full-load conditions, use **UV-7BC** valve.
10. **DO NOT** adjust the valve to suit switches. Adjust the switches (vanes / magnets) to suit the valve.

U1 - Up Fast solenoid — **Up Adjustments (From Preset)** — **U2 - Up Slow solenoid**

1) **BP** **Bypass - Note: UA** must be on preset (CW to stop). Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Turn **BP** CW until car moves, then CCW until car stalls plus a minimum of 1/2 turn. Stop pump motor and reconnect **U2**.

2) **UA** **Up Acceleration -** Car at lower floor with **no load**. Turn **UA** CCW 2 1/2 turns from fully closed position. Register an up call and observe up acceleration. Turn **UA** CCW for faster or CW for slower up acceleration. Car should reach full speed in 2 1/2 feet (.8 m). **DO NOT** drag out acceleration**.**

3) **UL** **Up Leveling -** Car at lower floor with **no load**. Disconnect **U1**. Register an up call. Adjust **UL** to set up leveling speed at 10 to 13 fpm (.05 to .07 m/sec). Reconnect **U1**.

4) **UT** **Up Transition -** Car at lower floor with **no load**. Register an up call and observe up transition. Turn **UT** CW (slower) or CCW (faster) until up transition is satisfactory. Slowdown switch should be located to give 3 to 4 inches (75 to 100 mm) of stabilized leveling **(see note 10)**.

5) **US** **Up Stop -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **US** CW until car moves, then CCW until car stops again. Reconnect **U2**. Register an up call and observe up stop. Turn **US** CW for softer stop, CCW for firmer stop. **NOTE: Pump motor must run approximately 1 second after car has stopped.**

D1 - Down Fast solenoid — **Down Adjustments (From Preset)** — **D2 - Down Slow solenoid**

1) **DL** **Down Leveling -** Car at upper floor with **no load**. Turn **DC** CW 2 1/2 turns from fully open position position. Disconnect **D1**. Register a down call. Adjust **DL** to set down leveling speed at 7 to 9 fpm (.04 to .05 m/s). Reconnect **D1**.

2) **DM** **Down Main -** Car at upper floor with **no load**. Register a down call. Turn **DM** CW (slower) or CCW (faster) to set down speed at 25% less than contract (full load) speed **(see note 9).**

3) **DC** **Down Closing -** Cycle **empty** car and observe down stop. Turn **DC** CW (softer stop) or CCW (firmer stop) until down stop is satisfactory **(see note 8)**.

4) **DT** **Down Transition -** Cycle **empty** car and observe down transition. If **DT** requires adjustment, send empty car to upper floor. Disconnect **D1**. Register a down call. Car should come down at leveling speed. Turn **DT** CCW until car speeds up, then slowly CW until car slows down again. Reconnect **D1**. Cycle car and turn **DT** CCW (slower) or CW (faster) until down transition is satisfactory. Readjust **DL** to maintain down leveling at 7 to 9 fpm (.04 to .05 m/sec). Slowdown switch should be located to give 3 to 4 inches (75 to 100mm) of stabilized leveling **(see note 10)**.

5) **DA** **Down Acceleration -** Car at upper floor with **no load**. Turn **DA** CW to stop. Register a down call. Car should not move. Turn **DA** slowly CCW until car breaks away from floor. Turn **DA** CW (slower) or CCW (faster) until down acceleration is satisfactory.

ML **Manual Lowering** - Turn **ML** out CCW to lower car at leveling speed. All electrical power **MUST** be off when using manual lowering!

Relief Valve (RV):

1. With fully loaded car and a pressure gage installed on the **pump gage** port, register an up call and record maximum pressure as car nears top landing.
2. Close main line valve and turn **RV** and **UA** out CCW to stop.
3. Register an up call. Turn **RV** CW to set relief pressure as required by local code (not to exceed 50% above maximum pressure recorded earlier).
4. Restart pump to check pressure relief setting. Seal **RV** as required. Open main line valve to the jack. Readjust **UA** for proper up acceleration.

CW = Clockwise (IN) ↻ — **Adjuster Presetting** — ↺ **CCW** = Counter Clockwise (OUT)

		ADJUSTER	PRESETTING	FUNCTION
Up	**BP**	**Bypass**	CCW to stop, then CW 2 turns.	(CCW - Delays up start)
	UA	**Up Acceleration**	CW to stop (flush with end of lock nut).	(CCW - Faster acceleration)
	UL	**Up Leveling**	CCW to stop.	(CW - Faster speed)
	UT	**Up Transition**	CCW to stop, then CW 2 1/2 turns.	(CW - Slower transition)
	US	**Up Stop**	CCW to stop.	(CW - Softer stop)
	RV	**Relief Valve**	Factory set at 500 psi (34 bars).	(CW - Increase pressure)
Down	**DL**	**Down Leveling**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
	DM	**Down Main**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
	DT	**Down Transition**	CW to stop (flush with end of lock nut).	(CCW - Slower transition)
	DA	**Down Acceleration**	CCW to stop.	(CW - Slower acceleration)
	DC	**Down Closing**	CCW to stop.	(CW - Softer stop)
	ML	**Manual lowering**	CW to stop.	(CCW - Opens valve)

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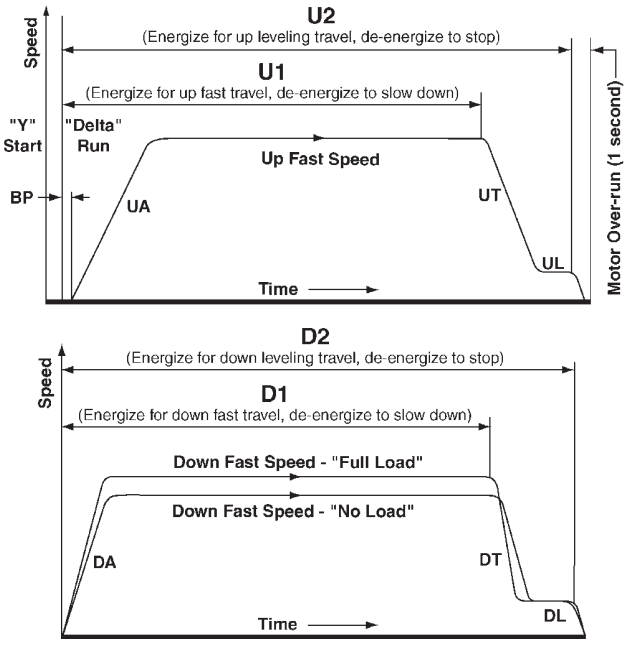
UV-7B Operational Data

PERFORMANCE CHART FOR UV-7B VALVES



PRESSURE

CSA-B44/UL Minimum/Maximum: 50 - 500 psi (3.5 - 34.5 bars).

FLOW RATE

Minimum 75 gpm to maximum 400 gpm (284 -1514 l/min). For higher flow rates contact EECO.

OPERATING TEMPERATURE

80°F (27°C) minimum to 150°F (65°C) maximum.

GAGE PORTS

Gage ports are 1/8" NPT and are provided on the top of the valve. Please refer to the illustration at right. Optional quick connect/disconnect fittings as well as 0-1000 psi liquid filled pressure gage can be supplied with the valve upon request.

OIL SPECIFICATIONS

Recommended oil: A good brand of 32 grade turbine oil with a viscosity of 150 ssu at 100°F (38°C). **Other oils:** The UV-7B is also compatible with 46 grade as well as biodegradable (vegetable) oil.

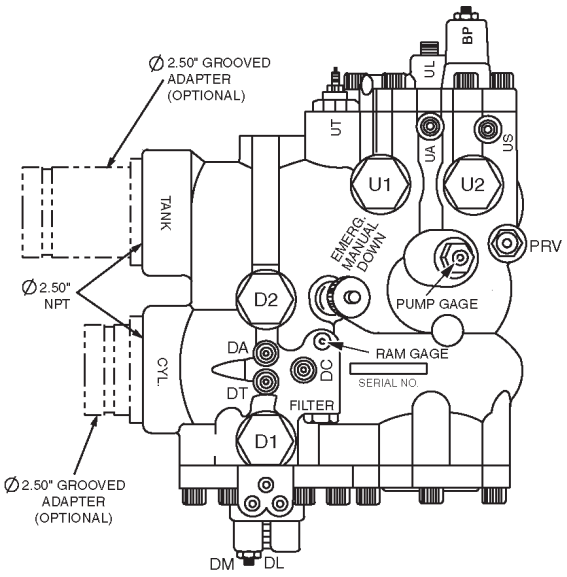
STANDARD CSA/UL APPROVED SOLENOID COILS

110 VAC, 208 VAC, 220 VAC, 440 VAC, 110 VDC, 220 VDC, For other coil options, please contact EECO.

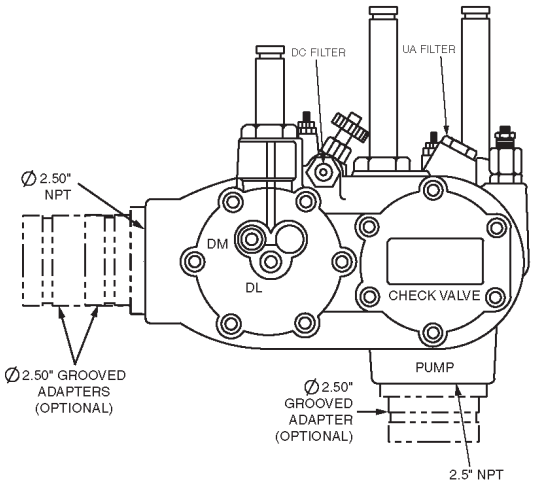
PLEASE NOTE NEW SOLENOID LABELING (since August 2003):

Solenoids: **U1** - Up Fast (Red wires) - (was **ULS**)
U2 - Up Slow (Yellow wires) - (was **UDS**)
D1 - Down Fast (Black wires) - (was **DMS**)
D2 - Down Slow (Blue wires) - (was **DLS**)

Adjuster: **US** - Up Stop - (was **UD**)



B44 ASME 17.1 C US — UL LISTED



SEQUENCE OF SOLENOID OPERATION

Up Start:

A) "ATL" (Across The Line) start: pump motor "ON".
Energize both **U2** and **U1** solenoids to run up at fast speed.

B) "Y" start: Pump motor "ON" (reduced voltage).
"Delta" run: Pump motor "ON" full voltage.
Energize both **U2** and **U1** solenoids to run up at fast speed.

De-energize **U1** to slowdown to leveling speed.
De-energize **U2** to stop at floor.

CAUTION: Never energize **U2** and **U1** during "Y" start, only after "Delta" run!

Down Start:

Energize **D1** and **D2** to lower car at fast speed.
De-energize **D1** to slowdown to leveling speed.
De-energize **D2** to stop at floor.

Note 1: For additional clarification on the sequence of operation please refer to the Performance Chart above.

Note 2: Pump motor must be timed to run approximately 1 second after car has stopped.

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UV-7BC (Constant Down Speed Valve) Adjustment Procedure

Notes:

1. **This information is to be used only by qualified hydraulic elevator professionals.**
2. The optimum oil temperature to adjust the valve is between 80° to 100°F (27° to 38°C). If oil temperature exceeds 100°F (38°C), make down stop firmer.
3. The following instructions are for adjusting the valve starting with adjusters on preset. However, each new valve is adjusted to a set of standard conditions at the factory and **you do not have to preset adjusters**. You only need to adjust **DM** and **BP**. Other adjusters may require fine-tuning to suit your application.
4. Hand tighten the seal nuts on the adjusters - **DO NOT** over tighten.
5. Valve must be mounted with solenoids in vertical position.
6. When disconnecting solenoids, do it electrically, not physically.
7. Both **UA** and **DC** adjusters have screened inputs and must be kept clean. **EECO** recommends use of a 5-micron filtration system.
8. If **DC** requires further fine-tuning after **DA** is adjusted, first open **DA** 3 turns, fine-tune **DC** and then readjust **DA**.
9. **DO NOT** adjust the valve to suit switches. Adjust the switches (vanes / magnets) to suit the valve.

U1 - Up Fast solenoid — **Up Adjustments (From Preset)** — **U2 - Up Slow solenoid**

1) **BP** **Bypass - Note: UA** must be on preset (CW to stop). Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Turn **BP** CW until car moves, then CCW until car stalls plus a minimum of 1/2 turn. Stop pump motor and reconnect **U2**.

2) **UA** **Up Acceleration -** Car at lower floor with **no load**. Turn **UA** CCW 2 1/2 turns from fully closed position. Register an up call and observe up acceleration. Turn **UA** CCW for faster or CW for slower up acceleration. Car should reach full speed in 2 1/2 feet (.8 m). **DO NOT** drag out acceleration**.**

3) **UL** **Up Leveling -** Car at lower floor with **no load**. Disconnect **U1**. Register an up call. Adjust **UL** to set up leveling speed at 10 to 13 fpm (.05 to .07 m/sec). Reconnect **U1**.

4) **UT** **Up Transition -** Car at lower floor with **no load**. Register an up call and observe up transition. Turn **UT** CW (slower) or CCW (faster) until up transition is satisfactory. Slowdown switch should be located to give 3 to 4 inches (75 to 100 mm) of stabilized leveling **(see note 9)**.

5) **US** **Up Stop -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **US** CW until car moves, then CCW until car stops again. Reconnect **U2**. Register an up call and observe up stop. Turn **US** CW for softer stop, CCW for firmer stop. **NOTE: Pump motor must run approximately 1 second after car has stopped.**

D1 - Down Fast solenoid — **Down Adjustments (From Preset)** — **D2 - Down Slow solenoid**

1) **DL** **Down Leveling -** Car at upper floor with **no load**. Turn **DC** CW 2 1/2 turns from fully open position position. Disconnect **D1**. Register a down call. Adjust **DL** to set down leveling speed at 7 to 9 fpm (.04 to .05 m/s). Reconnect **D1**.

2) **DM** **Down Main -** Car at upper floor with **no load** and **DSC** on preset (CCW to stop). Register a down call. Turn **DM** CW (slower) or CCW (faster) to set down speed at contract (full load) speed**.**

3) **DSC** **Down Speed Control -** Pressure compensation for down speed control is achieved automatically when **DSC** is completely out (CCW to stop). To close off **DSC**, relieve system pressure by landing car in pit, turn **DSC** CW until snap ring is flush with the end of **DM** adjuster. To reactivate down speed control**,** turn **DSC** CCW to stop.

4) **DC** **Down Closing -** Cycle **empty** car and observe down stop. Turn **DC** CW (softer stop) or CCW (firmer stop) until down stop is satisfactory **(see note 8)**.

5) **DT** **Down Transition -** Cycle **empty** car and observe down transition. If **DT** requires adjustment, send empty car to upper floor. Disconnect **D1**. Register a down call. Car should come down at leveling speed. Turn **DT** CCW until car speeds up, then slowly CW until car slows down again. Reconnect **D1**. Cycle car and turn **DT** CCW (slower) or CW (faster) until down transition is satisfactory. Readjust **DL** to maintain down leveling at 7 to 9 fpm (.04 to .05 m/sec). Slowdown switch should be located to give 3 to 4 inches (75 to 100mm) of stabilized leveling **(see note 10)**.

6) **DA** **Down Acceleration -** Car at upper floor with **no load**. Turn **DA** CW to stop. Register a down call. Car should not move. Turn **DA** slowly CCW until car breaks away from floor. Turn **DA** CW (slower) or CCW (faster) until down acceleration is satisfactory.

ML **Manual Lowering** - Turn **ML** out CCW to lower car at leveling speed. All electrical power **MUST** be off when using manual lowering!

Relief Valve (RV):

1. With fully loaded car and a pressure gage installed on the **pump gage** port, register an up call and record maximum pressure as car nears top landing.
2. Close main line valve and turn **RV** and **UA** out CCW to stop.
3. Register an up call. Turn **RV** CW to set relief pressure as required by local code (not to exceed 50% above maximum pressure recorded earlier).
4. Restart pump to check pressure relief setting. Seal **RV** as required. Open main line valve to the jack. Readjust **UA** for proper up acceleration.

CW = Clockwise (IN) ↻ — **Adjuster Presetting** — ↺ **CCW** = Counter Clockwise (OUT)

	ADJUSTER		PRESETTING	FUNCTION
Up	**BP**	**Bypass**	CCW to stop, then CW 2 turns.	(CCW - Delays up start)
	UA	**Up Acceleration**	CW to stop (flush with end of lock nut).	(CCW - Faster acceleration)
	UL	**Up Leveling**	CCW to stop.	(CW - Faster speed)
	UT	**Up Transition**	CCW to stop, then CW 2 1/2 turns.	(CW - Slower transition)
	US	**Up Stop**	CCW to stop.	(CW - Softer stop)
	RV	**Relief Valve**	Factory set at 500 psi (34 bars).	(CW - Increase pressure)
Down	**DL**	**Down Leveling**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
	DM	**Down Main**	CW to stop, then CCW 5 1/2 turns.	(CW - Slower speed)
	DSC	**Down Speed Control**	CCW to stop (flush with end of lock nut).	(No adjustment required)
	DT	**Down Transition**	CW to stop.	(CCW - Slower transition)
	DA	**Down Acceleration**	CCW to stop.	(CW - Slower acceleration)
	DC	**Down Closing**	CCW to stop.	(CW - Softer stop)
	ML	**Manual lowering**	CW to stop.	(CCW - Opens valve)

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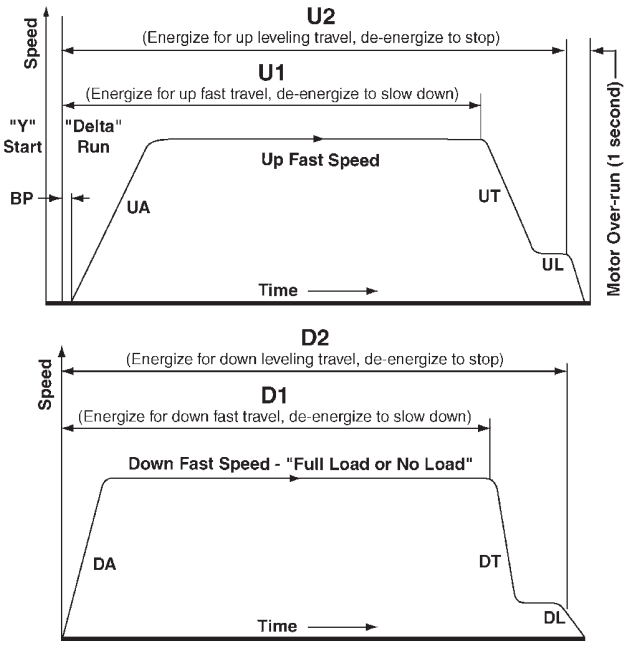
UV-7BC Operational Data

PERFORMANCE CHART FOR UV-7BC VALVES



PRESSURE

CSA-B44/UL Minimum/Maximum: 50 - 500 psi (3.5 - 34.5 bars).

FLOW RATE

Minimum 75 gpm to maximum 400 gpm (284 -1514 l/min). For higher flow rates contact EECO.

OPERATING TEMPERATURE

80°F (27°C) minimum to 150°F (65°C) maximum.

GAGE PORTS

Gage ports are 1/8" NPT and are provided on the top of the valve. Please refer to the illustration at right. Optional quick connect/disconnect fittings as well as 0-1000 psi liquid filled pressure gage can be supplied with the valve upon request.

OIL SPECIFICATIONS

Recommended oil: A good brand of 32 grade turbine oil with a viscosity of 150 ssu at 100°F (38°C). **Other oils:** The UV-7B is also compatible with 46 grade as well as biodegradable (vegetable) oil.

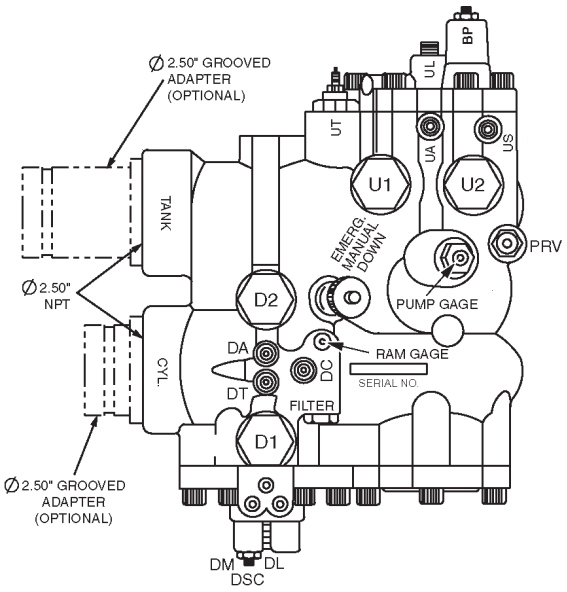
STANDARD CSA/UL APPROVED SOLENOID COILS

110 VAC, 208 VAC, 220 VAC, 440 VAC, 110 VDC, 220 VDC, For other coil options, please contact EECO.

PLEASE NOTE NEW SOLENOID LABELING (since August 2003):

Solenoids: **U1** - Up Fast (Red wires) - (was **ULS**)
U2 - Up Slow (Yellow wires) - (was **UDS**)
D1 - Down Fast (Black wires) - (was **DMS**)
D2 - Down Slow (Blue wires) - (was **DLS**)

Adjuster: **US** - Up Stop - (was **UD**)



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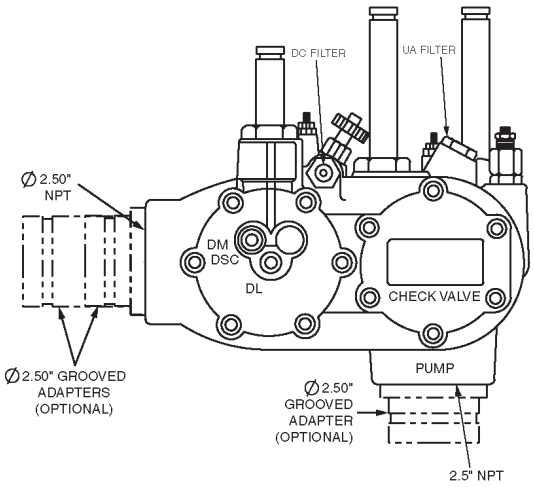

SEQUENCE OF SOLENOID OPERATION

Up Start:

A) "ATL" (Across The Line) start: pump motor "ON".
Energize both **U2** and **U1** solenoids to run up at fast speed.

B) "Y" start: Pump motor "ON" (reduced voltage).
"Delta" run: Pump motor "ON" full voltage.
Energize both **U2** and **U1** solenoids to run up at fast speed.

De-energize **U1** to slowdown to leveling speed.
De-energize **U2** to stop at floor.

CAUTION: Never energize **U2** and **U1** during "Y" start, only after "Delta" run!

Down Start:

Energize **D1** and **D2** to lower car at fast speed.
De-energize **D1** to slowdown to leveling speed.
De-energize **D2** to stop at floor.

Note 1: For additional clarification on the sequence of operation please refer to the Performance Chart above.

Note 2: Pump motor must be timed to run approximately 1 second after car has stopped.

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UV-4R Adjustment Procedure

For residential, LULA and low flow applications.

1 This information is provided with the understanding that it is only to be used by qualified hydraulic elevator professionals.

2 Optimum oil temperature for adjusting valve is 80°F (27°C) min. to 100°F (38°C) maximum.

3 Each new valve is adjusted to a set of standard conditions at the factory. You only need to adjust **DM** and **BP** settings. Other minor adjustments may be required to suit your application. Final adjustments are made 1/8 turn (or less) at a time for optimum performance.

4 After valve adjustments are finalized, snug tighten lock nuts **(DO NOT over tighten).**

5 Valve must be mounted with solenoids in vertical position. 5 inches (127mm) minimum clearance is required to remove the valve cover for service.

6 When disconnecting solenoids, do it electrically, not physically.

7 It is important to keep system oil clean. EECO recommends use of a 5 micron filtration system.

8 If **DC** requires further adjusting, first preset **DA**, adjust **DC** as required, then readjust **DA**.

9 DO NOT adjust valve to suit switches (vanes/magnets). Adjust the switches to suit the valve.

Up Adjustments

U1 - Up Fast solenoid — **U2 - Up Slow solenoid**

BP **Bypass -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Turn **BP** CW until car moves, then CCW until car stalls plus 1/2 turn. Stop pump and reconnect **U2**.

UA **Up Acceleration -** Car at lower floor with **no load**. Turn **UA** CCW 9 turns from preset. Register an up call and observe up acceleration. Turn **UA** a small step at a time CCW for faster or CW for slower up acceleration. **DO NOT DRAG OUT ACCELERATION.**

UL **Up Leveling -** Car at lower floor with **no load**. Disconnect **U1**. Register an up call with **U2** energized only. Turn **UL** CW (faster) or CCW (slower) to set up leveling speed at 9 to 12 fpm (.05 to .06 m/s). Leave **U1** disconnected.

UT **Up Transition -** Car at lower floor with **no load**. Start pump with **U2** energized only. Car will move up at leveling speed. Turn **UT** CW until car speeds up, then slowly CCW until car slows down to leveling speed again. Reconnect **U1**. Cycle car and observe up transition. Turn **UT** CW for slower transition, CCW for faster transition. Slowdown switch should be set to give 3 to 4 inches (75 mm to 100 mm) of stabilized leveling.

US **Up Stop -** Car at lower floor with **no load**. Disconnect **U2**. Register an up call. Car should not move. Turn **US** CW until car moves then slowly CCW until car stops again. Reconnect **U2**. Cycle car and observe up stop. Turn **US** CW for softer stop, CCW for firmer stop. **NOTE:** Pump motor must run approximately 1 second after car has stopped.

Down Adjustments

D1 - Down Fast solenoid — **D2 - Down Slow solenoid**

DL **Down Leveling -** Car at upper floor with **no load**. Register a down call. Turn **DC** CW approximately 10 turns from preset until car comes down at full speed. Send car back up. Disconnect **D1**. Make a down call. Adjust **DL** to set down leveling speed at 7 to 9 fpm (.04 to .05 m/s). Cycle car and observe down stop. Adjust **DC** for proper stop (CW for softer stop, CCW for firmer stop). **STOP SHOULD BE FIRM.** Reconnect **D1**.

DM **Down Main -** With car at upper floor with **no load** and **DSC** on preset, register a down call. Adjust **DM** to down contract speed. Turn **DM** CW for slower or CCW for faster speed.

DC **Down Closing -** Cycle **empty** car and observe down stop. Turn **DC** CW (softer stop) or CCW (firmer stop) until down stop is satisfactory (see **note 8**).

DT **Down Transition -** Car at upper floor with **no load**. Disconnect **D1.** Register a down call. Car should come down at leveling speed. Turn **DT** CCW until car speeds up, then slowly CW until car slows down again. Reconnect **D1.** Cycle car and turn **DT** CCW for slower or CW for faster transition. Readjust **DL** to maintain 7 to 9 fpm (.04 to .05 m/s) leveling speed. Slowdown switch should be set as to give 3 to 4 inches (75 to 100mm) of stabilized leveling.

DA **Down Acceleration -** Car at upper floor with **no load**. Turn **DA** CW to stop. Register a down call. Car should not move. Turn **DA** slowly CCW until car breaks away from the foor. Turn **DA** CCW (faster) or CW (slower) until down acceleration is satisfactory.

DSC **Down Speed Control -** Car at upper floor with **full load**. Register a down call. Turn **DSC** CW from preset to slow car to down contract speed. Remove the load, cycle car and recheck empty car speed (should be the same as set before).

ML **Manual Lowering -** Open **ML** CCW to lower car at leveling speed. All electrical power **MUST** be off when using manual lowering!

Relief Valve (RV):

1. With fully loaded car and a pressure gage installed on the **pump gage** port, register an up call and record maximum pressure as car nears top landing.
2. With fully loaded car at bottom landing, close main line valve and turn **RV** and **UA** out CCW to stop.
3. Register an up call. Turn **RV** in CW to set relief pressure as required by local code (not to exceed 50% above maximum pressure recorded earlier).
4. Restart pump to check the RV setting. Seal RV as required. Open main line valve to the jack. Readjust **UA** for proper up acceleration.

Adjuster Presetting

CW = Clockwise (IN) — **CCW** = Counter Clockwise (OUT)

	ADJUSTER	PRESETTING	FUNCTION
Up	**BP Bypass**	CCW to stop.	(CCW - Delays up start)
	UA Up Acceleration	3/16" in from end of locknut.	(CCW - Faster acceleration)
	UL Up Leveling	CW to stop then CCW 5 turns.	(CW - Faster speed)
	UT Up Transition	CCW to stop.	(CW - Slower transition)
	US Up Stop	CCW to stop.	(CW - Softer stop)
	RV Relief Valve	Factory set at 550 psi (38 bars).	(CW - Increase pressure setting)
Down	**DL Down Leveling**	CCW to stop then CW 6 turns.	(CW - Slower speed)
	DM Down Main	CW to stop then CCW 6 turns.	(CW - Slower speed)
	DC Down Closing	CCW to stop.	(CW - Softer stop)
	DT Down Transition	CW to stop.	(CCW - Slower transition)
	DA Down Acceleration	CCW to stop.	(CW - Slower acceleration)
	DSC Down Speed Control	CCW to stop.	(CW - Slower down speed with full load)
	ML Manual Lowering	CW to stop.	(CCW - Opens valve)

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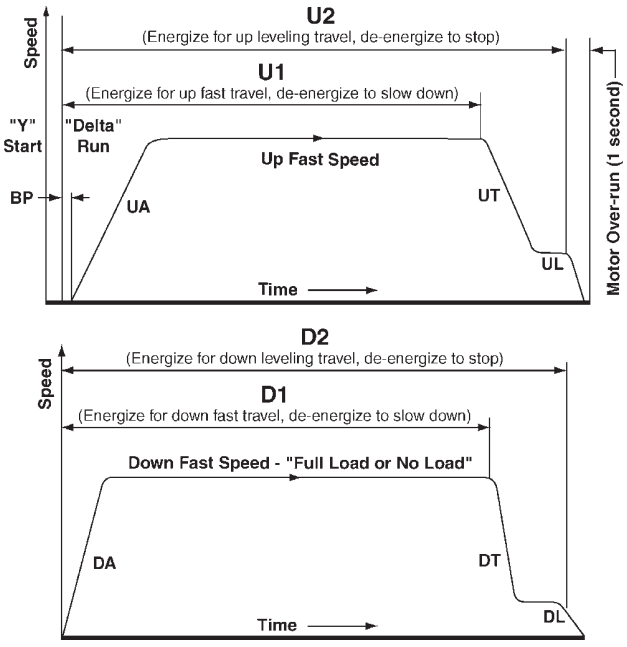
UV-4R Operational Data

PERFORMANCE CHART FOR UV-4R VALVE



PRESSURE

CSA-B44/UL Minimum/Maximum: 50 - 1200 psi (3.5 - 84 BAR).

FLOW RATE

Minimum 3 gpm to maximum 35 gpm (11 - 133 l/min).

OPERATING TEMPERATURE

80ºF (27ºC) minimum to 150ºF (65ºC) maximum.

GAGE PORTS

Two 1/8" NPT gage ports are provided on the valve. The cylinder gage port (labeled as "C" port) is located on the unused jack port cover. The pump gage port is labeled "P".

OIL SPECIFICATIONS

Recommended oil: A good brand of 32 grade turbine oil with a viscosity of 150 SSU at 100ºF (38º C). **Other oils:** The UV-4R is also compatible with 46 grade as well as biodegradable (vegetable) oil.

LINE CONNECTION

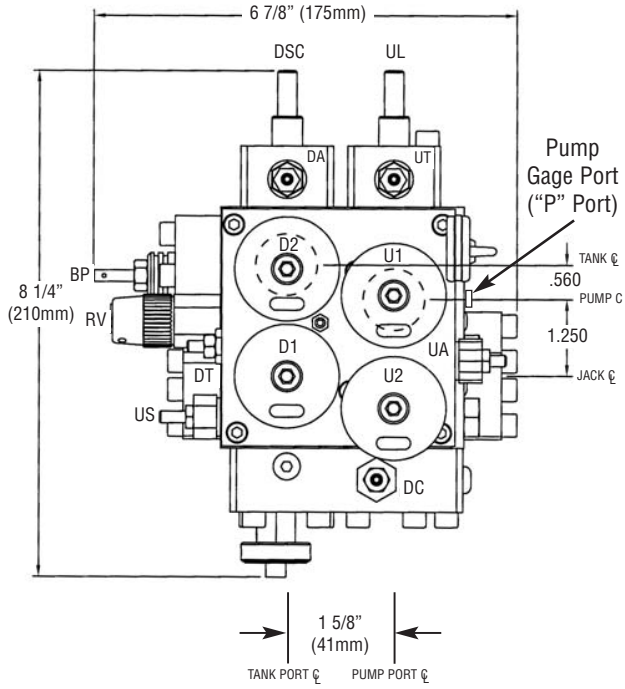
Factory standard for each of the three valve ports is 3/4" NPT.

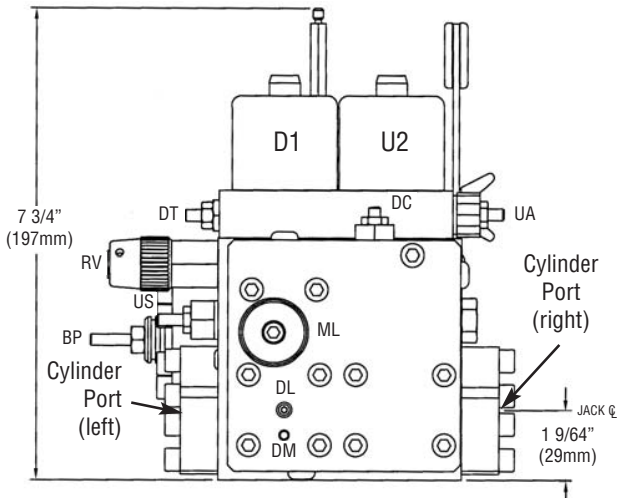
STANDARD CSA-B44/UL APPROVED SOLENOID COILS

24 VDC, 110 VAC, 208 VAC, 220 VAC/110 VDC (dual voltage), 440 VAC/220 VDC (dual voltage). For emergency (battery backup) lowering: 110 VAC/12 VDC (dual voltage). For other coil options, please contact EECO.

SOLENOID LABELING:

Solenoids: **U1** - Up Fast (Red wires)
U2 - Up Slow (Yellow wires)
D1 - Down Fast (Black wires)
D2 - Down Slow (Blue wires)





NOTE: The cylinder gage port ("C" port) is located on the unused jack port cover.

SEQUENCE OF SOLENOID OPERATION

Up Start:

A) "ATL" (Across The Line) start: pump motor "ON".
Energize both **U2** and **U1** solenoids to run up at fast speed.

B) "Y" start: Pump motor "ON" (reduced voltage).
"Delta" run: Pump motor "ON" full voltage.
Energize both **U2** and **U1** solenoids to run up at fast speed.

De-energize **U1** to slowdown to leveling speed.
De-energize **U2** to stop at floor.

CAUTION: Never energize **U2** and **U1** during "Y" start, only after "Delta" run!

Down Start:

Energize **D1** and **D2** to lower car at fast speed.
De-energize **D1** to slowdown to leveling speed.
De-energize **D2** to stop at floor.

Note 1: For additional clarification on the sequence of operation please refer to the Performance Chart above.

Note 2: Pump motor must be timed to run approximately 1 second after car has stopped.

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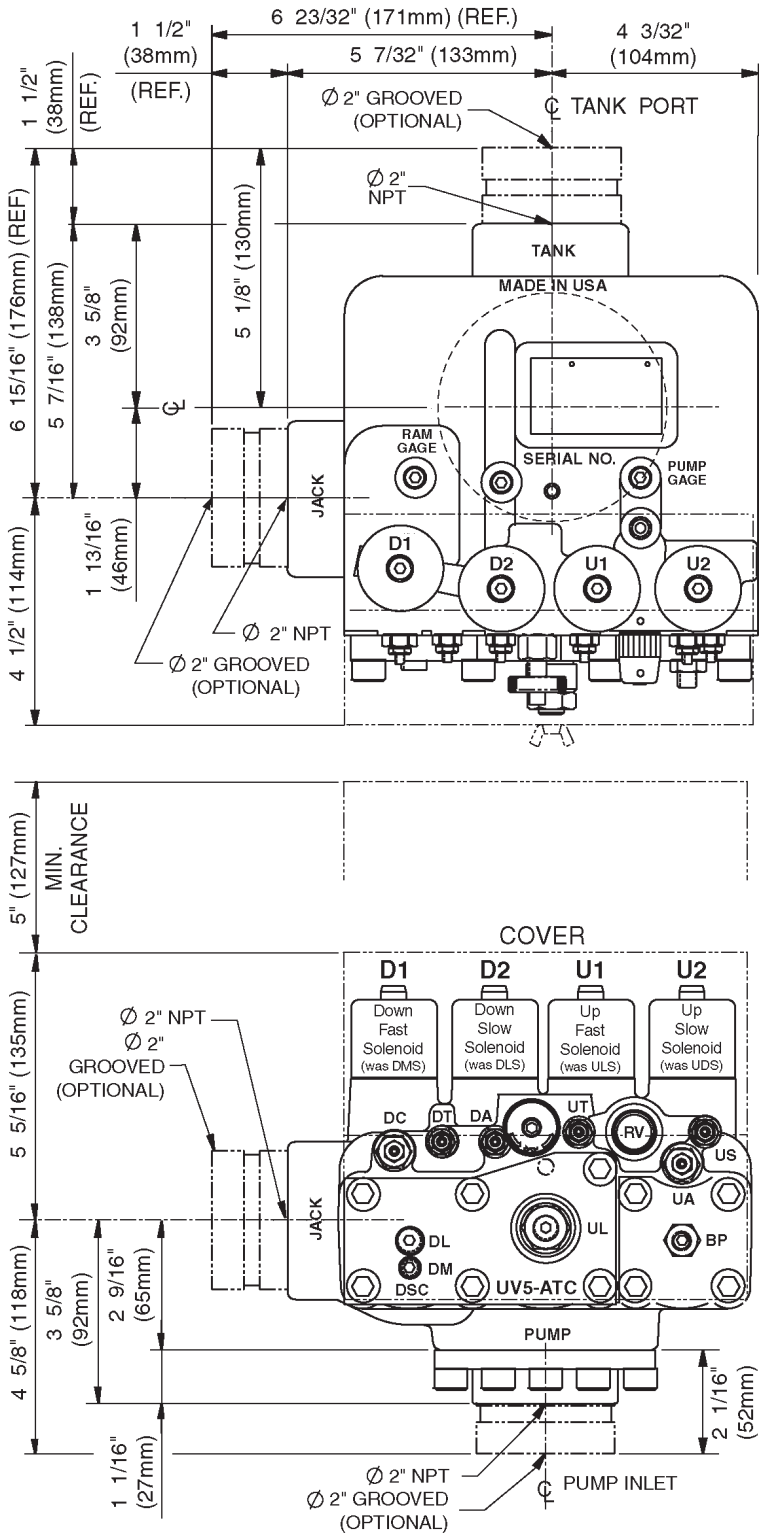
UV-5AT & UV-5ATC Valve Dimensions



Valve Dimensions:

Standard 2" NPT ports: Width 9 5/16" (237mm), Height 8 15/16" (227mm), Depth 9 15/16" (252mm), Weight (including coils) 29 lbs. (13.2 Kg).
Optional 2" Grooved ports: Width 10 13/16" (275mm), Height 9 15/16" (252mm), Depth 11 7/16" (291mm), Weight (including coils) 33 lbs. (15 Kg).

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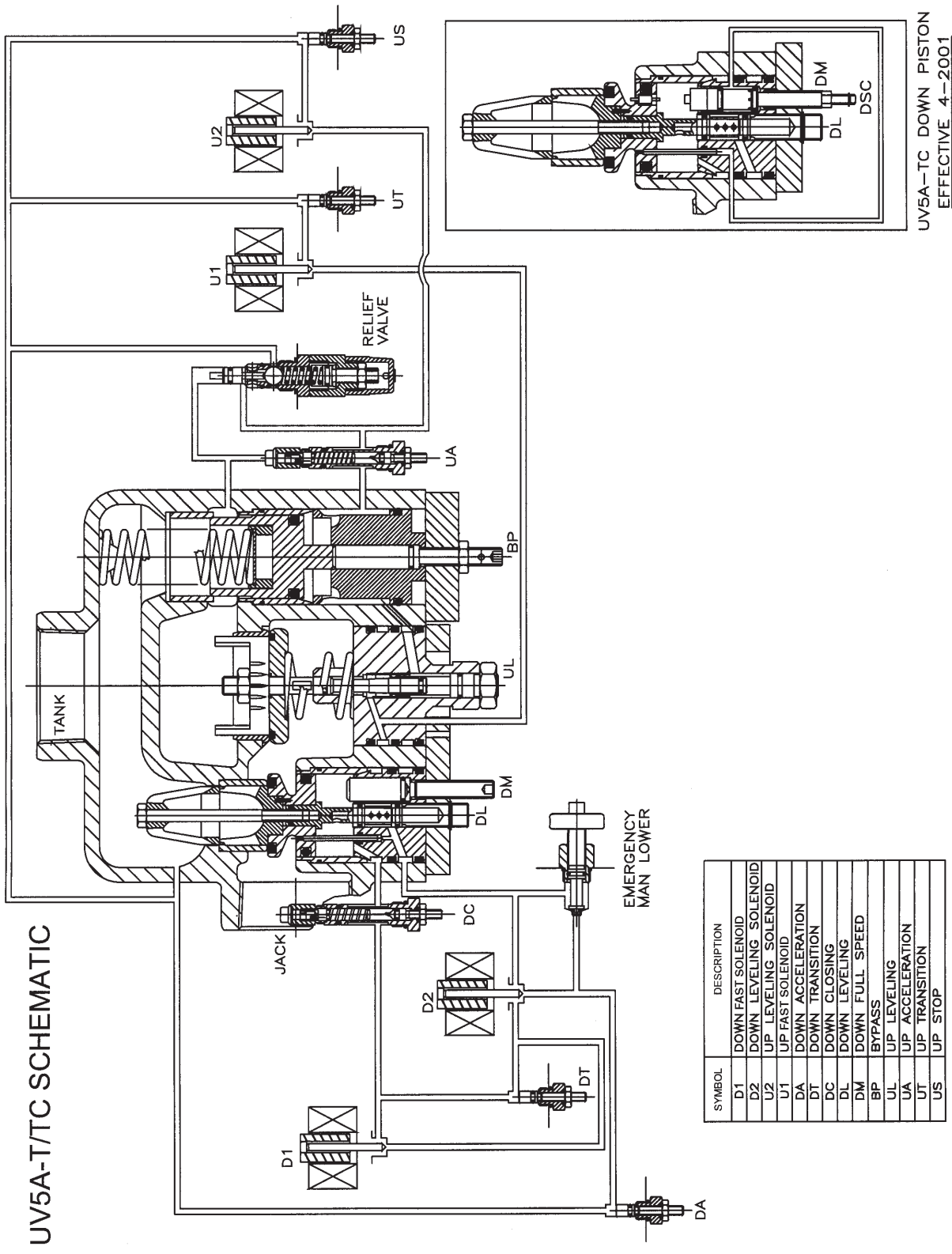
UV-5AT & UV-5ATC Valve Schematic



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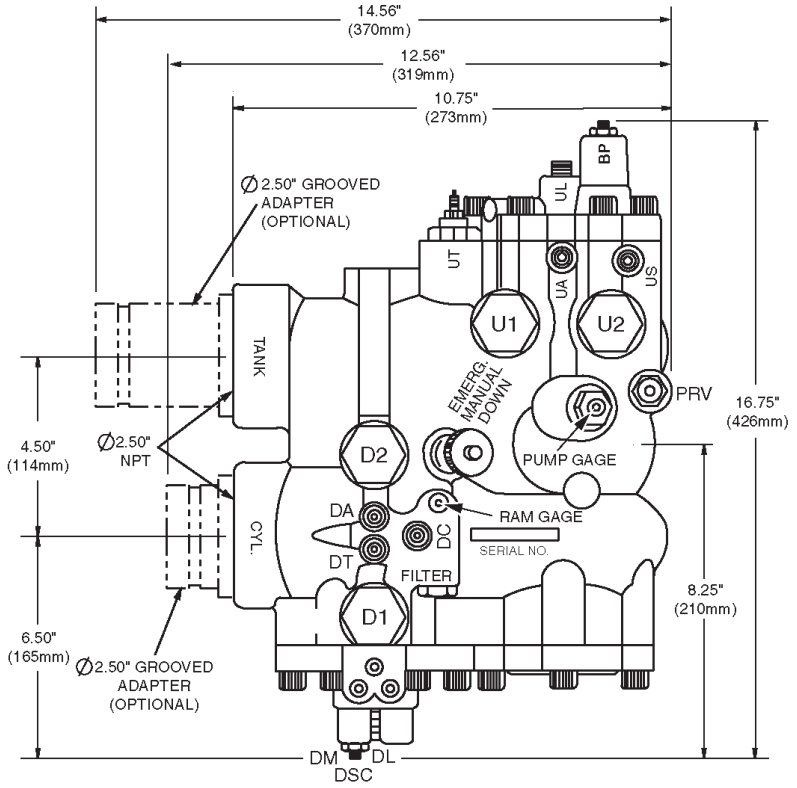
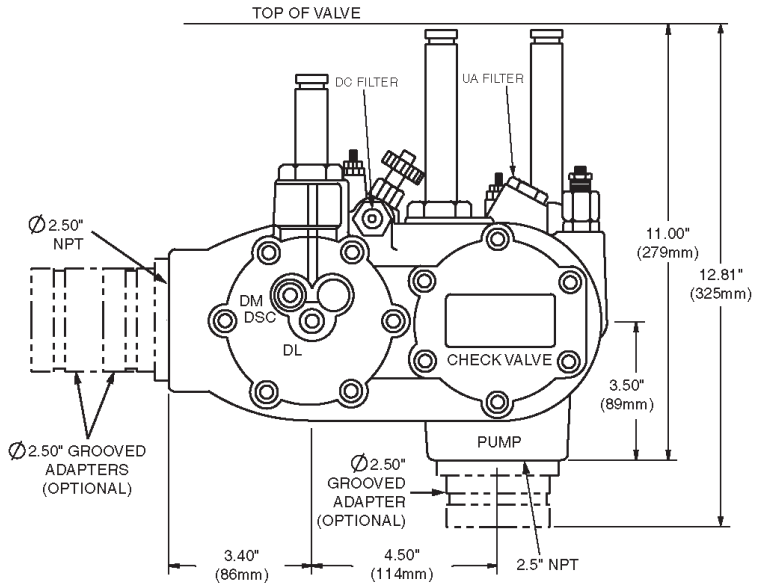
UV-7B & UV-7BC Valve Dimensions





Valve Dimensions:

Standard 2.5" NPT ports: Width 16 3/4" (426mm), Height 11" (279mm), Depth 10 3/4" (273mm), Weight (including coils) 49 lbs. (22.2 Kg).
Optional 2.5" Grooved ports: Width 16 3/4" (426mm), Height 12 3/16" (325mm), Depth 14 9/16" (291mm), Weight (including coils) 53 lbs. (24 Kg).

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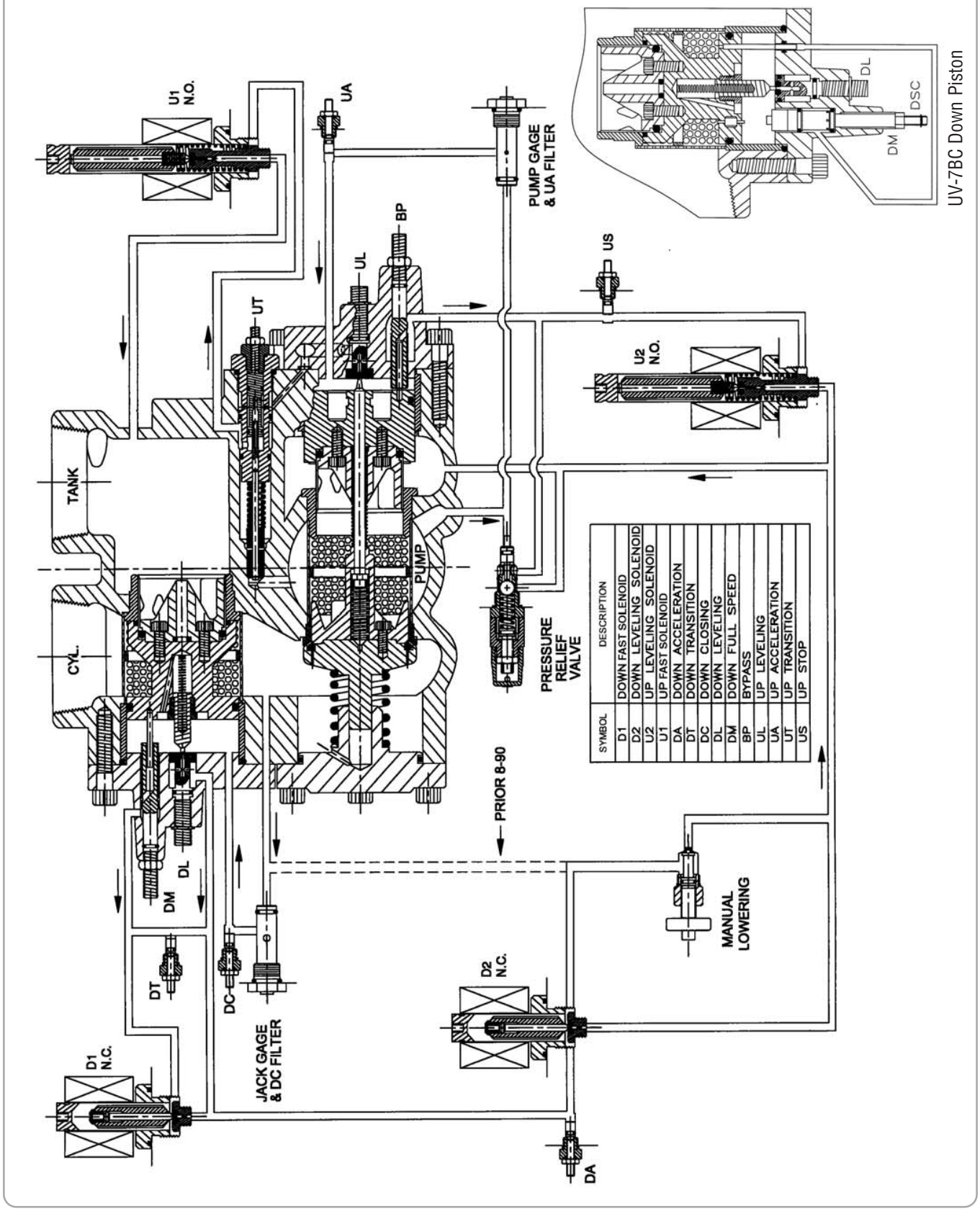
UV-7B & UV-7BC Valve Schematic



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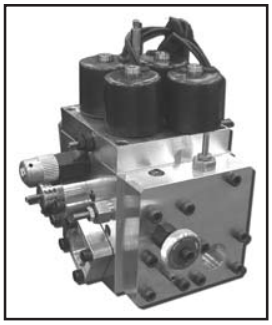
EECO Valve Troubleshooting Guide

Forward

The information presented herein is intended for use by persons having skill and experience in hydraulic elevator or lift servicing, and used at their own risk. We believe the information to be reliable, and assume no liability or expense due to injury, sickness, or death sustained by any person, or damage or destruction of property arising from information hereunder. Please read our Equipment Warranty.

Troubleshooting

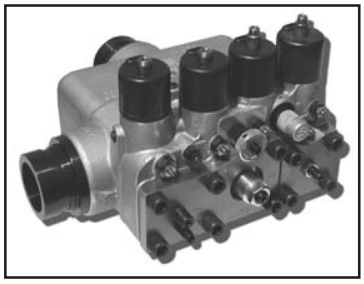
Before changing any adjustments, or removing any operating section of a valve, be sure that the electrical controller is supplying the proper information, in the correct sequence, to the valve solenoids (coils).



For a normal Up run, both **U1** & **U2** solenoids must be energized.

For an Anti-Creep or slow up run, only the **U2** solenoid must be energized.

When the elevator is making a normal Up run, and is approaching a floor for which it has been programmed to stop, the **U1** solenoid must be deenergized, by some means, at a certain distance below the floor, allowing the valve enough time to respond to the signal so as to smoothly effect a transition from high speed to low speed and to be at a stabilized leveling speed for a distance of 3 - 4 inches before the car reaches the floor. The **U2** solenoid must remain energized until the approximate floor level is reached and the motor must be allowed to run for 1 to 1 1/2 seconds after **U2** is de-energized so as to obtain the desired soft stop.



For a normal Down run, both **D1** and **D2** solenoids must be energized to obtain full down speed. For a slow or leveling speed Down run, only the **D2** solenoid must be energized.

When the elevator is making a normal Down run, and is approaching a floor for which it has been programmed to stop, the **D1** solenoid must be de-energized, by some means, at a certain distance above the floor, allowing the valve enough time to respond to the signal so as to smoothly effect a transition from high speed to low speed and to be stabilized leveling speed for a distance of 3-4 inches before the car reaches the floor. The **D2** solenoid must remain energized until the approximate floor level is reached.

In the following instructions, the terms CW & CCW are abbreviations for clockwise and counterclockwise. CW means turn to the right. CCW means turn to the left.

Caution

Be absolutely certain that the pressure has been shut off from the valve section of the system before removing or disassembling any part of the valve. Either lower the elevator car down to the pit supports and/or close the main line gate valves and tank valves. Disconnect the main electrical power switch. Always open the manual lowering valve before you close the tank shut-off.

IMPORTANT: After a valve is adjusted according to instructions, if the transition and/or leveling zones are either too long or too short, DO NOT readjust the valve! Move the appropriate switches or vanes/cams.

UP SECTION

1. MAKES HAMMERING NOISE (PUMP RUNNING)

(a) Check oil level in tank. Check suction tank shutoff, rotation of motor.

2. CAR WILL NOT MOVE OR GO INTO FULL SPEED (PUMP RUNNING)

(a) Check voltage at disconnect switch, controller, and valve coils. Check solenoids to see if they correspond with control voltage.
(b) Check main line shutoff to cylinder.
** (c) Check belt tension. If belts are too hot, they are slipping.
(d) Check relief valve setting with gauge.
(e) Turn UA adjustment CCW. See adjustment procedure.
(f) Worn pump.
(g) Check down valve to see if piston is stuck in open position. Turn **DM** CW to stop and turn **DC** CCW to stop, then return **DM** CCW to 5 turns.
** (h) Check plunger assembly, plunger enclosure, and needle orifice.

3. UP START SLOW

(a) Check **BP** adjustor to see if it is set properly. See adjustment procedure.
** (b) Check **UA** adjustor screen to see if it is filled with debris.
UV-7B has separate screen.
(c) Check U1 and U2 solenoids. Both must be energized.
** (d) Inspect U1 and U2 needle orifice.
** (e) Check belts on pump motor for proper tension and that they are not slipping. (If belts are hot, they are slipping).

4. UP START ROUGH

(a) Check **BP** to see that it is set properly. See adjustment procedure.
(b) Check **UA** adjustment to see that it is set properly. See adjustment procedure.
** (c) Close **UA** adjustment. If car starts up readily, check

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EECO Valve Troubleshooting Guide (cont.)

O-rings on **UA** adjustment, **BP** piston, and **UL** stem. One of these is leaking.

(d) Check jack assembly packing to see if it is adjusted properly.

(e) Check guide shoe adjustment and rails.

(f) Check car speed (fpm) and static pressure (PSI) with empty car to see if valve is proper size. (If valve is too small, you will get a rough start and car will not stall).

** (g) Inspect **BP** piston spring to see if it might be broken or on the wrong side of the piston. The spring goes in first.

** (h) Bypass piston stuck in closed position.

5. UP SPEED SLOW

** (a) Check belts on pump and motor to see if they have proper tension and are not slipping.

(b) Check relief valve to see that it is set properly.

(c) Check packing to see that it is not too tight on the piston.

(d) Check suction to pump to see that it is not being restricted. Pump will be noisy.

(e) Check oil level. If low, pump will be noisy.

** (f) Check **UA** screen to see that it is not filled with debris. UV-7B has separate screen.

** (g) Clean valve of all foreign material.

(h) Check motor horsepower and line voltage drop.

(k) Be sure adjustments are made with oil at normal operating temperature and not when oil is cold. Normal temperature is approximately 85° to 100° F.

6. TRANSITION FROM UP SPEED TO LEVELING SPEED TOO SMOOTH CAUSING DRIFTING UP THROUGH FLOOR LEVEL

(a) Turn **UT** CCW. Remember **UT** must be opened more than **UA**. If up start is too abrupt, see "b" of section 4. Also see "a" of section 11.

** (b) Inspect solenoid, needle orifice, needle assembly, and plunger enclosure for dents or debris.

(c) Check controller and hatch switches to see if they are properly set; 2" per 10 fpm speed.

7. TRANSITION FROM UP SPEED TO UP LEVELING SPEED TOO ROUGH OR QUICK

(a) Turn **UT** adjustment CW. See adjustment procedure.

8. CAR STALLS AS CAR ENTERS LEVELING ZONE FROM HIGH SPEED OR WILL NOT ANTI-CREEP

(a) Be sure U1 and U2 are not reversed.

(b) Check **UL** adjustment. See adjustment procedure.

(c) Check **UL** assembly. (Note: To check **UL** assembly, lower car to lowest floor. Disconnect **U1** coil. Start pump and slowly turn **UL** adjustment CCW*** from the closed position until car pulls out of stall).

** (d) Examine **UA** screen for debris.

** (e) Inspect middle O-ring on check valve flange (**UV-5A & UV-4R** only).

(f) Check up level switch, check all electrical circuits pertaining to up leveling.

9. CAR STALLS WITH CAPACITY LOAD

(a) Check relief valve adjustment. See adjustment procedure.

** (b) Check belts on pump and motor to see if they have proper tension and are not slipping.

10. HARD STOP AT FLOOR LEVEL

(a) Turn **US** CW. See adjustment procedure.

(b) Check to see that pump continues to run electrically for about one second after car stops at the floor level.

(c) Broken check valve spring. Car will settle very hard after a stop.

11. CAR CONTINUES TO LEVEL THROUGH FLOOR IN LEVELING SPEED

(a) Turn **US** adjustment CCW. See adjustment procedure.

** (b) **U1** needle orifice plugged with debris.

** (c) **U2** adjustor plugged with debris.

12. CAR WILL NOT STALL. PUMP RUNNING - UA ADJUSTOR TURNED OFF.

(a) Check **UA** adjustor to make sure it is turned off. Turn CW until stopped position is reached).

(b) Turn **BP** flow control screw to open position CCW until stopped). 12 turns open maximum on **UV-5A & UV-4R**.

** (c) If car will not stall, install larger bypass piston. Note: On **UV-7B**, piston area may be increased (or decreased) by rotation of port ring after loosening bolts holding port shield. Re-tighten bolts & reset **BP** to correct position.

** (d) Inspect **BP** piston spring position. Spring goes in first.

13. CAR WILL NOT "HOLD" POSITION AFTER UP RUN, BUT LOWERS IMMEDIATELY TO PIT

** (a) Check valve stuck open.

** (b) Down valve stuck open.

** (c) Manual lowering open.

**** DISCONNECT ELECTRICALLY FOR YOUR SAFETY**
*****CW on UV-7B**

DOWN SECTION

1. CAR WILL NOT LOWER (DOWN MAIN)

(a) Check voltage supply and coils on valve for proper voltage and/or open circuits.

(b) Turn **DM** CCW.

(c) Turn **DA** CCW.

(d) Turn **DC** CW slowly - remember that **DA** must be open more than **DC**. Closing **DC** too much may cause the car to lower into the pit at full speed!

(e) Open pit or tank valve, if closed.

(f) Check guide shoe adjustment.

(g) Check jack packing adjustment.

** (h) Inspect needle orifice for debris.

** (i) Inspect **DA** adjustment cavity for debris.

** (1) Inspect down piston O-ring or piston ring for size.

2. CAR WILL NOT LOWER (DOWN LEVEL ONLY)

** (a) Inspect down level spool on end of piston - if broken - replace. **UV-7B** has spring loaded needle.

3. SLOW DOWN START (BOUNCY)

(a) Bleed jack of air.

(b) Check jack packing adjustment.

(c) Check guide shoe adjustment.

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EECO Valve Troubleshooting Guide (cont.)

(d) Check piston O-ring for size. An oversize or swollen ring can prevent a valve from opening or closing in a smooth manner. **Note: UV-7B** down piston ring is oversized on valves up to S/N C802. Do not change to smaller size unless you order a complete new down piston assembly.

4. SUDDEN DOWN START
- (a) Check jack packing adjustment (too tight).
- (b) Check **DA** adjustment to see if it is set properly. See adjustment procedure.

5. VALVE WILL NOT CLOSE
- (a) Check **DT** adjustment. Turn CW to stop, on **UV-7B**. Turn CW until flush with nut on **UV-5A & UV-4R** .
- ** (b) Check filter screen in **DC** adjustment to see if it is full of debris. When checking this screen, do not change the adjustment. Clean screen first. If minor adjustments are required, do so after cleaning screen. **UV-7B** has a separate screen.
- ** (c) Check solenoid plunger tubes for damage. Plunger should slide freely in all positions.
- ** (d) Check solenoid needle and seat for damage. If damaged (leaking), replace.
- (e) Check hatch switches, relays, or other electrical devices which could hold solenoid in open (energized) position.
- ** (f) Clean valve of all solid debris.
- ** (g) Inspect 'V' guide. Piston and 'V' guide should move freely in bore.
- ** (h) Inspect piston O-ring for size. A badly oversized or swollen ring may prevent a valve from closing. See note 3 (d) (in Down Section, above).

6. DOWN STOP ROUGH (QUICK)
- (a) Turn down valve **DC** closing adjustment CW. See adjusting sheet.
- (b) Check main piston O-ring to see if it has shrunk.

7. DOWN STOP SLOW OR BOUNCY
- (a) Bleed jack of air.
- (b) Turn **DC** adjustment CCW. Disconnect **D1** coil when checking.
- ** (c) Check filter screen in **DC** adjustment. When checking this screen, be sure not to change adjustment until after you have cleaned screen). The **UV-7B** has separate screen.
- (d) Check guide shoe adjustment.

8. DOWN TRANSITION ROUGH (WITHOUT DT ADJUSTER)
- (a) Turn **DC** CW. (Check stop after making **DC** adjustment, hatch switch adjustment might have to be made). See adjustment procedure.
- ** (b) Check down piston O-ring to see if it has shrunk.

9. DOWN TRANSITION ROUGH (WITH DT ADJUSTER)
- ** (a) Check **DT** adjuster to see if it is plugged with debris. (See adjusting sheets for **UV-5A**, **UV-5AT, UV-5ATC & UV-4R**).

10. DOWN LEAK
- (a) Check jack packing and fittings.
- (b) Close manual lowering valve.
- ** (c) Inspect down valve seal disc and seat area.
- ** (d) Inspect check valve seal and seat area.
- ** (e) Inspect both down solenoid needle orifices and needles for sealing.
- ** (f) Inspect innermost O-rings on **UL** stem and check flange, **UV-5A & UV-4R** only.

**** ELECTRICALLY DISCONNECT FOR YOUR SAFETY**

UV-5AT

UV-4R

UV-7B

For EECO valve technical support please call:

(888) 577-EECO

Between 8:00 AM Eastern and 4:30 PM Pacific time, Monday through Friday.

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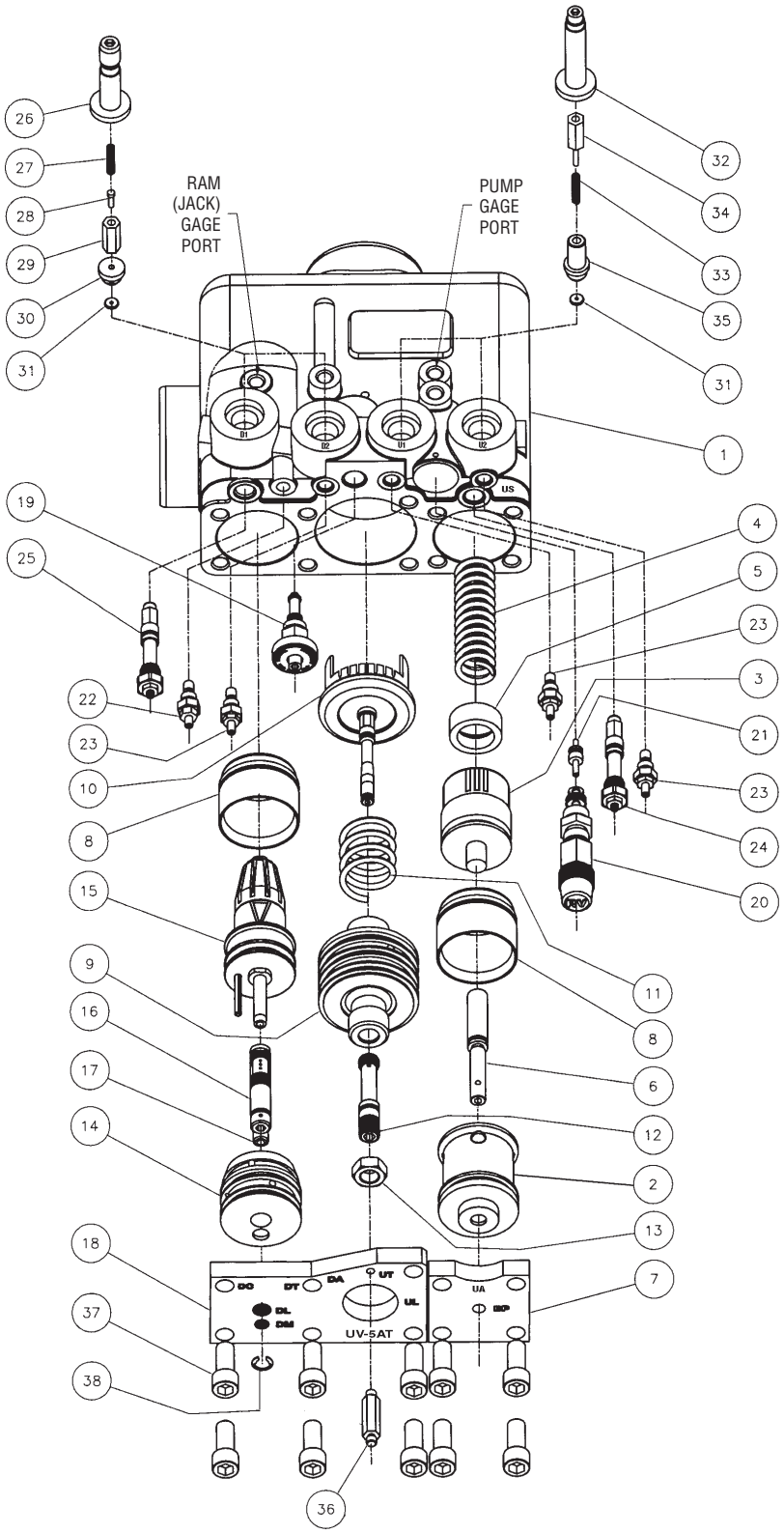
UV-5AT Valve Exploded View



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UV-5AT Parts List

ITEM	PART NO.	DESCRIPTION	QTY.
1	5000BA	UV-5AT BODY	1
2	5012C	BYPASS CLOSURE	1
3	5007-TAB	BYPASS PISTON	1
4	5006-1	BYPASS SPRING	1
5	5132A	SPRING CAP ASSEMBLY	1
6	5010	UP FLOW CONTROL SCREW (BP)	1
7	5104	BYPASS FLANGE	1
8	5023A	BYPASS/DOWN SLEEVE	2
9	5045D	CHECK CLOSURE	1
10	5611A-TAB	CHECK PISTON ASSEMBLY	1
11	5018	CHECK SPRING	1
12	5022B	UP LEVELING ADJUSTER (UL)	1
13	5224	CHECK JAMB NUT	1
14	5036B	DOWN CLOSURE	1
15	5026FA-TAB	DOWN PISTON ASSEMBLY	1
16	5033B	DOWN LEVELING ADJUSTER (DL)	1
17	5029B	DOWN FLOW CONTROL SCREW (DM)	1
18	5609	UV-5AT DOWN/CHECK FLANGE	1
19	5211BA	MANUAL LOWERING ASSEMBLY	1
20	5079A	RELIEF VALVE ASSEMBLY	1
21	5122BA	RELIEF VALVE PISTON	1
22	5137A	DOWN TRANSITION ADJUSTER (DT)	1
23	2400A	ADJUSTER ASSEMBLY (US, UT, DA)	3
24	5604A	UA ADJUSTER ASSEMBLY	1
25	5606A	DC ADJUSTER ASSEMBLY	1
26	5129A	N.C. PLUNGER TUBE ASSEMBLY	2
27	5055	N. C. NEEDLE HOLD OUT SPRING	2
28	5059	N.C. HAMMER NEEDLE	2
29	5056	N. C. SOLENOID HAMMER	2
30	5062	N.C. NEEDLE ORIFICE BODY	2
31	5065-4	ORIFICE NEEDLE SEAT	4
32	5128A	N.O. PLUNGER TUBE ASSEMBLY	2
33	5054	N. O. HAMMER LIFT OFF SPRING	2
34	5130A	N.O. PLUNGER ASSEMBLY	2
35	5066BA	N.O. NEEDLE ORIFICE BODY ASSEMBLY	2
36	5108	COVER STAND OFF SCREW	1
37	5005	FLANGE BOLT	16
38	5035	DL RETAINING RING	1

BYPASS PISTON	CHECK PISTON	DOWN PISTON	SIZE
5007-1	5611A-1	5026FA-1	1/8
5007-2	5611A-2	5026FA-2	1/4
5007-3	5611A-3	5026FA-3	1/2
5007-4	5611A-4	5026FA-4	3/4
5007-5	5611A-5	5026FA-5	1
5007-6	5611A-6	5026FA-6	1 1/4
5007-7	5611A-6	5509FA-7	1 1/2

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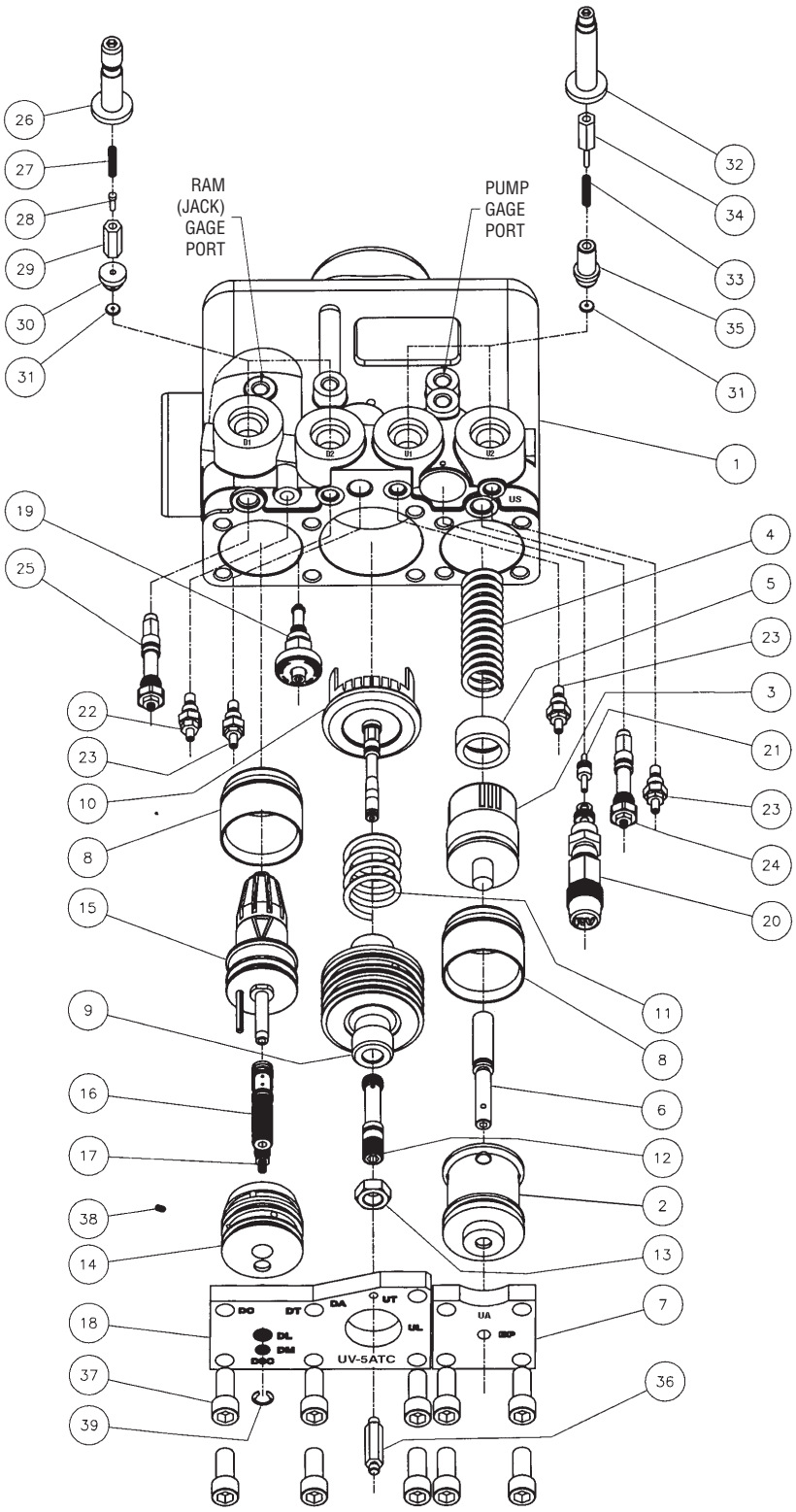
UV-5ATC Valve Exploded View



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UV-5ATC Parts List

ITEM	PART NO.	DESCRIPTION	QTY.
1	5000BA	UV-5AT BODY	1
2	5012C	BYPASS CLOSURE	1
3	5007-TAB	BYPASS PISTON	1
4	5006-1	BYPASS SPRING	1
5	5132A	SPRING CAP ASSEMBLY	1
6	5010	UP FLOW CONTROL SCREW (BP)	1
7	5104	BYPASS FLANGE	1
8	5023A	BYPASS/DOWN SLEEVE	2
9	5045D	CHECK CLOSURE	1
10	5611A-TAB	CHECK PISTON ASSEMBLY	1
11	5018	CHECK SPRING	1
12	5022B	UP LEVELING ADJUSTER (UL)	1
13	5224	CHECK JAMB NUT	1
14	5517	DSC DOWN CLOSURE	1
15	5509A-TAB	DOWN PISTON ASSEMBLY	1
16	5033B	DOWN LEVELING ADJUSTER (DL)	1
17	5501A-TAB	DSC COMPENSATOR BODY ASSEMBLY	1
18	5609	UV-5ATC DOWN/CHECK FLANGE	1
19	5211BA	MANUAL LOWERING ASSEMBLY	1
20	5079A	RELIEF VALVE ASSEMBLY	1
21	5122BA	RELIEF VALVE PISTON	1
22	5137A	DOWN TRANSITION ADJUSTER (DT)	1
23	2400A	ADJUSTER ASSEMBLY (UD, UT, DA)	3
24	5604A	UA ADJUSTER ASSEMBLY	1
25	5606A	DC ADJUSTER ASSEMBLY	1
26	5129A	N.C. PLUNGER TUBE ASSEMBLY	2
27	5055	N. C. NEEDLE HOLD OUT SPRING	2
28	5059	N.C. HAMMER NEEDLE	2
29	5056	N. C. SOLENOID HAMMER	2
30	5062	N.C. NEEDLE ORIFICE BODY	2
31	5065-4	ORIFICE NEEDLE SEAT	4
32	5128A	N.O. PLUNGER TUBE ASSEMBLY	2
33	5054	N. O. HAMMER LIFT OFF SPRING	2
34	5130A	N.O. PLUNGER ASSEMBLY	2
35	5066BA	N.O. NEEDLE ORIFICE BODY ASSEMBLY	2
36	5108	COVER STAND OFF SCREW	1
37	5005	FLANGE BOLT	16
38	5520	CLOSURE PLUG	1
39	5035	DL RETAINING RING	1

BYPASS PISTON	CHECK PISTON	DOWN PISTON	SIZE
5007-1	5611A-1	5509A-1	1/8
5007-2	5611A-2	5509A-2	1/4
5007-3	5611A-3	5509A-3	1/2
5007-4	5611A-4	5509A-4	3/4
5007-5	5611A-5	5509A-5	1
5007-6	5611A-6	5509A-6	1 1/4
5007-7	5611A-6	5509A-7	1 1/2

NOTE: NOT ALL PARTS SHOWN SOLD INDIVIDUALLY

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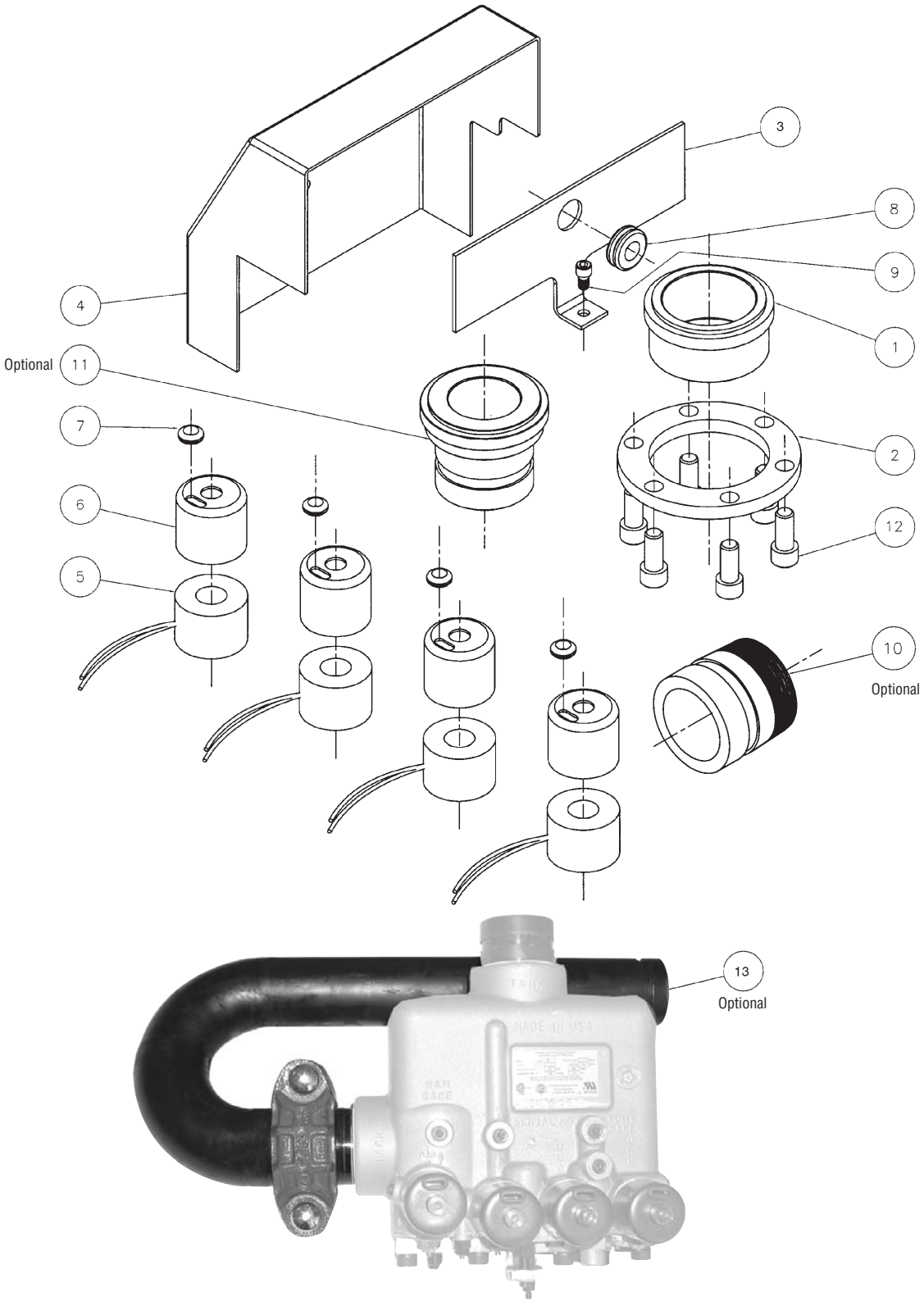
UV-5AT & UV-5ATC External Parts - Exploded View



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UV-5AT & UV-5ATC External Parts List

ITEM	PART NO.	DESCRIPTION	QTY.
1	5231	2" NPT PUMP INLET NIPPLE	1
2	5232	PUMP INLET CLAMP RING	1
3	5040	CONDUIT PLATE	1
4	5107	VALVE COVER	1
5	-	COILS (SEE CHART FOR VOLTAGE)	4
6	5047A	COIL TUBE COVERS	4
7	5042-1	COIL TUBE COVER GROMMET	4
8	5038	CONDUIT PLATE GROMMET	1
9	5039	CONDUIT PLATE SCREW 1/4-20 x 1/4"	1
*10	5365	2" GROOVED ADAPTER	2
*11	5231-VC	2" GROOVED PUMP INLET NIPPLE	1
12	5005	FLANGE BOLT	6
*13	5620A	RIGHT HAND JACK PORT ADAPTER (See page 72)	1

* OPTIONAL PARTS

NOTE: NOT ALL PARTS SHOWN SOLD INDIVIDUALLY

PART NO.	VOLTAGE (V)	FREQUENCY (Hz)	IN RUSH CURRENT (A)	HOLDING CURRENT (A)	RESISTANCE (Ohm)	COIL COLOR
COILS FOR UV-5A, T & TC VALVES ONLY						
S461	110	60	0.64	0.34	113	GREEN
S462	208	60	0.35	0.22	276	
S453	220	50	0.18	0.15	560	
S463/S401	220/110	60/DC	0.20/0.15	0.15	434	
S464/S403	440/220	60/DC	0.11/0.08	0.08	1765	
S455	24	DC	0.12	0.12	24	
S465	110/12	60/DC	0.64	0.34		
	Black Lead - 12VDC				4.7	
	Yellow Lead - Common					
	Red Lead - 110VAC				84	

ALL COILS SUPPLIED WITH 96" LEADS

Also see coil table on page 70

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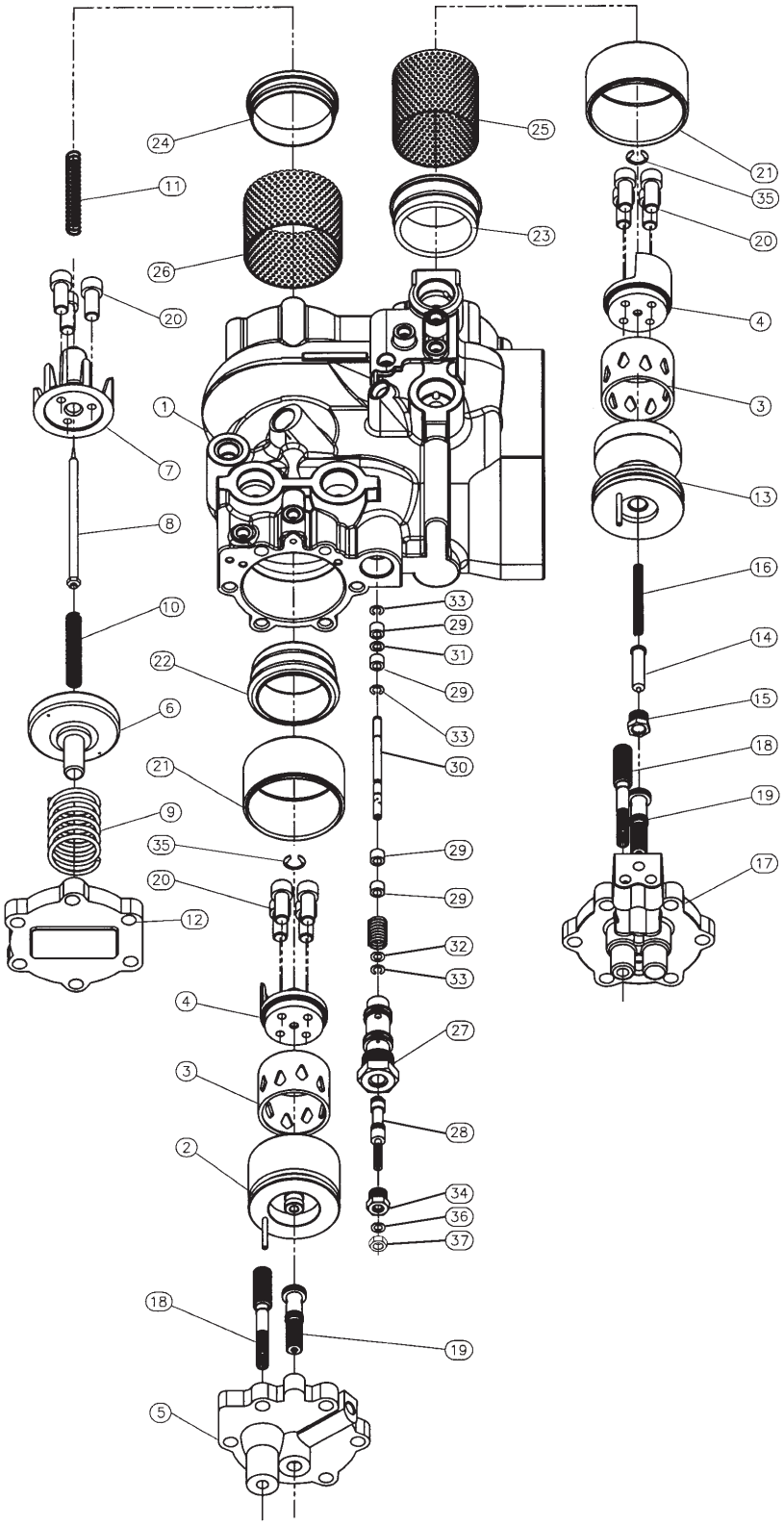
UV-7B Valve Exploded View



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UV-7B Valve Parts List

ITEM	PART NO.	DESCRIPTION	QTY.
1	5250M	UV-7B BODY	1
2	5261	BYPASS PISTON	1
3	5269-1	BYPASS/DOWN PORT RING	2
4	5270	PORT SHIELD	2
5	5258	BYPASS FLANGE	1
6	5255	CHECK VALVE POPPET	1
7	5268	CHECK POPPET GUIDE STEMM	1
8	5284BA	UP LEVEL NEEDLE ASSEMBLY	1
9	5308	CHECK PISTON SPRING	1
10	5281	NEEDLE EXTENSION SPRING	1
11	5315B	BYPASS RETURN SPRING	1
12	5252	CHECK FLANGE	1
13	5273	LOWERING PISTON	1
14	5262	DOWN LEVEL NEEDLE	1
15	5263	DOWN LEVEL NEEDLE RETAINING GUIDE NUT	1
16	5280	DOWN LEVEL NEEDLE SPRING	1
17	5251	DOWN FLANGE	1
18	5267	BYPASS/DOWN MAIN SPEED ADJUSTER	2
19	5191BA	LEVELING ADJUSTER ASSEMBLY	2
20	5292A	CAP SCREW 1/4"-20 x 5/8"	11
21	5271	BYPASS/LOWERING CYLINDER SLEEVE	2
22	5272	BYPASS INSERT SEAT RING	1
23	5283	DOWN INSERT SEAT RING	1
24	5282	CHECK INSERT SEAT RING	1
25	5304A	DOWN SCREEN ASSEMBLY	1
26	5306A	PUMP INLET SCREEN ASSEMBLY	1
27	5276	UT BODY ASSEMBLY	1
28	5274	UT ADJUSTER BODY	1
29	5279	UT COMPENSATOR SHAFT PISTON SLEEVE	4
30	5275B	UT COMPENSATOR SHAFT	1
31	5294V	O-RING	1
32	1630V	O-RING	1
33	5303	RETAINER RING	2
34	5277	UT RETAINER NUT	1
35	5367	PORT SHIELD SNAP RING	2
36	5227V	O-RING	1
37	5291	NUT	1

NOTE: NOT ALL PARTS SHOWN SOLD INDIVIDUALLY

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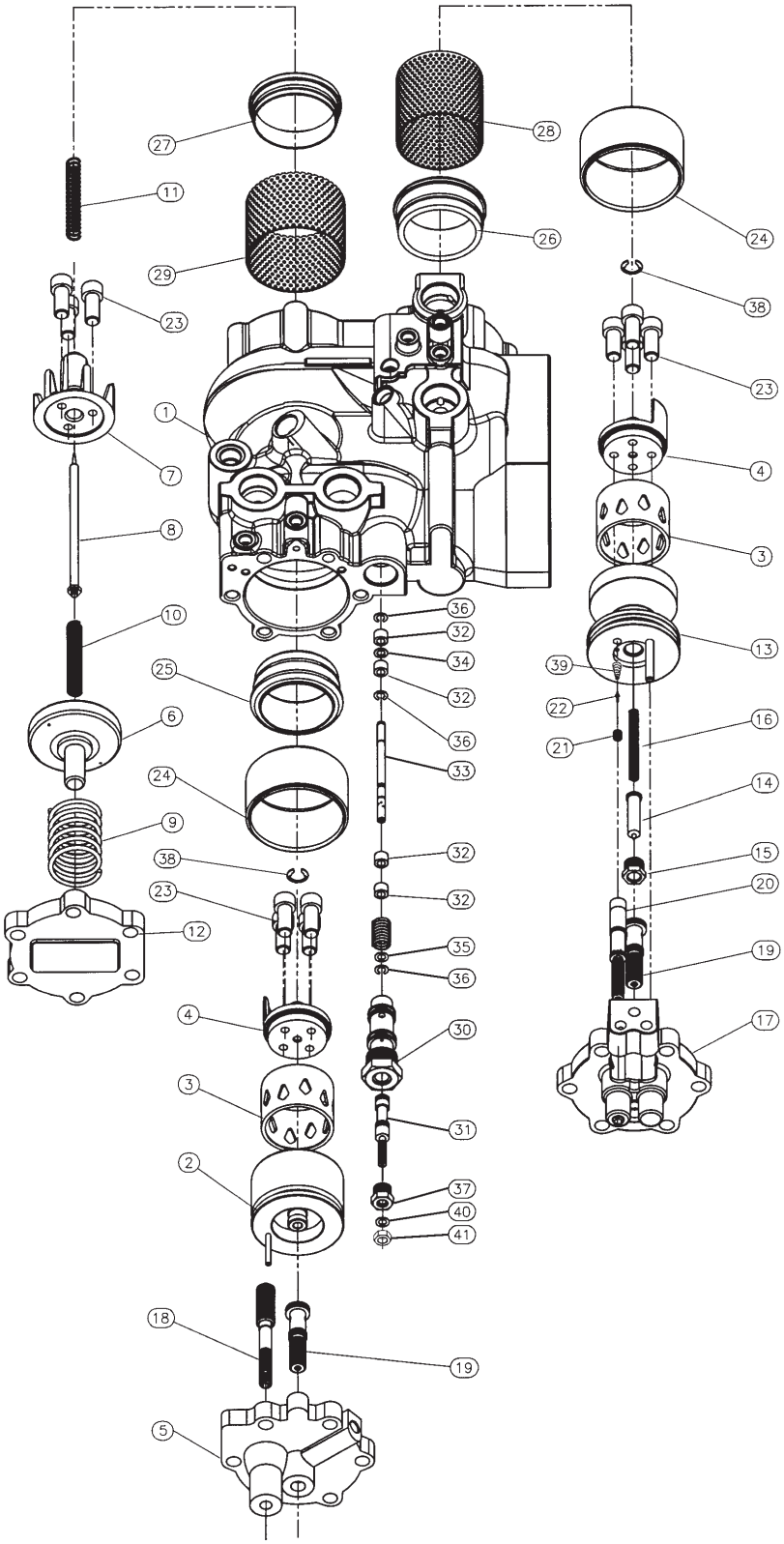
UV-7BC Valve Exploded View



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UV-7BC (Constant Down Speed) Valve Parts List

ITEM	PART NO.	DESCRIPTION	QTY.
1	5250M	UV-7B BODY	1
2	5261	BYPASS PISTON	1
3	5269-1	BYPASS/DOWN PORT RING	2
4	5270	PORT SHIELD	2
5	5258	BYPASS FLANGE	1
6	5255	CHECK VALVE POPPET	1
7	5268	CHECK POPPET GUIDE STEMM	1
8	5284BA	UP LEVEL NEEDLE ASSEMBLY	1
9	5308	CHECK PISTON SPRING	1
10	5281	NEEDLE EXTENSION SPRING	1
11	5315B	BYPASS RETURN SPRING	1
12	5252	CHECK FLANGE	1
13	5453	DSC LOWERING PISTON	1
14	5262	DOWN LEVEL NEEDLE	1
15	5263	DOWN LEVEL NEEDLE RETAINING GUIDE NUT	1
16	5280	DOWN LEVEL NEEDLE SPRING	1
17	5458	DSC DOWN FLANGE	1
18	5267	BYPASS MAIN SPEED ADJUSTER	1
19	5191BA	LEVELING ADJUSTER ASSEMBLY	2
20	5457A	DSC COMPENSATOR BODY ASSEMBLY	1
21	5512	DSC CHECK VALVE BODY	1
22	5514	DSC CHECK VALVE PISTON	1
23	5292A	CAP SCREW 1/4"-20 x 5/8"	11
24	5271	BYPASS/LOWERING CYLINDER SLEEVE	2
25	5272	BYPASS INSERT SEAT RING	1
26	5283	DOWN INSERT SEAT RING	1
27	5282	CHECK INSERT SEAT RING	1
28	5304A	DOWN SCREEN ASSEMBLY	1
29	5306A	PUMP INLET SCREEN ASSEMBLY	1
30	5276	UT BODY ASSEMBLY	1
31	5274	UT ADJUSTER BODY	1
32	5279	UT COMPENSATOR SHAFT PISTON SLEEVE	4
33	5275B	UT COMPENSATOR SHAFT	1
34	5294V	O-RING	1
35	1630V	O-RING	1
36	5303	RETAINER RING	2
37	5277	UT RETAINER NUT	1
38	5367	PORT SHIELD SNAP RING	2
39	5628	DSC CHECK VALVE SPRING	1
40	5227V	O-RING	1
41	5291	NUT	1

NOTE: NOT ALL PARTS SHOWN SOLD INDIVIDUALLY

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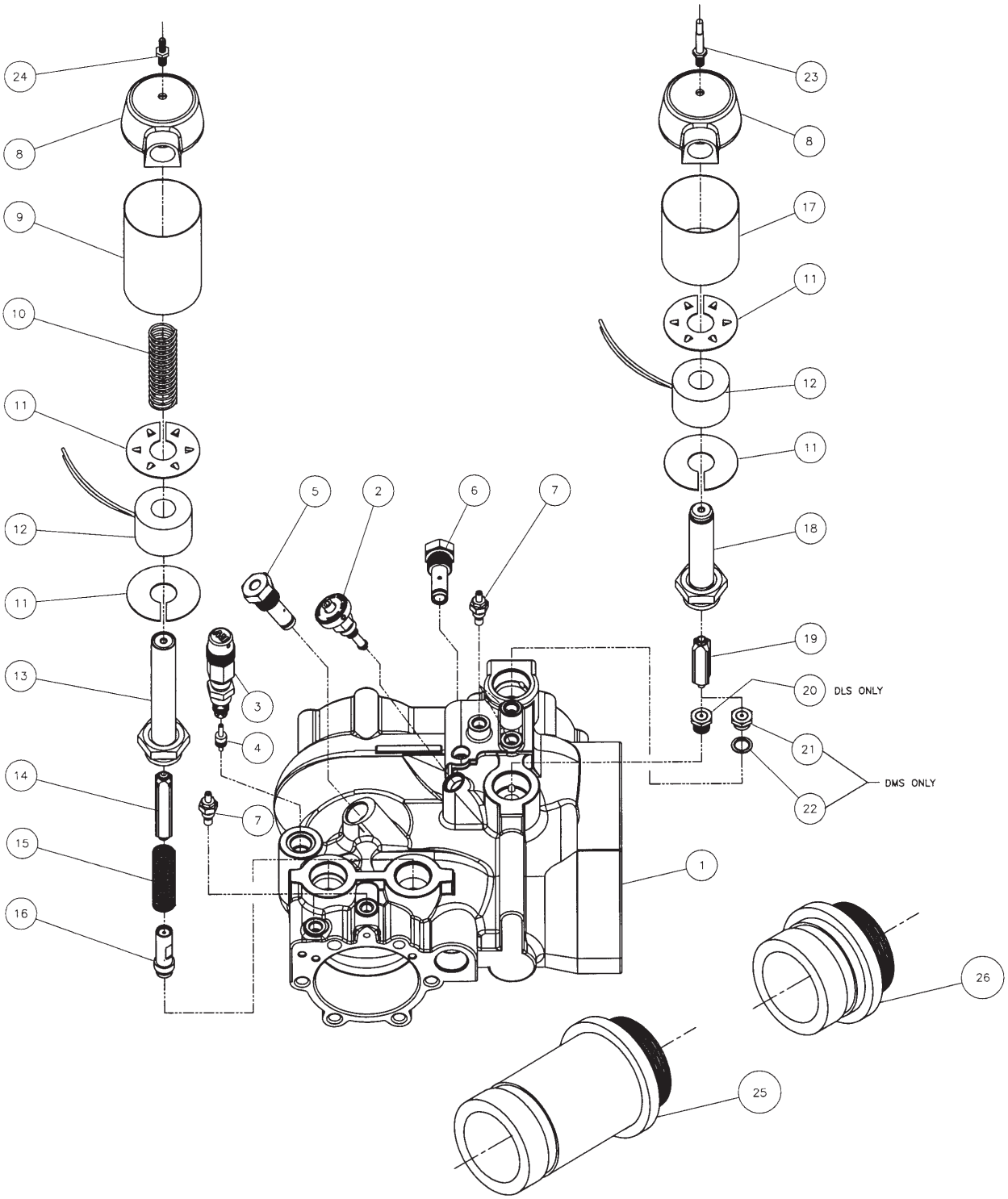
UV-7B & UV-7BC Valve External Parts Exploded View



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UV-7B & UV-7BC Valve External Parts List

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1	5250M	UV-7B BODY	1
2	5211BA	MANUAL LOWERING ASSEMBLY	1
3	5079A	RELIEF VALVE ASSEMBLY	1
4	5122BA	RELIEF VALVE PISTON	1
5	5363A	UA FILTER INPUT	1
6	5260-1	DC FILTER INPUT	1
7	5349A	ADJUSTER ASSEMBLY	5
8	2133	COIL COVER CAP	4
9	2122	COIL COVER TUBE N/O	2
10	1275	PISTON SPRING N/O	2
11	1062	COIL WASHER	4
12	-	COILS (SEE CHART FOR VOLTAGE)	4
13	2129A	PLUNGER ENCLOSURE N/O	2
14	2125A	SOLENOID PLUNGER ASSEMBLY N/O	2
15	2132	PLUNGER SPRING N/O	2
16	2391A	NEEDLE ORIFICE ASSEMBLY N/O	2
17	2120	COIL COVER TUBE N/C	2
18	2164A	PLUNGER ENCLOSURE N/C	2
19	1456DA	SOLENOID HAMMER ASSEMBLY N/C	2
20	5353A	NEEDLE ORIFICE SEAT ASSY. (DLS)	1
21	1465BA	NEEDLE ORIFICE SEAT ASSY. (DMS)	1
22	1458B	NEEDLE ORIFICE WASHER	1
23	5246	SCREW SPACER N/C	2
24	5247	SCREW SPACER N/O	2
25	5447	2.5" LONG GROOVED ADAPTER (Optional)	1
26	5446	2.5" SHORT GROOVED ADAPTER (Optional)	2

NOTE: NOT ALL PARTS SHOWN SOLD INDIVIDUALLY

UV-7B & BC COIL CHART	
PART NO.	**VOLTAGE**
S651	110VAC, 60 Hz
S652	208VAC, 60 Hz
S653	220VAC,60 Hz
S654	440VAC, 60 Hz
S655	550VAC, 60 Hz
S656	220VAC, 50 Hz
S752	110VDC
S753	220VDC

ALSO SEE COIL TABLE ON PAGE 70.

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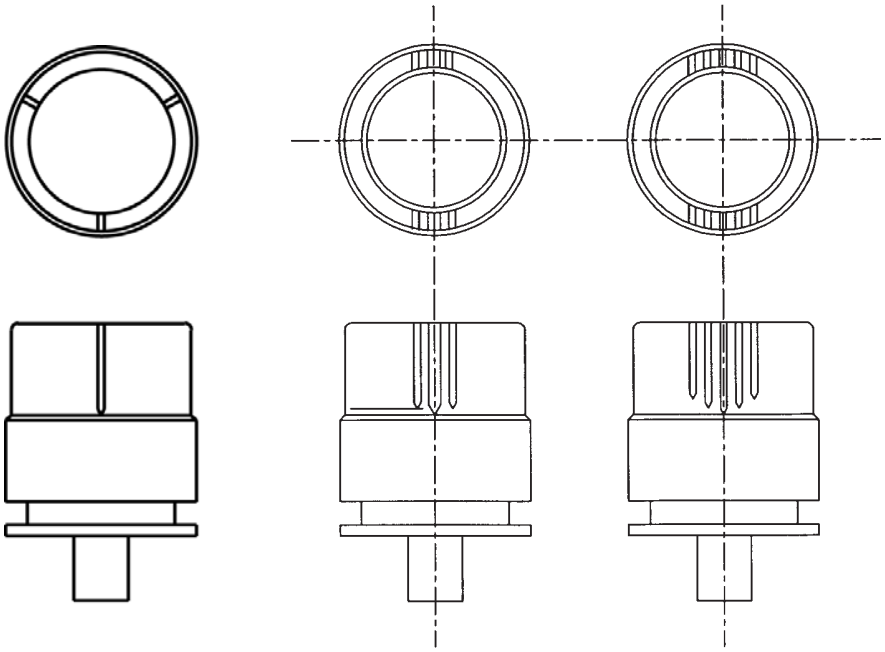
UV-5AT & TC Bypass V-Guide Pistons

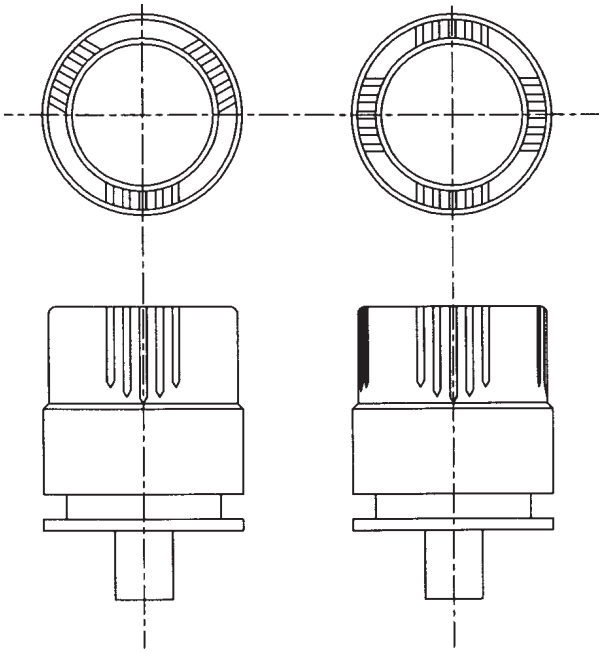
Note: When replacing the bypass piston on older **S-series** (or earlier) **UV-5A** valves, you **MUST** use the UV-5A Bypass Piston & Spring Replacement Kit (Part Number 5006A-X) on page 61.



1/4 Valve
5007-2

1/2 Valve
5007-3

3/4 Valve
5007-4



1 Valve
5007-5

1-1/4 Valve
5007-6

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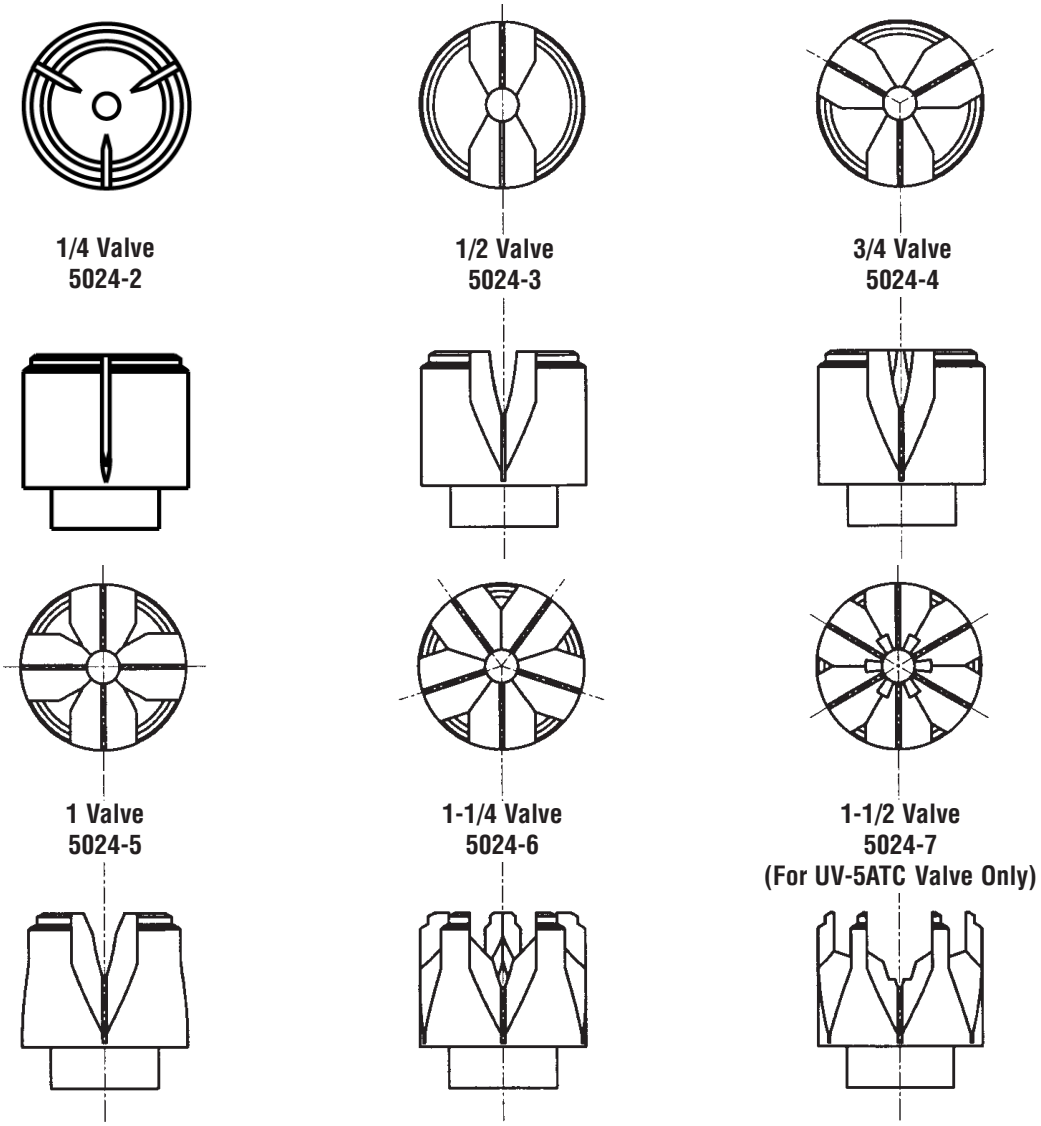
EECO UV-5AT & TC Down V-Guides

Note: When replacing the down piston in a **UV-5A** valve manufactured before November 2005, you must replace the down piston and down closure assembly (kit number 5627A-( ) on page 60).



1/4 Valve
5024-2

1/2 Valve
5024-3

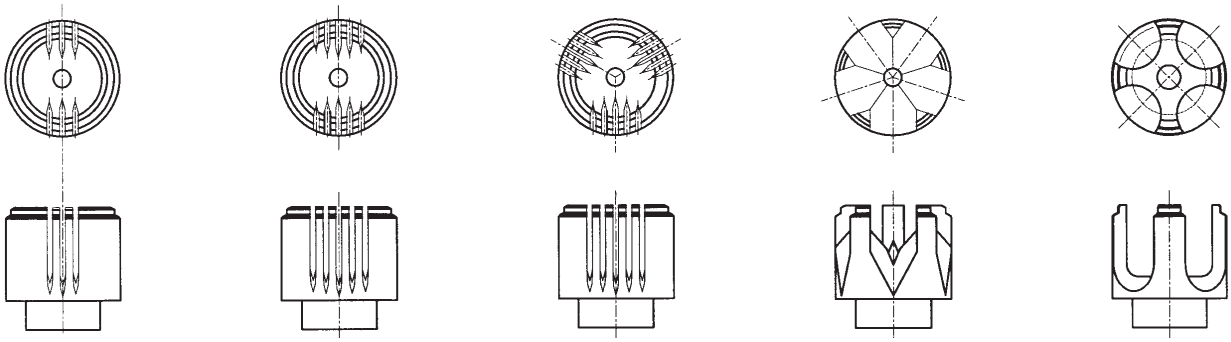
3/4 Valve
5024-4

1 Valve
5024-5

1-1/4 Valve
5024-6

1-1/2 Valve
5024-7
(For UV-5ATC Valve Only)

PREVIOUS DESIGN



1/2 Valve
5024-3

3/4 Valve
5024-4

1 Valve
5024-5

1-1/4 Valve
5024-6

1-1/2 Valve
5024-7

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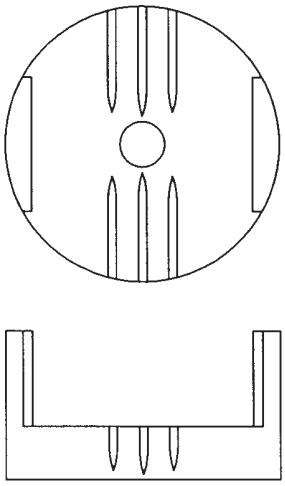
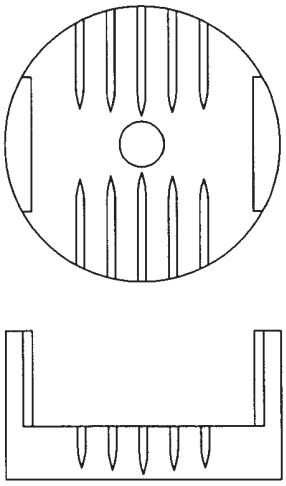
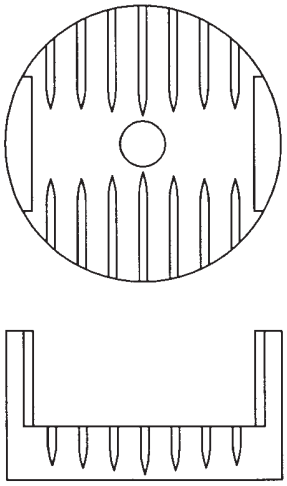
UV-5AT & TC Check Poppet V-Guides



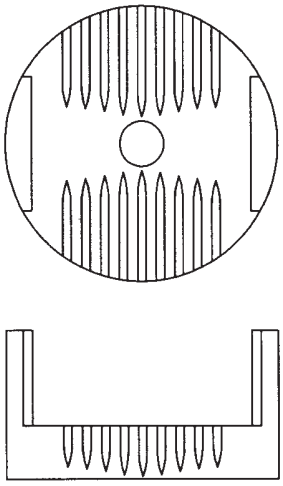
1/4 - 1/2 Valve
5603-3



3/4 Valve
5603-4



1 Valve
5603-5



1-1/4 Valve
5603-6

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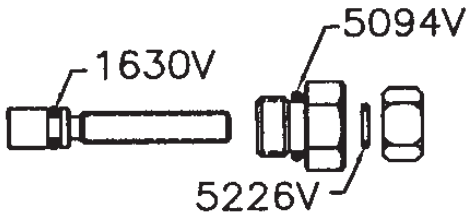
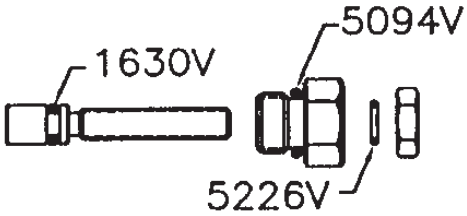
Kit # 5131V - UV-5A, T & TC Viton Seal Kit

NOTE: We do not recommend rebuilding the DSC adjuster of the UV-5ATC valve in the field.



DT Adjuster Assembly
5137A



US, UT, DA, Adjuster Assembly
2400A

Parts Included With Kit 5131V

PART NUMBER	QTY	LOCATION & DESCRIPTION
1181V	1	DOWN PISTON O-RING (NOVEMBER 2005 AND LATER)
5025V	1	DOWN PISTON SEAL DISK
5009V	2	O-RINGS FOR BYPASS & DOWN PISTONS
A504V	1	O-RINGS FOR PUMP INLET
5021V	3	O-RINGS FOR CHECK CLOSURE
5238V	1	O-RINGS FOR CHECK PISTON ASSEMBLY
5013V	3	O-RINGS FOR BYPASS & DOWN CLOSURES
5111V	2	O-RINGS FOR BYPASS & DOWN PISTON SLEEVES
5034V	1	O-RING FOR PRESSURE RELIEF VALVE (RV) ASSY.
5030V	1	O-RING FOR MANUAL LOWERING ASSY.
5020V	2	O-RINGS FOR UA & DC ADJUSTERS
5011V	7	O-RINGS FOR DL, DM, UL, BP, PRV & UP LEVELING STEM
5094V	8	O-RINGS FOR DA, DT, DC, UT, UD, UA, PRV & DOWN LEVELING SPOOL
5227V	2	O-RINGS FOR UP LEVELING STEM & MANUAL LOWERING ASSEMBLIES
5063V	1	O-RINGS FOR PRESSURE RELIEF VALVE (RV)
5226V	8	O-RINGS FOR DA, DC, DT, UT, UD, UA ADJUSTERS, UP LEVELING STEM & DOWN CLOSURE
1630V	6	O-RINGS FOR DA, DC, DT, UT, UD, UA ADJUSTERS
5237V	1	O-RING FOR MANUAL LOWERING ASSEMBLY

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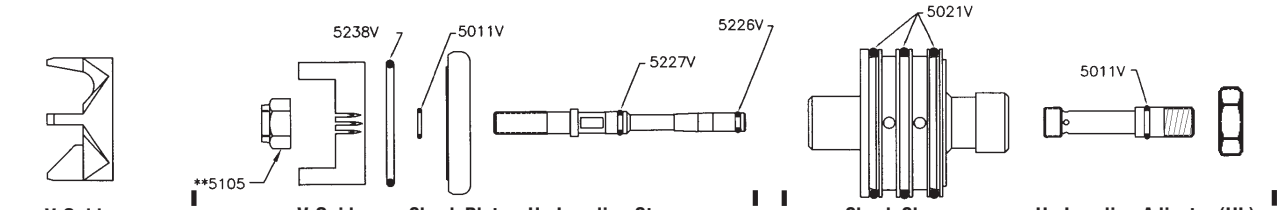
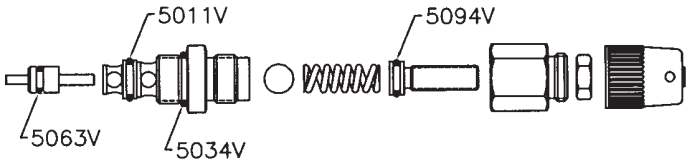
Kit # 5131V - UV-5A, T & TC Viton Seal Kit (cont.)



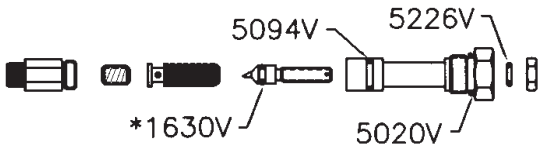
V-Guide (Prior to 4-2001)

V-Guide | Check Plate | Up Leveling Stem — Check Poppet Assembly 5611A-TAB

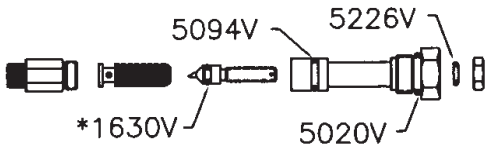
Check Closure | Up Leveling Adjuster (UL) — Check Closure Assembly 5045DA



Pressure Relief Assembly (RV)
5079A

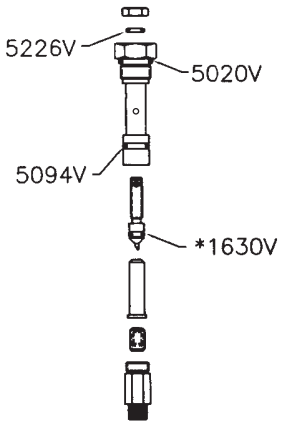


UA Adjuster Assembly
5604A (Effective 4-2001)

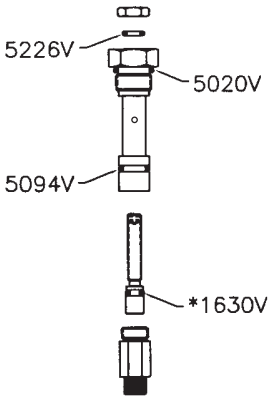


DC Adjuster Assembly
5606A (Effective 4-2001)

- For Information Only -
UA Adjuster Assembly
5089A (Prior to 4-2001)



- For Information Only -
DC Adjuster Assembly
5101A (Prior to 4-2001)



* Replacement of internal O-rings in the field is not recommended. However if O-rings are replaced, apply Locktite 222MS to threads of input cap assembly and tighten it snug tight to the adjuster body.
** Torque the check poppet jamb nut to 90 in.-lbs.

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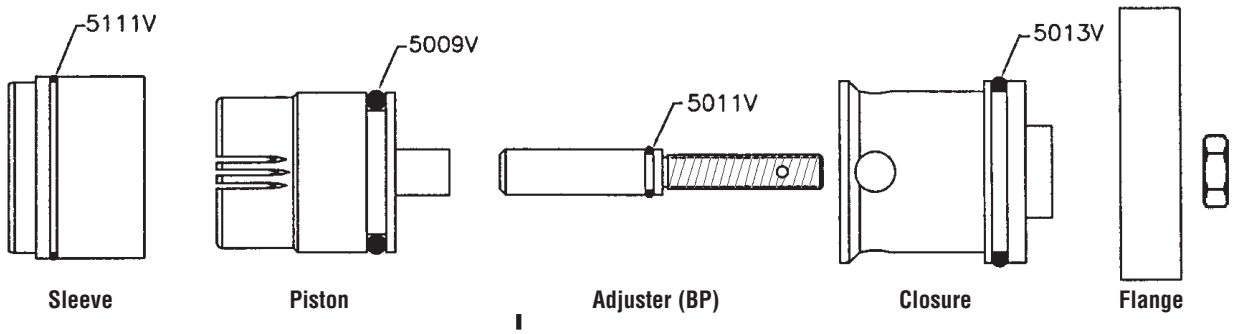
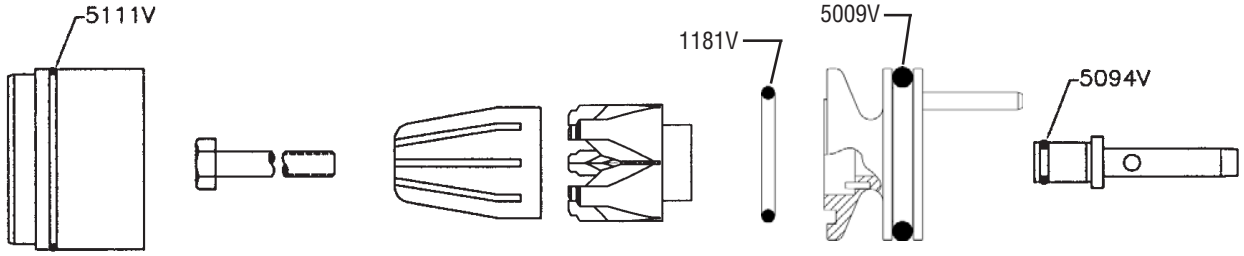
Kit # 5131V - UV-5A, T & TC Viton Seal Kit (cont.)



Removable Sleeve 5023A

Bypass Piston 5007-TAB

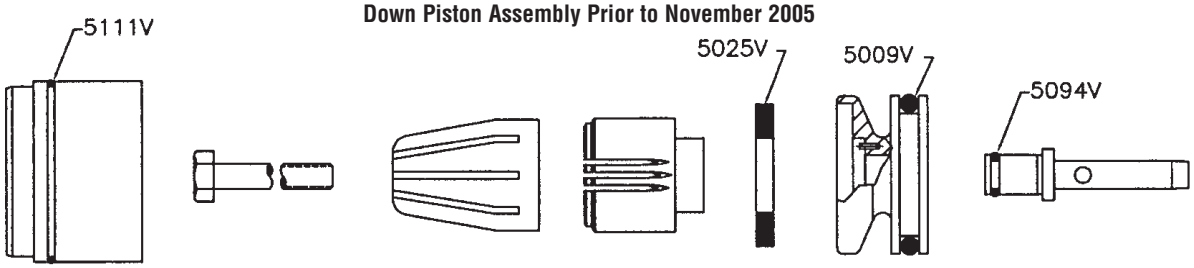
Bypass Closure Assembly 5012CA

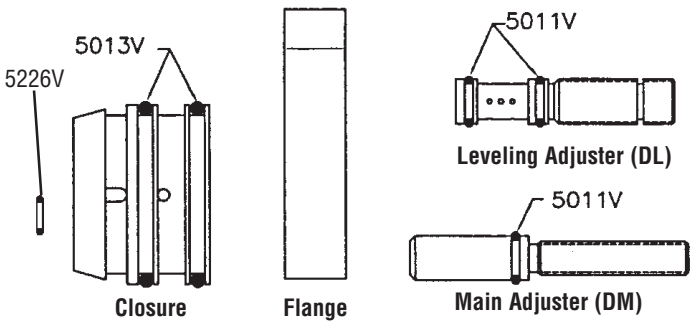


Down Piston Assembly, 5623A-TAB

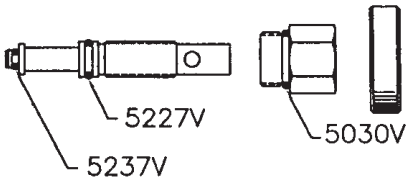
For Information Only

Down Piston Assembly Prior to November 2005





Down Closure Assembly, 5622A



Manual Lowering Assembly, 5211BA

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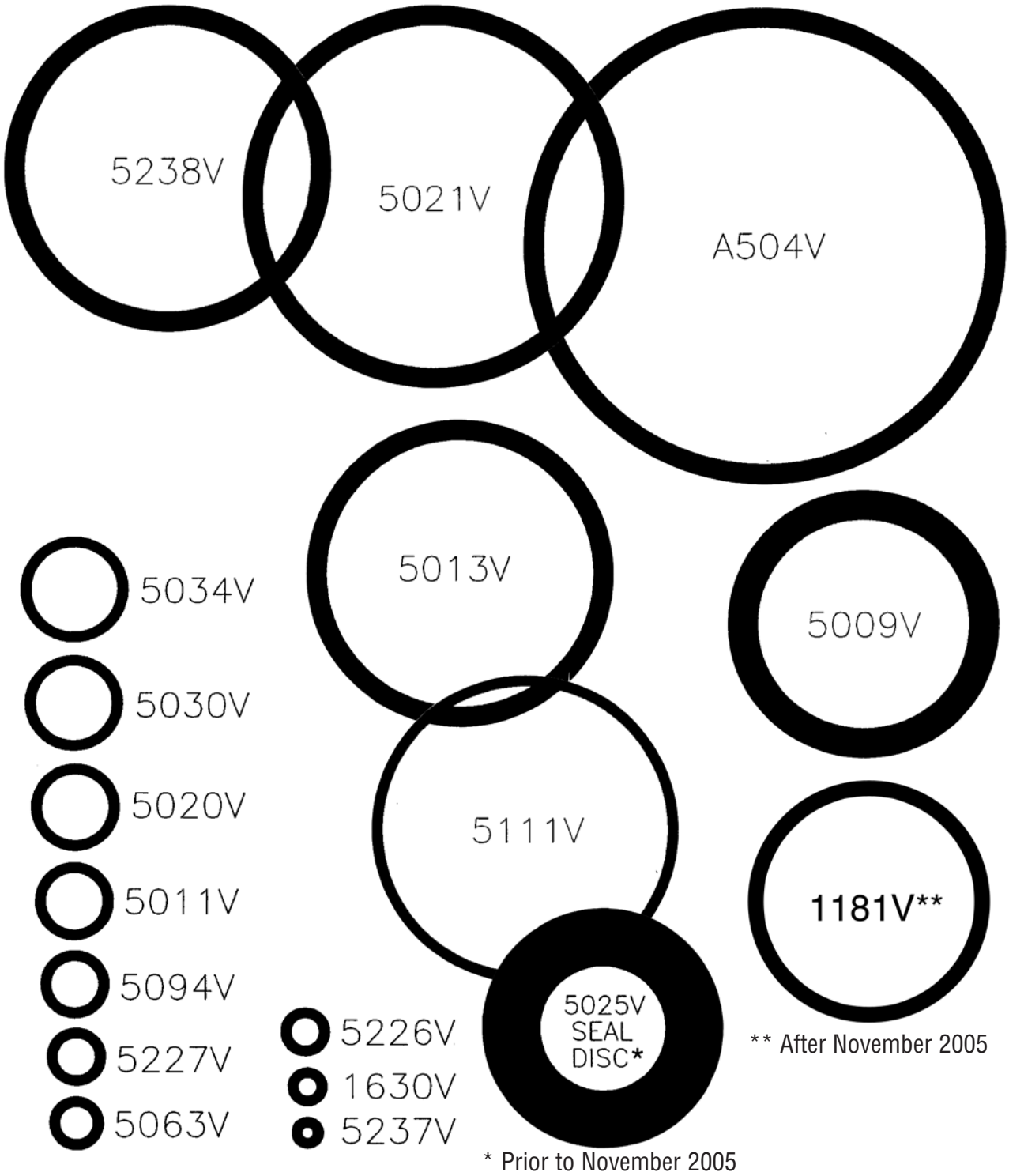
Kit # 5131V - UV-5A, T & TC Viton Seal Kit, O-Rings



NOTE: When replacing down piston o-ring seal** (or seal disk*) on down piston assembly, and reusing diffuser bolt, apply locktite compound #680 on diffuser bolt thread and torque the bolt to 90 in.-lbs. max.

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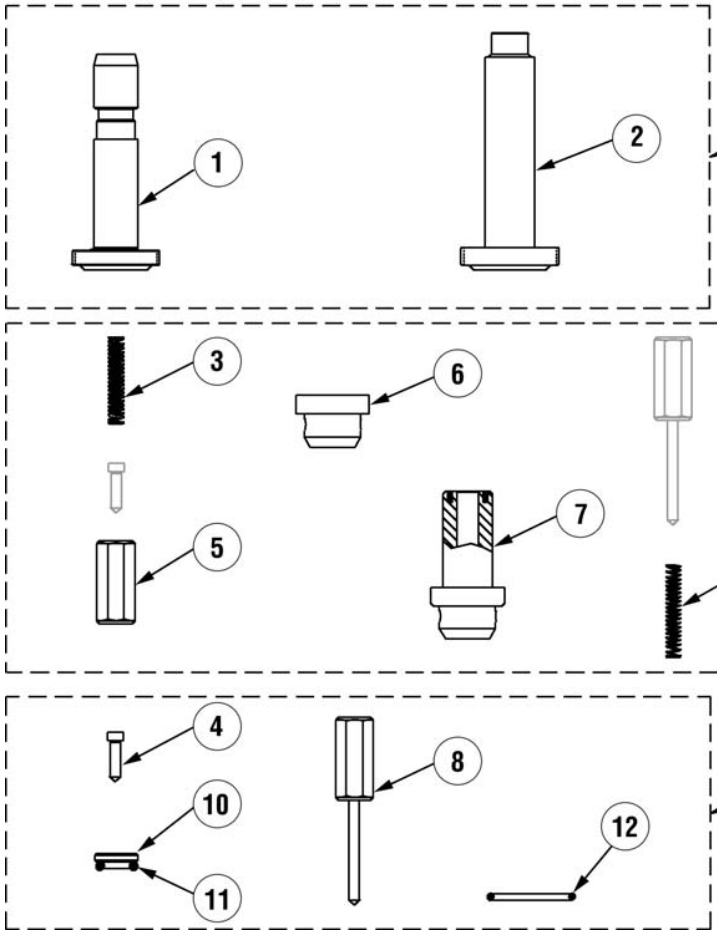
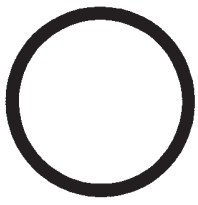
Kit # 5106V - UV-5A, UV-5AT & UV-5ATC
Solenoid Kit



Note: The three solenoid kits shown above can be order together as Part # 5106V, or individually as Part #'s 5432, 5433 or 5434.



5060V

5065–4

5063V

Parts Included With Kit 5106V

ITEM	PART NUMBER	QTY	LOCATION & DESCRIPTION
A	**SOLENOID PLUNGER TUBE KIT (5432)**		
2	5128A	2	N/O PLUNGER TUBE ASSEMBLY
1	5129A	2	N/C PLUNGER TUBE ASSEMBLY
B	**SOLENOID HAMMER KIT (5433)**		
9	5054	2	N/O HAMMER LIFT OFF SPRING
7	5061A	2	N/O NEEDLE ORIFICE ASSEMBLY
6	5064A	2	N/C NEEDLE ORIFICE ASSEMBLY
5	5056	2	N/C SOLENOID HAMMER
3	5055	2	N/C NEEDLE HOLD OUT SPRING
C	**SOLENOID ORIFICE KIT (5434)**		
12	5060V	4	O-RING N/C & N/O PLUNGER TUBES
11	5063V	4	O-RING N/C & N/O NEEDLE ORIFICE ASSY
10	5065-4	4	N/C & N/O NEEDLE ORIFICE INSERT
8	5130A	2	N/O PLUNGER ASSEMBLY
4	5059	2	N/C HAMMER NEEDLE

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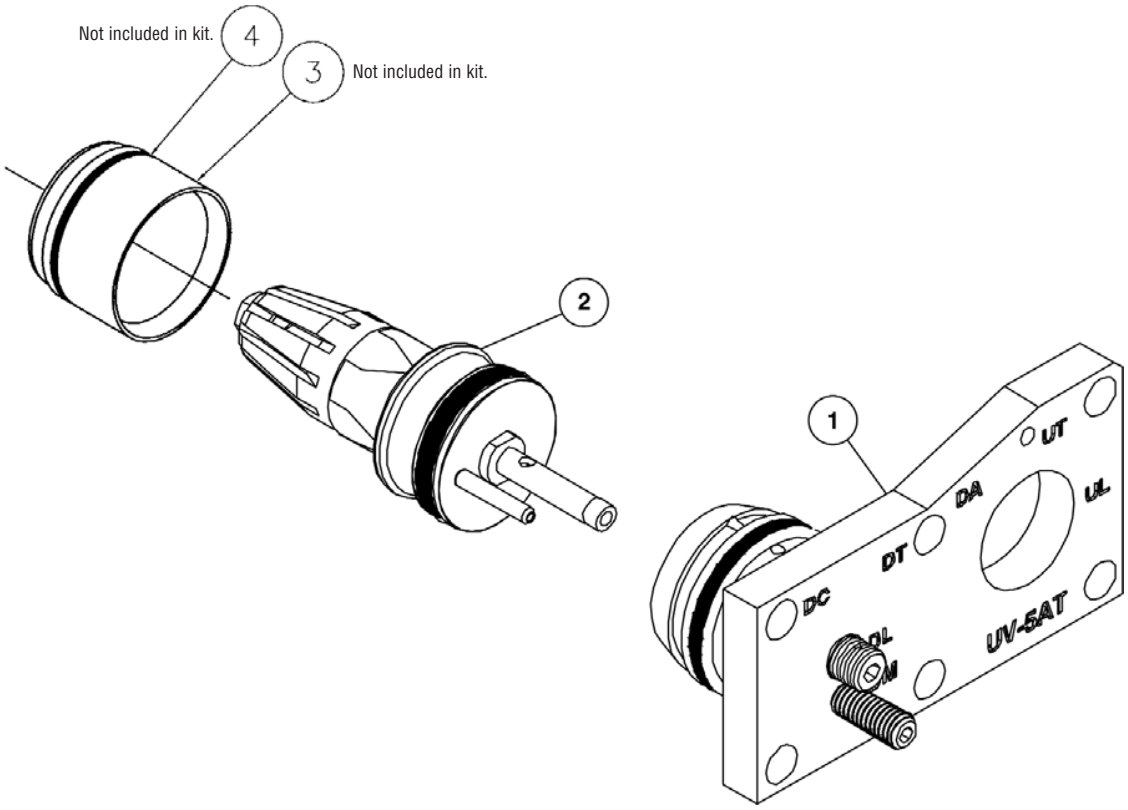
Kit # 5627A-( ) - Down Piston Replacement Kit FOR UV-5A & UV-5AT

You must use this replacement kit when replacing the Down piston assembly (2) in UV-5A and UV-5AT valves manufactured before November 2005. The new down piston assembly will not fit in the old down closure manufactured prior to this date.



Replacement Procedure

1) Close supply shut-off valve to jack.
2) Relieve pressure in the valve by opening **Manual Lowering**.
3) Remove 6 bolts from UV-5A down/check flange.
4) Remove UV-5A down/check flange from the valve. The down closure will come off as well.
5) Remove UV-5A down piston assembly from the valve.
6) If removable sleeve (3) is also removed, inspect its O-ring to make sure it is in good condition. Replace O-ring (4) if necessary.
8) Insert provided UV-5AT down piston assembly into the new UV-5AT down closure flange assembly (1) and insert them into the valve.
9) Replace and tighten bolts.
10) Close manual lowering and slowly open supply shut off valve.
11) Cycle car and refer to UV-5AT "Adjustment Procedure" to readjust the valve.

Kit Part Number & Sizes

ASSEMBLY NO.	SIZE
5627A-0*	1/16
5627A-1	1/8
5627A-2	1/4
5627A-3	1/2
5627A-4	3/4
5627A-5	1
5627A-6	1 1/4
5627-7*	1 1/2

* Old "S Series" (or earlier) Valves.

Parts Included With Kit 5627A - ( )

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	5622A	DOWN CLOSURE ASSEMBLY
2	1	5623A-TAB	DOWN PISTON ASSEMBLY

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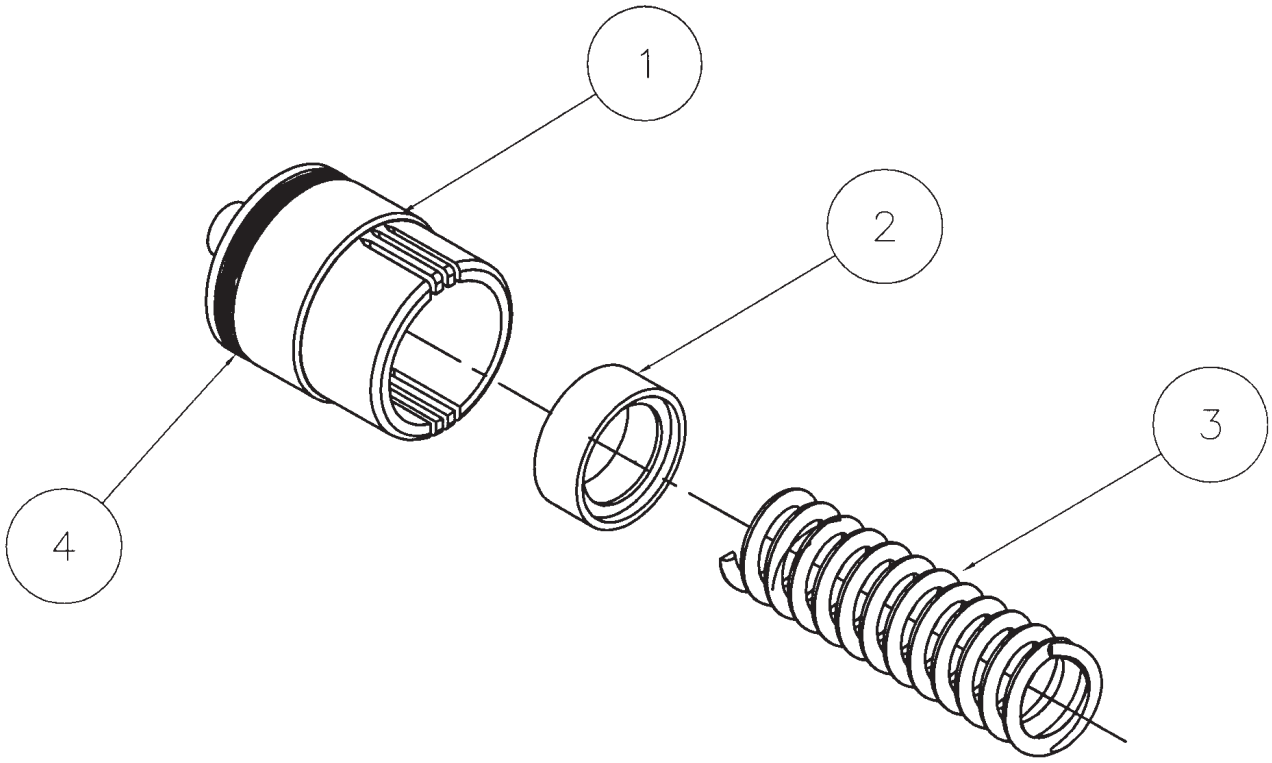
Kit # 5006A-( ) - Bypass Piston & Spring Replacement Kit For UV-5A, UV-5AT & UV-5ATC

This kit **MUST** be used when replacing the bypass piston in an older **S-series** (or earlier) **UV-5A** valve. Due to improvements in the current EECO bypass V-Guide piston, the spring must also be replaced when replacing the bypass v-guide piston. The replacement kit includes a new bypass v-guide piston with seal (1 & 4), spring buffer (2) and a new, shorter, bypass spring (3).

This kit can also be used in current UV-5AT & TC valves.



Installation Procedures

1. Snap Spring (3) into Spring Buffer (2)
2. Insert Buffer/Spring assembly, buffer first, into Bypass Piston (1)
3. Insert Piston Assembly and Closure into Bypass Section of valve

Kit Part Number & Sizes

PART NO.	PISTON SIZE
5006A-0	1/16*
5006A-1	1/8
5006A-2	1/4
5006A-3	1/2
5006A-4	3/4
5006A-5	1
5006A-6	1 1/4
5006A-7	1 1/2*

* Old “S Series ” (or earlier)Valves.

Parts Included With Kit 5006A- ( )

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	5006A-TAB	BYPASS V-GUIDE
2	1	5132A	SPRING CAP ASSEMBLY
3	1	5006-1	BYPASS SPRING
4	1	5900V	BYPASS V-GUIDE O-RING

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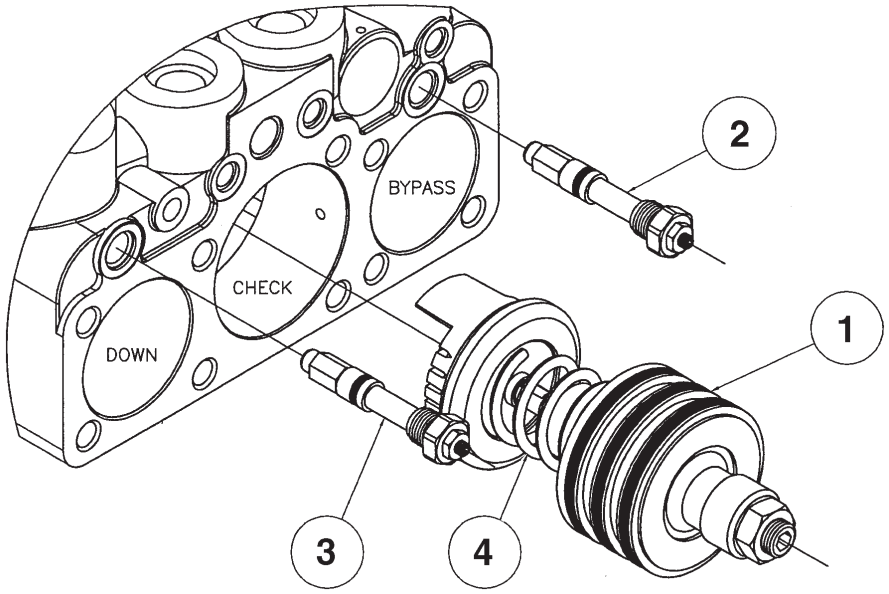
Kit # 5600A-( ) - Temperature Compensation Upgrade Kit For UV-5A

EECO has developed a temperature compensation kit 5600A-( ) to upgrade standard S-series and earlier UV-5A valves currently in service. This upgrade provides **Full Temperature Compensation** over the valve's entire operational temperature range of 80° to 150° F (27° to 66° C). These changes will allow consistent elevator operation by maintaining floor-to-floor travel time and up leveling speed. EECO recommends that when a temperature compensation kit is installed in a valve, the rest of the seals in the rest of the valve also be replaced with high temperature Viton seals using EECO's standard seal kit 5131V. When ordering a temperature compensation kit and the 5131V seal kit, please have the existing valve size and/or serial number available.



Upgrade Procedure

1) Close supply shut off valve to jack.
2) Relieve pressure in the valve by opening **Manual Lowering**.
3) Remove 6 bolts from UV-5A down/check flange.
4) Remove UV-5A down/check flange from the valve.
5) Remove UV-5A check piston assembly from the valve.
6) Insert provided UV-5AT check piston assembly into valve.
7) Remove DC adjuster from valve and replace it with provided UV-5AT DC adjuster (painted red).
8) Remove UA adjuster from valve and replace it with provided UV-5AT UA adjuster (painted green).

NOTE: It is strongly recommended that at this time the rest of the valve be rebuilt with seal kit 5131V, which contains high temperature Viton O-rings. To order this kit please contact EECO sales.

9) Replace down/check flange back into valve and replace and tighten bolts.
10) Close manual lowering and open supply shut off valve.
11) Refer to the UV-5AT "Adjustment Procedure" to readjust the valve.

NOTE: The optimum oil temperature range for adjusting the valve is 80° F to 100° F (27° to 38° C).

Kit Part Number & Sizes

ASSEMBLY NO.	SIZE
5600A-0*	1/16
5600A-1	1/8
5600A-2	1/4
5600A-3	1/2
5600A-4	3/4
5600A-5	1
5600A-6	1 1/4
5600A-7*	1 1/2

* Old "S Series" (or earlier) Valves.

Parts Included With Kit 5600A- ( )

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	5601A-TAB	CHECK CLOSURE ASSEMBLY
2	1	5604A	UA ADJUSTER ASSEMBLY
3	1	5606A	DC ADJUSTER ASSEMBLY
4	1	5018	CHECK SPRING

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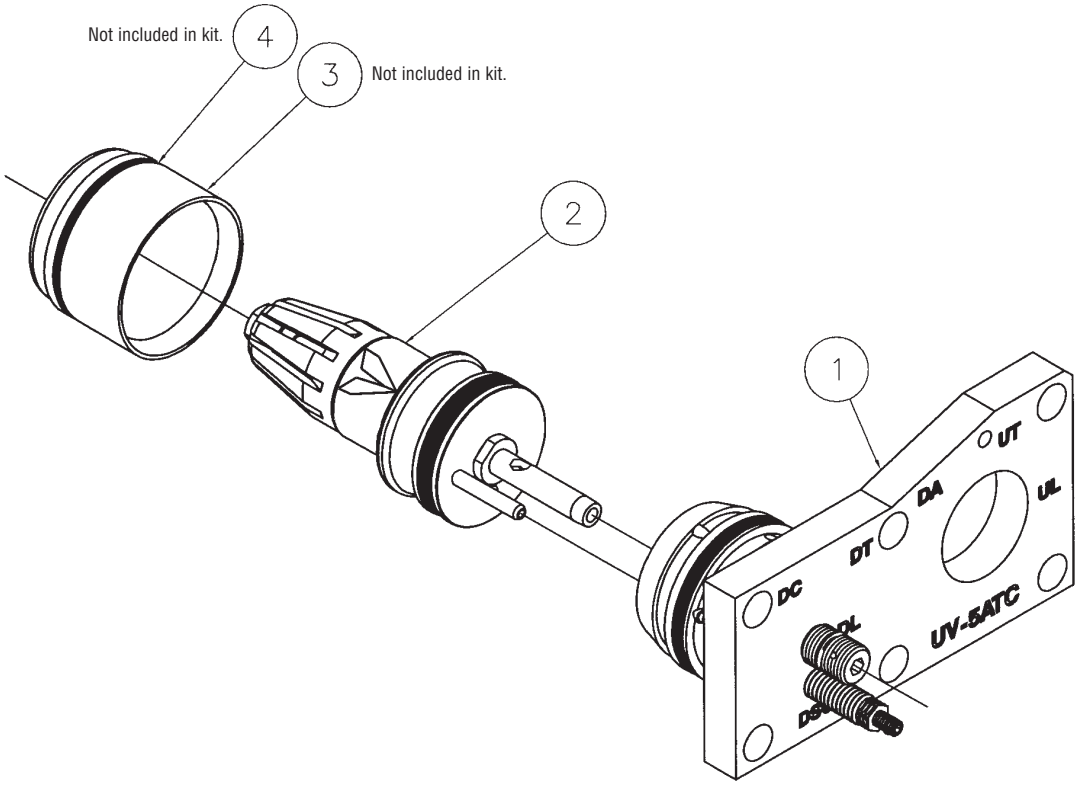
Kit # 5500A-( ) - Pressure Compensation (Constant Down Speed) Upgrade Kit For UV-5A & UV-5AT

EECO has developed a pressure compensation kit 5500A-( ) to upgrade all UV-5A and UV-5AT valves currently in service. Kit works separately from the temperature compensation kit. With this upgrade the valve will maintain **Constant Down Speed** between no load and full load conditions. Please have down contract speed and piston diameter (or flow rate), as well as empty car and full load pressures when ordering this kit.



Upgrade Procedure

1) Close supply shut-off valve to jack.
2) Relieve pressure in the valve by opening **Manual Lowering**.
3) Remove 6 bolts from UV-5A down/check flange.
4) Remove UV-5A down/check flange from the valve. The down closure will come off as well.
5) Remove UV-5A down piston assembly from the valve.
6) If removable sleeve (3) is also removed, inspect its O-ring to make sure it is in good condition. Replace O-ring (4) if necessary.
7) Insert removable sleeve (3) back into valve.
8) Insert provided UV-5ATC down piston assembly (2) into the new UV-5ATC down closure flange assembly (1) and insert them into the valve.
9) Replace and tighten bolts.
10) Close manual lowering and slowly open supply shut off valve.
11) Cycle car and refer to UV-5ATC "Adjustment Procedure" to readjust the valve.

NOTE: There is no need to adjust **DSC**. Constant down speed is achieved automatically when **DSC** adjuster is open (CCW to stop). To close off down speed control, turn **DSC** adjuster CW until snap ring is flush with end of DM adjuster. To reactivate down speed control, turn **DSC** adjuster CCW to stop.

Kit Part Number & Sizes

ASSEMBLY NO.	SIZE
5500A-0*	1/16
5500A-1	1/8
5500A-2	1/4
5500A-3	1/2
5500A-4	3/4
5500A-5	1
5500A-6	1 1/4
5500A-7*	1 1/2

* Old "S Series" (or earlier) Valves.

Parts Included With Kit 5500A - ( )

ITEM	QTY.	PART NO.	DESCRIPTION
1	1	5515-TAB	DSC CLOSURE ASSEMBLY
2	1	5509A-TAB	DOWN PISTON ASSEMBLY

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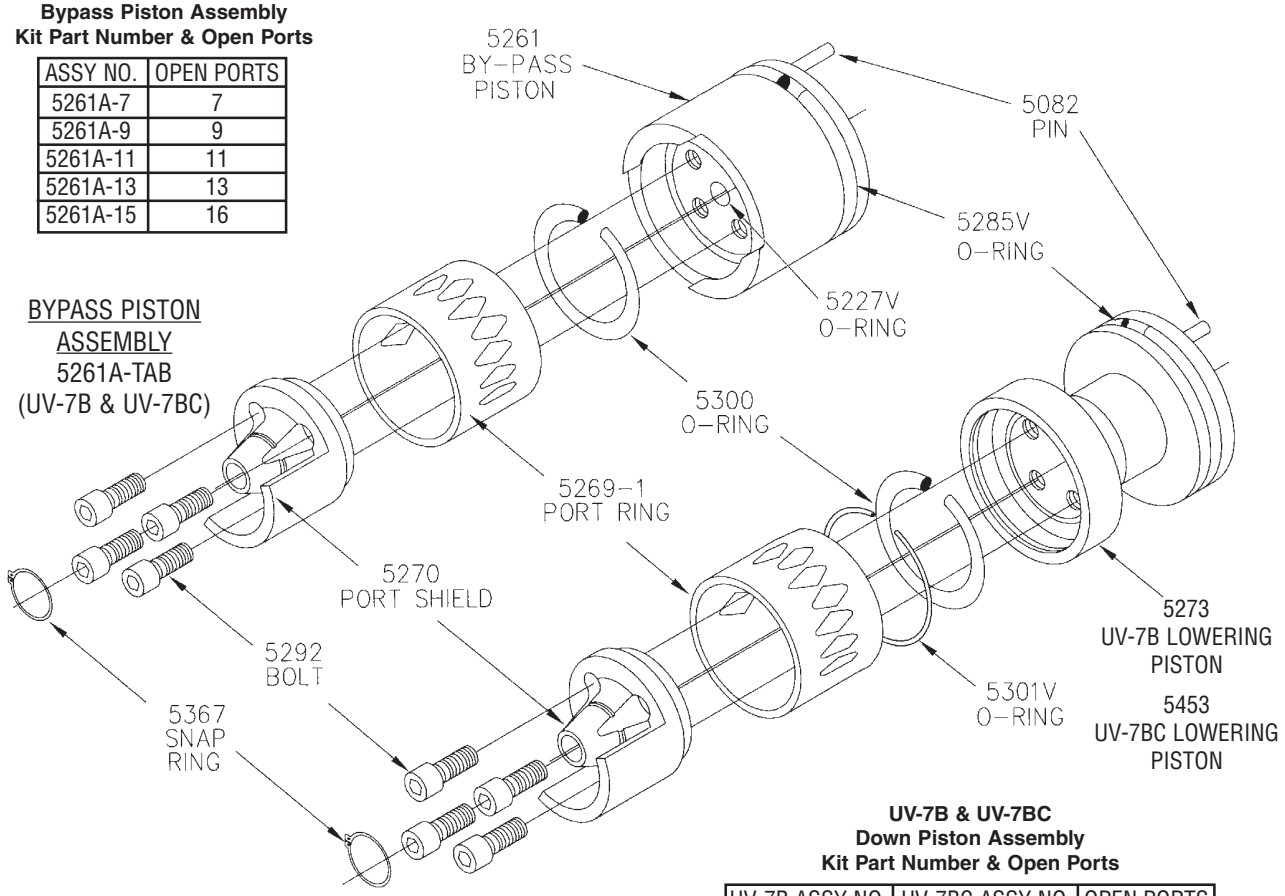
UV-7B & BC Bypass Piston Assembly, Part # 5261A-TAB
UV-7B Down Piston Assembly, Part # 5273A-TAB
UV-7BC Down Piston Assembly, Part # 5453A-TAB

UV-7B & UV-7BC
Bypass Piston Assembly
Kit Part Number & Open Ports

ASSY NO.	OPEN PORTS
5261A-7	7
5261A-9	9
5261A-11	11
5261A-13	13
5261A-15	16



BYPASS PISTON ASSEMBLY
5261A-TAB
(UV-7B & UV-7BC)

DOWN PISTON ASSMBLY
5273A-TAB (UV-7B)
5453A-TAB (UV-7BC)

UV-7B & UV-7BC
Down Piston Assembly
Kit Part Number & Open Ports

UV-7B ASSY NO.	UV-7BC ASSY NO.	OPEN PORTS
5273A-7	5453A-7	7
5273A-9	5453A-9	9
5273A-11	5453A-11	11
5273A-13	5453A-13	13
5273A-15	5453A-15	16

Procedure for Replacing the Down and Bypass port shields EECO UV-7B & UV-7BC valves:

1. Remove the bolts holding the port shield in place.
2. Clean the bolts and remove all loose material from the threads.
3. Use a non-CFC solvent surface activator such as Loctite activator 7649 to clean the surface of the threads. Wait at least five minutes for the solvent to dry.
4. Apply Loctite 680 compound to the threads.
5. Put the new port shield inside the port ring. Make sure correct number of ports are open in each of the port rings.
6. Secure the port shields by the bolts and tighten the bolts to 40 in-lbs. torque.
7. Snap the supplied snap ring on the port shield. Be sure that the snap rings are properly installed.

Adjustable flow piston assemblies:

To increase or decrease flow capability, loosen bolts #5292 enough to allow the port ring #5269 to be rotated to the desired flow rate.

Re-tighten locking bolts #5292 evenly to 40 in. lbs. of torque which is about as tight as you can get them using a 3/16" T-handle Allen driver by hand.

NOTE: If bolts are replaced, please be sure to use Loctite 680 on clean threads of the bolts.

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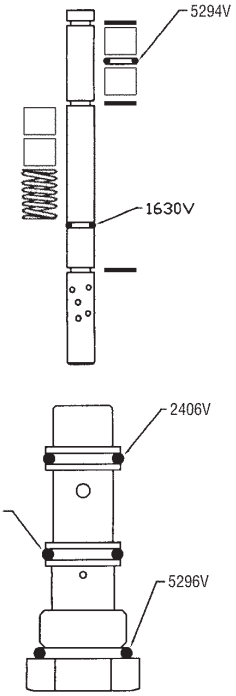
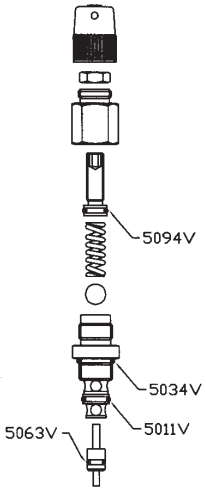
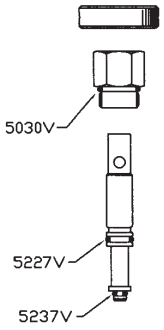
Kit # 5317V - UV-7B & BC Viton Seal Kit

NOTE: We do not recommend rebuilding the DSC adjuster of the UV-7BC valve in the field.

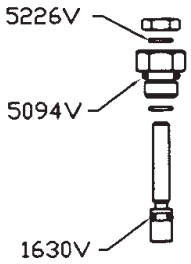




Relief Valve (RV)
Part # 5079A

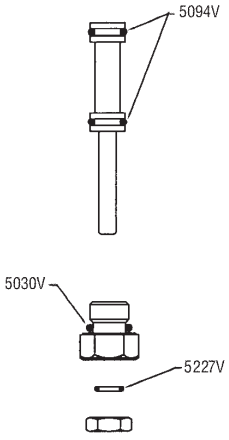


Manual Lowering Assembly (ML)
Part # 5211BA



UA, US, DA, DC, DT Adjuster Assembly
Part # 5349A

NOTE: When replacing o-rings on down, by-pass & check piston assemblies, apply locktite compound #680 on screw thread & torque the screws 40 in.-lbs.



Up Transition (UT) Compensator Assembly
Part # 5276A

Parts Included With Kit 5317V

PART NUMBER	QTY	LOCATION & DESCRIPTION
5285V	2	O-RINGS FOR BYPASS & DOWN PISTONS
5297V	1	O-RINGS FOR CHECK PISTONS
5300V	2	O-RINGS FOR BYPASS & DOWN PISTONS
5299V	3	O-RINGS FOR BYPASS & DOWN SLEEVE, CHECK FLANGE
5301V	1	O-RINGS FOR DOWN PISTON PORT
5296V	1	O-RINGS FOR UT COMPENSATOR ASSY
5295V	1	O-RINGS FOR UT COMPENSATOR ASSY
2406V	1	O-RINGS FOR UT COMPENSATOR ASSY
5294V	1	O-RINGS FOR UT COMPENSATOR ASSY
5311V	2	O-RINGS FOR DC & UA FILTER ASSY
5193V	2	O-RINGS FOR LEVELING ADJUSTER ASSY
5034V	1	O-RINGS FOR RELIEF VALVE (RV)
5030V	2	O-RINGS FOR UT COMPENSATOR & MANUAL LOWERING
5020V	2	O-RINGS FOR BYPASS & DOWN ADJUSTER ASSY'S
5011V	3	O-RINGS FOR RELIEF VALVE (RV), DC & UA FILTER ASSY
5094V	7	O-RINGS FOR RELIEF VALVE (RV), ADJUSTERS (5), UT COMPENSATOR ASSY
5227V	12	O-RING FOR BYPASS PISTON ASSY, UT COMPENSATOR, ML, DOWN FLANGE, BYPASS FLANGE, BYPASS ADJUSTER ASSY & DOWN ADJUSTER ASSY
5063V	1	O-RING FOR RELIEF VALVE (RV)
5226V	5	O-RINGS FOR ADJUSTERS (5)
1630V	6	O-RINGS FOR ADJUSTERS (5) & UT COMPENSATOR ASSY
5237V	1	O-RING FOR ML

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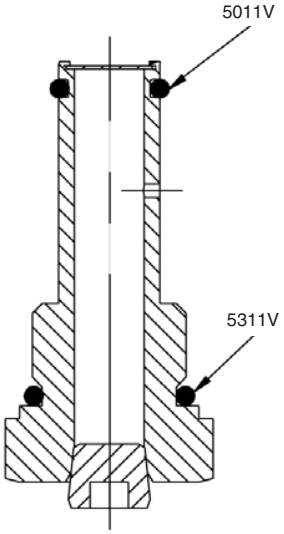
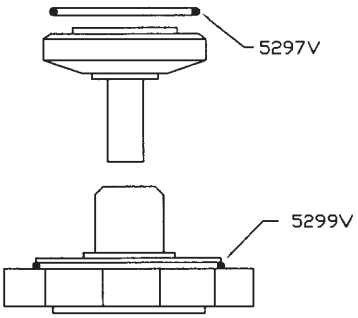
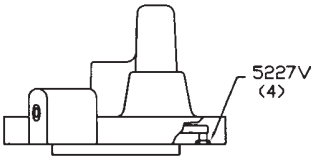
Kit # 5317V - UV-7B & BC Viton Seal Kit (cont.)



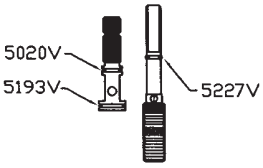
Up Acceleration (UA)
Filter Assembly
Part # 5363A



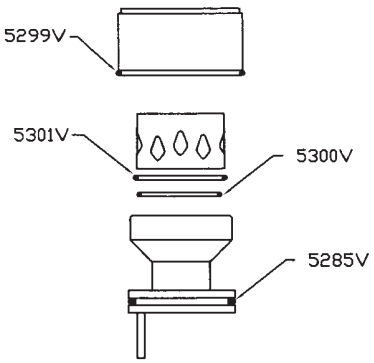
Check Piston Assembly
Part # 5255A



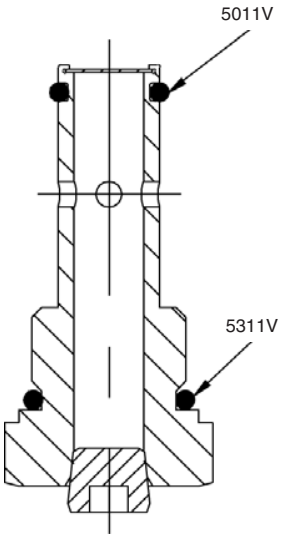
Bypass Flange



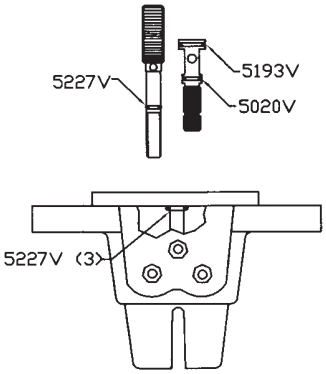
Bypass Adjuster
Assemblies
Part # 5258A



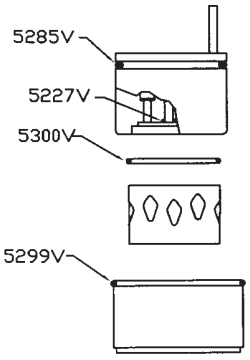
Down Adjuster Assembly
Part # 5273A-TAB (UV-7B)
Part # 5453A-TAB (UV-7BC)



Down Closing (DC)
Filter Assembly
Part # 5260-1A



Down Flange Assembly
Part # 5251A (UV-7B)
Part # 5258A (UV-7BC)



Bypass Piston Assembly
Part # 5261A-TAB

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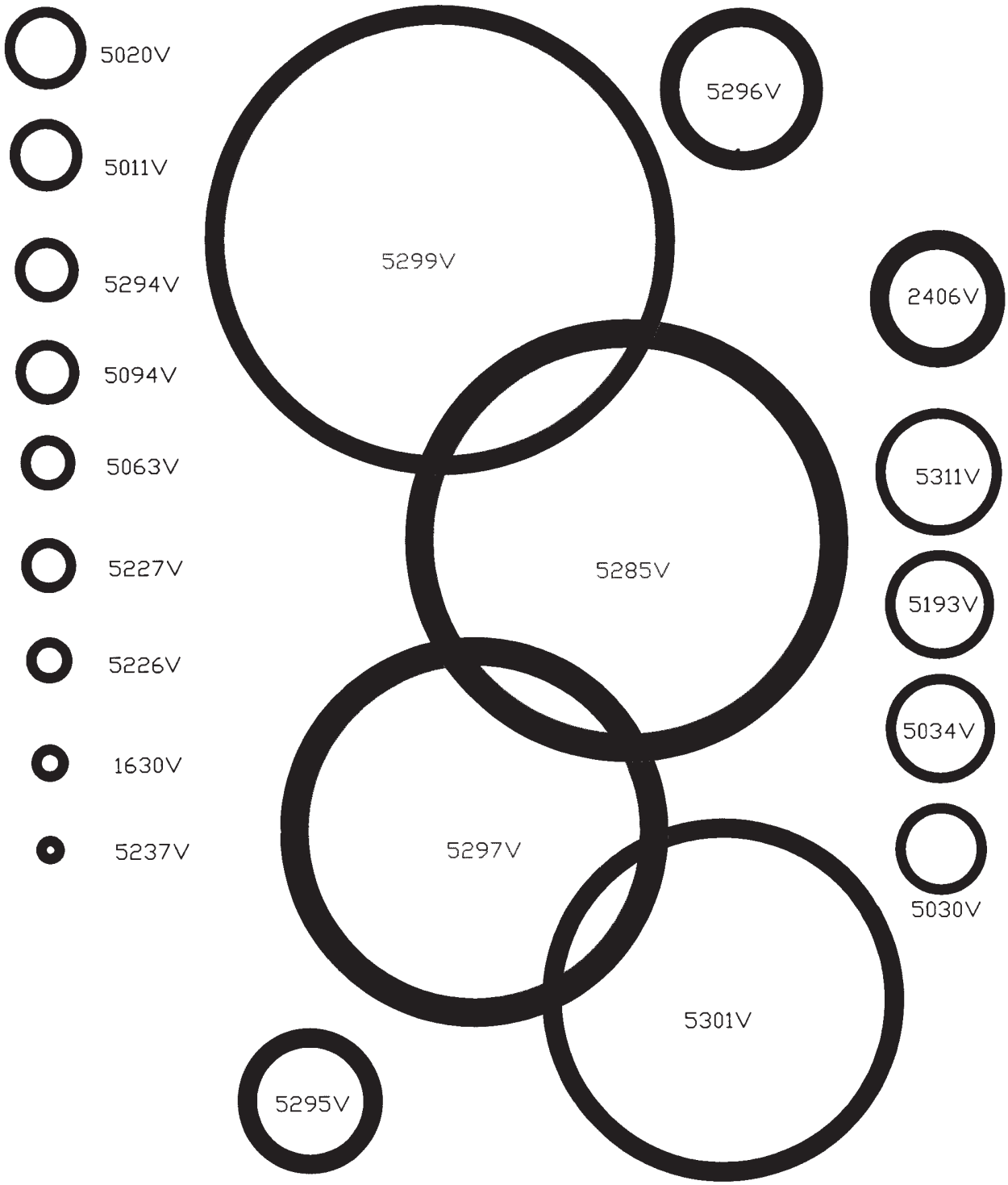
Kit # 5317V - UV-7B & BC Viton Seal Kit, O-Rings



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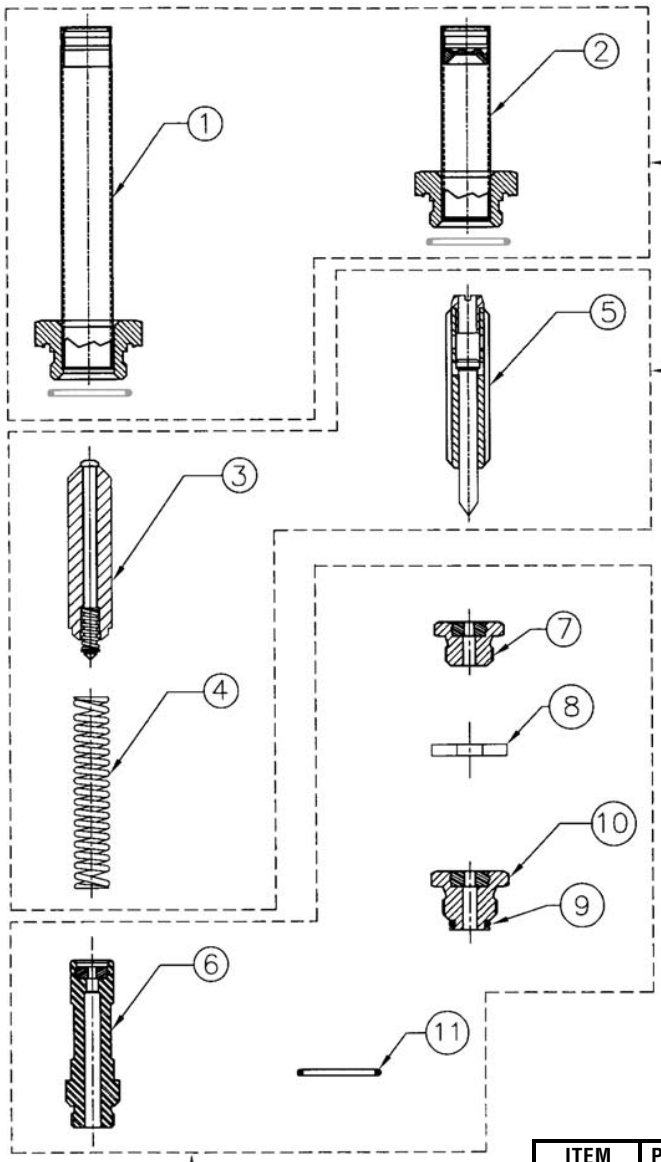
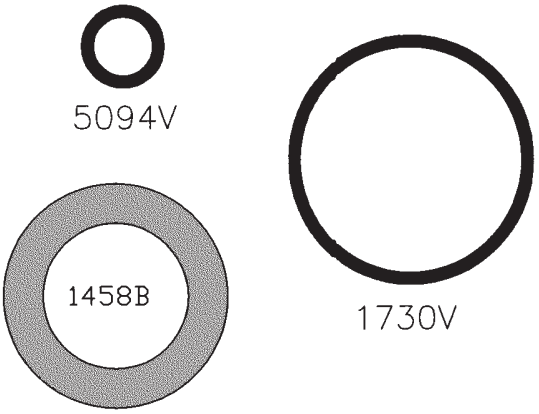
Kit # 5428 - UV-7B & BC Solenoid Kit





Parts Included With Kit 5428

ITEM	PART NUMBER	QTY	LOCATION & DESCRIPTION
A	**PLUNGER TUBE KIT (5431)**		
1	2129A	2	N/O PLUNGER TUBE ASSY
2	2164A	2	N/C PLUNGER TUBE ASSY
	HAMMER KIT (5430)		
3	2125A	2	N/O SOLENOID PLUNGER ASSEMBLY
4	2132	2	N/O PLUNGER ASSEMBLY SPRING
5	1456DA	2	N/C SOLENOID HAMMER ASSEMBLY
C	**ORIFICE KIT (5429)**		
6	2391A	2	N/O NEEDLE ORIFICE ASSEMBLY
7	1465BA	1	N/C NEEDLE ORIFICE SEAT ASSEMBLY (D1)
8	1458B	1	N/C NEEDLE ORIFICE WASHER
9	5094V	1	O-RING FOR N/C NEEDLE ORIFICE SEAT ASSEMBLY (D2 ONLY)
10	5353A	1	N/C NEEDLE ORIFICE ASSEMBLY (D2)
11	1730V	4	O-RINGS FOR N/O & N/C PLUNGER ENCLOSURE ASSEMBLIES

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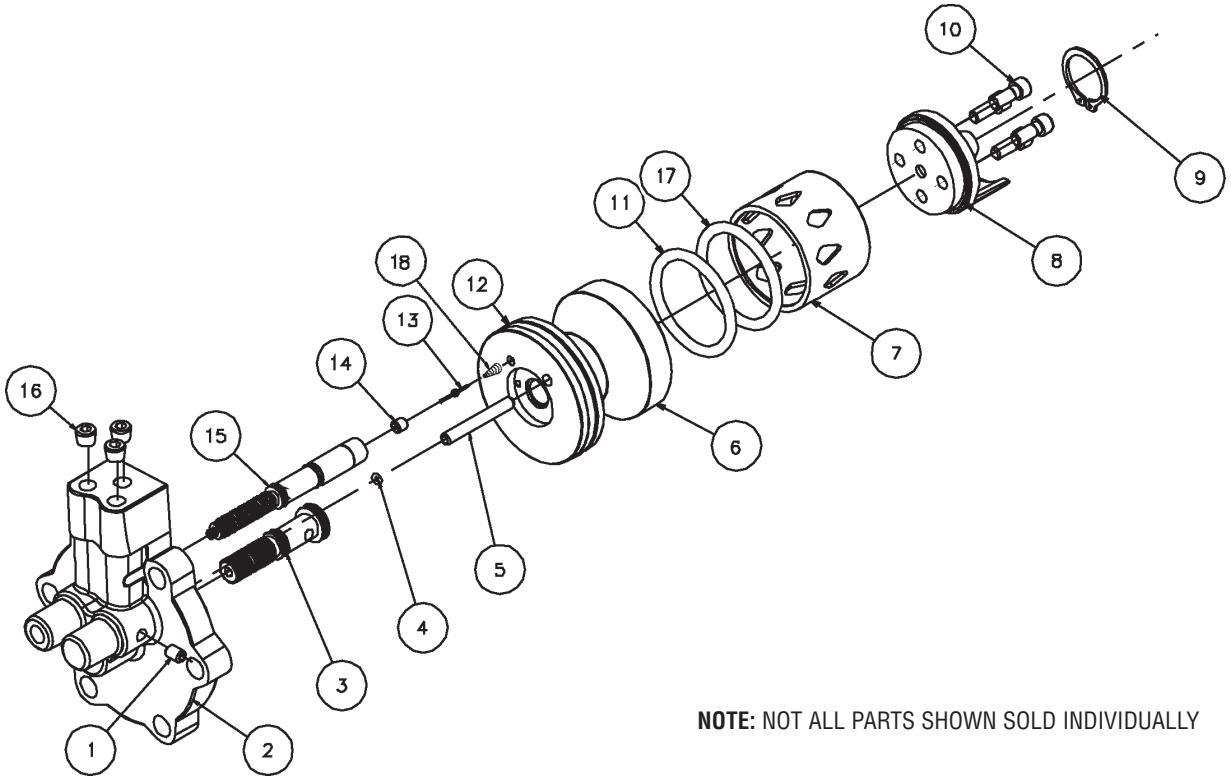
Kit # 5458A-( ) - Pressure Compensation (Constant Down Speed) Upgrade Kit For UV-7B

This kit is used to convert an existing, in-service, UV-7B valve into a UV-7BC (Constant Down Speed) valve.



NOTE: NOT ALL PARTS SHOWN SOLD INDIVIDUALLY

Kit Part Number & Sizes

SIZE	ASSEMBLY NO.
7 Ports Open	5458A-7
9 Ports Open	5458A-9
11 Ports Open	5458A-11
13 Ports Open	5458A-13
16 Ports Open	5458A-16

Parts Included With Kit 5458A-( )

ITEM	QTY.	Part No.	Description
1	1	5520	1/4-20 x 1/4" Long Brass Tube
2	1	5458	DSC Down Flange
3	1	5191BA	Leveling Adjuster Assembly
4	1	5227V	Viton O-Ring-010
5	1	5459	Transfer Pin
6	1	5453	DSC Down Piston
7	1	5269	Port Ring, Bypass & Down Pistons
8	1	5270	Port Shield, Bypass & Down Pistons
9	1	5367	Port Shield Snap Ring
10	4	5292	Socket H.D. Cap Screw
11	1	5300V	Viton O-Ring-328
12	1	5285V	Viton O-Ring-333
13	1	5454	DSC Check Piston
14	1	5412	DSC Plug
15	1	5457A	DSC Compensator Body Assembly
16	3	5113	Pipe Plug
17	1	5301V	Viton O-Ring - 040
18	1	5628	DSC Check Spring

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Solenoid Coils

PART NO.	VOLTAGE (V)	FREQUENCY (Hz)	IN RUSH CURRENT (A)	HOLDING CURRENT (A)	RESISTANCE (Ohm)	COIL COLOR
COILS FOR UV-5A, T & TC VALVES ONLY						
S461	110	60	0.64	0.34	113	GREEN
S462	208	60	0.35	0.22	276	
S453	220	50	0.18	0.15	560	
S463/S401	220/110	60/DC	0.20/0.15	0.15	434	
S464/S403	440/220	60/DC	0.11/0.08	0.08	1765	
S455	24	DC	0.12	0.12	24	
S465*	110/12	60/DC	0.64	0.34		
	Black Lead - 12VDC				4.7	
	Yellow Lead - Common					
	Red Lead - 110VAC				84	
COILS FOR UV-7B & BC VALVES ONLY						
S651	110	60	1.41	0.60	32	BLACK
S652	208	60	0.75	0.32	102	
S653	220	60	0.70	0.30	136	
S654	440	60	0.35	0.15	520	
S655	550	60	0.26	0.11	833	
S656	220	50	0.59	0.25	199	
S752	110	DC	0.40	0.40	245	
S753	220	DC	0.20	0.20	985	

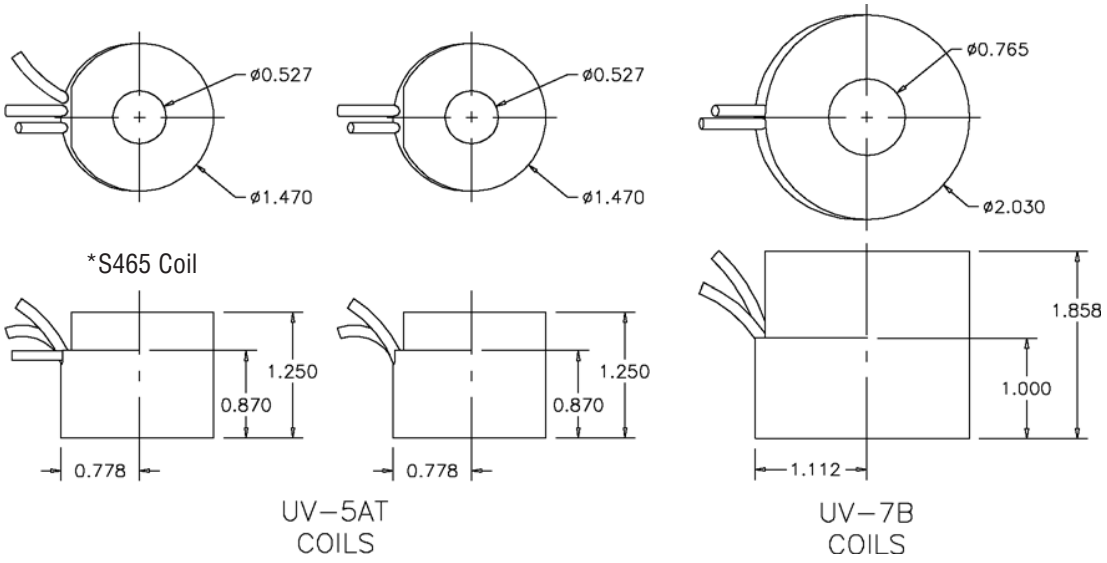
ALL COILS SUPPLIED WITH 96" LEADS

NOTE:

Coils are supplied with the following colored wires to simplify valve wiring:

U1 coils = **Red** wires
U2 coils = **Yellow** wires,
D1 coils = **Black** wires
D2 coils = **Blue** wires

Please specify which valve solenoid coil you need at the time of order.



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Low Pressure Switch

N.O. Low Pressure Switch
Part # 5253

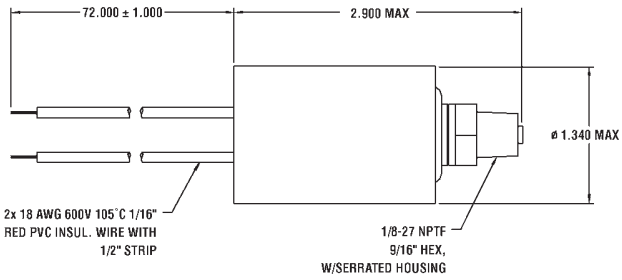
SWITCH SPECIFICATIONS:

CONTACTS . . . . . .N.O.
ACTUATION PRESSURE . . . . . .90 ± 10 PSIG
RELEASE PRESSURE . . . . . .50 ± 10 PSIG
MAX PRESSURE (UL) . . . . . .750 PSIG
MAX PRESSURE (NON-UL) . . .1000 PSIG
BURST PRESSURE . . . . . .5000 PSIG
TEMPERATURE RANGE . . . . . .AMBIENT: -20°F TO 150°F
. . . . . .FLUID: -65°F TO 275°F
ELECTRICAL RATING . . . . . .120VAC - 13A, 13FLA, 65LRA, 480VA
. . . . . .240VAC - 10A, 10FLA, 45LRA, 720VA
DIELECTRIC STRENGTH . . . . .750 VRMS OPEN SWITCH
1550 VRMS TERMINALS TO SWITCH
UL RECOGNIZED . . . . . .FILE SA995, GUIDE SDFY 2
UL CANADA RECOGNIZED . . . .FILE SA995, GUIDE SDFY 8

SWITCH CONFIGURATIONS

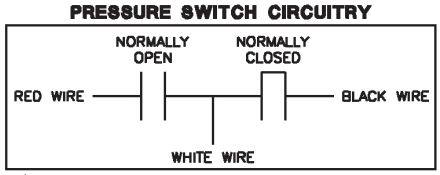
SPST AT ATMOSPHERIC PRESSURE: OPEN

THE MECHANICAL CONNECTION IS 1/8-27 NPTF MALE CONNECTION.
LEAD WIRES ARE 72" ± 1.000 OF #18 AWG WITH INSULATION RATED FOR 105° IN OIL.



N.O./N.C. Low Pressure Switch
Part # 5245

PRESSURE SWITCH CIRCUITRY



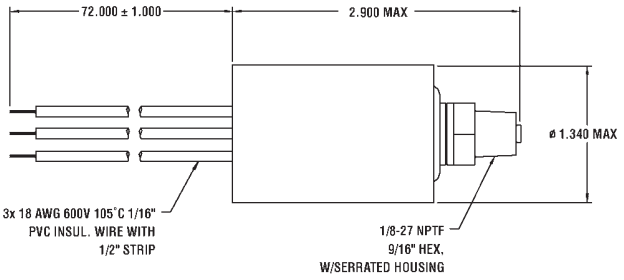
THE **WHITE** WIRE WILL ALWAYS BE CONNECTED TO THE CIRCUIT

CIRCUIT DESCRIPTION

CIRCUIT REQUIREMENT	COLOR OF OTHER WIRE FOR CIRCUIT	WHEN SWITCH IS ACTIVATED
IF A NORMALLY OPEN CIRCUIT IS REQUIRED	CONNECT THE RED WIRE IN THE CIRCUIT	THIS CIRCUIT WILL CLOSE OR MAKE.
IF A NORMALLY CLOSED CIRCUIT IS REQUIRED	CONNECT THE BLACK WIRE IN THE CIRCUIT	THIS CIRCUIT WILL OPEN OR BREAK.

CHARACTERISTICS

PART NUMBER:	5245
CONTACTS:	N.O. / N.C.
ACTUATION PRESSURE:	100 ±10 PSIG
RELEASE PRESSURE:	60 ±5 PSIG
MAX PRESSURE (UL):	750 PSIG
MAX. PRESSURE (NON UL):	1000 PSIG
BURST PRESSURE:	5000 PSIG
PRESSURE MEDIA:	HYDRAULIC FLUID
TEMERATURE RANGE:	-65° TO 275° F
ELECTRICAL RATING:	120 VAC -5.8 FLA 34.8 LRA 240 VAC - 2.9 FLA 17.4 LRA
SWITCH CONFIGURATION:	SPDT
WIRE SIZE:	18 AWG
LEAD LENGTH:	72" (1/2" STRIPPED)



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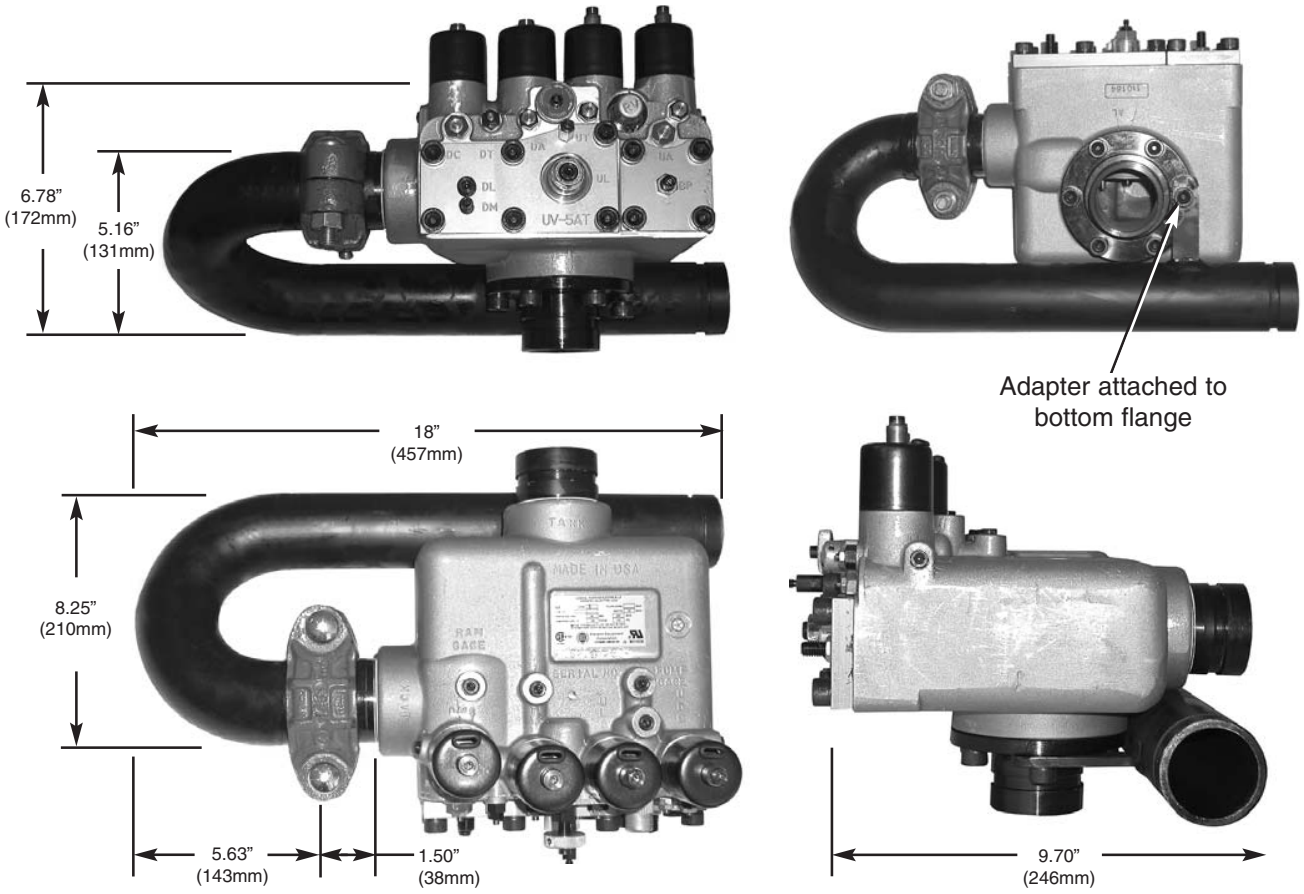
www.elevatorequipment.com and www.eecovalves.com

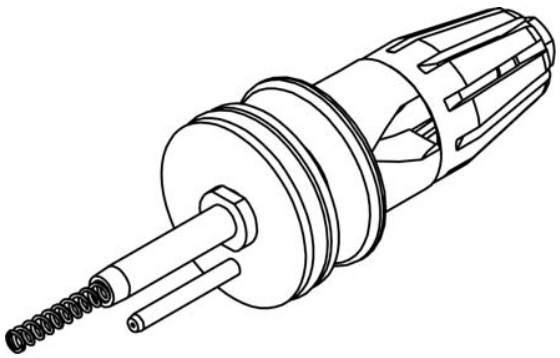
Optional UV-5AT & TC Right Hand Jack Port Adapter, Part # 5620A

This adapter is attached to the valve and is designed to provide standard dimentions for all right hand jack port power unit installations.



UV-5AT & TC Roped Application Options

Low Pressure Down Piston



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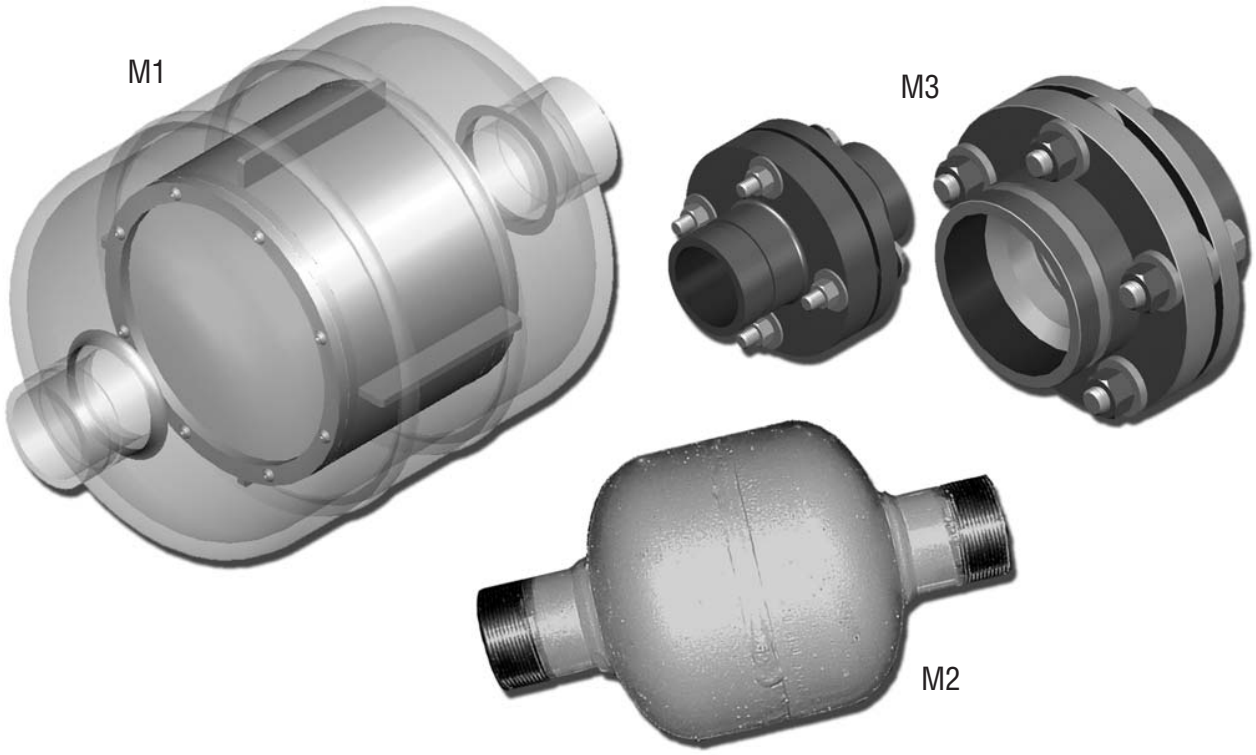
Elevator Components

Machine Room Accessories



M1. The EECO Hydraulic Dampener has a minimum burst pressure of 6000 PSI with an ASME A17.1 allowable working pressure of 1200 PSI. The unit is 14" long with 2" fittings, 14.5" long with 2.5" & 3" fittings.

Available dampeners:
2" GRV to GRV
2" NPT to GRV
2" NPT to NPT
2.5" GRV to GRV
2.5" NPT to GRV
2.5" NPT to NPT
3" GRV to GRV
3" NPT to GRV
3" NPT to NPT

M2. The standard EECO muffler provides superior noise isolation for most standard power unit installations.

Available muffler:
2" GRV to GRV
2" GRV to NPT
2" NPT to NPT
2.5" GRV to GRV
2.5" GRV to NPT
2.5" NPT to NPT
2.5" to 3" GRV to NPT
2.5" to 3" GRV to GRV
3" GRV to GRV
3" GRV to NPT
3" NPT to NPT
Hex fitting
Male connector
Female connector

M3. The EECO isolation coupling is available in three sizes to help reduce noise and vibration from being transmitted to the cab and also provides electical isolation. Each isolation coupling has a dielectric of 25KV. 2" isolation couplings are rated at 1200 PSI, 2.5" and 3" are rated at 1000 PSI.

Available couplings:
2" GRV to GRV, 5.000" OD
2" GRV to NPT, 5.000" OD
2" NPT to NPT, 5.000" OD
2.5" GRV to GRV, 6.875" OD
2.5" GRV to NPT, 6.875" OD
2.5" NPT to NPT, 6.875" OD
3" GRV to GRV, 7.375" OD
3" GRV to NPT, 7.375" OD
3" NPT to NPT, 7.375" OD

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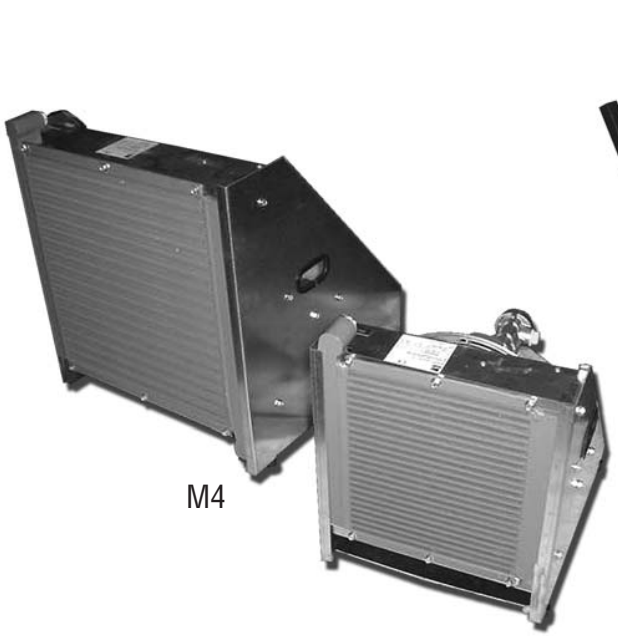
Elevator Components

Machine Room Accessories



M4

M6

M5

M4. Oil coolers are extremely efficient in cooling the oil in the hydraulic elevator machine room. The heart of the unit is a highly reliable and quiet triple screw pump. To safeguard the entire system, the pump is equipped with a safety valve set at 87 PSI to prevent a system over-pressure. The oil is cooled using air produced by a helical fan mounted coaxial with the screw pump motor. Must vent outside the machine room.

Available units:
9.3 GPM, 230/400VAC, 1800 RPM, 26000 BTU/h
17.1 GPM, 230/400VAC, 1800RPM, 59000 BTU/h

M5. The EECO 5 micron Valve Return Filtration System (VRFS) attaches to the tank return port of the valve. The VRFS is a passive oil filtration system. Each time the car moves down, return oil is forced through the filtration bag resulting in the removal of contamination, 5 microns in size or larger, floating in the oil. It also reduces oil turbulence in the tank, helping reduce overall system noise.

Available units:
2" connection, Female NPT
2" connection, Male NPT
2" connection, Grooved
Replacement filter bag

M6. EECO control valve adjusting tools. Designed to fit the adjusters on EECO valves.

Available tools:
Valve adjusting tool (1/16" & 3/8")

Valve adjusting "Z" wrench (1/16") Not Pictured.

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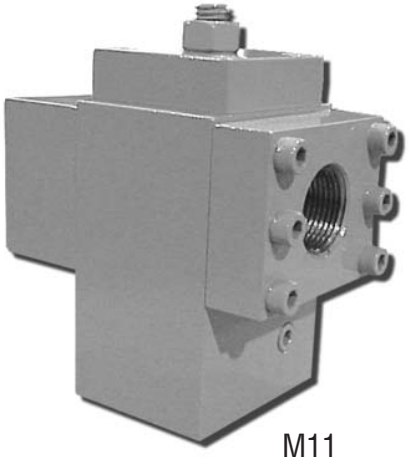
Elevator Components

Machine Room Accessories

M7

M9



M11

M8

M10

M12

M7. 0 to 1000 PSI oil filled pressure gage for use on the 1/8" pump or jack gage ports on EECO control valves.

M8. Quick connect/disconnect fittings for use with the above listed pressure gage or low pressure switch.

1/8" female NPT to female quick connect
1/8" female NPT to male quick connect
1/8" male to male NPT adaptor

M9. Low oil sensor for hydraulic elevator power units.

M10. Power unit tank heater, simple to install and operate. Designed to keep your hydraulic oil at the optimum operating temperature in cooler environments to provide optimum operation of your hydraulic elevator system. Features: Pre-Set 110° F Thermostat, 120 Volt AC (220 VAC available), 250 Watts, 2.1 Amps, Oil-Tight Fittings, Handy-Box with Illuminated Switch Included, Standard 3' Flexible Non-Metallic Pipe (Other lengths available), Power Cord Included.

M11. Pipe rupture valve

Available connection sizes:
3/4" NPT or GRV
1" GRV
1 1/2" GRV
2" NPT or GRV
2 1/2" GRV
3" GRV

M12. EECO Standard low oil sight gage.

Available sizes:
1" diameter, NPT

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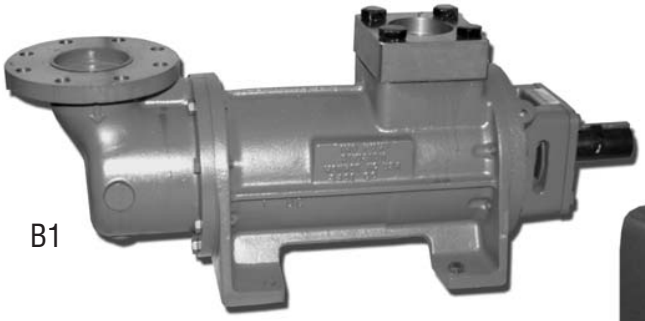
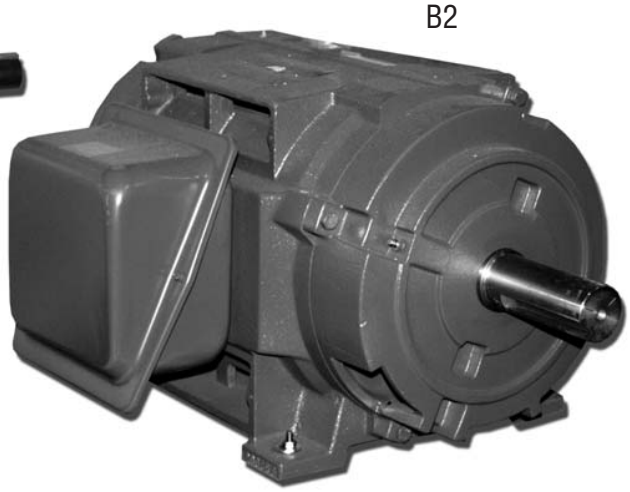
Elevator Components

Replacement Belt Drive Power Unit Pumps & Motors



B1



B2

B1. Replacement pumps for belt-drive power units.

Available pumps:
15 to 35 GPM
20 to 50 GPM
30 to 75 GPM
50 to 125 GPM
75 to 175 GPM
125 to 200 GPM
175 to 275 GPM
225 to 375 GPM
201 to 397 GPM

B2. Replacement electric motors for belt-drive power units.
(S/H = Starts per Hour)

Available motors:
15HP, 200VAC, 80 S/H
15HP, 200VAC, 120 S/H
15HP, 230/460VAC, 80 S/H
15HP, 230/460VAC, 120 S/H
15HP, 575VAC, 80 S/H
20HP, 200VAC, 80 S/H
20HP, 200VAC, 120 S/H
20HP, 230/460VAC, 80 S/H
20HP, 230/46VAC, 120 S/H
20HP, 575VAC, 80 S/H
25HP, 200VAC, 80 S/H
25HP, 200VAC, 120 S/H
25HP, 230/460VAC, 80 S/H
25HP, 230/460VAC, 120 S/H
25HP, 480VAC, 80 S/H
25HP, 575VAC, 80 S/H
30HP, 200VAC, 80 S/H
30HP, 200VAC, 120 S/H
30HP, 230/460VAC, 80 S/H
30HP, 230/460VAC, 120 S/H
30HP, 575VAC, 80 S/H
40HP, 200VAC, 80 S/H
40HP, 200VAC, 120 S/H
40HP, 230/480VAC, 80 S/H
40HP, 230/480VAC, 120 S/H
40HP, 575VAC, 80 S/H
50HP, 208VAC, 80 S/H
50HP, 208VAC, 120 S/H
50HP, 230/460VAC, 80 S/H

Replacement electric motors for belt-drive power units (cont.).

Available motors (cont.):
50HP, 230/460VAC, 110 S/H
50HP, 230/460VAC, 120 S/H
50HP, 460VAC, 80 S/H
50HP, 480VAC, 120 S/H
50HP, 575VAC, 80 S/H
60HP, 200VAC, 80 S/H
60HP, 200VAC, 120 S/H
60HP, 230/460VAC, 80 S/H
60HP, 230/460VAC, 120 S/H
60HP, 460VAC, 120 S/H
60HP, 575VAC, 80 S/H
60HP, 575VAC, 120 S/H
75HP, 230/460VAC, 80 S/H
75HP, 230/460VAC, 120 S/H
75HP, 575VAC, 80 S/H
75HP, 575VAC, 120 S/H
100HP, 230/460VAC, 80 S/H
100HP, 230/460VAC, 120 S/H
100HP, 575VAC, 80 S/H
125HP, 230/460VAC, 80 S/H
125HP, 575VAC, 80 S/H

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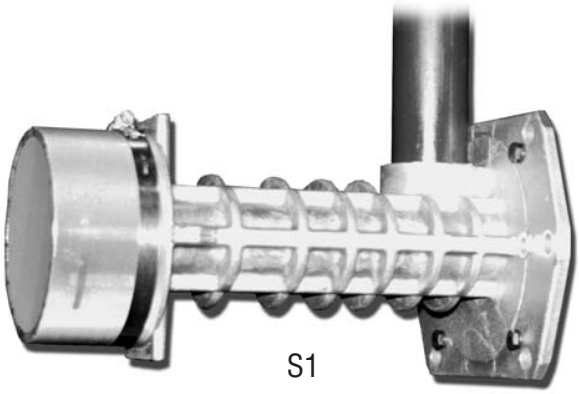
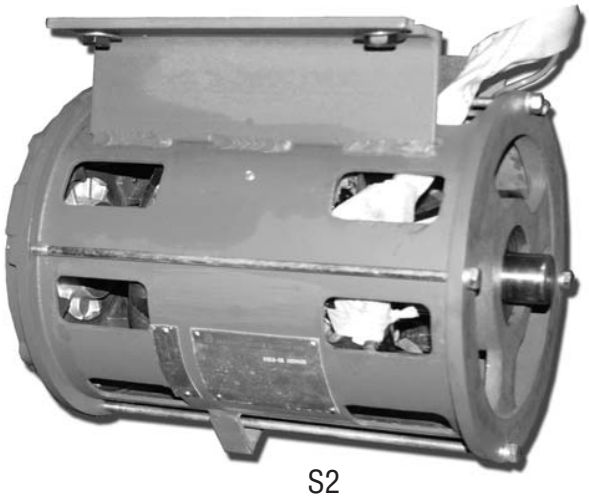
Elevator Components

Replacement Submersible Power Unit Pumps & Motors



S1



S2

S1. Replacement pumps for submersible power units.

Available pumps:

7.4 GPM
9.3 GPM
11.0 GPM
12.5 GPM
15.0 GPM
17.8 GPM
23.0 GPM
32.7 GPM
39.8 GPM
47.2 GPM
49.0 GPM
58.2 GPM
68.5 GPM
78.0 GPM
82.6 GPM,
88.0 GPM,
98.4 GPM
117.7 GPM
123.5 GPM
140.5 GPM
167.0 GPM
184.0 GPM
198.5 GPM
200.1 GPM
236.0 GPM
253.1 GPM
283.4 GPM

S2. Replacement electric motors for submersible power units.

Avalable motors:

15HP, 200VAC
15HP, 230/460VAC
15HP, 575VAC
20HP, 200VAC
20HP, 230/460VAC
20HP, 575VAC
25HP, 200VAC
25HP, 230/460VAC
25HP, 575VAC
30HP, 200VAC
30HP, 230/460VAC
30HP, 575VAC
40HP, 200VAC
40HP, 230/460VAC
40HP, 575VAC
50HP, 200VAC
50HP, 230/460VAC
50HP, 575VAC

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Elevator Components

Hoistway Accessories & Parts

H1. Guides.

Available units:
Guide shoe - solid
Guide shoe - swivel
Guide shoe - roller

H2. Mounting clips.

Available units:
LS-1B switch clip
Guide rail clip

H3. Rail Brackets.

Available units:
Standard rail bracket
Adjustable rail bracket

H4. Hoistway switches.

Available switches:
MV-4C magnet switch
LS-1B limit switch
LDS-3004A inductor switch

H5. Pendant station (unwired).

H6. TS-2002 Tape Selector.
(ALS = Access Zone Sensor)

Available units:
Model S2 - 2 stops, front opening
Model R2 - 2 stops, rear opening
Model S3 - 3 stops, front opening
Model R3 - 3 stops, rear opening
Model SF - Short floor
Model S2A - 2 stops, front opening, ALS
Model R2A - 2 stops, rear opening, ALS
Model S3A - 3 stops, front opening, ALS
Model R3A - 3 stops, rear opening, ALS
Model SFA - Short floor, ALS
Replacement magnet strips
Replacement sensors
Replacement 3" steel tape

NOTE: Refer to the installation manual at: **www.eeco-elevatorcomponents.com /PDF/SelectorManual.pdf** for model identification.

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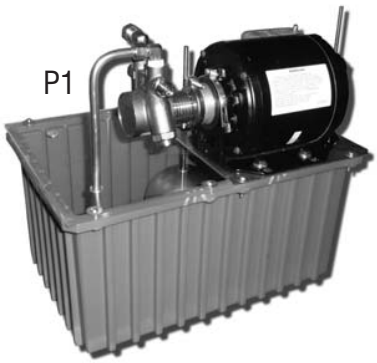
Elevator Components

Pit Equipment

P1



P2

P3

P4

P5

P6

P1. Scavenger pump.

P2. Jack bleeder replacement
Brass, 2" bleeder.

P3. Welded steel pit ladder Custom designed and manufactured to your requirements. Call EECO Sales for a custom quote.

P4. Car buffer: Custom designed to your requirements. Call EECO Sales for a custom quote.

P5. Pipe stand. For hydraulic lines and electrical conduit.

P6. Jack leak monitoring system for sealed PVC.Call EECO for a custom quote.

NOTE: This system can only be utilized on new jack installations, or jack unit replacements, with sealed PVC liners.

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Elevator Components

Replacement Jack Packing Kits

J1. NJ series replacement jack packing.
(single stage jack)

Available kits:
NJ-275, 2 3/4" piston
NJ-3NET, 3" piston

NOTE: The NJ kits contain 1 seal, 1 wiper, 1 bearing and 1 o-ring.

J2. TLJ series replacement packing.
(two stage telescopic jack)

Available kits:
TLJ-3, 3" piston
TLJ-4 (4H), 4" piston

NOTE: The TLJ kits contain 3 wipers, 5 seals, 3 bearings and 5 o-rings.

J3. TJ series replacement packing.
(two stage telescopic jack)

Available kits:
TJ-250, 2 1/2" piston
TJ-275, 2 3/4" piston
TJ-400, 4" piston
TJ-450, 4 1/2" piston

NOTE: The TJ kits contain 1 seal, 1 wiper, 1 bearing and 1 o-ring.

J4. LJ series replacement jack packing.
(single stage jack)

Available kits:
LJ-3R, 3 7/16" piston
LJ-3, 3 1/2" piston
LJ-387, 3 7/8" piston
LJ-4NET, 4" piston
LJ-4, 4 3/8" piston
LJ4.5, 4 1/2" piston
LJ-5NET, 5" piston
LJ-5, 5 7/16" piston
LJ-5.5, 5 1/2" piston
LJ-6NET, 6" piston
LJ-6, 6 1/2" piston
LJ-7NET, 7" piston
LJ-7, 7 1/2" piston
LJ-8NET, 8" piston
LJ-8, 8 1/2" piston
LJ-9, 9 1/2" piston
LJ-10, 10 5/8" piston
LJ-12, 12 5/8" piston
LJ-14, 13 7/8" piston
LJ-16, 15 7/8" piston
LJ-18, 17 7/8" piston

NOTE: The LJ kits contain 2 seal, 1 wiper, 1 lantern ring, 1 bearing and 2 o-rings.

J5. PJ/PJR series replacement jack packing.

Available kits:
PJ/PJR-275, 2 3/4" piston
PJ/PJR-3NET, 3" piston
PJ/PJR-3R, 3 7/16" piston
PJ/PJR-3, 3 1/2" piston
PJ/PJR-4NET, 4" piston
PJ/PJR-4, 4 3/8" piston
PJ/PJR-4.5, 4 1/2" piston
PJ/PJR-5NET, 5" piston
PJ/PJR-5, 5 7/16" piston
PJ/PJR-5.5, 5 1/2" piston
PJ/PJR-6NET, 6" piston
PJ/PJR-6, 6 1/2" piston
PJ/PJR-7NET, 7" piston
PJ/PJR-7, 7 1/2" piston
PJ/PJR-8NET, 8" piston
PJ/PJR-8, 8 1/2" piston

NOTE: The PJ/PJR kits contain 1 seal, 1 wiper, 1 bearing and 1 o-ring.

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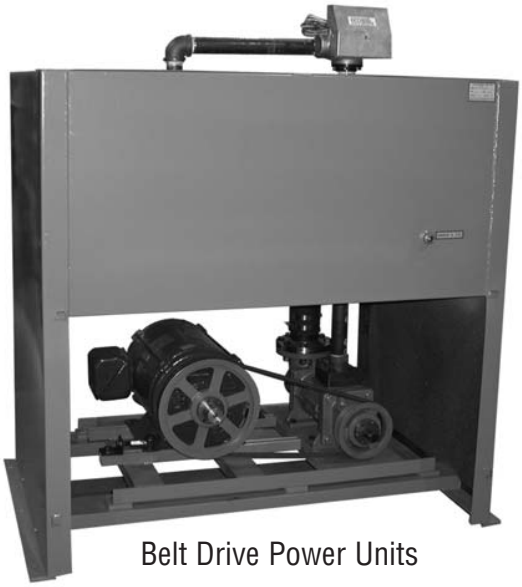
Elevator Components

Power Units / Jack Units / Car Slings & Platforms



Belt Drive Power Units

Submersible Drive Power Units

Single and multi-stage, in-ground and holeless Jack Units

Call EECO Sales today for a custom quote!

(888) 577-3326

Residential Power Units

Car Slings & Platforms

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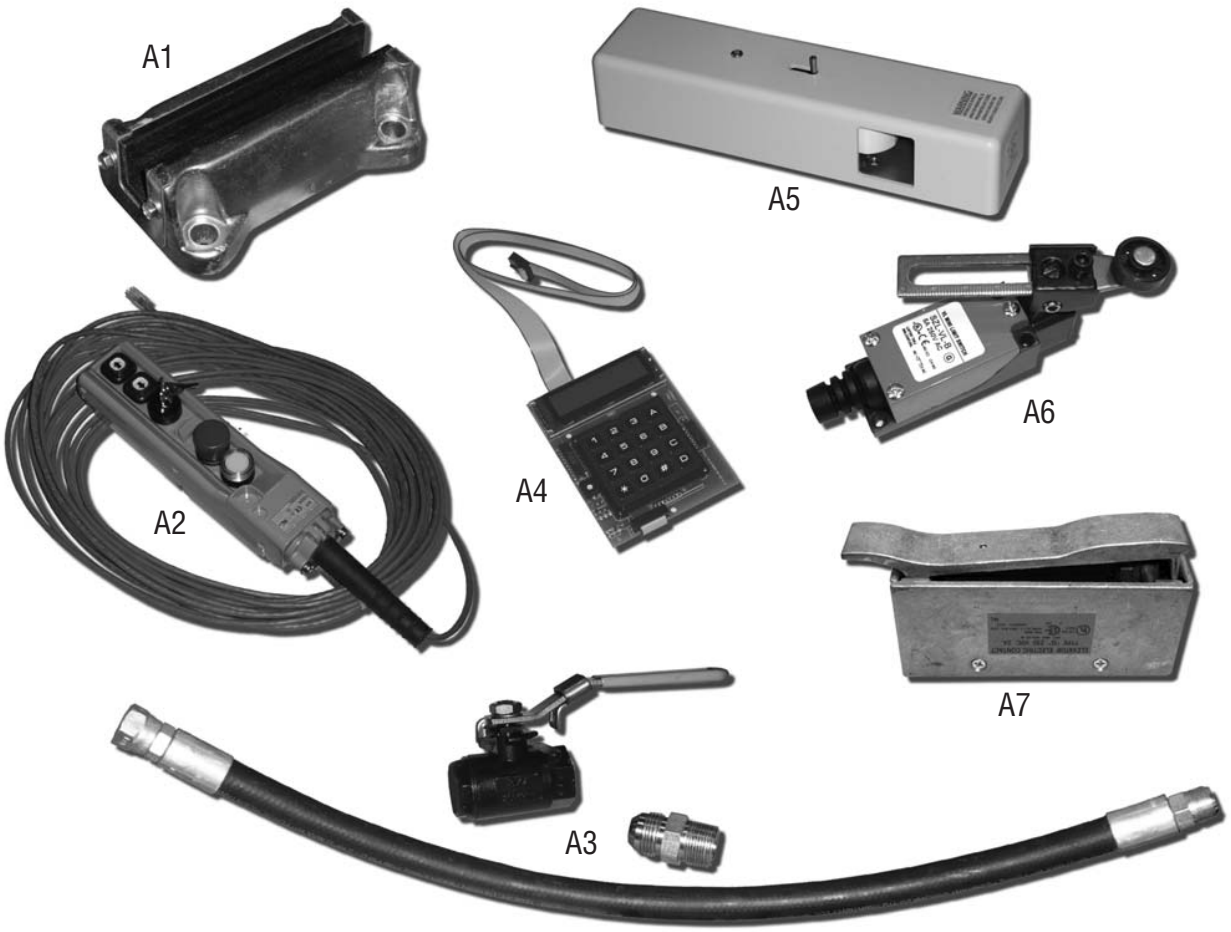
Elevator Components

Advantage Home Elevator Replacement Parts



A1. Advantage home elevator guide shoe replacement.

A2. Advantage home elevator pendant station (wired)**.** Used during the construction of the Advantage home elevator.

A3. Control valve jack port hose kit. Includes hose, 3/4" ball valve and adaptor.

Available kits:
10' hose kit
15' hose kit
20' hose kit

A4. Programming tool (P-Tool) used in programming the Advantage home elevator controller. Used on both the MRL and Hydraulic versions of the Advantage home elevator.

A5. Door safety interlock unit.

Available units:
Left hand door interlock
Right hand door interlock

A6. Mini limit switch.
Type SZL-VL-B

A7. Door switch.
Type "G", 230VDC, 2A

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Notes

Elevator Equipment Corporation

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Mid-West & East Coast:
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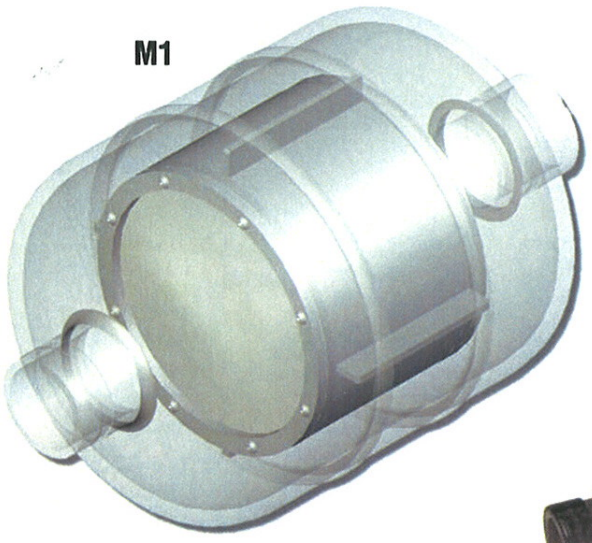
www.advantagehomeelevator.com

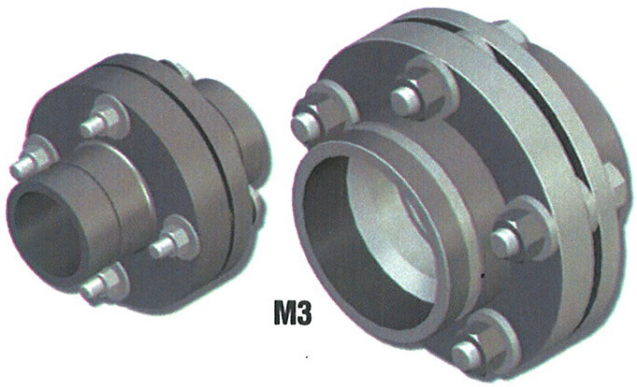
5.6 Muffler

Machine Room Accessories

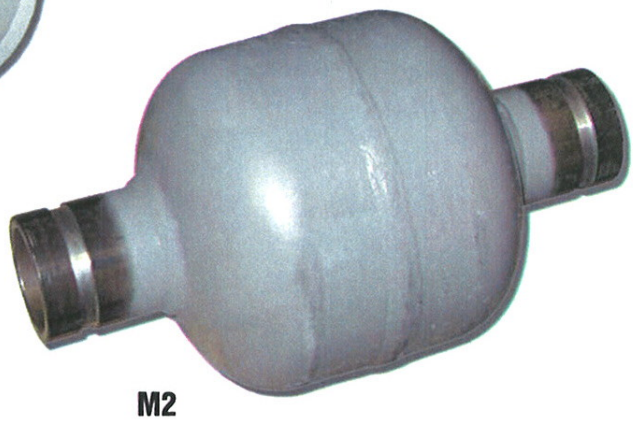
Elevator Equipment Corporation



M1



M3



M2

M1. The EECO Hydraulic Dampener has an ASME A17.1 allowable working pressure of 1200 PSI. The unit is 8-5/8 in diameter and 14" long with 2" fittings, 14.5" long with 2.5" & 3" fittings.

Available dampeners:

2" GRV to GRV
2" NPT to GRV
2" NPT to NPT
2.5" GRV to GRV
2.5" NPT to GRV
2.5" NPT to NPT
3" GRV to GRV
3" NPT to GRV
3" NPT to NPT

M2. The standard EECO muffler provides superior noise isolation for most standard power unit installations. The units working pressure of 1200 PSI and it is 11.75" long. Unit diameter for 2" is 6-5/8", all others are 8-5/8" diameter.

Available muffler:

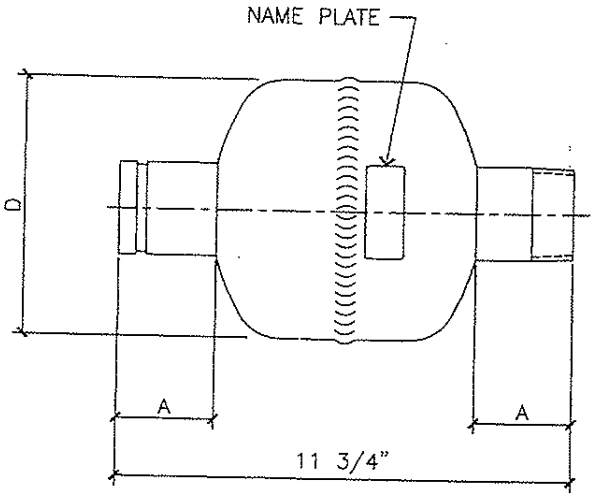
2" GRV to GRV
2" GRV to NPT
2" NPT to NPT
2.5" GRV to GRV
2.5" GRV to NPT
2.5" NPT to NPT
2.5" to 3" GRV to NPT
2.5" to 3" GRV to GRV
3" GRV to GRV
3" GRV to NPT
3" NPT to NPT

M3. The EECO isolation coupling is available in three sizes to help reduce noise and vibration from being transmitted to the cab and also provides electrical isolation. Each isolation coupling has a dielectric of 25KV. 2" isolation couplings are rated at 1200 PSI, 2.5" and 3" are rated at 1000 PSI.

Available couplings:

2" GRV to GRV, 5.000" OD
2" GRV to NPT, 5.000" OD
2" NPT to NPT, 5.000" OD
2.5" GRV to GRV, 6.875" OD
2.5" GRV to NPT, 6.875" OD
2.5" NPT to NPT, 6.875" OD
3" GRV to GRV, 7.375" OD
3" GRV to NPT, 7.375" OD
3" NPT to NPT, 7.375" OD

PART NO.	MUFFLER	NAME PLATE	MODEL NO.	MAX. GPM	NIPPLE TYPE	A	D
ML00267AKK01	ML00267AAK01	PL00101AKK01	MU2000-1	185	2" VIC TO 2" VIC	2"	6 5/8"
ML00267AKK02	ML00267AAK02	PL00101AKK02	MU2000-2		2" VIC TO 2" NPT		
ML00267AKK03	ML00267AAK03	PL00101AKK03	MU2000-4		2" NPT TO 2" NPT		
ML00267AKK04	ML00267ABK01	PL00101AKK04	MU2500-1	260	2 1/2" VIC TO 2 1/2" VIC	2 1/2"	6 5/8"
ML00267AKK05	ML00267ABK02	PL00101AKK05	MU2500-2		2 1/2" VIC TO 2 1/2" NPT		
ML00267AKK06	ML00267ABK03	PL00101AKK06	MU2500-4		2 1/2" NPT TO 2 1/2" NPT		
ML00267AKK07	ML00267ABK04	PL00101AKK07	MU2500-5		2 1/2" NPT TO 3" VIC.	2 1/2"-3"	
ML00267AKK08	ML00267ABK05	PL00101AKK08	MU2500-6		2 1/2" VIC TO 3" VIC		
ML00267AKK09	ML00267ABK06	PL00101AKK09	MU3000-1	350	3" VIC TO 3" VIC	3"	8 5/8"
ML00267AKK10	ML00267ABK07	PL00101AKK10	MU3000-2		3" VIC TO 3" NPT		
ML00267AKK11	ML00267ABK08	PL00101AKK11	MU3000-3		3" NPT TO 3" NPT		



PART NO. ML00267AKK

NOTES:

1. MINIMUM BURST PRESSURE OF 6000 PSI.
2. ASME A17.1 ALLOWABLE WORKING PRESSURE OF 1200 PSI.
3. PRODUCTION PRESSURE TEST TO BE PERFORMED AT MINIMUM PRESSURE OF 1000 PSI. STATISTICAL SAMPLING AT AQL 1.0 PER ISO2859.
4. MUFFLER MUST BE LABELED WITH THE MANUFACTURER, PRODUCT NAME AND WORKING PRESSURE. INFORMATION TO BE LOCATED ON NAME PLATE TO BE VISIBLE WHEN MUFFLER IS INSTALLED.

REV.	DATE	REVISION
–		

APPROVED FOR MANUFACTURING

BY:

DATE:

SF=2 | THIRD ANGLE PROJECTION

FINISH

GROUND

MACHINE

TOLERANCE

FRACTIONS ± 1/8"

DEC. ± .005 / MM ± .1

DEGREES ±

DRAWING NO. L00267AKK | REV. –

TITLE : HYDRAULIC MUFFLER

MATERIAL: A36

DRAWN: R. R. BELTRAN | DATE: 08-10-99 | CHECKED: ABE SALEHPOUR

ELEVATOR EQUIPMENT CORPORATION

2010 PRICING
DAMPENER/MUFFLER

Elevator Equipment Corporation

PRINTED DATE:
12/22/2010
PRINTED TIME:
3:31 PM

(M1) DAMPENER					
(M1) HYDRAULIC DAMPENER	2" GRV-GRV	32.002671021500	EA	$ 470.00	$ 313.00
	2" GRV-THD	32.002671021600			
	2" THD-THD	32.002671021700			
	2-1/2" GRV-GRV	32.002671021800			
	2-1/2" GRV-THD	32.002671021900			
	2-1/2" THD-THD	32.002671022000			
	3" GRV-GRV	32.002671022100			
	3" GRV-THD	32.002671022200			
	3" THD-THD	32.002671022300			
(M2) MUFFLER					
(M2) MUFFLER *6-5/8"* DIAMETER ADD IN ORDER NOTES SIZE OF DIAMETER	2" GRV-GRV	32.002671000100	EA	$ 225.00	$ 150.00
	2" GRV-THD	32.003671000200			
	2" THD-THD	32.002671000900			
(M2) MUFFLER *8-5/8"* DIAMETER ADD IN ORDER NOTES SIZE OF DIAMETER	2" GRV-GRV	32.002671000100		$ 275.00	$ 175.00
	2" GRV-THD	32.003671000200			
	2" THD-THD	32.002671000900			
(M2) MUFFLER *8-5/8"* DIAMETER ADD IN ORDER NOTES SIZE OF DIAMETER	2-1/2" GRV-GRV	32.002671001100		$ 300.00	$ 200.00
	2-1/2" GRV-THD	32.002671001200			
	2-1/2" THD-THD	32.002671001400			
(M2) MUFFLER 8-5/8" DIAMETER	3" GRV-GRV	32.002671002000		$ 350.00	$ 225.00
	3" GRV-THD	32.002671002100			
	3" THD-THD	32.002671002200			
* CUSTOM MADE LENGTH ARE AVAILABLE UPON REQUEST. (ADD $25.00 TO $50.00 DEPENDING ON LENGTH).					

PREPARED BY:
MICHAEL G. SANTOS/SALES DEPARTMENT

5.7 Over-speed Rupture Valve

R 10 Elevator Rupture Valve
Valve parachute pour ascenseur

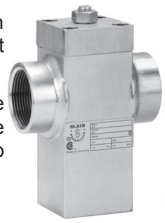
Aufzugs-Rohrbruchventil
Válvula paracaidas para ascensor

EN ISO 9001

GB

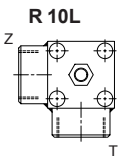
The rupture valve R 10 can be mounted in any position directly onto the cylinder inlet connection **Z.**

In the event of failure in the main cylinder line or where the down speed exceeds allowable limits, the R 10 valve closes, bringing the car to a smooth stop.

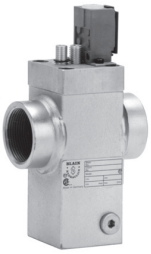


R 10 AA Standard

R 10L AA



R 10L



R 10 AA + DK + ES

F

La valve parachute R 10 peut être fixée en quelconque position directement au vérin **Z.**

A la suite d'une rupture de conduite hydraulique ou bien, d'une vitesse de descente excessive la cabine sera freinée en douceur par la fermeture de la valve R 10.

D

Das Rohrbruchventil R 10 kann direkt am Zylinderanschluß **Z** in beliebige Einbaulage angebaut werden. Wenn sich der Aufzug wegen eines Rohrbruchs in der Zylinderleitung oder sonst über der vorgesehenen Betriebsgeschwindigkeit absenkt, wird der Aufzug durch gedämpftes Schließen zum Stillstand gebracht.

E

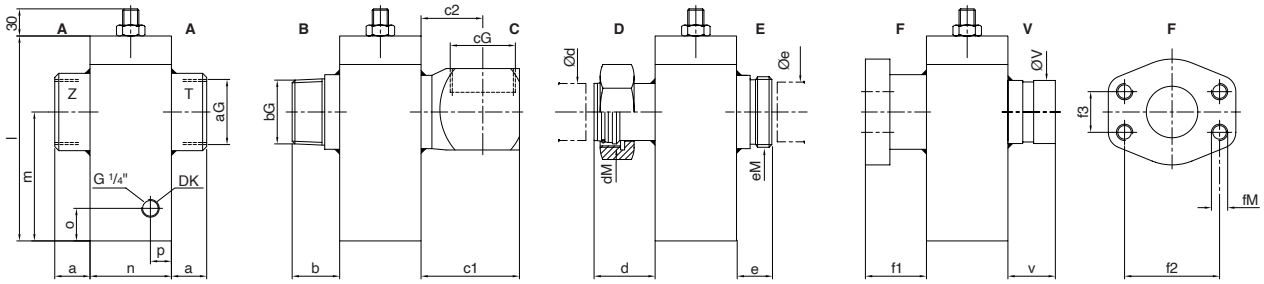
La válvula paracaidas R 10 se acopla en cualquier posición directamente a la conexión del cilindro **Z.**

Cuando el ascensor desciende a causa de la rotura de tubos en el conducto del cilindro principal, o sobrepasa la velocidad de marcha prevista, la válvula R 10 cerrará y la cabina parará suavemente.

Attention: Danger des blessures de personnes! Les paramètres standards ne doivent êtres changés que par le personnel qualifié de l'ascenseur. Avant de remplacer des pièces à l'interieur, veuillez vous assurer que la ligne de cylindre est fermée, que l'approvisionement électrique est coupé et que la pression dans la soupape est réduite à zero.

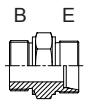
Advertencia: Peligro de daños a personas! Sólo personal cualificado debería revisar las válvulas. La manipulatión por inexpertos podría causar daños serios del equipo. Para la revisíon de la parte interior, hay que asegurarse de que esté desconectado del suministro eléctrico y el resto de presión en la válvula se haya reducido a cero.

Alternative connections • Alternative Anschlüsse • Connexions alternatives • Conexiones alternativas



Recommended size • Empfohlene Grösse • Grandeur recommandé • Tamaño recomendádo

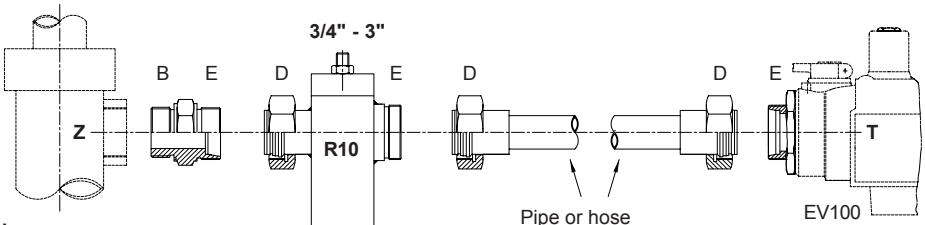
R10 Qc		R10 P max.		A		B		C			D		E		F SAE					V Victaulic		l	m	n	o	p	DK Tube	kg
l/min.	US gpm	bar	psi	G o. NPT	a	G o. NPT	b	G o. NPT	c1	c2	dM	Ød / d	eM	Øe / e	DN	fM	f1	f2	f3	ØV in / ØV mm	V in / V mm						Ød	(AA)
5 - 100	1,3 - 26	100	1500	¾"	18	¾"	32	¾"	57	33	M 52 x 2	42 / 44	M 36 x 2	28 / 26						1,05 / 26,7	1,5 / 38	105	62	50	11	11	6	1,6
101 - 175	27 - 45	100	1500	1"	21	1"	32	1"	57	33	M 52 x 2	42 / 44	M 36 x 2	28 / 26						1,31 / 33,4	1,5 / 38	105	62	50	11	11	6	1,6
176 - 425	46 - 110	100	1500	1½"	26	1½"	35	1½"	72	36	M 52 x 2	42 / 44	M 52 x2	42 / 26	38	M12	44	70	35,7	1,90 / 48,3	1,5 / 38	143	94	60	11	11	6	3,4
426 - 800	111 - 208	100	1500	2"	28	2"	38	2"	83	45	M 65 x 2	56 / 44	M 65 x2	56 / 40	51	M12	45	77,8	42,9	2,37 / 60,3	1,5 / 38	167	108	80	20	17	8	7
801 - 1225	209 - 318	80	1200	2½"	30	2½"	45	2½"	103	55	M 78 x 2	63 / 50	M 78 x 2	63 / 40	64	M12	50	89	50,8	2,87 / 73,0	1,5 / 38	196	121	100	19	18	8	13
1226 - 2100	319 - 546	60	900	3"	34	3"	45	3"	120	65	M 78 x 2	63 / 50	M 78 x 2	63 / 40	76	M16	50	106,4	62	3,50 / 88,9	1,5 / 38	240	149	120	22	21	10	21



Adaptor BE
Inch - mm
B - E

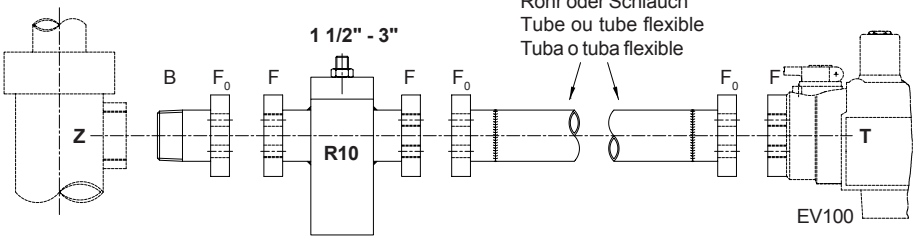
3/4" - M36x2
1" - M36x2
1 1/2" - M36x2
1" - M52x2
1 1/2" - M52x2
2" - M52x2
1 1/2" - M65x2
2" - M65x2
2" - M78x2
2 1/2" - M78x2

5-2100 l/min
1,3-546 gpm



Examples:

176-2100 l/min
46-546 gpm



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BLAIN HYDRAULICS GmbH

Manufacturers of the Highest Quality:
Control Valves for Elevators
Tank Heaters - Hand Pumps
Pipe Rupture Valves - Ball Valves

Elevator Rupture Valve

(GB)

Warning: Only qualified personell should service hydraulic valves. Unauthorised manipulation may result in injury or damage to equipment. Prior to servicing internal parts, ensure that the electrical power is switched off and residual pressure in the system is reduced to zero.

Options

2 Through adjustment **'2'** the R 10 can be preset to lower the car to the bottom floor after it has been slowed down by the closing of the R 10, to allow the escape of passengers.

DK For twin cylinder systems the connecting of pilot ports **'DK'** ensures that both R 10 valves close almost simultaneously. See in table 'DK Tube' on first page.

ES The rupture valve can be fitted with an electrical limit switch **ES** which is actuated when the valve closes and serves to initiate a warning signal or to shut down the elevator.

Adjustment

1 'Closing flow' **Qc**. By screwing inwards, the valve closes with increased oil flow. Deceleration is less than 1 g and for safety reasons is a non adjustable, built in feature of the R 10 valve.
The rupture valve reopens through an 'Up' command.

2 'Lowering Speed' (optional). By screwing inwards, the lowering speed is increased.

Testing

The R 10 must be tested with load to ensure closing of the valve between nominal and 0,3 m/sec (60 fpm) above nominal down speed of the car.
When the down flow is approximately equal to the adjusted closing flow, the R 10 will take several seconds to close.
When the down flow is in great excess of the adjusted closing flow, the R 10 will close in 1-2 seconds.

Aufzugs-Rohrbruchventil

(D)

Warnung: Verletzungsgefahr! Neueinstellungen und Wartung dürfen nur durch qualifiziertes Aufzugspersonal durchgeführt werden. Vor der Wartung innerer Teile ist sicherzustellen, daß der elektrische Strom des Aufzuges abgeschaltet und der Druck im Ventil auf Null reduziert worden ist.

Optionen

2 Das Ventil R 10 kann mittels Einstellung **'2'** so eingestellt werden, daß der Aufzug nach der Abbremsung langsam in die unterste Haltestelle absenkt, zur Evakuierung von Personen.

DK Bei Doppelkolben-Anlagen sichert eine Steuerleitungsverbindung zwischen Anschlüssen **'DK'** das fast gleichzeitige Schließen beider Ventile. Siehe Tabelle 'DK Tube' auf Seite 1.

ES Ein oben auf dem R 10-Ventilflansch montierter elektrischer Schalter **ES** wird beim Schließen des R 10 betätigt, um eine Warnung auszulösen oder den Aufzug abzuschalten.

Einstellung

1 'Schließmenge' **Qc**. Hineindrehen bewirkt eine größere Schließmenge. Die Abbremsung durch das R 10 Ventil ist weniger als 1 g und aus Sicherheitsgründen nicht verstellbar.
Das R 10 Ventil öffnet sich selbsttätig bei einer Hubfahrt.

2 Einstellung 'Absenkung' (Option). Hineindrehen bewirkt eine schnellere Absenkgeschwindigkeit.

Prüfung

Das R 10 Ventil soll mit Last geprüft werden, zur Vergewisserung, daß sich das Ventil zwischen der Nenngeschwindigkeit und 0.3 m/sek. über der Nenngeschwindigkeit schließt.
Wenn der Durchfluß abwärts ungefähr der Schließmenge entspricht, wird das R 10 nach einigen Sekunden schließen.
Wenn der Durchfluß abwärts weit mehr als die eingestellte Schließmenge beträgt, wird das R 10 in 1-2 Sekunden schließen.

Valve parachute pour ascenseur

A option

(F)

2 A l'aide du réglage **'2'** la valve R 10 peut être programmée de telle façon qu'après le freinage la cabine puisse descendre lentement jusqu'à l'étage inférieur pour permettre l'évacuation des passagers.

DK Pour les systèmes d'ascenseur à deux vérins, les connections pilotes entre les adjonctions **DK** assurent que les deux valves R 10 se ferment presque simultanément. Regardez tableau 'DK Tube', page 1.

ES Un interrupteur **ES** fixé sur la valve, et actionné par la fermeture de celle-ci, permet le déclanchement d'une alarme ou la mise hors service de la commande électrique.

Réglage

1 Débit de fermeture' **Qc**. Visser provoque un plus grand débit de fermeture. La valve parachute R 10 permet un freinage amorti moins d'1 g et par mesure de securité celui-ci est indéréglable. La valve R 10 se réarme seulement à l'occasion d'une commande 'montée'.

2 Réglage. 'Vitesse de descente' (á option). Visser provoque une descente plus rapide de l'ascenseur pour l'évacuation aprés fermeture de la valve parachute.

Essais

La valve doit être testée avec charge afin de s'assurer que la fermeture s'effectue bien entre la vitesse nominale et 0,3 m/sec (60 fpm) plus de cette dernière. Lorsque le débit descente atteind approximativement le débit de fermeture de la soupape R 10 celle-ci ferme après quelques secondes. Lorsque le débit descente dépasse le débit de fermeture de la soupape R 10 celle-ci ferme après 1 ou 2 secondes.

Válvula paracaidas para ascensor

Opciones

(E)

2 La válvula puede ser ajustada por medio del regulador **'2'**, que permite que el ascensor, después de la deceleración, vaya bajando lentamente, hasta la posición de parada más baja, facilitando así la evacuación de personas en la cabina.

DK Para sistemas con dos cilindros, autoacoplándose conexiones **DK** se asegura que ambas válvulas R 10 cierren casi simultáneamente. Véase tabla 'DK Tube', página 1.

ES Puede suministrarse un interruptor eléctrico **ES** que va embridado sobre la válvula R 10. Funciona al cerrarse la válvula - y se emplea para accionar la alarma o desconectar el ascensor.

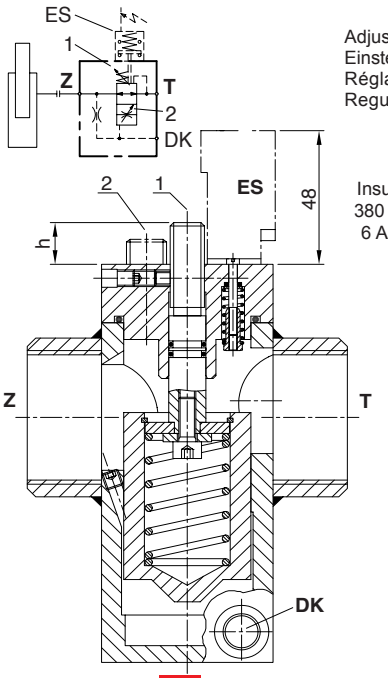
Regulación

1 'Cierre de caudal' **Qc**.
Enroscándola, hacia adentro, la válvula cierra con mayor caudal.
La deceleración es menor de 1 g, y por razones de seguridad no es regulable.
La válvula de rotura se reabre con una orden de 'subida'.

2 Velocidad de descenso (opcional). Enroscándola hacia adentro, se aumenta la velocidad de descenso.

Prueba

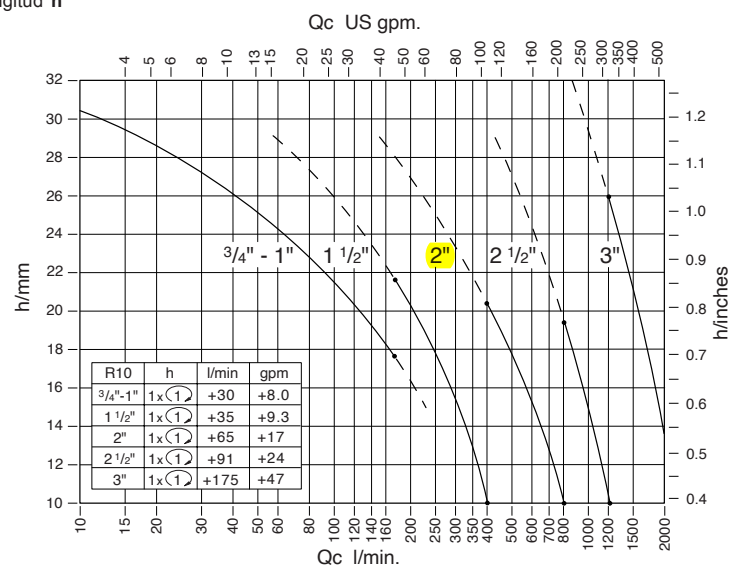
La R 10 debe ser comprobada con cabina cargada y asegurarse que se cierra entre la velocidad nominal y 0,3 m/s sobre esta velocidad.
Cuando el caudal descendente concuerda aproximadamente con el cierre de caudal, el R 10 se cierra después de un par de segundos.
Cuando el caudal descendente es mucho más grande que el cierre de caudal ajustado, el R 10 tardará 1 ò 2 segundos en cerrarse.



Adjustment **1** - Length **h**
Einstellung **1** - Länge **h**
Réglage **1** - Loungueur **h**
Regulador **1** - Longitud **h**

ES
Insul. P 65
380 V max.
6 A 100%

	Range	Bereich	Gamme	Gama
———	Recommended	Empfohlen	Recommandé	Recomendada
– – –	Allowed	Zulässig	Permis	Permitida



R10	h	l/min	gpm
3/4"-1"	1x(1)	+30	+8.0
1 1/2"	1x(1)	+35	+9.3
2"	1x(1)	+65	+17
2 1/2"	1x(1)	+91	+24
3"	1x(1)	+175	+47

5.8 Cut Off Ball Valve

Vic-Ball® Valve

SERIES 726

The Series 726 is a high-pressure standard port ball valve with grooved ends. This two-piece, end-entry valve features a floating ball for lower torque requirements. Series 726 valves are NACE compliant and are capable of pressures up to 1000 psi/6900 kPa in sizes 1 ½ – 3"/40 – 80 mm; 800 psi/5515 kPa for sizes 4 – 6"/100 – 150 mm. The valve is available in 1 ½ – 6"/40 – 150 mm sizes. The internal design has been streamlined to provide excellent flow characteristics. The valve features a chrome plated carbon steel ball and stem. The seat material is glass-reinforced PTFE.

Series 726 features ISO standard mounting holes for easier mounting of remote actuation. The valve is offered with manual handles with integral/tamper resistant lock/seal and gear operators. A full range of power actuators can be mounted.

NOTE: Vic-Ball valves are designed for full open or shut-off service; throttling is not recommended with standard ball valves as damage to the seat can result from high velocity flow over the exposed seat.

Pressure Rating Chart

Valve Size		Max. Work Pressure
Nominal Size Inches mm	Actual Outside Diameter Inches mm	psi kPa
1 ½ – 3 40 – 80	1.900 – 3.500 48.3 – 88.9	1000 6900
4 – 6 100 – 150	4.500 – 6.625 114.3 – 168.3	800 5515

MATERIAL SPECIFICATIONS

Body and End Cap: Ductile iron conforming to ASTM A-395

Stem: Carbon steel, chrome plated
- **Optional:** 316 stainless steel

Ball: Carbon steel, chrome plated
- **Optional:** 316 stainless steel

Seats: PTFE (Polytetrafluoroethylene) glass-reinforced

Seals: Fluoroelastomer

Operators:
- **Lever Handle:**
  - **1 ½ – 3"/40 – 80 mm**
    Carbon steel, zinc plated. Plastic grip
  - **4 & 6"/100 & 150 mm**
    Carbon steel, enamel paint
- **Gear Operator:** Manual with hand wheel
  - **Optional:** Stainless steel
- **Operator Bracket:** Hot rolled steel, black enamel coated
- **Bracket Bolts/Washers:** Cold rolled steel, zinc plated
- **Power Actuators:** Electric, pneumatic, hydraulic
- **Integral Locking Drive Components:** Stamped carbon steel, zinc plated

JOB/OWNER
System No. _____
Location _____

CONTRACTOR
Submitted By _____
Date _____

ENGINEER
Spec Sect _____ Para _____
Approved _____
Date _____

www.victaulic.com

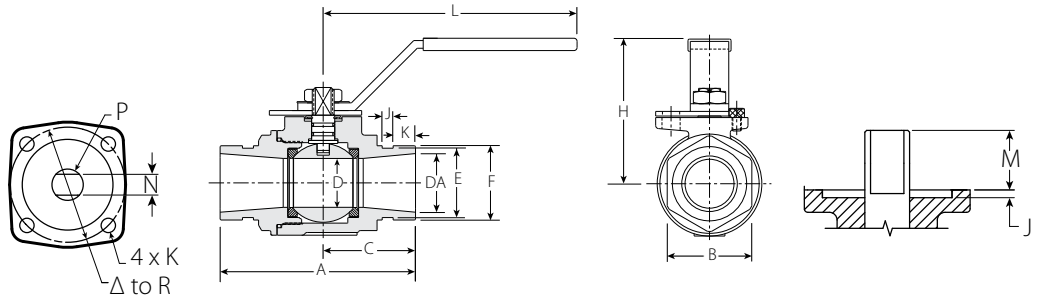
Vic-Ball® Valve

SERIES 726

DIMENSIONS

SERIES 726
With Standard Handle
1 ½ – 3"/40 – 80mm

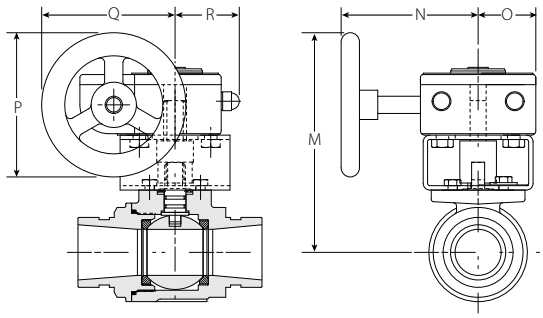
Size		Dimensions – Inches/mm															Approx. Wgt. Each
Nominal Size Inches mm	Actual Outside Diameter Inches mm	A	B	C	D	DA	E	F	H	J	K	L	P	M	N	R	Lbs. kg
1 ½ 40	1.900 48.3	5.12 130	2.00 51	2.36 60	1.25 32	1.50 38	1.78 45	1.90 48	3.00 76	0.28 7	0.56 14	6.97 177	0.56 14.2	0.81 20.6	0.35 9.0	1.97 50.0	4.4 2.0
2 50	2.375 60.3	5.50 140	2.64 67	2.48 63	1.50 38	2.00 51	2.25 57	2.38 60	3.31 84	0.34 9	0.56 14	6.97 177	0.56 14.2	0.81 20.6	0.35 9.0	1.97 50.0	6.5 3.0
2 ½ 65	2.875 73.0	6.25 159	3.03 77	2.80 71	1.97 50	2.50 64	2.72 69	2.88 73	4.00 102	0.34 9	0.56 14	9.84 250	0.75 19.0	1.00 25.4	0.47 12.0	2.76 70.0	10.4 4.7
76.1	2.875 73.0	6.25 159	3.03 77	2.80 71	1.97 50	2.50 64	2.72 69	2.88 73	4.00 102	0.34 9	0.56 14	9.84 250	0.75 19.0	1.00 25.4	0.47 12.0	2.76 70.0	10.4 4.7
3 80	3.500 88.9	6.56 167	3.50 89	3.15 80	2.50 64	3.00 76	3.34 85	3.50 89	4.53 115	0.34 9	0.56 14	9.84 250	0.75 19.0	1.03 26.2	0.47 12.0	2.76 70.0	14.9 6.8



DIMENSIONS

SERIES 726
With Gear Operator
1 ½ – 3"/40 – 80mm

Size		Dimensions – Inches/mm						Approx. Wgt. Each
Nominal Size Inches mm	Actual Outside Diameter Inches mm	M	N	O	P	Q	R	Lbs. kg
1 ½ 40	1.900 48.3	6.03 153	4.29 109	1.58 40	3.94 100	2.64 92	1.75 44	7.1 3.2
2 50	2.375 60.3	6.30 160	4.29 109	1.58 40	3.94 100	2.64 92	1.75 44	9.1 4.1
2 ½ 65	2.875 73.0	7.43 189	4.65 118	1.97 50	4.92 125	4.43 112	2.28 58	12.9 5.9
76.1	2.875 73.0	7.43 189	4.65 118	1.97 50	4.92 125	4.43 112	2.28 58	12.9 5.9
3 80	3.500 88.9	7.94 202	4.65 118	1.97 50	4.92 125	4.43 112	2.28 58	20.0 9.1



Vic-Ball® Valve

SERIES 726

PERFORMANCE

FLOW CHARACTERISTICS

Flow testing for Vic-Ball Series 726 ball valves demonstrated superior flow characteristics to other competitive standard port valves. Testing for Vic-Ball valve and competitive valves was performed in our own engineering laboratory facilities with systems and equipment calibrated to National Bureau of Standards.

C_v values for flow of water at +60°F/+16°C with a fully open valve are shown in tables below.

Formulas for C_v values:

$$\Delta P = \frac{Q^2}{C_v^2}$$

$$Q = C_v \times \sqrt{\Delta P}$$

Where:
Q = Flow (GPM)
ΔP = Pressure Drop (psi)
C_v = Flow Coefficient

Size		C_v	Size		C_v
Nominal Size Inches mm	Actual Outside Diameter Inches mm	Full Open	Nominal Size Inches mm	Actual Outside Diameter Inches mm	Full Open
1 ½ 40	1.900 48.3	130	3 80	3.500 88.9	600
2 50	2.375 60.3	180	4 100	4.500 114.3	650
2 ½ 65	2.875 73.0	340	6 150	6.625 168.3	800

TORQUE REQUIREMENTS

SERIES 726

With Gear Operator
4 and 6"/100 and 150 mm

The following chart details required torque to operate Vic-Ball Series 726 Ball valves under varied working pressure conditions. This chart may be used to determine optional gear operator or remote electric or pneumatic actuator requirement. Contact Victaulic for specific operator/actuator recommendations.

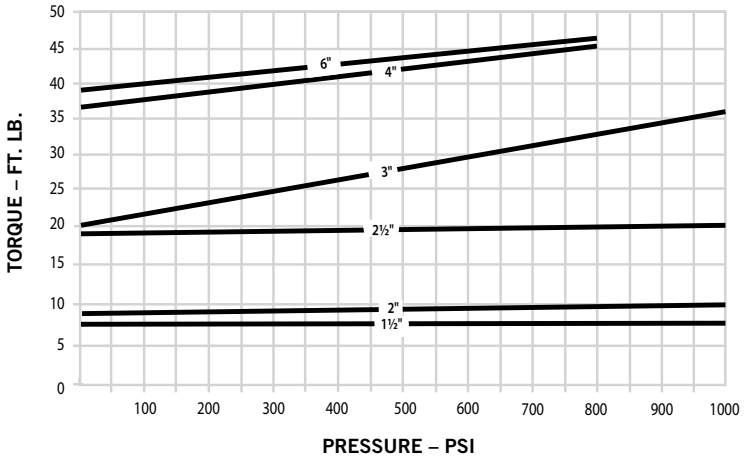
These torque values were derived from test data in water at ambient temperature. All torque values are for normal service conditions where corrosion is expected to be minor, and the media is clean and nonabrasive. The torque shown on the chart should be multiplied by the appropriate factor listed below.

Breakaway Factor: Ball valves will require additional breakaway torque if they are not continuously operated. A breakaway factor of between 2:1 and 3:1 should be applied to break the ball loose after being in a static condition for more than a few hours.

Typical service factors commonly used in the industry are:

- Water and other liquids – 1.0
- Dry gasses – 1.5 – 2.0

Actuation Factor: A minimum factor of 1.2 is recommended for directly actuated valves and 1.5 for 3-way assemblies. Apply the actuation factor to the higher of the breakaway or service factor.



Vic-Ball® Valve

SERIES 726

SERIES 726 VALVE NUMBERING SYSTEM

B - 020 - 1 1 6 6 - 15

Type	Act. In./mm	Size Code	Pressure Rating	Body	Ball & Stem	Seat	Operator
B	1½/40 2/50 2½/65 3/80 4/100 6/150	014 020 024 030 040 060	1 - 1,000 psi 8 - 800 psi[3]	1 - Iron[2] 9 - Special[1]	2 - 316 Stainless Steel 6 - Chrome Plated Carbon Steel 9 - Special[1]	6 - Reinforced PTFE 9 - Special[1]	00 - Bare 15 - 2-Position Handle 16 - 2-Position Handle with Tamper-proof Locking Device 19 - Locking Device - Without Handle 20 - Gear Operator 21 - Gear Operator with Memory 22 - Gear Operator with Chain Wheel 23 - Gear Operator with AWWA Square Nut 29 - Non-standard Gear Operator[1]

NOTES:
(1) Details required.
(2) All Iron Body valves are NACE compliant.
(3) Pressure rating applicable to 4 and 6" sizes only.
* For Stainless Steel Series 726S, please see publication 17.22.

Vic-Ball® Valve

SERIES 726

WARRANTY

Refer to the Warranty section of the current Price List or contact Victaulic for details.

NOTE

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

08.23 3068 REV F UPDATED 12/2010

5.9 Schedule 80 Pipe and Fittings

INDEPENDENT Pipe and Supply Corp.

Pipe Specification A106

Specification	**A106** NPS 1/8 -- 48 ANSI Schedules to 160
Scope	Covers SEAMLESS carbon steel nominal wall pipe for high-temperature service, suitable for bending, flanging and similar forming operations. NPS 1 1/2 and under may be either hot finished or cold drawn. NPS 2 and larger shall be hot finished unless otherwise specified.
Kinds of Steel Permitted For For Pipe Material	Killed Steel Open-hearth Electric-furnace Basic-oxygen
Hot-Dipped Galvanizing	Not covered in specification.
Permissible Variations in Wall Thickness	The minimum wall thickness at any point shall not be more than 12.5% under the nominal wall thickness specified.
Chemical Requirements	**Grade A** / **Grade B** / **Grade C** Carbon max. %..... 0.25 / 0.30 / 0.35 Manganese %..... 0.27 to 0.93 / 0.29 to 1.06 / 0.29 to 1.06 Phosporous, max. %..... 0.025 / 0.025 / 0.025 Sulfur, max. %..... 0.025 / 0.025 / 0.025 Silicon, min. %..... 0.10 / 0.10 / 0.10
Tensile Requirements	**Seamless** **Grade A** / **Grade B** / **Grade C** Tensile Strength, min., psi..... 48,000 / 60,000 / 70,000 Yield Strength, min., psi..... 30,000 / 35,000 / 40,000
Hydrostatic Testing	Inspection test pressures produce a stress in the pipe wall equal to 60% or specified minimum yield strength (SMYS) at room temperature. Maximum Pressures are not to exceed 2500 psi for NPS 3 and under and 2800 psi for the larger sizes. Pressure is maintained for not less than 5 seconds.
Permissible Variations in Weights per Foot	Weight of any length shall not vary more than 10% over and 3.5% under that specified. NOTE -- NPS 4 and smaller -- weighed in lots. Larger sizes -- by length
Permissible Variations in Outside Diameter	**Outside Diameter** at any point shall not vary from standard specified more than-- **NPS** / **Over** / **Under** 1 1/2 and smaller / 1/64" / 1/32" 2 -- 4 / 1/32" / 1/32" 5 -- 8 / 1/16" / 1/32" 10 -- 18 / 3/32" / 1/32" 20 -- 26 / 1/8" / 1/32"
Mechanical Tests Specified	**Tensile Test --** NPS 8 and larger -- either transverse or longitudinal acceptable Smaller than NPS 8 -- weighed in lots. Larger sizes -- by length. **Flattening Test --** NPS 2 and larger. **Bending Test(Cold) --** NPS 2 and under. **Degree of Bend** / **Diameter of Mandrel** For Normal A106 uses / 90 / 12 x nom. dia. of pipe For Close Coiling / 180 / 8 x nom. dia. of pipe
Number of Tests Required	**NPS** / **On One Length From Each Lot of** **Tensile** 5 and smaller / 400 or less 6 and larger / 200 or less **Bonding** 2 and smaller / 400 or less **Flattening** 2 through 5 / 400 or less 6 and over / 200 or less
Lengths	Lengths required shall be specified on order. No "jointers" permitted unless otherwise specified. If no definite lengths required, following practice applies: **Single Random --** 16' - 22'. 5% may be 12' - 16' **Double Random --** Minimum length 22', Minimum average 35'. 5% may be 16' - 22'.
Required Markings on Each Length (On Tags attached to each Bundie in case of Bundled Pipe)	Rolled Stamped or Stenciled (Mfgrs. option) Manufacturer's name or brand. / Length of pipe. A106 A, A106 B, A106 C. / ANSI schedule number. Hydrostatic test pressure and/or NDE. / Weight per foot (NPS 4 and larger) or NH if neither is specified. / Additional "S" if tested supplementary requirements.
General Information	* Unless otherwise specified, pipe furnished with plain ends. * Purchaser may specify NDE * Surface finish standards are outlined in specification. in lieu of hydrostatic test or neither

INDEPENDENT Pipe and Supply Corp.

Malleable Specifications

MALLEABLE THREADED FITTINGS

Standard Class 150 Specifications:

ANSI B1.20.1, Threads. B16.3, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing.
Federal Spec. WWP 521
Pressure Ratings: 150 p.s.i. – Saturated Steam
300 p.s.i. – At 150 degrees W.O.G.
U.L. Listed Where Applicable

Extra Heavy Class 300 Specifications:

ANSI B1.20.1, Threads, B16.3, Dimensions, Pressure Rating.
A.S.T.M. A197, Material. A153, Galvanizing
Pressure Ratings: 300 p.s.i. – Saturated Steam
¼" – 1" – 2000 p.s.i. – At 150 Degrees W.O.G.
1 ¼" – 2" – 1500 p.s.i. – At 150 Degrees W.O.G.
2 ½" – 3" – 1000 p.s.i. – At 150 Degrees W.O.G.
U.L. Listed Where Applicable

Union Specifications: (Brass to Brass, Brass to Iron, Iron to Iron, Gasket Type, Dielectric Iron to Brass)

ANSI B.1.20.1, Threads, B16.39, Dimensions, Pressure Rating.
A.S.T.M. A197, Material, A153, Galvanizing.
Federal Spec. WW-U-531
Pressure Ratings: Class 150 – 150 p.s.i. – Saturated Steam
300 p.s.i. – At 150 Degrees W.O.G.
Class 250 – 250 p.s.i. – Saturated Steam
500 p.s.i. – At 150 Degrees W.O.G.
Class 300 – 300 p.s.i. – Saturated Steam
600 p.s.i. – At 150 Degrees W.O.G.
U.L. Listed Where Applicable

INDEPENDENT Pipe and Supply Corp.

Cast Iron Specifications

CAST IRON FITTINGS

Standard Class 125 Specifications:

ANSI B1.20.1, Threads. B16.4, Dimensions, Pressure Rating.
A.S.T.M. A126, Material, A153, Galvanizing.

Pressure Ratings: 125 p.s.i. – Saturated Steam
300 p.s.i. – At 150 degrees W.O.G.

Federal Spec: WW-P-501
U.L. Listed Where Applicable

Plug and Bushing Specifications:

ANSI B1.20.1, Threads. B16.14, Dimensions, Pressure Rating.
A.S.T.M. A197(Malleable),A126(Cast) A153 Galvanizing.

Pressure Ratings (Mall.): 125 p.s.i. – Saturated Steam
300 p.s.i. – At 150 degrees W.O.G.

Federal Spec: WW-P-471
U.L. Listed Where Applicable

Pressure Rating (Cast): 125 p.s.i. – Saturated Steam
175 p.s.i. – At 150 Degrees W.O.G.

Drainage Fitting Specifications:

ANSI B1.20.1, Threads, B16.12, Dimensions.
A.S.T.M. A126, Material. A153, Galvanizing

Federal Spec: WW-P-941

Cast-Iron Flange Specifications:

ANSI B1.20.1, Threads. B16.1, Dimensions, Pressure Rating.
A.S.T.M. A126, Material, A153, Galvanizing.

Pressure Ratings: 125 p.s.i. – Saturated Steam
175 p.s.i. – At 150 degrees W.O.G.

Federal Spec: WW-F-406
U.L. Listed Where Applicable

Cast-Iron Flanged Fitting Specifications:

ANSI B16.1, Dimensions, Pressure Rating.
A.S.T.M. A126 Class B Material.

Pressure Ratings: 125 p.s.i. – Saturated Steam
175 p.s.i. – At 150 degrees W.O.G.

Federal Spec: WW-F-406
U.L. Listed Where Applicable

INDEPENDENT Pipe and Supply Corp.

Malleable, Cast Iron, Forged Steel, and Nipple standards & specifications.

Standards and Specifications

	DIMENSIONS	MATERIAL	GALVANIZING	THREAD	PRESSURE RATING	FEDERAL/ OTHER
M.I. Fittings						
Class 150	ANSI B16.3	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.3	WW-P-521
Class 300	ANSI B16.3	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.3	
M.I. Unions						
Class 150	ANSI B16.39	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.39	WW-U-531
Class 250	ANSI B16.39	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.39	WW-U-531
Class 300	ANSI B16.39	ASTM A-197	ASTM A-153	ANSI B.1.20.1+	ANSI B16.39	WW-U-531
Cast-Iron Threaded Fittings						
Class 125	ANSI B16.4	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	ANSI B16.4	WW-P-501
Class 250	ANSI B16.4	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	ANSI B16.4	WW-P-501
C.I. Plugs and Bushings						
	ANSI B16.14	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	*	WW-P-471
C.I. Drainage Threaded Fittings						
	ANSI B16.12	ASTM A-126(A)	ASTM A-153	ANSI B.1.20.1+	*	WW-P-491
C.I. Flanges and Flanged Fittings						
Class 125 (1"-12")	ANSI B16.1	ASTM A-126 (A) or (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Class 125 (14"-up)	ANSI B16.1	ASTM A-126 (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Class 250 (1"-12")	ANSI B16.1	ASTM A-126 (A) or (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Class 250 (14"-up)	ANSI B16.1	ASTM A-126 (B)	ASTM -A 153	ANSI B.1.20.1+	ANSI B16.1	WW-F-406
Forged Steel Threaded Fittings Class 2000,3000,6000						
	ANSI B16.11	ASTM A105 A182 A350		ANSI B.1.20.1+	ANSI B16.11	
Pipe Nipples	ASTM A 733			ANSI B.1.20.1+	*	WW-N-351**
Steel Pipe						
Welded		ASTM A 53 Type F				
Welded		ASTM A 120				
Seamless		ASTM A 53 Gr. B. Type S				
Seamless(High Temp.)		ASTM A 106 Gr. B				
Brass		ASTM B 43				

*The Standard
**Compliance with Dimensions and Material Only
"+" ANSI B.1.20.1 was ANSI B2.1

INDEPENDENT Pipe and Supply Corp.

Nipple Specifications

Steel Pipe
NIPPLES

SPECIFICATIONS

MATERIALS:
Manufactured in accordance with ASTM Standard Specification A733 - Welded and seamless carbon steel and austenitic stainless steel pipe nipples.
Paragraph 1.1.1 welded carbon steel nipples and 1.1.2 seamless carbon steel nipples.

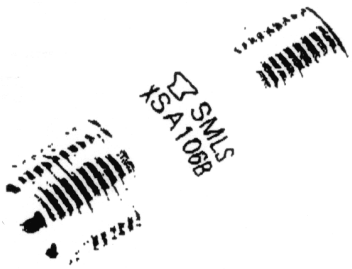
FINISHES
Anvil steel nipples are available in black, electro galvanized or hot-dipped galvanized finishes. Please specify finish required when ordering.

THREADS
Anvil pipe nipples are threaded on both ends with standard tapered pipe threads conforming to the American Standard for Pipe Threads A.N.S.I. B1.20.1.
Threads are right hand on each end unless otherwise specified. Left hand threads or plain ends or combinations are available.

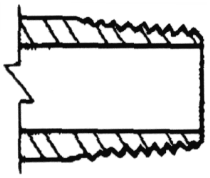
SPECIAL LENGTHS
Anvil can supply special lengths, special threading and special finishes to order.

LENGTH
Nipples with lengths up through 12 in. long have a length tolerance of +/- 1/10 in. Nipples over 12 in. long have a tolerance of +/- 1/8.

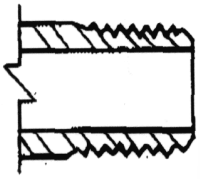
IDENTIFICATION
Where possible, each Anvil seamless pipe nipple is identified with
The anvil trademark
Seamless designation "SMLS"
Pipe schedule STD, XS,
SCH160 and XXS.
Material designation A106 B



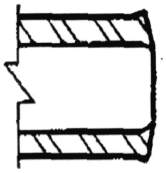
END FINISHES



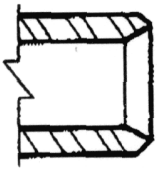
Tapered Pipe Thread(NPT)
Furnished unless special finish requested.



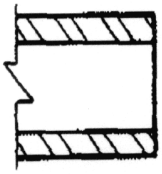
Straight Pipe Thread



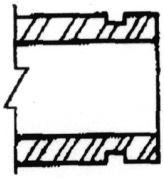
Roller Cut
Furnished when specified on order. (Not deburred.)



Reamed and Chamfered
Ends sq. cut and bevelled on O.D. at 35° +/- 10° to axis. Inside burrs removed



Square Cut
Ends square cut to central axis-
all burrs removed



Grooved

5.10 Victaulic Fittings and Seals

Standard Flexible Coupling

STYLE 77

SEE VICTAULIC PUBLICATION 10.01 FOR DETAILS

¾ – 12"/20 – 300MM SIZES

14 – 24"/350 – 600 MM SIZES

Style 77 couplings are designed with cross-ribbed construction to provide a strong component for pressure piping systems. The coupling is offered in a two piece housing design from ¾ - 24"/20 – 600mm sizes* for pressures up to 1000 psi/6900 kPa.

All sizes are provided with plated bolts and nuts. Galvanized and stainless steel housings are also available.

Independent testing has shown the Style 77 coupling to be an effective stress relief and vibration attenuation device providing performance superior to braided steel and elastomeric arch-type connectors when used in close proximity to the source of vibration. Refer to 26.04 for vibration information.

Independent testing has shown that Victaulic Style 77 flexible couplings provide exceptional functionality during and after earthquake conditions. Refer to 26.12 for further information.

* Sizes 14 to 24" are designed for cut groove systems only.

MATERIAL SPECIFICATIONS

Housing: Ductile iron conforming to ASTM A-536, grade 65-45-12. Ductile iron conforming to ASTM A-395, grade 65-45-15, is available upon special request.

Housing Coating: Orange enamel.

- **Optional:** Hot dipped galvanized and others.

Coupling Gasket: (specify choice*)†

- **Grade "E" EPDM (All other sizes)**
  EPDM (Green color code). Temperature range –30°F to +230°F/–34°C to +110°C. Recommended for hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. UL classified in accordance with ANSI/NSF 61 for cold +86°F/+30°C and hot +180°F/+82°C potable water service. NOT RECOMMENDED FOR PETROLEUM SERVICES.

- **Grade "T" nitrile**
  Nitrile (Orange color code). Temperature range –20°F to +180°F/–29°C to +82°C. Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Not recommended for hot water services over +150°F/+66°C or for hot dry air over +140°F/+60°C.

* Services listed are General Service Recommendations only. It should be noted that there are services for which these gaskets are not recommended. Reference should always be made to the latest Victaulic Gasket Selection Guide for specific gasket service recommendations and for a listing of services which are not recommended.

NOTE: Additional gasket styles are available. Contact Victaulic for details.

Bolts/Nuts: Heat-treated plated carbon steel, trackhead meeting the physical and chemical requirements of ASTM A-449 and physical requirements of ASTM A-183.

- **Optional:** Type 316 stainless steel, Grade B-8M, Class 2.

† Supplemental lubricant is recommended for services installed at or continuously operating below 0°F/–18°C.

JOB/OWNER
System No. _____
Location _____

CONTRACTOR
Submitted By _____
Date _____

ENGINEER
Spec Sect _____ Para _____
Approved _____
Date _____

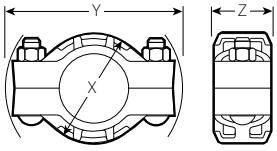
Standard Flexible Coupling

STYLE 77

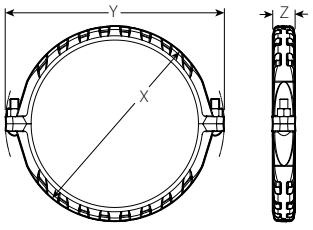
DIMENSIONS

Size		Max. Work Pressure *	Max. End Load *	Allow. Pipe End Sep. †	Deflect. Fr. C_L†		Bolt/Nut@ No - Size	Dimensions – Inches/mm			Approx. Wgt. Each
Nominal Size Inches mm	Actual Outside Diameter Inches mm	psi kPa	Lbs. N	Inches mm	Per Cplg. Deg.	Pipe In./Ft. mm/m	Inches mm	X	Y	Z	Lbs. kg
¾ 20	1.050 26.7	1,000 6900	865 3850	0 – 0.06 0 – 1.6	3° – 24'	0.72 60	2 – ⅜ x 2	2.13 54	4.00 102	1.75 44	1.1 0.5
1 25	1.315 33.4	1,000 6900	1,360 6050	0 – 0.06 0 – 1.6	2° – 43'	0.57 48	2 – ⅜ x 2	2.38 61	4.12 105	1.75 44	1.2 0.5
1 ¼ 32	1.660 42.2	1,000 6900	2,160 9610	0 – 0.06 0 – 1.6	2° – 10'	0.45 38	2 – ½ x 2 ½	2.65 67	5.00 127	1.88 48	2.0 0.9
1 ½ 40	1.900 48.3	1,000 6900	2,835 12615	0 – 0.06 0 – 1.6	1° – 56'	0.40 33	2 – ½ x 2 ½	3.13 79	5.38 137	1.88 48	2.1 1.0
2 50	2.375 60.3	1,000 6900	4,430 19715	0 – 0.06 0 – 1.6	1° – 31'	0.32 26	2 – ½ x 2 ½	3.63 92	5.88 149	1.88 48	2.6 1.2
57.0 mm	2.664 57.0	1,000 6900	3955 17592	0 – 0.16 0 – 1.6	1° – 34'	0.33 27	2 – ½ x 2 ½	3.43 87	5.73 146	1.9 48	3.0 1.4
2 ½ 65	2.875 73.0	1,000 6900	6,490 28880	0 – 0.06 0 – 1.6	1° – 15'	0.26 22	2 – ½ x 2 ¾	4.25 108	6.50 165	1.88 48	3.1 1.4
76.1 mm	3.000 76.1	1,000 6900	7,070 31460	0 – 0.06 0 – 1.6	1° – 12'	0.26 22	2 – ½ x 2 ¾	4.38 111	6.63 168	1.88 48	3.2 1.5
3 80	3.500 88.9	1,000 6900	9,620 46810	0 – 0.06 0 – 1.6	1° – 2'	0.22 18	2 – ½ x 2 ¾	5.00 127	7.13 181	1.88 48	3.7 1.7
3 ½ 90	4.000 101.6	1,000 6900	12,565 55915	0 – 0.06 0 – 1.6	0° – 54'	0.19 16	2 – ⅝ x 3 ¼	5.63 143	8.25 210	1.88 48	5.6 2.5
4 100	4.500 114.3	1,000 6900	15,900 70755	0 – 0.13 0 – 3.2	1° – 36'	0.34 28	2 – ⅝ x 3 ¼	6.13 156	8.88 226	2.13 54	6.7 3.0
108.0 mm	4.250 108.0	1,000 6900	14,180 63100	0 – 0.13 0 – 3.2	1° – 41'	0.35 29	2 – 16 x 82.5	6.00 152	8.63 219	2.13 54	11.0 5.0
5 125	5.563 141.3	1,000 6900	24,300 108135	0 – 0.13 0 – 3.2	1° – 18'	0.27 23	2 – ¾ x 4 ¼	7.75 197	10.65 270	2.13 54	10.6 4.8
133.0 mm	5.250 133.0	1,000 6900	21,635 96275	0 – 0.13 0 – 3.2	1° – 21'	0.28 24	2 – 20 x 108	7.63 194	10.38 264	2.13 54	10.0 4.5
139.7 mm	5.500 139.7	1,000 6900	23,745 105665	0 – 0.13 0 – 3.2	1° – 18'	0.28 24	2 – 20 x 108	8.63 219	10.65 270	2.13 54	10.0 4.5
6 150	6.625 168.3	1,000 6900	34,470 153390	0 – 0.13 0 – 3.2	1° – 5'	0.23 18	2 – ¾ x 4 ¼	8.63 219	11.88 302	2.13 54	12.0 5.4
159.0 mm	6.250 159.0	1,000 6900	30,665 136460	0 – 0.13 0 – 3.2	1° – 9'	0.24 20	2 – 20 x 108	8.63 219	11.50 292	2.13 54	13.2 6.0
165.1 mm	6.500 165.1	1,000 6900	33,185 147660	0 – 0.13 0 – 3.2	1° – 6'	0.23 19	2 – ¾ x 4 ¼	8.88 226	11.63 295	2.13 54	13.2 6.0

Table continued on page 3.
See notes on page 3.



¾ – 12"/20 – 300 MM SIZES



14 – 24"/350 – 600 MM SIZES

Standard Flexible Coupling

STYLE 77

DIMENSIONS

Size		Max. Work Pressure *	Max. End Load *	Allow. Pipe End Sep. †	Deflect. Fr. C_L†		Bolt/Nut@ No - Size	Dimensions – Inches/mm			Approx. Wgt. Each
Nominal Size Inches mm	Actual Outside Diameter Inches mm	psi kPa	Lbs. N	Inches mm	Per Cplg. Deg.	Pipe In./Ft. mm/m	Inches mm	X	Y	Z	Lbs. kg
8 § 200	8.625 219.1	800 5500	46,740 207995	0 – 0.13 0 – 3.2	0° – 50'	0.18 14	2 – ⅞ x 5	11.00 279	14.75 375	2.50 63	20.8 9.4
10 § 250	10.750 273.0	800 5500	73,280 326100	0 – 0.13 0 – 3.2	0° – 40'	0.14 12	2 – 1 x 6	13.63 346	17.13 435	2.63 67	31.1 14.1
12 § 300	12.750 323.9	800 5500	102,000 453900	0 – 0.13 0 – 3.2	0° – 34'	0.12 9	2 – 1 x 6½	15.63 397	19.25 489	2.63 67	27.8 12.6
14 ‡ 350	14.000 355.6	300 2065	46,180 205500	0 – 0.13 0 – 3.2	0° – 31'	0.11 9	2 – 1 x 3½	16.75 425	20.25 514	3.00 76	39.2 17.8
377.0 mm µ	14.842 377.0	300 2065	51,875 230,845	0 – 0.13 0 – 3.2	0° – 31'	0.11 9	2 – 1 x 3½	17.39 442	20.96 531	2.8 71	48.8 22.1
16 ‡ 400	16.000 406.4	300 2065	60,320 268425	0 – 0.13 0 – 3.2	0° – 27'	0.10 9	2 – 1 x 3½	18.75 476	22.25 565	3.00 76	45.0 20.4
426.0 mm µ	16.772 426	300 2065	66,245 294,795	0 – 0.13 0 – 3.2	0° – 27'	0.10 9	2 – 1 x 3½	19.69 500	22.92 581	2.92 74	56.7 25.7
18 ‡ 450	18.000 457.2	300 2065	76,340 339710	0 – 0.13 0 – 3.2	0° – 24'	0.08 7	2 – 1⅛ x 4	21.56 548	25.00 635	3.13 80	64.1 29.1
480.0 mm µ	18.898 48	300 2065	84,105 374,265	0 – 0.13 0 – 3.2	0° – 24'	0.08 7	2 – 1⅛ x 4	22.38 569	25.86 655	3.04 77	77.2 35
20 ‡ 500	20.000 508.0	300 2065	94,000 418300	0 – 0.13 0 – 3.2	0° – 22'	0.08 7	2 – 1⅛ x 4	23.63 600	27.00 686	3.13 80	74.8 34.0
22 550	22.00 559.0	300 2065	114,000 507300	0 – 0.13 0 – 3.2	0° – 19'	0.07 6	2 – 1⅛ x 4	25.63 651	29.13 740	3.13 80	82.6 37.5
530.0 mm µ	20.866 530	300 2065	102,535 456,280	0 – 0.13 0 – 3.2	0° – 22'	0.08 7	2 – 1⅛ x 4	24.29 617	27.8 704	3.07 77	91.7 41.6
580.0 mm µ	22.835 580	300 2065	102,380 455,591	0 – 0.13 0 – 3.2	0° – 19'	0.07 6	2 – 1⅛ x 4	26.76 680	30.01 762	3.12 79	92.8 42.2
24 ‡ 600	24.000 609.6	250 1725	113,000 502850	0 – 0.13 0 – 3.2	0° – 18'	0.07 6	2 – 1⅛ x 4	27.75 705	31.00 787	3.19 81	89.6 40.7
630.0 mm µ	24.803 630	250 1725	102,790 457,416	0 – 0.13 0 – 3.2	0° – 18'	0.07 6	2 – 1⅛ x 4	28.42 722	32.16 817	3.12 79	96.8 44
14 – 24 350 – 600	AGS™ **See Style W77, Publication 20.03**										

§ Couplings 8, 10, 12"/200, 250, 300 mm sizes available to JIS standards. Refer to Section 06.17 for details.

* Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard **roll** or **cut** grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

WARNING: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.

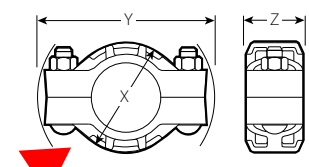
† Allowable Pipe End Separation and Deflection figures show the maximum nominal range of movement available at each joint for standard **roll** grooved pipe. Figures for standard **cut** grooved pipe may be doubled. These figures are maximums; for design and installation purposes these figures should be reduced by: 50% for ¾ – 3½"/20 – 90 mm; 25% for 4"/100 mm and larger.

@ Number of bolts required equals number of housing segments.

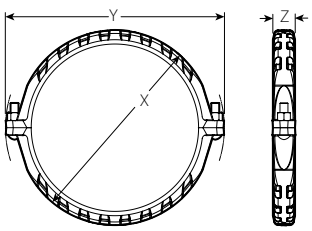
Metric thread size bolts are available (color coded gold) for all coupling sizes upon request. Contact Victaulic for details.

‡ For cut groove systems only. For 14 – 24"/350 – 600 mm Roll Groove systems Victaulic offers the Advanced Groove System (AGS) line of products. Request publication 20.03 for information on the Style W77 flexible AGS coupling.

µ CIS size product is designed with two housings and requires two bolts.



¾ – 12"/20 – 300 MM SIZES



14 – 24"/350 – 600 MM SIZES

Standard Flexible Coupling

STYLE 77

INSTALLATION

Reference should always be made to the I-100 Victaulic Field Installation Handbook for the product you are installing. Handbooks are included with each shipment of Victaulic products for complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

WARRANTY

Refer to the Warranty section of the current Price List or contact Victaulic for details.

NOTE

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

06.04 1469 REV L UPDATED 8/2010

6.1 Smartrise Controller

SMARTRISE™

Above the Rest

Smartrise™ is a non-proprietary, state of the art elevator control platform, that will provide years of trouble-free operation. Built to outperform today's leading elevator controllers, the Smartrise™ system never compromises when it comes to safety. Four independent control systems divide and conquer the task of moving passengers quickly and safely to their destinations. But safe and reliable operation is only part of the story.

You will realize your purchase of an elevator controller from Smartrise™ was a smart move long before you've ferried a single passenger. Our controllers are designed with the field installer always in mind. Our traveler cables use five times fewer wires than many competitors. That means smaller, cheaper, lighter and easier to handle cables. But, Smartrise reduces more than just cables—boards, relays, and hardware in general is kept to a minimum by our software centric design. Less hardware means fewer parts that can fail, and fewer parts that can fail means fewer spare parts for the maintenance contractor to keep in stock.

CONTACT OUR SMARTRISE™ SALES DEPARTMENT AT 1-916-457-5129 FOR MORE INFORMATION.

SMARTRISE™

Open Market Control

The next step in non-proprietary.

What good is a non-proprietary elevator controller if you can only get your spare parts from one source? Smartrise™ introduces the revolutionary concept of "open market" to the elevator controller industry. Parts can be purchased from us or on the "open market" —now you have a choice!

- No special tools required.
- Equipment can be maintained by any elevator contractor.
- Parts can be sourced from multiple vendors.
- Parts are available off the shelf.

	Non-Proprietary	Open Market
No special tools required.	●	●
Maintained by any elevator contractor.	●	●
Sourced parts from multiple vendors.		●
Available parts off the shelf.		●

We Are Different

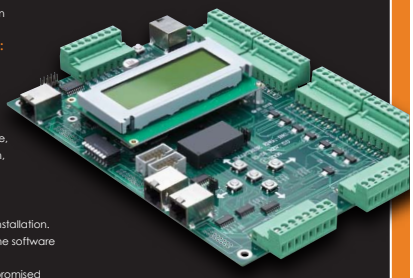
Here to outperform with simplicity.

Smartrise™ kept everything in mind, from your ability to buy parts from a 3rd party vendor to the light weight slim design of our systems.

- Smallest cable raceways.
- Least amount of printed circuit boards.
- Least amount of travelling cable 8-15.
- Least amount of hoistway cabling 12-18.
- Lightest and slimmest panels.
- On board full diagnostic and adjustment capabilities on three locations, machine room, top of car, and car panel.
- Least amount of engineering drawings 3-4 pages.
- Least amount of spare parts.
- All parts are available through a third party vendor.
- Distance and velocity feedback for all tractions and hydraulic.
- Perform car adjustments from inside the car.

The "Green" Board

Knowing the expectations you face in today's "on-demand" marketplace, we have developed the **SRU Board: "Smartrise™ Universal Board"** which has a wide range of features that are easy to deploy with quicker installation and less waste.



Our architecture is open and scalable, will integrate with your existing system, and allows you to start quickly and grow on your terms.

FEATURES

- Perfect for renovation and new installation.
- Adding more features are only one software download away.
- Strategic edge to assure uncompromised reliability and longevity.

SMARTRISE™ CONTROLS

By utilizing the latest technology and design practices, Smartrise™ has created a simpler, more reliable, and more capable elevator controller system. With a universal design that is shared across all Smartrise controllers, the software-centric design reduces the number of boards, relays, and wiring.

1. Our **SRA AC Drive Traction Controller** performs serial data exchange between the machine room, the top of the car and the car panel. This simplifies the programming effort with extensive communication and operator interface, available through the built-in LCD—in return eliminates the number of traveling cable all the way to 8-15 wires.

FEATURES

- Application: Geared, Gearless
- Feedback: Distance and Velocity
- Max Floors: 96
- Max Speed: 1600 FPM
- Dimension: 36" x 30" x 13"
- Location: Machine Room & Machine Room Less

2. The **SRD DC Drive Traction Controller** includes all the features of our AC controller with the option of a state-of-the-art fully regenerative DC motor drive. It offers reduced utility line harmonics and near unity power factor.

FEATURES

- Application: Geared, Gearless
- Feedback: Distance and Velocity
- Max Floors: 96
- Max Speed: 1600 FPM
- Dimension: 36" x 30" x 13"
- Location: Machine Room & Machine Room Less

3. Smartrise's **SRH Hydraulic Controller** is one of the only hydraulic controllers on the market with velocity and distance feedback. It reduces valve adjustment time by watching the car performance on the screen.

FEATURES

- Conveniently shares the same hardware and software platform as our high-end traction controllers.
- Feedback: Distance and Velocity
- Max Floors: 10
- Max Speed: 200 FPM
- Dimension: 30" x 24" x 10"

4. This **Group Controller** operates a Smart Hall Calls ETA based logic.

FEATURES

- Application: Coordinated Dispatching of Two or More Cars
- Computer: SRU Dual Microprocessor
- Dimension: 18" x 12" x 6"
- Location: Machine Room

5. In addition to reducing traveling cable, the **Top of Car Controller Box** operates doors, floor selection, and load weighing. It also provides a powerful diagnostics tool.

FEATURES

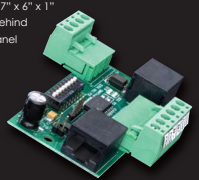
- Application: Localized Control of Door and Cartop Safety Functions
- Computer: SRU Dual Microprocessor
- Dimension: 18" x 12" x 6"
- Location: On Top of Car

SMARTRISE™ Controls in Use

6. Our **COP Controller: "Car Panel"** connects to the cartop box via a single Cat5 network cable, irrelevant of your number of stops.

FEATURES

- Application: Localized Control of Car Station Functions
- Computer: SRU Dual Microprocessor
- Dimension: 7" x 6" x 1"
- Location: Behind the COP Panel



7. Our **Hall Board** provides two inputs and two outputs to interface with all relative devices.

FEATURES

- Hall Board turns any button, lamp or key switch into a networked device.
- All Hall Boards connect to the machine room via a shared 4-wire network or Cat5.
- Network provides communication plus power for boards and devices.
- Call buttons and other devices are wired locally to Hall Board at floor.
- Cat5 connection plug-ins between hall boards to ease installation.
- Application: Serial Connection to Hall Fixtures
- Dimension: 1.57" x 2.91" x 0.79"
- Serialized Components: Access Top & Bottom Switch, Fire Switch, Hall Buttons & Lanterns, and medical service

Specifications

SMARTRISE™

above the rest

SMARTRISE™

above the rest

Warning and Disclaimer
Although every effort has been made to make this document as complete and accurate as possible, Smartrise Engineering Inc. and the document authors, publishers, distributors, and representatives have neither liability nor responsibility for any loss or damage arising from information contained in this document or from informational errors or omissions. Information contained in this document shall not be deemed to constitute a commitment to provide service, equipment, or software by Smartrise Engineering Inc. or the document authors, publishers, distributors, or representatives. Smartrise's policy is to continually develop and improve their products. The company reserves the right to change the detail and technical specification of products. We cannot accept liability for errors and omission in publications.

Limited Warranty
Smartrise Engineering Inc. (manufacturer) warrants its products for a period of 15 months from the date of shipment from its factory to be free from defects in workmanship and materials. Any defect appearing more than 15 months from the date of shipment from the factory shall be deemed to be due to ordinary wear and tear. Manufacturer, however, assumes no risk or liability for results of the use of the products purchased from it, including, but without limiting the generality of the forgoing: (1) The use in combination with any electrical or electronic components, circuits, systems, assemblies or any other material or equipment (2) Unsuitability of this product for use in any circuit, assembly or environment. Purchasers' rights under this warranty shall consist solely of requiring the manufacturer to repair, or in manufacturer's sole discretion, replace free of charge, F.O.B. factory, any defective items received at said factory within the said 15 months and determined by manufacturer to be defective. The giving of or failure to give any advice or recommendation by manufacturer shall not constitute any warranty by or impose any liability upon the manufacturer. This warranty constitutes the sole and exclusive remedy of the purchaser and the exclusive liability of the manufacturer, AND IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY AS TO MERCHANTABILITY, FITNESS, FOR PURPOSE SOLD, DESCRIPTION, QUALITY PRODUCTIVENESS OR ANY OTHER MATTER. In no event will the manufacturer be liable for special or consequential damages or for delay in performance of this warranty.

About Smartrise Engineering, Inc. Philosophy and Direction

The purpose of this book is to inform elevator Consultants, Contractors, and Building Owner/ Managers about Smartrise Engineering products.

Extensive research coupled with in depth experience in the *design, development, field support, sales, and the manufacturing of elevator controllers*, have enabled Smartrise to produce the elevator industry's most advanced controller platform.

Up until Smartrise, no elevator controller platform seamlessly integrated hardware simplicity with diagnostic, and performance to serve the building transportation needs.

As a result, Smartrise developed a truly universally serviceable elevator controller based on the realities of INSTALLATION, MAINTENANCE and SERVICE of elevator controllers that Building Owner/Managers experience.

As such, Smartrise operates under the following principles:

- The end user should be able to CONTRACT any elevator service providers to perform maintenance on the elevator controller.
- Smartrise imposes no restraints on the ability to service and maintain its elevator controllers.
- Parts must be available for inventory or exchange.
- Diagnostics must be built in, requiring no proprietary service tool and no external tool for any adjustment or maintenance. All manuals and drawings shall be provided.
- Technical and sales training, engineering, and technical phone and field support shall be available to all.
- *Smartrise provides direct support to the "end user" and their designated maintenance company.*
- *Smartrise provides support in the selection of the right equipment for a given project.*

Smartrise provides solutions for special requirements that may arise after the completion of a project or during the development of the specification of a project.

There should be no more than two type of printed circuit boards made by the elevator controller manufacturer, so that:

- Longevity of components and reliability is assured and not compromised.
- Hardware changes over the product lifetime are kept to a minimum.
- The life of the product is not dependent on the life of the manufacturer.
- They are the same across all the product line, to ensure the least inventory cost.
- *The elevator controller shall be so simple that training to learn to work with the product is not required, but field and in house training is available open request.*
- All parts should be available through Smartrise or a third party vendor.

The schematic and their bill of material shall be made available upon request from the end user, so that the manufacturer, to control repair and replacement cost, does not hold the end user hostage.

There should be no more than fifteen traveling cables per car for any given project scope, so that traveling wiring replacement cost is kept low.

If a printed circuit board interface to the car station operating panel is provided or required by the elevator controller to be installed inside the car station operating panel, then there should be an on that printed circuit board an on-board diagnostic tool displaying in plain English the mode of operation with a menu system written in plain elevator language to determine the status of signals, to allow for parameter adjustment, and the display of faults.

If a printed circuit board is provided on the top of the cabin, there should be on that printed circuit board an on-board diagnostic tool displaying in plain English the mode of operation with a menu system written in plain elevator language to determine the status of signals, to allow for parameter adjustment, and the display of faults.

The following are features common to most elevator controller equipment.

- Code Compliance
- ADA Requirements
- Environmental Considerations
- Diagnostics
- Intended Operation of Critical Components
- Status Indicators
- Out of Service Timer
- Door Operation
- Fire Service Operation
- Independent Service
- Leveling
- Earthquake Operation
- Emergency Power
- Hospital Emergency
- Security
- Controller
- Dispatching
- Physical Specification

Code Compliance
The elevator controller shall use a dual microprocessor based logic system and shall comply with applicable elevator and electrical safety codes. Smartrise complies with ASME A17/CSA-B44.

ADA Requirements
The elevator controllers shall comply with Title III of the Americans with Disabilities Act:

- Leveling accuracy is within a tolerance of 0.5" or better under all loading conditions up to the rated load.
- Hall Lanterns for visible and audible signals at each hall entrance to indicate which elevator car is answering a call.
- Car Position for visible signals to indicate the corresponding floor numbers as the car passes or stops at a floor. An audible signal shall sound as the position indicator changes floors.
- Optional – The controller shall have a voice annunciator to announce direction, floor label, fire and nudging messages.

Environmental Considerations

- Ambient Temperature: 14° F to 130° F (0° C to 40° C)
- Humidity: Non-condensing up to 95%
- Altitude: Up to 7500 feet (2286 m)
- Smartrise provides products for adverse environmental conditions

Diagnostics
The microprocessor boards shall be equipped with on-board diagnostics to provide a user-friendly interaction between the mechanic and the controller.

Intended Operation of Critical Components
The control system shall be manufactured so that the monitoring of critical components and the operation resulting from a failure of a critical component are in compliance with ASME A17/CSA B44.

Status Indicators
Visible indicators of field wiring and messages information displayed shall be provided to indicate the status of the elevator controller and the mode of operation.

Out of Service Timer
An out of service timer shall be provided to take the car out of service if the car cannot leave the landing while calls exist in the system.

Door Operation
Door protection logic shall be provided to determine malfunction of door operation. Audible noise and reduce speed, otherwise called Nudging, shall be used to close the doors if the doors are prevented to close normally.

Fire Service Operation
Fire Phase I emergency recall operation, alternate level Phase I emergency recall operation and Phase II emergency in-car operation shall be provided according to applicable local codes.

Independent Service
Independent service operation shall be provided so that actuation of a key switch in the car operating panel will take the car out of automatic service and then respond only to constant pressure car calls placed by an attendant in the car.

Leveling
The car shall level automatically at a destination landing, within the required range of leveling accuracy, with any load up to full load.

Earthquake Operation
The controller shall be provided with logic for applicable code requirements for earthquake operation.

Emergency Power
Optional – The elevator system shall be equipped with logic to meet the demand of building transportation when the building is operating under emergency power. The demand is based on the number of elevators the emergency power is designed to operate with, it can be a manual selection of the number of elevators, a number of designated elevators or an automated process by the elevator system.

Hospital Emergency
Optional – A medical emergency capture switch (Blue Code) shall be installed at each floor where medical emergency service is needed. Elevator Logic shall be provided to enable Blue Code operation as per the Hospital requirements.

Load Weighing
The controller shall be equipped with the ability to determine load in the car, via an external load-weighing device, to improve dispatching, ride quality and safety.

Security
Optional – The controller shall be equipped with logic to meet the security needs of a building transportation system. Such needs may be to lock out a car or hall call to a floor.

Controller
The elevator controller shall be designed in compliance with ASME A17/CSA B44 to implement the safety features as required by code. The safety logic shall utilize forcibly guided relays to disengage the motor and brake for traction controller and to disengage the valves and pump for Hydraulic controller when a fault condition is detected.

Changes in the controller configuration shall only be authorized by the manufacturer.

The elevator controller shall not require interaction via an external tool such as a computer or a hand held.

Dispatching
Individual elevators as part of a group of elevators shall be dispatched to efficiently deliver performance based on the following criteria of the NEII operational criteria:

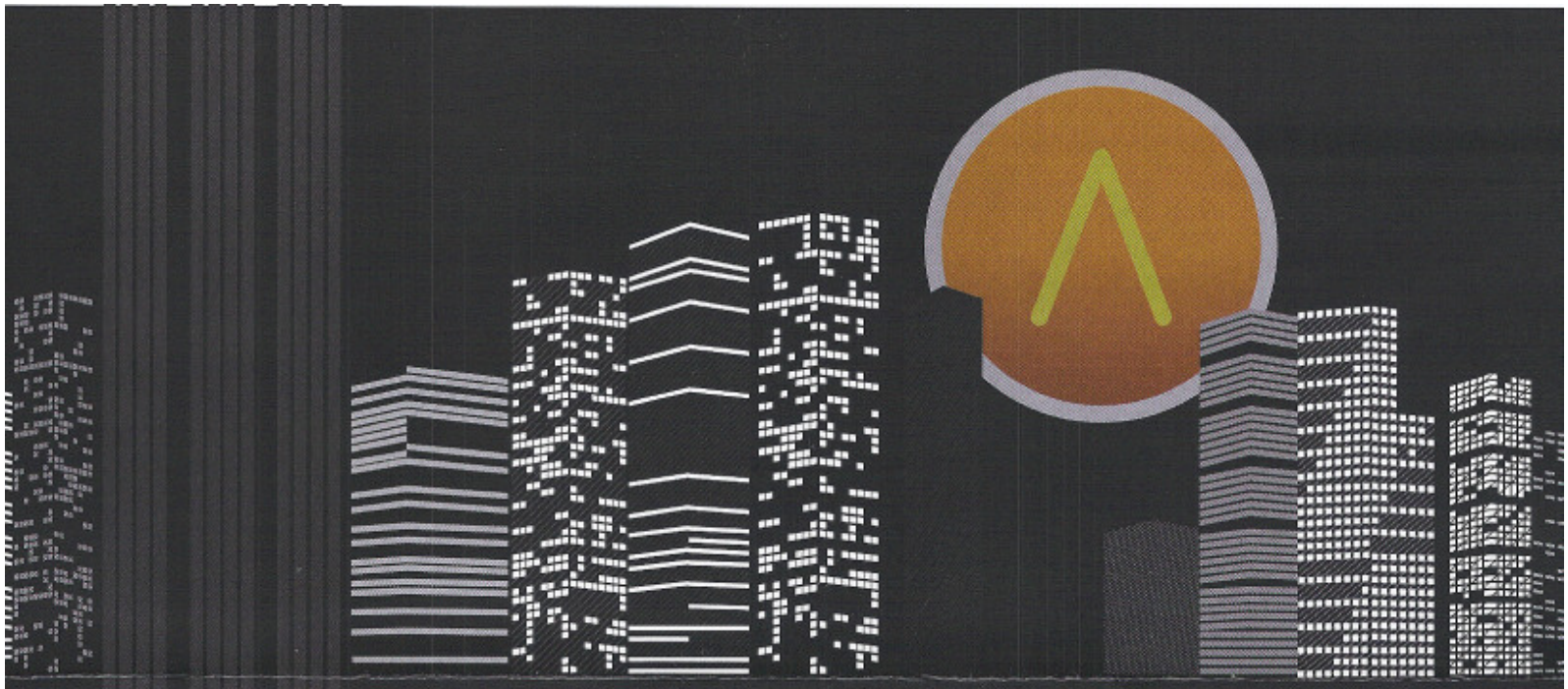
- Average Time of Hall Call Registration
- Coincident Call
- Demand and Transfer
- Headway Time
- Load and Schedule
- Down Peak
- High and Low Call
- Up Peak, Up Peak Booster, Up Peak Zoning

Controller Specifications

TYPE	SRA	SRD	SRH
Control	Drive Traction AC	Drive Traction DC	Solid State Hydrolic
Motor	Induction Gear & Gearless, PM	Gear & Gearless	Three Phase & Single Phase
Speed (fpm)	1,600	1,600	200
Stops	96	96	10
Car In Group	8	8	3
HP	75	168	125
Line Voltage	190 - 480	150 - 525	190 - 600
Speed Regulation	0.05%	0.05%	Valve Controlled
Distance Tracking	Quadrature Absolute or Binary	Quadrature Absolute or Binary	Quadrature Absolute or Binary
Power Regeneration	Dynamic Braking, Full	Dynamic	N/A
Operational Ambient Tempurature	14 - 130° F	14 - 130° F	14 - 130° F
Altitude No Derating	3300 ft	3300 ft	3300 ft
Relative Humidity	95% non-condensing	95% non-condensing	95% non-condensing
Vibration	< 57Hz	< 57Hz	< 57Hz
Peak Acceleration	0.5 g	0.5 g	Valve & Pump Controlled
Tuning	Adaptive	Adaptive	Valve & Pump Controlled
Hall Fixtures	Serially Connected	Serially Connected	Serially Connected
Cabin Fixtures	Serially Connected	Serially Connected	Serially Connected
Hoistway Wiring	12 - 20	12 - 20	9 - 12
Traveling wires	11 - 14	11 - 14	10 - 12
Diagnostics	Built-in On Top of Car, Inside Cabin & In Machine Room	Built-in On Top of Car, Inside Cabin & In Machine Room	Built-in On Top of Car, Inside Cabin & In Machine Room
Compliance	ASME, CSA	ASME, CSA	ASME, CSA
Delivery	1 - 4 Weeks Standard, with Option for Shorter Lead Time	1 - 4 Weeks Standard, with Option for Shorter Lead Time	1 - 4 Weeks Standard, with Option for Shorter Lead Time
General Warranty	15 Months, with Option to Extend	15 Months, with Option to Extend	15 Months, with Option to Extend
Smartrise Boards Warranty	3 Years, with Option to Extend	3 Years, with Option to Extend	3 Years, with Option to Extend
Original and Upgrade Software	No Charge	No Charge	No Charge
Original and Upgrade Drawings	No Charge	No Charge	No Charge
Technical Support	No Charge	No Charge	No Charge
Standard Configuration	Machine Room Controller, Top of Car Controller, Car Panel Controller, Selector & Hall Board Fixture Interface	Machine Room Controller, Top of Car Controller, Car Panel Controller, Selector & Hall Board Fixture Interface	Machine Room Controller, Top of Car Controller, Car Panel Controller, Selector & Hall Board Fixture Interface
Enclosure	All Wall Mount Single Door, Nema 1 Standard. Adverse Conditions for Dust, Corrosion & Water is Optional.	All Wall Mount Single Door, Nema 1 Standard. Adverse Conditions for Dust, Corrosion & Water is Optional.	All Wall Mount Single Door, Nema 1 Standard. Adverse Conditions for Dust, Corrosion & Water is Optional.
Enclosure Sizes, Inches H x W x D	36 x 30 x 13	36 x 30 x 13	30 x 24 x 10

Features

Fire service I & II
Hoistway Access
Inspection
Independent Service
Hoistway Locks & Gate Switch Bypass
Interface to Door Operators
Calls Lockouts
Photo-eye, Electric Eye, Safety Edge
Car Position Indication
Voice Annunciation
Hall lanterns Interface
Door Hold
In Car Inspection
Front & Rear Doors Operation, Staggered & Walk-through
Short Foors Operation Up to 6 Inches
Selective, Collective Calls
Group Operation Smart Hall Calls ETA Based,
Lobby Car Calls Dispatching Custom Per Job
Load Weigher Interface
Pre-torque Operation
Local & Remote Monitoring
Custom Security Interface
Emergency Brake Interface – Traction
Earthquake Operation – Traction
Interface to Serial Fixture from CE Electronics & E-Motive
Anti-creep – Hydraulic
Viscosity Control – Hydraulic
Low Oil – Hydraulic
Low Pressure – Hydraulic
Battery Lowering – Hydraulic
Emergency Power Lowering Operation
Hospital Service
Distance & Velocity Feedback



Above the Rest

Smartrise™ is a non-proprietary, state of the art elevator control platform, that will provide years of trouble-free operation. Built to outperform today's leading elevator controllers, the Smartrise™ system never compromises when it comes to safety. Four independent control systems divide and conquer the task of moving passengers quickly and safely to their destinations. But safe and reliable operation is only part of the story.

You will realize your purchase of an elevator controller from Smartrise™ was a smart move long before you've ferried a single passenger. Our controllers are designed with the field installer always in mind. Our traveler cables use five times fewer wires than many competitors. That means smaller, cheaper, lighter and easier to handle cables. But, Smartrise reduces more than just cables—boards, relays, and hardware in general is kept to a minimum by our software centric design. Less hardware means fewer parts that can fail, and fewer parts that can fail means fewer spare parts for the maintenance contractor to keep in stock.

CONTACT OUR SMARTRISE™ SALES DEPARTMENT AT 1-916-457-5129 FOR MORE INFORMATION.

SMARTRISE™

Open Market Control

The next step in non-proprietary.

What good is a non-proprietary elevator controller if you can only get your spare parts from one source? Smartrise™ introduces the revolutionary concept of "open market" to the elevator controller industry. Parts can be purchased from us or on the "open market" —now you have a choice!

- No special tools required.
- Equipment can be maintained by any elevator contractor.
- Parts can be sourced from multiple vendors.
- Parts are available off the shelf.

	Non-Proprietary	Open Market
No special tools required.	●	●
Maintained by any elevator contractor.	●	●
Sourced parts from multiple vendors.		●
Available parts off the shelf.		●

We Are Different

Here to outperform with simplicity.

Smartrise™ kept everything in mind, from your ability to buy parts from a 3rd party vendor to the light weight slim design of our systems.

- Smallest cable raceways.
- Least amount of printed circuit boards.
- Least amount of travelling cable 8-15.
- Least amount of hoistway cabling 12-18.
- Lightest and slimmest panels.
- On board full diagnostic and adjustment capabilities on three locations, machine room, top of car, and car panel.
- Least amount of engineering drawings 3-4 pages.
- Least amount of spare parts.
- All parts are available through a third party vendor.
- Distance and velocity feedback for all tractions and hydraulic.
- Perform car adjustments from inside the car.

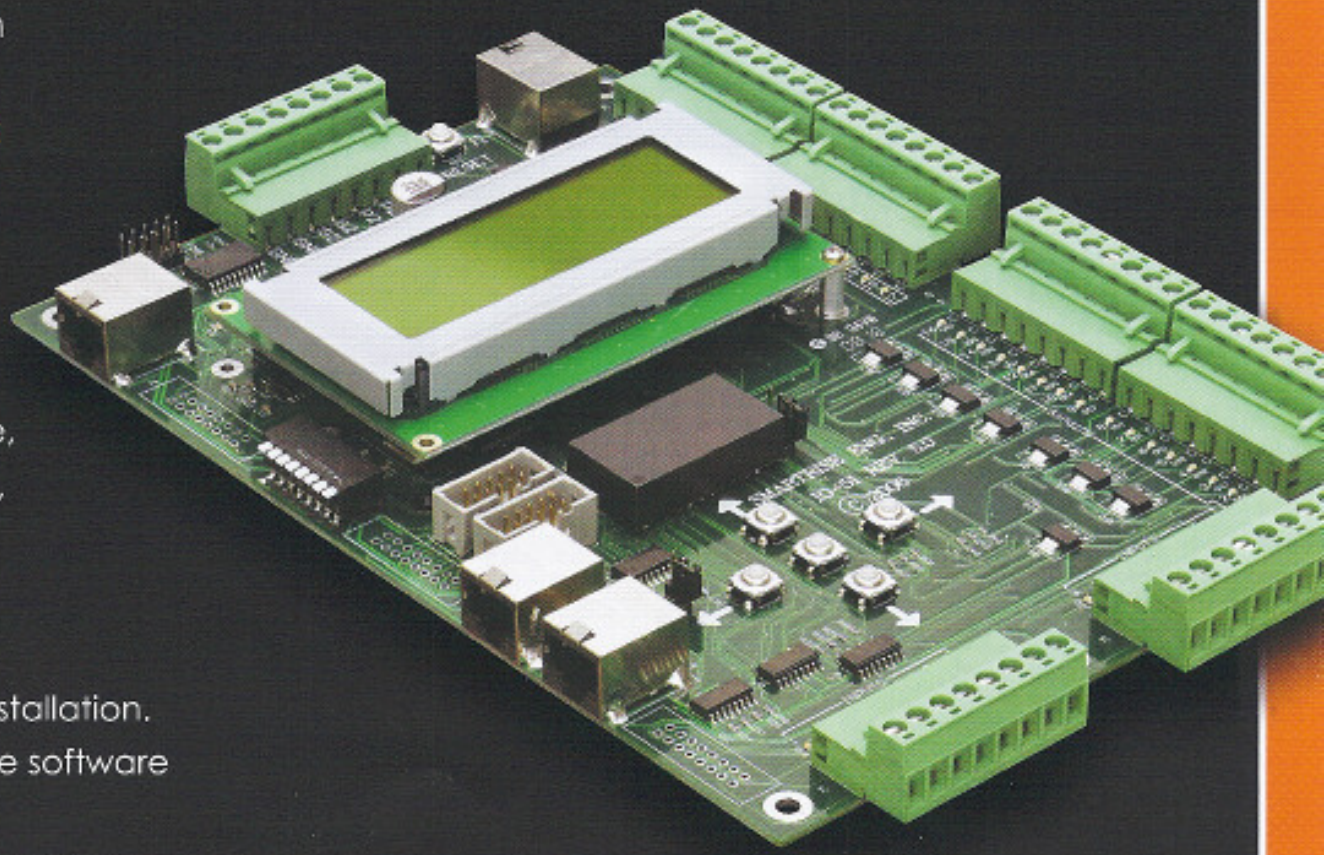
The "Green" Board

Knowing the expectations you face in today's "on-demand" marketplace, we have developed the **SRU Board: "Smartrise™ Universal Board"** which has a wide range of features that are easy to deploy with quicker installation and less waste.

Our architecture is open and scalable, will integrate with your existing system, and allows you to start quickly and grow on your terms.

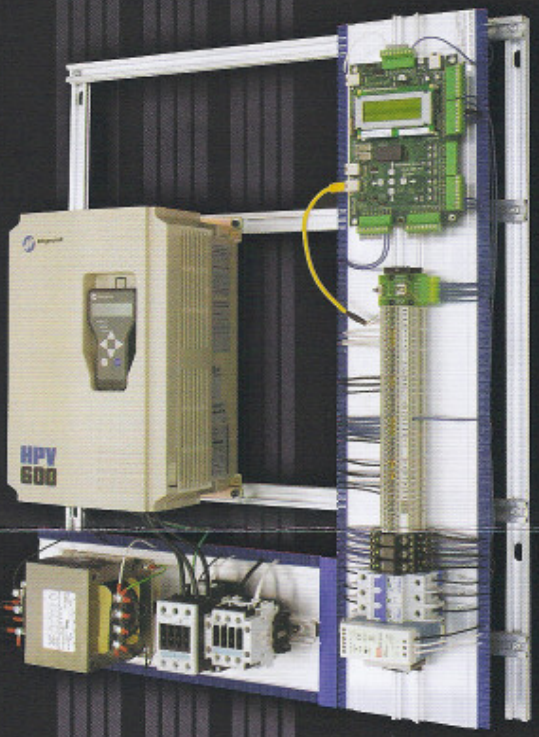
FEATURES

- Perfect for renovation and new installation.
- Adding more features are only one software download away.
- Strategic edge to assure uncompromised reliability and longevity.



SMARTRISE™ CONTROLS

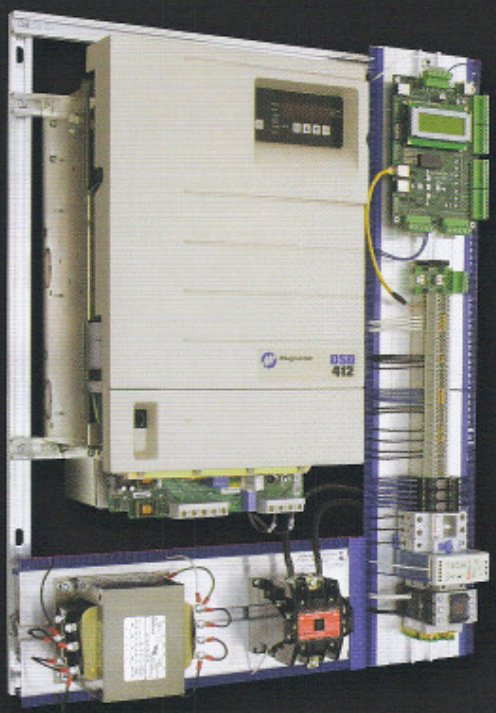
By utilizing the latest technology and design practices, Smartrise™ has created a simpler, more reliable, and more capable elevator controller system. With a universal design that is shared across all Smartrise controllers, the software-centric design reduces the number of boards, relays, and wiring.



1. Our **SRA AC Drive Traction Controller** performs serial data exchange between the machine room, the top of the car and the car panel. This simplifies the programming effort with extensive communication and operator interface, available through the built-in LCD—in return eliminates the number of traveling cable all the way to 8-15 wires.

FEATURES

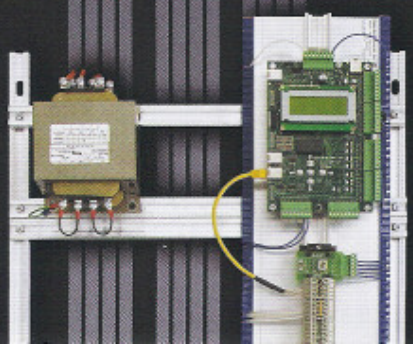
- Application: Geared, Gearless
- Feedback: Distance and Velocity
- Max Floors: 96
- Max Speed: 1600 FPM
- Dimension: 36" x 30" x 13"
- Location: Machine Room & Machine Room Less



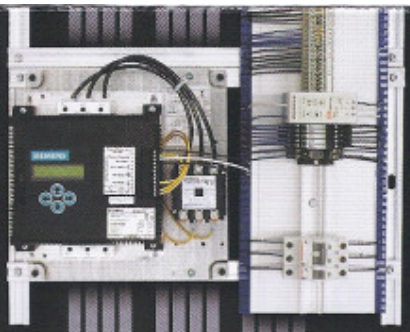
2. The **SRD DC Drive Traction Controller** includes all the features of our AC controller with the option of a state-of-the-art fully regenerative DC motor drive. It offers reduced utility line harmonics and near unity power factor.

FEATURES

- Application: Geared, Gearless
- Feedback: Distance and Velocity
- Max Floors: 96
- Max Speed: 1600 FPM
- Dimension: 36" x 30" x 13"
- Location: Machine Room & Machine Room Less



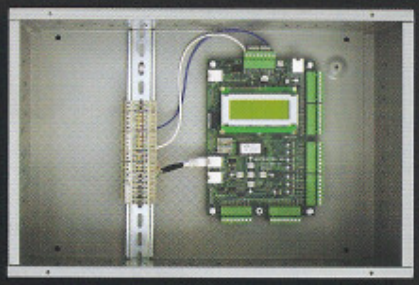
3. Smartrise's **SRH Hydraulic Controller** is one of the only hydraulic controllers on the market with velocity and distance feedback. It reduces valve adjustment time by watching the car performance



on the screen.

FEATURES

- Conveniently shares the same hardware and software platform as our high-end traction controllers.
- Feedback: Distance and Velocity
- Max Floors: 10
- Max Speed: 200 FPM
- Dimension: 30" x 24" x 10"



4 This **Group Controller** operates a Smart Hall Calls ETA based logic.

FEATURES

- Application: Coordinated Dispatching of Two or More Cars
- Computer: SRU Dual Microprocessor
- Dimension: 18" x 12" x 6"
- Location: Machine Room

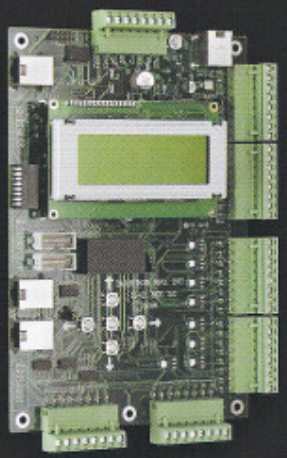
5 In addition to reducing traveling cable, the **Top of Car Controller Box** operates doors, floor selection, and load weighing. It also provides a powerful diagnostics tool.

FEATURES

- Application: Localized Control of Door and Cartop Safety Functions
- Computer: SRU Dual Microprocessor
- Dimension: 18" x 12" x 6"
- Location: On Top of Car

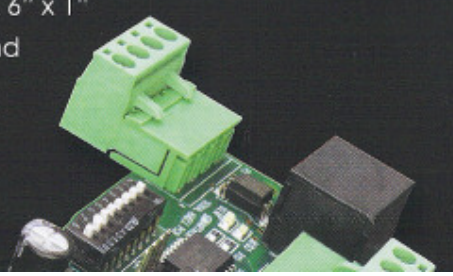
SMARTRISE™ Controls in Use

6 Our **COP Controller: "Car Panel"** connects to the cartop box via a single Cat5 network cable, irrelevant of your number of stops.



FEATURES

- Application: Localized Control of Car Station Functions
- Computer: SRU Dual Microprocessor
- Dimension: 7" x 6" x 1"
- Location: Behind the COP Panel



7

Our **Hall Board** provides two inputs and two outputs to interface with all relative devices.

FEATURES

- Hall Board turns any button, lamp or key switch into a networked device.
- All Hall Boards connect to the machine room via a shared 4-wire network or Cat5.
- Network provides communication plus power for boards and devices.
- Call buttons and other devices are wired locally to Hall Board at floor.
- Cat5 connection plug-ins between hall boards to ease installation.
- Application: Serial Connection to Hall Fixtures
- Dimension: 1.57" x 2.91" x 0.79"
- Serialized Components: Access Top & Bottom Switch, Fire Switch, Hall Buttons & Lanterns, and medical service

6.2 Elevator Controls Controller

H900/H-PAC AT A GLANCE

ELEVATOR TYPE	*H900 Hydraulic for all applications* *H-PAC Quick ship line for up to five stops*
BUILDING TYPE	*Low Rise*
SPEED	*All Hydraulic Car Speeds*
LANDINGS	*64*
DISPATCHING	*Simplex* *Duplex* *Group 16 Cars** **with G900 group option*
DRIVE TECHNOLOGY OPTIONS	*Mechanical Starter Standard* *Solid State Starter Option*

Universal
Simple
Interoperable
Supportable
Economical

H900/H-PAC
Controls for Hydraulic Elevators

The 900 Series is our next generation, standardized non-proprietary control platform for Hydraulic, AC and DC Traction, and MRL elevators.

Advanced microprocessor technology has consolidated PC boards and eliminated many component parts. This is our most reliable and simplified control system yet.

Modular design is retained to ensure essential maintainability. CSA and TSSA certifications confirm safety code compliance.

EC's traditional, "*learn one, know all*" equipment design speeds transition to our newest technology. Trademark PC board interchangeability and backward compatibility reduce spares burden while extending service life.

When the power of technology is used to simplify essential tasks – including installation, adjustment, maintenance and troubleshooting – everybody wins.

ELEVATOR EC CONTROLS
SIMPLE. SOLID. SUPPORTABLE.

H900 / H-PAC

Controls for Hydraulic Elevators

About Elevator Controls

Elevator Controls Corporation, established in 1986, is a widely recognized manufacturer of Non-proprietary microprocessor based elevator controllers.

Standardization across all products allows EC to offer true backward compatibility, enhancing maintainability, reducing spares burden, and extending service life.

Our mission is to develop equipment that is simple for customers to install, adjust and maintain.

Learn more at: www.elevatorcontrols.com

08/08 5M

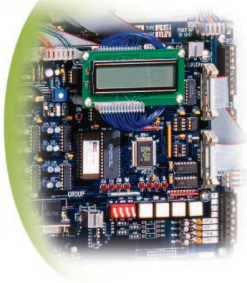
Model H900

Model **H900** hydraulic controller is a field reprogrammable, microprocessor based unit capable of handling both standard and non-standard applications with simplex, duplex and group configuration. The **H900** control family is suitable for all hydraulic elevator speeds, most valves and the majority of both freight and passenger elevator door operators. Interfaces for special or unusual valves are also available.

Choice of Starter

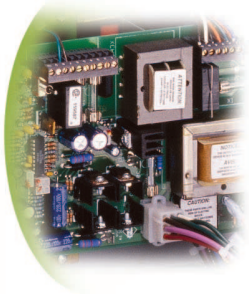
Tailor your H900 solution to each specific application with Electronic Soft Start, Y-Delta and Across-the-Line starting options.

Microprocessor Board



EC's forward-looking system architecture provides universal backward compatibility. Proven components and technology are always used to ensure years of field reliability.

Optional Built-In Battery Lowering Device



To prevent entrapments under lost power conditions, battery lowering provides backup power to lower the car to the next available landing and open the doors. For most passenger elevators the unit fits inside the control enclosure. For power freight doors the unit is typically mounted externally.

Model H-PAC

Model **H-PAC** combines many of the most popular **H900** features with quick ship availability. Off-the-shelf standardization makes the **H-PAC** a truly economical alternative. **H-PAC** handles standard hydraulic applications to five stops (in line) with a limited range of interfaces to standard valves and door operators.

See Specifications for Microprocessor Elevator Controls for complete details.

Powerful Control Technology that's Easy to Use

- Non-Proprietary
- A17.1-2005/ B44-05 Safety Code Compliant
- Standardization
- Backward Compatibility
- Onboard Diagnostics
- Field Reprogrammable "personality parameters"
- Choose Discrete or Ez-LINK™ serial communication wiring options
- Works with Interact™ elevator management, analysis and reporting tools
- Unrestricted Telephone Technical Support for customers
- Configure any car to function as a simplex, duplex or group

ELEVATOR EC CONTROLS
SIMPLE. SOLID. SUPPORTABLE.

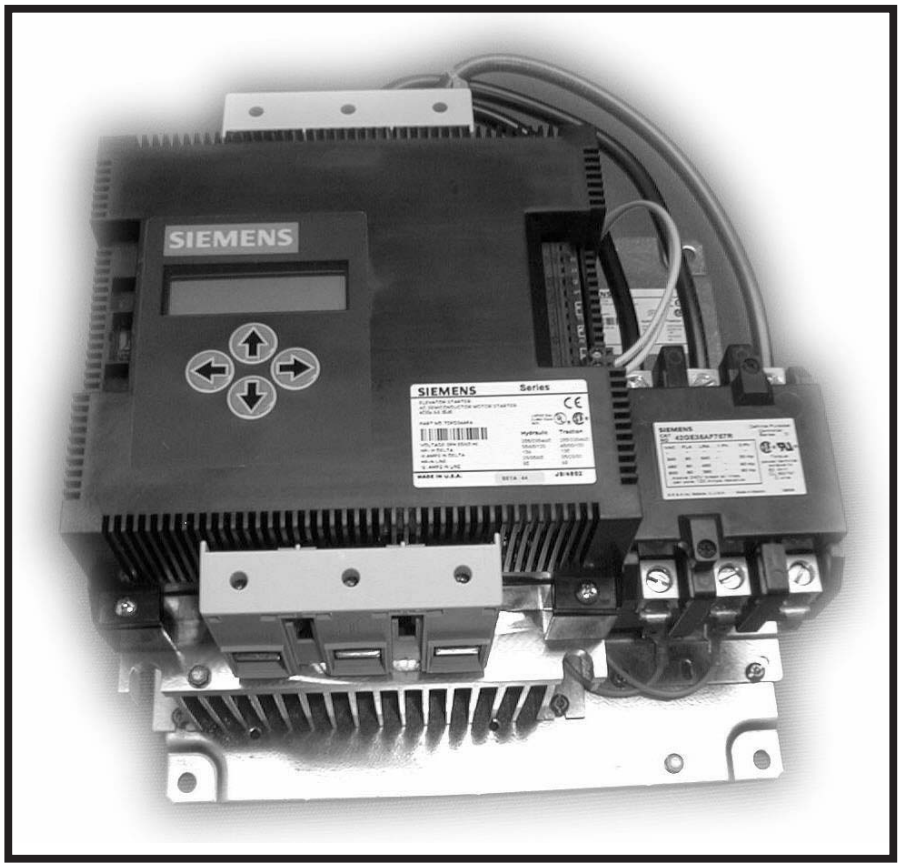
Toll-Free: 800/829-8106
Tel: 916/428-1708
Fax: 916/428-1728

e-mail: info@elevatorcontrols.com
www.elevatorcontrols.com

SIEMENS

SFIS-72G000-0203
February, 2003

Class 72G Starter Quick Set-up Guide for Hydraulic Elevator Pump Motors



⚠ DANGER

Hazardous voltage.
Will cause death or serious injury.

Always de-energize and ground the equipment before maintenance. Read and understand this manual before installing, operating or maintaining the equipment. Maintenance should be performed only by qualified personnel. The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel may result in dangerous conditions which may cause death or serious injury, or equipment or property damage. Follow all safety instructions contained herein.

THIS EQUIPMENT CONTAINS HAZARDOUS VOLTAGES. DEATH, SERIOUS PERSONAL INJURY, OR PROPERTY DAMAGE CAN RESULT IF SAFETY INSTRUCTIONS ARE NOT FOLLOWED. ONLY QUALIFIED PERSONNEL SHOULD WORK ON OR AROUND THIS EQUIPMENT AFTER BECOMING THOROUGHLY FAMILIAR WITH ALL WARNINGS, SAFETY NOTICES, AND MAINTENANCE PROCEDURES CONTAINED HEREIN.

THE SUCCESSFUL AND SAFE OPERATION OF THIS EQUIPMENT IS DEPENDENT UPON PROPER HANDLING, INSTALLATION, OPERATION AND MAINTENANCE.

SIGNAL WORDS

The signal words "**DANGER**," "**WARNING**" and "**CAUTION**" used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as:

DANGER - For the purpose of this manual and product labels, **DANGER** indicates an imminently hazardous situation which, if not avoided will result in death or serious injury.

WARNING - For the purpose of this manual and product labels, **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION - For the purpose of this manual and product labels, **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

QUALIFIED PERSON

For the purposes of this manual and product labels, a qualified person is one who is familiar with the installation, construction, operation or maintenance of the equipment and the hazards involved. In addition this person has the following qualifications:

(a) is trained and authorized to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.

(b) is trained in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.

(c) is trained in rendering first aid.

Class 72G Starter Quick Set-up Guide **SFIS-72G000-0203**

February, 2003

Congratulations, you have just purchased the most advanced, full-featured Elevator Starter available. While this product contains several features to aid in set up, it is important to read and understand this manual before attempting to install. As the set up and wiring of this version is quite different from previous versions of Siemens Elevator Starters, it is equally important to read even if you have a good working knowledge of the 72E version. If questions arise, additional help is available by calling Siemens Technical Support at 800-323-5450. Visit us on the web at www.siemens.com/controlsusa

Special Features:

16 Character by 2 Line Liquid Crystal Display
-------Displays RMS Currents for motor and line amps
-------Displays RMS Voltages for the incoming line power.
Dynamic Stall Prevention
-------Automatically increases current to motor under stall conditions.
Digital Current Limit
-------Allows precise control and monitoring of currents during starting and run modes.

IMPORTANT

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens sales office. The contents of this manual shall not become part of or modify any prior or existing agreement, commitment, or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

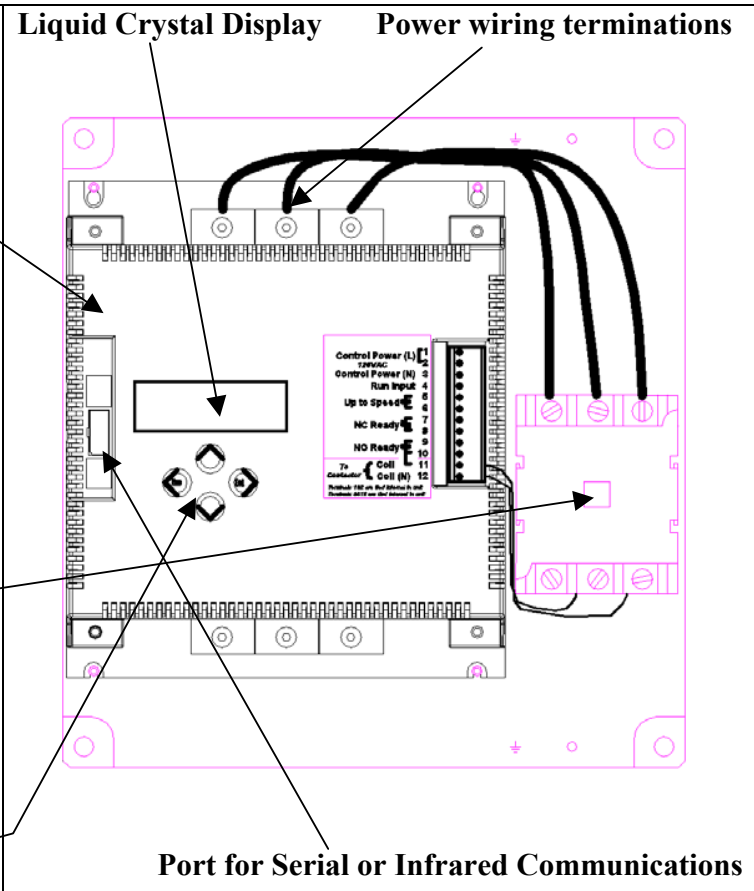
Overview:

The 72G series of elevator starters consists of two main components.

The Solid State Starter controls the current during the start and provides overload, current imbalance, reverse phase, single phase and shorted SCR protection. In addition to those faults, on power up the starter will check the motor configuration.

The Fault Contactor provides a means for interrupting current during shorted SCR conditions. It DOES NOT provide electrical isolation when opened if wired in delta.

Keypad for easy setup and operation.



Control Power Connections:

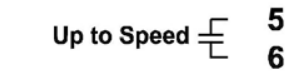
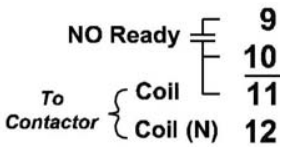
CAUTION

Wrong voltage or power rating, may cause property damage.

To avoid possible starter and/or motor damage, be sure the line and control voltage sources are as specified on starter label, and motor rating corresponds to the type of wiring used (Inside Delta or In Line).

The customer control connections on the 72G Solid State Elevator Starter feature a removable terminal block. Depending on the style of controller ordered, one or two terminal strips would be used to make the connections. The layout is shown to the left. If two terminal blocks are used, terminals 1 through 10 will be on the first block, while terminals 11 and 12 will be on the second.

Terminal	Connection
Control Power (L) 120VAC 1 2 Control Power (N) 3	A constant 120 VAC 500VA supply should be connected between the (L) 1, Line and (N) 3, Neutral terminals. This supply also powers the fault contactor. Terminal 1 and 2 are internally connected. An external jumper wire is required to connect terminal 1 to terminal 9.
Control Power (N) 3 Run Input 4	The 120 VAC motor run input is connected to terminal 4. The neutral for the motor run input must be referenced to the neutral of the Control Power input.

	This output is used to either directly supply power to the Up valves or supply a signal to a control board to indicate the motor is up to speed. This output utilizes a triac rated for 120 VAC.
	This contact may be used to signal a control board that the unit is in a fault condition.
	Terminal 9 should be connected via a jumper wire to either terminal 1 or 2 (L). This provides a hot feed to the fault contactor coil when the **NO Ready** contact is closed. Terminals 10 and 11 are the switched side of the **NO Ready** contact. This configuration allows terminal 10 to be used to signal that the starter is ready to run while terminals 11 and 12, the neutral for the fault contactor coil, control the fault contactor.

Note: The load on terminals 5 and 6 must not be greater than 1 amp at 120V. The load on terminals 7 – 11 must not be greater than 3 amps at 240V. All terminals are rated for AC voltage only.

Inside Delta Motor Wiring

The motor wiring on the next pages should be connected exactly as shown. If it is not, the starter will detect a motor wiring error. If you have elected to cycle the fault contactor on each start, you must contact technical support for directions on configuring the starter and wiring in a required off delay timer.

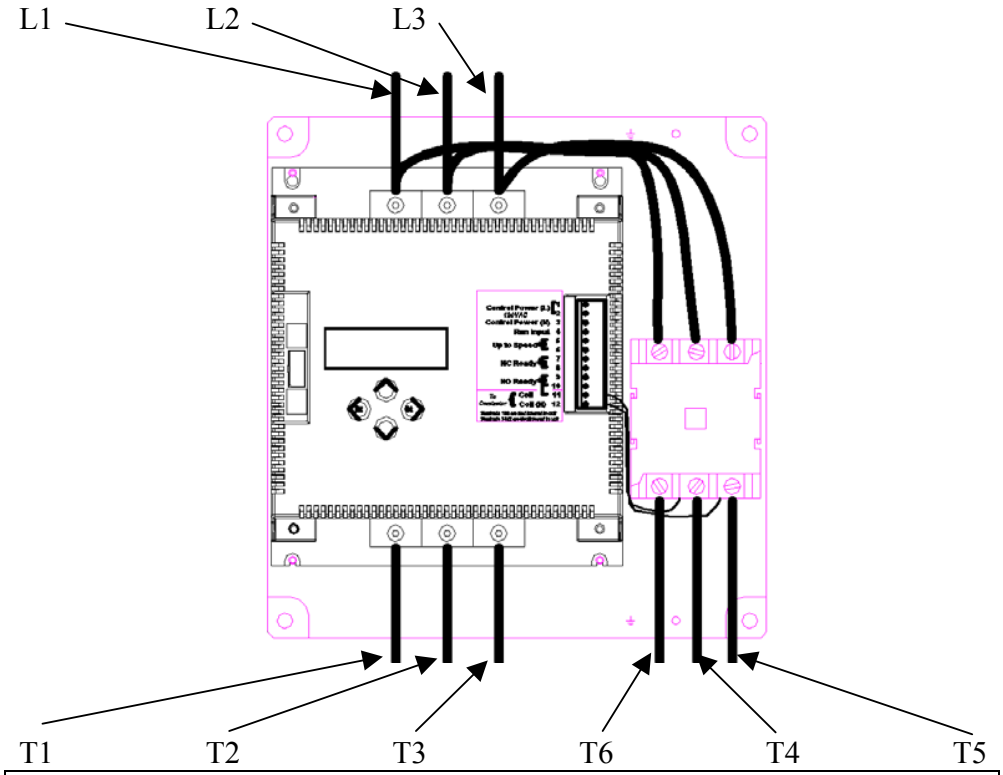
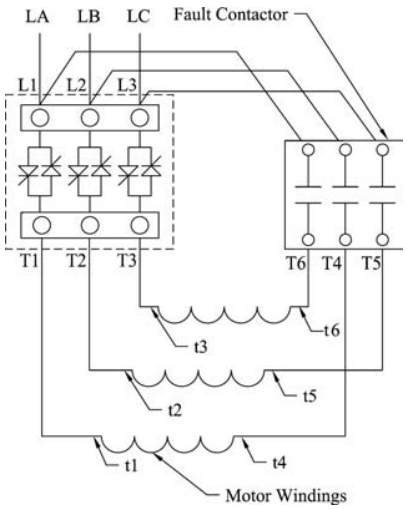
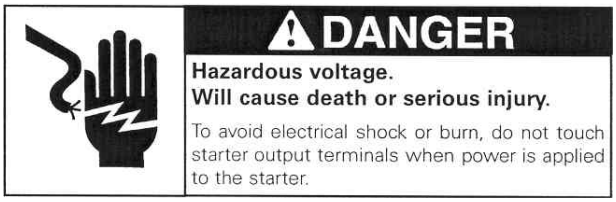
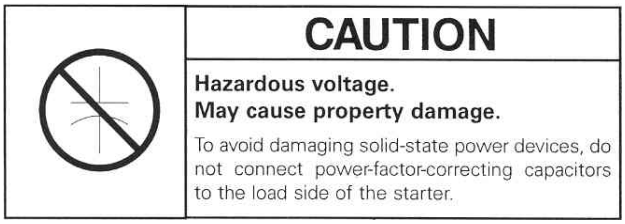


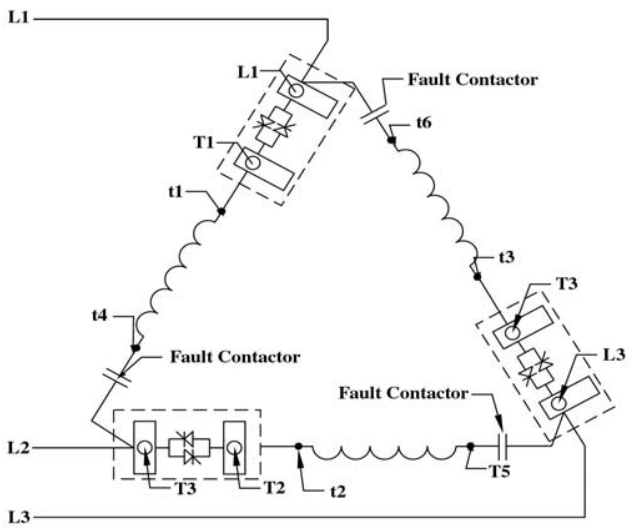
Figure 1 – Power Wiring for In-Delta Configuration

Wiring Diagram









Low Voltage Connections					
T1 1,7	T2 2,8	T3 3,9	T4 4,10	T5 5,11	T6 6,12

High Voltage Connections					
T1 1	T2 2	T3 3	T4 10	T5 11	T6 12

Join 4&7, 5&8, 6&9

Figure 2 – Motor Wiring for In Delta Applications

Current ->	22	42	55	68	80	105	130	156	252
L1, 2,3 Terminals	36-53	36-53	36-53	36-53	36-53	89-110	89-110	89-110	89-110
T1,2,3 Terminals	36-53	36-53	36-53	36-53	36-53	89-110	89-110	89-110	89-110

Table 1 - Solid State Starter Torque Requirements in Lb.-In. for Power Connections.

Contactor Catalog Number	Top Connection	Bottom Connection	Coil Connection
42EF35AFN (60A)	40	40	9
42FE35AF757R (75A)	50	50	9
42GE35AF757R (90A)	50	50	9
42HF35AAA (120A)	120	120	9
42IF35AAA (150A)	120	120	9

Table 2 - Fault Contactor Torque Requirements in Lb.-In. for Power Connections.

Note: The Siemens Solid State starter is intended for in Delta operation on 6 and 12 lead Delta motors only! If you have a 9 lead delta motor, you must run it in the "In Line" application. If you have a submersible application where only 3 motor leads are brought to the starter, you may elect to run the starter "in line" also. When running "in line", the correct size starter must be used. The following pages show how to connect the starter in the "In Line" configuration. If needed, consult Siemens Technical Support at 800-323-5450 for additional information or see website for additional information.

Inline Motor Connections

Line Connections	Motor Connections

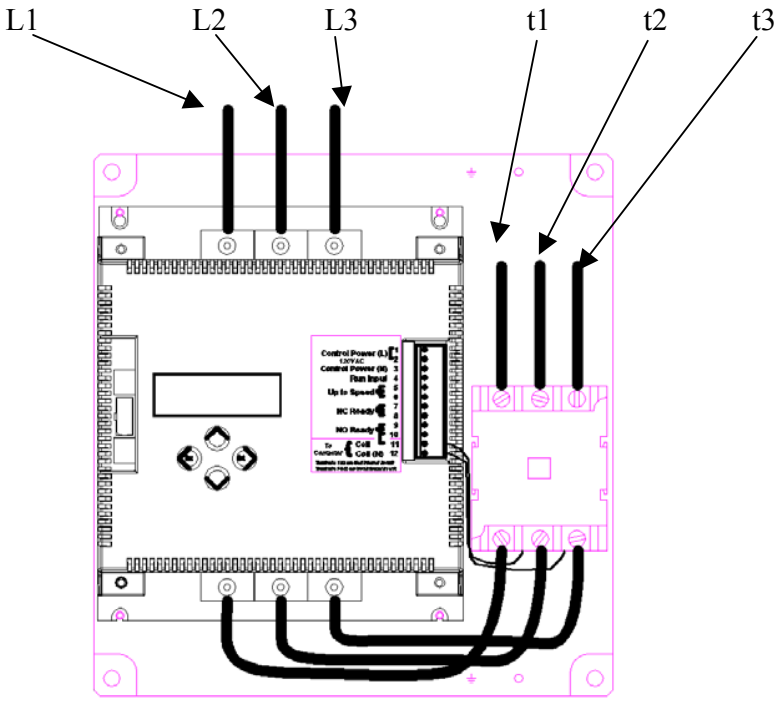


Figure 3 - Conversion for In Line Applications

It is up to the end user to reconfigure the leads from the starter to the fault contactor for In-Line operation

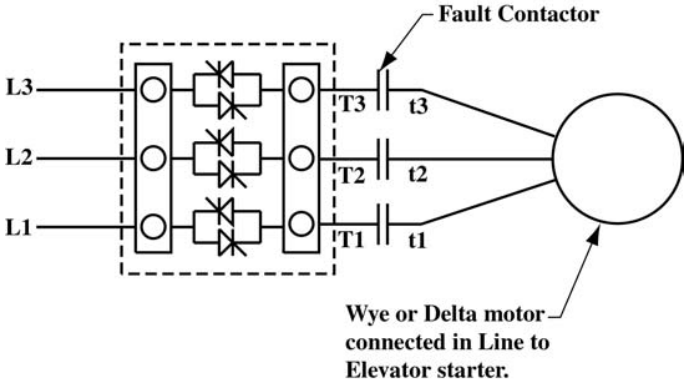
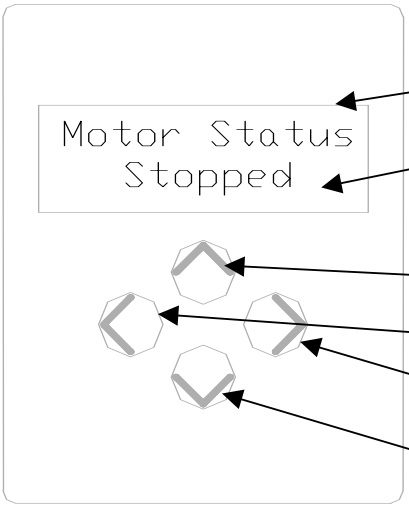


Figure 4 - Motor wiring for in line Applications.

Any motor may be run In Line. When sizing the starter use the In Line rating as opposed to the Inside Delta rating. The conversion is done by removing the wires between the L1, L2, and L3 inputs on the top of the starter and top of the fault contactor from the top of the starter and moving them to the bottom, as shown in the diagram.

LCD Menu

Upon power up the LCD will display the status of the starter. If a fault is present, it will be displayed.

<table>
<tr><td> 
</td><td>Top Line of LCD
Bottom Line of LCD

Up Button
Exit Menu Button
Enter Menu Button
Down Button</td></tr>
<tr><td>Up Button</td><td>This key is used to move up in all of the menu structures. It also is used to increase or select different parameters in the parameter adjust mode.</td></tr>
<tr><td>Exit Button</td><td>This key is used to exit menus and to exit the parameter adjustment menus after selections have been made.</td></tr>
<tr><td>Enter Button</td><td>This key is used to enter menus and to enter the parameter adjustment menus.</td></tr>
<tr><td>Down Button</td><td>This key is used to move down in all of the menu structures. It also is used to decrease or select different parameters in the parameter adjust mode.</td></tr>
</table>

LCD Menu (Cont.)

Main Menu →	Sub Menus
Status Menu	The submenus for the Status menu show line voltages, minimum line voltages, actual and peak motor and line currents, control power status, Motor configuration, operating frequency and line rotation.
Configuration Menu	The sub-menus for the Configuration menu display the unit's catalog number, rated current, rated volts, software revision, serial number, and final test date.
Parameter Menu	The submenus for the Parameter menu control the following adjustments of the elevator starter: Starting Current Overload Current Line Rotation Off Delay in milliseconds On Delay in milliseconds To edit any of the above parameters, select the parameter and press the right arrow key. If the parameter is a numerical field, the flashing digit is the only digit currently being changed. Use either the Up or Down keys to adjust each digit to the desired setting. Using the right key will move you to the next digit. If you are at the last digit, the right key will move you to the first. Once the adjustment is finished, the left arrow key will take you back and display the present setting. If a value outside of the range for a particular unit was entered, either the lowest or highest setting will be displayed.
Diagnostics Menu	The submenus for the Diagnostic menu display the following: Power on time Running time Starting time Number of Starts Power Ups Total Faults This information cannot be changed.
Faults Menu	The submenus for the Faults Menu show the following information for the last four faults: Type of fault Run Status when the fault occurred Time that the fault occurred Amount of time in the run that the fault occurred The motor currents when the fault occurred This information cannot be changed.
System Menu	This menu allows users to reset the starter, reset the settings to the default values. A password is required for further setup adjustment.

Basic Configuration of Your Siemens Elevator Starter using the Parameter Menu.

Configuring the starter to operate is very simple. Simply enter the desired settings in the Parameter Menu. The factory default settings are shown in the default setting.

Menu Choice		Default Setting
Starting Current	This is the level that the elevator starter will hold the current limit to during the start. Keep in mind that while lower settings reduce the inrush currents, they increase the starting time. This setting should not be less than twice the motor's FLA.	
Overload Current	This setting should be set at or below the FLA of the hydraulic pump motor.	
Line Rotation	The choices for this are either ABC or CBA. To change the setting from the factory default of ABC rotation, select the right key, which causes the ABC to flash and select the up key. To exit select the left key.	ABC Rotation
Off Delay	This is the time the starter continues to run after the run signal has been removed. This value is adjustable from 0 to 1250 milliseconds. To change from the factory default of 500 milliseconds, press the right key then select the desired setting the same using the up, down and right keys. Once the desired value is reached, press the left key to exit.	500 milliseconds
On Delay	This is the time the starter waits before running after receiving a run signal. The factory default is 0 milliseconds. This value is adjustable from 0 to 5000 milliseconds. It is adjusted the same way the Off delay is adjusted.	0 milliseconds

Resetting

Menu Choice	
Reset Fault	This is one way to reset the starter after it has tripped on a fault. To reset the starter, press the right key followed by the up key and the left key. The starter may also be reset by pressing both the Up and Down keys at the same time or by cycling the control power.
Password	The menu allows the user to enter a password, which allows advanced setup. Depending on the style ordered the password may or not be available. If you were given a password, enter it here: _____ to ensure it is not lost or forgotten.

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Publication No. SFIS-72G000-0203
Subject to change without prior notice
Printed in the U.S.A.

ELEVATOR EC CONTROLS
SIMPLE. SOLID. SUPPORTABLE.

Installation & Adjustment Manual
MODEL H900
Prodigy & Standard Models
For Microprocessor-Based Hydraulic Elevator Controls

Product Documentation that's Simple to Navigate ™

This is the Installation and Adjustment Manual which is the guide for installation, startup and final adjustment of all Model H900 Series hydraulic elevator controllers. Other resources include:

- **Field Reprogramming Manual** for Model V900/H900 Prodigy & Standard controllers
- **Solid State Starter Manual** for controllers equipped with such starters
- **Maintenance & Troubleshooting Training Manual** provided in conjunction with Factory and Customer Site technical training classes
- **Battery Lowering Device** for controllers equipped with such device
- **Telephone Technical Support** available for Customers at no charge
  call: 916/428-1708; **fax**: 916/428-1728; **e-mail**: techsupport@elevatorcontrols.com
- **Onsite Product & Engineering Support** available worldwide by prior arrangement.

Publication H900manv5 rev 8/11/08

Table of Contents

Introduction

Warnings

Throughout this manual, icons will be used to call attention to certain areas of text. These icons represent safety warnings, cautions, and notes.

WARNING: Denotes operating procedures and practices that may result in personal injury and/or equipment damage if not correctly followed.

CAUTION: Denotes operating procedures and practices that may result in equipment damage if not correctly followed.

NOTE: Denotes useful information or procedures.

Throughout this manual it is assumed that field personnel are well qualified in the installation of elevator equipment. No attempt has been made to define terms or procedures that should be familiar to a qualified elevator mechanic.

NOTE: It is assumed that all switches for slowdown, stop, and over travel limits at both terminal landings have been checked for proper type, placement, and operation.

CAUTION: Equipment installation must be in compliance with all Local and applicable Elevator and Electrical Codes and regulations

This manual is intended only to acquaint the service technician with the information required to successfully install the microprocessor-based elevator controller. Field personnel must be familiar with all codes and regulations pertaining to the safe installation and operation of the elevator system.

NOTE: Installation and wiring must be in accordance with the National Electrical Code and consistent with all local codes, and National elevator codes and regulations. The AC power supply to this equipment must be provided through a proper fused disconnect or circuit breaker. Improper protection may create a hazardous condition.

NOTE: Wiring to controller terminals must be done in a neat and careful manner. Stranded wire conductors must be twisted together to avoid strands that would create potential shorts if left out of terminals. All controller and Field terminals and cable connectors must be checked for proper seating and tightness. When connecting flat cable connectors, be certain to match pin #1 marks (arrow symbol on connectors, red stripe on cable) to prevent damage.

CAUTION: Restrict access to elevator control equipment and apparatus to qualified personnel only.

Section 1 – Overview

1.1 Product Description

ELEVATOR CONTROLS model H900 microcomputer based Hydraulic Controller utilizes *state-of-the-art, large scale integrated circuits* incorporated in a high performance modular circuit board design in such a way as to optimize *reliability* and *minimize installation* and *maintenance costs*.

The Basic Simplex System contains a Computer Microprocessor Board, P8 for standard controller or PIO9 for Prodigy Controllers, I/O Boards and a Relay Interface Board in addition to a Power Supply, Control Transformer and Starter.
Group Controller G900-XL is available for the control of up to 16 cars.

A *simple to use, powerful diagnostic station* is built into the Computer Microprocessor Board which includes capabilities for *complete on-site re-programming* of elevator "Personality" parameters via the LCD display.

Video Display, Modem Remote Communications, and Hardcopy Elevator performance report printing are all available by means of an output connector capable of driving a standard PC, including notebook and palmtop computers.

H900 Specifications

Number of Stops	64 stops maximum with selective door operation (typical of EC standardized system architecture)
Number of Cars in a Group	16 cars maximum
Environment Limits	32 to 104 Degrees Fahrenheit or 0 to 40 Degrees Celsius 12,000 ft (3,658 m) altitude 95% relative humidity (non-condensing)
Motor Control Options	Across the Line Y-Delta Solid State Starters (from multiple manufacturers) Variable Voltage Variable Frequency

1.2 Typical Car Controller Physical Layout

Figure 1.2.1 and 1.2.2 show typical layouts of the H900 Standard and Prodigy car controllers respectively; Following is a brief description of the various components of each controller in Section 1.3.

Figure 1.2.1 – Typical H900 Standard Controller Layout

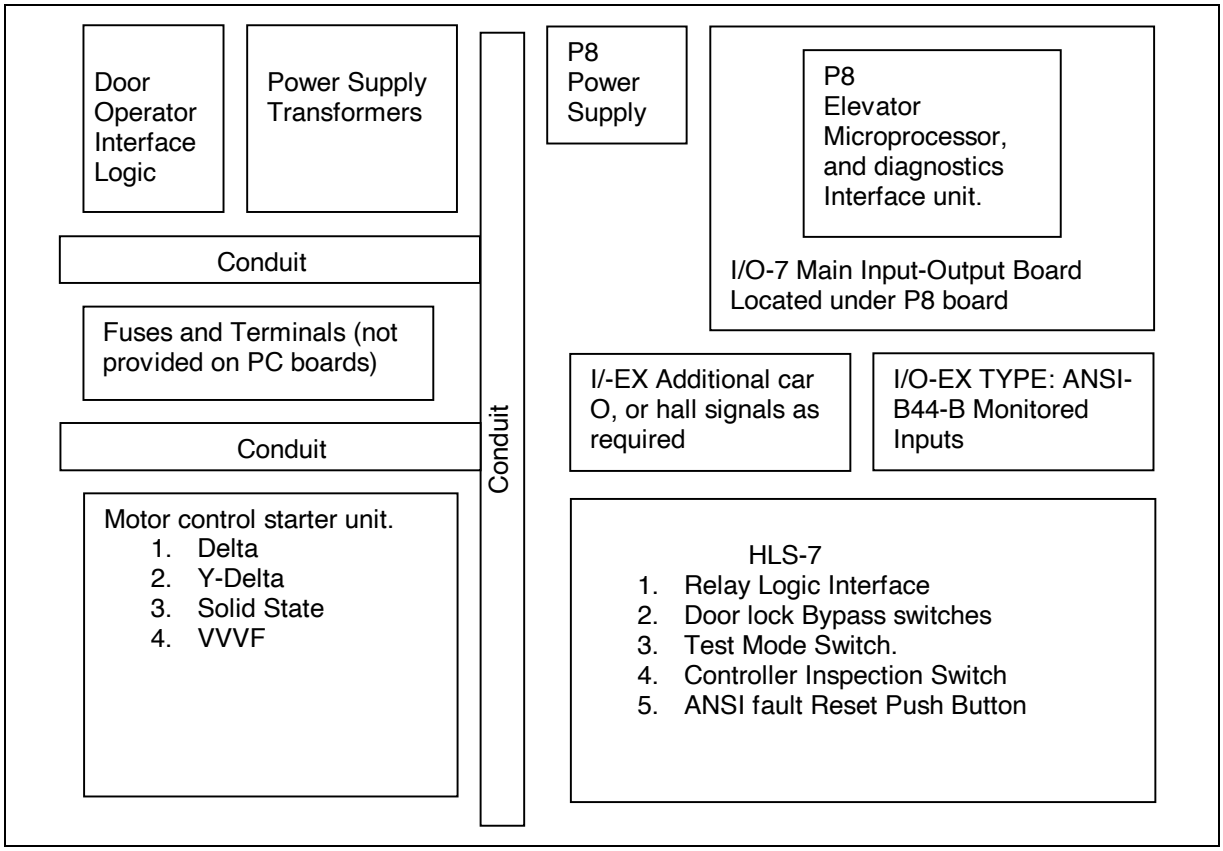
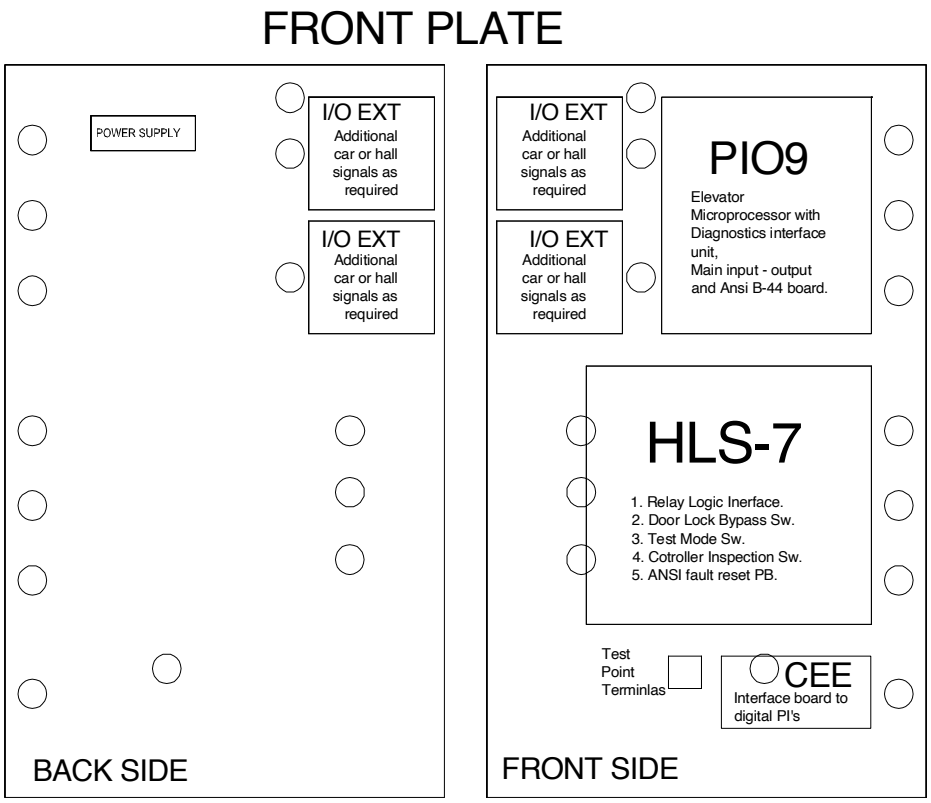
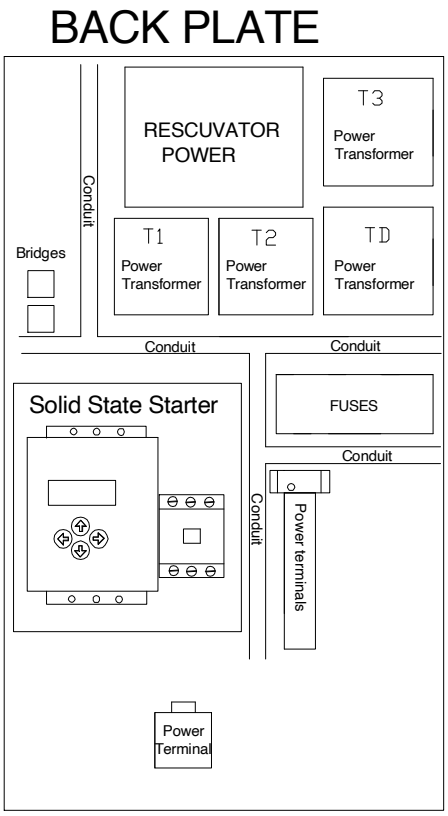


Figure 1.2.2 - Typical H900 Prodigy Controller Layout





1.3 Components General Function and Description

1.3.1.1 P8 Microprocessor (H900 Standard Controller Only)

The P8 board is universal to all H900 standard series of Elevator Controls microprocessor control systems, and is used in all types of elevators from hydraulic to traction, and as a main Group dispatcher microprocessor. The P8 board utilizes high speed, microprocessor technology with a high level of system integration.

✍ **NOTE**: microprocessor board may also be called MPC-P8 microprocessor board.

The P8 board contains: an Onboard Menu Driving Diagnostics Tool coupled with a 2 x 16 alphanumeric display that allows full system reprogramming and diagnostics, four serial ports, a parallel port, an HSO high speed clocked serial port, and a real time clock. System ports are assigned as follows:

- COM1 (IBM) standard RS232 to drive IBM compatible systems
- COM2 (Duplex) duplex port for communication of duplex systems
- COM3 (PVF) communication with position velocity processor (Not used by H900 controller)
- COM4 (Group) communication with the group G900 processor
- HSO Communication for Ez-LINK™ serial network system P8X microprocessor
- LPT1 (Dispatcher) parallel data communication with G900 processor, when P8 is used as Dispatcher processor

The P8 board is responsible for all the decision making for the elevator's automatic mode of operation, and the monitoring of inputs and outputs for ASME-17.1A-2000 code compliance.

1.3.1.2 PIO9 Microprocessor (H900 Prodigy Controller Only)

The PIO9 board is universal to all Prodigy series of Elevator Controls microprocessor control systems, and is used in all types of elevators from hydraulic to traction. The PIO9 board utilizes high speed, microprocessor technology with a high level of system integration.

The PIO9 board contains: an Onboard Menu Driving Diagnostics Tool coupled with a 2 x 16 alphanumeric display that allows full system reprogramming and diagnostics, four serial ports, an HSO high speed clocked serial port, and a real time clock. System ports are assigned as follows:

- COM1 (IBM) standard RS232 to drive IBM compatible systems
- COM2 (Duplex) duplex port for communication of duplex systems
- COM3 (PVF) communication with position velocity processor (Not used by H900 controller)
- COM4 (Group) communication with the group G900 processor
- TOC and HALL serial ports for Ez- LINK™ serial network

The PIO9 board is responsible for all the decision making for the elevator's automatic mode of operation, and the monitoring of inputs and outputs for ASME-17.1A-2000 code compliance.

1.3.2 I/O-7 (H900 Standard Controller Only)

The I/O-7 is the main input-output board used in all the elevator standard control systems except for the group controller. It provides all of the main inputs and outputs required to run the elevator, such as safety inputs and door control signals. Such signals are permanently labeled on the left and right sides of the board.

The connector at the right top area of the board permanently contains the first 4 position indicators, direction arrows, fire buzzer and indicator outputs which drive the actual position and fire fixtures. Different types of IO-7 boards are provided, ranging from 110AC Standard to 24DC. When replacing this board, be sure that the type and voltage match the one being replaced, and that the LED power select jumpers are placed in the same positions.

1.3.3 IO-EX

The I/O-EX board provides all inputs and outputs that cannot be accommodated within the I/O-7 or PIO9 board, including car calls, hall calls, hall gongs, position indicators, etc. Voltage and LED power select jumper positions are critical (as with the I/O-7 above) so care must be exercised when replacing this board. Note that the I/O-EX may not be present in all control panels.

1.3.4 IO-EX-B44-B (H900 Standard Controller Only)

The I/O-EX-B44-B board provides ASME-17.1A-2000 redundancy inputs and outputs. Voltage and LED power select jumper positions are critical (as with the I/O-7 above) so care must be exercised when replacing this board. Note that the I/O-EX-B44-B- may not be present in all standard control panels.

1.3.5 HLS-7

The HLS-7 board is the main relay panel board, providing all the relay logic to interface to the elevator system door control, starters, selector, etc. It should be noted that the HLS-7 does not contain any “Smart” logic. It is a basic board that has been developed to replace point-to-point wiring with a more cost effective and reliable solution. The HLS-7 is configured per job using onboard clad cuts, and jumper configurations.

NOTE: The COP and TOC boards are used when the elevator control system is designed with serial communications to the top of the car and the car-operating panel. The hall boards are used when the elevator control system is designed with serial communications to the hall stations. Skip 1.3.6 to 1.3.10 for standard or Prodigy, non-serial elevator systems, without “Ez-LINK”.

1.3.6 COP

The COP microprocessor board gathers all signals from the COP buttons such as car calls, door open and door close buttons, fire service, etc and transmits such information via RS-485 to the TOC board. It also receives all output information for car call outputs, passing chime, fire indicators, etc. from the TOC through the same RS-485 communications channel.

The COP board serves as interconnection point for signals, that can’t be transmitted via serial communication, on their way to the traveling cable. Examples include emergency stop switch bypass, in car inspection, etc.

The COP board is linked to the TOC board via two twelve pin terminal connectors, housing all interconnects and shielded communication twisted pairs. When replacing the COP board, make sure that all board configuration jumpers are placed matching those on the board being replaced.

1.3.7 TOC

The TOC microprocessor board gathers all signals from the top of car including the selector unit, door operator limit switches, load weighing device, car top inspection station, etc. It also receives all information from the COP board front (and rear, if elevator has rear doors) via an RS-485 channel dedicated for communications between TOC and COP boards. This information is then combined with locally gathered information, and transmitted via RS-422 to the P8X board for standard controllers or to the PIO9 for Prodigy controllers.

The TOC board receives all output and control information from the P8X or PIO9 for door control and other information on its way to the COP board through the same RS-422 communications channel.

The TOC board serves as interconnection point for signals, that can't be transmitted via serial communication, on their way to the traveling cable. Examples include emergency stop switch bypass, in car inspection, power supplies etc.

The TOC board is linked to the elevator controller via traveling cable. This cable contains three ten pin terminal connectors (which house all interconnects) and two sets of two twisted shielded pairs for communication.

When replacing the COP board, make sure that all board configuration jumpers are placed matching those on the board being replaced.

1.3.8 COP-EX

The COP-EX board is a sixteen general input/output board that is used to accommodate signals not being housed by the COP or the TOC board such as car calls, attendant service, line per floor position indicators, etc.

When replacing the COP board, make sure that all board configuration jumpers are placed matching those on the board being replaced.

1.3.9 HALL

The HALL board is used at each landing in a multi-drop configuration. This board gathers hall call information, per opening, and transmits this information to the P8X or PIO9 board via RS-485 communication path. It also receives information that illuminates and extinguishes hall calls indicator lights and sounds hall gongs.

CAUTION: The HALL board is configured for a particular floor layout through SW1, an eight-switch pack (dip switch). When replacing the HALL board, make sure the dipswitch positions match those on the board being replaced, or permanent damage to one or more boards in the hall loop may occur.

1.3.10 P8X (H900 Standard Controller Only)

The P8X board is attached to the back of the P8 main elevator microprocessor. It communicates with the P8 via a high-speed port, HSO. The P8X function is to gather all information from the elevator serial network, from the COP-TOC, and hall station HALL boards, which is then conveyed to the elevator microprocessor. The P8X board also receives all process commands from the P8 board and distributes commands on the network, relieving the P8 microprocessor from any communications burden.

1.3.11 Power Supply

The power supply has a single linear output that provides +5VDC for all microprocessor logic, and provides power to boards including P8, or PIO9, IO-6, IO-EX-B44-B and IO-EX. Typical part: Power-One HB5-3/OVP, 3 Amps @ 5VDC.

1.3.12 Power Supply Transformers

Power supply transformers are provided as necessary, according to the power requirements of each individual job, to step down and/or provide power isolation from the main AC power line.

1.3.13 Door Operator Interface Logic

Logic is provided as required for control of the various door operators and configurations used in the industry.

1.3.14 Fuses and Terminals

Fuses, terminals, and any miscellaneous job-specific circuits that are not part of the standard PC board set are provided as required for each specific job.

1.3.15 Motor Control Starter Unit

A motor starter unit required for control of the pump motor is provided. This unit is capable of being configured to control various starters from a simple Across the Line starting (delta), Y-Delta Line Starting, to solid-state control, or a sophisticated Variable Voltage Variable Frequency drive unit.

Section 2 – Preparation

2.1 General Information

This section contains important instructions and recommendations pertaining to the site selection, environmental considerations, and wiring guidelines to ensure a successful installation.

2.2 Site Selection

While selecting the best location for the controller equipment, take into account the following factors:

a. Make sure the control system is placed logically, while taking into consideration the rest of the equipment location.

b. Provide adequate working space for installation, wiring, and maintenance of the control system. Please note that rear access is not required on Elevator Controls standard control systems.

c. Do not install equipment in a hazardous location.

d. Do not install equipment in areas or on surfaces where it will be subject to vibration as the control systems contains parts, such as relays in sockets, whose functions may be adversely affected by vibration.

e. Provide adequate lighting and working space for comfort and efficiency; a telephone line is desirable for access for optional remote diagnostics, as well as more efficient access to Elevator Controls factory technical support if required.

2.3 Environmental Considerations

For proper operation and longevity, the elevator control system should be installed according to the following requirements:

a. The temperature inside the control system enclosure should be maintained between 32 to 104 degrees Fahrenheit (0 to 40 degrees Celsius). Higher or lower temperatures will reduce the life of the system and may prevent the system from functioning normally. Provide air-conditioning if required.

b. The air in the machine room should be free of corrosive gases. Air should be sufficiently dry to prevent condensation from moisture. NEMA 4 or NEMA 12 enclosures with integral air-conditioning units are available for these applications.

c. Avoid placing any control system cabinet or component near windows to prevent severe weather conditions from damaging the equipment.

d. Extreme levels of Radio Frequency (RF) radiation should be avoided. Radio Frequency Interference (RFI) may interfere with the operation of the control system. Elevator Controls hydraulic control systems have been tested by CKC Laboratories, Inc. Report Number IM00-029 and found to be in compliance with EN61000-4-2, EN61000-4-3 and EN61000-4-4 in accordance with EN12016 regulations.

✍ **NOTE**: Hand-held communications devices used close to the system computers may generate disruptive RF interference.

2.4 Recommended Tools and Test Equipment

The following tools are recommended for installation of the H900 control system:

a. Digital multi-meter
b. Assorted electronic tools such as pliers, cutters, flashlight, Elevator Controls small screwdriver (supplied with each controller), etc
c. Amp-Prove probe-type ammeter
d. Telephone
e. Test weights
f. Control system "as built" wiring prints
g. This manual
h. Model V900/H900 Prodigy & Standard P8 Field Reprogramming Manual
i. Solid State Starter Manual (for controllers containing a solid state starter)
j. Battery Lowering Device Manual (for controllers equipped with such device)
k. Oscilloscope and Meg-Ohmmeter may be desirable for advanced troubleshooting (rarely required)

2.5 Controller Installation Guidelines

✍ **NOTE**: It is very important to follow control system wiring guidelines to prevent problems with interference and line pollution.

✍ **NOTE**: Wiring to controller terminals must be done in a neat and careful manner. Stranded wire conductors must be twisted together to avoid strands that would create potential shorts if left out of terminals. All terminals and cable connectors must be checked for proper seating. When connecting flat cable connectors be certain to match pin #1 marks (arrow symbol on connectors, red stripe on cable) to prevent damage.

⚑ **CAUTION**: Restrict access to elevator control equipment and apparatus to qualified personnel only.

There are four different entry points that should be maintained separately while wiring the control system:

a. Power wiring: the line power coming from the elevator service disconnect with power ground.
b. Motor wiring: power to pump motor and power ground.

c. Safety and Logic wiring: all wiring to fixtures and switches, as well as cross-connect signals from one car to another in a multi-car group system.

d. Communication cables: communication cables run from one controller to another in a group of two or more cars.

✍ **NOTE**: Study your control system layout to achieve the best arrangement, keeping the four entry points separated and positioned logically to suit the particular control system you will be installing. Following are the proposed layout for wiring a standard and Prodigy controller.

✍ **NOTE**: The standard NEMA-1 enclosure provided for H900 Standard or Prodigy controllers includes factory knockouts, which suggest locations for wiring entry points. These knockouts are located as follows: one on the top right side of the enclosure for the communication cable; and two on each side of the lower portion of the enclosure for other required wiring, Figures 2.1 & 2.2.

Figure 2.1 – Typical H900 Standard Controller Wiring Layout

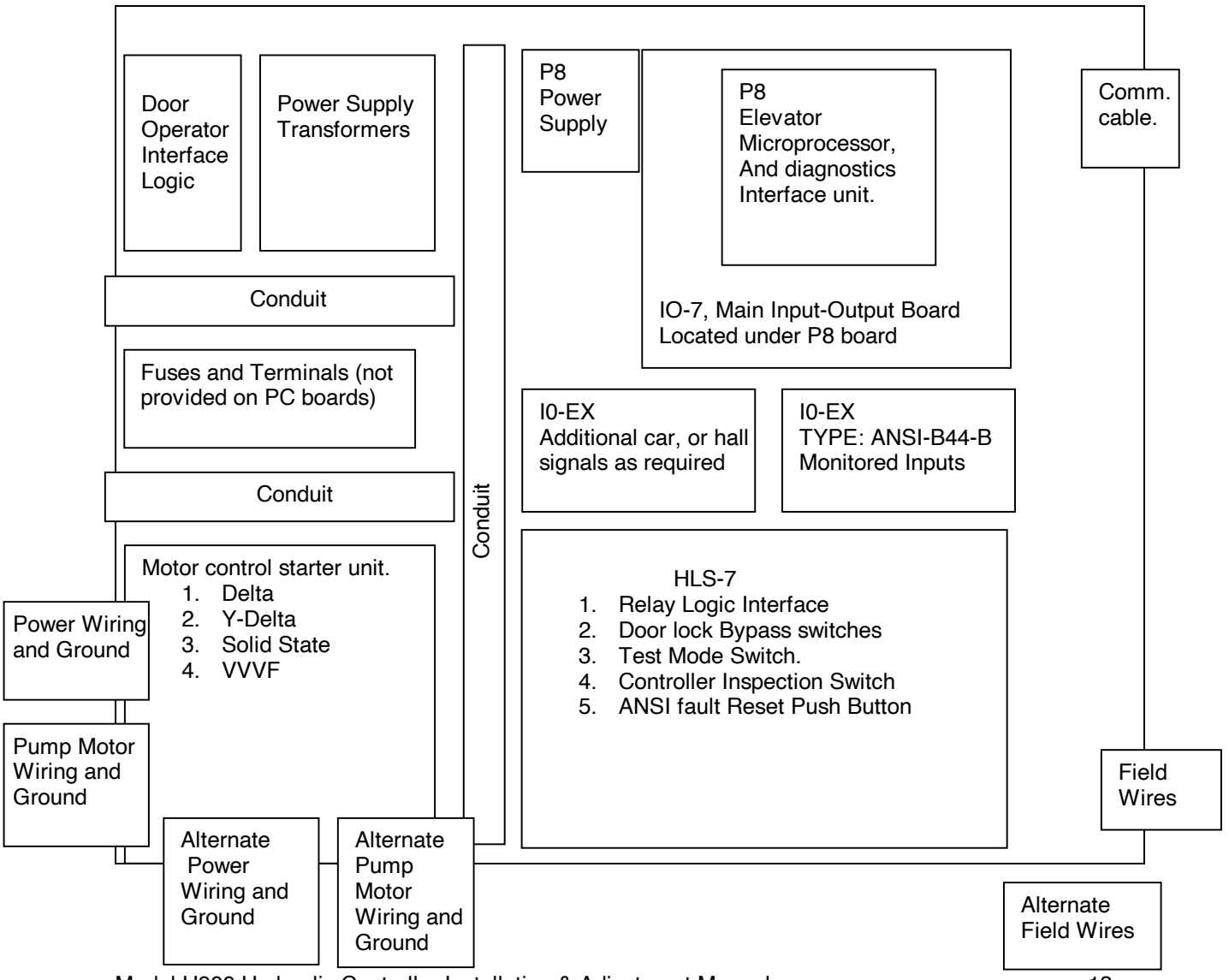
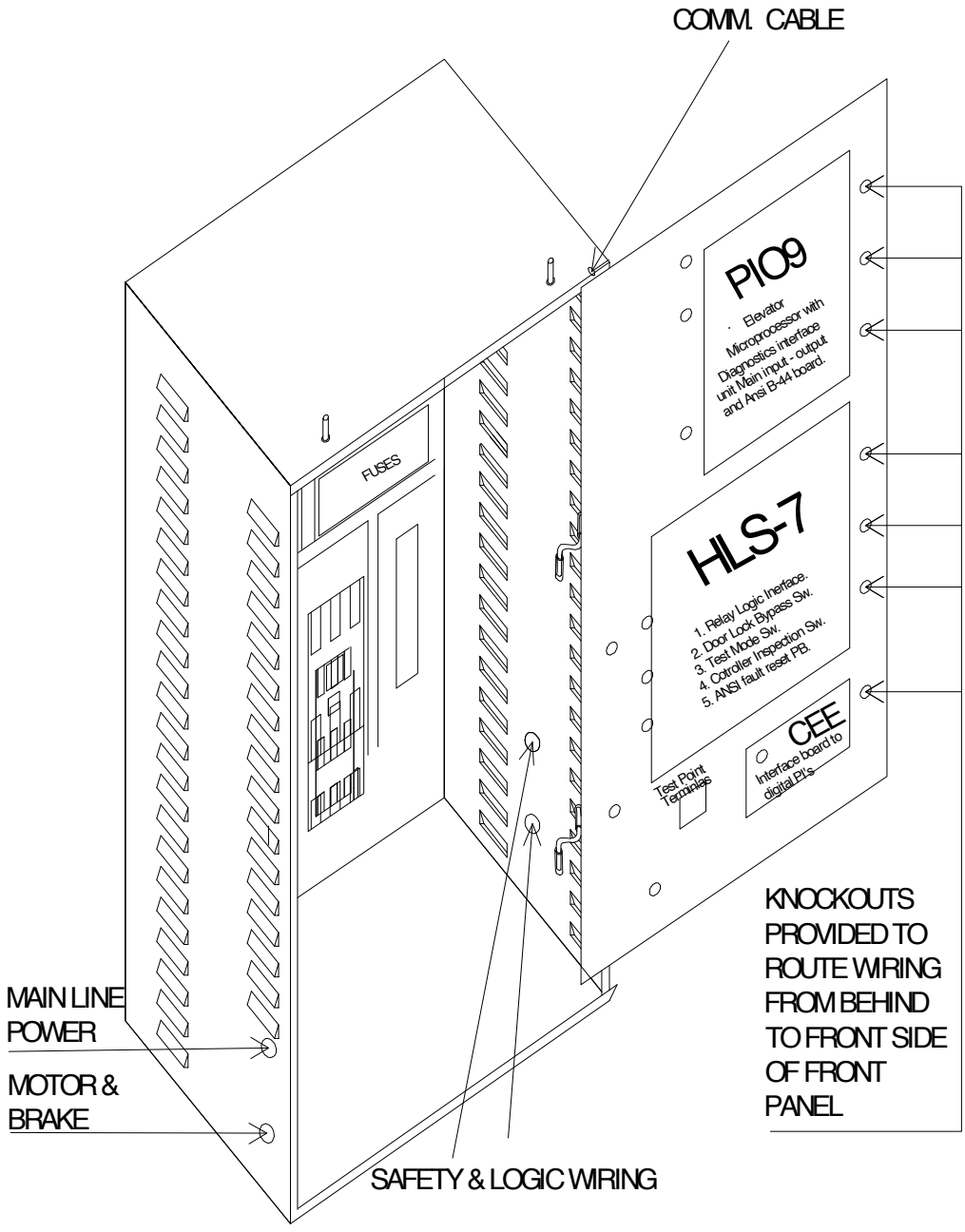


Figure 2.2 – Typical H900 Prodigy Controller Wiring Layout



Section 3 – Startup

3.1 General Information

Protect printed circuit boards from dust and foreign materials. Remove main fuses.

Complete controller mounting, installation and wiring. Observe controller field terminal locations in relation to wiring ducts in order to determine optimum locations for wiring to enter the control equipment enclosure.

CAUTION: Use care to protect circuit boards from metal debris when cutting.

3.2 Startup of H900 Microprocessor Control System

NOTE: These are not instructions for final adjustment.

In the following instructions it is assumed that all hatch doors are closed but not necessarily locked and that all hoistway and machine room wiring is complete. Correct any inadequacy before proceeding further.

These instructions also assume that the installer has a working knowledge of electrical troubleshooting. Follow prescribed procedure carefully.

If the elevator does not respond as expected, check the circuits according to your ability. If you can't locate the problem in a reasonable time, call in an adjuster or serviceman with advanced troubleshooting experience. Proceed with caution.

NOTE: You will find multiple LED indicators on PC boards and onboard computer diagnostics very useful tools that will save installation and troubleshooting time.

Read these instructions all the way through before starting work to become familiar with the entire procedure.

3.2.1 Test Ground Continuity

Test all terminals for continuity to ground. If continuity is identified, remedy the problem before proceeding.

3.2.2 Remove Group System Fuses (if applicable)

Make sure supervisory control system supply fuses are removed.

3.2.3 Remove Primary Controller Fuses

Remove fuses F4, F7, F8, to disable primary controller relay voltage, and the door operator. Place controller INSP and TEST switches in inspection and test positions, respectively (on).

✍ **NOTE**: Always review prints to double check fuse designations and correct amperages.

3.2.4 Check Disconnect Switch

Check the line side of the disconnect switch and verify that all three legs are at the correct voltage.

⚑ **CAUTION**: Remove all protective covering on PC boards and components before applying power.

3.2.5 Turn on Disconnect

Turn on disconnect switch and check voltages at L1, L2, and L3 on starter(s).

✍ **NOTE**: For Prodigy controllers the Starter unit and power terminals are located behind the front the panel, on the auxiliary power panel.

3.2.6 SH6 "Serial Safety" Jumper for Serial Link to Top of Car

✍ **NOTE**: If serial link to Top of Car is not used, skip to next step.

Place SH6 jumper on the HLS-7 board, located in front of the JDRK2 harness connector, to allow safety string to be made without the TOC and COP boards being wired to the elevator system, thus permitting movement of the car on Inspection mode; Refer to page 3 area 3 of job prints for reference on jumper function, which is to bypass the circuit that makes sure the TOC and COP boards are in place.

✍ **NOTE**: 3.2.7 is for Wye-Delta or Delta Motor Starter. Skip to Section 3.2.8 if using Solid State Starter.

3.2.7 Proper Pump Motor Rotation (Wye Delta or Delta Starter only)

Verify proper rotation of the pump motor by momentarily closing starter contacts (use the Y Contactor for Y-Delta starters). Do not hold for more than one second). If rotation is incorrect, interchange two of the leads at disconnect, or the top of the starter **(power lines only, not motor leads).**

3.2.7.1 Reverse Phase Relay (Wye Delta or Delta Starter only)

Observe the RP (Reverse Phase) relay. If it is picked, proceed to the next step. If RP is not picked, checks fuses F1, F2, and F3 and make sure that, if an adjustable sensor is provided, that the setting is correct.

If this does not cause the RP relay to pick, turn off the power and reverse two of the three wires (probably #14-#18 gauge) that feed 3-phase AC power from the starter to the rest of the controller (these wires will typically be at the top of the starter). Restore power. The RP relay should pick. If not, replace the RP plug-in sensor or the RP relay and repeat this step.

✍ **NOTE**: Section 3.2.8 is for Solid State Motor Starter. (Skip to Section 3.2.9 if using

Wye-Delta or Delta Starter).

3.2.8 Review Instructions (Solid State Starter only)

Read the manufacturer's solid-state starter unit (SSSU) application instructions and use for reference through this section. The ready light should come on when power is applied to the input side of the SSSU. If there is a phase loss the phase reverse indicator will come on. Verify that the line-to-line voltage is the proper value. If incorrect, swap any two power input lines to the starter. This should correct the problem and the ready LED indicator should come on. Refer to SSSU manufacturer's manual for advanced troubleshooting.

3.2.8.1 Proper Pump Motor Rotation (Solid State Starter only)

Verify proper rotation of the pump motor by momentarily jumpering the enable contacts (Motor Run Input) on the SSSU. If motor rotation is reversed, correct by swapping two of the motor winding connections (refer to the SSSU manufacturer manual for directions to properly swap two of the motor winding connections).

3.2.9 Power Off

Make sure power is turned off and replace the F4 fuse to restore relay voltage to normal.

 **CAUTION**: Do not insert door fuses at this time.

3.2.10 Verify Safety Switches

Verify car, car-top stop and any other safety switches making sure they are operating properly. In order for the elevator safety monitoring system to permit movement of the elevator, the following conditions must be met:

1. If roped hydraulic unit with governor switch: governor contact must be wired from terminals 4A to GOV. If no governor used, the SH33 jumper must be in place.
2. Verify the emergency stop switch between terminals 4A and 17, and the safeties between terminals 17 and 24. Please refer to job prints page 3.
3. If a submersible overload is provided, wire it between terminals 4 and SOL. If no submersible overload is used, jumper from 4 to SOL.
4. Verify that the UP (terminals 28 to 30) and DOWN (terminals 29 to 33) normal limits are made.
5. The car gate (Terminals 4 and CG) must be made, as well as the hoistway door safety string, bottom door locks (Terminals 4S and 19), intermediate door lock (Terminals 19 and 13), and top door lock (Terminals 13 and THD).
6. The Door Open Limit (Terminals 4 and DOLF) must be closed, and the Door Close Limit (Terminals 4 and DCLF) must be opened. If equipped with selective rear doors, the rear Car Gate and Door Open and Close limits must follow the same status as the front.

7. If the controller is equipped with the Ez-LINK serial communication option, install the SH6 "SERIAL LINK" jumper on HLS-7 to enable safeties to set without the COP and TOC boards being installed.

✍ **NOTE**: Circuits above will allow the car to move on Car Top Inspection mode of operation.

✍ **NOTE**: In order to allow the car to be run on Controller Inspection, car top inspection, in-car inspection, and Access mode switches must be in the off position. Car Top Inspection (4 to ICTO), In Car Inspection (ICTO to ICIO), Access (INAC to INAO), and Hall & Car Door Bypass switches in controller must be on normal position.

✍ **NOTE**: If elevator installation does not require In Car Inspection or In Car Access, jumper the respective terminals above to permanently disable these functions.

3.2.11 Temporary Final Limit Jumper

If the car is at the top of the hoistway, jumper final limit terminals 23 to 24 to allow the car to move in the down direction.

⚑ **CAUTION**: Remove this jumper as soon as it is possible to do so.

Use the UP/DN rocker switch if provided (the elevator safety code disallows this switch in some jurisdictions) on the controller to run the car. Refer to the valve manufacturer's adjustment instructions to adjust the low speed valves. The pump motor should start when running the car up.

For WYE-DELTA starters, the proper transition time from Wye to Delta should be checked at this time. Verify the Wye to Delta transition time and adjust the timer as required for smooth transition. The Wye to Delta timer is located under the System Timers Menu display. The default value is 2 seconds. Refer to the H900 Prodigy & Standard Field Reprogramming Manual for directions on how to use onboard diagnostics to modify parameters.

If no relays are picked, check fuse F4 and verify that 110 VDC, plus or minus 10%, is present between terminals 3 and 4A. This voltage should also be found on terminal 4. If voltage is present on terminal 4A but not on terminal 4, turn to page 3 of the prints (area 3) and re-verify Emergency Stop and Elevator Safeties wiring.

If Solid State Starter Unit or Variable Voltage Variable Frequency starter is provided, refer to the manufacturer's manual for acceleration and up-to- speed motor control adjustment.

3.2.12 Run the Car

Use the controller UP/DN switch to run the car.

✍ **NOTE**: The controller INSPECTION switch must be in ON position. The car top inspection switch, and other switches must be on normal for the up/dn switch to operate.

3.2.13 Startup is Complete

The elevator installation should now be completed including installation of the selector, etc.

Section 4 – Adjustment

4.1 Final Adjustment of the Elevator Controls H900 Controller

4.1.1 Door Adjustment

The elevator should be shut down and main power shut off.

a. Install door fuses F7 and F8.

b. Position the car in the hoistway so that car doors can be adjusted to a preliminary setting within the door zone area.

c. Open the doors by jumpering the non-banded side of diode D73 (under the DO relay) to terminal 3 on the controller and close doors by jumpering the non-banded side of diode D65 under the DC relay to terminal 3, or place the car on inspection and follow door operation adjustment procedure described by the door operator manufacturer.

✍ **NOTE**: Most new solid-state door control systems offer adjustment procedures that require no interaction with the elevator controller.

4.2 Check Hoistway Clearances

The door operator must be operating properly with all door equipment clutches, rollers, etc., adjusted to correct running clearances. Make sure all hoistway and car doors in the building are closed and locked. Run the car on inspection the entire length of the hoistway to be sure that the hoistway is completely clear of obstructions. Check to be sure that all selector vanes and the tape selector unit are properly installed per manufacturer's instructions.

4.3 Use of Test Switch

Turn the TEST switch to "Test" position, (the TEST switch is located on the HLS-7 board). Placing this switch in the test position prevents the controller from opening the doors (both front and rear if the car has rear doors) while car behaves as on Independent Service mode of operation.

Verify that all ribbon cable connectors, harness connectors, and relays are seated properly. Turn on AC power. Switch from inspection to normal operation. The car should travel to the bottom terminal landing, or re-position itself to the correct landing.

✍ **NOTE**: If this does not happen, jumper terminal 4 to DCB (door close button), place the control test switch in the "TEST" position. Observe the LCD liquid crystal display for Error Condition to determine why the elevator is not responding. Pay particular attention to the multiple LED indicators on the I/O-7 or PIO9, board.

If the car is leveling, the LVLM indicator will be off, and the car will not be able to respond until the leveling process is complete. If any of the door opening devices or any call input is active, the corresponding indicator will be lit. If the SD (or SU for up) indicator is on and the Down relay is not picked, check the normal limit switch. Also, check DSD2 and USD2 LED's. They must not both be off, or reversed, as these are the terminal floors slowdown switches that open when the car is at the corresponding terminal landing.

Refer to Troubleshooting Section 5 of this manual for guidance.

4.4 Ez-LINK Serial Communication System Verification

CAUTION: Make sure the Serial Safety jumper has been removed from SH6 post terminals on HLS-7 board, if job is equipped with Ez-Link to top of car.

NOTE: For non Ez-LINK systems, skip to Section 4.1.5.

4.4.1 Verify Communication to TOC Board

To verify communication to the top of the car, LED's DIAG1 and DIAG2, on the TOC board should be blinking (approximately 4 times a second). DIAG2 indicates communication with the P8X or PIO9, board in the controller, and DIAG1 indicates communication with COP board (or boards if rear doors are present). If the two diagnostic LED's are not blinking 4 times a second, verify wiring, and shielded communications wiring connections. Also, make sure all shields are jumpered on all hoistway junction terminal strips.

4.4.2 Verify Communication to COP Board

To verify communication to the COP board, LED's TOC, COP and PC, on the COP board, should be blinking (approximately 4 times a second). LED1 and LED2 indicate communication with the TOC board on top of the elevator cab. If the two diagnostic LED's are not blinking 4 times a second, verify wiring. Perform this same check for the rear COP board, if present.

4.4.3 Verify Communication from COP to TOC Boards

Verify all signals coming from the COP and TOC boards to the P8 or PIO9, elevator microprocessor board. Refer to the Field Reprogramming Manual "Direct Access" menu. To view the following table, have someone go inside the elevator cab and press each car call and activate each button, while a second person selects and verifies proper activation response in the P8 or PIO9, memory map below:

NOTE: Verify that all job-required signals activate the proper input memory location in the P8 or PIO9, computer, per the table below, before removing the car from Inspection operation. Table Fig 4.1 lists all possible signals. You need only verify signals pertaining to your specific system.

To verify communications to the top of the car, LED's DIAG1 and DIAG2, on the TOC board should be blinking approximately 4 times a second. DIAG2 shows communications with the P8X or PIO9, board in the controller, and DIAG1 shows communications with COP board or boards if front and rear doors are present. If any of the two diagnostics LED's are not blinking approximately 4 times a second verify wiring and communications shield wiring connections, make sure all shields were jumpered through out all hoistway junction terminal strips.

Figure 4.1 – Ez-LINK Memory Input Map

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
F900	U8R	U7R	U6R	U5R	U4R	U3R	U2R	U1R	UCIR: Up call input rear
F901	U16R	U15R	U14R	U13R	U12R	U11R	U10R	U9R	
F902	U24R	U23R	U22R	U21R	U20R	U19R	U18R	U17R	
F903	U32R	U31R	U30R	U29R	U28R	U27R	U26R	U25R	
F904	U40R	U39R	U38R	U37R	U36R	U35R	U34R	U33R	
F905	U48R	U47R	U46R	U45R	U44R	U43R	U42R	U41R	
F906	U56R	U55R	U54R	U53R	U52R	U51R	U50R	U49R	
F907	U64R	U63R	U62R	U61R	U60R	U59R	U58R	U57R	
F908	D8R	D7R	D6R	D5R	D4R	D3R	D2R	D1R	DCIR: Down call input rear
F909	D16R	D15R	D14R	D13R	D12R	D11R	D10R	D9R	
F90A	D24R	D23R	D22R	D21R	D20R	D19R	D18R	D17R	
F90B	D32R	D31R	D30R	D29R	D28R	D27R	D26R	D25R	
F90C	D40R	D39R	D38R	D37R	D36R	D35R	D34R	D33R	
F90D	D48R	D47R	D46R	D45R	D44R	D43R	D42R	D41R	
F90E	D56R	D55R	D54R	D53R	D52R	D51R	D50R	D49R	
F90F	D64R	D63R	D62R	D61R	D60R	D59R	D58R	D57R	
F910	U8F	U7F	U6F	U5F	U4F	U3F	U2F	U1F	UCIF: Up call input front
F911	U16F	U15F	U14F	U13F	U12F	U11F	U10F	U9F	
F912	U24F	U23F	U22F	U21F	U20F	U19F	U18	U17F	
F913	U32F	U31F	U30F	U29F	U28F	U27F	U26F	U25F	
F914	U40F	U39F	U38F	U37F	U36F	U35F	U34F	U33F	
F915	U48F	U47F	U46F	U45F	U44F	U43F	U42F	U41F	
F916	U56F	U55F	U54F	U53F	U52F	U51F	U50F	U49F	
F917	U64F	U63F	U62F	U61F	U60F	U59F	U58F	U57F	
F918	D8F	D7F	D6F	D5F	D4F	D3F	D2F	D1F	DCIF: Down call input front
F919	D16F	D15F	D14F	D13F	D12F	D11F	D10F	D9F	
F91A	D24F	D23F	D22F	D21F	D20F	D19F	D18F	D17F	
F91B	D32F	D31F	D30F	D29F	D28F	D27F	D26F	D25F	
F91C	D40F	D39F	D38F	D37F	D36F	D35F	D34F	D33F	
F91D	D48F	D47F	D46F	D45F	D44F	D43F	D42F	D41F	
F91E	D56F	D55F	D54F	D53F	D52F	D51F	D50F	D49F	
F91F	D64F	D63F	D62F	D61F	D60F	D59F	D58F	D57F	
F920	DOLF	DBCF	DOBF	LLI	SEF	PHEF	DHLDF	DCLF	Front door inputs
F921	DOLR	DBCR	DOBR	DHLDR	HLI	SER	PHER	DCLR	Rear Door Inputs
F922	FCS	CLLI	IND	PGI	CCCI	copRc	copFc	tocC	Fire and Misc. inputs
F923	RD	PR	R32	R16	R8	R4	R2	R1	Absolute floor position
F924	Analog load weigher 16 bit value (future)								Used if analog load weighing device is used
F925									
F926	CF8	CF7	CF6	CF5	CF4	CF3	CF2	CF1	Car calls front floors 1 to 8
F927	CR8	CR7	CR6	CR5	CR4	CR3	CR2	CR1	Car calls rear floors 1 to 8
F928	FREE	FREE	FREE	p8xC	hallC	auxIr	auxIf	emtP2in	
F929	C16F	C15F	C14F	C13F	C12F	C11F	C10F	C9F	ACCIF: Front car call input
F92A	C24F	C23F	C22F	C21F	C20F	C19F	C18F	C17F	
F92B	C32F	C31F	C30F	C29F	C28F	C27F	C26F	C25F	
F92C	C40F	C39F	C38F	C37F	C36F	C35F	C34F	C33F	
F92D	C48F	C47F	C46F	C45F	C44F	C43F	C42F	C41F	
F92E	C56F	C55F	C54F	C53F	C52F	C51F	C50F	C49F	
F92F	C64F	C63F	C62F	C61F	C60F	C59F	C58F	C57F	
F930	C16R	C15R	C14R	C13R	C12R	C11R	C10R	C9R	ACCIR: Rear car call input

F931	C24R	C23R	C22R	C21R	C20R	C19R	C18R	C17R	
Ez-LINK Memory Input Map Continues									
F932	C32R	C31R	C30R	C29R	C28R	C27R	C26R	C25R	
F933	C40R	C39R	C38R	C37R	C36R	C35R	C34R	C33R	
F934	C48R	C47R	C46R	C45R	C44R	C43R	C42R	C41R	
F935	C56R	C55R	C54R	C53R	C52R	C51R	C50R	C49R	
F936	C64R	C63R	C62R	C61R	C60R	C59R	C58R	C57R	
F937	FREE	FREE	FREE	FREE	FREE	ATT	UP	DN	Attendant inputs

4.5 Running the Car on Test Mode

✍ **NOTE**: When the test switch on the HLS board (located on the relay printed circuit board) is in the "ON" position, the doors will not open when the car arrives at a floor.

✍ **NOTE**: To place car calls from the machine room for a standard non Ez-LINK systems, jumper from the IO-7 Call GND post, located on the top right corner of the board, to the car call field terminals on the IO-7 or IO-EX boards for standard controllers or from Terminal 3 to the car call field terminals on the PIO9 or IO-EX boards for Prodigy controllers.

✍ P8 or PIO9 with car program version V5.50 or latter, use the Reprogramming Manual to locate the car call entry menu by raising all four menu switches and pressing the **UP** or **DN** (down) buttons to display **System Control**. Lower the Menu / Sub switch to enter the System Control menu and press the **UP** button until **EZ Link Advance** is displayed. Lower the View / Edit switch to enter direction and floor data.

Procedure

- Place the car on test mode.
- Set the left LCD character to 1 to move the car up or 0 to move the car down by pressing the **UP** or **DN** buttons.
- Press the shift button **SHIFT** to move between characters.
- Set the right LCD character to the number of floors from the current position to move the car by pressing the **UP** or **DN** buttons. A valid floor offset entry is 1 to 9 where 1 will command a 1 floor run, and 3 will command a 3 floor run, etc.
- Press the write button **WR** to start. Keep pressing the write button each time the car arrives at a floor to continue moving the car up or down by the same number of floors.

.

If a car traveling in either direction fails to reach the call within a pre-determined interval, the controller will identify this occurrence as a fault condition and automatically stop the car. Further operation of the elevator will be prevented until the fault condition has been cleared. To reset this fault, momentarily place the car on Inspection mode.

4.6 Landing System Selector

Verify placement and operation of selector magnets or vanes and switches in the hoistway for proper stepping. Adjust valves for proper operation, verify the operation of all call buttons, and verify all functions including fire service main, alternate, and phase 2; independent service, access operation, etc. and verify car and door devices and switches; terminal slowdown, Up and Down normal limit switches, and all safety switches. Verify proper floor leveling and correct any problems.

4.7 Soft Stop Timer Control

Regulation of the pump motor for the up direction is controlled by relay outputs AA/MGR and BB-BH driving the pilot relays AA and BH (see prints). When these relays are energized, and the car is in the door zone area completing an up run, the computer will hold AA/MGR and BB-BH outputs, (as indicated by the LED indicators on the I/O-7 or PIO9 board) for a predetermined field adjustable time. If it becomes necessary to adjust this timer, please refer to the Field Reprogramming Manual re: use of onboard diagnostics for complete details. This manual also includes instructions for accessing the "wealth" of information available through use of the onboard diagnostics provided.

4.8 Motor Limit Timer Control

If the car is traveling in the up direction and fails to reach the call within a pre-determined time interval, the controller will identify this occurrence as a fault condition. The controller will automatically stop the pump and motor and return the car to the lowest landing.

After the doors are opened, further operation of the elevator will be prevented until the fault condition has been cleared. To reset this fault, cycle the inspection switch, or power disconnect.

The computer error code LED indicators and LCD will display the corresponding error status. This timer is factory preset for 180 seconds. Refer to the Field Reprogramming Manual for instructions on adjusting this timer.

4.9 Multiple Door Open Times

The H900 controller is equipped with selective door timing for car, hall, and short door open times. The factory-preset values are field-adjustable through the use of the onboard diagnostics unit. Refer to the Field Reprogramming Manual for complete details. Check door open times for proper operation conforming to ADA and other applicable codes.

NOTE: The hall door timer starts as soon as the car engages DZ, even if it is still leveling. If the pre-opening option is not set, the doors may not finish opening before the hall door timer expires. If this happens because the car takes too long to finish leveling into the floor, extend the hall door timer value to account for the extra leveling time.

Section 5 – Troubleshooting

5.1 System Not Functional in General (Car Won't Run)

✍ **NOTE**: The Solid State portion of the Elevator Controls Microprocessor Controller is the most reliable part of the entire elevator system. While it is possible that a problem may occur, one should first look to the power controller and "outside world" for the malfunctions that most frequently take elevators out of service.

5.1.1 General Troubleshooting Tips

For your convenience, and to save troubleshooting time, the H900 controller is equipped with multiple indicators that are designed to help you troubleshoot at a glance.

You are strongly advised to pay particular attention to the indicators on the I/O-7 or PIO9 board. Every action instructed by the computer is indicated (DOF for example means door open function, the computer wants to open doors), and every action the human interface wants the computer to perform is also indicated (DOB for example means the door open button is active).

✍ **NOTE**: Signal names written with bar on top of the signal name indicates the signal is in active mode when the LED is off ($\overline{\text{FRS}}$ and $\overline{\text{FRA}}$ are a good examples – when the LED is off they indicate the car is on main or alternate fire mode respectively).

The computer error code LED display will flash a particular status/error code as detected by the P8 or PIO9 computer; a list of these codes can be found permanently applied to the inside of the controller door. Extra or replacement copies can be made from the list found in the Field Reprogramming Manual.

Computer error/status codes are also displayed in English format on the LCD display. Finally, an optional PC may be used for powerful troubleshooting, diagnostics, and for monitoring purposes.

5.1.2 Car Not Running General Check List

a. Make sure that the car is not on Fire Emergency Service; The P8 or PIO9 will display the fire operation active if any. During normal operation of fire emergency circuits, 24-110V should be present on each fire recall terminal with respect to terminal 3, (refer to prints page 6 for fire interface circuits).

b. If all terminals for Fire Emergency Service are properly set, refer to Section 5.2.1 for directions to reset the different modes of Fire Emergency Service.

c. If the elevator is not set to Fire Emergency Service, all power supplies should then be checked. The natural starting point is the three-phase input. There must be 208-480 VAC (as specified) present between all combinations of phases.

d. Verify that each power control step-down transformer has the correct secondary voltage (refer to Controller Schematic page 1 for terminal and fuse numbers). Replace fuses as necessary.

e. The RP (Reverse Phase) Relay must be latched. If it is not:

(1) Check the fuses supplying power the RP Module.

(2) Replace the RP Relay with the correct type specified.

f. After verifying the operation of the RP Relay, the local controller power supplies should be verified. First, Terminal 4A should measure approximately +110 VDC. The voltage at Terminal 50, (hall lamp supply) with reference to ground and the voltage between Terminal Strip terminals AC1 and AC2 should be measured and verified to be in accordance with the voltages shown on page 1 of the job prints. If any of the above power supply voltages are not within range, check the appropriate fuses.

✍ **NOTE**: System common is terminal 3, (normally terminal 3 is connected to chassis ground) unless otherwise noted, all DC voltage measurements are shown with respect to Terminal 3, or chassis ground.

g. Verify the Safety String (schematic for it is located on the upper portion of page 3 of the job prints). The Safety String is made up of normally closed safety contacts and switches connecting Terminal 4A to Terminal 24. In order for the car to run, all of these contacts must be closed, which will cause +110 VDC to be applied to Terminal 24 (for Hydraulic controls, system terminal 24 is connected to terminal 4) signaling the computer input that the safety string is closed (SAF input is active, verify LED on IO-7 or PIO9).

h. Assuming Terminal 4 is operating properly at +110 VDC; verify that the computer display does not show Safety String Open. If this message is displayed, check to be sure that the termination jumper plug has been correctly placed on the last IO-7, IO-EX or PIO9 board inside the Out ribbon cable connector.

i. Verifying that the GTS indicator located on the IO-7 or PIO9 is on, the following relays should also be on: GTS, GTSX, STOP, (STOP will be on for Automatic mode of operation and off for Inspection/ Access operation) CG, and once demand is establish, U or D (depending on intended direction). AA should be on, H relay will also pick if the slowdown for that direction of travel is closed and automatic mode of operation is selected.

✍ **NOTE**: All relays mentioned above on item “i” are located on the HLS-7 board.

j. Direction (SU/SD) and speed signal HR both enter the HLS-7 board from the computer relay driver outputs on the I/O-7 or PIO9 board via the connecting ribbon cable. Pin numbers are indicated on prints (pin one is indicated by a red conductor in the ribbon cable). If a high speed run toward a call is required, register a call and check the appropriate up or down arrow (SUA/SDA) LED. If neither arrow is on, make sure no special function has control of the car (INS-STOP in), and that the fire warning indicator (FWI) is off. If all the above functions are normal, call registration should establish a direction of travel as indicated by an arrow, which can be observed

on the IO-7 top right corner or towards bottom left corner on the PIO9 LED indicator. If no arrow is displayed, refer to the Microprocessor Troubleshooting Section 5.6 following below.

k. Some of the relay coils referenced above are hardware interlocked through the door safety circuit. In order for the car to move away from a landing, all doors must be closed and locked. A locked condition is indicated by a lit DLK indicator on the I/O-7 or PIO9 board (+11O VDC on Terminal 11). An unlocked condition leaves the DLK indicator unlit (with 0 VDC on Terminal 11). Also the door closed limit switch should be open and the door open limit should be made, (verify 0 volts on terminal DCLF and +110 VDC on terminal DOLF). If the door string indicates an unlocked condition, examine and repair door locks as required.

l. Should the U or D relays remain unlatched with a properly locked door circuit, check the UP STOP LIMIT switch located between terminals 28 to 30, similarly terminals 29 to 33 for down. These switches are feeding power to the directional circuits. If switches are not made, the direction relays can not be energized by the microprocessor outputs. See page 3, area 4 and 5 of prints for stop limit switches and directional circuit functions.

5.2 Microprocessor Error Reporting and Correction

5.2.1 Elevator Normal Operation and Fault Monitoring & Display

The tables below list the various faults that can be generated from the normal monitoring portion of the system as follows:

Scrolling Message: Indicates the display shown on the LCD display for each fault.

Description and Possible Solution: Explains how the fault was generated and possible corrective action to resolve the fault.

✍ **NOTE**: Faults listed in Figure 5.1 below will not prevent the car from starting or executing the function fault such as Fire Service, Independent Service, Etc. Faults listed in Figure 5.2 will prevent the car from running.

✍ **NOTE**: A group of special conditions are recognized by the microprocessor. If one of these "errors" occurs, a code will be displayed corresponding to that condition. The microprocessor will scroll up to 6 errors at a time on the LCD display. The eight LED array will display the error that needs too be corrected first, that is, the one with the highest priority.

✍ **NOTE**: The field technician should look first to the LED array to identify the error that needs to be corrected first. Error codes can be found in this Section (below) and on the inside of the control equipment enclosure door.

Figure 5.1 – Fault Conditions that will Not Prevent the Car from Running

Scrolling Message	Description and Possible Solution
Main Fire Service Phase 1	Main floor smoke detectors or HF1 smoke detectors activated. Reset smoke detectors. **Return car to the fire floor and turn fire service switch to reset to clear fire service condition.**
Alternate Fire Service Phase 1	Alternate floor smoke detectors or HF2 smoke detectors activated. **Reset smoke detectors. Return car to the fire floor and turn fire service switch to reset to clear fire service condition.**
Fire Service Phase 2	Fire Service Phase II switch is on or was on before power down. **Return car to the fire floor and turn Fire Service Phase II switch to off position and open the doors to break door open limit to clear fire service condition.**
Front Doors Not Fully Closed	Front door closed limit not open, even do door lock is made.
Rear Doors Not Fully Closed	Rear door closed limit not open, even do door lock is made.
Leveling Down	Level Down input on
Leveling Up	Level Up input on
In leveling Zone Without Direction	Either level Up or Down input is active but direction of movement can't be achieved. **Verify Up and Down terminal switches probably one or both are open**.
Re-Leveling Down	Re-Leveling Down on after being level
Re-Leveling Up	Re-Leveling Up on after being level
Trying to Re-Level Without Direction, or Both Directions On	Either level Up or Down input become active after being level, but direction of movement can't be achieved. **Verify Up and Down terminal switches probably one or both are open.**
Doors Unlocked	Car at landing with the doors not locked, DLK input off.
Security mode in operation	BSI input is active, placing car in COP security operation, where the COP car call buttons are used to input access codes to place car calls.
Independent Service	IND input is active, placing car in independent mode of operation.
Hospital Service	Car is responding to a hospital emergency request.
Emergency power operation	Car is executing an emergency power return or operating under emergency power.

Fault Conditions that will Not Prevent the Car from Running (continued)

EMT phase 1 operation	EMT-1 input became active to request Massachusetts's Medical emergency recall.
EMT phase 2 operation	EMT-2 input became active to place the car on Mass. Medical emergency mode of operation.
Earthquake: Normal condition	EQI input become active and then went back to normal allowing the car to run on earthquake normal mode at 150ft/min maximum speed.
Earthquake: Abnormal condition	EQI and CWI inputs became active and stayed active, counter-weight derailed grounding both inputs, or CWI input is active only indicating that the string running in the hoistway tear down.
Heavy Load in Car	HLI input became active, placing car under heavy load operation thus bypassing hall calls until doors open and HLI input becomes in-active.
Controller Inspection	Car is under controller inspection mode of operation.
Access Inspection	Car is under access inspection mode of operation.
In-car inspection	Car is under in car inspection mode of operation.
Ca top inspection	Car is under car top inspection mode of operation.
Viscosity Control	The microprocessor is running the pump motor while the VSI input is on to keep the motor oil viscosity under control. The pump will run for three minutes on and stop for nine minutes, and will continue this cycle until VSI input becomes inactive.
Car on wild operation	Group - loss of communication, or WILD operation is active. Function can be used for Sabbath operation.
Car door bounced during takeoff	The car took off on high speed run and the doors relaxed, opening the door lock safety string to terminal 11. **Make sure door close power while running jumper is on across terminals 43 to 44, where applicable, verify page 3 of prints and your door operator manufacturer for proper guidance.**
Door lock clipped open at high speed	The car was running on high speed while the door lock broke open. **Check door lock clearance.**
Hall or car lamp fuse blown	The computer is detecting all car or all hall call buttons active at the same time, which happens when the common to the lamps is not present. **Check fuses FLS or 50H, 50. Refer to page 1 of prints**.

Fault Conditions that will Not Prevent the Car from Running (continued)

Absolute PI correction	The computer internal selector track did not match the absolute floor encoding in the hoistway for the floor the car just arrived. **Remove RD signal and run the car with the internal selector tracking only, if car does not stop at the wrong landing verify the position feedback portion of the selector. If the car stops at the wrong floor verify the stepping portion of the selector.**
Door zone count error	Error display will occur when stepper tracking option is set to on, and is used to determine which selector signal may be missing in the hoistway causing the car to stop at the wrong floors. **Call Elevator Controls for more information about using this option for diagnostics.**
Door Zone Input Error	The car got the door zone input before engaging leveling, i.e. crash into a floor. Once error occurs it latches until microprocessor is reset or the car is momentarily placed on inspection to clear fault message. **Verify LU and LD work properly at each floor.**
Car out of Step	Missed door zone input or mechanical speed limit actuated before selector stepping input. This error is only detected while the car approaches a terminal landing. Once it occurs, it latches until the microprocessor is reset or the car is momentarily placed on inspection to clear fault message. **Correct position of Up and Down slowdown switches, need to activate 1 to 2 inches after STU or STD drop off. Verify and replace any DZ target on the selector if needed.**
Test mode	Test switch on, car will behave as in independent service but will inhibit door opening operation.
Unknown Error	The computer detected an error that was not able to identify. **Place car on inspection, and reset the microprocessor. Call Elevator Controls if error persists.**
Password access active	Current password has been entered and system access granted.

Figure 5.2 – Fault Conditions that Will Prevent the Car from Running

Scrolling Message	Description and Possible Solution
Safety String Open	Voltage is not getting to the microprocessor SAF input. **Check voltage on terminal 4A (110 VDC), and follow the safety string path to terminal 24. Refer to page 3 of job prints**.
USD2 & DSD2 on simultaneously	Both Up and Down Slowdown speed limits switches are open at same time. **One of the two or both limit switches failed repair or replace.**
Check channel A cable / termination	A cable on Channel A chain is not properly seated or the last board on the chain does not have the terminator jumper installed. **Re-seat cables, or add terminator to last IO board.**
Check channel B cable / termination	A cable on Channel B chain is not properly seated or the last board on the chain does not have the terminator jumper installed. **Re-seat cables, or add terminator to last IO board, only for P8 driven controllers.**
EEPROM write failure	The computer was not able to write to the electrically erasable EEPROM. **Replace EEPROM U-18. U-18 contains the personality portion of this elevator, replacing this chip will mean that all field modified parameters will need to be re-entered, or notify Elevator Controls so that they can be incorporated with new chip.**
Door open limit & door lock on simultaneously	Door lock input is active and, door open limit (DOL or DOLR) is open. One of the two inputs is incorrect if the doors are fully closed the DOL limit is bad, and if fully open the door lock is bad. **Correct either door open limit or door lock switches**.
Starter stuck in Wye or bad starter output	No DEL input or feedback is being received and the Delta output has been activated. **Bad delta contactor or auxiliary contact, or bad IO-7 or PIO9 output or input.**
Door reopen input active	The door open button or safety edge is still active and the doors are already fully open.
DCL: Doors not closed	Door lock is made but door closed limit still closed. **Re-position DCL switch as to open while the doors lock.**
Motor run stall protection timer expired	The car did not reach destination during the time allowed to be with the pump motor on. This problem occurs if car can not level into a floor due to malfunction of valves, or the Motor limit timer is too short for the distance required to travel. **Verify Motor stall protection Timer, refer to the Field Reprogramming Manual, and make sure car is capable leveling at every landing especially terminal landings without opening the normal terminal switches.**

5.2.2 ASME-A17.1A Monitoring

The table below shows the different faults that can be generated by the ASME-A17.1A monitoring portion of the system as follows:

a. Message: Indicates the display shown on the LCD display for each fault.

b. Output: The response of the system by dropping the Stop relay only, or Stop and GTS-GTSX combination, depending on the severity of the fault.

c. Reset Required Yes: indicates that in order for the car to return to normal the fault generating problem has to be resolved and the ANSI-Rest push button has to be pressed to clear the fault. Reset Required No: will allow the car to return to normal operation as soon as the problem that caused the fault is resolved.

d. Conditions Producing Monitor Fault: Indicate the input and output flags that are involved to generate such faults.

e. Description and Possible Solution: Explains how the fault was generated and what may be a corrective action to resolve fault.

f. Address of Bit in Memory: Indicates where in memory the computer stores the state of the monitored points. Please refer to the Field Reprogramming Manual to see how to access these memory locations.

Fig 7.4 ASME-17.1A Monitor Errors

Message	Output	Reset Required	Conditions Producing Fault	Description and Possible Solution	Bit Memory Address
Contactor drop system fault **Note: Fault active also on Non- ANSI-2000 Controllers**	Won't run until fault clears	No	MGR = 1 STPM = 1 Or MGR = 0 STPM = 0	Contactor relay output is on and monitoring input is on. **Bad contact on AA, BK, H, or contactor auxiliary, see page 3 of job prints for reference**.	F007 bit 7 F1C2 bit 5
GTS relay fault	Reset inStop and gtsOut	Yes	GtsOut = 0 GTSM = 0 Or GtsOut = 1 GTSM = 1	GTS relay output and GTSM monitoring contact is active. **GTS or GTSX or both relays are bad.**	F1CE bit 0 F1C2 bit 0
Stop relay fault	Reset inStop	No	HDBM = 1 INS-STOP= 1 STOPM = 1	Door lock bypass is off, INS-STOP output is on and STOPM monitoring contact is active. **Bad STOP relay.**	F1C2 bit 6 F1CE bit 5 F1C2 bit 3

Front door limit system fault	Won't run until fault clears.	No	DCLF = 0 DOLF = 0	Door open limit front and door closed limit front are both open. **Bad IO or PIO9 board or field problem**.	F006 bit 0 F000 bit 7
ASME-17.1A Monitor Errors (continued)					
Rear door limit system fault	Won't run until fault clears.	No	DCLR = 0 DOLR = 0	Door open limit rear and door closed limit rear are both open. **Bad IO or PIO9 board or field problem.**	F006 bit 1 F005 bit 7
Door zone relay fault	Won't run until fault clears.	No	DZORDZ = 0 DZM = 0	Door zone input is not active and DZM relay monitoring contact is also not active. **Bad DZ relay.**	F01A bit 0 F37F bit 2
Door zone relay fault	Won't run until fault clears.	No	DZORDZ = 1 DZM = 1	Door zone input is active and DZM relay monitoring contact is also active. **Bad DZ relay.**	F01A bit 0 F1C2 bit 2
Door lock relays fault	Won't run until fault clears.	No	CGF = 1 DLM=1 Or CGR=1 DLM=1	Car gate CG Front or CG Rear, and Hoistway door locks are open but monitoring input DLM is not active. **Bad CG relay.**	F1C2 bit 7 F1C3 bit 0 F1C3 bit 5 F1C3 bit 0
Door lock relay fault	Won't run until fault clears.	No	CGF = 0 CGR = 0 HDR=0 DLM=0	Car gates inputs are active and CG monitoring contact is also active. **Bad CG relay or HDR relay, or both relays are bad.**	F1C2 bit 7 F1C3 bit 5 F1C3 bit 4 F1C3 bit 0
Level relay fault	Won't run until fault clears.	No	lvlOut = 1 LU = 1 LVLM = 1	Car is allowed to level into a floor LU input is active and LVLM monitoring input is active. **Bad LVL relay.**	F1CD bit 0 F01C bit 7 F001 bit 1
Level relay fault	Won't run until fault clears.	No	lvlOut = 1 LD = 1 LVLM = 1	Car is allowed to level into a floor LD input is active and LVLM monitoring input is active. **Bad LVL relay.**	F1CD bit 0 F01C bit 6 F001 bit 1
Bypass system fault	Won't run until fault clears.	No	INS = 1 HDBM =1	Inspection input not active inside memory, LED indicator on IO-7 or PIO9 On, and HDBM Switch monitoring input still active. **Bad IO-7,or PIO9 or bad HLS-7 bypass Switches.**	F001 bit 7 F1C2 bit 6

Door lock system fault	Won't run until fault clears.	No	IN = 0 CGF = 1 DOLF=0 DCLF=1 THD=0	Car not on inspection, front doors fully open, and car gate is closed. **Bad IO-7 or PIO9, or bad Door open limit front Switch.**	F001 bit 7 F1C2 bit 7 F000 bit 7 F006 bit 0 F1C3 bit 1
ASME-17.1A Monitor Errors (continued)					
Door lock system fault	Won't run until fault clears.	No	IN = 0 CGF= 0 DOLF=0 DCLF=1 THD=1	Car not on inspection, front doors fully open, and hoistway doors still closed. **Bad IO-7 or PIO9, or bad hoistway door lock Switch.**	F001 bit 7 F1C2 bit 7 F000 bit 7 F006 bit 0 F1C3 bit 1
Door lock system fault	Won't run until fault clears.	No	IN = 0 CGR= 1 DOLR=0 DCLR=1 HDR=0	Car not on inspection, rear doors fully open, and car gate is closed. **Bad IO-7 or PIO9, or bad Door open limit rear Switch.**	F000 bit 7 F1C2 bit 7 F005 bit 7 F006 bit 1 F1C3 bit 1
Door lock system fault	Won't run until fault clears.	No	IN = 0 CGR= 0 DOLR=0 DCLR=1 HDR=1	Car not on inspection, front doors fully open, and hoistway doors still closed. **Bad IO-7 or PIO9, or bad Door open limit Switch.**	F000 bit 7 F1C2 bit 7 F005 bit 7 F006 bit 1 F1C3 bit 1
Car stop bypass relay fault	Won't run until fault clears.	No	CSB = 0 CSBM = 0	CSB relay output is off, and CSB monitoring contact input is also off. **Bad CSB relay.**	F007 bit 6 F1C2 bit 4
Car stop bypass relay fault	Won't run until fault clears.	No	CSB = 1 CSBM = 1	CSB relay output is on, and CSB monitoring contact input is also on. **Bad CSB relay.**	F007 bit 6 F1C2 bit 4
Inspection switch fault	Won't run until fault clears.	No	InsACC = 1 or InsCT = 1 or	Main inspection input is off, and one of the inspection mode inputs is on. **Bad IO-7 or PIO9, or bad Inspection, car top or in-car, or Access switches bad.**	F01C bit 2 F01C bit 4
Inspection switch fault	Won't run until fault clears.	No	insINC = 1 INS = 0 insACC = 1 insCT = 1	Main inspection input is on, and access input and car top input on. **Bad Access switch.**	F01C bit 3 F001 bit 7 F01C bit 2 F01C bit 4

Inspection switch fault	Won't run until fault clears.	No	INS= 0 insACC = 1 insINC = 1	Main inspection input is on, and access input and in car input on. **Bad Access switch.**	F001 bit 7 F01C bit 2 F01C bit 3
Inspection switch fault	Won't run until fault clears.	No	IN = 1 insCT = 1	Main inspection input is on, and in car and car top input on. **Bad in car inspection switch.**	F001 bit 7 F01C bit 4
ASME-17.1A Monitor Errors (continued)					
Down Relay Fault **Note: Fault active also on Non-ANSI-2000 Controllers**	reset inStop and gtsOut	Yes	Hydro Option On SD=0 DNS=1	Computer Down input DNS, is active while down output SD, is off. **Bad Contact on D relay, Replace D Relay**	F003 bit 0 F007 bit 1 F001 bit 2
Unintended movement system fault **Car will stop immediately. Manual reset is required.**	reset inStop and gtsOut	Yes	INS = 1 DZORDZ = 0 THD = 0 CG=0	Car is not within door zone area, not on inspection mode, and the car gate and hoistway door lock string are open. **Correct door lock string, and car gate lock switches.** **Note: While releasing car from car top inspection there is a time-out period to allow the technician to close doors and release car before tripping occurs.**	F1C3 bit 1 F01A bit 0 F1C3 bit 1 F1C2 bit 7

5.2.3 ASME-A17.1a Fault Monitoring Flow Charts

The following section contains a series of flow charts showing the different scenarios that create an ASME-A17.1a monitoring fault. Flow chart analysis may aid understanding of system processes In order to resolve problems that may occur with the elevator control system.

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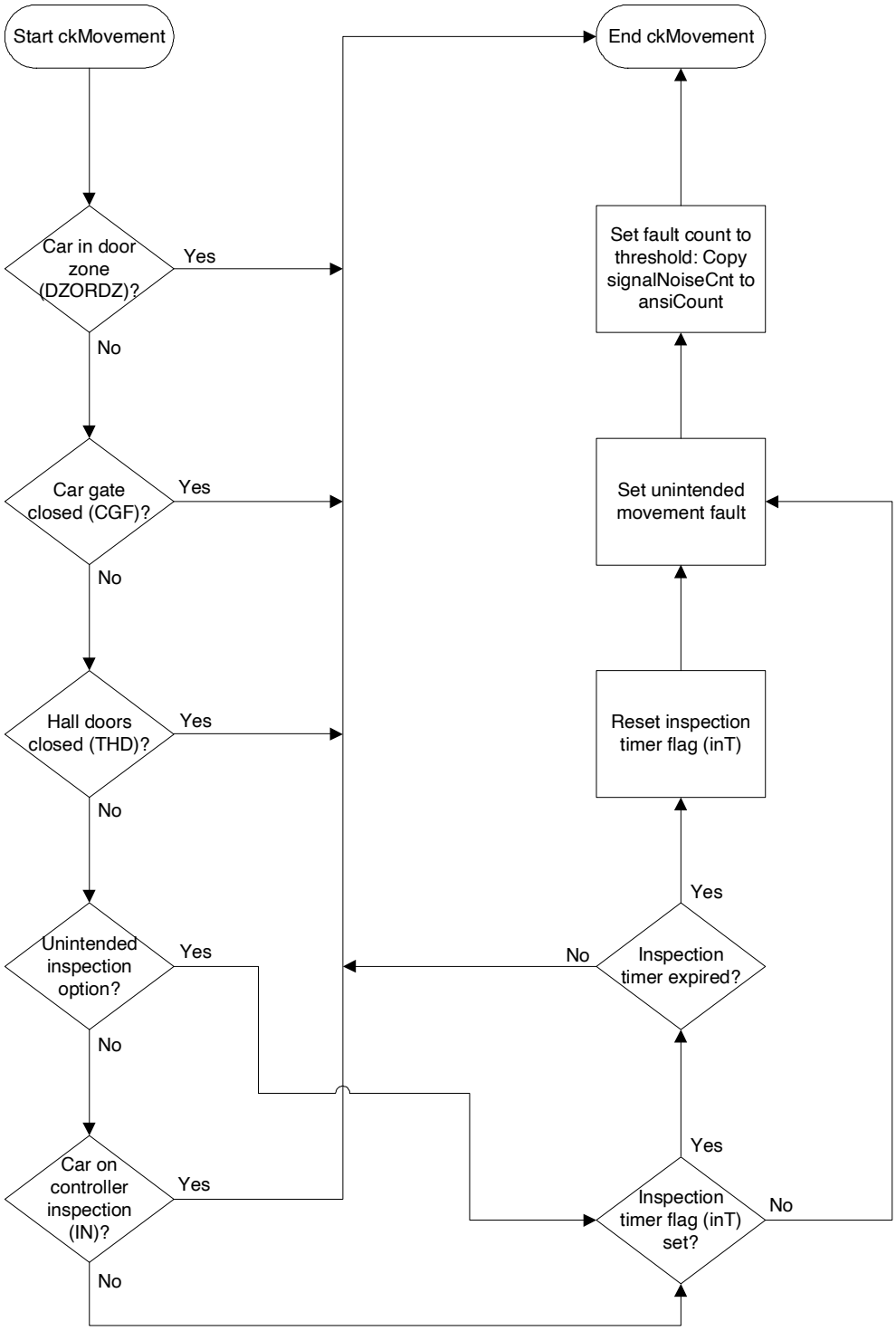
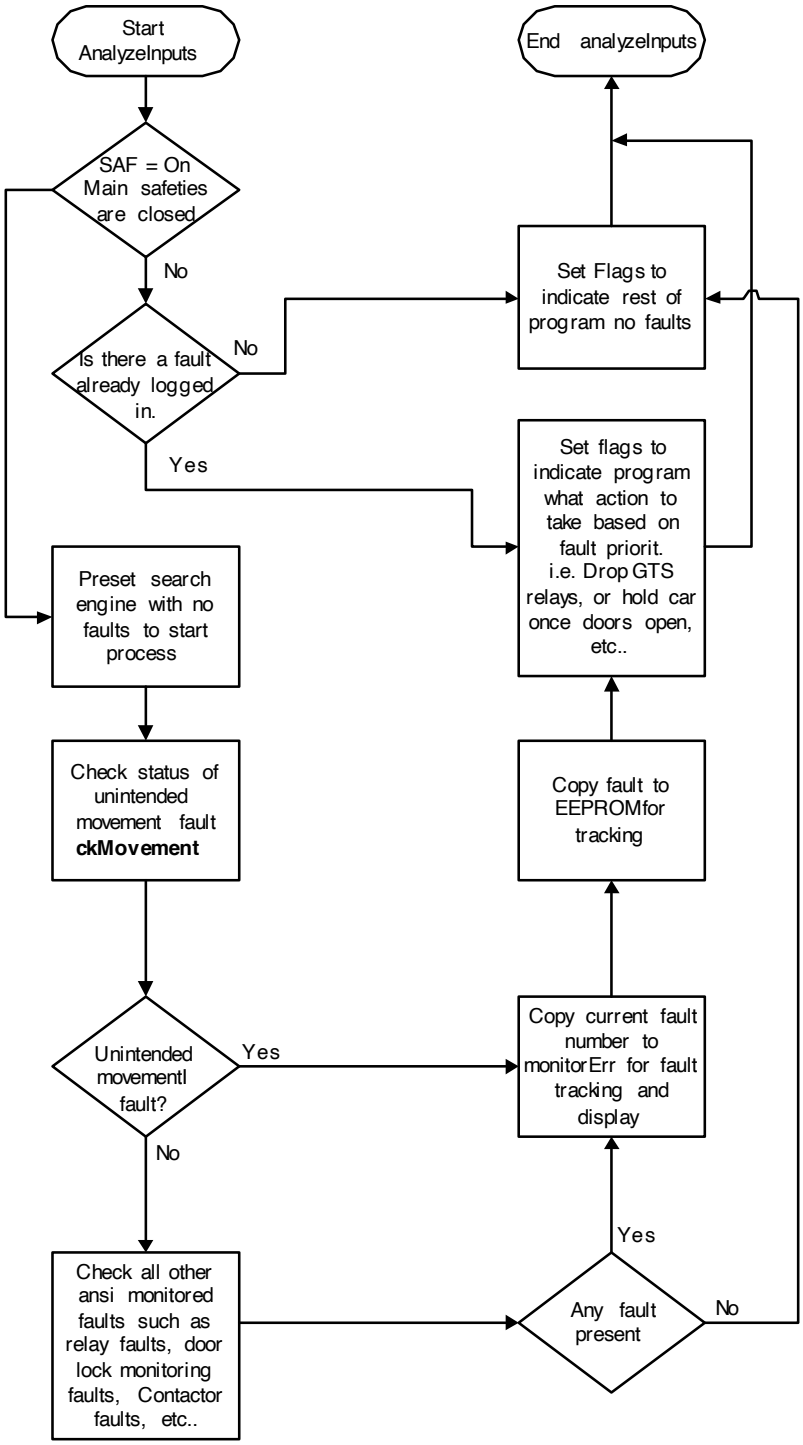
5.2.3.1 Unintended Movement Flow Chart

The following flow chart shows the status and events that result in Unintended Movement Fault.



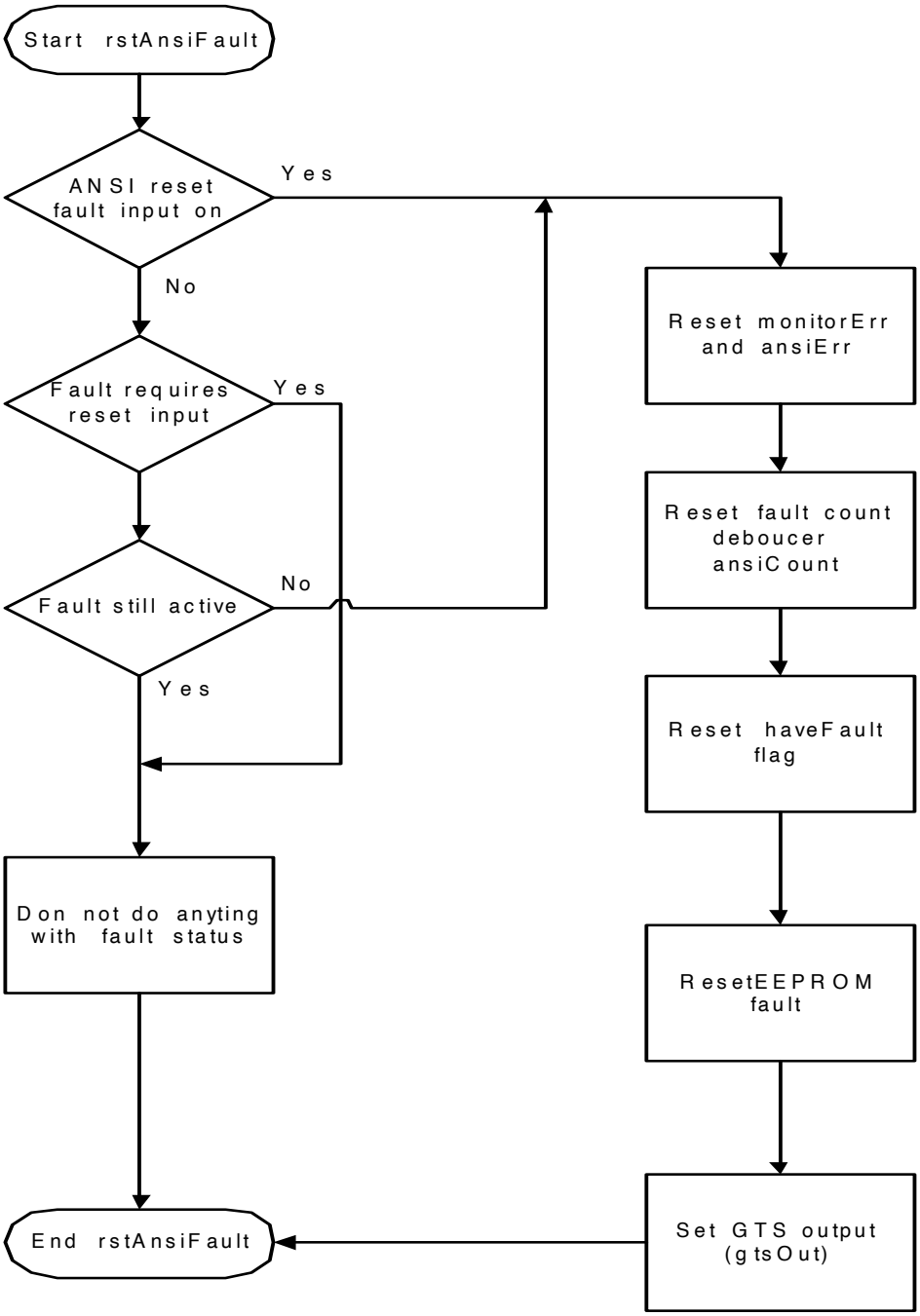
5.2.3.2 ASME-A17.1A Monitoring Analysis Input Fault Flow Chart

The following flow chart shows the fault-scan process for logging and responding when an ASME-A17.1A monitoring fault is detected.


Start AnalyzeInputs
End analyzeInputs
SAF = On Main safeties are closed
No
Is there a fault already logged in.
No
Yes
Set Flags to indicate rest of program no faults
Set flags to indicate program what action to take based on fault priorit. i.e. Drop GTS relays, or hold car once doors open, etc..
Preset search engine with no faults to start process
Check status of unintended movement fault ckMovement
Copy fault to EEPROMfor tracking
Unintended movementl fault?
Yes
No
Copy current fault number to monitorErr for fault tracking and display
Check all other ansi monitored faults such as relay faults, door lock monitoring faults, Contactor faults, etc..
Yes
Any fault present
No

5.2.3.3 ASME-A17.1A Fault Reset Process Flow Chart

The following flow chart shows the fault reset process required by the monitoring programs for both latching faults (faults requiring the reset fault input) and not-latching faults (faults which the program will auto reset once the fault condition clears).



5.3 Malfunctions in the Operating System

5.3.1 Troubleshooting Doors Operating Improperly or Not at All

Problem	Solution
Blows fused F8 and/or F7 and/or Resistor (RD1) Overheats (25ohms 225W).	Test For: (1) Damage to relays O, C, or CX. (2) Mechanical trouble on door operator on car.
Problem	Solution
No operation of doors, DO and DC relays operate OK, fuses F7 and F8 are OK.	Check: (1) All components in the O, C, and CX relay circuits, and (2) Mechanical trouble on door operator on car.
Problem	Solution
Doors operate one direction only and correct DO and DC relays are operating.	Test for contact closure across proper relay – DC for close, DO for open.
Problem	Solution
Doors operate one direction only. Only one DO or DC relay will operate.	Check DOF/DCF indicator on I/O7 or PIO9 driver board. (Refer to Microprocessor Troubleshooting Guide). Turn "NORMAL-TEST" switch on HLS-7 board to NORMAL."
Problem	Solution
Door speed incorrect at either end of travel. Doors slam or drag.	Check: (1) Slowdown cams that operate slowdown resistors on door operator on car top. Readjust if necessary; and (2) Spring operated door closer on hoistway door.
Problem	Solution
Doors open a few inches or less at one particular landing and appear to be mechanically stuck but re-close so car can leave.	Readjust upper and lower link connections on lift rod for door lock so that lock properly clears lip of enclosure.
Problem	Solution
Other mechanical problems with doors.	Refer to drawings relating to mechanical portions of door operator.

5.3.2 Troubleshooting Call Button Problems

Problem	Solution
Car responds to call button but call registration lamp will not light.	After verifying that the bulb is not burned out, check to see if the problem is internal to the controller or in the external wiring. This is most easily observed by noting if associated LED is lit. If it won't show call registration, check for voltage on call common supply. Should the common voltage be correct, replace the associated input/output driver board.
Problem	Solution
Car will not respond to a specific call.	If the system does not register a call (or a group of calls) but the car functions normally otherwise, the call information is not reaching the computer data storage memory. First make sure that the car and hall call common (terminal 6 for car calls or terminal 50 for hall calls) have proper fixture voltage with respect to3 buss. Next check the terminals on the controller. One easy method of determining whether the problem is internal to the controller or in the external field wiring is to momentarily jumper 3 to the call terminal number in question. If the car responds to the call, the problem is external. If not: (1) Check that when call terminal is jumpered to terminal 3, the corresponding LED lights up, then refer to microprocessor troubleshooting section to check the computer CCD (HCDX) - Car (Hall) Call Disconnect - function inside computer indicating computer not accepting calls. (2) Replace the associated input/output board.

5.3.3 Position Indicator Malfunctions

Problem	Solution
Position indicator out of step with elevator car	The computer system contains automatic synchronizing logic to place the position indicator in step with the car whenever it reaches a terminal landing. Therefore placing a call for a terminal landing should resynchronize the position indicator. Should the car get out of step repeatedly, or the position indicator jumps from terminal to terminal, a stepping problem in indicated. Verify proper operation of the DZ, STU, STD (and ISTU and ISTD, if provided) inputs, making sure that the proper signal LED operates when magnetic switch is on a vane (note that STU/STD, ISTU/ISTD indicators go off when input is active), and signal reaches the appropriate controller input terminal. Also check for missing or damaged hoistway vanes, and make sure that activation of STU or STD does not overlap with activation of DZ or LU/LD.

✍ **NOTE**: The position indicator is strictly under software control and will not respond if the car is moved manually by using the car top inspection station.

5.4 Proper Stepping Sequence

This section is intended to describe the state of the stepping signals required to execute an automatic run, and to illustrate how the elevator computer, P8 or PIO9, keeps track of the car movements as it travels from floor to floor.

5.4.1 Initial Selector Status

While the Car is at a landing floor level…

1. The DZ indicator LED will be lit, indicating car is at floor level.
2. STU/STD signals at IO-7 or PIO9 board LED indicators, or at memory location F000 are lit. Refer to the Field Reprogramming Manual "Memory Flags List" menu.
3. Indicating that stepping inputs are not active, i.e. they are active low.

5.4.2 Re-Arming the Selector

1. As car travels out of the door zone area, the DZ indicator should turn off.
2. The STU (or STD for down) indicator will turn off as the stepping signals from the selector unit are sent to the P8 or PIO9 microprocessor, the Position indicator output will reflect the new floor position.
3. Further activation of STU/STD will be ignored until after DZ is cycled (on/off), "re-arming" the electronic selector for stepping at the next floor.

5.4.3 Car Approaching a Stop at Floor

1. Once the target floor is reached and the target STU/STD signals arrive to the P8 or PIO9 board causing the elevator microprocessor to update position to match the target position.
2. After the last STU/STD signal, the P8 or PIO9 drops the H relay output.
3. As the car travels into the Door Zone area, it is driven into final stopping position by the LU and/or LD leveling sensors.

5.5 Valve Problems

Refer to the manual supplied by the valve manufacturer.

5.6 Microprocessor Troubleshooting

This section is intended to help determine if the Computer Logic Check indicates a faulty board, and if so, which if any of the microprocessor system logic boards is bad so that a good board can be substituted. No attempt has been made to diagnose specific problems that might occur on any particular board, since doing so requires specialized test equipment, which is not generally available to elevator service mechanics in the field.

Assume it has been determined that an output signal is not being sent by the computer system when conditions appear that a signal should be present. The next step is to determine whether the computer is attempting to turn on the output or not, and if not, what might be preventing it from doing so.

To find out what the computer is trying to do or "thinking", look into the computer memory itself using the onboard diagnostics described in the Field Reprogramming Manual.

5.6.1 Troubleshooting Example

For example, let's say you note that the door open output fails to operate door open relay DO in response to a door opening input signal. You observe that the DOFF (door open function) output LED indicator does not turn on. Set the diagnostics switches as described in the Field Reprogramming Manual. Locate the DOFF function on the Memory Flags Listing which indicates an address of F007 for DOFF. Check the LED indicator corresponding to address location F007 and observe that the LED is off.

This tells us the computer is not turning on the Door Open output. This must mean that either the open signal input (say door open button DOBF address F001 is not coming in, or the computer incorrectly thinks doors are already fully open (DOLF - door open limit front input is zero, address F000). Alternatively, the computer may have determined it unsafe to open doors (DZF=0 or HIR=1). Inspection of these flags will show that either (1) an input was not supplied to the system properly, or (2) that the computer cannot see it. In the later case, it is suspected that the I/O7 or PIO9 board (especially if DOBF and DOLF do not track input signals) or ribbon cable connecting the I/O board to the computer board is faulty for standard controllers.
Based on the methods used in this example, any other input/output can be traced to the computer memory to help identify the cause of the fault. The section following illustrates the computer logic used to process the indicated outputs and signals.

5.7 Operational Logic Description

The following description of computer logic control is described in a synthesized format (Boolean logic flow equations). This method of representation is simple to read and understand if the following guidelines are understood:

a. The logic equations below use signal abbreviations, as listed in the Field Reprogramming Manual, which are referenced in the job prints describing input/output signals. Straightforward signal abbreviations aid understanding (e.g., DOB=door open button, DC=Down Call cancel, etc.).

b. The small zero superscript used on a signal name indicates that the signal is active when off, or it is otherwise required that the signal go off in order for something else to happen. Thus, $DOLF^0$ is a signal that, when on, indicates that doors are not fully open. When off, $DOLF^0$ indicates that doors are fully open.

c. The plus symbol + is used to indicates an OR function. Thus, the equation: DOB+SE reads, "either door open button input OR safety

edge input". Likewise, the & symbol is used to indicate an AND function. Thus the equation DOI & $DOLF^0$=DOF reads, "door open intent on AND door open limit off will generate a door open function output". Please note that the words AND and OR are used instead of & and + symbols when combining two smaller equations.

5.7.1 Door open function output - DOF

(Demand) CCF+UC+DC OR (Input) DOB+SE+PHE+DHLD AND DZ = DOI
DOI & $DOLF^0$ = DOF

5.7.2 Door open function rear output - DOF

Same as above, flags are suffixed with letter R: CCFR, UCR, ETC.

5.7.3 Computer up output - SU

Start: DZ & DLK^0 & HIR & DMU & DCL^0 = SU
Hold: HIR+DZ^0 AND SU & DLK^0 = SU

5.7.4 Computer down output - SD

Same as SU above, replace DMU/SU with DMD/SD.

NOTE: DMU/DMD are the demand flags, which are set any time the computer requires the car to move in response to a call (SUA+SDA = 1), car lost (BFD+TFD = 1), parking demand (UPF+LPF = 1) or fire or emergency recall (FRM+EPR).

5.7.5 High Speed Output - HR

Start: DLK^0 & EQA^0 & (DMU & USD1 + DMD & DSD1) & LVL & DOI^0 = HR
Drop: CCT+HCT+CCF+CCR = HR^0. Call answered.
OR DMU^0 & DMD^0 & (SU & STU + SD & STD) = HR^0. Lost demand.
OR DLK+EQA+(DNS & $DSD1^0$)+(UPS & $USD1^0$) = HR^0. Not safe for HR.

5.7.6 Call Disconnect and Reject - CCD, HCDX, HCR

A. CCD – Car call disconnect (Car calls won't latch):
IN+EPI+FRM+EPS+EQA+MLT+INC+ISR^0+TFD+BFD+CCDFU+CCDFD = CCD

B. HCDX – Hall call disconnect (Hall calls won't latch):
FRS^0+FRA^0+EQA^0 = HCDX. If duplex both car's flags are considered.

C. HCR – Hall call reject (Calls latch but car won't respond):
INC+FRM+EQA+TOS+ISR^0+HLW+SAF^0+IN+EPS = HCR

NOTE: Even if HCR=0 (CCD=0), Hall (car) calls will be ignored by the computer (even when latched, if the car stopping table indicates that the car should not respond to such a call. See Car stopping table in the Field Reprogramming Manual.

5.8 Hardware Logic

5.8.1 Computer Power Supply

The proper voltage to the computer board is +5VDC +/-5%; this voltage should be checked at the power supply +OUT to -OUT terminals. Adjust with caution, as a trip out will result if voltage is adjusted too high. To reset a trip, reduce the voltage adjustment, then cycle power.

CAUTION: Adjusting output too high will cause the unit to trip.

5.8.2 Microprocessor Board

On the microprocessor board there are nine LED's (light emitting diodes), five pushbuttons, and four switches. The On LED for the P8 or the Status LED for PIO9 microprocessor being on indicates that the board is running but not necessarily functioning normally. The eight remaining LED's (in a row) display error/status codes (the LCD display will display this information in English format when provided). In general, the car A/B switch toggles the function of the eight LED's as indicators for CAR A (if the switch is UP) or CAR B (if switch is DOWN). Note that CAR A/B switch is not used for H900 control systems. Refer to the Field Reprogramming Manual for more details on the use of microprocessor PC board switches.

WARNING: Do **NOT** depress the microprocessor-reset button while any car is running, as it will cause an emergency stop. Use extreme care.

A group of special conditions are recognized by the microprocessor. If one of these "errors" occurs, a code will be displayed corresponding to that condition. The microprocessor will scroll up to six errors at a time, which show on the LCD display. The eight LED array will display the error that needs too be corrected first, that is, the one with the highest priority.

The field technician should look first to the LED array to identify the error that needs to be corrected first. Error codes can be found in Section 5 of this manual and on the inside of the control equipment enclosure door.

Not all system errors are detected and displayed by the P8 or PIO9; however, the most frequent errors have been programmed to be recognized. Even the fact that the door lock string is open, as it sometimes is during normal operation, is defined with an "error" code, which is frequently displayed during normal.

5.8.3 I/O-7 or PIO9 IO Section, Board (I/O-EX board)

The I/O boards perform the task of buffering or protecting the five volt computer logic environment from the electrically noisy 110 volt outside world. For this reason, most microprocessor system problems occur on the I/O boards.

The input buffer section of the I/O accepts high-level inputs from the HLS-7 board or car signals, and converts them to five volts computer signals. The I/O board also provides low-pass filtering to reduce noise susceptibility and Schmitt triggers to increase noise margin. The

relay and signal driver sections of the I/O board provide high voltage switching outputs that actuate relays on the HLS-7 module and general elevator signals.

The output portion of the IO-7 or PIO9 or IO-EX is field replaceable. The replaceable components consist of an output Triac and a Zener diode, which can be identified by the corresponding LED number (i.e. LED 77 corresponds to Triac Q77 and Zener diode Z77).

To determine if the Triac is bad, note that normal behavior of the output will be to turn on such signal as soon as power is applied to the controller. If the Zener diode is shorted, the output will not come on until the controller turns it on, and once turned on it will not be able to be turned off.

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Section 6 – Group System

6.1 Detailed Explanation of the Group Dispatching Subsystem

Since an elevator is a continuous, real-time machine, the supervisory control subsystem microcomputer (or microprocessor) is designed to operate in a loop, performing a predetermined pattern of instructions many times each second. Its speed is such that each elevator control function appears to be continuously monitored. The basic control loop and the functions performed by the computer during each portion of that loop are described below.

6.2 Data Acquisition

Before any logic decisions can be made data must be acquired during the first portion of the control loop called "contact scan." The microprocessor interrogates each input (hall calls, car calls, and power subsystem inputs) and saves the data in storage memory. This data is used during the rest of the control loop. In effect, the controller takes a "snapshot" of the entire elevator system, and then it makes decisions based on that information. Snapshots are made many times each second providing functionally continuous system monitoring.

6.3 Fireman's Service

After data has been acquired, proper outputs are computed for fireman's service.

6.4 Stepping

The next major block in the control loop deals with stepping. The system has no mechanical floor selector so, when power is first applied, the Supervisory Control system checks to see if the car is at the top landing (on the up slowdown limit) or at the bottom landing (on the down slowdown limit). If the car is at either of these locations the internal electronic "selector" is set to the proper value.

If the car happens to be somewhere mid-hoistway when power is first applied, the system will create a phantom call, and run the car until it reaches a terminal landing, whereupon it will become synchronized. After initial synchronization, magnetic vanes placed in the hoistway (STU for step-up and STD for step-down) inform the Supervisory Control System when the car passes each floor. The internal electronic "selector" updates accordingly.

The stepping point is actually one slowdown distance ahead of each floor. When the car steps into any given floor, the control system determines if there are any calls registered for that floor, and if so, initiates a slowdown and cancels the calls. This method requires no mechanical attachments to the car, such as chains, wires, or tapes.

After the controller processes data pertaining to a moving car it scans all calls present and selects a direction preference for the car (if it is not already answering a call).

6.5 Door Operation

The next block in the control loop is concerned with door operation. While the car is running, this portion is bypassed, but when the car enters a door zone this block becomes active. Functions performed by the door-processing block include door holding times (hall call time, car call time, and shortened door time), door opening and closing, and permission to proceed at high speed. The car actually moves in response to signals generated during door control loop processing, since all interlocks and timers (as well as car panel button inputs) must be correct before car movement is allowed.

6.6 Indicator Lamps

The final block of the control loop uses data generated by all previous calculations and calls stored in memory to light the appropriate car panel and hall indicator lamps. Once this has been accomplished, the loop is completed and the processor starts the next contact scan.

The entire loop process is repeated many times each second for a smooth and, to all outward appearances, continuous operation.

It should be noted that the power-up logic, in addition to correctly presetting the floor selector memory location, clears all memory locations and output buffers prior to applying any signals to the power control subsystem, ensuring safe, stable operation.

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Section 7 – Redundancy Testing Procedure

7.1 This Section Describes Test Procedures that Confirm Compliance with Part B, Redundancy & Monitoring in Critical Circuits (ASME 17.1a 2000, Sections 2.26.9.3 and 2.26.9.4)

✍ **NOTE**: **A**ll relays used as critical components are **Safety Relay SR6,** such relays are known as forced guided relays with the characteristics which allow monitoring of one contact and use it to determine the state of the remaining relay contacts.

✍ **NOTE**: LCD refers to the P8 or PIO9 display unit for all tests below, unless otherwise specified

✍ **NOTE**: Make sure elevator is placed on TEST mode of operation and elevator cab has been evacuated before proceeding with testing procedure below.

7.1.1 Microprocessor Monitoring

Critical Component: P8 or PIO9 Microprocessor
Redundant Component: P8 or PIO9 and GTS watch dog timers
Monitored Component: Memory Checksum, I/O Integrity check

The P8 or PIO9 microprocessor board incorporates a watch dog timer which needs to be refreshed by the program loop every 0.25seconds, a second watch dog timer is used to time out the P8 main safety output for the GTS relay, therefore in the event that the computer were to malfunction the watch dog timer will perform a computer reset and in the event that the computer is not able to reset, the GTS watch dog timer will reset the GTS output, to disable the GTS relay and removing power to Valves and Starter coils.

GTS Watch dog timer test:
Press the reset button on the P8 or PIO9 and hold it down to prevent the computer from functioning. This will also prevent the onboard microprocessor timeout from updating the GTS output. As a result, GTS relay should drop, resetting the GTS relay outputs opens the power circuit to the Valves and Starter coils.
Print reference to GTS and GTSX contacts 4 is page 1 area 1 of the prints.
To restore, release pressure on the reset button.

P8 or PIO9 Watch dog timer test:
Turn power off and remove program chip labeled L.Hex, turn power back on and observe the Power on LED on the P8 board blink at the rate of 0.25 seconds demonstrating the effect of the P8 or PIO9 watch dog timer, turn power off to restore program chip.

✍ **NOTE**: The P8 or PIO9 also performs a memory integrity check for by writing a pattern to the Ram memory and by performing check sums to the program portion of the software and comparing them to default stored values, if the program gets corrupted the computer will display a "Memory Corruption Error" and will disable all outputs.

P8 I/O Integrity Check (Standard controller only)
Turn power off and remove the ribbon cable that connects the P8 to the Monitor board, this should signal the computer that the computer I/O string to the monitor board has failed. The computer display should show, "Safety String Open," preventing the computer from executing any motion commands.
Restore the ribbon cable into its socket. Make sure socket latching hooks are latched.

✍ **NOTE**: The IO-EX-B44 circuits are part of the PIO9 board.

7.1.2 GTS & GTSX Relay Operation and Monitoring

Critical Component: GTS and GTSX Relays
Redundant Component: GTSM Computer Monitoring Input
Monitored Component: GTS and GTSX Relays contacts

Apply 110 VDC using a jumper from terminal 4A to R13 resistor, located above the HDR relay label, on HLS-7 board. The LCD should show, "GTS Relay Fault". GTS and GTSX relays should drop, Confirm that the car will not respond to hall or car calls. The latching fault should not clear until the ANSI-RST button is pressed.

7.1.3 Stop Relay Proper Operation and Monitoring

Critical Component: STOP Relay
Redundant Component: STOPM Computer Monitoring Input
Monitored Component: STOP Relay Contacts

Apply 110 VDC using a jumper from terminal 4A to harness connector JSDI-6, STOPM monitor input, located on the top left corner of the HLS-7 board. The LCD should show, "Stop Relay Fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER**. Car shall return to normal operation once jumper has been removed.

7.1.4 DZ Relay Proper Operation and Monitoring

Critical Component: DZ Relay
Redundant Component: DZM Computer Monitoring Input
Monitored Component: DZ Relay Contacts

On inspection move the car outside door zone area, remove field wire from terminal DZM on HLS-7 board, remove car from inspection. The LCD should show, "Door zone relay fault." Confirm that the car will not respond to hall or car calls. **Replace wire into DZM terminal** to return Car to normal operation.

7.1.5 Leveling Relay Operation and Monitoring

Critical Component: LVL Relay
Redundant Component: LVLM Computer Monitoring Input
Monitored Component: LVL Relay Contacts

Position the car below or above floor level using Controller Inspection mode, Short resistor R4 to terminal 4A, R4 is located on HLS-7 board below JUP ribbon cable connector. Turn Controller Inspection switch off. The LCD Display should show, "Level Relay Fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER**. Car shall

return to normal operation once jumper has been removed and ANSI-Reset push button is pressed.

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7.1.6 Car Gate Relay Operation and Monitoring

Critical Component: CG Relay
Redundant Component: DLM Computer Monitoring Input
Monitored Component: CG Relay contact.

With the car doors fully closed, DLK LED indicator on IO-7 or PIO9, DCLF LED indicator OFF, apply 110 VDC with a jumper from terminal 4A to terminal SH47 jumper, located above HDR relay label, on HLS-7 board. The LCD should show, "Door Lock Relays Fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER** car shall return to normal operation once jumper has been removed.

7.1.7 Car Stop Bypass Relay Operation and Monitoring

Critical Component: CSB Relay
Redundant Component: CSBM Computer Monitoring Input
Monitored Component: CSB Relay contact.

With the car level at a floor, remove field wire from terminal 17B on the HLS-7 board, to remove power to CSBM computer input. The LCD should show, "Car stop bypass relay Fault" Confirm that the car will not respond to hall or car calls. Replace wire to 17B Car shall return to normal operation once jumper has been removed.

7.1.8 Up direction Relay Operation and Monitoring

Critical Component: U Relay
Redundant Component: UPS Computer Monitoring Input
Monitored Component: U Relay contact.

With the car level at the floor remove the U relay from its socket on the HLS-7 board, to remove power to UPS computer input. The LCD should show, "PUMP Protection Timer" after a couple of seconds. Confirm that the car will not respond to hall or car calls.
To reset fault momentary place the car on controller inspection, and press the ANSI-Reset button.

7.1.9 Down direction Relay Operation and Monitoring

Critical Component: D Relay
Redundant Component: DNS Computer Monitoring Input
Monitored Component: D Relay contact.

With the car level at the floor remove the D relay from its socket on the HLS-7 board, to remove power to DNS computer input. The LCD should show, "Down Relay Fault" after a couple of seconds. Confirm that the car will not respond to hall or car calls.
To reset fault momentary place the car on controller inspection, and press the ANSI-Reset button.

7.1.10 High Speed, Contactor Aux., Contactor Relays Operation and Monitoring

Critical Component: H, AA, Delta Relays
Redundant Component: STPM Computer Monitoring Input
Monitored Component: H, AA, Delta Aux. Relay contact.

With the car level at a floor, remove H relay from its socket on the HLS-7 board, to remove power to STPM computer input. The LCD should show, "Contactor Drop relay Fault" Confirm that the car will not respond to hall or car calls. Replace H relay Car shall return to normal operation once jumper has been removed. Repeat for AA relay and for Delta Auxiliary manually press contactor instead of removing wiring

7.1.11 High Speed HR Relay output Operation and Monitoring

Critical Component: H Relay
Redundant Component: USD2 and DSD2 Terminal Slowdowns and STU and STD stepping Signals, and Computer Monitoring Inputs.
Monitored Component: USD2 and DSD2 Terminal Slowdown switches.

USD2 and DSD2 inputs test:
Place car on test mode of operation and verify car runs to all floors and stops and levels into position without generating faults to verify all selector signals normal operation.
Move the car to an intermediate landing and remove field wire from terminal 32, verify computer will reset elevator position indicator to top floor, replace wire to terminal 32 and remove wire from terminal 35, verify computer will reset floor position indicator to bottom floor.

DSD2 test:
On Test mode of operation move the car away from bottom floor to another landing, then jump D31 anode to ground, this will pick up H (high speed relay) upon getting a command to run. Remove wire from terminal 72, STD signal preventing the computer from stepping the car down. Place a car call to the bottom floor; upon arrival to the bottom floor the car will slow down and will make a normal stop into the bottom floor.
Replace wire to terminal 72, remove jumper to D31 diode, and momentarily place car on inspection to clear out of step fault.

USD2 test:
On Test mode of operation move the car away from top floor to another landing, then jump D31 anode to ground, this will pick up H (high speed relay) upon getting a command to run. Remove wire from terminal 71, STU signal preventing the computer from stepping the car up. Place a car call to the top floor; upon arrival to the top floor the car will slow down and will make a normal stop into the top floor.

Replace wire to terminal 71, remove jumper to D31 diode, and momentarily place car on inspection to clear out of step fault.

7.1.12 LVLO Relay output Operation and Monitoring

Critical Component: LU and LD Selector signals
Redundant Component: LVLO Computer output & LVL relay.
Monitored Component: LU & LD, LVLM input.

Place car on test mode of operation and make several one and multi floor runs, observe that the LVLO output LED on IO-7 or PIO9 board and that the LVL Relay energizes only when the car comes into leveling zone of target floor independently of the LU and LD inputs. Please refer to test 4 above for LVL Relay test for LVL relay test.

7.1.13 DZ1 and DZ2 Selector signals Operation and Monitoring

Critical Component: DZ1 and DZ2 Selector signals
Redundant Component: DZI, DZM Computer inputs and DZ relay.
Monitored Component: DZ relay and DZI, DZM computer inputs.

Place car on test mode of operation and make several one and multi floor runs, observe that the DZ input t LED on IO-7 or PIO9 board come on and the DZM input goes off as the car passes over the trucking zone but the car continues to move in high speed only allowing leveling and door operation at the target floor. Refer to test 3 above for DZ relay test and unintended movement test below for further monitoring of the DZ1 and DZ2 inputs.

7.1.14 Hall & Car Door Bypass Switch Operation and Monitoring

Critical Component: Hall and Car Door Bypass Switches
Redundant Component: HDBM Computer Monitoring Input
Monitored Component: Hall and Car Door Bypass Switches Contacts

Jump R15 resistor top to ground, R15 is located above the STOP relay on HLS board. The LCD should show, "Door Bypass System Fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER**. Car shall return to normal operation once jumper has been removed

Place the car on Automatic Operation and open the hall and/or car doors, the DLK LED should be off. Turn on Car Door Bypass and/or Hall Door Bypass switch(s) as necessary. Verify that the controller mode of operation changes to Inspection.

On the controller relay board, flip the Inspection Switch to "ON." Flip the run switch "Up" and then "Down" and confirm that the car will not run on inspection. Turn on Car Door Bypass and/or Hall Door Bypass switch(s) off, and press the ANSI-Reset push button to return car to normal operation.

✍ **NOTE**: If the hoistway door or car door is bypassed, the elevator controller will prevent the car from being run using the machine room inspection circuit or on access inspection mode, the car will only be allowed to move on Car Top Inspection mode of operation.

7.1.15 Detection of Jumpers on Door Safety String

Critical Component: Car Gate and Hoistway Door Locks
Redundant Component: CG Relay
Monitored Component: CG, THD, DLK and DCL Computer Monitoring Input

With the car on automatic operation, place a jumper from terminal 4 to CG on the HLS-7 board. Press the Door Open button and allow doors to fully open. The LCD should show, "Door lock system fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER**. Car shall return to normal operation once jumper has been removed.

With the car on Automatic Operation, place a jumper from terminal 4 to THD on the HLS-7 board. Press the Door Open button and allow doors to fully open. The LCD should show, "Door Lock System Fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER**. Car shall return to normal operation once jumper has been removed. Place the car on Inspection Mode and verify that the car will not respond to hall or car calls.

7.1.16 Door Open and Closed Simultaneously

Critical Component: Door Opened & Door Closed Limits
Redundant Component: DOL and DCL Computer Monitoring Inputs
Monitored Component: Door Opened & Door Closed Limits

Place a jumper from the Terminal DOB to terminal 4 on the IO-7 or PIO9 board and allow the doors to open fully. Confirm that the DOLF LED indicator on the IO-7 or PIO9 board is off, and remove the DCLF input wire from IO-7 or PIO9. The LCD should show, "Front Door Limit Switches Fault." Confirm that the car will not respond to hall or car calls. **REMOVE JUMPER** and reattach DCLF input wire to return car to normal operation.

7.1.17 Revert to Automatic Operation (ASME 2.26.9.3.d)

Critical Component: IN Computer Input, SU or SD Computer Outputs
Redundant Component: IN, and STOP relays
Monitored Component: INM, and STOPM Computer Monitoring Inputs

With the car on Inspection operation, place a jumper from D20 or D26 diode anodes on the HLS-7 board to terminal 3 "ground." These diodes are in series with the computer SU and SD direction relay outputs. Confirm that the car will not move and will not respond to any car or hall call demand.

REMOVE JUMPER. Return the car to Normal mode of operation.

7.1.18 Unintended Movement (ASME 2.19.2)

Critical Component: DZ, and LVL Relays
Redundant Component: DZ, and LVL Contacts
Monitored Component: DZM, LVLM, CG, and THD Computer Monitoring Inputs

Place a jumper from the Terminal DOBF to terminal 4 on the IO-7 or PIO9 board and allow the doors to open fully. Confirm that the DOLF LED indicator on the IO-7 or PIO9 board is off. Turn power off, remove wires from 27 and DZM terminals located on HLS-7 board. Restore power.

The LCD should show, "Unintended Movement System Fault." Relays GTS and GTSX should drop, setting the emergency brake and opening the directional circuits. Turn power off and rewire terminals 27 and DZM. Confirm that the error does not reset by cycling power. The latching fault should not clear until the ANSI-RST button is pressed.

7.1.19 Single Ground

Critical Component: N/A
Redundant Component: N/A
Monitored Component: N/A

Short terminal 4 located on the controller power terminal strip, (not on the any of the PC boards) to ground. Fuse F4 should blow removing power to all elevator control relay logic disabling all controller functions. Turn power off, and replace fuse.

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Section 8 – Maintenance

8.1 Maintenance

The Elevator Controls Microprocessor Elevator Controller has been designed to require as little routine maintenance as possible. The mechanical interconnections are the least reliable portion of the solid-state system, so the less they are disturbed, the more likely the system is to continue to function properly.

The elevator itself, however, is a complex mechanical apparatus, which requires periodic routine preventive maintenance. In addition to lubrication of the various moving parts, door lock contacts should be cleaned and inspected regularly since exposed contacts are susceptible to dirt and corrosion. The doors also receive the heaviest wear, often making two or even three cycles at a floor.

The various rotating machinery belts and couplings should be routinely inspected for wear. Wear could cause loss of control of the elevator car.

If the elevator system develops problems or becomes inoperative refer to the Troubleshooting guide Section 5 of this manual.

8.2 Replacement Parts List

8.2.1 Elevator Controls PC Boards

1) P8 Main microprocessor board (Standard controllers only)
2) IO-7-Vxx Main input-output board (Standard controllers only)
3) IOEX-B44 ASME-17.1A-2000 monitoring board (Standard controllers only)
4) IOEX-Vxx Input-output expander board.
6) PIO9 Main microprocessor board (Prodigy controllers only)

For EZ-Link systems only

1) P8X Controller to serial link microprocessor board (Standard controllers only)
2) TOC Car top microprocessor board.
3) COP Car panel microprocessor board.
4) Hall Microprocessor for hall stations.
5) COP/TOC-EX Car top or COP extender board.

✍ **NOTE**: xx is the fixture voltage

8.2.2. Relays

4 pole ice-cube 120 VAC
P&B KHAU-17A12N-120
Omron MY4AC110/120S
Idec RU4S-D12

4 pole ice-cube 110 VDC
P&B KHAU-17D12N-110
Omron MY4-DC12S
Idec RU4S-A12

3 pole ice-cube 110 VDC
P&B KUP-14D35-110
Omron RR3B-ULDC110V

Power 2 poles 30-amp 110VDC relay with DC Blow-outs
P&B PRD11DH0-110VDC

Force guided relay
Shrack SHRACK V23050-A1110-A533, 110 VDC

8.2.3 Fuses

AGC ¼, 1, 2, 3, 5, 6,10, 15 AMP 250VOLT
MDA TYPE 3, 5, 10 & 15 AMP 250 VOLT
FRN-R 10, 20, 30, 60 AMP 250 VOLT (208 to 240 VAC power supply)
FNQ 5,10,15A 500 VOLT (440 to 480 VAC power supply)

8.2.4 Power Supply

Power One HB5-3/0VP 3-AMPS @ 5VDC

8.2.5 Semiconductors

Motorola HEP-RO170
Motorola 1N5347B – 10V, 5 Watt, Zener Diode
Motorola 1N5333B – 3.3V, 5 Watt, Zener Diode
Tecor L4004F31 – 4 AMP, 400 VOLT, Sensitive Gate Triac

Controls

Electronic Elevator controller

H900

Field Reprogramming guide

ELEVATOR CONTROLS
SIMPLE. SOLID. SUPPORTABLE.

Field Reprogramming Manual
MODEL V900 / H900
Prodigy & Standard P8
Software versions 5.x & 1.xx.xx
For Microprocessor-Based Traction and Hydraulic Elevator Controls

Product Documentation that's Simple to Navigate™

This is the Field Reprogramming Manual to be used with all Model V900 Series Traction and H900 Series Hydraulic elevator controllers. Other resources include:

- **Installation and Adjustment Manual** for Model V900 and Model H900 controllers
- **Solid State Starter Manual** for controllers equipped with such starters
- **Maintenance & Troubleshooting Training Manual** provided in conjunction with Factory and Customer Site technical training classes
- **Telephone Technical Support** available for Customers at no charge
  call: 916/428-1708; **fax**: 916/428-1728; **e-mail**: techsupport@elevatorcontrols.com
- **Onsite Product & Engineering Support** available worldwide by prior arrangement.

Publication Reprog8v5 rev 1/27/09

Table of Contents

Introduction

Warnings

Throughout this manual, icons will be used to call attention to certain areas of text. These icons represent safety warnings, cautions, and notes.

WARNING: Denotes operating procedures and practices that may result in personal injury and/or equipment damage if not correctly followed.

CAUTION: Denotes operating procedures and practices that may result in equipment damage if not correctly followed.

NOTE: Denotes useful information or procedures.

Throughout this manual it is assumed that field personnel are well qualified in the installation of elevator equipment. No attempt has been made to define terms or procedures that should be familiar to a qualified elevator mechanic.

NOTE: Some of the information in this manual is pertinent only to Part # MPC-P8 and PIO9 with software Versions 5.x or 1.xx.xx and above dated 9/1/05 or later. Software version and date can be found by viewing the User Menu - Software Version.

NOTE: Paragraphs or table contents presided by symbol **»** apply to version 1.xx.xx software version only.

NOTE: Paragraphs or table contents presided by symbol ∞ apply to version 5.x software version only.

NOTE: The difference between version 5.x and 1.xx.xx is such that version 5.x is used for simplex, duplex, and 3 or more elevator group configuration and version 1.xx.xx is used for 1 car group, 2 car groups and 3 or more elevator group configuration.

Reprogramming Using Onboard Diagnostics

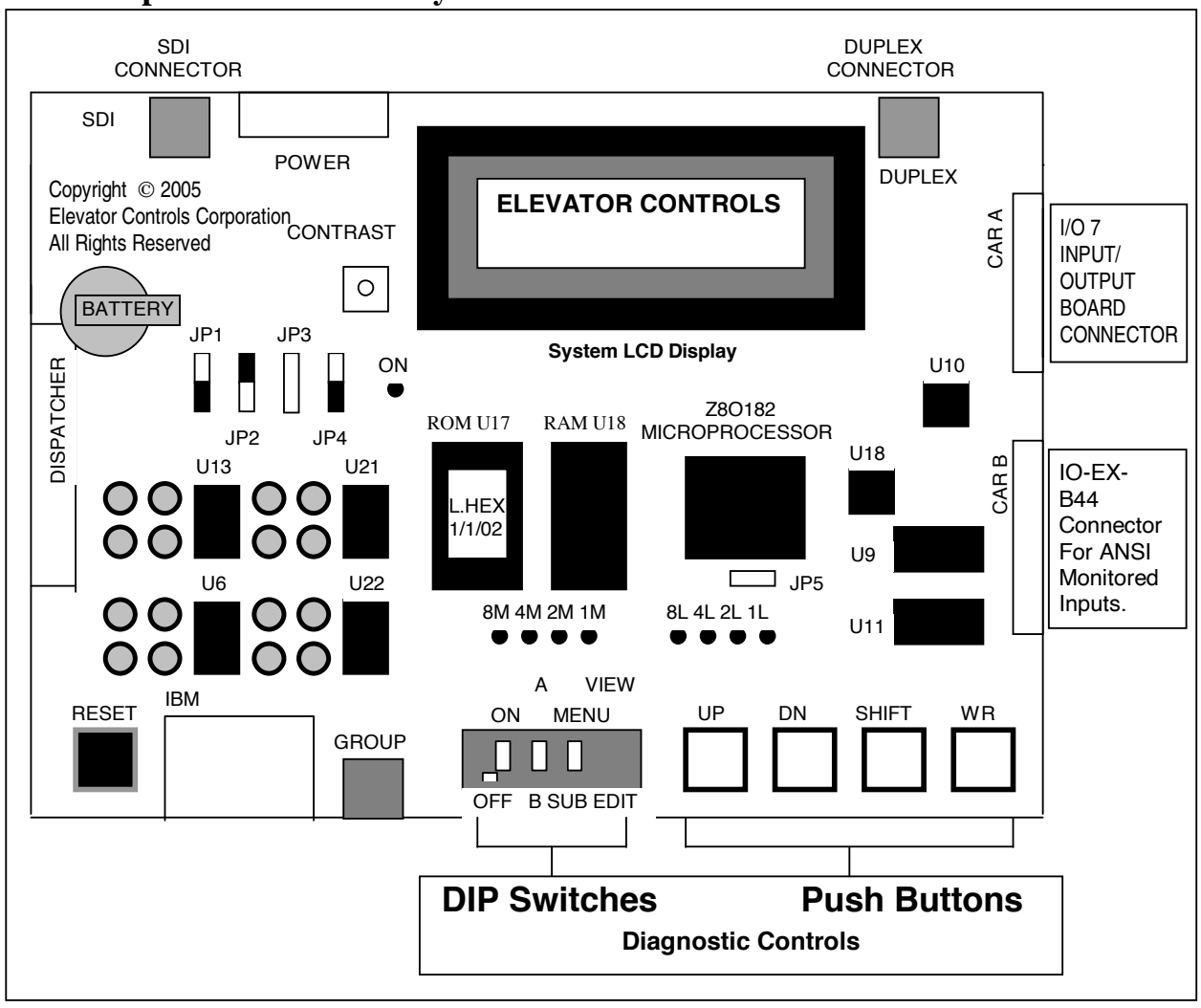
1.1 Overview of P8 and PIO9 Microprocessor boards

The P8 Microprocessor Computer board is used in all 900 Series standard controllers, 900 series Prodigy controllers us a single, highly integrated circuit board which includes a replica of the P8 reprogramming and diagnostic controls tools. When working with standard 900 Series control equipment, refer to the P8 specific sections. When working with Prodigy controllers, pay specific attention to the PIO9 sections.

1.1.1 Overview of the P8

The P8 Microprocessor Computer board (MPC) pictogram appears below. Reprogramming and diagnostic controls are located on the bottom right-hand side of the P8. The liquid crystal display (LCD) is also used by the onboard diagnostics. The LCD is located at the top center of the P8 board.

P8 Microprocessor Board Layout



The four DIP switches and four push buttons make up the diagnostic controls. The name and function of each control is summarized in the Push Button Functions table below. The buttons listed in the table from top to bottom correspond to the buttons from left to right on the P8. The name for each button in the left column of the table corresponds to how it is labeled on the P8 board and to the labels on the drawing above. For more information about the function of each button, please refer to the sections later in this chapter.

1.1.2 Overview of the PIO9 Microprocessor Board

The PIO9 Microprocessor Computer board (PIO9) includes a replica of the P8 reprogramming and diagnostic controls tools. These are located in the center at the bottom of the PIO9 board. The LCD is located at the center of the PIO9 board.

WARNING: Do not depress the button (labeled RESET) on the P8 board or the PIO9 while elevator is in operation, as it will cause the car to come to an immediate stop.

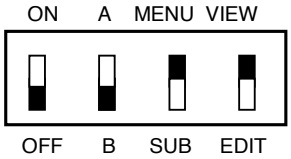
Push Button Functions

Button Name	Function
ON/OFF DIP switch	Selects between elevator status and user display
A/B DIP switch	The A/B switch is irrelevant on software version 5.x. The A/B switch for software version 1.xx.xx works in conjunction with the ON/OFF switch in the OFF position, while on A it selects the Group mode of operation for the Group active dispatcher car, and while on B it selects the car normal diagnostics mode of operation, it becomes irrelevant when the ON/OFF switch is on the ON position, or for slaved cars.
MENU/SUB DIP switch	Selects menu or sub-menu display in the user display.
VIEW/EDIT DIP switch	Selects view parameter or edit (change) parameter in the user display.
UP push button	Selects the next menu or sub-menu in the user display.
DN (DOWN) push button	Selects the previous menu or sub-menu in the user display.
SHIFT push button	Selects the next parameter or digit in the edit (change) parameter mode in the user display.
WR (WRITE) push button	Saves the changed parameter permanently when in edit (change) parameter mode in the user display.

1.2 Selecting the Elevator Status Display

1.2.1 Car Status Display

Move the **ON/OFF** DIP switch to the **OFF** position and **A/B** switch to the **B** position. The Elevator Status display is now selected. The system LCD will display up to four of the following messages. The LED's display the highest priority code according to the table below:



LED Error Codes

LED Display Code (Left-to-Right)	Hex Value	Description
○○○○○○○●	01	USD2 and DSD2 on simultaneously
○○○○○○●○	02	Trying to step up and down at the same time
○○○○○○●●	03	Channel A cable disconnected or no I/O board
○○○○○●○●	05	EEPROM write failure to
○○○○○●●○	06	Controller inspection
○○○○○●●●	07	Safety string open
○○○○●○○○	08	Main Fire service phase 1
○○○○●○○●	09	Fire service phase 2
○○○○●○●○	0A	Earthquake: normal operation
○○○○●○●●	0B	Earthquake: abnormal condition
○○○○●●○○	0C	Front doors not fully closed
○○○○●●○●	0D	Rear doors not fully closed
○○○○●●●○	0E	Independent service
○○○○●●●●	0F	Out-of-service timer elapsed
○○○●○○○○	10	Heavy load in car
○○○●○○○●	11	DCL: Doors not closed
○○○●○○●○	12	Door open limit & door lock on simultaneously
○○○●○○●●	13	Starter stuck in wye or bad starter driver output
○○○●○●○○	14	Car on wild operation
○○○●○●○●	15	Password access active
○○○●○●●○	16	Re-leveling down
○○○●○●●●	17	Leveling down
○○○●●○○○	18	Door reopen input active
○○○●●○○●	19	Car out-of-step
○○○●●○●●	1B	Brake did not lift last run
○○○●●●○○	1C	Hospital service
○○○●●●●●	1F	Alternate fire service phase 1
○○●○○○○○	20	Drive resetting
○○●○○○○●	21	Drive reset failure
○○●○○○●○	22	Access inspection
○○●○○○●●	23	Cartop inspection
○○●○○●○○	24	In-car inspection
○○●○○●●○	26	Re-leveling up
○○●○○●●●	27	Leveling up
○○●○●○○○	28	Emergency Power phase 1
○○●○●○○●	29	Emergency Power phase 2

○○●○●○●○	2A	Out of Service operation
○○●○●○●●	2B	Emergency Recall operation
○○●○●●●○	2E	Car-to-Lobby operation
○○●○●●●●	2F	Check channel B cable / termination (P8 only)
○○●●○○○○	30	Test mode
○○●●○○○●	31	No P8X Comm.
○○●●○○●○	32	Viscosity operation
○○●●○○●●	33	Pit switch tripped
○○●●○●○○	34	Low oil return
○○●●○●○●	35	Emergency power pre-transfer operation
○○●●○●●○	36	Trying to relevel without direction, or both directions on
○○●●○●●●	37	In leveling zone without direction
○○●●●○○○	38	Battery lowering
○○●●●●●○	3E	Unable to close doors
○○●●●●●●	3F	Top slowdowns wired backwards
○●○○○○○○	40	Security mode in operation
○●○○○○○●	41	Bottom slowdowns wired backwards
○●○○○○●○	42	Hydro pump synchronization
○●○○○●○○	44	Motor run stall protection timer expired
○●○○●●●○	4E	Independent and security mode
○●○●○●●○	56	SDI out-of-service
○●○●○●●●	57	Door Zone input error
○●○●●○○●	59	Door zone count error
○●○●●○●○	5A	Pump protection timer expired
○●○●●○●●	5B	EMT phase 1 operation
○●○●●●○○	5C	EMT phase 2 operation
○●○●●●○●	5D	Hall/ car lamp fuse blown or all calls active
○●○●●●●○	5E	Car doors bounced during takeoff
○●○●●●●●	5F	Absolute PI correction
○○●●○○○○	60	Bypass system fault
○○●●○○○●	61	Door lock relays fault
○○●●○○●○	62	Door zone relay fault
●●●○○○●●	63	GTS relay fault
○●●○○●○○	64	Inspection switch fault
○●●○○●○●	65	Level relay fault
○●●○○●●○	66	Stop relay fault
○●●○○●●●	67	Door lock system fault
●●●○●○○○	68	Governor contact system fault
○●●○●○○●	69	Front door limit system fault
○●●○●○●○	6A	Rear door limit system fault
○●●○●○●●	6B	Contactor drop fault
○●●○●●○○	6C	Unintended movement fault
○●●○●●○●	6D	Car stop bypass relay fault
○●●○●●●○	6E	SDI safety relay fault
○●●○●●●●	6F	Drive relay Fault
○●●●○○○○	70	LSSM relay fault
○●●●○○○●	71	Down relay fault
○●●●○○●○	72	Up relay fault
●○●○**xxxx**	AX	Doors unlocked (**X**=PI value, 1st to 15th)

●○●●**xxxx**	BX	Doors unlocked (**X**=PI value, 16th to 30th
●●○○**xxxx**	CX	Same as AX above, but DLK clipped – open at high speed
●●○●**xxxx**	DX	Same as BX above, but DLK clipped – open at high speed
○○●●●○●○		3ARescue operation

✍ **NOTE**: Error display codes below as well as Group Status Display errors are only present on software version 1.xx.xx.

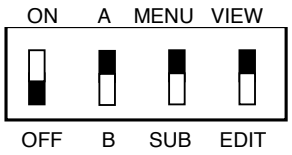
○●○○○●○●	45No Hall Comm.
○●○○○●●○	46No TOC Comm.
○●○○○●●●	47No COP front Comm.
○●○○●○○○	48No COP rear Comm.

1.2.2 Group Status Display

Move the **ON/OFF** DIP switch to the OFF position and **A/B** switch to the **A** position. The group dispatcher Elevator Status display is now selected. The system LCD will display up to four of the following messages. The LED's display the highest priority code according to the table below:

LED Error Codes

LED Display Code	Hex Value	Description
	81	Balanced demand
	82	Up peak demand
	83	Down peak demand
	84	Lobby up peak demand
	85	Intermittent demand program



✍ **NOTE**: The LED readout will indicate the highest priority code according to the Car Status Display table, no LED readout is will be provided for Group Status Display table.

The left hand column of the table above provides the LED code for each error displayed. These codes are generally only useful to determine the fault condition with the highest priority. If more than one fault is present, the LCD messages will scroll up to four faults at a time. The Elevator Status display will also display the car position (floor number) and date and time for the elevator controller.

1.3 Selecting the User Display

To select the User Display, move the **ON/OFF** switch to the **ON** position. Move the **MENU/SUB** DIP switch to the MENU position. Finally, move the **VIEW/EDIT** switch to the **VIEW** position.

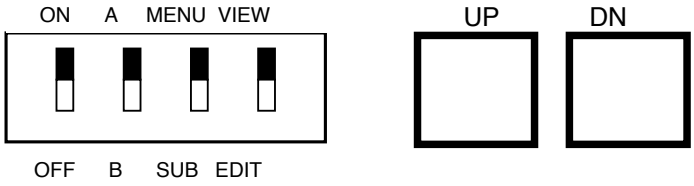
The User Display has twelve programming menu options from which you can select, described below. The exact function of each of the menu items is explained on the following pages. Each menu works in the same way. Use the **UP** and **DN** push buttons to select the menu item

from the list below. When the menu item you want is displayed, move the **MENU/SUB** DIP switch to the **SUB** position. The LCD will then display the sub-menu for that User Display menu.

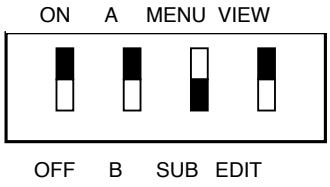
✍ **NOTE**: The A/B switch is irrelevant while diagnostics tool is used within User Display menus except for Stopping Table manipulation covered under section 1.15.

User Display Menus

Direct Access	Car Control	Fire Options
Set Clock	System Timers	Stopping Table
Fault Log	System Control	Password Access
Car Timers	Door Options	Version / Job #



1. Set the DIP switches as shown and use the **UP** and **DN** push buttons to select the User Display menu you want.



2. Then move the **MENU/SUB** DIP switch to the **SUB** position. The LCD will then show the submenu for that User Display menu.

3. Use the **UP** and **DN** push buttons to select the parameter to be viewed.

User Display

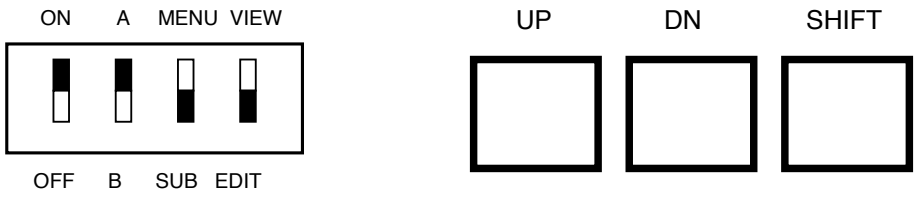
1.4 Changing a User Display Menu Parameter

Once you have selected a User Display parameter, you have the option of changing its value. For all User Display menus except Direct Access, follow this procedure.

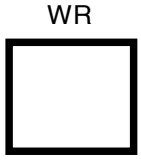
Move the **VIEW/EDIT** DIP switch to the **EDIT** position. The bottom line of the LCD will change; 'New=XX' will appear where XX is the current value of the User Display parameter. Next, use the **UP** and **DN** push buttons to change the value. Use the **SHIFT** push button to switch to the next digit. When the value you want is displayed, press the **WR** (WRITE) push button to record the new value permanently. Return the **VIEW/EDIT** DIP switch back to the **VIEW** position.

CAUTION: Write down the value of the parameter before you begin changing it. If you make a mistake, you can always restore the old value.

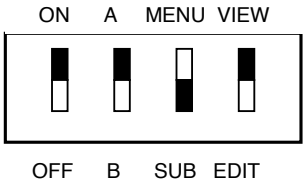
WARNING: If you realize you made a mistake, **DO NOT** PRESS THE **WR** BUTTON. Instead, skip that step and move the **VIEW/EDIT** DIP switch to the **VIEW** position. The old value will automatically be restored.



1. Set the DIP switches as shown to change a User Display parameter. Use the UP, DN and SHIFT push buttons to change the value of the parameter.



2. Press the WR (WRITE) push button to record your changes permanently. Skip this step if you decide that you don't want to record your changes permanently.



3. Move the VIEW/EDIT DIP switch back to the position shown. To select another Parameter in the selected sub-menu, use the UP and DN push buttons. To select another User Display sub-menu, start over again as on the previous page.

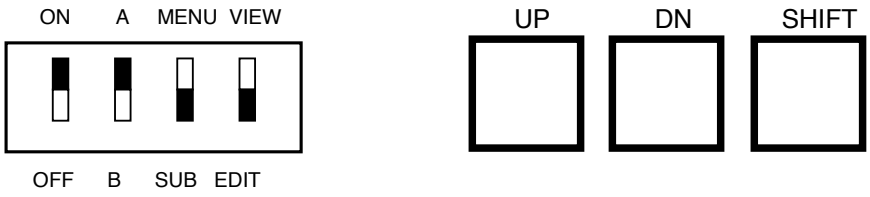
1.5 Changing a Direct Access Parameter

Once you have selected the Direct Access menu, you have the option of selecting an individual parameter and changing its value.

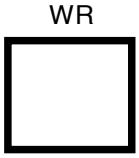
Move the **MENU/SUB** DIP switch to the **SUB** position. The bottom line of the LCD will change; 'F000=XX' will appear where XX will be the current value of the selected parameter. Next, use the **UP**, and **DN** push buttons to change the first digit (F). Use the **SHIFT** push button to switch to the next digit, etc. When the parameter you want is displayed, move the **VIEW/EDIT** DIP switch to the **EDIT** position. The bottom line of the LCD will change; 'New=XX' will appear where XX is the current value of the User Display parameter. Use the **UP** and **DN** push buttons to change the value. Use the **SHIFT** push button to switch to the next digit. When the value you want is displayed, press the **WR** (WRITE) push button to record the new value permanently.

CAUTION: Write down the value of the parameter before you begin changing it. If you make a mistake, you can always restore the old value.

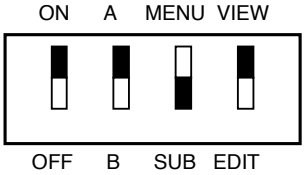
WARNING: If you realize you made a mistake, **DO NOT** PRESS THE **WR** BUTTON. Instead, skip that step and move the **VIEW/EDIT** DIP switch to the **VIEW** position. The old value will automatically be restored.



1. Set the DIP switches as shown to change a User Display parameter. Use the **UP**, **DN** and **SHIFT** push buttons to change the value of the parameter.



2. Press the **WR** (WRITE) push button to record your changes permanently. Skip this step if you decide that you don't want to record your changes permanently.



3. Move the **VIEW/EDIT** DIP switch back to the position shown. To select another Parameter in the selected sub-menu, use the **UP** and **DN** push buttons. To select another User Display submenu, start over again as on the previous page.

1.6 Direct Access User Display

The Direct Access User Display menu bypasses many of the other menus. Use this menu when directed by Elevator Controls technical support. For those familiar with EC's MPC-P7 computer boards, you can reprogram the P8 or PIO9 in a similar "address/data" fashion as done with the P7 switchgear. The reprogramming address conversions are: (P7) E400's = FC00's (P8 or PIO9), and (P7) E700's = FF00's (P8 or PIO9).

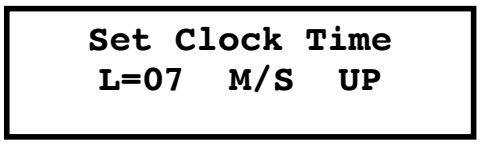
✍ **NOTE**: The entire parameter reprogramming area for software version 5.x covers from FB00 to FFFF, and for software version 1.xx.xx from FA00 to FFFF.

To view "Memory Flags, inputs and outputs," use direct access and refer to the "Memory Flag Listing" tables section 1.17 pages 30 for version 5.x and 31 for version 1.xx.xx of this manual.

Normally, you will use one of the following User Display menus:

To change system clock, use the **Set Clock** User Display menu.
To change car timers, use the **Car Timers** User Display menu.
To change car control variables, use the **Car Control** Display menu.
To change system timers, use the **System Timers** User Display menu.
To change system I/O programming, use the **System Control** User Display menu.
To change floor stopping variables, use the **Stopping Table** User Display menu.
To change door operation, use the **Door Options** User Display menu.
To change fire service options, use the **Fire Options** User Display menu.

1.7 Set Time Clock Parameters



Use the Set Clock Time User Display to change your date and time display. The table below lists all of the options available within the Set Clock Time menu. Use the **UP** and **DN** push buttons to select parameters to view.

Time Clock Parameters

Parameter	**Function**
Clk: Seconds 00-59	Sets the current second for the system clock.
Clk: Minutes 00-59	Sets the current minute for the system clock.
Clk: Hours 00-23	Sets the current hour for the system clock. The clock uses military time. 00 hour is midnight to 1AM. 13 hour is 1PM.
Clk: Day SUN, MON, TUE,… SAT	Sets the current day of the week. SUN=Sunday, MON=Monday, TUE=Tuesday, WED=Wednesday, THU=Thursday, FRI=Friday and SAT=Saturday
Clk: Date 01-31	Sets the current day of the month.
Clk: Month JAN, FEB, MAR, ….. …, DEC	Sets the current month of the year. JAN=January, FEB=February, MAR=March, APR=April, MAY=May, JUN=June, JUL=July, AUG=August, SEP=September, OCT=October, NOV=November, DEC=December.
Clk: Year 00-99	Two digit year, i.e. enter 04 for 2004.

1.8 Fault Log List

```
Fault Log List
L=xx  M/S  UP
```

✍ **NOTE**: xx indicates the number of faults in the fault buffer from 0 to 25.

The Fault Log List User Display is used to view up to the last 25 faults logged. Upon entering this menu, move the Menu/ Sub switch to Sub position, to view the following display. **If the fault log needs to be cleared, press the WR button**. If you want to view and keep the existing fault log, simply scroll through the faults using the **UP** and **DN** buttons.

```
Fault Log
Write Clears All
```

Once the **UP** or **DN** button are pressed, fault entries will be displayed. The display has four quadrants: The fault entry number appears at the top left corner, the fault code at top right corner, date of fault occurrence at bottom left corner, and time, time is displayed in military format 24 hour clock, of occurrence at bottom right corner.

```
01  Fault=07
Jan 12 11:11:35
```

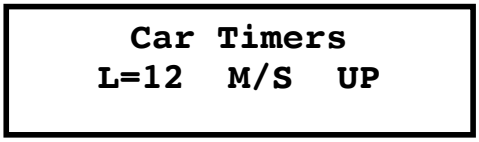
✍ **NOTE**: Pressing **DN** button positions the fault pointer at the most recent fault logged in the buffer, pressing **UP** button first places fault pointer to oldest fault logged.

To display the car position and translate the fault code, simple place the View switch in the Edit position to show car position at time of fault, on the top line, and the fault code translation will scroll on the bottom line of LCD display.

```
PI=01
Safety String Open
```

To go back to fault scroll mode simply place the **EDIT** switch back to **VIEW** and repeat steps above to scroll through rest of fault history.

1.9 Car Timers



Use the Elevator Timers User Display to review and adjust the car function timers. The table below lists parameters available within the Elevator Timers sub-menu. Use the **UP** and **DN** push buttons to select one of the parameters below.

✍ **NOTE**: The **Car Timers** can only be used to change timer values from 0 to 99 seconds. The Direct Access menu in used to set timer values over 99 seconds. Contact Elevator Controls for assistance in resetting timer values over 99 seconds.

✍ **NOTE**: Timers can be disabled, by setting both timer address parameters to 00, using Direct Access menu.

Car Timers

Timer Parameter (Direct Access Address)	**Function**
Close Prtn Timer (FFA0 - FFA1)	Sets the maximum time that power will be applied to the doors for closing before a reopen, if the doors fully closed position is not achieved. Default = 30 seconds.
Open Prtn Timer (FFAA – FFAB)	Sets the maximum time allowed for the doors to achieve full open position before closing, opening stops if DOL is broken regardless of timer status. Default = 30 seconds
Short Door Timer (FFA2 – FFA3)	Sets the time the doors will wait at the open limit, before closing on door closed button or demand. Default = 2 seconds.
Car Door Timer (FFA4 – FFA5)	Sets the time the doors will wait at the open limit after opening for a car call. Default = 3 seconds.
Hall Door Time (FFA6 – FFA7)	Sets the time the doors will wait at the open limit after opening for a hall call. Default = 7 seconds.
Eq Normal Timer (FFA8 - FFA9)	Sets delay to wait after the seismic switch returns to normal before car is allowed to return to run on earthquake automatic operation mode. Default = 30 seconds.
∞ Eq Abnormal Timer » Eq Door Timer (FFAC - FFAD)	Sets delay to wait before opening the car doors once the car stops into door zone after an earthquake occurrence. Default = 05 seconds.
Eq Stop Timer (FFB2 - FFB3)	Recovery time to wait before moving car to door zone area after counterweight derailment. Default = 10 seconds.
Lobby Door Timer (FFB0 - FFB1)	Sets time to wait with doors open on a hall call at the lobby floor. Default = 10 seconds.
Gong Double Ding (FFB4 - FFB5)	Sets the time between pulses for a double ding on the Gongs. Default = 00.

Gong Hold Timer (FFB6 - FFB7)	Sets time to hold gong pulse active. Default 3 seconds
Door Hold Timer (FFBC - FFBD)	Sets the time the doors will remain open after breaking the door open limit if the door hold input is activated. Default = 10 seconds.

1.10 Car Control

Use the Car Control User Display to view or change system parameters for a simplex, serial duplex or group system. The table below lists parameters available in the Car Control submenu. Use the **UP** and **DN** push buttons to select one of the parameters below.

Many of these parameters will change the I/O configuration of the controller. These parameters are marked with a †. Do not change these parameters without contacting Elevator Controls support staff for assistance.

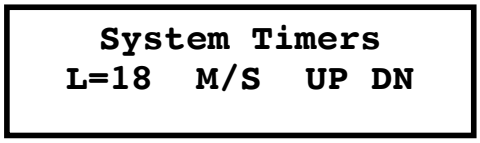
WARNING: Do not change † parameters (below) without first contacting Elevator Controls support staff for assistance.

Car Control

Bottom Floor No.	Normally 00. Determines the starting level which this car services. Example on a duplex if this car has no basement but other car does this car will be 01 the other will be 00.
† Hall Call Rej Op	Enables HCRO output if set to 01; disables if set to 00.
Hi Speed Step Op	Normally set to 00. Set to 20 on jobs that require slowdown distances greater than the shortest floor height. Set to 20 for all jobs with SDI.
Hydro Option 00=N,01=Y	Set to 00 for traction jobs. Set to 01 for hydraulic systems.

Input Option 1	A hex number with seven options. See appendix A for complete information on hex numbers. The hex number is: **M:** X ATT UCR DCR**; L:** CCR UCF DCF CCF Descriptions: CCF- Set to 1 to enable Car Call input † DCF- Set to 1 to enable Down Call input † UCF- Set to 1 to enable Up Call input † CCR- Set to 1 to enable Rear Car Call input † DCR- Set to 1 to enable Rear Down Call input † UCR- Set to 1 to enable Rear Up Call input † ATT- Set to 1 to enable Attendant inputs & outputs † PitSw-Set to 1 to enable Pit Switch input option †
† Input Option 2	Factory set. Do not change. †
† Input Option 3	Factory set. Do not change. †
† Input Option 4	Factory set. Do not change. †
» † Input Option 5	Factory set. Do not change. †
LCD Display Rate	Controls the LCD scroll rate. Normally set to 05.
PC display Optn	Used to select type of monitoring system attached to controller.
Lobby Floor No.	Set to lobby floor level minus 1. i.e.: bottom floor = 00.
Top Floor No.	Set to top level number minus 1. i.e. top floor level 5 = 04.
† Number of PI's	Set to the number of PI outputs on the system.
Alt Park Floor	Set to level value minus 1 for which the car is to park when the alternate parking floor input is active.
SDI Option (PVF)	Set to 01 for jobs with position velocity feedback. Otherwise set to 00.
† These options will cause wiring terminals to change function. Elevator Controls support staff will need to assist you in rewiring your system if you change one of these options. Record current values before changing.	

1.11 System Timers



The table below lists parameters available in the System Timers submenu. Use the **UP** and **DN** push buttons to select one of the parameters below.

✍ **NOTE**: Timer values are in seconds.

✍ **NOTE**: Timers can be disabled by setting the Direct Access parameters to 00.

System Timers

Timer Name (Direct Access Parameters)	**Description**
Delta-Wye Timer (FF60 – FF61)	Sets the time to switch motor starter from Wye to Delta mode, or to go from brake pick to brake hold voltage on traction jobs. Default = 2 seconds.
Vic On Timer (FF62 – FF63)	Sets the time the pump motor will be turned on while on Viscosity control mode of operation default = 180 seconds (Display shows B3 seconds)
Vic Off Timer (FF64 – FF65)	Sets the time the pump motor will be turned OFF while on Viscosity control mode of operation default = 540 seconds (Display shows 69 seconds)
Pres Hoist Timer (FF66 – FF67)	Sets the time the doors will remain open at the fire return floor on fire phase 1 mode of operation, if car has pressurized hoist-way default = 10 seconds
MG Timer (FF68 – FF69)	Used for two purposes. The first is the time a generator is allowed to run before shutting down if there is no activity. Default is 90 seconds. The second purpose is the as soft stop pump timer on a hydro. Default = 1 second.
MG Lockup Tmr (FF6A – FF6B)	Sets the maximum allowed for the starter to switch provide the Delta feedback input, before signaling error for car starter stuck in Wye error display. Default = 15 seconds.
Trip-fail Timer or Motor Limit Timer (FF6C – FF6D)	Sets the maximum time the car is allowed to run in the hoist way for a single non stop trip. Default = (B4) 180 seconds. Note: 900 controller manuals call timer Motor Limit Timer instead of Trip Failure Tmr as shown on LCD display

TOS Timer (FF6E – FF6F)	Sets the time the car can normally be held at a floor before the system attempts to use nudging to close the doors. Default = 45 seconds.
Sec Code Timer (FF70 – FF71)	Sets the time allowed between car call coded security button entries. Default = 05 seconds.
» Idle Timer (FF74 – FF75)	Timer activates the Idle output if part of IO of controller after the timer programmed time out period once doors are closed since last request for demand. Default 5 minutes.
α Park Release Tmr (FF80 – FF81)	Sets the time allowed upon demand before car is released from parking. Default = 30 seconds. **Software version 5.x only.**
Parking Timer (FF82 – FF83)	Sets the time allowed from when car looses demand before is allowed to park. Default = 05 seconds.
Hsp Trp-fail Tmr (FF84 – FF85)	Time allowed for the selected car to respond to Hospital Service Call. Default = (B4) 180 seconds
Hsp Door Timer (FF86 - FF87)	Sets time allowed to take control of the car after car responded to a hospital service hall call, before car returns to normal operation mode. Default = 30 seconds.
SU/SD Delay Tmr (FF88 – FF89)	Sets the time to hold SU or SD relay outputs after demand for direction has been lost. Set to 00, currently not being used.
Brake Pick Timer (FF8A – FF8B)	Sets the time allowed for the brake auxiliary contact to signal controller that the brake has picked. Default 5 seconds
IND Hold Timer (FF8E / FF8F)	Sets time to wait before taking car on fire service phase 1 return while car is on independent service. Default = 30 seconds.
Inspection Timer (FF90 / FF91)	For Ansi-2000, sets time to delays fault to allow exit from elevator. Default = 15 seconds.
EP Trip-fail Tmr (FF96 / FF97)	Sets time before car parks when no demand. Default = 15 seconds.
» Drive Reset Tmr (FF98 / FF99)	Sets time the drive reset output is held active to reset a drive trip out mode. Default = 3 seconds.

1.11 System Control

Menu for Software Version 5.x

```
System Control
L=10  M/S  UP DN
```

Menu for Software Version 1.xx.xx

```
System Control
L=13  M/S  UP DN
```

NOTE: System Control menu for software version 5.x contains 10 entries, and software version 1.xx.xx contains 13 entries. Refer to the applicable job System Control table below based on job software version and skip other System Control table. Software version and date can be found by viewing the User Menu - Software Version.

The System Control User Display represent a options used for dispatching of two or more car control system behavior such emergency power behaviors, parking, etc, but that will also apply to a one car system. The table below lists parameters available in the System Control submenu. Use the **UP** and **DN** push buttons to select one of the parameters below.

Some of the options should not be changed unless you are directed to by Elevator Controls technical support staff to do so. These options will change the configuration of your I/O and will require rewiring. These options are marked with a †.

WARNING: Do not change † parameters (below) without first contacting Elevator Controls support staff for assistance.

System Control Software Version 5.x

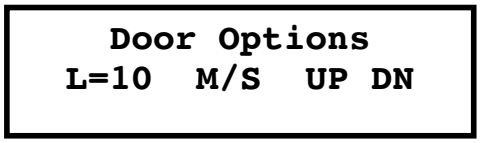
Variable Option Name	Description
CCD on Reversal	Car Cancel car calls upon direction reversal. 00 = off; set to 80 for group systems.
CCD, Slwdn & Ind	Car will cancel car calls ahead while slowing down to the first car call target, while on Independent. 00= off, 80= on.
†Emergency Power Option	Normally 00. Set to 01 if the system has emergency power generators.
Excess Call Can.	Set to 82 to cancel car calls after 2 floors of no activity on the photo-eye. Set to 04 to cancel calls after 4 if the light load weight switch is active.
Nudging: on = 10	Door nudging output. Set to 00 to turn off
Lower Parking Fl	Set to floor number, minus one, of the main parking floor. Set to FF to turn off
Upper Parking Fl	Set to the floor number, minus one, of a 2nd parking floor. Set to FF to turn off
Sec Code Length	Number of digits making up the security sequences.
†Duplex Operation	00 = Simplex; 03 = Master car; 01 = Slave car.
Wild Option	Normally 00. Set to 10 to use Wild Operation.

EZ Link Advance	00 = EZ link off, 03= EZ link to Hall On, 05= EZ Link to Top of Car on, 07= EZ Link to both Hall and Top of Car On

System Control Software Version 1.xx.xx

Variable Option Name	Description
Car Priority	Set 01 for master car, 02 for Slave car, and 03 for a car working as part of a three or more cars group in conjunction with the G900 group dispatcher controller
Number of Cars	Set to 01 for Simplex operation, set to 02 for two car group operation, set to 00 a car working as part of a three or more cars group in conjunction with the G900 group dispatcher controller
Dispatch Help	Number of assigned calls a car has before it asks for help from the other car.
† Emergency Power Option	Set to 80 to enable emergency power return and to 81 to allow 1 car to run under emergency power generator power, or 83 to allow both cars to run under emergency power generator power.
† Hospital Service	Set to 80 to enable hospital service operation and to C0 to enable hospital service & hall call acknowledge indicator driver outputs
Zone 1 Park Floor	Set to floor number, minus one, of the main parking floor.
Zone 2 Park Floor	Set to the floor number, minus one, of a 2nd parking floor.
CCD on Reversal	Car Cancel car calls upon direction reversal. 00 = off; set to 80 for group systems
CCD, Slwdn & Ind	Car will cancel car calls ahead while slowing down to the first car call target, while on Independent. 00= off, 80= on.
Excess Call Can.	Set to 82 to cancel car calls after 2 floors of no activity on the photo-eye. Set to 04 to cancel calls after 4 if the light load weight switch is active.
Nudging: on = 10	Door nudging output. Set to 00 to turn off
Sec Code Length	Number of digits making up the security sequences.
EZ Link Advance	00 = EZ link off, 03= EZ link to Hall On, 05= EZ Link to Top of Car on, 07= EZ Link to both Hall and Top of Car On

1.13 Door Options



The Door Options User Display represents a variety of options that will affect elevator door operation. The table below lists parameters available in the Door Options submenu. Use the UP and DN push buttons to select one of the parameters below.

Some of the options should not be changed unless you are directed to by Elevator Controls technical support staff to do so. These options will change the configuration of your I/O and will require rewiring. These options are marked with a †.

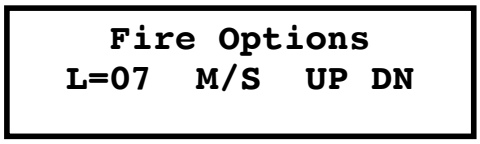
WARNING: Do not change † parameters (below) without first contacting Elevator Controls support staff for assistance.

Door Options

Variable Option Name	Description
Bth Door Lob Rtn	0 0 F R F R F R | | | | | | | + -- Rear door open on main fire return | | | | | | + + -- Front door open on main fire return | | | | | + + + -- Rear door open on Alt. fire return | | | | + + + + -- Front door open on Alt. fire return | | | + + + + + -- Rear door open Lobby up Peak | | + + + + + + -- Front door open Lobby up Peak Note: If set to 00 both doors will open on both fire return floors, and doors will stay closed on Lobby up peak return. Else set proper bit per above to selectively open doors in Fire Return Normal and Alternate services.
Dbl Ding: DN =10	Normally set to 10, which generates two gong pulses for down travel. Set to 00 to generated one pulse for gongs which generate two pulses on their own.
DOB Enab: Nudging	Normally set to 20, which allows the door open button to reopen doors in nudging mode. Set to 00 to disable DOB in nudging mode.
Door Lk Dir Pref	Normally 00. Set to 80 to cancel direction preference (UPD and DPD) with DLK instead of DCF (do this only if directed by Elevator Controls support staff).

Door Lock Gong	Normally 00. Set to 80 to delay gongs until the door lock breaks (for jobs w/o hall gongs).
Door Time Short.	Normally 00. Set to 01 to prevent car call buttons from shortening door time. Set to 02 to shorten door time when a hall call, SE or PHE are activated. Set to 80 to close doors on lobby park and DBC or car call input.
† Miscel Option 1	Factory set. Do not change.
† Miscel Option 2	Factory set. Do not change.
† Rear Door Option	Set to 00 for front only or staggered rear doors. Set to 01 for selective rear doors. †
SE No Stop: Nudg	Normally 00. Set to 01 to ignore safety edge during nudging.

1.14 Fire Options



The Fire Options User Display represents a variety of options that will affect elevator operation during fire service phase 1 and phase 2. The table below lists parameters available in the Fire Options submenu. Use the **UP** and **DN** push buttons to select one of the parameters below.

Fire Options

Variable Option Name	Description
Fire Code Option	7 6 5 4 3 2 1 0 Set bit to 1 for required fire code | | | | | | | + -- ASME Fire service | | | | | | + + -- Not Used | | | | | + + + -- Not used Bit always zero | | | | + + + + -- Not used Bit always zero. | | | + + + + + -- New York City = 10h. | | + + + + + + -- Chicago = 20h. | + + + + + + + -- ASME 1996 Fire Code + + + + + + + + -- Not used Bit always zero Note: For old California Fire option set bit 6, and option FF16 is set to 00, see Section 1.19 of this manual.
Mn. Fire Rtn:Cxh	Set to Cx, where x is the floor number, minus one, of the main fire recall floor.
Alt Fire Rtn: Cxh	Set to Cx, where x is the floor number, minus one, of the secondary fire recall floor.
SE qual: Phase 1	Normally 00. Set to 01 to prevent the Safety Edge from working on fire return operation.
SE qual: Phase 2	Normally 00. Set to 01 to prevent the Safety Edge from working on Phase 2 Fire Service.
Fire Hold: on=20	Normally 00. Set to FF to enable door hold button to work on Fire Phase 2 Fire Service.
Bypass ES on Ph2	Normally 00. Set to FF to bypass the car stop switch on Fire Phase 2 Fire Service. Set to 40 to bypass on fire service phase whether moving or not.

1.15 Stopping Table

The Stopping Table User Display is used to program which and how many floors the elevator car will stop at. This is where changes are made if you need to increase or decrease the number of floors served by the system. This User Display also programs which calls (up, down and car calls) are accepted at each floor, so these submenus are used to set up functions such as down collective operation.

You can increase or decrease the number of stops in the system by adding or removing entire floors from the top of the stopping table. When you do this, you will need to change No. Floors-1 and Number of PI's parameters in the Car Control User Display submenu.

NOTE: Changing parameters in this User Display will cause you terminal wiring configuration to change. You should contact Elevator Controls Corporation support staff for help if you need to change any of these parameters.

WARNING: Do not change † parameters (below) without first contacting Elevator Controls support staff for assistance.

Stopping Table

Parameter	Function
† Fl 1	Each parameter contains the hex coding for one floor of the elevator system. **M:** X X CCR CCF**; L:** UPR DNR UPF DNF † Description: DNF - Set to 0 to enable a down call at this floor. † UPF - Set to 0 to enable an up call at this floor. † DNR - Set to 0 to enable a rear down call at this floor. † UPR - Set to 0 to enable a rear up calls at this floor. † CCF - Set to 0 to enable a car call at this floor. † CCR- Set to 0 enable a car call rear X - Unused. Set to 1. X - Unused. Set to 1.
† Fl 2	same as above †
† Fl 3	same as above †
Etc.	etc.

Common Codes for Stopping Table

	Function
† FF	Car doesn't stop here. All your floors above the top one must have this code. †
† EE	One car call and one down call. This is the normal code for the top floor. †
† EC	One car call, up call and down call. This is the normal code for an intermediate floor. †
† ED	One car call and one up call. This is the normal code for the bottom floor, F11. †
† C0	All calls-front and rear car calls, up calls and down calls. This is the code for levels with two openings. †
† DB	One rear car call and down call. A top floor with a only a rear opening. †
† D3	One rear car call, up call and down call. An intermediate floor with a rear opening. †
† D7	One rear car call and up call. A bottom floor with rear openings. †
† Changing these parameters will change your terminal I/O configuration. Contact Elevator Controls support staff for assistance.	

NOTE: Software version 5.x has this car stopping table only, software version 1.xx.xx has a copy of the other car stopping table used for two car group hall call assignments when in a two car group mode of operation, each table is addressed by the A/B switch while on A position it points to this car's stopping table and while on B to the other car's stopping table, therefore for proper dispatching operation make sure to modify the four stopping tables, two in each car if job is configured for two car group operation.

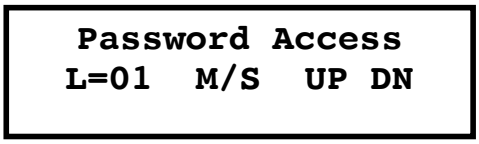
To modify both stopping tables locate the floor you need to change with the A/B switch on the A position, this car's stopping table, modify contents as required following common stopping tables contents stop codes as needed, then flip the A/B switch on the B position, to address the other car's stopping table, modify contents as required following common stopping tables contents stop codes as needed, repeat the same procedure on the other car as required.

NOTE: Controllers using software version 1.xx.xx and arranged as two car group system, both cars will have the same hall call input output I/O so that either of the cars will be able to perform the group hall call assignments and dispatching.

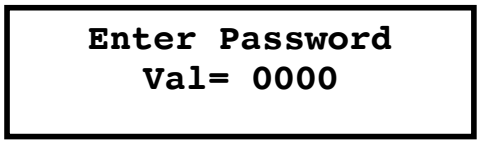
1.16 Password Access

A password is a way to protect your controller from unauthorized users. A password will prevent unauthorized changes to field reprogrammable controller data and personality parameters. Unless the correct password is entered, the P8 or PIO9 microprocessor will ignore the **WR** (Write) push button when a personality address is displayed, thereby preventing data from being changed. A new password must be entered before changing or deactivating the current password.

The controller can be reprogrammed by first entering the four character password key. Entering the correct key will enable the **WR** write push button, allowing changes to be made to controller personality parameters. Cycling power or resetting the P8 or PIO9 microprocessor (pushing the "Reset" button) will remove the password entered.



With the main menu displaying Password Access, lower the **MENU/SUB** switch to display:

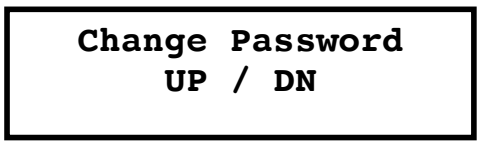


Press the **UP** or **DN** buttons to cycle through 1 – 9 and A – Z. Press the **SHIFT** button to cycle clockwise through the four characters. Finally press the **WR** button to compare the digits on the password entry display to the master password. If there is a match, **OK** will be display on the LCD screen. Raise the **MENU** and **VIEW** switch to exit to the main menu or lower the ON / OFF switch to exit the menu system.

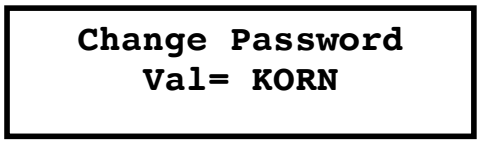
The password remains active for approximately two hours and twenty minutes during which time the personality parameters may be changed. The controller LCD will display "Password Active".

The password is disabled upon entry of the master password (0000) allowing access to all personality parameters. No message will be displayed on the controller LCD screen.

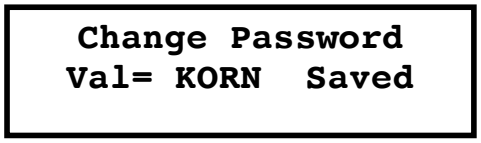
Starting with all switches in the up position, lower the **MENU/SUB** switch from the Password Access menu, to display the change password screen.



Lower the **VIEW/EDIT** switch to edit the current password.



Press the **UP** or **DN** buttons to cycle through 1 – 9 and A – Z. Press the **SHIFT** button to cycle clockwise through the four characters. The LCD screen will display "Saved" upon pressing the **WR** button and saving the new password key.



Raise the **MENU** and **VIEW** switch to exit to the main menu or lower the **ON/OFF** switch to exit the menu system.

Prevent changes to the personality parameters while away from the controller by disabling or removing the password key. Starting with all switches in the up position, lower the **MENU/SUB** switch from the Password Access menu to display the change password screen. Press the **UP** or **DN** buttons to display:

Lower the **VIEW/EDIT** switch to display:

Upon pressing the **WR** button the password key is removed deactivating the **WR** button, while the master password value remains unchanged.

1.17 Memory Flags List

Use the Direct Access User Display to view memory flags. This is an important debugging aid. If you suspect that the system is not responding to a signal, check the memory flags to determine whether the computer is actually receiving or trying to send an output signal.

Make sure the signal is present on the IO-7 board or PIO9 by verifying the LED indicator associated with the signal, or by verifying correct signal voltage at the signal terminal or test point (if available). If the signal is present there, a defective board may be preventing the elevator computer from receiving the signal.

Using the Direct Access menu, dial up the address of the signal or signals to be observed (please note the addresses associated with each group of signals on table below).

Using table MPC P8 SOFTWARE VERSION 5.x for software version 5.x or Grouplees P8 or PIO9 Software Version 1.xx.xx, identify the signal in question and refer to the associated LED from 1L to 8M. To properly observe the actual signal behavior, is recommended that the LEDs be used, since each LED is associated with a specific signal and the LCD display may not have a fast enough refresh rate to display all signal changes, potentially confusing rather than aiding diagnosis.

Refer to Appendix B for proper identification of the pneumonic used to identify each signal.

EXAMPLE: To view the status of DOB, door open button input.

1. Using the direct access menu select memory address F001.
2. Identify LED 4M as representing DOB button input.
3. Observe whether the LED on the computer follows the status of the door open button.

NOTE: Some of the pneumonic names have been underscored denoting an active low signal, where the LED is off when the signal is active (ie: DOL, door open limit switch, where LED will be off if switch is open).

NOTE: The following memory flag charts are copies of the memory flag chart found taped to the inside the controller door.

ELEVATOR CONTROLS
SIMPLE SOLID SUPPORTABLE

MPC-P8 SOFTWARE VERSION 5.x

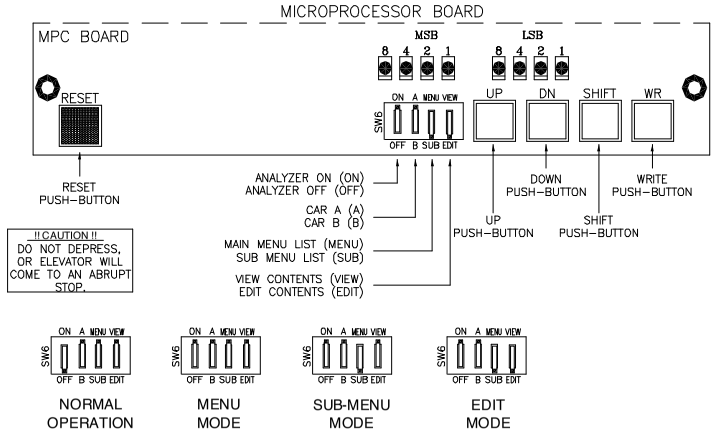
Bar over signal name indicates the signal is active when LED is off.

MEMORY FLAG LISTING

"DIRECT ACCESS" ADDRESS	Left Most L.E.D. ⑧	④	②	①	⑧	④	②	Right Most L.E.D. ①	
F-0-0-0	DOLF	DBCF	SAF	LLI	FRA	STU	STD	IND	INPUTS
F-0-0-1	IN	DOBF	DLK	DEL	UPS	DNS	LVL	EPI	
F-0-0-2	SEF	PHEF	DZF	FRS	FCS	USD1	DSD1	DHLDF	
F-0-0-3	USD2	DSD2	ISTU	ISTD	ATT	UP	DN	HLI	
F-0-0-4	PTR	PTS	N5B	BPI	BSI	ACS	HSI	WILD	
F-0-0-5	DOLR	DBCR	DOBR	DHLDR	PITF	SER	PHER	DZR	
F-0-0-6	EQI	CWI	EDS	APF	PGI	CSI	DCLR	DCLF	
F-0-0-7	MGR/AA	CSB	HR	HIR	DOFF	SU	SD	RL	OUTPUTS
F-0-0-8	DCFF	DCPF	EQS	NUDG	SPR	FGEU	FGED	MPR	
F-0-0-9	FWI	85X	SUA	SDA	P4	P3	P2	P1	
F-0-0-A	ATE	ATB	ATU	ATD	HEWI	HCRO	HLWO	SALRM	
F-0-0-B	DOFR	RGEU	RGED	EQAM	DCFR	DCPR	EPIM	SAFM	INTERNALLY GENERATED FLAGS
F-0-0-C	TFAR	CCR	UCR	DCR	NDSR	FDCR	DPD	UPD	
F-0-0-D	LTR	HCTR	CCTR	SDTR	UFQ	FDCF	DHOR	XREL	
F-0-0-E	STRE	TFX	DSF	DOIR	FRM	FRC	EQN	EQA	
F-0-0-F	HCR	INC	ISV	CCD	PK	TFD	BFD	STC	
F-0-1-0	DOPH2	CMC	CCA	CCB	MLT	DCA	DCB	lvlCSB	
F-0-1-1	UFP	LFP	DMU	DMD	TFAF	CCF	UCF	DCF	
F-0-1-2	DSM	mIS	DOMR	PGO	DOMF	UCA	UCB	fireCSB	
F-0-1-3	DDF	-	CCCI	HSR	YBP	RESCV	GTUE	GTDE	
F-0-1-4	PHTX	FCSWO	LCD	ISRT	SHLD	ISC	SELDLY	HSEL	
F-0-1-5	DOLMF	EPS	FCSM	DHLDTF	DOLMR	NDGBPS	DCC	DHLDTR	
F-0-1-6	CAC	CBC	UDP	DDP	LTF	HCTF	CCTF	SDTF	
F-0-1-7	DIN	CCHOLH	DHOF	DOIF	RUN	HD	H	HI	
F-0-1-8	LRC	LRF	DPR	THO	LBF	ISR	YRQ	TOS	
F-0-1-9	NDSF	STE	SQH	STCP	ECC	LWQ	HLW	LLW	
F-0-1-A	REV	GHTF	PSTX	GHTR	DSR	fireMlt	OUTDZ	DZORDZ	
F-0-1-B	PRT	TPR	HCDX	FIREMEM	aFire	mFire	HF2	HF1	
F-0-1-C	LU	LD	FON	insCT	insINC	insACC	insUP	insDN	
F-0-1-D	OFF	CTL	EPPT	SHNT	fireOut	PIT	PITI	IDLE	
F-0-1-E	fp2	FBPM	FBP	-	-	DHPO	DHLO	LOIL	
F-0-1-F	DRSOK	DSOF	DISCR	DISCF	DLYO	SSM	SSAFM	LSSM	
F-1-C-0	tesInp	FCS	FBPi	FONi	HF2i	HF1i	FRAi	FRSi	V5.x and ANSI 2k flags
F-1-C-1	SSM	SSAFM	LSSM	DCLF	DOLF	DHLDF	IND	LLI	
F-1-C-2	CGF	HDCDM	STPM	CSBM	stopM	DZM	GOV	GTSM	
F-1-C-3	DRST	GTSX	CGR	HDR	fltRst	DSAF	THD	DLM	
F-1-C-D				bbOut				LvlOut	
F-1-C-E			inStop		pOut			gtsOut	

Note: Hydraulic Elevators (only) High Speed on Inspection option, program Address FCBB to 02, verify local elevator code for compliance before changing. Controller shipped with option set to off

CONTROLS and INDICATORS



"WARNING"

For proper operation of Static Drive and Microprocessor Controller must ensure that:

1. Incoming controller power and outgoing motor power wires are routed in separate grounded conduits, and routed away from printed circuit boards.
   "DON'T ROUTE MOTOR AND POWER WIRES TOGETHER"
   Routing incoming power and outgoing motor power wires together may induce noise into power lines, and render "RFI" filters ineffective.

2. Properly ground motor and controller with direct solid wire. Indirect grounds that relay on pipes or conduit instead of a properly sized solid ground are a poor practice and may result in "RFI" noise.disturbances affecting electronic sensitive equipment.

"ENVIRONMENTAL LIMITS"

32 TO 104 DEGREES FAHRENHEIT OR 0 TO 40 DEGREES CELSIUS, 95 % RELATIVE HUMIDITY (NON-CONDENSING).

File: EF-P089-28

ELEVATOR CONTROLS
SIMPLE SOLID SUPPORTABLE

Bar over signal name indicates the signal is active when LED is off.

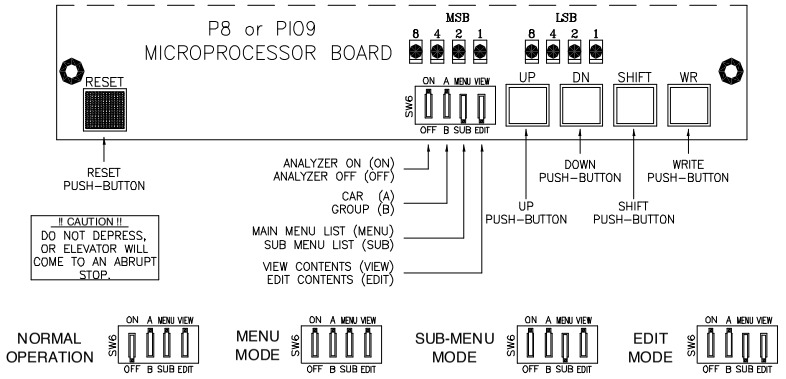
MEMORY FLAG LISTING

"DIRECT ACCESS" ADDRESS	Left Most L.E.D. ⑧	④	②	①	⑧	④	②	Right Most L.E.D. ①	
F-0-0-0	DOLF	DBCF	SAF	LLI		STU	STD	IND	INPUTS
F-0-0-1	IN	DOBF	DLK	DEL	UPS	DNS	LVL	EPI	
F-0-0-2	SEF	PHEF	DZF			USD1	DSD1	DHLDF	
F-0-0-3	USD2	DSD2	ISTU	ISTD	ATT	UP	DN	HLI	
F-0-0-4	TEST			BPI	BSI	ACS	HSI	WILD	
F-0-0-5	DOLR	DBCR	DOBR	DHLDR		SER	PHER	DZR	
F-0-0-6	EQI	CWI	EDS	APF	PGI		DCLR	DCLF	
F-0-0-7	MGR/AA	CSB	HR	HIR	DOFF	SU	SD	RL	OUTPUTS
F-0-0-8	DCFF	DCPF	EQS	NUDG	SPR	FGEU	FGED	MPR	
F-0-0-9	iEQI	iCWI	SUA	SDA	P4	P3	P2	P1	
F-0-0-A	ATE	ATB	ATU	ATD	HEWI	HCRO	HLWO	SALRM	
F-0-0-B	DOFR	RGEU	RGED	EQAM	DCFR	DCPR		SAFM	INTERNALLY GENERATED FLAGS
F-0-0-C	epDO	CCR	UCR	DCR	NDSR	FDCR	DPD	UPD	
F-0-0-D	LTR	HCTR	CCTR		UFQ	FDCF	DHOR		
F-0-0-E	STRE	TFX	DSF	DOIR	YRQ	TOS	EQN	EQA	
F-0-0-F	HCR	INC	ISV	CCD	PK	TFD	BFD	STC	
F-0-1-0	NDSF	CMC	CCA	CCB	MLT	DCA	DCB	lvlCSB	
F-0-1-1	CSI	DRLW	DMU	DMD		CCF	UCF	DCF	
F-0-1-2	DSM	-	DOMR	PGO	DOMF	UCA	UCB		
F-0-1-3	DDF	eqReset	CCCI	HSR	YBP	RESCV	GTUE	GTDE	
F-0-1-4	DPR	-	doTop	startW	SHLD	ISC	SELDLY	-	
F-0-1-5	DOLMF	EPS	HLT	DHLDTF	DOLMR	NDGBPS	DCC	DHLDTR	
F-0-1-6	CAC	CBC	UDP	DDP	LTF	HCTF	CCTF	SDTF	
F-0-1-7	DIN	CCHOLH	DHOF	DOIF	RUN	HD	H	HI	
F-0-1-8	mstrFire	FRC	FRM		FBPM	FCSM	fireMlt	fireCSB	
F-0-1-9	FWI	X85	FCS		FCSWO	pHTx	DOPH2	fp2	
F-0-1-A	REV	GHTF	PSTX	GHTR	DSR		OUTDZ	DZORDZ	
F-0-1-B		TPR	HCDX	STPC		LWQ	HLW	LLW	
F-0-1-C	LU	LD		insCT	insINC	insACC	insUP	insDN	
F-0-1-D	OFF	CTL	EPPT	SHNT	BLO	PIT	PITI	IDLE	
F-0-1-E	simplex	forceDoors	BL	STX	PIL	DHPO	DHLO	LOIL	
F-0-1-F	drsOR	drsOF	drsCR	drsCF	DLYO	SSM	SSAFM	LSSM	
F-1-C-2	CGF	HDBM	STPM	CSBM	stopM	DZM	GOV	GTSM	A.S.M.E. 2k
F-1-C-3	DRST	GTSX	CGR	HDR	fltRst	DSAF	THD	DLM	
F-2-1-9				bbOut				lvlOut	
F-2-1-A			inStop		pOut			gtsOut	
E-8-5-E	-	gFBP	-	gFON	gHF2	gHF1	FRA	FRS	SYSTEM
E-8-5-F	-	-	gFRO	-	-	-	gaFire	gmFire	
E-8-7-9	gEPO	gEPP	gHCDX	-	atLobby	EPIHSI	-	gEPI	
E-8-6-D	-	-	-	GRL	DUP	LUP	DDnP	BAL	

Note: Hydraulic Elevators (only) High Speed on Inspection option, program Address FCBB to 02, verify local elevator code for compliance before changing. Controller shipped with option set to off

GROUPLESS P8 or PI09 SOFTWARE VERSION 1.xx.xx

CONTROLS and INDICATORS



"WARNING"

For proper operation of static drive & microprocessor controller ensure that:

1. Incoming controller power and outgoing motor power wires are routed in separate grounded conduits, and routed away from printed circuit boards.
   "DON'T ROUTE MOTOR AND POWER WIRES TOGETHER"
   Routing incoming power and outgoing motor power wires together may induce noise into power lines, and render "RFI" filters ineffective.

2. Motor and controller are properlly grounded with direct solid wire. Indirect grounds that relay on pipes or conduit instead of a properly sized solid ground are a poor practice and may result in "RFI" noise.disturbances affecting electronic sensitive equipment.

"ENVIRONMENTAL LIMITS"

32 TO 104 DEGREES FAHRENHEIT OR 0 TO 40 DEGREES CELSIUS, 95 % RELATIVE HUMIDITY (NON-CONDENSING).

File: Group Less Memory Flag Map Rev 12-18-08

1.18 Software Version

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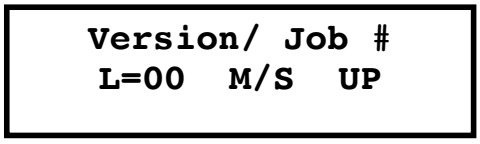
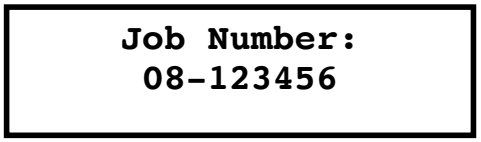


Submenu Switch down:

Submenu and Edit switches down:



To verify the software version, use the User Display to access the Software Version submenu.

1.19 ANSI-2000 Settings

If the controller is to comply with the requirements of ASME Code A17.1 – 200x (where x is the release year of the applicable safety code section), the controller will be provided with an A17.1-2000 Monitor Board and the following Direct Access parameters will have been set. The table below lists parameters required for ANSI-200x operation.

WARNING: Do not change † parameters (below) without first contacting Elevator Controls support staff for assistance.

ANSI-2000 Settings

Direct Access	Function
† FF16 = 09	Bit 0- 2000 code option bit † Bit 1- Car has PI's at lobby † Bit 2- Car has PI's at alternate fire floor † Bit 3- ∞ 2000 code, Monitor safeties through car B port † Bit 4- Rear Car Gate Monitoring input † Bit 5- Freight Doors ANSI-2000 monitoring Bit 6- Ignore Unintended Movement on Inspection Mode Bit 7- Daily GTS, GTSX monitoring cycle at 2:00 AM
FF18 = 05	Noise Filter; No of computer loops before fault is latched
Inspection Timer (FF90 / FF91)	For Ansi-2000, sets time to delays fault to allow exit from elevator. Default = 15 seconds. **Note: Timer can be set through System Timers menu.**
† Changing this parameter will change your terminal I/O configuration. Contact Elevator Controls support staff for assistance.	

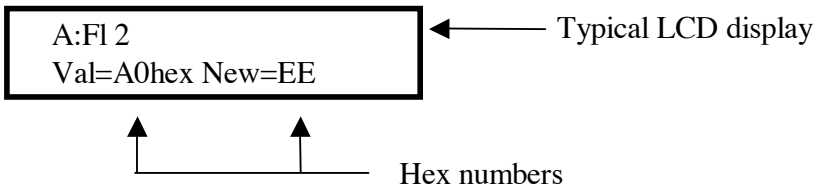
Appendix A –
Working with Hexadecimal Numbers

Elevator Controls uses hexadecimal (hex) numbers in several of the User Displays. Hex numbers are a compact way of representing information.

A1 – Converting Hexadecimal Numbers

Hex numbers are always displayed as two digits. The first digit (left hand side) contains the M or most significant information; the second digit (right hand side) contains the L or lest significant information. The digits themselves use the number 0 through 9 and letters A through F.

Hex Numbers



In the example above, A0 and EE are the hex numbers. A and E are the M digits and 0 and E are the L digits. The M and L digits are indicated in the description in the text by bold letters.

To use hex numbers, you must convert each digit separately into a series of four ones and zeros. Use the table on the next page to do the conversion. Then compare the ones and zeros with the description given in the User Display.

Converting Hex Numbers

Example Conversion A:Fl 2 VAL=C0hex (see page 16 Input Option 1)

Hex Number				**C**							**0**				
Converted				**1**	**1**	**0**					**0**	**0**	**0**		
Description	**M**	X	X	CCR			**;**	**L:**	UPR	DNR	UPF	DNF			

Result This shows that car will respond to front and rear car calls (CCR/CCF =0), and to all hall calls front and rear (UPR= DNR=UPF=UPR=0) since a 0 here means "eligible" (see

Hexadecimal Number Conversions			
Hex Number	Conversion	Hex Number	Conversion
0	0 0 0 0	8	1 0 0 0
1	0 0 0 1	9	1 0 0 1
2	0 0 1 0	A	1 0 1 0
3	0 0 1 1	B	1 0 1 1
4	0 1 0 0	C	1 1 0 0
5	0 1 0 1	D	1 1 0 1
6	0 1 1 0	E	1 1 1 0
7	0 1 1 1	F	1 1 1 1

A2 – Changing Hex Numbers

Changing a hex number is a four step process, whether it is an option, an internal flag or anything else. Follow the outline below:

1. Convert the hex number as described on the previous page. This will indicate which options are currently set.
2. Decide what options you want to set (or reset). If necessary, write the new series of ones and zeros down on paper. This will help verify that the new series is correct. Do not try to proceed until you've checked this new series at least once. It is very easy to make a conversion mistake.
3. Use the table above to look up the new hex number from the new series of ones and zeros. The ones and zeros are in no particular order so you'll have to search the table carefully. Double check that you have the correct new hex number (it is a good idea to convert the new number as described in the previous section).
4. Now change the hex number via the User Display as described on page 9 of this manual.

Changing a Hexadecimal Number

1. First convert the existing number to see which options are currently set. See instructions on the previous page.

A

1 1 0 0 0 0 0

X=1, X=1, CCR=0, CCF=0; UPR=0 DNR=0, UPF=0,

2. Then decide which options need to be changed. For example, assume that we only want the car to respond to car calls and hall up and down.

X=1, X=1, CCR=1, CCF=0; UPR=1 DNR=1, UPF=0,

1 1 0 0 1 1 0

3. Look up the new series of ones zeros in the table above.

C

4. Finally, follow the instructions on page 10 of this manual to change the number.

Appendix B –

B1 – Pneumonic description translation table and flag-LED memory locations

		LED Bank								
Name	Address	8	4	2	1	8	4	2	1	Description
ACS	F004						X			Alternate Call Scheme
aFire	F01B						X			Master Alternate Fire
APF	F006					X				Alternate Parking Floor Input
ATB	F00A		X							Attendant Buzzer
ATE	F00A	X								Attendant Enable
ATD	F00A				X					Attendant Down Direction Input
ATT	F003				X					Attendant Indicator
ATU	F00A			X						Attendant Up Direction Input
BFD	F00F							X		Bottom Floor Demand
BPI	F004				X					Brake auxiliary contact input
BSI	F004					X				Building Security Input
CAC	F016	X								Car Above Counterweight
CBC	F016		X							Car Below Counterweight
CCA	F010			X						Car Call Above Car
CCB	F010				X					Car Call Below Car
CCCI	F013			X						Car Call Cancel Input Flag
CCD	F00F				X					Car Call Disconnect
CCF	F011						X			Car Call Cancel Flag - Front
CCR	F00C		X							Car Call Cancel Flag - Rear
CCHOLD	F017		X							Car Call Hold
CMC	F010		X							Chicago Fire Memory
CSB	F007		X							Car Stop Bypass Output
CSI	F006						X			Car Select to run on EPI phase 2
CCTF	F016							X		Car Call Door Time - Front
CTL	F01D		X							Car to Lobby
CCTR	F00D			X						Car Call Door Time - Rear
CWI	F006		X							Counterweight Earthquake Input
DBCF	F005		X							Door Close Pushbutton Front
DBCR	F000		X							Door Close Pushbutton - Rear
DCC	F015							X		Door Close Complete
DCA	F010						X			Down Call Above the Car
DCB	F010							X		Down Call Below the Car
DCFF	F008	X								Door Close Function Front
DCFR	F00B					X				Door Close Function - Rear
DCLF	F006								X	Door Closed Limit Front
DCLR	F006							X		Door Closed Limit Rear

		LED Bank								
Name	Address	8	4	2	1	8	4	2	1	Description
DCPF	F008		X							Door Close Power Front
DCPR	F00B						X			Door Close Power - Rear
DCR	F00C				X					Down Call Rear
DDF	F013	X								Double Ding Function
DDP	F016				X					Down Direction Preference
DHLDF	F002								X	Door Hold Input Front
DHLDR	F005				X					Door Hold Input - Rear
DHLDTF	F015				X					Front Door Hold Timer Flag
DHLDTR	F015								X	Rear Door Hold Timer Flag
DHLO	F01E							X		Door Hold Output
DHOF	F017			X						Door Hold Open Front
DHOR	F00D							X		Door Hold Open Rear
DHPO	F01E						X			Door Hold Pre-Expired Output
DIN	F017	X								Door Inactive Flag
DISCF	FO1F				X					N.Y. Fire Doors Closing Front
DISCR	F01F			X						N.Y. Fire Doors closing Rear
DSOF	F01F		X							N.Y. Fire Doors Open Front
DRSOK	F01F									N.Y. Fire Doors Open Rear
DLK	F001			X						Door Lock Input
DLYO	F01F									Car Delayed Flashing Output
DMD	F011				X					Demand Down
DMU	F011			X						Demand UP
DN	F003							X		Attendant Down Direction Input
DNS	F001						X			Down Sense
DOBF	F001		X							Door Open Push-button - Front
DOBR	F005			X						Door Open Push-button - Rear
DOIF	F017				X					Door Open Intent Front
DOIR	F00E				X					Door Open Intent - Rear
DOLF	F000	X								Door Open Limit - Front
DOLR	F005	X								Door Open Limit - Rear
DOFF	F007					X				Door Open Function Front
DOFR	F00B	X								Door Open Function - Rear
DOLMF	F015	X								Door Open Limit Front Memory
DOLMR	F015					X				Door Open Limit Rear Memory
DOMF	F012					X				Door Open Memory Front
DOMR	F012			X						Door Open Memory Rear
DOPH2	F010	X								Door Open Phase flag
DPD	F00C							X		Down Previous Direction
DPR	F018			X						Door Protection Timer flag
DSF	F00E			X						Door Time Shortening Flag Front
DSM	F012	X								Chicago Door Button Pressed
DSD1	F002							X		Down Slowdown Switch 1 Input

		LED Bank								
Name	Address	8	4	2	1	8	4	2	1	Description
DSD2	F003		X							Down Slowdown Switch 2 Input
DSR	F01A					X				Rear Door Shortening flag
DZF	F002			X						Door Zone - Front
DZORDZ	F01A	X								Door Zone Front or Rear
DZR	F005								X	Door Zone - Rear
ECC	F019					X				Excess Car Calls
EDS	F006			X						Earthquake Direction Switch input
EPI	F001								X	Emergency Power Input
EPIM	F00B							X		Emergency Power Memory Flag
EPPT	F01D			X						Emergency Power Pre-Transfer
EPS	F015		X							Emergency Power Selected to Run
EQA	F00E								X	Earthquake Abnormal
EQAM	F00B				X					Earthquake Abnormal memory
EQN	F00E							X		Earthquake Normal
EQS	F00-8			X						Earthquake Output
EQI	F006	X								Earthquake Input
FBP	F01E			X						Fire Bypass Input
FBPM	F01E		X							Fire Bypass Memory
FCS	F002					X				Fire Service Phase 2 Input
FCSM	F015			X						Fire Service Phase 2 Memory
FCSWO	F014		X							Fire Service Phase 2 Was Active
FDCF	F00D						X			Doors Front Fully Closed Phase 2
FDCR	F00C						X			Doors Rear Fully Closed Phase 2
FGED	F008							X		Front Gong Enable Down
FGEU	F008						X			Front Gong Enable Up
FIREMEM	F01B				X					Fire Memory Flag
fireMLT	F01A						X			Fire Service With MLT Operation
fireOUT	F01D					X				Fire Service Output
FON	F01C			X						Fire Service Return Switch Input
FP2	F01E	X								Fire Phase 2 Flag
FRA	F000					X				Alternate Fire Service Input
FRC	F00E						X			Fire Service Phase 2
FRM	F00E					X				Fire Service Phase 1
FRS	F002				X					Main Fire Service Input
FWI	F009	X								Fire Warning Indicator
GHTF	F01A		X							Gong Hold Timer Front
GHTR	F01A				X					Gong Hold Timer Rear
GTDE	F013								X	Gong Timer Down Enable
GTUE	F013							X		Gong Timer Up Enable
H	F017							X		High Speed
HCDX	F01B			X						Hall Call Disconnect
HCR	F00F	X								Hall Call Reject

		LED Bank								
Name	Address	8	4	2	1	8	4	2	1	Description
HCRO	F00A						X			Hall Call Reject Output
HCTF	F016						X			Hall Call Door Time - Front
HCTR	F00D		X							Hall Call Door Time - Rear
HD	F017						X			High Speed Delay
HEWI	F00A					X				Hospital Emergency Indicator
HF1	F01B								X	Machine Room Smoke Detector
HF2	F01B							X		Hoistway Smoke Detector
HI	F017								X	High Intermediate Speed
HIR	F007				X					High Intermediate Speed Output
HLI	F003								X	Heavy Loadweigher Input
HLW	F019							X		Heavy Load Input
HLWO	F018							X		Heavy Load Output
HR	F007			X						High Speed Output
HSEL	F014								X	Hospital Selected Car
HSI	F004							X		Hospital Input
HSR	F013				X					Heat Sensor Input
IDLE	F01D								X	Idle Timeout output
IN	F001	X								Controller Inspection Input
INC	F00F		X							Independent Service Aux. Flag
insACC	F01C						X			Inspection/ Access mode
IND	F000								X	Independent Service Input
insCT	F01C				X					Car Top Inspection
insDN	F01C								X	Inspection Down Direction Input
insINC	F01C					X				In Car Inspection
insUP	F01C							X		Inspection Up Direction Input
ISTD	F003				X					Intermediate Step Down Input
ISTU	F003			X						Intermediate Step Up Input
ISC	F014						X			In Service Capable
ISR	F018						X			In Service & Ready
ISRT	F014				X					Truly in Service
ISV	F00F			X						In Service
LBF	F018					X				Car-At-Lobby
LCD	F014			X						Lobby Car Disable
LD	F01C		X							Leveling Down Input
LFP	F011		X							Lower Floor Parking Intent
LLI	F000				X					Light Loadweigher Input
LLW	F019								X	Light Load
LOIL	F01E								X	Low Oil Input
LRC	F018	X								Lobby Return Call
LRF	F018		X							Lobby Return Function
LSSM	F01F								X	Low Speed Safety Monitor Input
LTF	F016					X				Lobby Door Time Front

		LED Bank								
Name	Address	8	4	2	1	8	4	2	1	Description
LTR	F00D	X								Lobby Door Time - Rear
lvlCSB	F010								X	Car Safety Stop Switch Bypass
fireCSB	F012								X	Car Safety Stop Switch Bypass
LU	F01C	X								Leveling Up Input
LVL	F001							X		Leveling Input
mFIRE	F01B					X				Main Fire Master Flag
MGR/AA	F007	X								M/G Set Run Output
MIS	F012		X							Master In Service Flag
MLT	F010					X				Motor Limit Timer
MPR	F008								X	Microprocessor Running
NDGBPS	F015						X			Nudging Bypass
NDSF	F019	X								Front Hall Door Timer Non-Short.
NDSR	F00C					X				Rear Hall Door Timer Non-Short.
NUDG	F008				X					Nudging
N5B	F004			X						No 50 Buss (Hall Call Common)
OFF	F01D	X								Car Shot Off input
OUTDZ	F01A							X		Car Out of Door Zone Arear
PGI	F006					X				Passing Gong Input
PGO	F012				X					Passing Gong Out
PK	F00F					X				Car Parked
PHEF	F002		X							Photo-Eye Input Front
PHER	F005							X		Photo-Eye Input – Rear
PIT	F01D						X			Pit Switch Flag
PITF	F005					X				Not Used
PITI	F01D							X		Pit Switch Input
PRT	F01C	X								Park Release Timer Elapsed
PSTX	F01A			X						STU or STD flags active
PTR	F004	X								Permission to Run (From Group)
PTS	F004		X							Permission to Start (From Group)
REV	F01A								X	Car Reversal Flag
RGED	F00B			X						Rear Gong Enable Down
RGEU	F00B		X							Rear Gong Enable Up
RL	F007								X	Level/Relevel Output
RUN	F017					X				Elevator Run Flag
SAF	F000			X						Primary Safety String Input
SAFM	F00B								X	Safety String Input memory
SALRM	F00A								X	Security Alarm output
SD	F007							X		Down Direction Output
SDA	F009				X					Down Direction Arrow
SDTF	F016								X	Short Door Time Front
SDTR	F00D				X					Short Door Time Rear
SEF	F002	X								Safety Edge Input Front

		LED Bank								
Name	Address	8	4	2	1	8	4	2	1	Description
SELDLY	F014							X		Hospital Select Delay
SER	F005						X			Safety Edge Input - Rear
SPR	F009					X				Stall Protection Timer Expired
SHLD	F014					X				Hospital Select Hold
SHNT	F01D				X					Shunt Trip Input
SSAFM	F01F							X		SDI Safety String Monitor
SSM	F01F						X			Field Safety String Input
STC	F00F								X	Stepping Complete Flag
STCP	F019				X					Stepping Complete Flag Primed
STD	F000							X		Step Down Input
STE	F019		X							High Speed Stepping Error
SQH	F019			X						Fake High Speed for Squelching
STRE	F00E	X								Stop Timer Elapsed
STU	F000						X			Step Up Input
SU	F007						X			Up Direction Output
SUA	F009			X						Up Direction Arrow
TFAF	F011					X				Not Used Flag
TFAR	F00C	X								Not Used Flag
TFD	F00F						X			Top Floor Demand
TFX	F00E		X							Transfer Function
THO	F018				X					Tongue Hanging Out
TOS	F018								X	Timed Out Of Service
TPR	F01B		X							Timer Tick Input
UCF	F011							X		Up Call Cancel Flag Front
UCA	F012						X			Up Call Above the Car
UCB	F012							X		Up Call Below the Car
UCR	F00C			X						Up Call Cancel Flag - Rear
UFQ	F00D					X				Up First Qualifier
UDP	F016			X						Up Direction Preference
UFP	F011	X								Upper Floor Parking
UP	F003					X				Attendant Up direction Selection
UPD	F00C								X	Up Previous Direction
UPS	F001					X				Up Direction Sense
USD1	F002						X			Up Slowdown Switch 1 Input
USD2	F003	X								Up Slowdown Switch 2 Input
WILD	F004								X	Wild Switch Input
XREL	F00D								X	Especial Release from parking
YBP	F013					X				Wye Bypass flag
YRQ	F018							X		Request to Start M/G
85X	F009		X							Fire Service Output

LIMITED PRODUCT WARRANTY

Before attempting to install Elevator Controls products, please read and familiarize yourself with the respective manuals. Elevator Controls warrants its products to be free from defects in materials and workmanship for a period of 15 months from the date of shipment by Elevator Controls. Any defect appearing more than 15 months from the date of shipment by Elevator Controls shall be deemed to be due to ordinary wear and tear. Elevator Controls assumes no risk or liability for results of the use of products purchased from it, including but without limiting the generality of foregoing: (1) the use 8in combination with any electrical or electronic components, circuits, systems assemblies or any other materials or substances; (2) unsuitability of any product for use in any circuit or assembly or environment. Satisfaction of this warranty, consistent with other provision herein, shall be limited to, at the sole discretion of Elevator Controls, repair, replacement, or modification of the product, free of charge, F.O.B. factory. This warranty applies to any product which is received at the factory within said 15 months and which, upon examination by Elevator Controls, is determined to have a defect which has not been caused by misuse, neglect, improper installation, improper application, improper operation, improper maintenance, repair or alteration, accident, or unusual deterioration or degradation of the equipment or parts thereof due to physical environment or due to electrical or electromagnetic environment.

Should purchaser experience trouble or difficulty with any product of Elevator Controls and request engineering assistance either by telephone or a field visit or visits by a representative of Elevator Controls, Elevator Controls may, at its sole discretion, provide said assistance. Should, in the opinion of Elevator Controls, the trouble or difficulty be a warranty problem as herein described, Elevator Controls will absorb all travel, labor, and expense costs involved. Should in the opinion of Elevator Controls, the trouble or difficulty be a result of any other reason than the warranty described herein, the purchaser will be charged for the travel, labor, and expense costs by Elevator Controls, for providing engineering assistance, whether it be by telephone, correspondence, or field visit or visits by a representative of Elevator Controls. A schedule of fees is available on request for engineering services by Elevator Controls.

The giving of or failure to give any advice or recommendation by Elevator Controls shall not constitute any warranty by or impose any liability upon Elevator Controls.

This warranty constitutes the sole and exclusive remedy of the purchaser and the exclusive liability of the manufacturer, AND IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY AS TO MERCHANTABILITY, FITNESS FOR PURPOSE SWSOLD, DESCRIPTION, QUALITY, PRODUCTIVITY, OR ANY OTHER MATTERS. In no event shall Elevator Controls be liable for special or consequential damages or for delay in performance of this warranty.

6.3 Car Top Stations

CAR TOP INSPECTION STATIONS WITH EMERGENCY LIGHT, CAR TOP INSPECTION STATIONS, PENDANT STATIONS

FEATURES AND OPTIONS

CAR TOP INSPECTION STATIONS (ASME A17.1)

Option / Model	TCIDG	TCIDG-A	TCIDG-A120	TCIG-24	TCIG	TCIG-A24	TCIG-A	TCIG-A120
Fire Service (Buzzer & Jewel)	No	No	No	Fire Service 24-48VDC	Fire Service 115VAC	Fire Service 24-48VDC	Fire Service 115VAC	Fire Service 115VAC
Top Mounted Alarm Bell	No	Bell 6VAC	Bell 120VAC	No	No	Bell 6VAC	Bell 6VAC	Bell 120VAC
Height (Typical)	5.1”	6.6”	6.6”	5.1”	5.1”	6.6”	6.6”	6.6”
Box size	A	B	B	A	A	B	B	B

Standard Features:

- “Up” Button, DPDT(2NO-2NC), 10A 250VAC
- “Dn” Button, DPDT(2NO-2NC), 10A 250VAC
- “Enable”/”Safe” Button, SPDT(1NO-1NC), 10A 250VAC
- “Run”/”Stop” Switch, SPST(1NO), 20A 250VAC
- “Light” On/Off” Switch SPST(1NO), 20A 125VAC, 10A 250VAC
- “Normal Operate”/“Inspection” Switch, DPDT(2NO-2NC), 15A 125VAC, 10A 250VAC
- Ceramic Incandescent Light Bulb Socket
- 3 Prong Electrical Cord Duplex Outlet GFCI, 15A 125VAC
- Six (6) Pre-Drilled Mounting Holes, 0.3”Dia.

Optional Features:

- Rough Service Lamp
- Rough Service Lamp Guard
- Pushbutton And Switch Safety Guards
- 3 Prong Electrical Cord Duplex Outlet, 15A 120VAC
- Custom Contact Arrangement*
- Permanently Attached Work Light**
- Wiring***

Designed to meet ASME A17.1 Elevator Safety Code Requirements. CSA approved.
Dimensions box A: 12”L x 4.1”H x 4”D. Dimensions box B: 12”L x 4.1”H x 6”D.
* Contact arrangement can be modified upon request.
** Permanently attached work light w/GFCI, lamp and strain relief. Standard cord length 12’, other lengths can be made.
*** Stations could be prewired according to customer specifications with multi-cable and optional flexible metal conduit. Please specify length.

6.4 GAL MOVFR Door Operator

G.A.L. Manufacturing Corporation
50 East 153rd Street, Bronx, N.Y. 10451
Phone 718-292-9000
Toll Free 877-425-3538
877-425-7763
Fax 718-292-2034
Web www.gal.com
E-mail info@gal.com

ISO 9001 : 2000 REGISTERED FIRM

MOVFR

DOOR OPERATOR INSTALLATION AND ADJUSTING MANUAL

Doc. No. DOC-0015N Revision D (12/09)

i

COMMENTS

All G.A.L. door operators are factory adjusted and tested for the actual job requirements. When installed correctly, they may require minor adjustments to suit actual job conditions.

IMPORTANT:

All equipment must be installed, adjusted, tested and maintained to comply with all Federal, State, and Local codes.

See section 7.6, page 28 in this manual for Kinetic Energy and closing force requirements.

Before mounting the operator, check that the car door is plumb, free and moves easily without bind. Check the attached standard measurements sheets. Install the operator according to the measurements supplied.

FOREWORD

It is the intent of this manual to give the reader certain key points of information critical to the proper installation of the door operator. It is not intended to give comprehensive installation procedures nor does it cover the installation of door headers, tracks, hangers, etc.

It is hoped that the procedures presented in this manual will reduce the installation and adjustment time and result in a smooth, long lasting door operation.

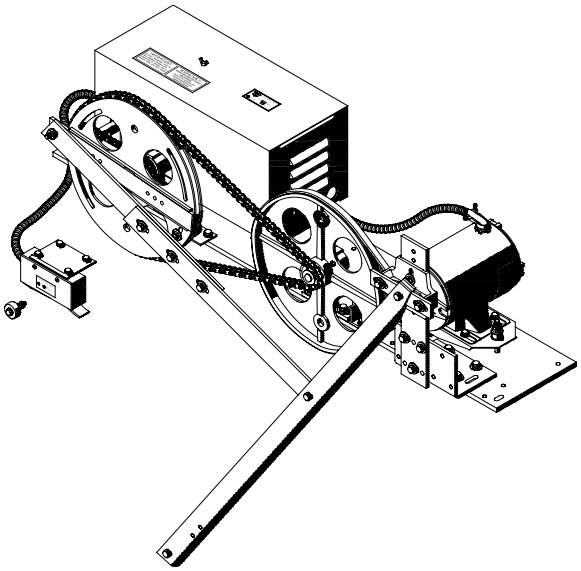
When properly installed, G.A.L. operators will give many years of trouble free service.

TABLE OF CONTENTS

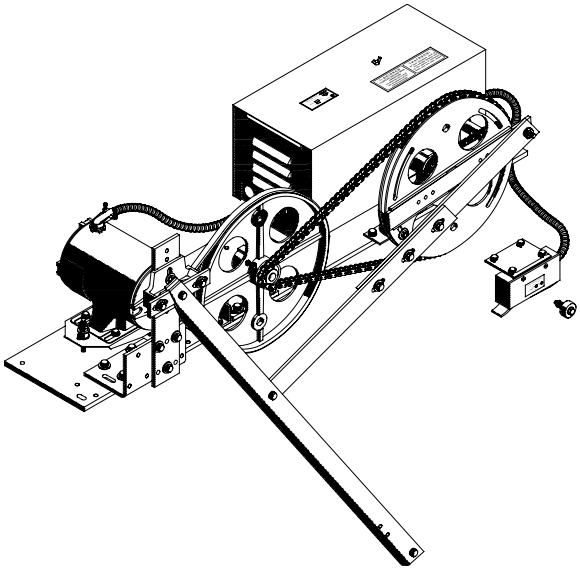
1
MOVFR OPERATORS

The MOVFR door operator is our newest model. It utilizes a 1/2 HP AC motor. the controls include the AC motor, a VVVF drive and a PC board.

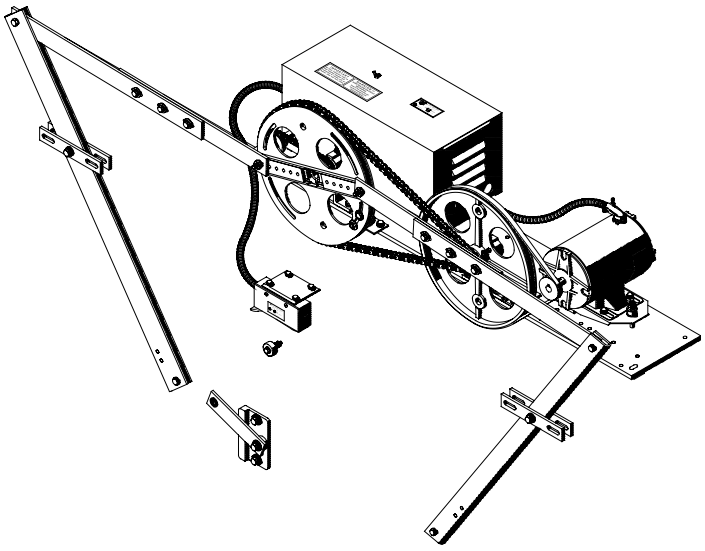
The illustrations on this page show the three different versions available; Left Hand, Right Hand and Center Parting.



LEFT HAND SIDE OPENING



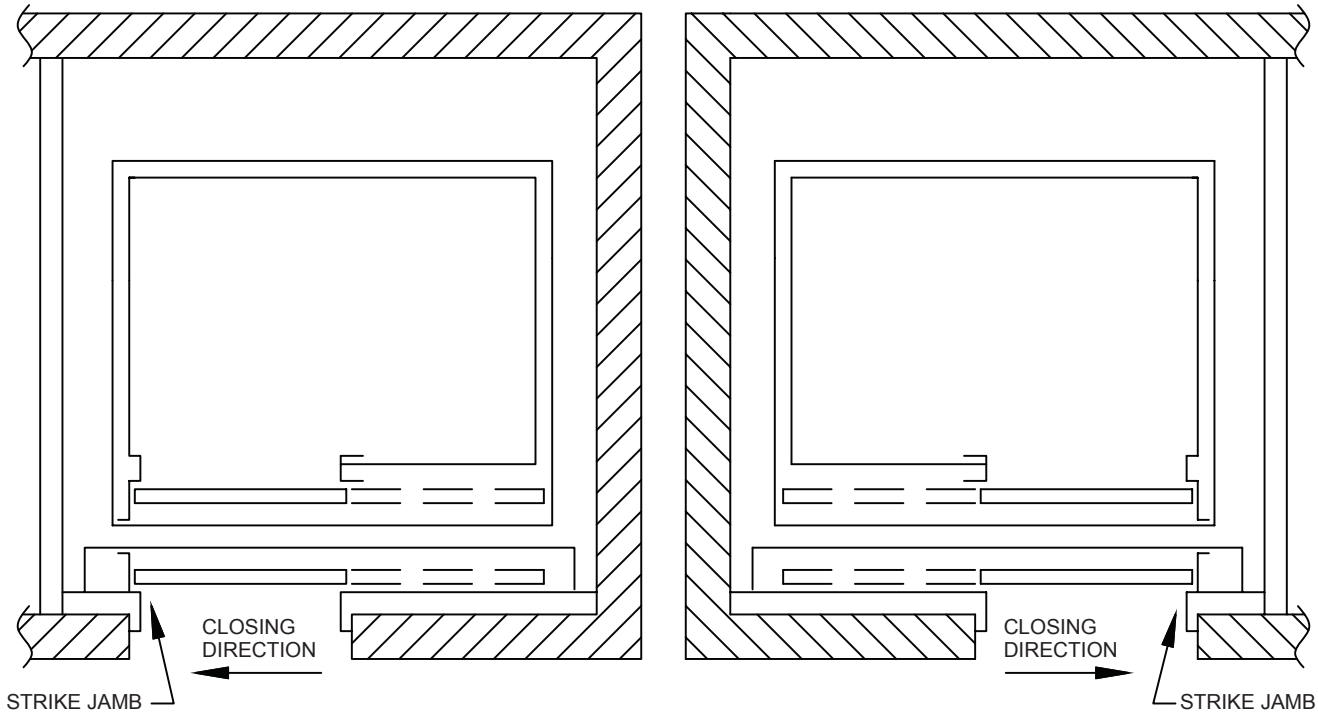
RIGHT HAND SIDE OPENING



CENTER PARTING

2
DETERMINING THE HAND OF THE DOOR

G.A.L. door operators are available for right hand doors and for left hand doors. (Center parting doors use a variation of the left hand operator). to determine the hand of the door, stand in the lobby facing the elevator doors. If the doors close to the left, it is a left hand door. If the door closes to the right it is a right hand door. The left hand, center parting and right hand operators are not interchangeable. The figures below illustrate the door hand.



LEFT HAND DOOR **RIGHT HAND DOOR**

3
MOUNTING THE OPERATOR

As with all G.A.L. operators it is important to have the proper mechanical set up. Before continuing, check that doors are hung properly and glide freely with no binding. The spring closer should also be set so that the hoistway door will close fully. The door operator should be mounted in the proper position with the drive arm plumb and the operator arm and pivots set according to the DATA sheets (DATA21 for single speed, DATA22 for two speed). Slight differences are acceptable.

Install the isolation pads.
Isolation pads for the operator base are provided to minimize noise and vibration transmission into the cab. These pads must be glued to the operator base before mounting it to the car top.

Set the header plumb.
Place the operator over the pre-tapped holes in the header assembly. Set the base flush with the face of the header assembly and tighten the front bolts only. Move the operator base and header until the header is perfectly plumb. Temporarily clamp the rear of the base to the operator support to prevent any further movement of the header.

Side opening Doors:
With the header assembly correctly installed, the vertical centerline of the operator drive pulley should be 9 3/4” form daylite for a door opening of 22” to 44” and 14 3/4” for a door opening of 45” to 48” (see figure 3 and Appendix drawings No. DATA21 and DATA22).

Center parting Doors:
With the header assembly correctly installed, the center of the door opening lines up with the center of the header track. the center of the operator drive pulley should also line up with center of the opening (see figure 6 and Appendix drawings No. DATA23).

Determining the position of the front edge of the door operator base:
Mount the drive arms to the drive arm support brackets on the header assembly for center parting doors and to the drive arm support bracket for slide doors. The mounting brackets are slotted for fine adjustment later, if needed. At this time, position the arms in the center of the bracket and tighten it.

Attach the connecting linkage(s) to the drive pulley, making sure that when the word “CLOSED” is on top the doors will be closed. Tighten the linkage(s) to drive pulley.

Attach the clutch assembly to the drive door linkage, then attach the clutch to the drive door using the pre-tapped holes on the door panel. Tighten the clutch assembly to the drive door. Attach the other door (for center parting doors) to its linkage and tighten the door bracket to the center of the slots.

Raise or lower the rear operator support bracket mounted to the cab to vertically level the operator drive pulley. This helps to prevent binds in the opening and closing.

Check that the operator arms hang free and are not forced to or away from the operator drive pulley. Slide the operator forward or backward, if necessary. Turn the drive pulley by hand making sure that the

drive arms and connecting links are perpendicular and clear of door and track. If necessary, slide the operator base forward or backward.

Proper positioning of the operator is critical to the life of the arm bearings. Bending of the drive arms will place stress on the bearings reducing their operating life.

Once the operator base is in correct position, drill the holes to permanently fasten the rear of the operator and tighten all mounting bolts.

4

PRE-ADJUSTMENT TIP

BEFORE PROCEEDING TO THE ADJUSTMENT SECTIONS, READ THE FOLLOWING TIP (REFER TO FIGURE 1)

Think of the drive pulley crank arm(s) and the connecting link(s) as each having its own independent role **The crank arm determines the total door travel.** The further the arm is away from the drive pulley, the longer the door travels.

The connecting link determines the door position. The longer the arm, the further the door moves from the jamb.

Example:

If the door opening is 42” but the door travels only 40” as stopped by the open and close limit cams, do not alter the cams. The cams have been factory pre-set. Correct the under travel by extending the crank arm outward from the drive pulley until the door travels 42” from fully open to fully closed (as determined by the limit cams), then fasten the crank arm in place.

Now, loosen the connecting link bolts, close the door against the stop roller and tighten one of the link bolts. Open the door until the open limit is activated and check the door position. If the door is not in the proper open position, close the door and readjust the connecting link. Repeat the above steps until the operation is complete and the fasten the two link bolts. Make sure that the closing door is stopped against the stop roller and not the strike post.

Remembering the above two points will facilitate door adjustments.

Bear in mind, that the drive pulley crank arm position and the cams are pre-set by our factory as indicated on the installation drawings.

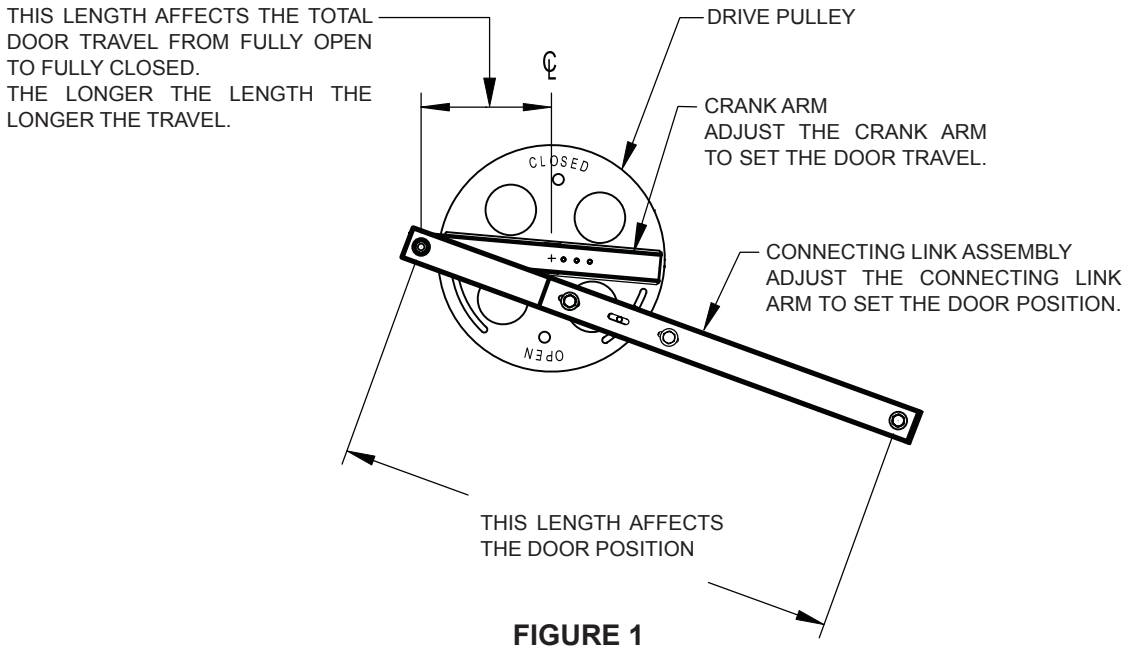


FIGURE 1

5

ADJUSTING THE SINGLE SPEED AND TWO SPEED SLIDE DOORS

5.1 Removing the zone locking device and the bumpers:

Before adjusting the operator, remove the car door bumpers and the locking cam from the zone locking device, (see document LWZ-1). Removing the locking cam from the zone locking device, allows unimpeded movement of the doors.

Removing the bumpers - Because the car door moves to unlock the hoistway door, it must move approximately 7/16” further than the hoistway door. Removing the car door bumpers makes up some of this difference and allows better door alignment at full open.

5.2 Adjusting the release roller and clutch:

Referring to figure 2A, adjust the lock release rollers so that they will clear the clutch by about 3/16” when the car door is in its final closed position and the drive pulley stop roller is against the stop plate. Adjust the clutch cam and roller depth as per figures 2C and 2D. The clutch should retract as late as possible in the closing cycle.

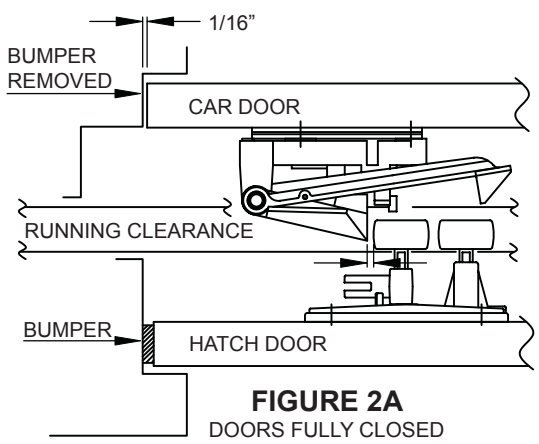


FIGURE 2A
DOORS FULLY CLOSED

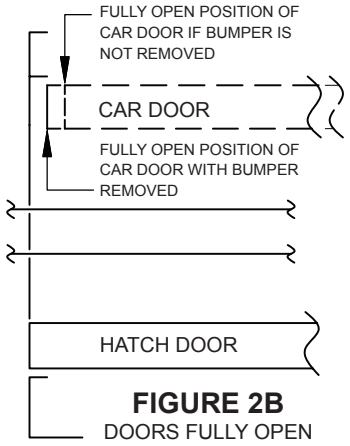


FIGURE 2B
DOORS FULLY OPEN

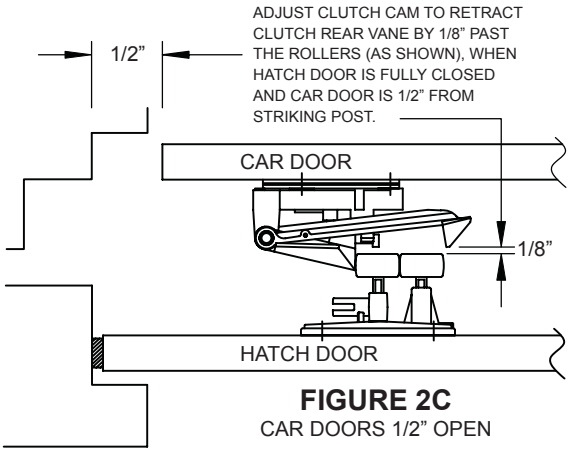


FIGURE 2C
CAR DOORS 1/2” OPEN

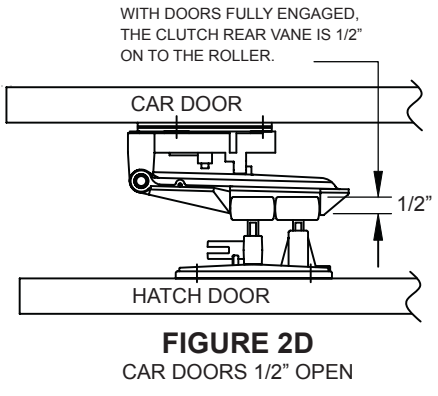


FIGURE 2D
CAR DOORS 1/2” OPEN

5.3 Crank arm and clutch link positions with door closed:

Referring to figure 3, with the door fully closed, the crank arm should be just a few degrees above the horizontal and the clutch link about 20 degrees above the horizontal. This setting will help prevent slamming and roll back, yet still allow manual opening of the doors when the car is stopped at a landing during a power failure.

If adjustments are necessary, close the car door. Loosen the two connecting link bolts and the two crank arm bolts. Keeping the door fully closed, adjust the link and arms to the proper positions. If necessary move the bolts to new holes. Re-tighten all four bolts when finished.

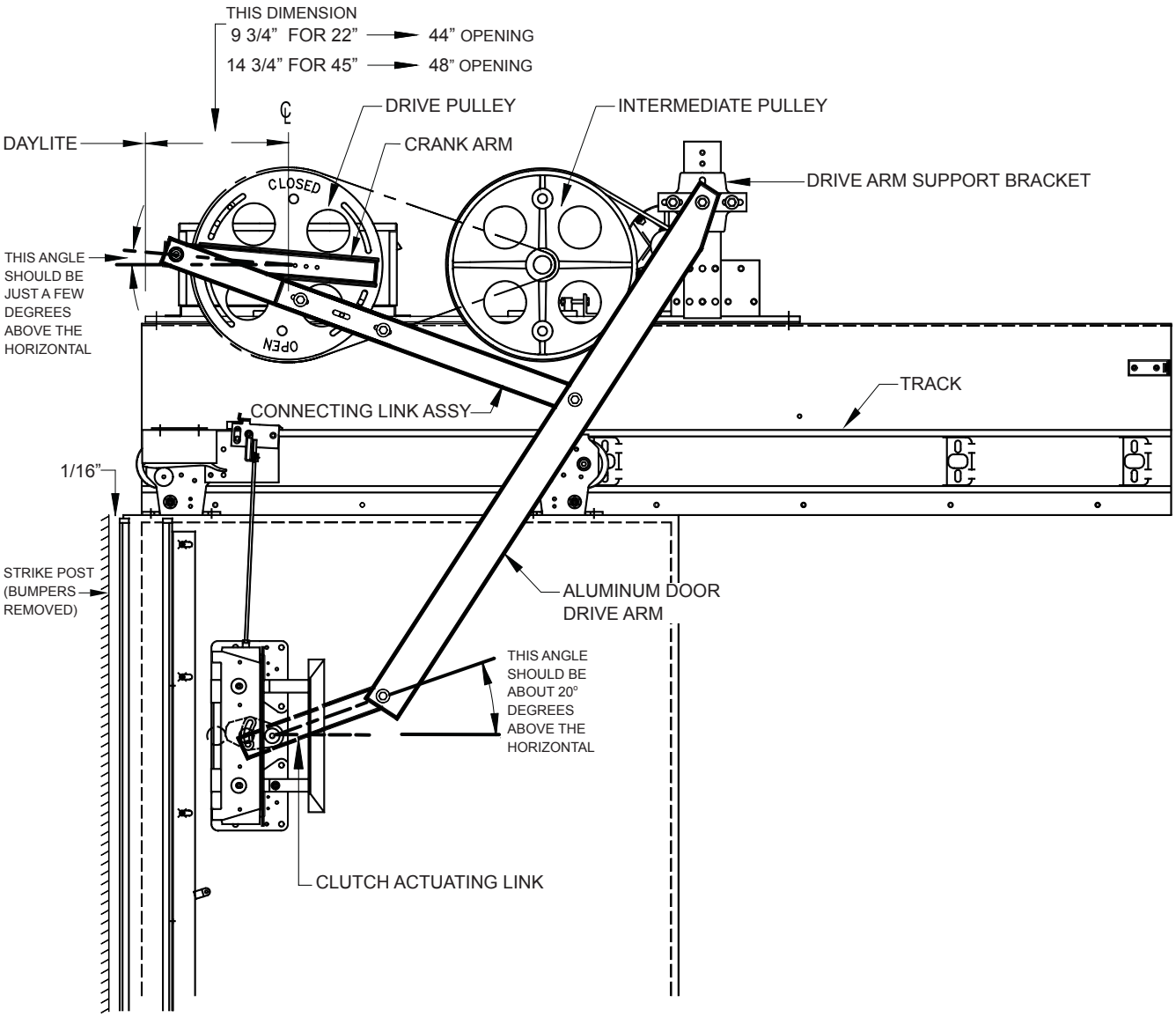


FIGURE 3
DOOR FULLY CLOSED

5.4 Crank arm and clutch link positions with door open:

Referring to figure 4, the best door opening operation occurs when the crank arm and the connecting link are in a straight line, the clutch link is about horizontal and the car door is approximately 1/2” past the return jamb. To make this adjustment, turn the drive pulley toward the open direction by hand until the crank arm and the connecting link are in line. Adjust the crank arm to bring the car door to 1/2” into the return jamb, then re-adjust the door open limit to stop the door electrically at this position.

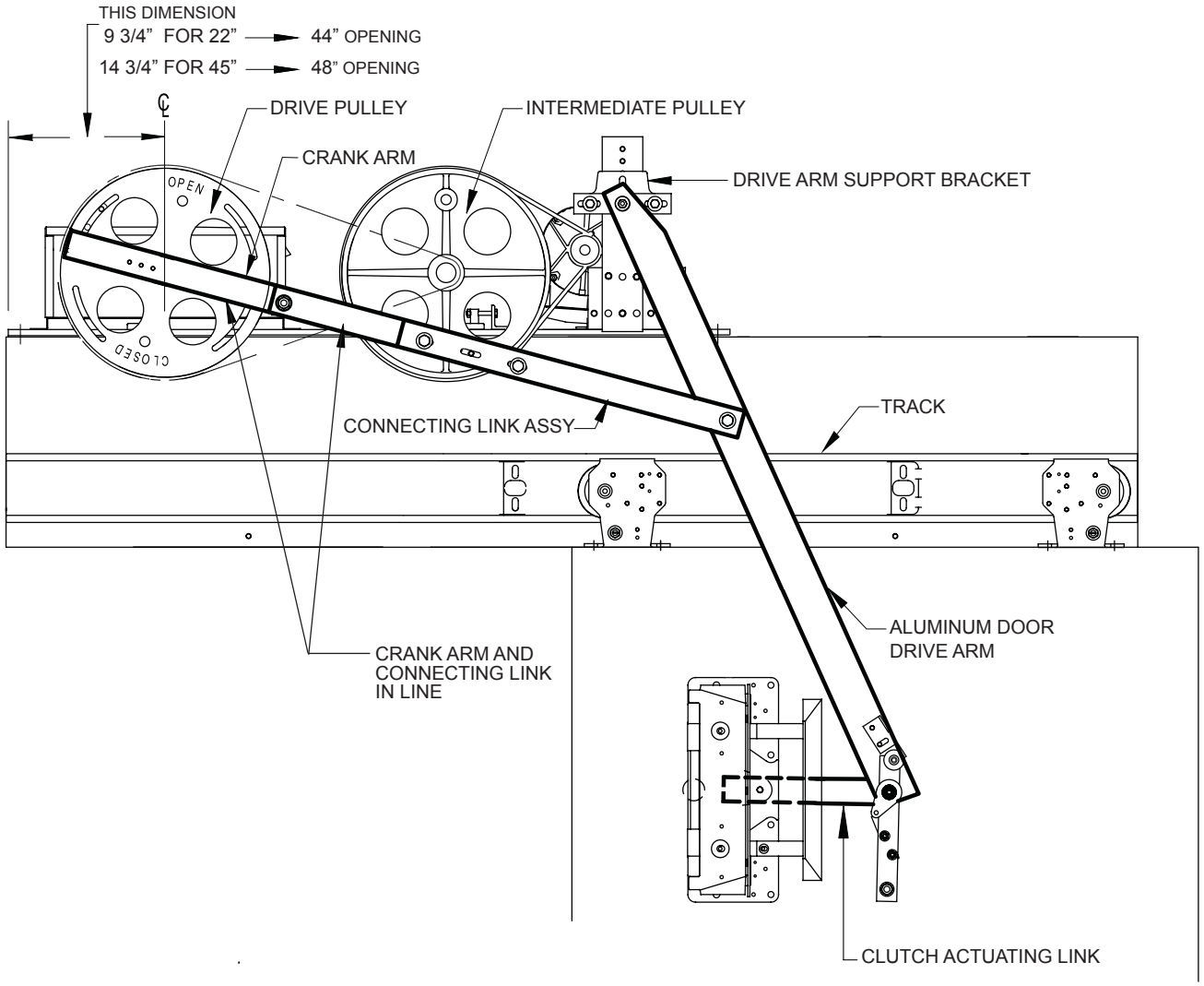


FIGURE 4
DOOR FULLY OPEN

6
ADJUSTING CENTER PARTING CAR DOORS

6.1 Adjusting the stop roller:

Referring to figure 5A, we recommend adjusting the driven car door so that it leads the hoistway door by 1/4". This will make the car door more closely match the hoistway door when fully open. Adjust the stop roller on the drive pulley so that the closing doors will be stopped by the roller as they meet. Do not have pressure on the meeting car doors, otherwise it will place unwanted stress on the arms.

6.2 Adjusting the release roller and clutch:

Referring to figure 5A, adjust the lock release rollers so that they will clear the clutch by about 3/16" when the car doors are in their final closed position and the operator stop roller is against the stop plate. Adjust the clutch cam as per figures 5B and 5C. The clutch should retract as late as possible in the closing cycle.

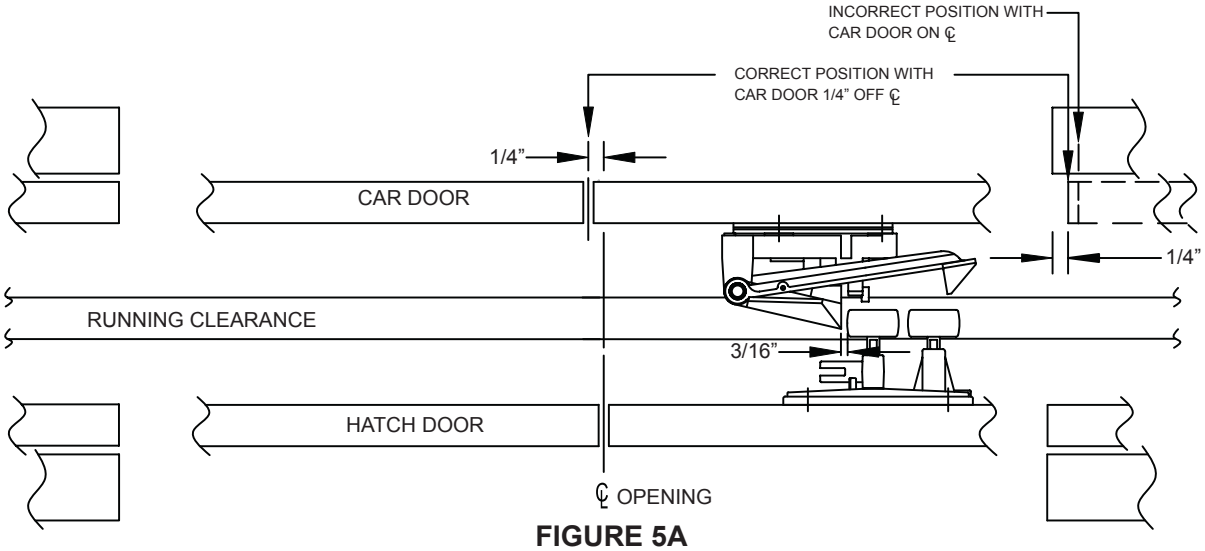


FIGURE 5A
DOORS FULLY CLOSED

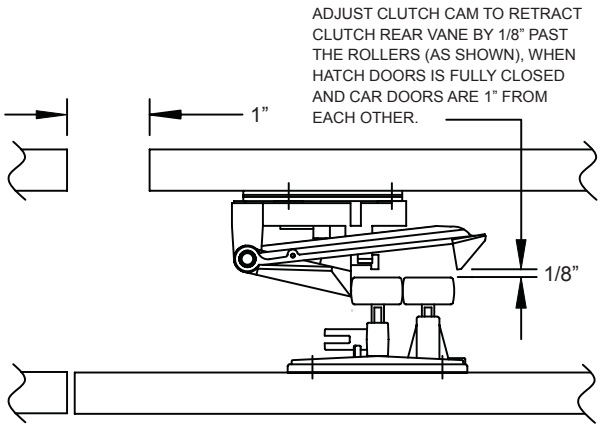


FIGURE 5B
CAR DOORS 1" OPEN

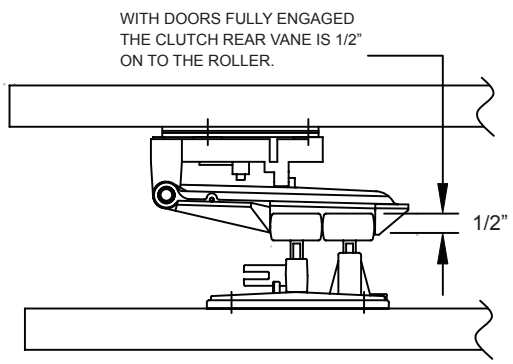


FIGURE 5C
DOORS FULLY ENGAGED

6.3 Crank arm and clutch link positions with doors closed:

Referring to figure 6, with the doors fully closed, the connecting links should be about 1 1/2" from the horizontal centerline of the pulley. the clutch link should be at about 20 degrees above the horizontal. as shown.

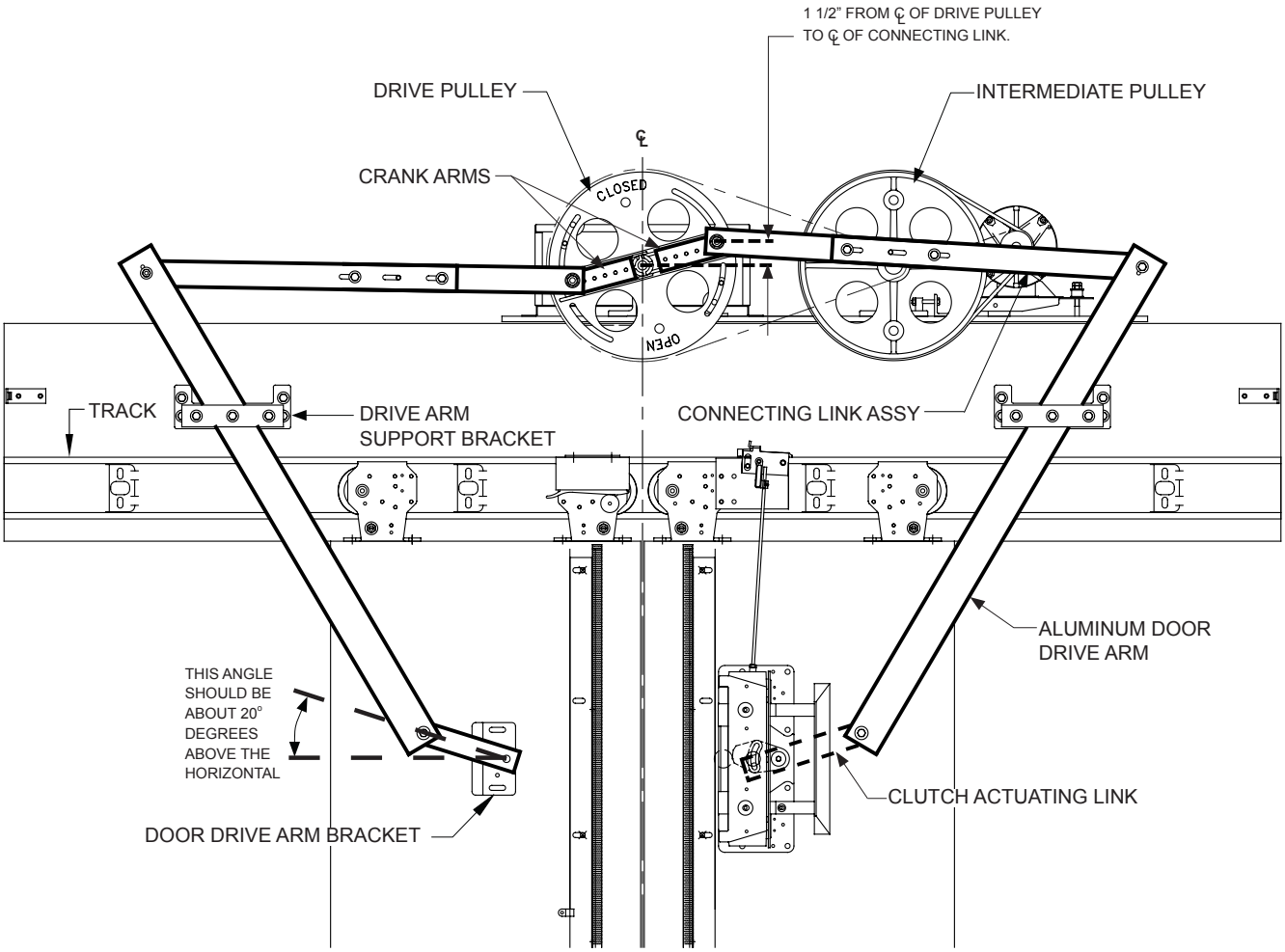


FIGURE 6
DOOR FULLY CLOSED

6.4 Crank arm and clutch link positions with doors open:

Referring to figure 7, with the doors fully open, the connecting links should be about 1 1/2" apart. the clutch link should be at about 20 degrees above the horizontal.

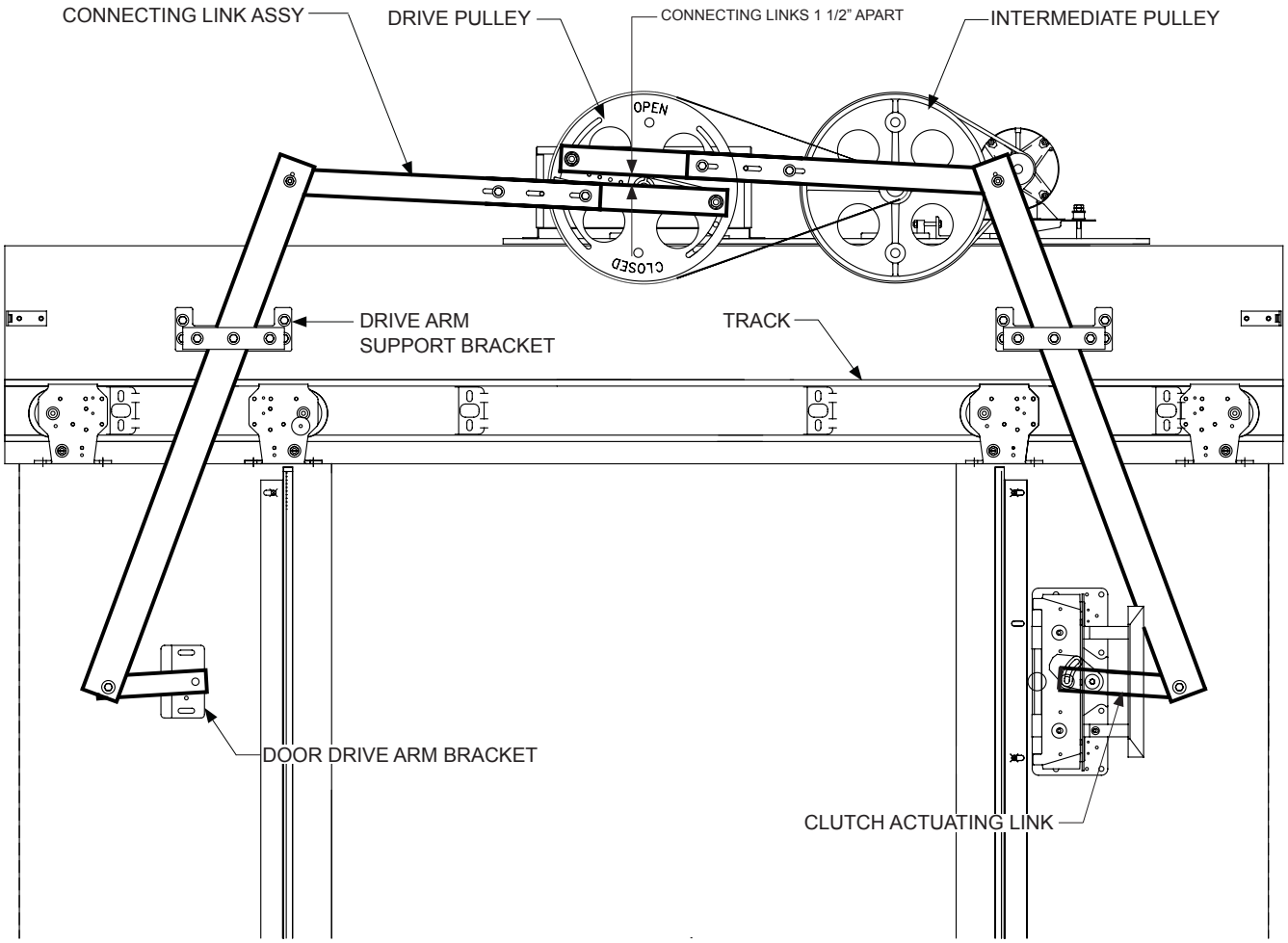
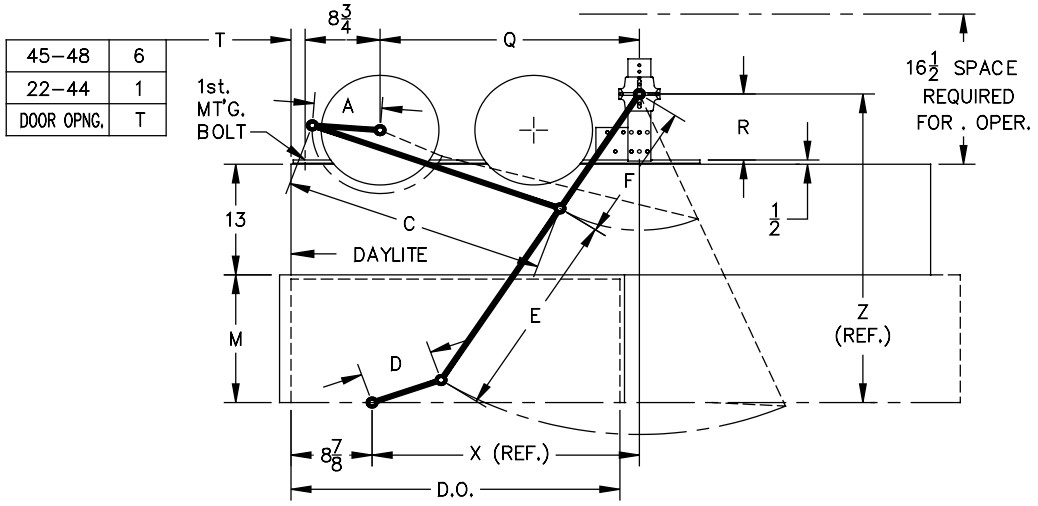


FIGURE 7
DOOR FULLY OPEN



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46	9 11/16	33 15/16	12	31	21	23	39 5/8	47 1/2	33 3/4	11
45	9 1/2	33 3/4	12	31	21	23	39 5/8	47 1/2	33 3/4	11
44	9 7/8	34 3/4	10	26	20	19	34 5/8	42	33 3/4	9 1/2
43	9 11/16	34 9/16	10	26	20	19	34 5/8	42	33 3/4	9 1/2
42	9 7/16	34 3/8	10	26	20	19	34 5/8	42	33 3/4	9 1/2
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23	5 5/16	25 3/16	10	18	14	11	25 7/8	30 3/4	25	6 1/4
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INCHES	A	C	D	E	F	M	X	Z	Q	R
DOOR OPENING	OPERATOR ARMS		DOOR ARMS			CLUTCH	PIVOT		OPERATOR	

GAL ELEVATOR DEVICES

SINGLE SPEED 22-48 D.O. OPERATOR DATA TABLE

NOV. 11, 1994

DATA21

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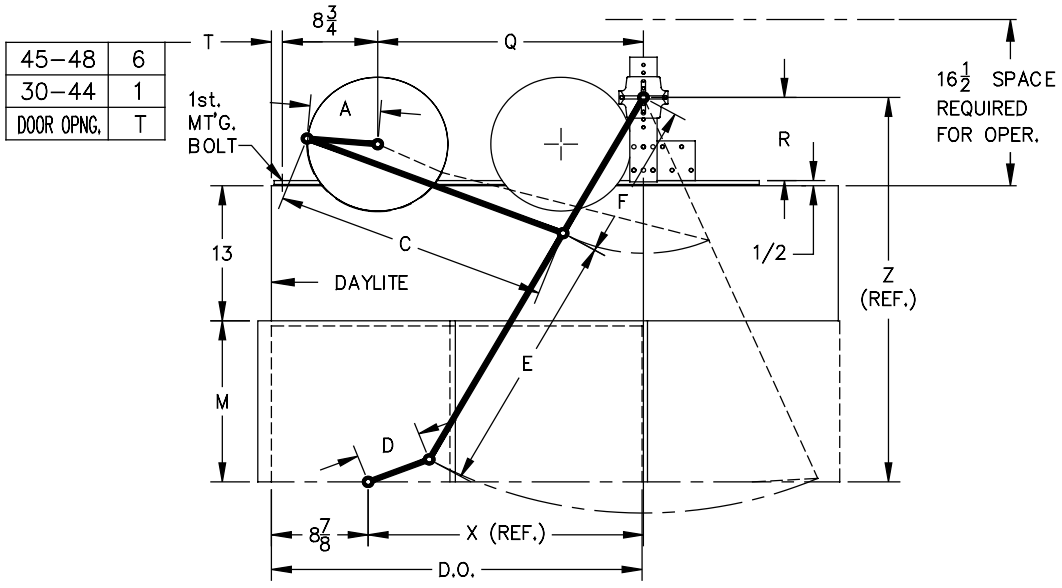
30–44	1
DOOR OPNG.	T



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45	9 1/2	33 3/4	12	31	21	23	39 5/8	47 1/2	33 3/4	11
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43	9 11/16	34 9/16	10	26	20	19	34 5/8	42	33 3/4	9 1/2
42	9 7/16	34 3/8	10	26	20	19	34 5/8	42	33 3/4	9 1/2
41	9 3/16	34 3/16	10	26	20	19	34 5/8	42	33 3/4	9 1/2
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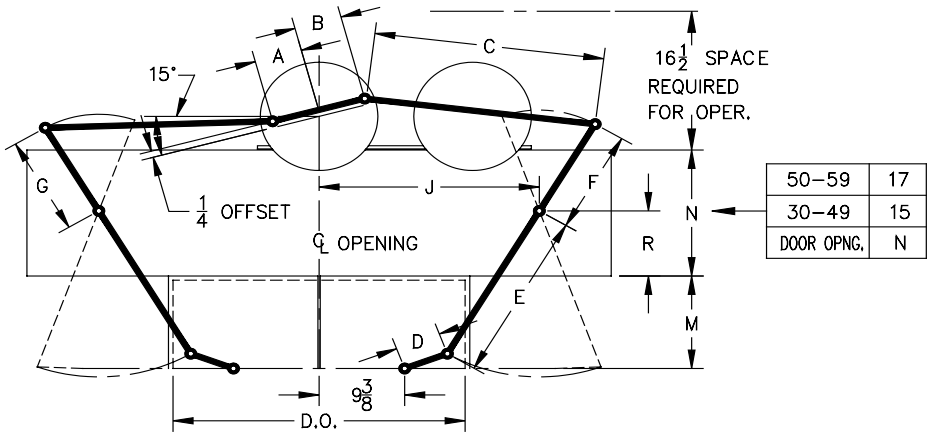
31	5 15/16	24 1/16	6	25	15	15	24 1/2	37 3/8	23 1/2	8 7/8
30	5 3/4	23 7/8	6	25	15	15	24 1/2	37 3/8	23 1/2	8 7/8
INCHES	A	C	D	E	F	M	X	Z	Q	R
DOOR OPENING	OPERATOR ARMS		DOOR ARMS			CLUTCH	PIVOT		OPERATOR	

G A L ELEVATOR DEVICES

TWO SPEED 30-48 D.O. OPERATOR DATA TABLE

AUG. 23 1994

DATA22



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57	7½	7 15/16	35 ¼	8	29½	15	14½	19	7¾	34
56	7⅜	7 13/16	35⅜	8	29½	15	14½	19	7¾	34
55	7¼	7 11/16	35½	8	29½	15	14½	19	7¾	34
54	6 7/16	7½	34	8	29½	15	13	19	8½	33
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44	5 5/16	5⅝	29⅛	6	25½	12	11½	15	8⅝	28¼
43	5 3/16	5½	29¼	6	25½	12	11½	15	8⅝	28¼
42	5 1/16	5⅜	29⅜	6	25½	12	11½	15	8⅝	28¼
41	4 15/16	5¼	29½	6	25½	12	11½	15	8⅝	28¼
40	4 13/16	5⅛	29⅝	6	25½	12	11½	15	8⅝	28¼
39	5⅞	6⅛	27½	6	21	12	11½	11	8½	26⅝
38	5⅝	5 15/16	27⅝	6	21	12	11½	11	8½	26⅝
37	5½	5 13/16	27¾	6	21	12	11½	11	8½	26⅝
36	5 5/16	5⅝	27⅞	6	21	12	11½	11	8½	26⅝
35	5⅛	5½	28	6	21	12	11½	11	8½	26⅝
34	5	5 5/16	28⅛	6	21	12	11½	11	8½	26⅝
33	5 3/16	5 9/16	25 1/16	5	19¾	12	11½	11	7¾	24⅛
32	5 1/16	5⅜	25 3/16	5	19¾	12	11½	11	7¾	24⅛
31	4 15/16	5¼	25⅜	5	19¾	12	11½	11	7¾	24⅛
30	4 13/16	5⅛	25½	5	19¾	12	11½	11	7¾	24⅛
INCHES	A	B	C	D	E	F	G	M	R	J
DOOR OPENING	OPERATOR ARMS		DOOR ARMS					CLUTCH	PIVOT	

GAL ELEVATOR DEVICES

CENTER OPENING 30–59 D.O. OPERATOR DATA TABLE

NOV. 11, 1994

DATA23

G.A.L. Manufacturing Corporation
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MOVFR
ELECTRICAL ADJUSTMENTS

ELECTRICAL ADJUSTMENTS

ADJUSTING INSTRUCTIONS FOR THE G.A.L. VARIABLE FREQUENCY CLOSED LOOP DOOR OPERATOR TYPE MOVFR

7.1 Overview:

The MOVFR is a 230VAC door operator. It is controlled by a variable voltage, variable frequency (VVVF) closed loop drive. The control includes an AC ½ HP Motor, a VVVF Drive, and a PC board. It features keypad programming with digital display, door position optical cams, sequential Light Emitting Diodes (LED) for door speed positions, obstruction detection signal, and DPM Fault Monitor* signal. A Heavy Door Input, and an Auxiliary Cam are also available, when needed. MOVFR accepts universal input control signals from dry contacts to signal voltages, from 24 to 230V AC or DC**. The output contacts rated at 10Amp, 230VAC, and they are: Door Close Limit (DCL), Door Open Limit (DOL), Re-Open (REOPEN), Door Protection Monitor (DPM), and Auxiliary (AUX).

*: The Fault Monitor is a G.A.L. patented door lock and gate switch protection device. Its purpose is to meet the ASME A17.1 RULE 210.15 and CAN/CSA-B44-M90 RULE 3.12.1.5.
**: If the input signal voltage is 60 volts or less, the input board resistor must be cut (see connection diagram Dwg. No. 8032).

7.2 Adjustment aids:

Switches, LED pilot lights and a Parameter Unit are available to aid the adjustment of the operator (see Figure 7.2.A).

A. Five toggle switches are provided to facilitate the adjusting procedure as describe below:

1. RUN/CAM SETUP switch. The RUN position is for normal operation. The CAM SETUP position allows adjusting the cams and turning on the appropriate pilot lights without applying power to the motor.

2. AUTO/MAN. switch. The AUTO position is for normal operation. The MAN. position allows opening and closing the door by means of the OPEN/CLOSE switch.

3. OPEN/CLOSE switch allows constant pressure opening and closing when the AUTO/MAN. switch is in the MAN. position.

4. NUDG. switch allows closing the door at a reduced speed (nudging speed) when the AUTO/MAN. is in the MAN. position and constant pressure is applied to CLOSE position and NUDG position of the OPEN/CLOSE and NUDG switches respectively.

5. HEAVY/RESET switch. When the AUTO/MAN. switch is in the MAN. position, if a constant pressure is applied to the HEAVY position, it will work in conjunction with OPEN/CLOSE, NUDG. switches to open, close, or nudge the door. The RESET position allows manual reset of faults of the drive. On the drive, the Green LED indicates drive has power, the Red LED indicates an alarm has occurred and shutdown the drive. If this occurs, make a visual inspection of the door, and if there are no visible problems, place the AUTO/MAN. switch in the MAN. position, apply pressure to the RESET position of the HEAVY/RESET switch then release. Operate the door with the OPEN/CLOSE switch.

Making sure that all is clear before returning to AUTO mode. Use the Parameter unit to view the Alarm history.

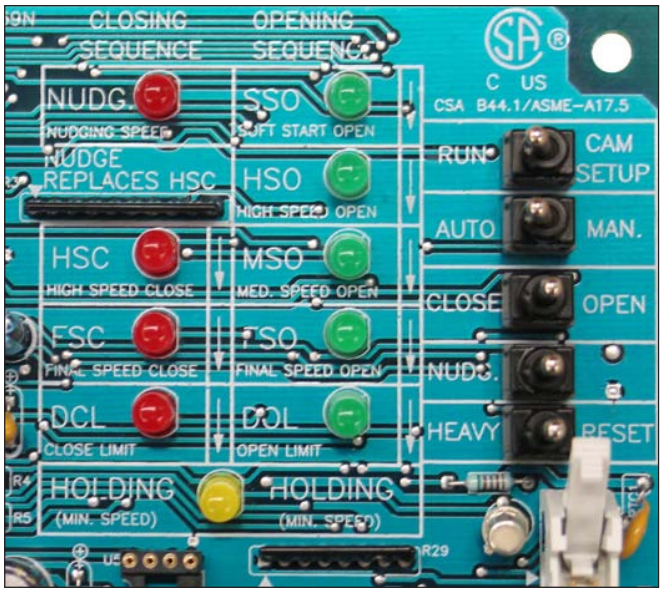


FIGURE 7.2.A

B. LED pilot lights:

A Red LED is provided on each of the four input boards (open, close, nudg., heavy). Heavy input is optional. As mentioned earlier, the input board resistor must be cut if the inputs signal voltage is 60 volts or less (see Figure 7.2.B.1).

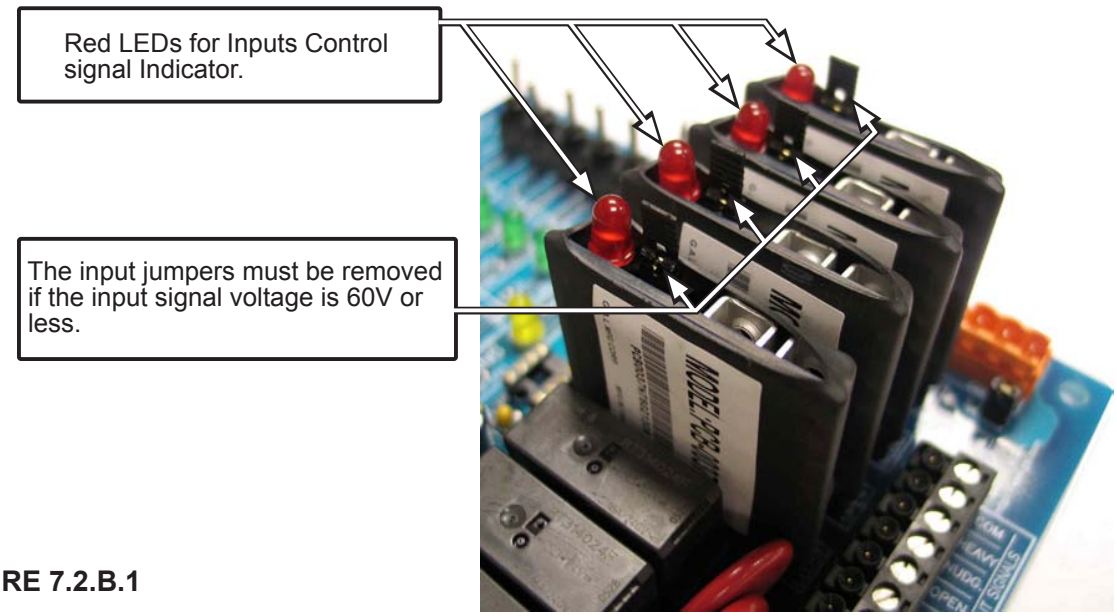


FIGURE 7.2.B.1

There are 16 more LED lights are provided to indicate the position of the speed cams, limit cams and modes of operation. When a cam blocks an optical sensor, the function is activated and the corresponding LED light turns on (see Figure 7.2.B.2). The 16 LED lights are:

1. HSC: High Speed Close.
2. FSC: Final Speed Close.
3. DCL: Door Close Limit (DCL output relay is energized when the DCL LED light turns on).
4. SSO: Slow Start Open.
5. HSO: High Speed Open.
6. MSO: Medium Speed Open.
7. FSO: Final Speed Open.

Note: The combination of Cam#1(SSO/FSO) and Cam#2(MSO) produces SSO, HSO, MSO, and FSO. See 7.7 CAM SETTINGS VS. DISTANCE for appropriate settings.

8. DOL: Door Open Limit (DOL output relay is energized when the DOL LED light turns on).
9. HOLDING: Door is in its full open or full close position. (When the door is fully open or fully closed, a minimal amount of power is applied to the motor to prevent drifting).
10. NUDG. Door is closing at reduced speed (nudging).
11. RE-OPEN: Door re-opening features have activated. (RE-OPEN output relay is energized when the RE-OPEN LED light turns on).
12. STALL REVERSE: In the close direction, if the door exceeds the Torque Limit set by Par. 9, the STALL REVERSE LED will turn on and the RE-OPEN relay will be energized).
13. FREQ. FAILURE: In the close direction, if the door exceeds the Speed Limit set by Par. 0, the FREQ. FAILURE LED will turn on and the RE-OPEN relay will be energized).
14. DPM: A car door closed contact for safety features such as G.A.L. Fault monitor. (DPM relay is energized when the DPM LED light turns on).
15. FAULT: The FAULT LED on indicates that there is a Fault in the drive.
16. AUX.: The AUX. LED and the AUX. relay will turn on when AUX cam is activated. AUX. cam and AUX. cam are optional and available upon request.

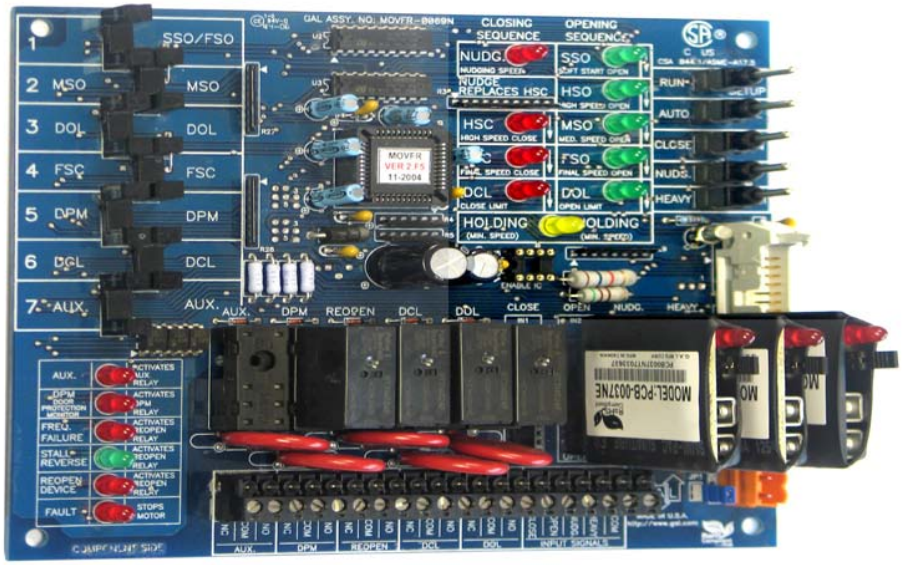


FIGURE 7.2.B.2

C. Parameter unit:

The Parameter unit plugs into the drive and permits changing values of pertinent parameters (see Figure 7.4).

7.3 Preliminary checks:

This procedure is to assure that the motor turns in the correct direction, and all speed signals are in the working order.

A. Place the RUN/CAM SETUP switch in the RUN position and place the AUTO/MAN switch in the MAN. Position.

B. With the door fully closed, hold the OPEN/CLOSE switch in the OPEN position while observing the door movement. If the motor turns in the wrong direction, turn Power OFF, swap any two of the three motor leads. The door should change speed as the various cams operate the speed controlling speed sensors.

The door should start moving at low speed with the SSO sensor blocked and then accelerate to high Speed (HSO) as the SSO sensor is unblocked. Deceleration takes place when the MSO sensor is blocked, then more deceleration with the FSO sensor is blocked, and finally the DOL sensor is blocked and the HOLDING LED turns on. A little power will apply to the motor to hold doors open.

When the door is fully open, hold the switch in the CLOSE position, the door should start accelerating To high speed (HSC) and then decelerating as the FSC sensor is blocked. Finally the DCL sensor is blocked and the HOLDING LED turns on. Again, a little power will apply to the motor to hold doors open. (See 7.7 CAM SETTING VS. DISTANCE).

7.4 The parameter unit:

The Parameter unit is a tool to assist users in the following tasks:

- Changing speed values, acceleration, deceleration, torque, maximum closing speed, carrier frequency, and stall reverse limit.

- Downloading, and Uploading Programs to and from the Drives.

- Monitoring Currents, Voltages, Speeds, Inputs, Outputs, and Faults.

- Resetting the Drive.

FIGURE 7.4

7.5 Parameter unit navigation:

A. How to change parameters:

Press SET. Enter a Parameter Number.

Press READ. Enter a new Value. Press WRITE.

Wait for the Completed Signal from the Display.

B. How to read (COPY) from the drive:

*Note 1 : The Parameter Unit is capable to store 4 Sets of Default Parameters and 1 Set of Working Parameters. To Copy a Default Set of Parameters into the Working Set Parameters, see item 8th of Section **F**.*

Note 2 : To Transfer data from one drive to another, users must, First, READ(COPY) from the First Drive.

Press SET. Press ▲.

Press READ. Wait for the Completed Signal from the Display.

C. How to write (DOWNLOAD) to the drive:

Set RUN/CAM setup switch to CAM setup.

Press SET. Press ▲.

Press WRITE. Wait for the Completed Signal from the Display.

D. Default settings for the MOVFR drive:

CLOSING	PARAMETER #		RANGE	DEFAULT VALUE							
				STANDARD				WATERPROOF			
				C/P		S/O		C/P		S/O	
	REG.	HVY.		REG.	HVY.	REG.	HVY.	REG.	HVY.	REG.	HVY.
MAX. CLOSE SPEED	0	0	0-30	30	30	30	30	30	30	30	30
HOLDING TORQUE	1	11	0-30	5	5	5	5	5	5	5	5
HOLDING SPEED	2	12	0-400	2	2	2	2	1.5	1.5	1.5	1.5
CLOSE TORQUE ■	3	13	0-400	225	225	173	173	173	173	135	135
HIGH SPEED HSC	4	14	0-400	23	12	19	10	14	7	12	6
FINAL SPEED FSC	5	15	0-400	4	4	5	5	3	3	4	4
NUDGING SPD	6	16	0-400	8	8	9	9	5	5	6	6
ACCELERATION TIME	7	17	0-320	9	9	6	6	7	7	10	10
DECELERATION TIME	8	18	0-320	6	6	10	10	17	17	25	25
STALL REV. FORCE	9	19	0-2	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
OVERLOAD	99	99	0-5	3	3	3	3	3	3	3	3

OPENING	PARAMETER #		RANGE	DEFAULT VALUE							
				STANDARD				WATERPROOF			
				C/P		S/O		C/P		S/O	
	REG.	HVY.		REG.	HVY.	REG.	HVY.	REG.	HVY.	REG.	HVY.
QUICK STOP ON REV.	21	31	0-6	0.8	1.0	1.4	1.6	0.8	1.0	1.4	1.6
SLOW START SSO	22	32	0-400	5	5	5	5	5	5	5	5
HIGH SPEED HSO	23	33	0-400	31	16	45	23	24	12	35	18
MEDIUM SPEED MSO	24	34	0-400	14	14	20	20	10	10	15	15
FINAL SPEED FSO	25	35	0-400	3	3	5	5	2	2	3	3
ACCELERATION TIME	26	36	0-320	6	6	4	4	6	6	6	6
DECELERATION TIME	27	37	0-320	6	6	10	10	9	9	10	10
SLOW SPD TORQUE	28	38	0-30	4	4	4	4	4	4	4	4
OPEN TORQUE ■	29	39	0-400	120	100	120	100	100	80	100	80

■To lower torque, increase the torque parameter value

OPENING AND CLOSING	PARAMETER #	RANGE	DEFAULT VALUE			
			STANDARD		WATERPROOF	
			C/P	S/O	C/P	S/O
CARRIER FREQUENCY	51	2-15	10	10	10	10

C/P = Center Parting Door S/O = Side Opening Door
REG. = Regular Doors HVY. = Heavy Doors

E. Convenient keys:

Press SPEED to check the Speed in Hz

Example:

Output	Frequency
HSC	19Hz

Press I/O to check Input & Output Signals.

Inputs:

Z: (Reserved) **C:** Door Close **O:** Door Open
R: Reset **V:** Heavy Door **L:** Control Bit L
M: Control Bit M **H:** Control Bit H

Outputs:

S: Over Speed **T:** Over Torque **F:** Fault

Example:

ZCORVLMH	STF
0 1 0 0 0 1 0 0 0 0 0 0	

Press FAULT to check the recent Faults.

Press ▼ or ▲ to view all the Faults

Example:

Present	Fault
Under	Voltage

Press V to check the Output Voltage.

Example:

Output	Voltage
132.00V	

Press A to check the Output Current.

Example:

Output	Current
0.78A	

Press RESET to Reset the Drive.

F. The VIEW keys:

Press the VIEW key will allow users to view, change, and reset to G.A.L. Default parameters.

Press ▲ or ▼ to navigate through all the items in the VIEW section.

Press READ to view an item. At any time, Press ESC to get back to the Previous Display.

1st. **V/I/H** Displays the Output Voltage, Output Current, Command Speed, and Actual Speed.

2nd. **I/O** Displays the Input and Output Signals

ZCORVLMH STF 1= Activate 0= Deactivate
(See the **Convenient keys** in part E)

3rd. **Faults**. (See the **Convenient keys** in part E)

Press  or  to View all the Faults.

4th. **Counters**. There are 2 Counters.
Counter 1 will count up to 9,999 times.
Counter 2 will count up to 60,000 times.
When Counter 1 reaches 9999,Counter 2 will increase 1
The total count will be 600,000,000 times.

Press  or  to View Counter 1 or Counter 2.

5th. **User List.**

The User List includes all the **Default settings for the MOVFR drive** in part D.

Press READ , Press  or  to view all the Parameters in the User List.

NOTE: Users can also change the Value of Parameters in this stage by doing the following:

Press READ , Enter the new value, then Press WRITE.

Press ESC to get back to the Previous Display.

6th. **Max. cl. Speed**

Press READ to view the Maximum Closing Speed.

Press ESC to get back to the Previous Display.

7th. **Max. cl. Force**

Press READ to view the Maximum Closing Force.

Press ESC to get back to the Previous Display.

8th. **GAL Defaults**

Press READ, Press  or  to pick one of the four sets of Parameters

Standard C/P
Standard S/O
Waterproof C/P
Waterproof S/O

Set RUN/CAM SETUP switch to CAM SETUP

Press WRITE to copy the chosen set of Parameters to the Working Set of Parameters.

G. LED indicators:

There are 7 LEDs on the Parameter Unit. DO, DC, NUD, HLD, PRG, FLT, OVT. DO=Door Open, DC=Door Close, NUD=Nudging, HLD=Holding, PRG=Programming Mode, FLT=Fault, OVT=Over Torque. These LEDs indicate the present status of the MOVFR.

7.6 Parameter adjustments:

CAUTION! All equipment must be installed and adjusted to meet Federal, State, and Local Codes.

NOTE 1: The closing Kinetic Energy is affected by the speed and the mass of the door. The closing Kinetic Energy must not exceed Code Limits. For more details about the Kinetic Energy of the G.A.L door operators, go to http://www.gal.com

NOTE 2: The closing Torque is affected by the Torque adjustment. The closing Torque must not exceed Code Limits.

NOTE 3: Whenever changing any value in the Closing Direction Parameters, the door should be rechecked to meet the Code requirement.

A. Closing sequence:

MAXIMUM CLOSE SPEED (Par. 0):
This Parameter is the Limit of the Closing speed. The Default value of this Parameter is 30Hz. If the Closing speed is higher than 30Hz, the Drive will turn on the Frequency Failure (FF) output and activate the Reopen Relay. Users should bear in mind that the Reopen Relay Contact, once activated, will send the re-open signal to the Main Controller ONLY and will wait for the OPEN signal from the Main Controller to Reopen the door. The Reopen Relay will NOT reopen the door by itself.

HOLDING TORQUE (Par. 1):
The Holding Torque is activated when the door reaches DOL or DCL.

HOLDING SPEED (Par. 2):
The Holding Speed is activated when the door reaches DOL or DCL.

NOTE: The reason to apply the Holding Power when the door is fully closed or fully open is to prevent the door from drifting or rolling back.
CAUTION! The Holding power should be less than 15W to prevent the motor from unnecessary heating, which would reduce its life.

HIGH SPEED CLOSE – HSC (Par. 4):
This is the highest speed for the overall Closing sequence. A higher value produces the faster speed.

FINAL SPEED CLOSE – FSC (Par. 5):
This is the Final Closing Speed. It should be set reasonably low so that when the DCL (Door Close Limit) and the Close Stop Roller are reached without slamming or bouncing.

NUDGING SPEED (Par. 6):
The Nudging Speed is the reduced speed that is equal or less than 60% of the max. HSC. This Nudging Speed is only occurred when DC (Door Close) and NUDG. (Nudging) input signals take place simultaneously

CLOSE ACCELERATION TIME (Par. 7):
The higher value produces a slower acceleration rate for smoother operation. The lower value produces a faster acceleration rate for faster opening times.

CLOSE DECELERATION TIME (Par. 8):
The Deceleration should be set so that the FSC is reached prior to the DCL and the Close Stop Roller position without bouncing.

STALL REVERSE FORCE (Par. 9):
The Default value of this Parameter is 1.5Amp. Whenever the current is above this value, the Drive will send a signal to turn on the STALL REVERSE LED and activate the REOPEN Relay. The range for this Parameter is 0-2Amp. If nuisance activation takes place, the value of this Parameter should be increase slightly.

OVERLOAD (Par. 99)
This is the Maximum Limit of the Motor Current. If the Motor Current exceeds this Limit, the Drive will shutdown, generate the OVER CURRENT FAULT, and turn on the FAULT LED. Recycling the Power to MOVFR or using the Reset switch on the Main Board or the Parameter Unit will Reset the Fault. However, a thorough inspection should be done before Resetting the Fault.

B. Opening Sequence:

QUICK STOP ON REVERSE (Par. 21):
Parameter 21 determines how quick the closing door is stopped when a reopen signal is activated. The range of Parameter 21 is from 0 to 6Amp. The lower value setting will produce a longer time to stop before the door can reopen. When the reopen signal is applied, the door should not move more than 2 inches before it reopens. (Note: too quick of a stop will degrade the doors mechanicals)

SLOW START OPEN – SSO (Par. 22):
When the door starts to open, the value of Par. 22 is the speed at which the clutch engages the interlock rollers unlock the hoistway door. A slower speed produces a smoother and quieter unlocking noise.

HIGH SPEED OPEN – HSO (Par. 23):
This is the highest speed for the overall opening sequence. The higher value produces a faster speed.

MEDIUM SPEED OPEN – MSO (Par. 24):
This speed is used for a fast reopening in the final 1/3 to 1/4 of the opening. When properly adjusted, this speed has little or no effect during the full reopening cycle because the doors will decelerate through MSO zone. Virtually the doors will decelerate from HSO to FSO.

FINAL SPEED OPEN – FSO (Par. 25)
This is the Final Opening Speed. It should be set reasonably low so that the DOL (Door Open Limit) and the Open Stop Roller are reached without slamming or bouncing.

OPEN ACCELERATION TIME (Par. 26).
The higher value produces a slower acceleration rate for smoother operation. The lower value produces a faster acceleration rate for faster opening times.

OPEN DECELERATION TIME (Par. 27).
The Deceleration should be set so that the FSC is reached prior to the DCL and the Close Stop Roller position without bouncing.

SLOW SPEED TORQUE (Par. 28).
This Parameter is set at 0 as a default value. The range of this Parameter is from 0 to 30%. It is a torque boost Parameter at low speed. It is a useful Parameter for the heavy doors, if needed.

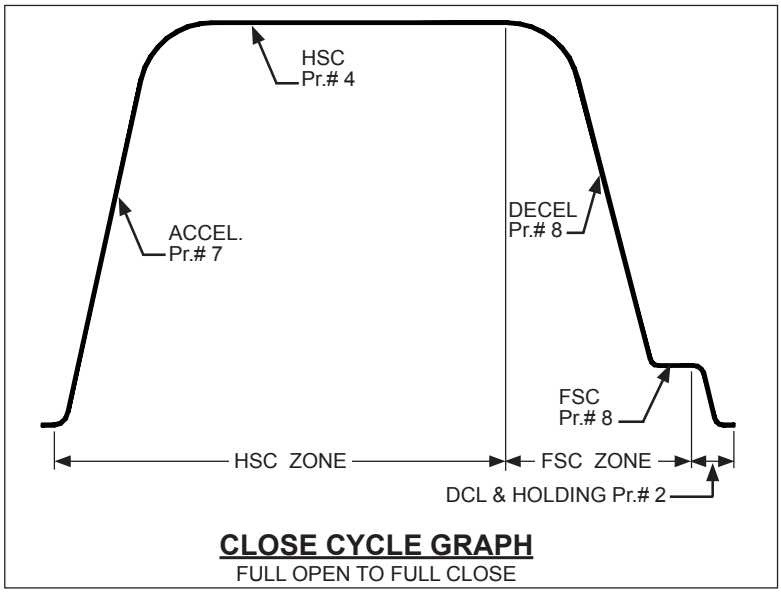
OPEN TORQUE (Par. 29)
The Default value of this Parameter should be suitable for most doors. Nevertheless, the rule for adjustment for this Parameter is: The higher value will produce less torque, and vice versa.

C. Carrier frequency:

CARRIER FREQUENCY (Par. 51)
The nominal frequency of the carrier wave is set by Parameter 51. The Default value is 10KHz. The MOVFR Drive is compliant with the CE regulation. However, if adjacent electronics, with poor EMI immunity, are affected by EMI of the MOVFR, users can lower the value of this Parameter to reduce the EMI level. The trade-off is the lower carrier frequency; the more audible noise will be produced by the motor.

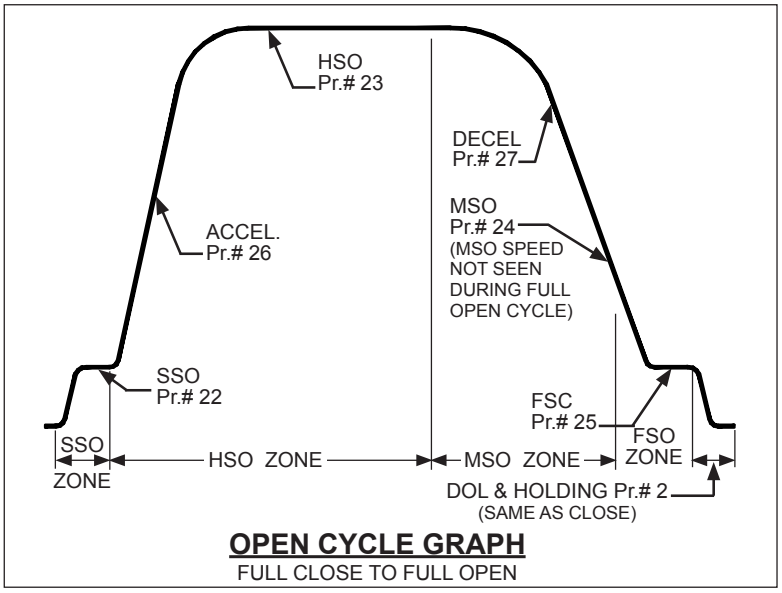
7.7 Speed profiles of the MOVFR:

A. Closing Cycle:



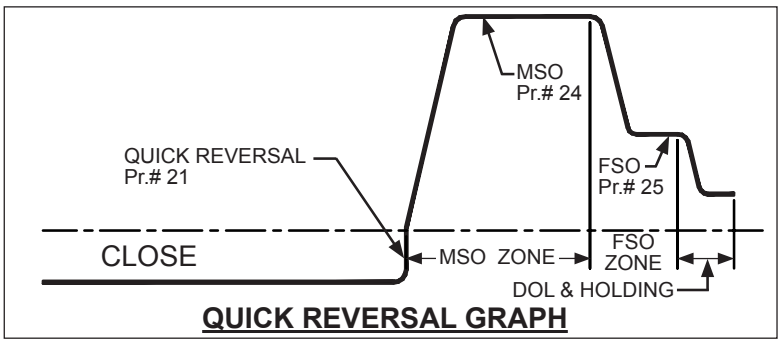
CLOSE CYCLE GRAPH
FULL OPEN TO FULL CLOSE

B. Opening Cycle:



OPEN CYCLE GRAPH
FULL CLOSE TO FULL OPEN

C. Quick Reversal:



QUICK REVERSAL GRAPH

7.8 Cam setting versus Distance:

CLOSING DIRECTION ←				
SPEED	**DCL**	**DPM**	**FSC**	**HSC**
DISTANCE	Last **1/4 inch**	1/2 inch before Gate Switch is activated	Last **4 inches**	Until the door reaches **4 inches from the final close**
CAM **4** FSC				
CAM **5** DPM				
CAM **6** DCL				

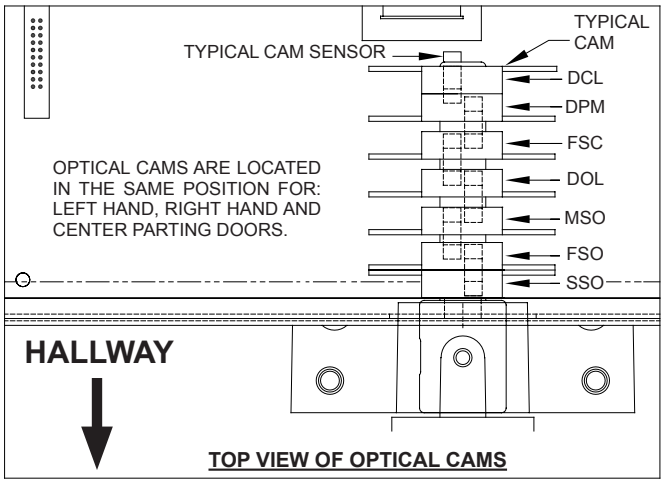
OPENING DIRECTION →					
SPEED	**SSO**	**HSO**	**MSO**	**FSO**	**DOL**
DISTANCE	Until the clutch makes up (first 1/2 inch	From the clutch made up (approx. 1/2) in to **3/4** of the total door width	Last **1/4** of the total door width	Last 4 inches	Last 1/4 inch
CAM **1** SSO/FSO					
CAM **2** MSO					
CAM **3** DOL					

CONVENIENT CAM ← →		
ACTION	**ACTIVATE AUX. RELAY**	**DEACTIVATE AUX. RELAY**
DISTANCE	Customer Setup	Customer Setup
CAM **7** AUX.		

 **= CAM BLOCKED**

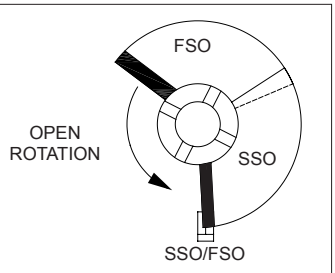
 **= CAM UNBLOCKED**

7.9 Rotational cam setting:

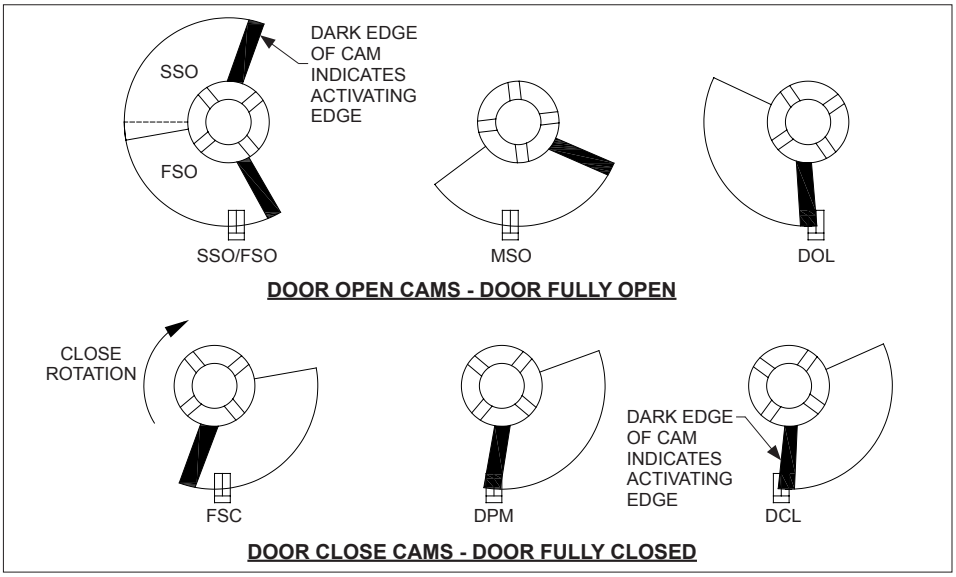


TOP VIEW OF OPTICAL CAMS

RIGHT HAND CAMS



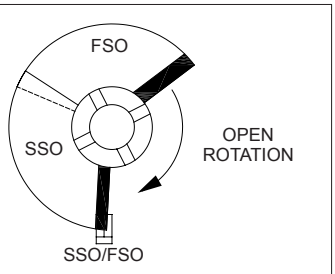
FSO & SSO CAMS DOOR FULLY CLOSED



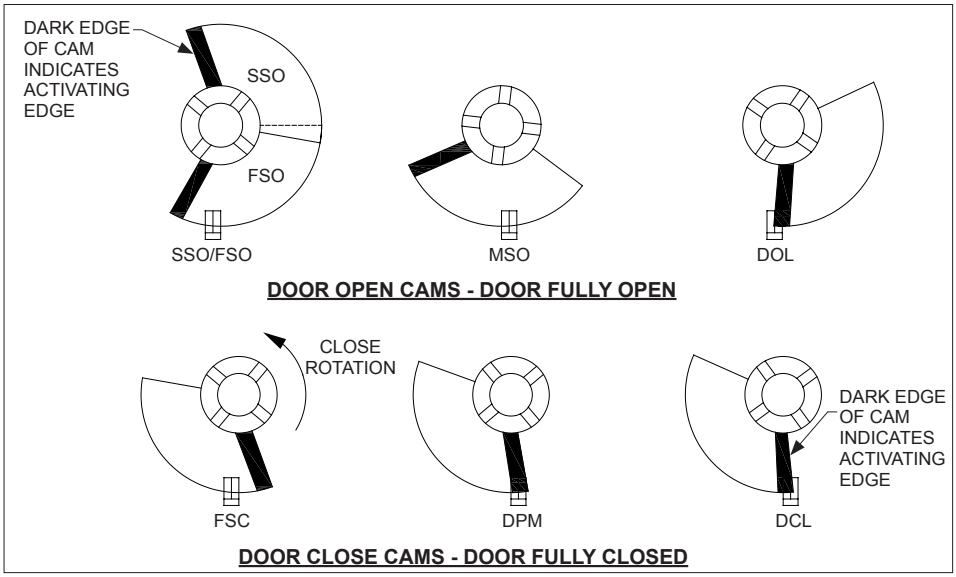
DOOR OPEN CAMS - DOOR FULLY OPEN

DOOR CLOSE CAMS - DOOR FULLY CLOSED

LEFT HAND AND CENTER PARTING CAMS



FSO & SSO CAMS DOOR FULLY CLOSED



DOOR OPEN CAMS - DOOR FULLY OPEN

DOOR CLOSE CAMS - DOOR FULLY CLOSED

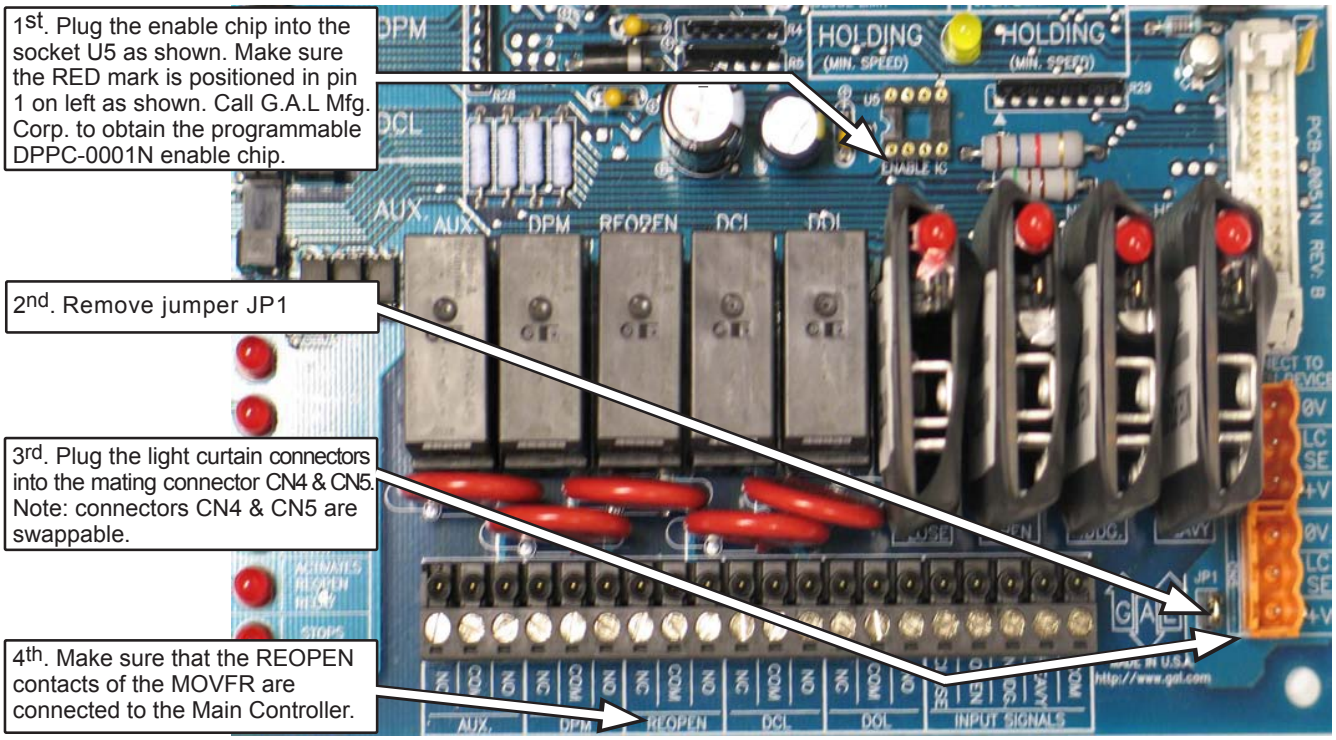
7.10 Interfacing between G.A.L. certified light curtain and MOVFR:

A. Procedure:

To take full advantage of the MOVFR and simplify the REOPENING circuits for the Door Operators, the REOPEN relay in the MOVFR board should be used to Reopen the doors in cases of:

- Exceeding the limit of the torque allowed.
- Exceeding the limit of the speed allowed.
- Obstructing the light curtain.

The exceeding Torque and exceeding Speed features have already been built in the MOVFR board. Additionally, for the obstruction of the Infrared Light Curtains, the following illustration shows the interfacing procedure of a **G.A.L. Certified Infra-Red Light Curtain** and the **G.A.L. MOVFR** board.



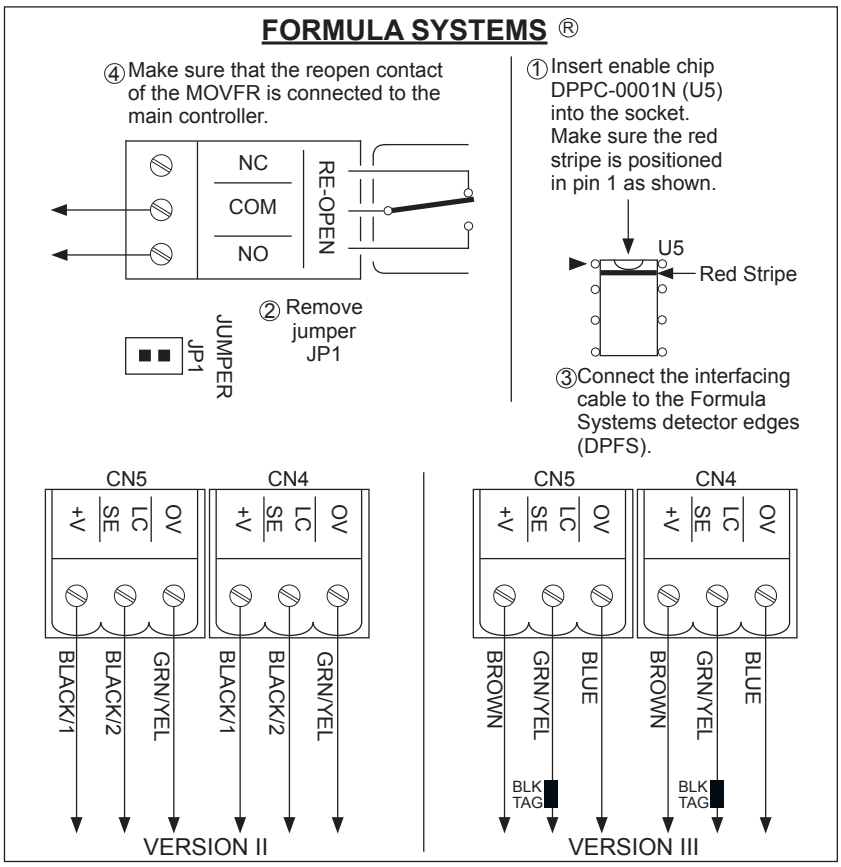
Followings are the G.A.L. Certified Infrared Light Curtain Detectors, in alphabetical order, that are available from G.A.L Mfg. Corp (http://www.gal.com).
Toll Free Phone: **1-877-425-3538 (877-GAL-ELEV)**

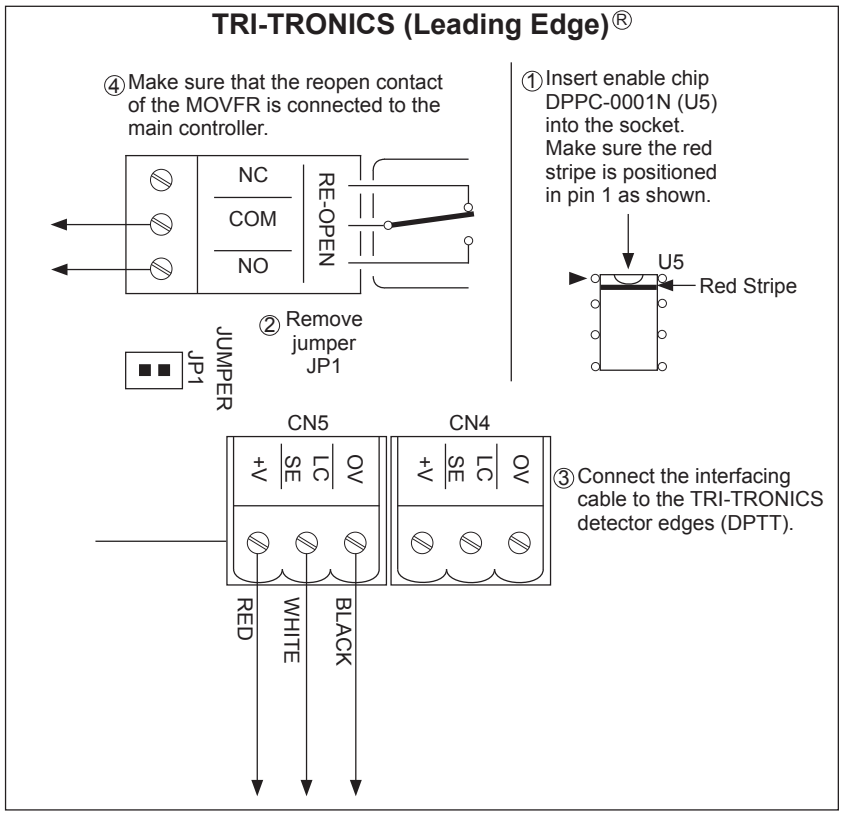
- Formula Systems
- Tri-Tronics

B. Operation:

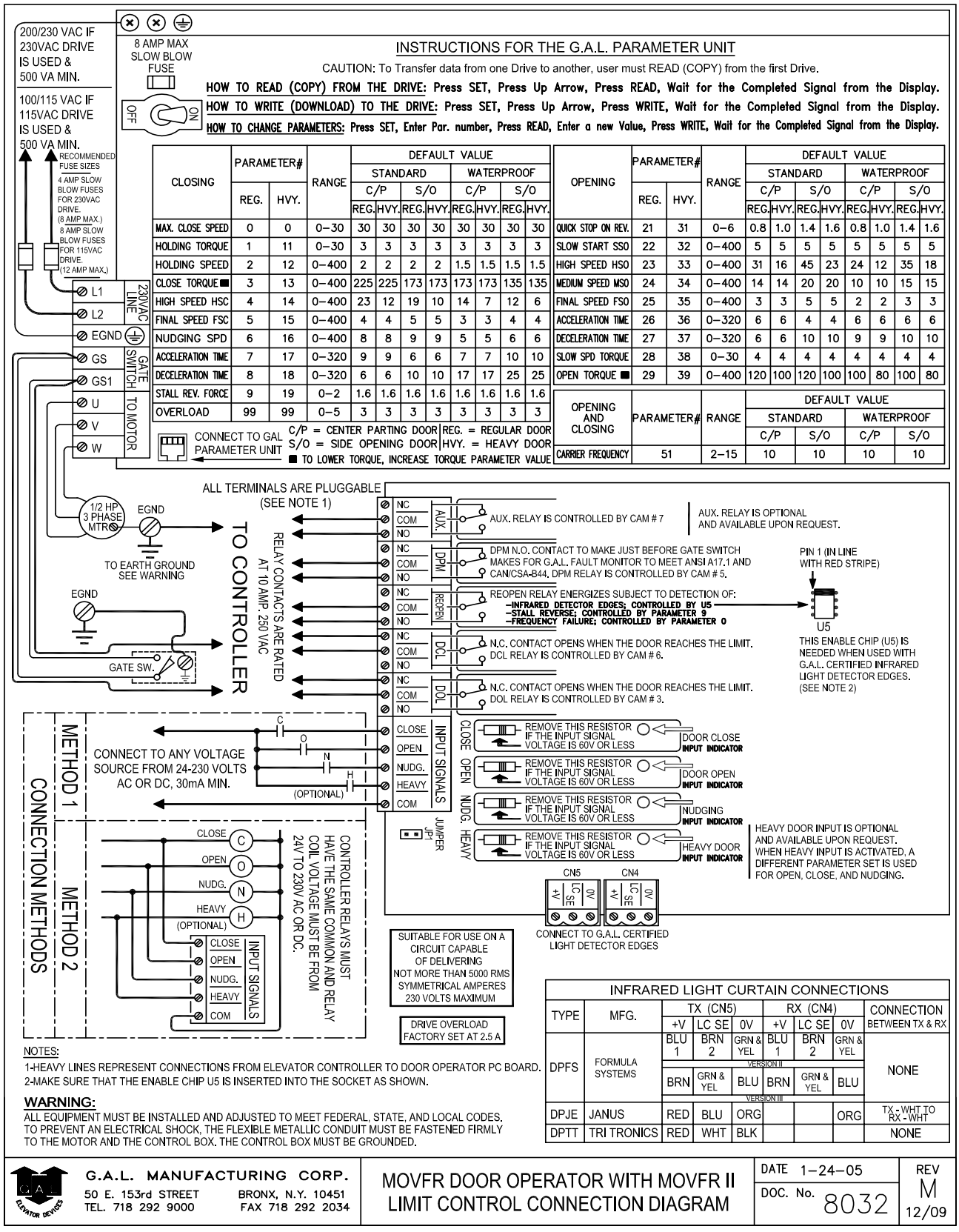
When obstruction on the edges occurs, the reopen LED on the MOVFR will turn on and the reopen relay will be activated. The reopen contacts will send reopen signal to the main controller and wait for the DO (Door Open) Signal from the Main Controller to Reopen the door.

C. Wiring diagram:





7.11 MOVFR connection diagram:



CLOSING	PARAMETER# REG.	PARAMETER# HVY.	RANGE	DEFAULT VALUE STANDARD C/P REG.	STANDARD C/P HVY.	STANDARD S/O REG.	STANDARD S/O HVY.	WATERPROOF C/P REG.	WATERPROOF C/P HVY.	WATERPROOF S/O REG.	WATERPROOF S/O HVY.
MAX. CLOSE SPEED	0	0	0–30	30	30	30	30	30	30	30	30
HOLDING TORQUE	1	11	0–30	3	3	3	3	3	3	3	3
HOLDING SPEED	2	12	0–400	2	2	2	2	1.5	1.5	1.5	1.5
CLOSE TORQUE ■	3	13	0–400	225	225	173	173	173	173	135	135
HIGH SPEED HSC	4	14	0–400	23	12	19	10	14	7	12	6
FINAL SPEED FSC	5	15	0–400	4	4	5	5	3	3	4	4
NUDGING SPD	6	16	0–400	8	8	9	9	5	5	6	6
ACCELERATION TIME	7	17	0–320	9	9	6	6	7	7	10	10
DECELERATION TIME	8	18	0–320	6	6	10	10	17	17	25	25
STALL REV. FORCE	9	19	0–2	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
OVERLOAD	99	99	0–5	3	3	3	3	3	3	3	3

OPENING	PARAMETER# REG.	PARAMETER# HVY.	RANGE	DEFAULT VALUE STANDARD C/P REG.	STANDARD C/P HVY.	STANDARD S/O REG.	STANDARD S/O HVY.	WATERPROOF C/P REG.	WATERPROOF C/P HVY.	WATERPROOF S/O REG.	WATERPROOF S/O HVY.
QUICK STOP ON REV.	21	31	0–6	0.8	1.0	1.4	1.6	0.8	1.0	1.4	1.6
SLOW START SSO	22	32	0–400	5	5	5	5	5	5	5	5
HIGH SPEED HSO	23	33	0–400	31	16	45	23	24	12	35	18
MEDIUM SPEED MSO	24	34	0–400	14	14	20	20	10	10	15	15
FINAL SPEED FSO	25	35	0–400	3	3	5	5	2	2	3	3
ACCELERATION TIME	26	36	0–320	6	6	4	4	6	6	6	6
DECELERATION TIME	27	37	0–320	6	6	10	10	9	9	10	10
SLOW SPD TORQUE	28	38	0–30	4	4	4	4	4	4	4	4
OPEN TORQUE ■	29	39	0–400	120	100	120	100	100	80	100	80

OPENING AND CLOSING	PARAMETER#	RANGE	DEFAULT VALUE STANDARD C/P	STANDARD S/O	WATERPROOF C/P	WATERPROOF S/O
CARRIER FREQUENCY	51	2–15	10	10	10	10

INFRARED LIGHT CURTAIN CONNECTIONS									
TYPE	MFG.	TX (CN5) +V	TX (CN5) LC SE	TX (CN5) 0V	RX (CN4) +V	RX (CN4) LC SE	RX (CN4) 0V	CONNECTION BETWEEN TX & RX
DPFS	FORMULA SYSTEMS	BLU 1	BRN 2	GRN & YEL	BLU 1	BRN 2	GRN & YEL	NONE
		VERSION II						
		BRN	GRN & YEL	BLU	BRN	GRN & YEL	BLU	
		VERSION III						
DPJE	JANUS	RED	BLU	ORG			ORG	TX - WHT TO RX - WHT
DPTT	TRI TRONICS	RED	WHT	BLK				NONE

7.12 Fault description and Fault reset:

F01 **HW Over Current**

The AC drive detects an abnormal increase in current. The maximum allowable hardware current is 300% (9A). When the drive output has exceeded this limit, the “F01” fault code will display on the parameter unit display.

F02 **Over Voltage**

The AC drive detects that the DC bus voltage has exceeded its maximum allowable value, 400V. When the DC bus voltage has exceeded this value, the “F02” fault code will display on the parameter unit display.

F03 **Heatsink OverTmp**

The AC drive temperature sensor detects excessive heat. When the Heat Sink temperature has exceeded 95^{O}C, the “F03” fault code will display on the parameter unit display.

F04 **Drive Overload**

The AC drive detects excessive drive output current. The AC drive can withstand up to 150% of rated current (4.5A) for 1 minute. When this limit has been exceeded, the “F04” fault code will display on the parameter unit display.

F07 **Motor Overload**

The AC drive detects an excessive motor load. When the value of maximum allowable motor load, which is the setting value of Pr.#99 multiplied by 150% for 1 minute, has been exceeded, the “F07” fault code will display on the parameter unit display.

F13 **Ground Fault**

The AC drive output is abnormal. When the output terminal is grounded (short circuit current is 50% more than the AC drive rated current), the AC drive power module may be damaged. The short circuit protection is provided for AC drive protection, not user protection.

F14 **Under Voltage**

The AC drive detects that the DC bus voltage has fallen below its minimum value, 150VAC. When the input voltage has fallen below this value, the “F14” fault code will display on the parameter unit display.

F33 **Auto Reset Trials**

When the AC drive auto-reset a fault unsuccessfully, the “F33” fault code will display on the parameter unit display.

F100 **EEPROM failure**

When the internal memory IC cannot be programmed, the “F100” fault code will display on the parameter unit display.

NOTE: All the above Faults are re-settable by change the Value of Parameter 110 to 1 and use the following procedure:

Set Par. 112 for the Number of Retries.
Default Value: 6 Range: 0 → 9 Increment: 1

After fault occurs, the AC drive can be reset/restarted automatically up to 10 times. Setting this parameter to 0 will disable the reset/restart operation after any fault has occurred.

Set Par.113 for the Retry Waiting Time.
Default Value: 2.5 Range: 0 → 120.0 Sec. Increment: 0.1 Sec.

Sets the time **between** restart attempts when Auto Rstrt Tries is set to a value other than zero.

Set Par. 114 for the Retry Selection.
Default Value: 1023 Range: 0 → 1023 Increment: 1

Settings
1: Ground Fault can be auto reset
2: Over Voltage can be auto reset
4: Over Current can be auto reset
8: Low Voltage can be auto reset
16: Motor Over Load can be auto reset
32: Drive Over Temperature can be auto reset
64: Drive Over Load can be auto reset
128: Current sensor Broken can be auto reset
256: EEPROM Broken can be auto reset
512: Software Over Voltage can be auto reset

Example:

If a “Ground Fault”, “Over Current” and “Drive Over Load” needs to be auto reset then Par 114 should be set to 69 (1+4+64). The default value is “1023” which means all faults can be auto reset.

Set Par. 115 for Reset Fault
Default Value: 0 Range: 0 → 2 Increment: 1

Settings
0: Idle State
1: Resets the active fault but does not clear any fault buffer
2: Resets the active fault and clears all fault buffers to “0”

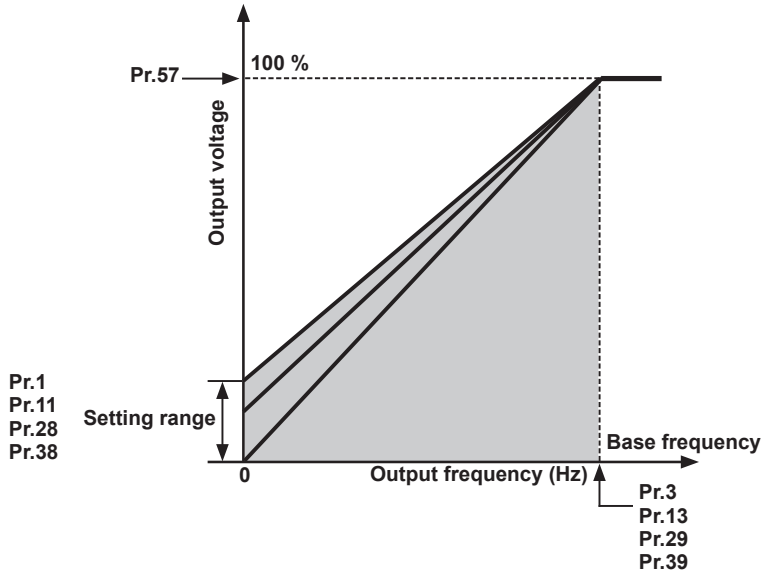
Resets a fault and clears the fault buffer. Used primarily to clear a fault over network communications.

7.13 Applications for the heavy input:

The door operator may operate two different hoist-way doors, one door is heavier than the other, in one elevator. As a result, the setting of Torque, and Speed of one door may not be applicable for the other door. More importantly, it may be a code violation issue due to the constraint of the kinetic energy and the Torque allowance. The HEAVY input will resolve this issue. When the HEAVY input is activated, the Drive will operate with a different set of Parameters for the heavier door.

In order to gain the access to the HEAVY set of Parameters, change the value of the Parameter 110 from 0 to 1. The HEAVY set of Parameters is located as follows:

Pr.11 Heavy Door Close Holding Torque
Unit: 0.1 %
Default: 3 %
Range: 0 ~ 30 %
Increase the setting when the motor torque in low speed range is insufficient.



Pr.12 Heavy Door Close Holding Speed
Unit: 0.1 Hz
Default: 2.0 Hz
Range: 0 ~ 400.0 Hz

Pr.13 Heavy Door Close Torque (Base Freq.)
Unit: 0.1 Hz
Default: 173.0 Hz
Range: 0 ~ 400.0 Hz
This parameter is used to adjust the AC drive output (voltage, frequency) to the motor rating.

Pr.14 Heavy Door High Speed Close (HSC)
Unit: 0.1 Hz
Default: 19.0 Hz
Range: 0 ~ 400.0 Hz

Pr.15 Heavy Final Speed Close (FSC)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.16 Heavy Door Nudging Speed
Unit: 0.1 Hz
Default: 9.0 Hz
Range: 0 ~ 400.0 Hz

Pr.17 Heavy Door Close Acceleration Time
Unit: 0.1 Sec
Default: 6.0
Range: 0 ~ 320.0 Sec
The Acceleration time is used to determine the time required for the AC drive to ramp from 0 Hz to its reference frequency (Pr.50).

Pr.18 Heavy Door Close Deceleration Time
Unit: 0.1 Sec
Default: 10.0
Range: 0 ~ 320.0 Sec
The Deceleration time is used to determine the time required for the AC drive to decelerate from the reference frequency (Pr.50) down to 0 Hz.

Pr.19 Heavy Door Stall Reverse Force (output current detection level)
Unit: (0.1 %)
Default: 1.2A
Range: 0 ~ 200.0 %rated
If the output current remains higher than this setting during AC drive operation, the output current detection signal is on from the open collector output terminal of the AC drive.

Pr.31 Heavy Door Quick Stop on Reverse
Unit: 0.1 A
Default: 2.0A
Range: 0~180 %rated
This parameter determines the level of the DC braking current output to the motor during stopping.

Pr.32 Heavy Door Slow Start Open (SSO)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.33 Heavy Door High Speed Open (HSO)
Unit: 0.1 Hz
Default: 45.0 Hz
Range: 0 ~ 400.0 Hz

Pr.34 Heavy Door Medium Speed Open (MSO)

Unit: 0.1 Hz
Default: 20.0 Hz
Range: 0 ~ 400.0 Hz

Pr.35 Heavy Door Final Speed Open (FSO)

Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.36 Heavy Door Open Acceleration Time

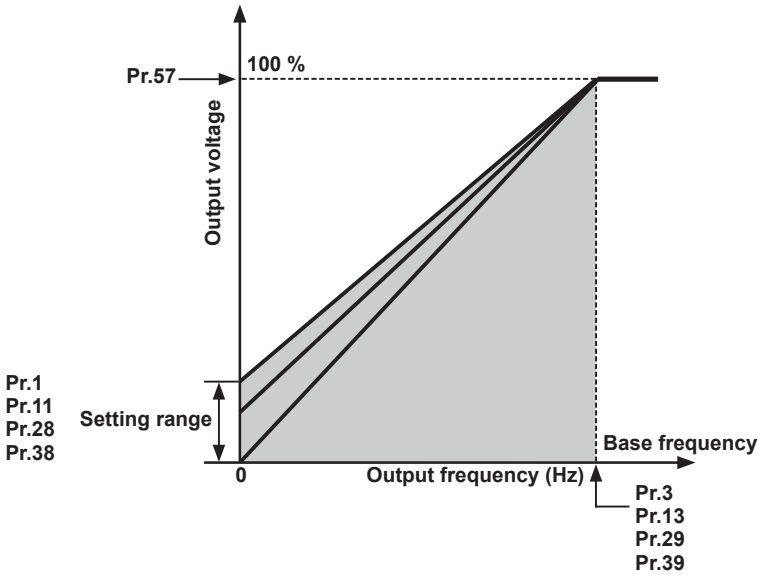
Unit: 0.1 Sec
Default: 4.0 Sec
Range: 0~400.0 Sec
The Acceleration time is used to determine the time required for the AC drive to ramp from 0 Hz to its reference frequency (Pr.50).

Pr.37 Heavy Door Open Deceleration Time

Unit: 0.1 Sec
Default: 10.0 Sec
Range: 0 ~ 400.0 Sec
The Deceleration time is used to determine the time required for the AC drive to decelerate from the reference frequency (Pr.50) down to 0 Hz.

Pr.38 Heavy Door Open Slow Speed Torque

Unit: 0.1 %
Default: 0 %
Range: 0 ~ 30 %
Increase the setting when motor torque in low speed range is insufficient.



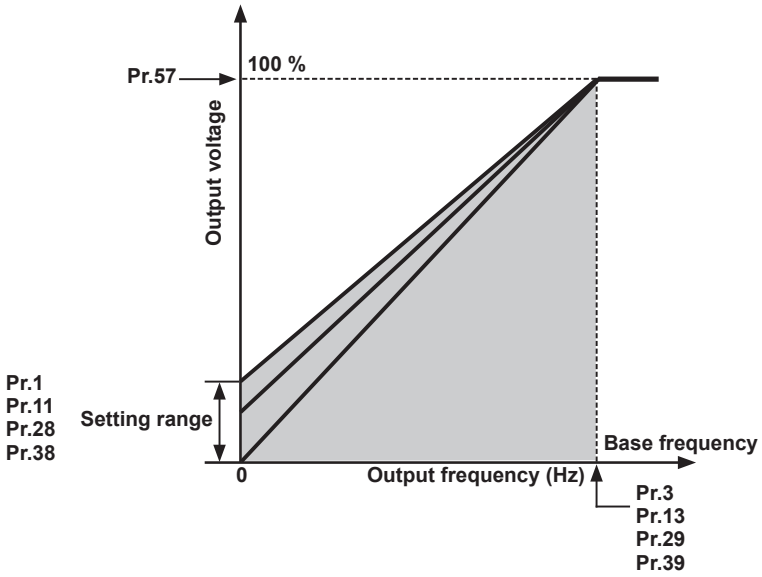
Pr.39 Heavy Door Open Torque (Second V/F (base frequency)

Unit: 0.1 Hz

Default: 80.0 Hz

Range: 0 ~ 400 Hz

Increase the setting when motor torque in low speed range is insufficient.



Pr.45 Heavy Door DC Injection Brake Operation Frequency

Unit: 0.1 Hz

Default: 60 Hz

Range: 0 ~ 400.0 Hz

This parameter determines the frequency that the DC braking will begin to output once frequency is reached during deceleration.

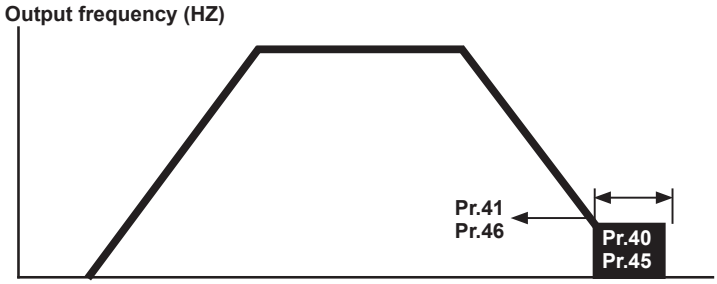
Pr.46 Heavy Door DC Injection Brake Operation Time

Unit: 0.1 Sec

Default: 1.0 Sec

Range: 0 ~ 10.0 Sec

This parameter determines the duration that the DC braking current will be applied to the motor during stopping.



7.14 Parameters list:

Pr.0 Max. Close Speed (Close Speed detection)
Unit: 0.1 Hz
Default: 30.0 Hz
Range: 0 ~ 400.0 Hz
The output frequency detection signal is on when the output frequency reaches or exceeds the setting value.

Pr.1 Close Holding Torque (torque boost)
Unit: 0.1 %
Default: 3 %
Range: 0 ~ 30 %
Increase the setting when motor torque in low speed range is insufficient.

Pr.2 Close Holding Speed
Unit: 0.1 Hz
Default: 2.0 Hz
Range: 0 ~ 400.0 Hz

Pr.3 Close Torque (Base Freq.)
Unit: 0.1 Hz
Default: 173.0 Hz
Range: 0 ~ 400.0 Hz
This parameter is used to adjust the AC drive output (voltage, frequency) to the motor rating.

Pr.4 High Speed Close (HSC)
Unit: 0.1 Hz
Default: 19.0 Hz
Range: 0 ~ 400.0 Hz

Pr.5 Final Speed Close (FSC)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.6 Nudging Speed
Unit: 0.1 Hz
Default: 9.0 Hz
Range: 0 ~ 400.0 Hz

Pr.7 Close Acceleration Time
Unit: 0.1 Sec
Default: 6.0
Range: 0 ~ 320.0 Sec
The Acceleration time is used to determine the time required for the AC drive to ramp from 0 Hz to its reference frequency (Pr.50).

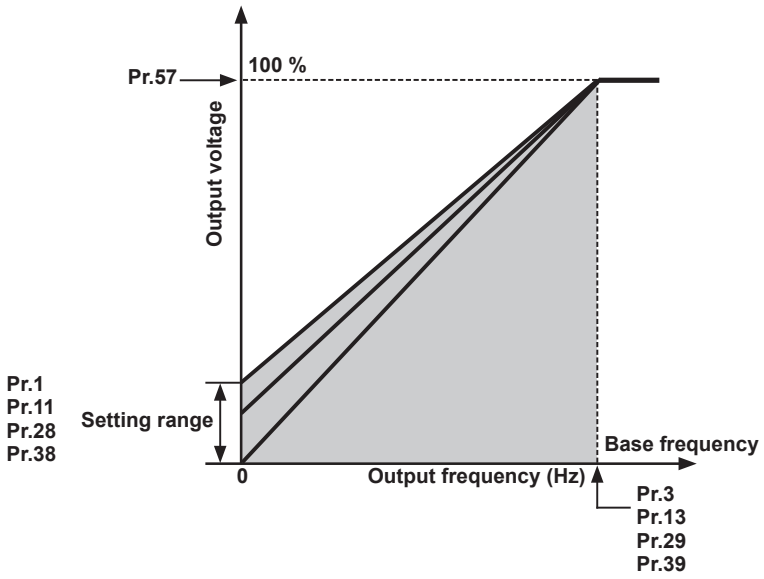
Pr.8 Close Deceleration Time
Unit: 0.1 Sec
Default: 10.0
Range: 0 ~ 320.0 Sec
The Deceleration time is used to determine the time required for the AC drive to decelerate from the reference frequency (Pr.50) down to 0 Hz.

Pr.9 Stall Reverse Force (output current detection level)
Unit: (0.1 %)
Default: 1.2A
Range: 0 ~ 200.0 %rated
If the output current remains higher than this setting during AC drive operation, the output current detection signal is on from the open collector output terminal of the AC drive.

Pr.11 Heavy Door Close Holding Torque
Unit: 0.1 %
Default: 3 %
Range: 0 ~ 30 %
Increase the setting when the motor torque in low speed range is insufficient.

Pr.12 Heavy Door Close Holding Speed
Unit: 0.1 Hz
Default: 2.0 Hz
Range: 0 ~ 400.0 Hz

Pr.13 Heavy Door Close Torque (Base Freq.)
Unit: 0.1 Hz
Default: 173.0 Hz
Range: 0 ~ 400.0 Hz
This parameter is used to adjust the AC drive output (voltage, frequency) to the motor rating.



Pr.14 Heavy Door High Speed Close (HSC)
Unit: 0.1 Hz
Default: 19.0 Hz
Range: 0 ~ 400.0 Hz

Pr.15 Final Speed Close (FSC)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.16 Heavy Door Nudging Speed
Unit: 0.1 Hz
Default: 9.0 Hz
Range: 0 ~ 400.0 Hz

Pr.17 Heavy Door Close Acceleration Time
Unit: 0.1 Sec
Default: 6.0
Range: 0 ~ 320.0 Sec
The Acceleration time is used to determine the time required for the AC drive to ramp from 0 Hz to its reference frequency (Pr.50).

Pr.18 Heavy Door Close Deceleration Time
Unit: 0.1 Sec
Default: 10.0
Range: 0 ~ 320.0 Sec
The Deceleration time is used to determine the time required for the AC drive to decelerate from the reference frequency (Pr.50) down to 0 Hz.

Pr.19 Heavy Door Stall Reverse Force (output current detection level)
Unit: (0.1 %)
Default: 1.2A
Range: 0 ~ 200.0 %rated
If the output current remains higher than this setting during AC drive operation, the output current detection signal is on from the open collector output terminal of the AC drive.

Pr.20 Open Speed detection
Unit: 0.1 Hz
Default: 30.0 Hz
Range: 0 ~ 400.0 Hz
The output frequency detection signal is on when the output frequency reaches or exceeds the setting value.

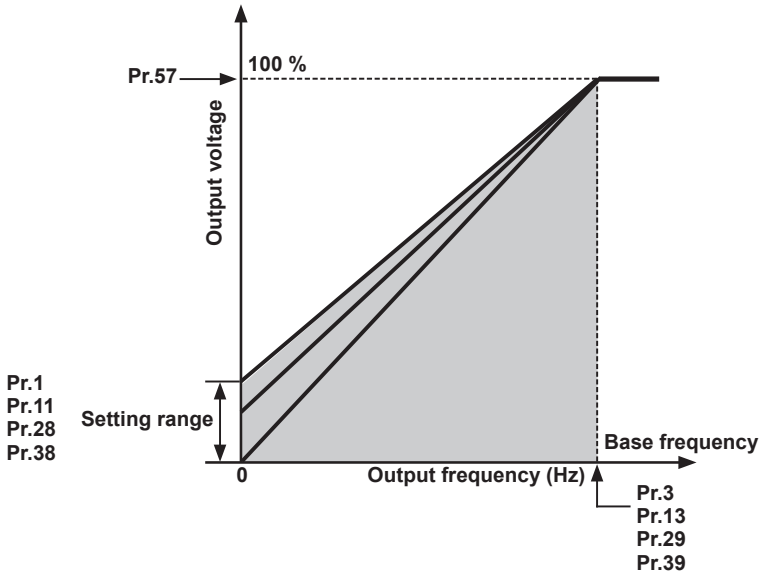
Pr.21 Quick Stop on Reverse
Unit: 0.1 A
Default: 2.0A
Range: 0~180 %rated
This parameter determines the level of the DC braking Current output to the motor during stopping.

Pr.22 Slow Start Open (SSO)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.23 High Speed Open (HSO)
Unit: 0.1 Hz
Default: 45.0 Hz
Range: 0 ~ 400.0 Hz

Pr.24 Medium Speed Open (MSO)
Unit: 0.1 Hz
Default: 20.0 Hz
Range: 0 ~ 400.0 Hz

Pr.25 Final Speed Open (FSO)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz



Pr.26 Open Acceleration Time
Unit: 0.1 Sec
Default: 4.0 Sec
Range: 0~400.0 Sec
The Acceleration time is used to determine the time required for the AC drive to ramp from 0 Hz to its reference frequency (Pr.50).

Pr.27 Open Deceleration Time
Unit: 0.1 Sec
Default: 10.0 Sec
Range: 0 ~ 400.0 Sec
The Deceleration time is used to determine the time required for the AC drive to decelerate from the reference frequency (Pr.50) down to 0 Hz.

Pr.28 Open Slow Speed Torque
Unit: 0.1 %
Default: 0 %
Range: 0 ~ 30 %
Increase the setting when motor torque in low speed range is insufficient.

Pr.29 Open Torque (Second V/F (base frequency)
Unit: 0.1 Hz
Default: 80.0 Hz
Range: 0 ~ 400 Hz
Increase the setting when motor torque in low speed range is insufficient.

Pr.31 Heavy Door Quick Stop on Reverse
Unit: 0.1 A
Default: 2.0A
Range: 0~180 %rated
This parameter determines the level of the DC braking Current output to the motor during stopping.

Pr.32 Heavy Door Slow Start Open (SSO)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.33 Heavy Door High Speed Open (HSO)
Unit: 0.1 Hz
Default: 45.0 Hz
Range: 0 ~ 400.0 Hz

Pr.34 Heavy Door Medium Speed Open (MSO)
Unit: 0.1 Hz
Default: 20.0 Hz
Range: 0 ~ 400.0 Hz

Pr.35 Heavy Door Final Speed Open (FSO)
Unit: 0.1 Hz
Default: 5.0 Hz
Range: 0 ~ 400.0 Hz

Pr.36 Heavy Door Open Acceleration Time
Unit: 0.1 Sec
Default: 4.0 Sec
Range: 0~400.0 Sec
The Acceleration time is used to determine the time required for the AC drive to ramp from 0 Hz to its reference frequency (Pr.50).

Pr.37 Heavy Door Open Deceleration Time
Unit: 0.1 Sec
Default: 10.0 Sec
Range: 0 ~ 400.0 Sec
The Deceleration time is used to determine the time required for the AC drive to decelerate from the reference frequency (Pr.50) down to 0 Hz.

Pr.38 Heavy Door Open Slow Speed Torque
Unit: 0.1 %
Default: 0 %
Range: 0 ~ 30 %
Increase the setting when motor torque in low speed range is insufficient.

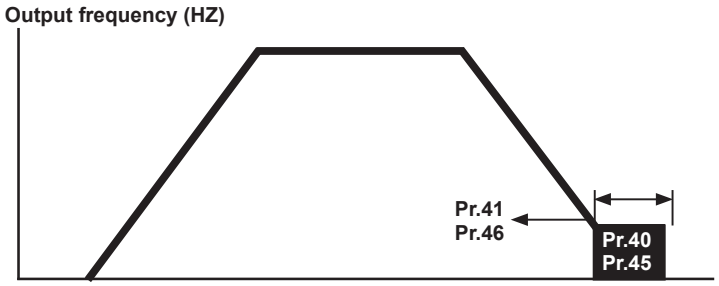
Pr.39 Heavy Door Open Torque (Second V/F (base frequency)
Unit: 0.1 Hz
Default: 80.0 Hz
Range: 0 ~ 400 Hz
Increase the setting when motor torque in low speed range is insufficient.

Pr.40 DC Injection Brake Operation Frequency
Unit: 0.1 Hz
Default: 60 Hz
Range: 0 ~ 400.0 Hz
This parameter determines the frequency that the DC braking will begin to output once frequency is reached during deceleration.

Pr.41 DC Injection Brake Operation Time
Unit: 0.1 Sec
Default: 1.0 Sec
Range: 0 ~ 10.0 Sec
This parameter determines the duration that the DC braking current will be applied to the motor during stopping.

Pr.45 Heavy Door DC Injection Brake Operation Frequency
Unit: 0.1 Hz
Default: 60 Hz
Range: 0 ~ 400.0 Hz
This parameter determines the frequency that the DC braking will begin to output once frequency is reached during deceleration.

Pr.46 Heavy Door DC Injection Brake Operation Time
Unit: 0.1 Sec
Default: 1.0 Sec
Range: 0 ~ 10.0 Sec
This parameter determines the duration that the DC braking current will be applied to the motor during stopping.



Pr.51 Max. Carrier Frequency
Carrier frequency for the PWM output waveform
Unit: 0.1k Hz
Default: 11.0k Hz
Range: 2.0 ~ 15.0kHz
This parameter determines the maximum carrier frequency of the AC drive.

Carrier Frequency	Acoustic Noise	Electromagnetic Noise, Leakage Current	Heat Dissipation
2KHz ↕ 15KHz	Significant ↕ Minimal	Minimal ↕ Significant	Minimal ↕ Significant

From the table, the PWM carrier frequency has a significant influence on the electromagnetic noise, heat dissipation of the AC drive, and the acoustic noise to the motor.

Pr.67 Door Zone Functionality
Unit: 1
Default: 0
Range: 0 ~ 1
0: Disable Door Zone Functionality
1: Enable Door Zone Functionality

Pr.99 Motor Over Load Current
Unit: 0.1 A
Default: 2.5 A
Range: 0 ~ 6 A
The setting is proportional to the rated current of motor.

Pr.110 User Group Read Selection
Unit: 1
Default: 0
Range: 0 ~ 9999
When the setting value is 1, user can view and select parameters Pr.0~46, 51, 67, 99, 110 and 112~115. If the setting value is set to any other value (not 1), user can view and select parameters Pr.0~9, 20~29, 51 and 110 only.

Pr.112 Number of Retries
Unit: 1
Default: 6
Range: 0 ~ 9
After a fault occurs, the AC drive can be reset/restarted automatically up to 10 times. Setting this parameter to 0 will disable the reset/restart operation after any fault has occurred.

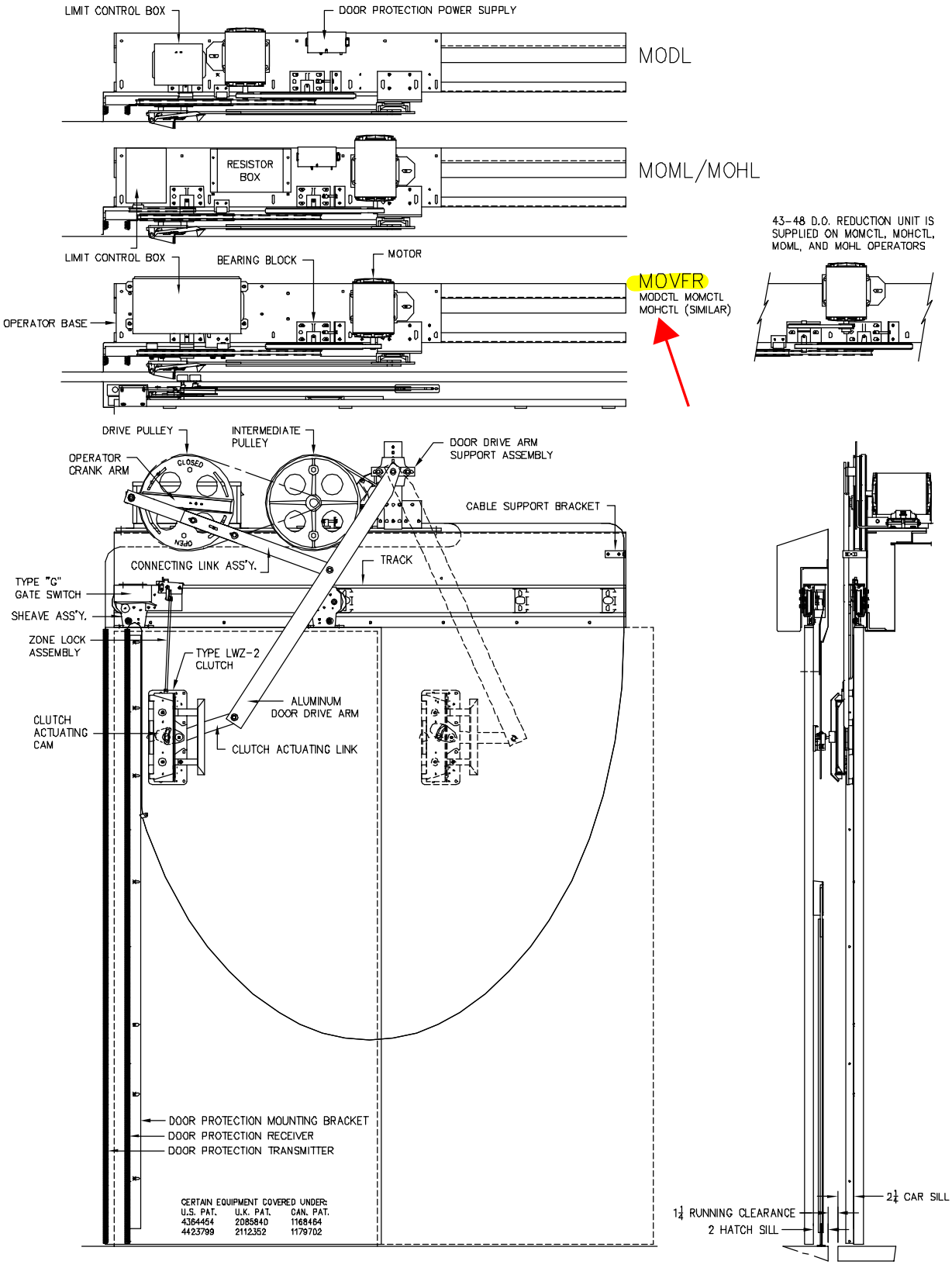
Pr.113 Retry Waiting Time
Unit: 0.1 Sec
Default: 2.5 Sec
Range: 0 ~ 120.0 Sec
Sets the time between restart attempts when Auto Restart Tries is set to a value other than zero.

Pr.114 Retry Selection
Unit: 1
Default: 1023
Range: 0 ~ 1023
1: Ground Fault can be auto reset
2: Over Voltage can be auto reset
4: Over Current can be auto reset
8: Low Voltage can be auto reset
16: Motor Over Load can be auto reset
32: Drive Over Temperature can be auto reset
64: Drive Over Load can be auto reset
128: Current sensor Broken can be auto reset
256: EEPROM Broken can be auto reset
512: Software Over Voltage can be auto reset
If a “Ground Fault”, “Over Current” and “Drive Over Load” needs to be auto reset then Par114 should be set to 69 (1+4+64). The default value is “1023” which means all faults can be auto reset.

Pr.115 Reset Fault
Unit: 1
Default: 0
Range: 0 ~ 2
0: Idle State
1: Resets the active fault but does not clear any fault buffer
2: Resets the active fault and clears all fault buffers to “0”
Resets a fault and clears the fault buffer. Used primarily to clear a fault over network communications.

7.15 How to replace the drive:

1. Disconnect the door operator power from the machine room
2. Flip ON-OFF switch on operator board to OFF position and the AUTO-MAN switch to the MAN position Wait 10 minutes for the drive’s internal capacitor to completely discharge.
3. Unplug the ribbon cable from the drive.
4. Unplug the green power connector.
5. Remove drive mounting screws.
6. Install the new drive
7. Plug the green power connector
8. Plug the ribbon cable to the drive
9. Reapply power to the drive but leave the switch in the MAN position for now.
10. WRITE the parameters from the parameter unit into the drive as explained in section 7.5
11. Check door operation with the OPEN-CLOSE switch before returning the system to AUTO.



N O T E
WHEN ORDERING REFER TO CATALOG PART NUMBER
FOR CAR DOOR DRILLINGS REFER TO DWG. 8231
FOR OPERATOR LAYOUT REFER TO DWG. DATA21

LEFT HAND SHOWN
RIGHT HAND OPPOSITE

REV	DESCRIPTION	DATE	ECN
C	LWZ-2 CLUTCH ADDED	10-19-05	
B	MOVFR OPERATOR ADDED	5-28-04	
A	MOCT OPERATOR ADDED	9-12-95	

G.A.L. MANUFACTURING CORP.
50 E. 153rd STREET BRONX, N.Y. 10451

SINGLE SPEED CAR ASSEMBLY
TYPE "A" HANGER WITH INFRARED DOOR PROTECTION

DRAWN BY CAVIRIA A.	DATE 8-31-94
ENGINEER VARON J.	SHEET OF
SCALE 5/64	SIZE
PART No.	REV
DOCUMENT No. 8221-1	C

G.A.L. Manufacturing Corporation
50 East 153rd Street, Bronx, N.Y. 10451
Phone (718) 292-9000 Fax (718) 292-2034

-THE LWZ-2 SERIES CLUTCH-

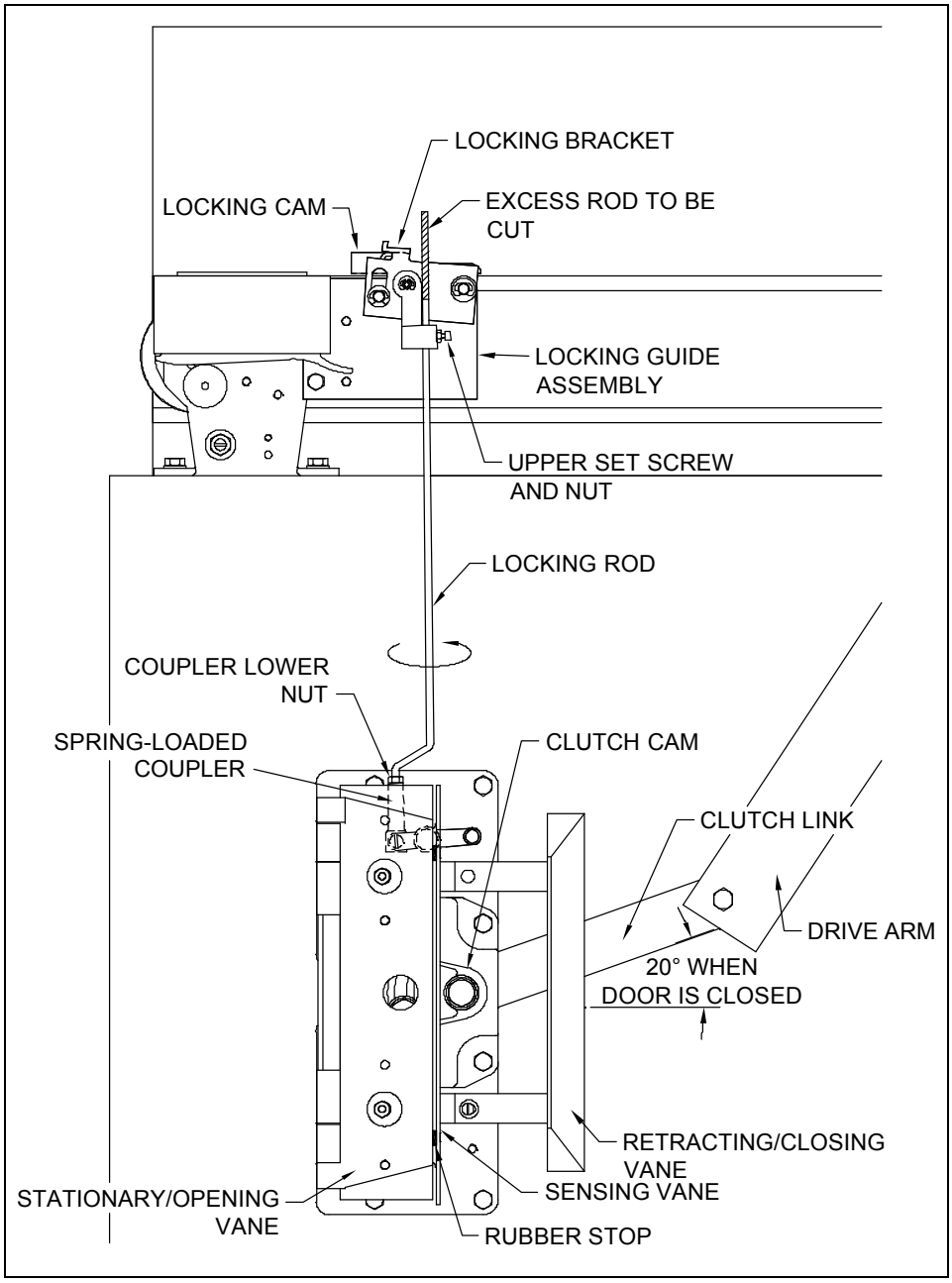


Figure 1: LWZ-2 clutch assembly

Table of Contents

Required tools for installing and adjusting LWZ-2 series clutches

- 5/64" ALLEN KEY
- 5/16" SOCKET WRENCH
- 7/16" SOCKET WRENCH
- 1/2" SOCKET WRENCH
- 6" SCALE OR TAPE MEASURE
- HACK SAW
- FILE

Note: Open vane may be flipped open during installation for better access to mounting hardware. After mounting, please make sure that lock nuts are tightened to meet the required 2-1/8" from the base shown in Fig.2. (for LRC styles also adjust the retracted position as described in the ***LRC (Limited Run Clearance) clutch adjustments*** section Fig.8. page 5.

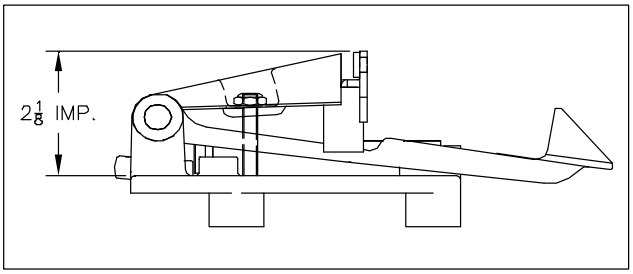


Figure 2: Open vane location

General installation and setup of the LWZ-2 clutch:

G.A.L. provides car reinforcement and drilling templates for both new installations and modernization jobs. The templates provide the appropriate locations and drillings to mount the new LWZ-2 clutch. (Note: The LWZ-2 uses the same mounting drillings as older designs). Mount the LWZ-2 clutch to the car door using either six (6) 5/16-18 bolts or carriage bolts. The clutch must be spaced (shown in Fig.3) out from the car door face so that there is a minimum of 1/4" between the hatch sill and the front tip of the clutch open vane throughout the shaft; in other words at the tightest landing. (**NOTE** For **LRC models**, adjust the 1/4" hatch sill measurement with the clutch in the retracted position) Adjust the interlock release roller assemblies on all landings so that there is 3/8" from the roller face to the edge of the car sill (shown in Fig. 4). For a typical 1-1/4" running clearance, this will provide for an interaction of 5/8" between the rollers and the clutch. After mounting and locating the clutch attach the operator drive arm (see operator setup instructions for drive arm setup).

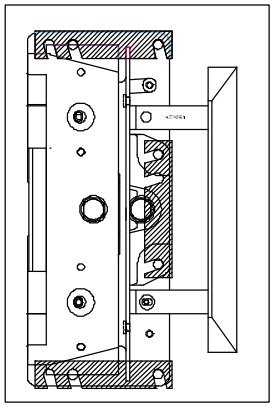


Figure 3: Arrangement of Clutch Spacers

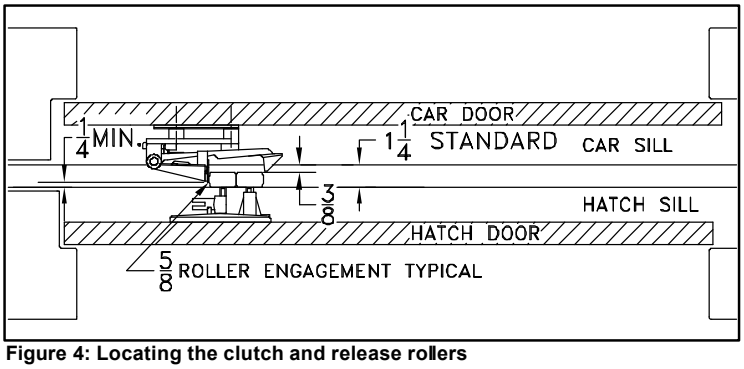


Figure 4: Locating the clutch and release rollers

CAUTION: to avoid damage, the clutch link should be 20° from horizontal when the door is closed.

Standard setup of the clutch retracting vane:

For LRC (Limited Run Clearance) clutch adjustment see the next page.

Once the pickup roller depth and position has been set properly, you need to adjust the retracting vane of the clutch so that it retracts as late as possible in the closing cycle. The rear vane should retract and clear the stationary roller in the pick up assembly by approximately 1/8" when the hoist-way door reaches full close. The point where the rear vane retracts is adjusted by turning the clutch cam (see Attachment "*Method for Rear Vane Adjustment*" in Fig 14 on page 7). By moving the cam down the rear clutch vane will retract sooner in the closing cycle.

LRC (Limited Run Clearance) clutch adjustments

This section is for **LRC type clutches only**. With the cab door closed, remove the nuts, and open the opening vane; then loosen cam bolts. Adjust cam until the nylon roller is on the outer most cam surface as shown in Fig.5. (**Note:** pushing the closing vane will relieve the forces on the cam for easier adjustment.) When releasing the

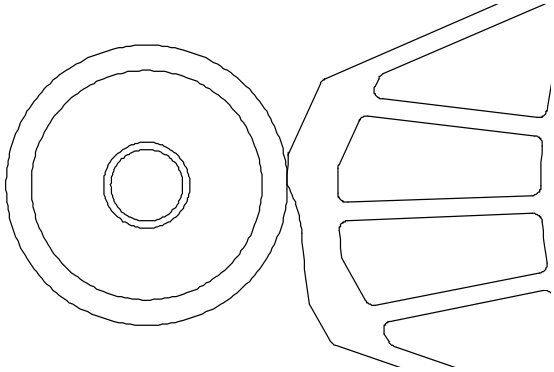


Figure. 5 fully retracted clutch position

closing vane, the cam should keep the vane in a retracted position even when the cam bolts are not fully tightened. Tighten both cam bolts securely. Open door manually until roller is just resting at the bottom of the machined step as shown in figure 6. This is the half-retracted clutch position, or the roller release contact point.

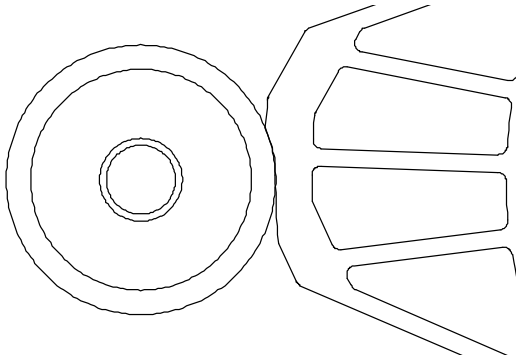
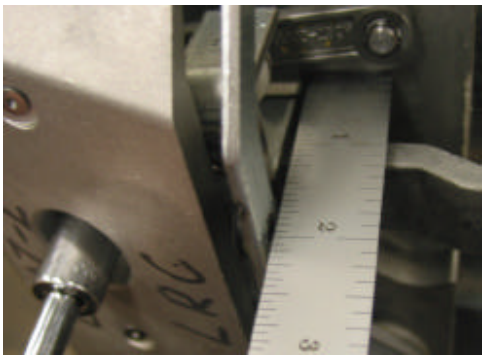


Figure. 6 half-retracted clutch position

If the door has moved more than one inch or beyond the desired roller release contact point (normally 5/16 inch), close the door and readjust the cam, by loosening the screws and adjusting it upwards; so the nylon roller is on the verge of dropping back down to the Fig. 6 position while still on the outer cam face. Then retighten cam screws. This procedure is to ensure that the clutch vain will start extending as soon as the door starts to open.

Open door until cam is fully disengaged. Close the opening clutch vane, ensuring that the springs are seated properly on both the vane and the base. Start and tighten the clutch-closure screw (the **UPPER SCREW ONLY** on the door opening vane) until the opening vane is 2.125 inches (2 1/8") from the base. See Fig. 7. Close



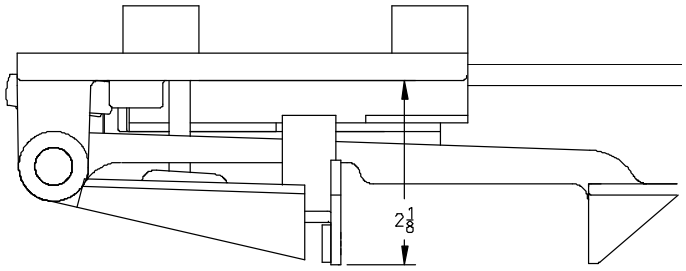
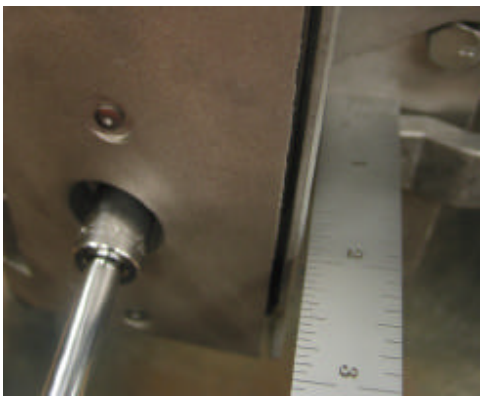


Fig. 7 adjust *UPPER SCREW ONLY* (clutch-closure screw) to extended position

the door all the way then start and tighten Clutch-retracting screw (the **LOWER SCREW** on the door opening vane) until the opening vane has retracted 0.25 inches (1/4") or as needed. See Figure 8.



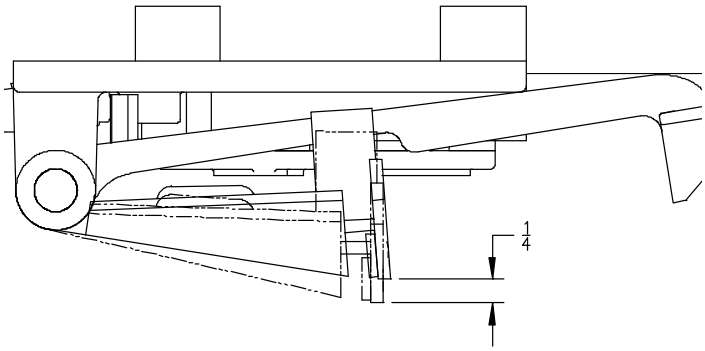
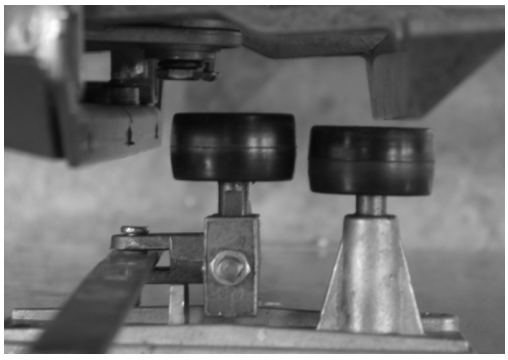


Fig. 8 adjusting the *LOWER SCREW* (clutch retracting) screw

Adjust roller release.

The stationary roller should clear half-retraced clutch by a minimum 0.0625 inches (1/16”). The movable roller should be adjusted to connect with as much of the retracted roller as possible. Ideally this should not be less then 0.125 inches (1/8”). See Figure 9. **NOTE:** The two rollers do not need to be perfectly aligned.



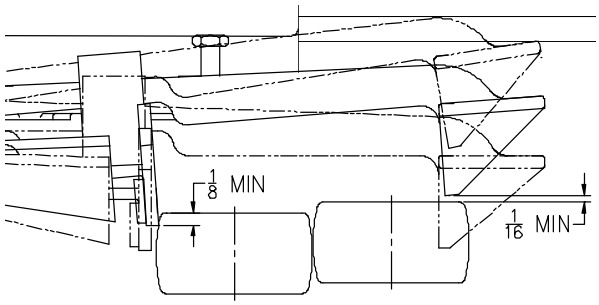


Fig. 9 adjust roller releases

Make sure that the car will safely pass the roller release.

Installation and setup of the zone locking device:

Mount the locking cam on top of the car door track, positioning the center of the cam slot in the center track holes (shown in Fig. 10). Mount the locking guide assembly to the leading door sheave using the tapped holes on the sheave. Since there are two sets of holes make sure to use the set that will position the locking bracket up and over the locking cam roller when the door is in the fully closed position (shown in Fig. 11). Insert the locking rod through the upper pivot assembly. Insert the bottom half of the locking rod, the spring end, into the coupler and tighten the coupler lower nut. Open door to locked position (approximately 5/8" from full closed), pull sensing bar out and away from the stationary/open vane (shown in Fig. 12). Make sure the locking bracket rotates down to the lowest possible position. Tighten the upper set screw (use 5/64" Key) & nut after the rod has been rotated to a position parallel to locking guide assembly (to prevent binding between pivot and plate). Close car door and check that the sensing bar pulls back to the rubber stops. The spring in the coupler should be slightly compressed at this point. If the spring does not compress, then the locking cam can be adjusted by moving its position along the track. The sensing bar should never actually move in normal operation and should be held in the retracted position by either the force of the locking cam roller or the force of the interlock release rollers. After completing, cut the excess rod just above the upper pivot (approximately 1/2" above pivot) and file away burr.

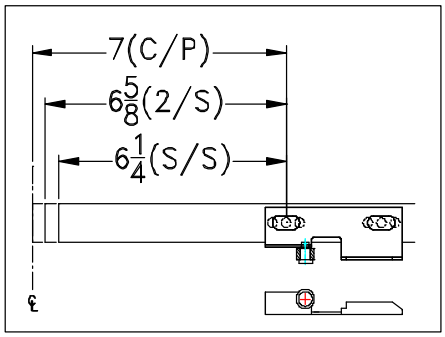


Figure 10: Clutch cam mounting position

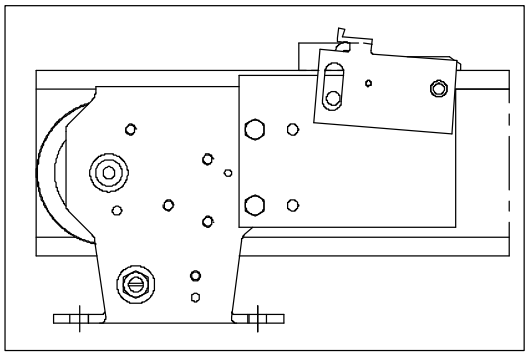


Figure 11: Car door in closed position

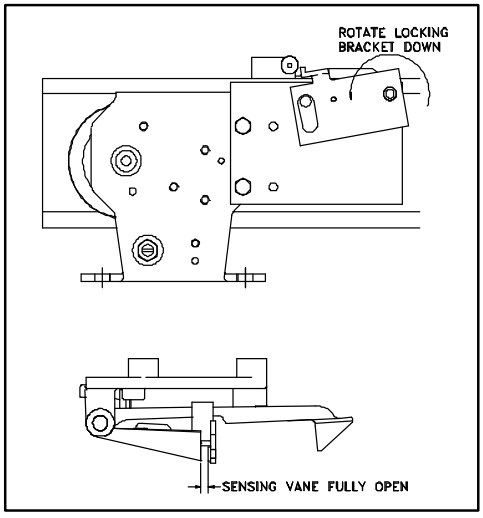


Figure 12: Zone lock in locked position

***Before you finish, perform a final check*:**

- With the hatch doors open, manually open the car door and make sure the door locks.
- Compress the sensing bar to check that there is clearance between the locking bracket and locking cam (shown in Fig. 13).

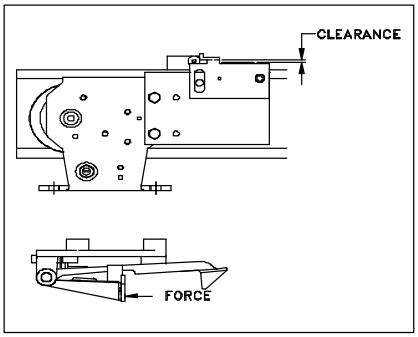
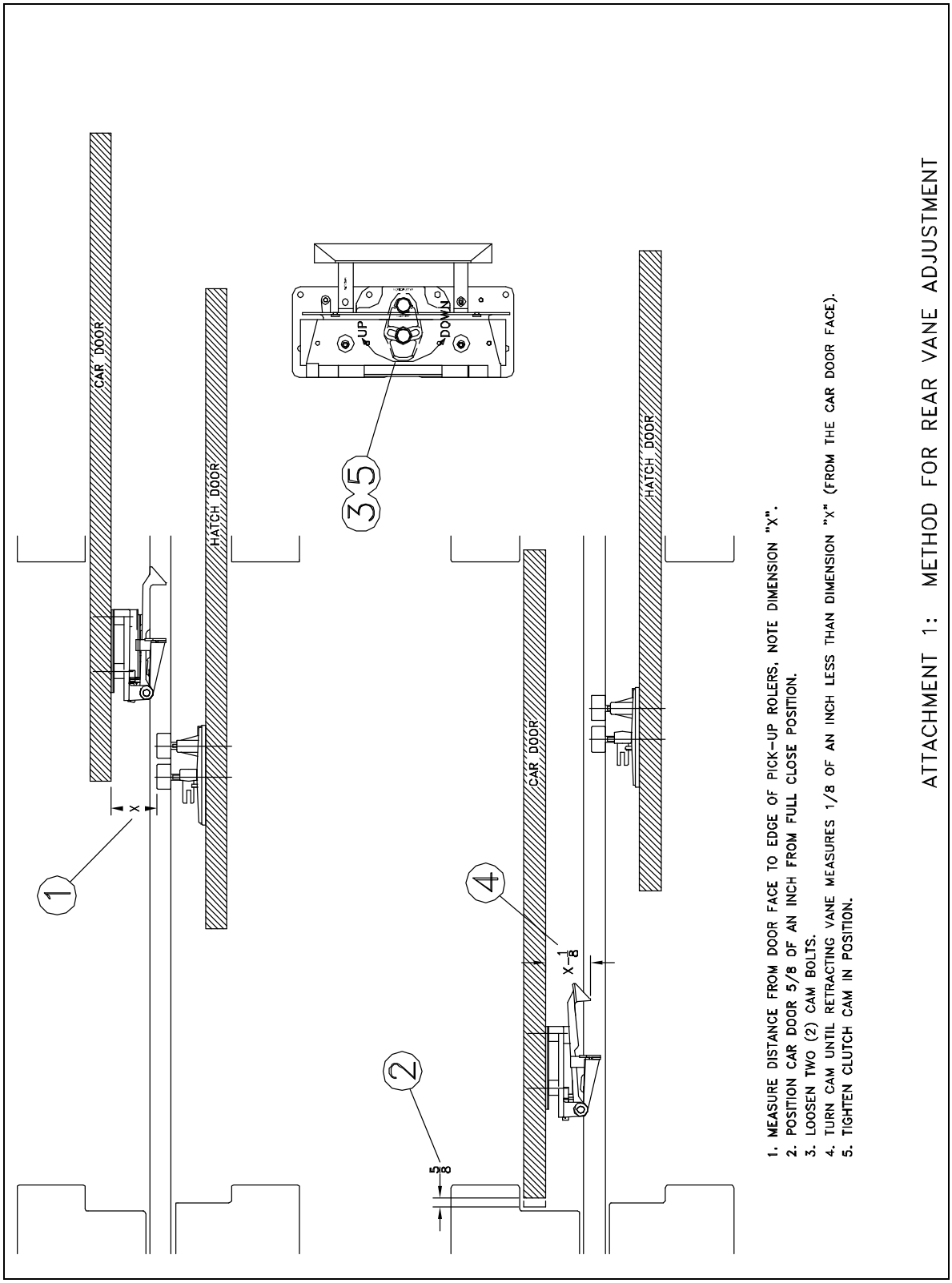


Figure 13: Zone lock in unlocked position

G.A.L. Manufacturing Corporation
50 East 153rd Street, Bronx, N.Y. 10451
Phone (718) 292-9000 Fax (718) 292-2034
12/19/2006

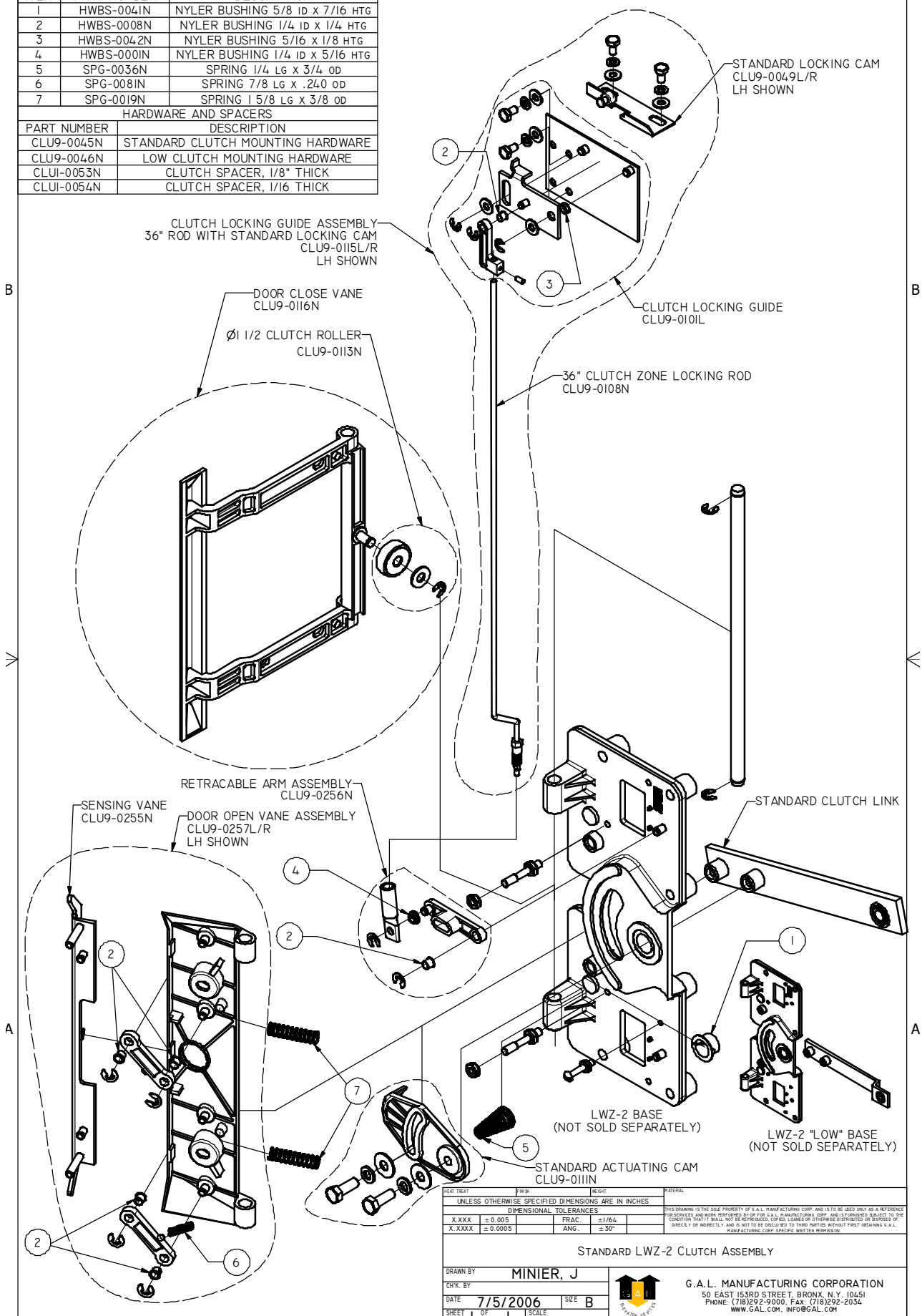


ATTACHMENT 1: METHOD FOR REAR VANE ADJUSTMENT

1. MEASURE DISTANCE FROM DOOR FACE TO EDGE OF PICK-UP ROLERS, NOTE DIMENSION "X".
2. POSITION CAR DOOR 5/8 OF AN INCH FROM FULL CLOSE POSITION.
3. LOOSEN TWO (2) CAM BOLTS.
4. TURN CAM UNTIL RETRACTING VANE MEASURES 1/8 OF AN INCH LESS THAN DIMENSION "X" (FROM THE CAR DOOR FACE).
5. TIGHTEN CLUTCH CAM IN POSITION.

PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	HWBS-0041N	NYLER BUSHING 5/8 ID X 7/16 HTG
2	HWBS-0008N	NYLER BUSHING 1/4 ID X 1/4 HTG
3	HWBS-0042N	NYLER BUSHING 5/16 X 1/8 HTG
4	HWBS-0001N	NYLER BUSHING 1/4 ID X 5/16 HTG
5	SPG-0036N	SPRING 1/4 LG X 3/4 OD
6	SPG-0081N	SPRING 7/8 LG X .240 OD
7	SPG-0019N	SPRING 1 5/8 LG X 3/8 OD

HARDWARE AND SPACERS	
PART NUMBER	DESCRIPTION
CLU9-0045N	STANDARD CLUTCH MOUNTING HARDWARE
CLU9-0046N	LOW CLUTCH MOUNTING HARDWARE
CLUI-0053N	CLUTCH SPACER, 1/8" THICK
CLUI-0054N	CLUTCH SPACER, 1/16 THICK



HEAT TREAT | FINISH | WEIGHT | MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DIMENSIONAL TOLERANCES

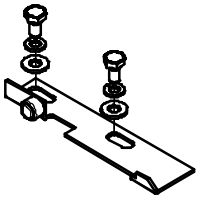
X.XXX	±0.005		FRAC.	±1/64
X.XXXX	±0.0005		ANG.	±30'

STANDARD LWZ-2 CLUTCH ASSEMBLY

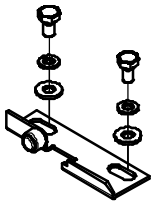
DRAWN BY: MINIER, J
CHK. BY:
DATE: 7/5/2006
SIZE: B
SHEET: OF
SCALE:
PART #:

G.A.L. MANUFACTURING CORPORATION
50 EAST 153RD STREET, BRONX, N.Y. 10451
PHONE: (718)292-9000, FAX: (718)292-2034
WWW.GAL.COM, INFO@GAL.COM

DOCUMENT No.: 8641.IDW
REV: A
RELEASED



CALIFORNIA LOCKING CAM
LH SHOWN



STANDARD LOCKING CAM
LH SHOWN

LOCKING CAM ASSEMBLIES	
PART NUMBER	DESCRIPTION
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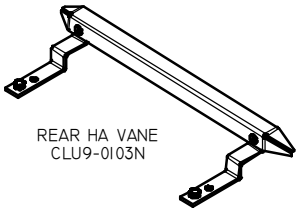
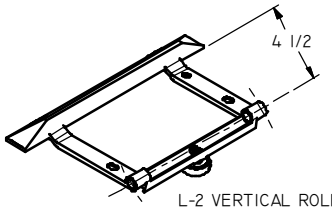
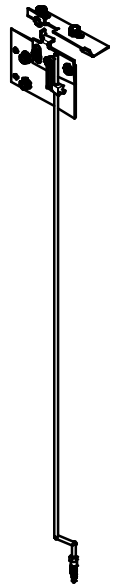
CLU9-049L/R	STANDARD LOCKING CAM



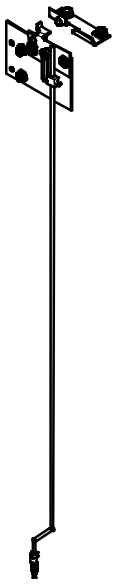
REAR HA VANE
CLU9-0103N



L-2 VERTICAL ROLLER
VANE ASSEMBLY
CLUI5-002IN



CLU9-0114L/R



CLU9-0115L/R

RETRACABLE ROLLER
ASSEMBLY ARM
CLU9-0117N

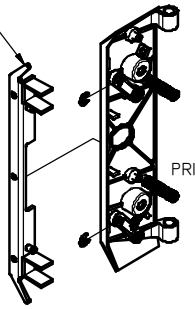
PRIOR TO AUGUST 2006

FIXED DOOR OPEN
VANE ASSEMBLY
CLUII-008IN
FOR NON ZONE LOCK CLUTCHES ONLY

CLUTCH ZONE LOCKING GUIDE ASSEMBLIES		
PART NUMBER	ROD SIZE	LOCKING CAM TYPE
CLU9-0114L/R	36"	CALIFORNIA
CLU9-0115L/R	36"	STANDARD

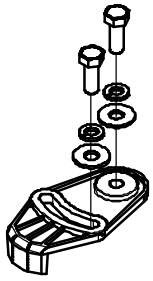
SENSING BAR
CLU9-0104N

PRIOR TO AUGUST 2006

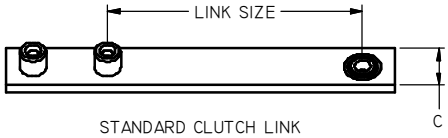


DOOR OPEN
VANE ASSEMBLY
CLU9-0109L

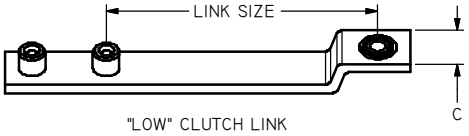
PRIOR TO AUGUST 2006



LRC CLUTCH ACTUATING CAM
CLU9-0238L/R
LH SHOWN



STANDARD CLUTCH LINK



"LOW" CLUTCH LINK

CLUTCH LINKS			
"STD" PART NUMBER	"LOW" PART NUMBER	LINK SIZE	C WIDTH
CLU9-0083N	CLU9-0063N	5 1/4	1 1/4
CLU9-0084N	CLU9-0064N	6	1 1/4
CLU9-0085N	CLU9-0065N	7	1 1/4
CLU9-0086N	CLU9-0066N	8	1 1/4
CLU9-0087N	CLU9-0067N	9	1 1/4
CLU9-0088N	CLU9-0068N	10	1 1/2
CLU9-0089N	CLU9-0069N	11	1 1/2
CLU9-0090N	CLU9-0070N	12	1 1/2
CLU9-0091N	CLU9-007IN	14	1 1/2
CLU9-0092N	CLU9-0072N	16	1 1/2

HEAT TREAT | FINISH | WEIGHT | MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

DIMENSIONAL TOLERANCES

X.XXX	±0.005		FRAC.	±1/64
X.XXXX	±0.0005		ANG.	±30'

LWZ-2 SERIES CLUTCH ACCESSORY ALTERNATIVES

DRAWN BY: MINIER, J
CHK. BY:
DATE: 7/5/2006
SIZE: B
SHEET: OF
SCALE:
PART #:

G.A.L. MANUFACTURING CORPORATION
50 EAST 153RD STREET, BRONX, N.Y. 10451
PHONE: (718)292-9000, FAX: (718)292-2034
WWW.GAL.COM, INFO@GAL.COM

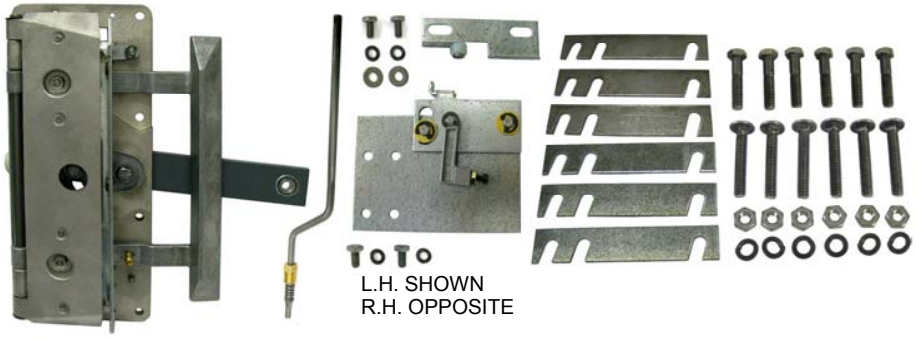
DOCUMENT No.: 8641-1.IDW
REV: A
RELEASED

G.A.L. Manufacturing Corporation
50 East 153rd Street, Bronx, N.Y. 10451
Phone (718) 292-9000 Fax (718) 292-2034

7/16/2010

ISO 9001 : 2000 REGISTERED FIRM

TYPE "LWZ-2" CLUTCH



L.H. SHOWN
R.H. OPPOSITE

TYPE "LWZ-2-LOW" CLUTCH

L.H. SHOWN
R.H. OPPOSITE

Door Opening					Link Size	LWZ-2 Part Number	LWZ-2-LOW Part Number
S/S	2/SP	C/P	2SP/CP	3/SP			
22-29 40-44	40-44	80-83			10"	**CLU9-0001L/R**	**CLU9-0013L/R**
30-34	27-34	34-49	50-59	35-39	6"	**CLU9-0002L/R**	**CLU9-0014L/R**
35-39	35-39	50-59 68-74	68-74	40-44	8"	**CLU9-0003L/R**	**CLU9-0015L/R**
45-48	45-52				12"	**CLU9-0004L/R**	**CLU9-0016L/R**
	24-26	24-33	32-49	30-34	5 1/4"	**CLU9-0005L/R**	**CLU9-0017L/R**
	53-56			55-59	12"	**CLU9-0006L/R**	**CLU9-0018L/R**
	57-64			60-64	14"	**CLU9-0007L/R**	**CLU9-0019L/R**
	65-72			65-69	16"	**CLU9-0008L/R**	**CLU9-0020L/R**
		60-67	60-67		7"	**CLU9-0009L/R**	**CLU9-0021L/R**
		75-79	75-79	45-49	9"	**CLU9-0010L/R**	**CLU9-0022L/R**
			80-83		10"	**CLU9-0011L/R**	**CLU9-0023L/R**
				50-54	11"	**CLU9-0012L/R**	**CLU9-0024L/R**

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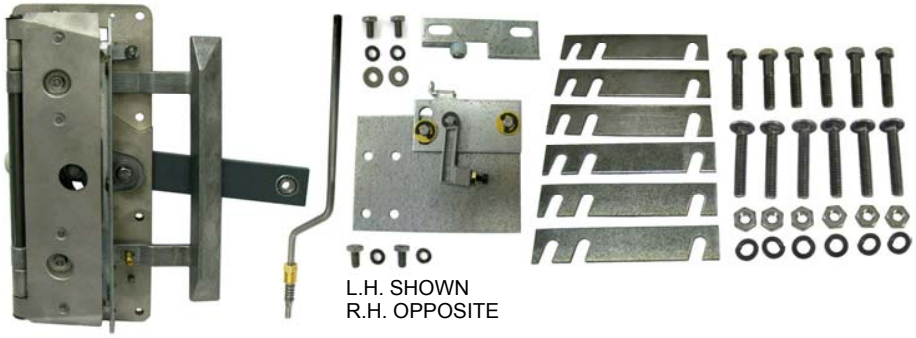
TYPE "LWZ-2-LRC STD" CLUTCH



L.H. SHOWN
R.H. OPPOSITE

TYPE "LWZ-2-LRC LOW" CLUTCH

L.H. SHOWN
R.H. OPPOSITE

Door Opening					Link Size	LWZ-2-LRC STD Part Number	LWZ-2-LRC LOW Part Number
S/S	2/SP	C/P	2SP/CP	3/SP			
22-29 40-44	40-44	80-83			10"	**CLU9-0193L/R**	**CLU9-0205L/R**
30-34	27-34	34-49	50-59	35-39	6"	**CLU9-0194L/R**	**CLU9-0206L/R**
35-39	35-39	50-59 68-74	68-74	40-44	8"	**CLU9-0195L/R**	**CLU9-0207L/R**
45-48	45-52				12"	**CLU9-0196L/R**	**CLU9-0208L/R**
	24-26	24-33	32-49	30-34	5 1/4"	**CLU9-0197L/R**	**CLU9-0209L/R**
	53-56			55-59	12"	**CLU9-0198L/R**	**CLU9-0210L/R**
	57-64			60-64	14"	**CLU9-0199L/R**	**CLU9-0211L/R**
	65-72			65-69	16"	**CLU9-0200L/R**	**CLU9-0212L/R**
		60-67	60-67		7"	**CLU9-0201L/R**	**CLU9-0213L/R**
		75-79	75-79	45-49	9"	**CLU9-0202L/R**	**CLU9-0214L/R**
			80-83		10"	**CLU9-0203L/R**	**CLU9-0215L/R**
				50-54	11"	**CLU9-0204L/R**	**CLU9-0216L/R**

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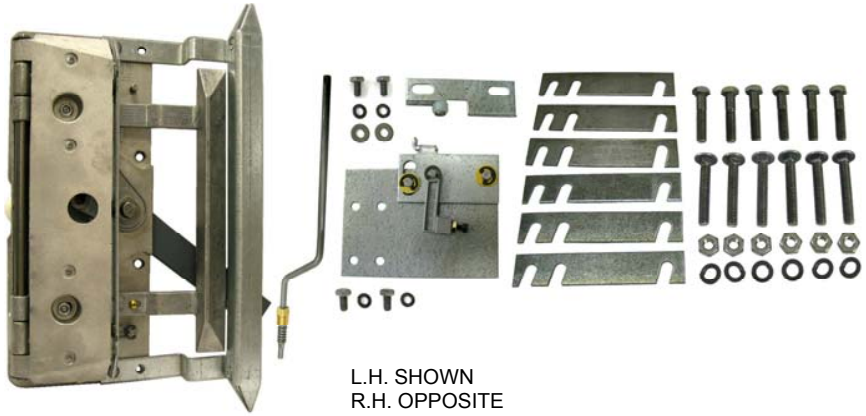
TYPE "LWZ-2-HA, LWZ-2-HA-LOW, LWZ-2-HA-LRC STD & LOW" CLUTCH

"CLU9"



L.H. SHOWN
R.H. OPPOSITE

WORK SHEET REQUIRED!

Door Opening			Link Size	LWZ-2-HA Part Number	LWZ-2-HA-LOW Part Number	LWZ-2-HA-LRC STD Part Number	LWZ-2-HA-LRC LOW Part Number
S/S	2/SP	C/P					
25-34	27-34	34-49	6"	**CLU9-0140L/R**	**CLU9-0148L/R**	**CLU9-0156L/R**	**CLU9-0164L/R**
35-42	35-39	50-59	8"	**CLU9-0141L/R**	**CLU9-0149L/R**	**CLU9-0157L/R**	**CLU9-0165L/R**
	24-26	30-33	5 1/4"	**CLU9-0142L/R**	**CLU9-0150L/R**	**CLU9-0158L/R**	**CLU9-0166L/R**
	40-44		10"	**CLU9-0143L/R**	**CLU9-0151L/R**	**CLU9-0159L/R**	**CLU9-0167L/R**
	45-52		12"	**CLU9-0144L/R**	**CLU9-0152L/R**	**CLU9-0160L/R**	**CLU9-0168L/R**
	53-56		12"	**CLU9-0145L/R**	**CLU9-0153L/R**	**CLU9-0161L/R**	**CLU9-0169L/R**
	57-64		14"	**CLU9-0146L/R**	**CLU9-0154L/R**	**CLU9-0162L/R**	**CLU9-0170L/R**
	65-72		16"	**CLU9-0147L/R**	**CLU9-0155L/R**	**CLU9-0163L/R**	**CLU9-0171L/R**

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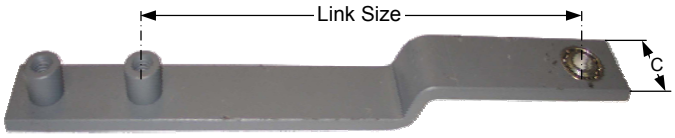
TYPE "LWZ-2" CLUTCHES

LWZ-2 & LWZ-2-LRC STD CLUTCH LINK

LWZ-2-LOW & LWZ-2-LRC LOW CLUTCH LINK



S/S D.O.	2/SP D.O.	3/SP D.O.	C/P D.O.	2SP/CP D.O.	Link Size	"C" Width	**LWZ-2 & LWZ-2-LRC STD** Part Number	**LWZ-2-LOW & LWZ-2-LRC LOW** Part Number
	24-26	30-34	24-33	32-49	5 1/4"	1 ¼"	**CLU9-0083N**	**CLU9-0063N**
30-34	27-34	35-39	34-49	50-59	6"		**CLU9-0084N**	**CLU9-0064N**
			60-67	60-67	7"		**CLU9-0085N**	**CLU9-0065N**
35-39	35-39	40-44	50-59 68-74	68-74	8"		**CLU9-0086N**	**CLU9-0066N**
		45-49	75-79	75-79	9"		**CLU9-0087N**	**CLU9-0067N**
22-29 40-44	40-44		80-83	80-83	10"	1 ½"	**CLU9-0088N**	**CLU9-0068N**
		50-54			11"		**CLU9-0089N**	**CLU9-0069N**
45-48	45-56	55-59			12"		**CLU9-0090N**	**CLU9-0070N**
	57-64	60-64			14"		**CLU9-0091N**	**CLU9-0071N**
	65-72	65-69			16"		**CLU9-0092N**	**CLU9-0072N**

NOTE: *FOR "HA" JOBS S/S 25-34 D.O. USE 6" CLUTCH LINK & S/S 35-42 D.O. USE 8" CLUTCH LINK.*

(6) 1/16" SPACERS
(3) 1/8" SPACERS

(6) 5/16-18 x 1 3/4"LG
Hex Cap 1"Thd Steel

(6) 5/16-18 x 1 3/4"LG
Carriage Bolt

(6) 1/4-20 x 7/16" wac
Hex Steel Plated Nut

(6) 5/16"ID x 9/16"OD x 0.093Thk Lock Washer

CLU9-0045N
HARDWARE,CLUTCH MOUNTING
LWZ-2 & LWZ-2-LRC STD CLUTCHES

(6) 1/16" SPACERS
(9) 1/8" SPACERS

(6) 5/16-18 x 1 1/4"LG
Hex Cap 7/8"Thd Steel

(6) 5/16-18 x 1 3/4"LG
Carriage Bolt

(6) 1/4-20 x 7/16" wac
Hex Steel Plated Nut

(6) 5/16"ID x 9/16"OD x 0.093Thk Lock Washer

CLU9-0046N
HARDWARE,CLUTCH MOUNTING
LWZ-2-LOW & LWZ-2-LRC LOW CLUTCHES

CLU1-0053N
SPACER,CLUTCH 1/8" THICK

CLU1-0054N
SPACER,CLUTCH 1/16" THICK

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TYPE "LWZ-2" CLUTCHES

R.H. SHOWN
L.H. OPPOSITE

CLU9-0049L/R CAM,LWZ-2 STANDARD LOCKING

DISCONTINUED

L.H SHOWN
R.H. OPPOSITE

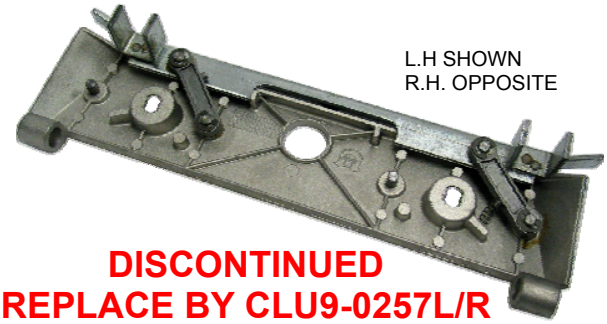
CLU9-0047L/R CAM,LWZ-2 CALIFORNIA LOCKING

CLU9-0108N ROD,36" LWZ-2 CLUTCH ZONE LOCKING

L.H SHOWN
R.H. OPPOSITE

CLU9-0101L/R GUIDE,LWZ-2 CLUTCH LOCKING

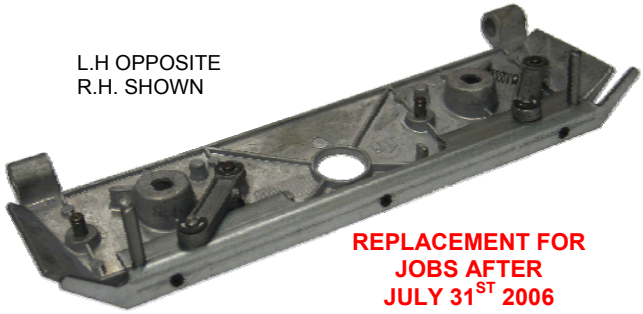
L.H SHOWN
R.H. OPPOSITE



DISCONTINUED
REPLACE BY CLU9-0257L/R

CLU9-0109L/R VANE ASSEMBLY,LWZ-2 DOOR OPEN

L.H OPPOSITE
R.H. SHOWN



REPLACEMENT FOR
JOBS AFTER
JULY 31ST 2006

CLU9-0257L/R VANE ASSEMBLY,LWZ-2 DOOR OPEN

R.H. SHOWN
L.H. OPPOSITE

CLU9-0115L/R
LOCKING ASSEMBLY,LWZ-2 CLUTCH 36" ROD
WITH STANDARD CAM

R.H. SHOWN
L.H. OPPOSITE

CLU9-0114L/R
LOCKING ASSEMBLY,LWZ-2 CLUTCH 36" ROD
WITH CALIFORNIA CAM

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7/16/2010

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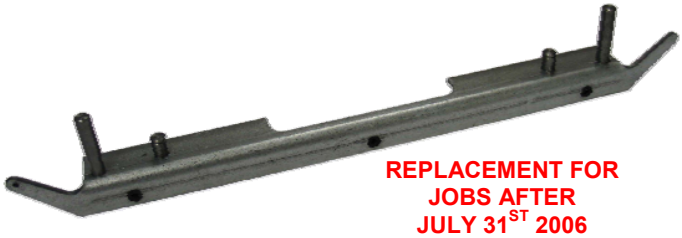
TYPE "LWZ-2" CLUTCHES

"CLU9"

DISCONTINUED
REPLACE BY CLU9-0255N

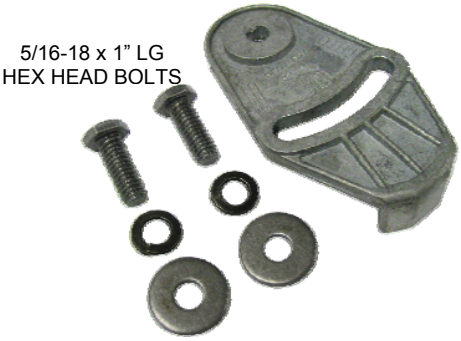
CLU9-0104N
SENSING BAR & PIVOT,LWZ-2 ZONE LOCK ASSY

CLU9-0103N
VANE,LWZ-2 HA CLUTCH REAR ASSEMBLY

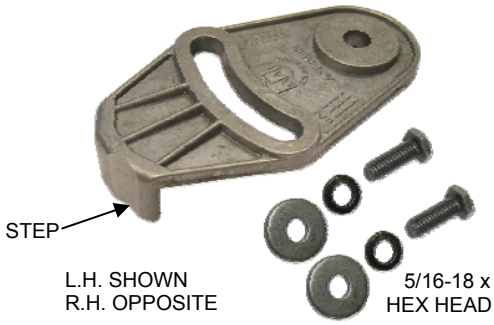


REPLACEMENT FOR JOBS AFTER JULY 31ST 2006

CLU9-0255N
SENSING BAR & PIVOT,LWZ-2 ZONE LOCK ASSY



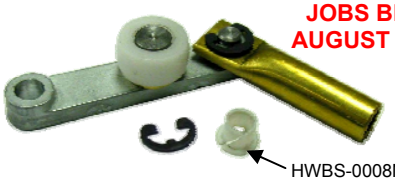
CLU9-0111N
CAM,LW2 & LWZ-2 CLUTCH ACTUATING



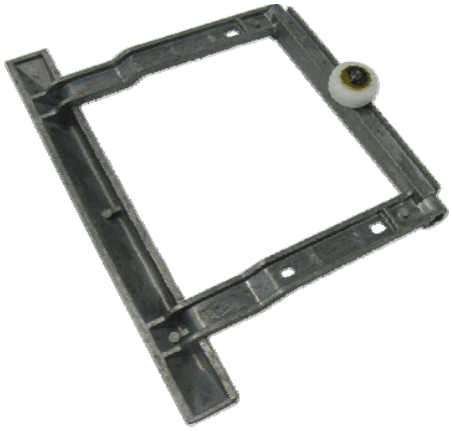
CLU9-0238L/R
CAM,LW2-LRC & LWZ-2-LRC CLUTCH ACTUATING

CLU9-0113N
ROLLER,1 1/2" DIA LWZ-2 CLUTCH

REPLACEMENT FOR JOBS BEFORE AUGUST 1ST 2006

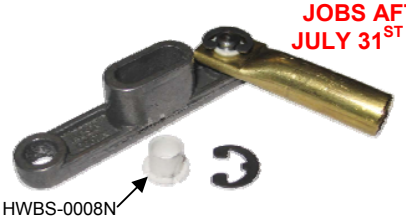


CLU9-0117N
ARM,LWZ-2 RETRACTABLE ROLLER ASSEMBLY



CLU9-0116N VANE,LWZ-2 DOOR CLOSE

REPLACEMENT FOR JOBS AFTER JULY 31ST 2006



CLU9-0256N ARM,LWZ-2 RETRACTING ASSEMBLY

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7/16/2010

TYPE "LWZ-2" CLUTCHES

"CLU9"

LW2 & LWZ-2 CLUTCHES
(2) SPRING REQUIRED.
USED ON DOOR CLOSE VANE

SPG-0019N
SPRING,1 5/8" LG x 3/8" OD.

LWZ-2 CLUTCH
(1) SPRING REQ'D.
USED ON DOOR
OPEN VANE

SPG-0036N
SPRING,1 1/4"LG x .750 OD

LWZ-2 CLUTCH
(1) SPRING REQUIRED.
USED ON SENSING BAR

SPG-0081N
SPRING,7/8"LG x .240 OD.

LWZ-2 CLUTCH
USED ON RETRACTABLE ROLLER ARM

HWBS-0008N
BUSHING,NYLINER 1/4 ID x 1/4 HTG

LWZ-2 CLUTCH
USED ON CLUTCH BASE

HWBS-0041N
BUSHING,NYLINER PLUS 5/8 x 7/16 PLUS

LWZ-2 CLUTCH
USED ON LOCKING GUIDE ASSEMBLY

HWBS-0042N
BUSHING,NYLINER 5/16 ID x 1/8 HTG

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7/16/2010

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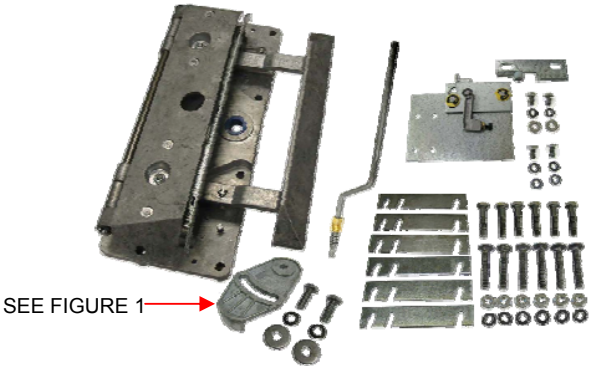
CLUTCHES FOR "INTERNATIONAL LIFT" STOCK PROGRAM
"CLU9"

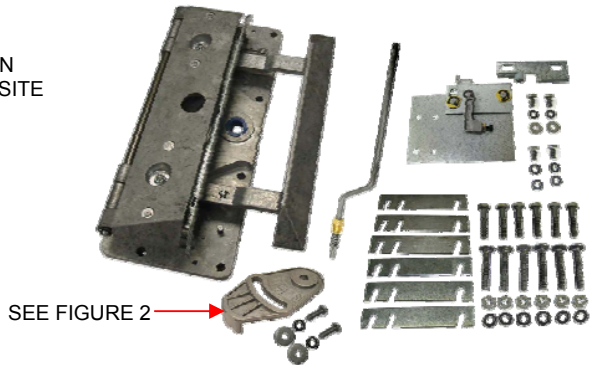
WORK SHEET REQUIRED!

"LWZ-2 & LWZ-2-LOW"

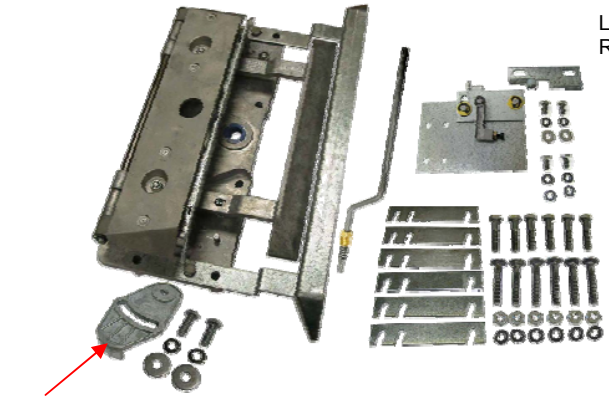


L.H. SHOWN
R.H. OPPOSITE

"LWZ-2-LRC STD & LOW"

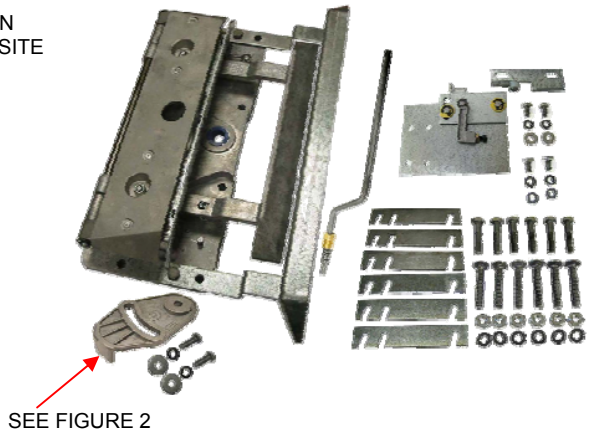


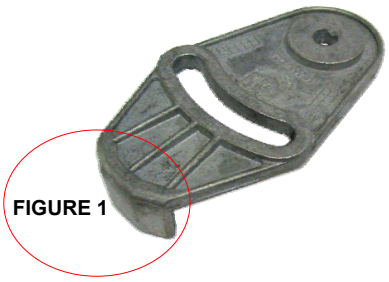
"LWZ-2-HA & LWZ-2-HA-LOW"

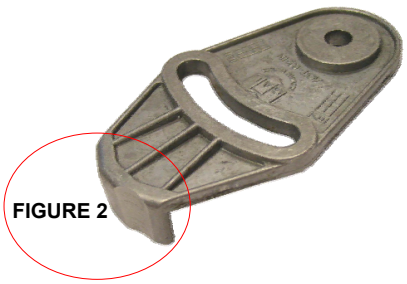


L.H. SHOWN
R.H. OPPOSITE

"LWZ-2-HA-LRC STD & LOW"







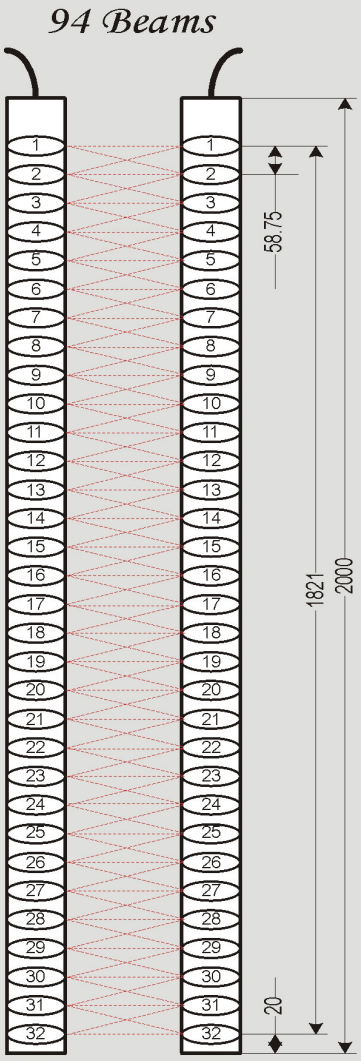
DOOR OPENING					LWZ-2 Part Number	LWZ-2-LOW Part Number	LWZ-2-LRC STD Part Number	LWZ-2-LRC LOW Part Number
S/S	2/SP	3/SP	2S/CP	C/P				
22-48	24-72	30-69	30-83	24-83	**CLU9-0239L/R**	**CLU9-0240L/R**	**CLU9-0241L/R**	**CLU9-0242L/R**

DOOR OPENING					LWZ-2-HA Part Number	LWZ-2-HA-LOW Part Number	LWZ-2-HA-LRC STD Part Number	LWZ-2-HA-LRC LOW Part Number
S/S	2/SP	3/SP	2S/CP	C/P				
22-48	24-72	30-69	30-83	24-83	**CLU9-0243L/R**	**CLU9-0244L/R**	**CLU9-0245L/R**	**CLU9-0246L/R**

6.5 WECO Door Sensor

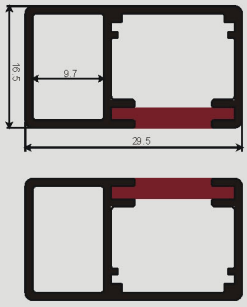
WECO-917P

Universal Model



Advantages:

- Cables are true traveling cables with plug-in connectors
- Anti-sunlight function, software redundancy, auto-standby
- Universal model covers both center opening/side slide and with/without nudging



Universal Aluminium Profile

Power Unit

Easy Connection

ISO9001

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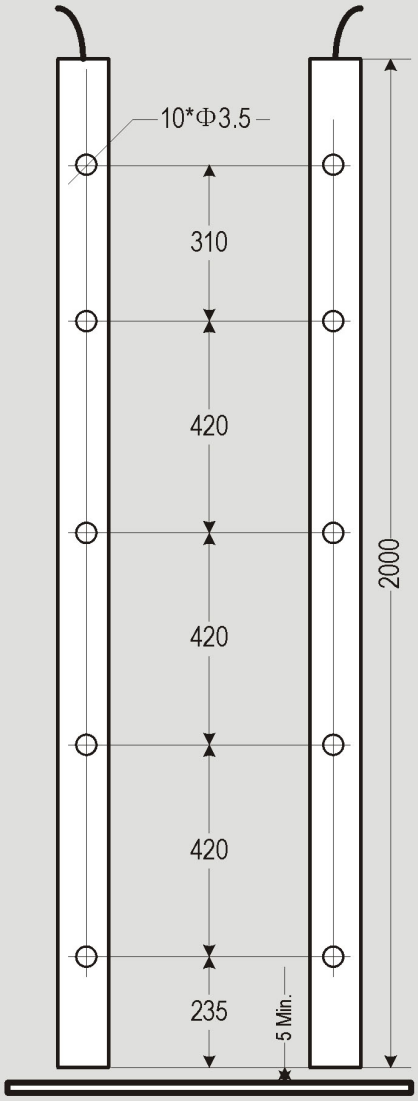
E: info@wecocanada.com W: www.wecocanada.com

WECO917P
Universal Model

WECO ELEVATOR DOOR DETECTOR



WECO917P TECHNICAL FEATURES

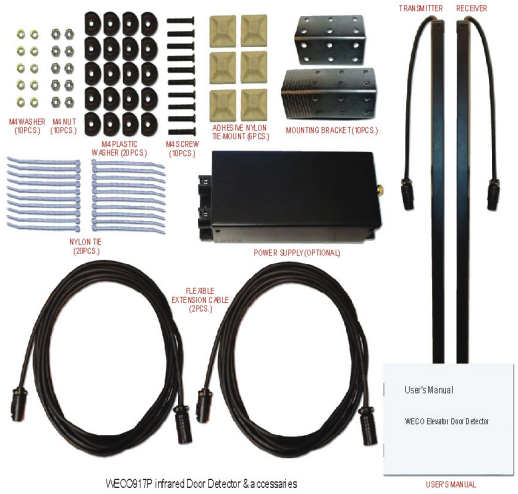
WECO917P	17mm×30mm×2000mm
Number of infra-red beams	94 Non-parallel
Number of diodes	32 pairs
Scan mode	3 ways
Response time	65ms
Diodes spacing	59mm
Operating range	0···3000mm(Max.4000mm as required)
Detecting height	20mm···1841mm
Infra-red pulses ratio	1:2
Max.ambient light(sunlight)	⩾100,000LUX
Linear tolerance	±15mm vertical, ±4mm horizontal
Connection flexible cables	3,500mm×2(Super strong flexible cables)
System indicators	Normal-Interrupted-Faulty
LED indicators	Green LED×1,Red LED×1
Operating temperature range	-20℃-65℃
Storage temperature range	-40℃-85℃
IP Rate	IP54
Isolation	⩾1500V

Power Unit PWS917_120

Dimension	50mm×60mm×190mm
Operating Voltage	120VAC+/-15%,60HZ
Enclosure	Steel cartop box
Output relay capacity	1NO+1NC(AC120V,1A or DC24V,1A)
Operation life	⩾10^7
Power consumption	3VA
Buzzer functions	OFF-ON-Timer
Buzzer delay/Nudging delay	45S,60S(USA)/20S,30S(CAN)
Buzzer active	60s,infinite
Buzzer setting	USA,CAN

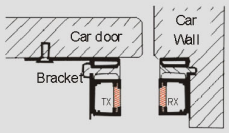
Power Unit PWS917_24

Dimension	37mm×42mm×75mm
Operating voltage	24VDC
Enclosure	Aluminium module
Output relay capacity	1NO+1NC(AC120V,1A or DC24V,1A)
Operation life	⩾10^7
Power consumption	⩽3VA

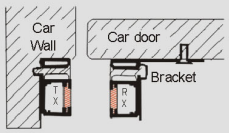


WECO917P Infrared Door Detector & accessaries

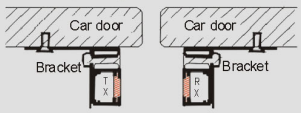
Left Side Opening



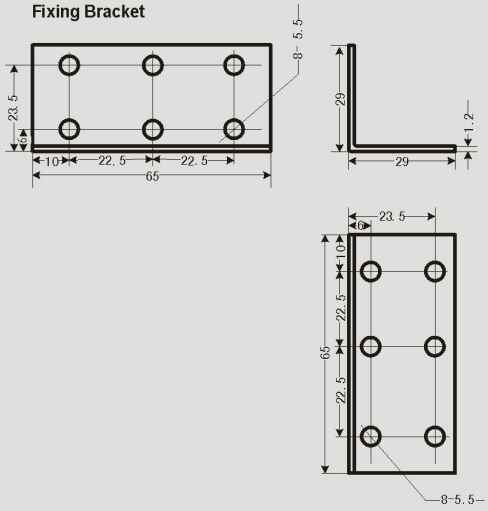
Right Side Opening



Central Opening



Fixing Bracket



917P

Infrared Elevator door detector

User's Mamual

EBOOK917P-WECO-V1.0

WECO ®

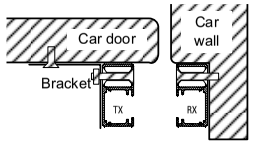
1. Technical features

Model name	917P
Diodes & spacing	32 pairs, 58.75mm
Detecting range	0-3000mm (0-5000mm on request)
Beams & Response time	94 beams, 65ms
Detecting height	20mm-1840mm
Tolerance (0mm)	Vertical: ±20mm (10°), Horizontal :±5mm (7°)
Working environment	-20℃-65℃, Max. ambient light ≥100,000LUX
Dimensions	2000mm*16.5mm*29.5mm
Certificate	CE、CSA
Scan mode	3 ways cross scan
Indictors and buzzer (in Receiver)	1. Green LED: ON-- power presents 2. Red LED: ON--system fault or beams obstructed FAST FLASHING-- TX diode broken SLOW FLASHING-- system standby Buzzer: 15s after beams obstructed

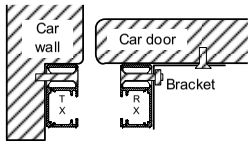
WECO ®

4.Installation diagrams

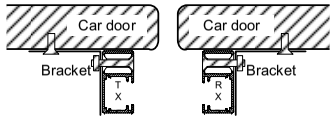
Left side opening



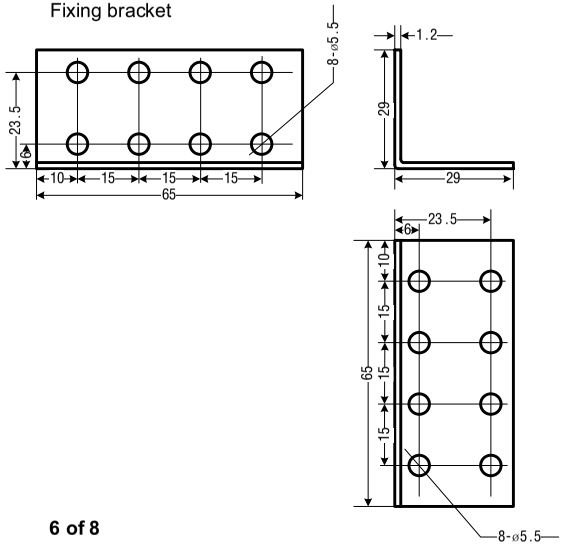
Right side opening



Central opening



Fixing bracket



WECO ®

6. Packing list

	ITEM	QUANTITY
1	Power supply control unit	1 pieces
2	Durable flexible cable (standard length 3.5m)	2 cables
3	Transmitter	1 piece
4	Receiver	1 piece
5	User Manual	1 copy
6	Fixing brackets	10 pieces
7	Mounting accessories	1 set
	Positioning pin	1 piece
	Cable clips	6 pieces
	M4×16 screw	20 pieces
	M4 washer	20 pieces
	M4 nut	20 pieces
	Nylon tie	10 pieces

WECO ®

Content

Thank you for using WECO917 infrared elevator door detector.

Please read this manual carefully before installation and keep this manual for future reference.
Please check if anything is missing from the following packing list. Contents may differ according to customers' special requirements.

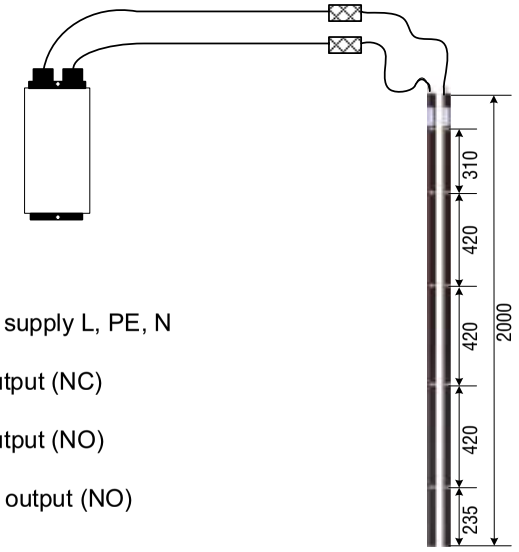
WECO ®

2. Power unit specifications

ITEM		PWS917-110	PWS917-24
Dimensions (L×W×D)		60mmx50mmx190mm	37mm×60mm×75mm
Material		Steel box	Aluminum Module
Power Supply		110VAC±15%, 50/60HZ	24VDC±20%
Power consumption		≤3VA	
Outputs		Relay contact (NC / NO)	
Electrical Action Span		$>10^7$	
Contact Capability		1A/120VAC or 1A/30VDC	
Isolation		≥1500V	
Short circuit protection		YES	
Buzzer function	DIP 1	On-OFF-Timer	NO USED
	DIP 2	10s, 30s	
	DIP 3	60s, infinite	
	DIP 4	Intermittent, constant	
LED indictors	Green	ON-- power presents	
	Red	Intermittent, constant	NO USED

WECO ®

3. Connection diagram



Power unit

4,5,6: Power supply L, PE, N

1/3: Relay output (NC)

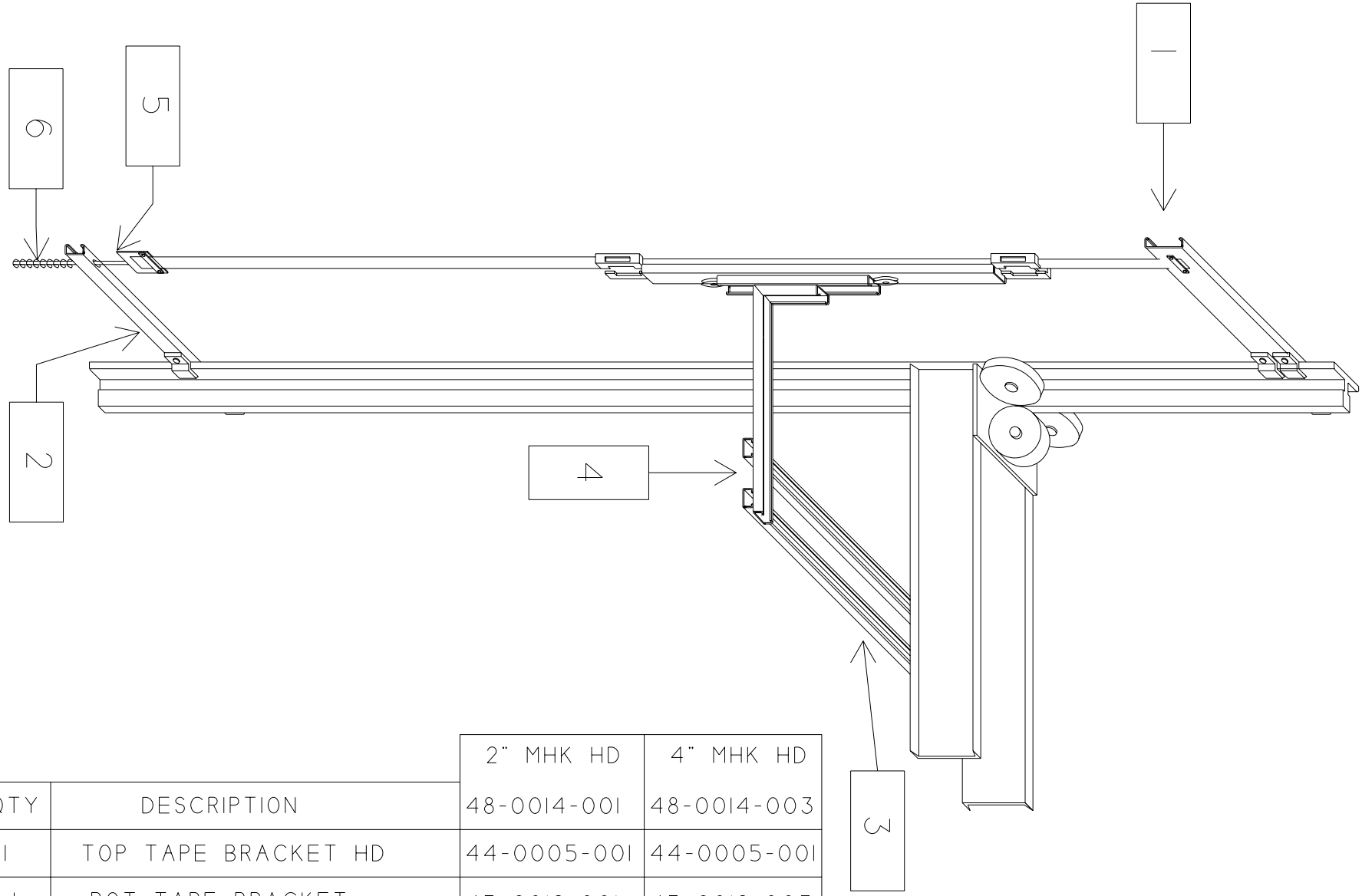
2/3: Relay output (NO)

4/3: Nudging output (NO)

WECO ®

5. Trouble shooting

Fault	Possible reasons
Both of the LEDs in the receiver are not lit	Internal wires or circuit broken
Red LED is lit while the yellow-green LED is not lit in the receiver	Minimum 1 wire broken inside the cables from receiver or transmitter
LEDs are lit correctly when interrupted, but the car doors do not open	Plastic filter is too dirty 1) Incorrect alignment of receiver and transmitter 2) resulting in receiver not receiving the signal from transmitter
LEDs are lit correctly when interrupted, but the car doors do not open	1) Wrong connection with NC/NO contacts 2) Output relay is broken 3) Check the wires
Red LED in the power block box is not lit when power is on	1) Power supply wires broken 2) Wrong connection (check terminals 4 and 6) 3) Terminal connections is too lose 4) Fuse is broken



REF	QTY	DESCRIPTION	2" MHK HD 48-0014-001	4" MHK HD 48-0014-003
1	1	TOP TAPE BRACKET HD	44-0005-001	44-0005-001
2	1	BOT TAPE BRACKET	45-6012-001	45-6012-003
3	2	24 in LONG MTG CHANNEL	45-6014-001	45-6014-001
4	1	18 in LONG MTG CHANNEL	45-6013-001	45-6013-001
	1	MHK BOLT PACK HD	48-0053-001	48-0054-001
5	1	TAPE CLAMP. BOTTOM	44-0001-001	44-0001-003
6	1	TAPE CLAMP.SPRING	44-8001-001	44-8001-001

REV 1 5-18-96 ITEM 5 REMOVED ADDED ANGLE TO ITEM 4

INTERFACE PRODUCTS
215 NORTH FEHR WAY BAYSHORE, NY 11706

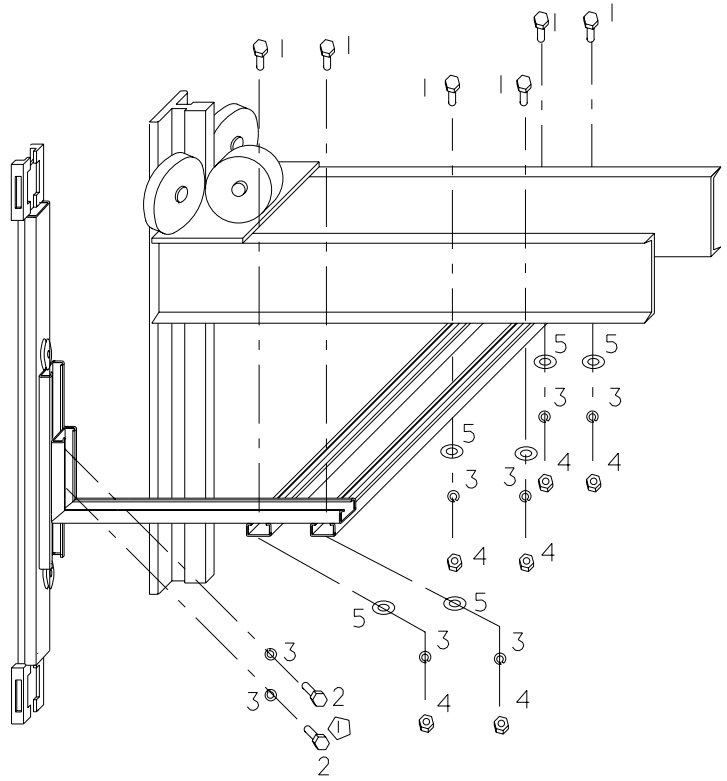
MHK BRACKET KIT HD 2".4"

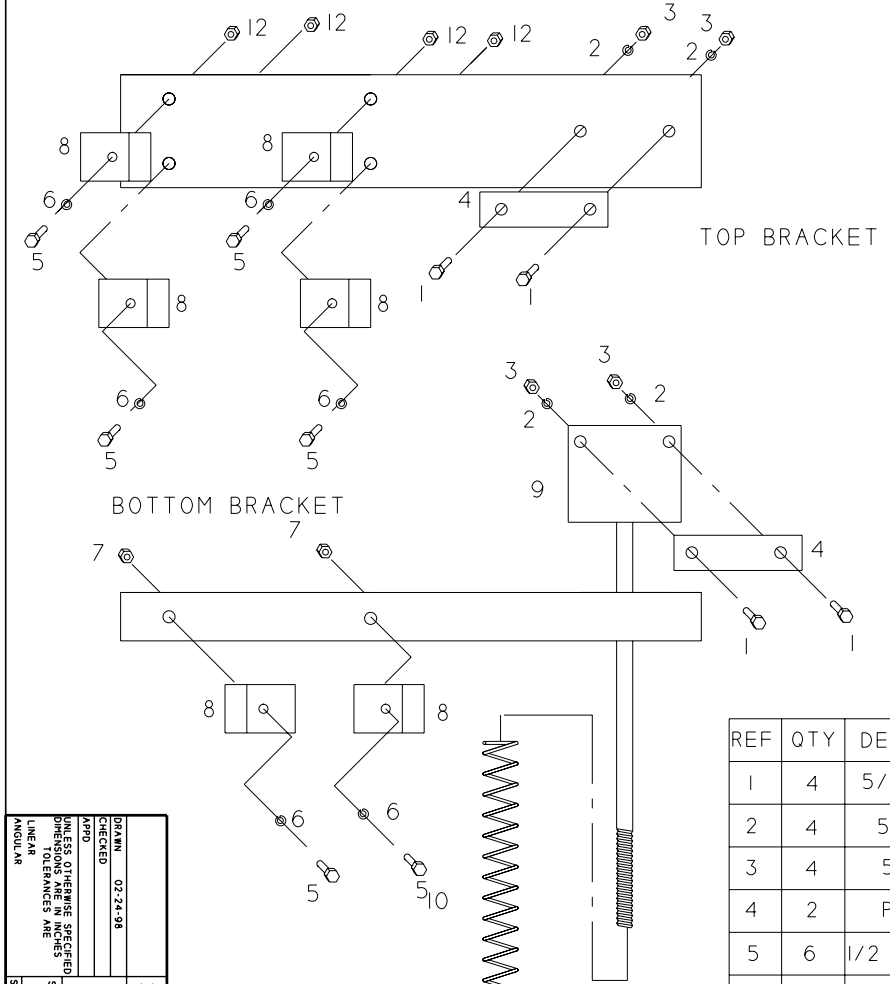
DRAWN 05-18-96
CHECKED
APPD

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE
LINEAR
ANGULAR

SIZE A | DRAWING NUMBER 48-0014-00X | REV B

SCALE NONE | 480014.GCD | SHEET OF





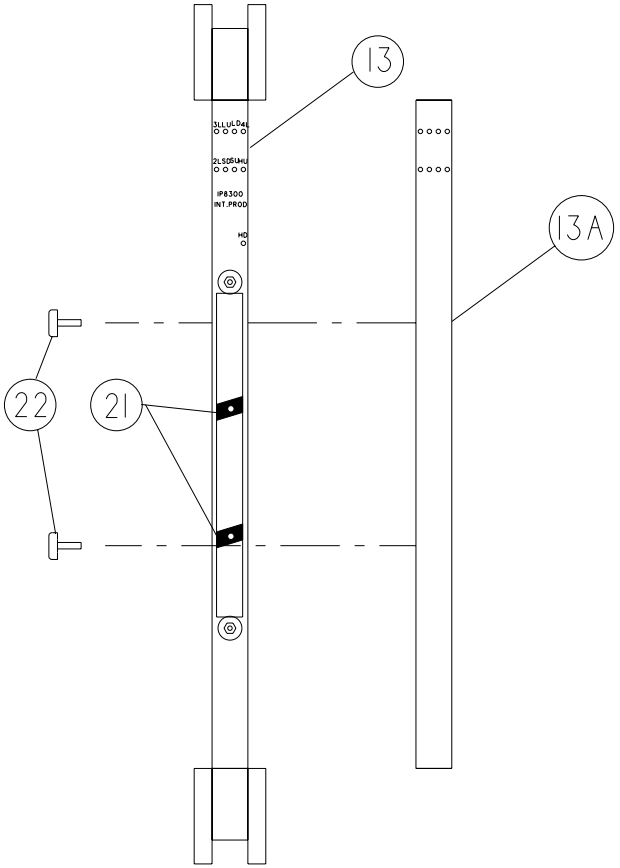
REF	QTY	DESCRIPTION
1	6	3/8 x 2 HEX BOLT
2	2	3/8 X 3/4 HEX BOLT ⟨1⟩
3	8	3/8 LOCK WASHER
4	6	3/8 HEX NUT
5	6	3/8 FLAT WASHER

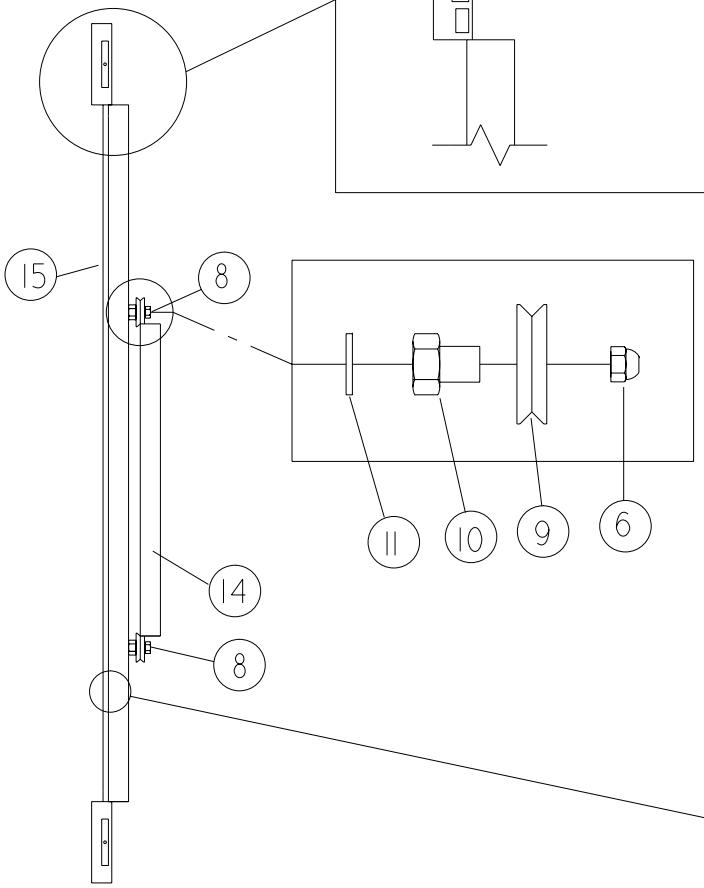
⟨1⟩ 1-19-99 CHANGED BOLT LENGTH

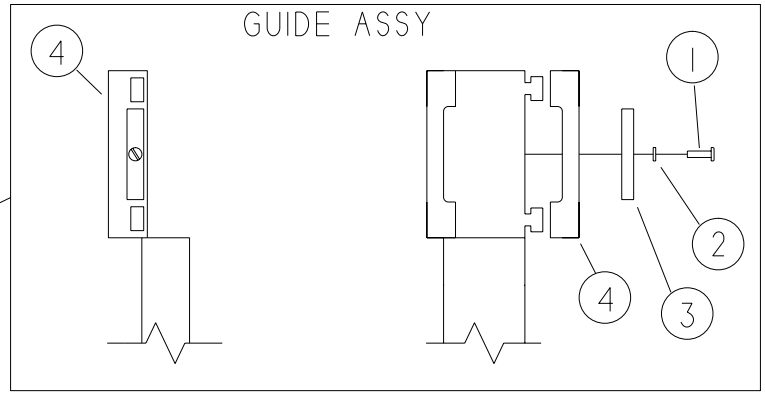
	INTERFACE PRODUCTS 215 NORTH FEHR WAY BAYSHORE, NY 11706		
DRAWN 12-11-96	IP8300 CAR TOP ASSY		
CHECKED			
APPD			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE LINEAR ANGULAR	SIZE A	DRAWING NUMBER 95-0928-010-B	REV B
	SCALE NONE	CAR-TOP4.GCD	SHEET OF

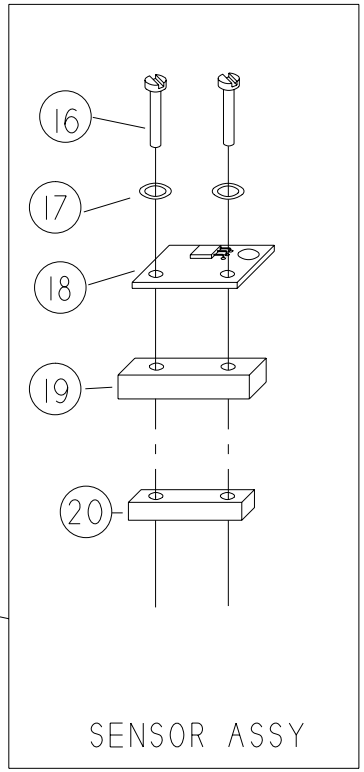
DRAWN 02-24-98	INTERFACE PRODUCTS 215 NORTH FEHR WAY BAYSHORE, NY 11706		
CHECKED	TAPE BRACKET ASSY (HD)		
APPD			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE LINEAR ANGULAR	SIZE A	DRAWING NUMBER 98-0224-010	REV 0
	SCALE NONE	HD-ASY.GCD	SHEET OF

REF	QTY	DESCRIPTION
1	4	5/16 x 1" HEX
2	4	5/16 LOCK
3	4	5/16 NUT
4	2	PLATE
5	6	1/2 X 1 1/2 HEX
6	6	1/2 LOCK
7	2	FLANGE NUT
8	6	RAIL CLIP
9	1	TAPE CLAMP
10	1	SPRING
11	1	1/2" FLAT WASH
12	6	1/2" NUT









SENSOR HEAD

	INTERFACE PRODUCTS 215 NORTH FEHR WAY BAYSHORE, NY 11706
DRAWN 01-09-97 CHECKED APPD UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE LINEAR ANGULAR	IP8300 QUICK CONNECT SENSOR HEAD PART LIST
SIZE A	DRAWING NUMBER 95-0825-010 REV
SCALE NONE	PRT-LSTI.GCD SHEET OF

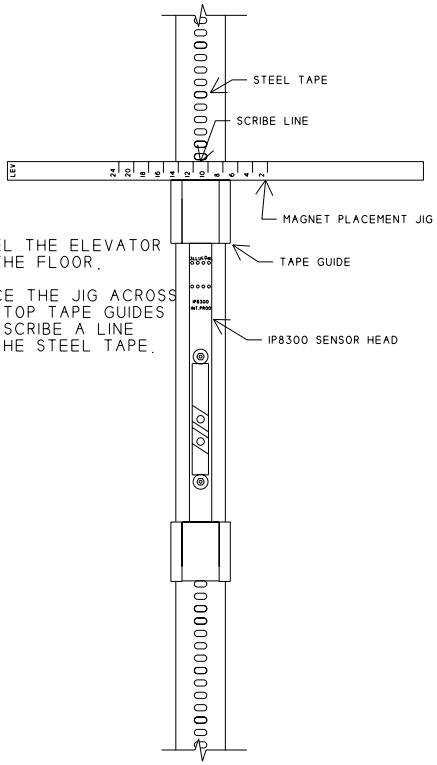
INTERFACE PRODUCTS CO. INC.

215 NORTH FEHR WAY
BAY SHORE, NY 11706 U.S.A.
PHONE: 631-242-4605
FAX: 631-242-0560

IP8300 Sensor Head (Quick Connect)			
Ref	Qty	Description	IP Part Number
1	4	Screw 6-32 X ½	70-0601-008
2	4	Lock Washer, #6, Int	70-0603-001
3	4	Tape Guide Spacer	44-2002-001
4	4	Tape Guide	44-2001-001
6	2	Nut, Stop, 1/4	70-0002-002
8	2	Stud 1/4 X 1-1/2	70-0001-124
9	2	Roller	46-2002-001
10	2	Bushing, Adjustable	44-2001-001
11	2	Washer, Flat 1/4	70-4000
13	1	Frame	Use Serial Number
13A	1	Sensor Channel	Use Serial Number
14	1	Mtg. Channel (For 15" Frame)	45-6001-001
14	1	Mtg. Channel (For 30" Frame)	45-6001-002
14	1	Mtg. Channel (For 45" Frame)	45-6001-002
15	1	Sensor Channel Cover (15" Frame)	44-0021-001
15	1	Sensor Channel Cover (30" Frame)	44-0022-001
15	1	Sensor Channel Cover (45" Frame)	44-0023-001
16	2*	Screw, 4-40 X 5/8,pan	70-0401-005
17	2*	Lock, #4, Int	70-0403-001
18	1*	Sensor PCB Assy	Use Sensor Name and Unit Serial #
19	1*	Top Sensor Clamp	44-2004-001
20	1*	Bottom Sensor Clamp	44-2005-001
21	2	Nut, Channel 3/8	70-6002-003

* Qty per sensor used

25-09-03



LEVEL THE ELEVATOR TO THE FLOOR.

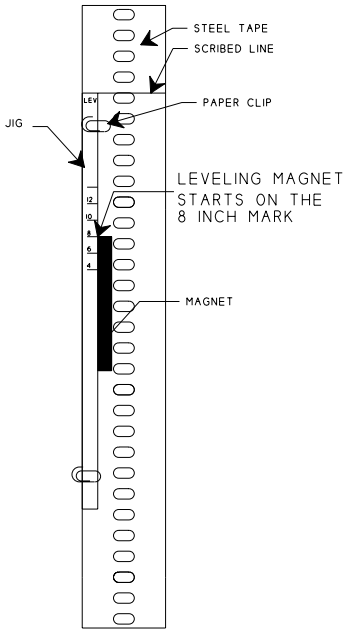
PLACE THE JIG ACROSS THE TOP TAPE GUIDES AND SCRIBE A LINE ON THE STEEL TAPE.

FOLD THE JIG AROUND THE STEEL TAPE WITH THE NUMBERED SIDE FACING OUT AND THE "LEV" MARKING ON TOP

ALIGN THE TOP OF THE JIG WITH THE SCRIBED LINE

SECURE THE JIG TO THE STEEL TAPE WITH THE PAPER CLIPS PROVIDED.

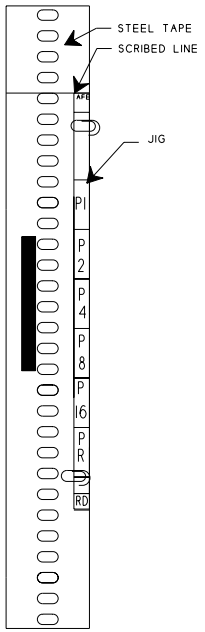
REMOVE THE PAPER BACKING FROM THE MAGNET. WIPE ANY OIL FROM THE STEEL TAPE. SECURE THE MAGNET TO THE STEEL TAPE AT THE 8 INCH MARK



FOLD THE A.F.E. JIG AROUND THE TAPE
ALIGN IT TO THE SCRIBE MARK
SECURE IT WITH THE PAPER CLIPS

INSTALL THE A.F.E. MAGNETS AS NEEDED BASED ON THE FLOOR CODE FROM THE E.C. JOB PRINT

RD MAGNET IS 1-INCH SOUTH
ALL OTHER A.F.E. MAGNETS ARE 3-INCH NORTH



	INTERFACE PRODUCTS 215 NORTH FEHR WAY BAYSHORE, NY 11706
DRAWN 03-09-02 CHECKED APPD UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE LINEAR ANGULAR	A.F.E MAGNET PLACEMENT
SIZE A	DRAWING NUMBER 102-0309-010 REV 0
SCALE NONE	INS-ECI.GCD SHEET OF

INTERFACE

PRODUCTS CO. INC.

IP8300 OPTICAL TROUBLESHOOTING ELEVATOR CONTROLS PVF

OVERVIEW

The optical function of the tape selector provides a set of digital pulses to the controller. The bracket attached to the sensor channel contains an IR LED. Infrared light is received by the two IR detectors located behind the slot in sensor channel. These two signals, DP1 and DP2, provide a voltage referenced to DPC. These two signals are 90° out of phase.

Troubleshooting

The following voltage measurements are made at the tape selector**.**

1) Confirm the tape selector has 115VAC into the power supply board.
2) Check the power supply has 12VDC out.
3) From the "DPC" terminal, to power supply +12 terminal, should measure 12VDC
4) Unscrew the thumb screws and remove the sensor channel from the frame. (Don't drop the thumb screws.)
5) With the controller connected to the selector, DP1 and DP2 will measure 6-7VDC to DPC
6) Block the top IR detector. DP1 should drop below 1VDC, DP2 will measure 6-7VDC.
7) Block the bottom IR detector. DP2 should drop below 1VDC, DP1will measure 6-7VDC.
8) A voltage reading of 12VDC at DP1 or DP2 to DPC indicates an open wire to the controller.

To confirm tape reader operation independent of the controller.

1) Remove the field wires from DP1, DP2 and DPC.
2) DP1 and DP2 will measure 12VDC to DPC.
3) Block the top IR detector. DP1 should drop below .5VDC, DP2 will measure 12VDC.
4) Block the bottom IR detector. DP2 should drop below .5VDC, DP1will measure 12VDC.

If these four steps check, the electrical portion of the tape selector is functioning correctly.

Alignment

The PVF tape readers are preadjusted and tested so the DP1 and DP2 signals are 90° out of phase. If these sensors are moved, it is recommended that a dual channel oscilloscope be used to calibrate the digital output. If a dual channel oscilloscope is unavailable, the following steps will approximate a 90° phase shift.

1) Position the DP1, DP2 sensors so the detector lenses are centered in the cover slot.
2) Space the plastic bodies of the two sensors with a gap of 1/8-inch (a 1/8 inch wide flat blade screwdriver works well as a spacing jig.)
3) If a set calibrated sensors is ordered, a spacer jig, calibrated for those sensors is provided.

6.6 Elevator Cab & Hall Fixtures

REVISIONS		
LTR	DESCRIPTIONS	DATE

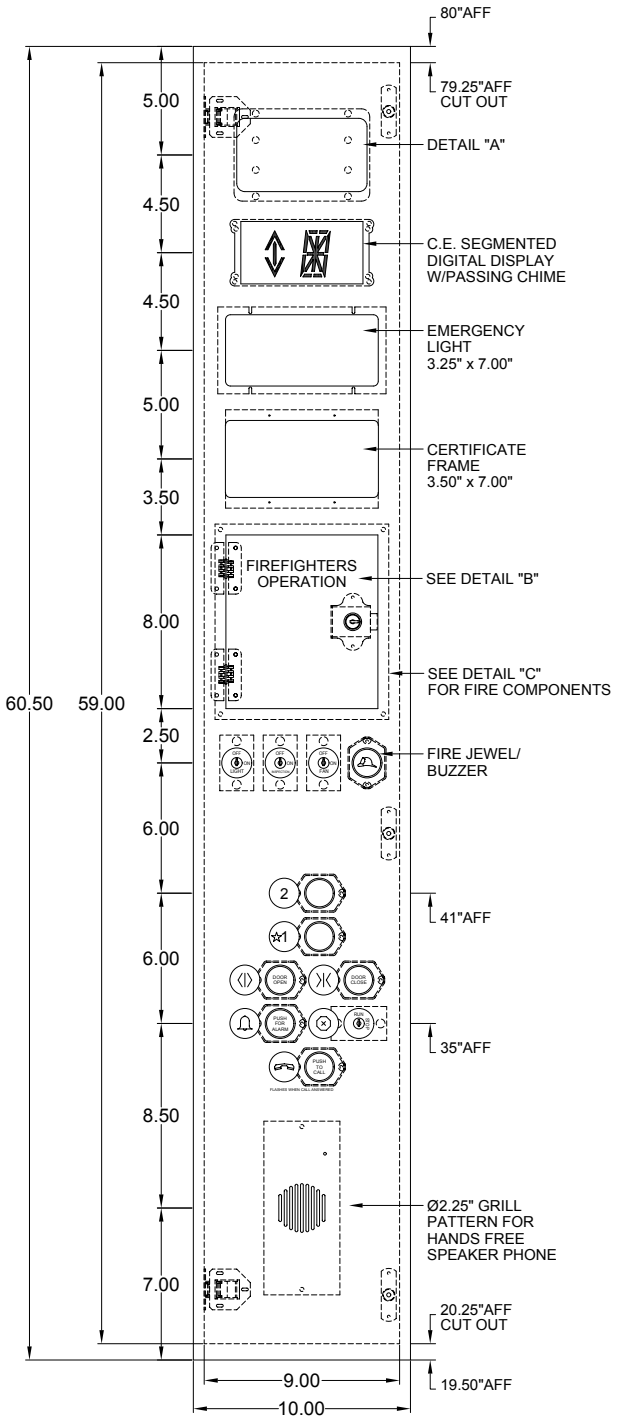


PLATE: 10.00" x 60.50"
BOX: 9.00" x 59.00" x 3.50"DP
(1) REQUIRED

CAR STATION NOTES:

-FACEPLATE: #11 GA. STAINLESS STEEL
W/#4 BRUSH FINISH

-LAMP VOLTAGE: 6V. LED

-SPEAKER GRILL: T.R.E.

-HINGE SIDE: LEFT

-FASTENERS: PANEL LOCKS

-PUSH BUTTONS:
CA-92 E.R.M. STANDARD ROUND BUTTON:
Ø1.38" BLACK HALO W/ILLUMINATING
CALIFORNIA RAISED ROUND, PLASTIC CAP
BRAILLE: Ø1.38" RAISED WHITE CHARACTERS ON
BLACK BACKGROUND FLUSH MOUNTED INTO PANEL

-STOP SWITCHES: (ERM-J202)
E.R.M. KEY SWITCH / RED W / WHITE CHARACTERS
ALONG W / E.R.M. ROUND BRAILLE

-KEY SWITCHES: E.R.M. Ø1.393"
FIRE SERVICE OFF/ON HOLD (ERM-HW1002)
INSPECTION (ERM-J204)
FAN (ERM-J201)
LIGHT (ERM-J201)

-ENGRAVED GRAPHICS:
"NO SMOKING"... .75"BLK.
"CAPACITY 2500 LBS."... .25"BLK.
"FIREFIGHTERS' OPERATION"... .125"RED
"FLASHES WHEN CALL..."... .125"BLK.

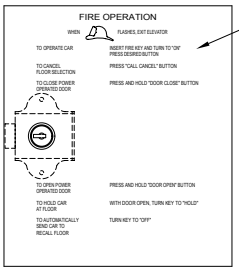
DETAIL "A"

NO SMOKING

CAPACITY 2500 LBS.

E.R.M. NO SMOKING INSERT
PART # 00P2001916

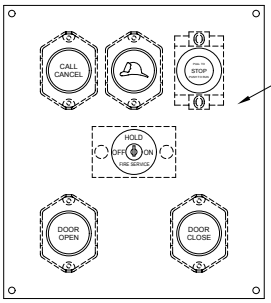
DETAIL "B"



BACK OF
7" x 8"
DOOR PANEL

ANSI PHASE II INSERT
PART # SPECIAL

DETAIL "C"



8" x 9"

Elevator Research &
Manufacturing Corp.
1417 ELWOOD ST.
LOS ANGELES, CA. 90021
PHONE: (213) 746 - 1914
FAX: (213) 749 - 1355

ASSEMBLY NOTES

PROJECT	MODULAR ELEV. 2004 FIRE	
DWG. BY	XXX	DWG. NO.
DWG. DATE	8/18/08	STD. LEFT
		SHEET 1 OF 2

REVISIONS		
LTR	DESCRIPTIONS	DATE

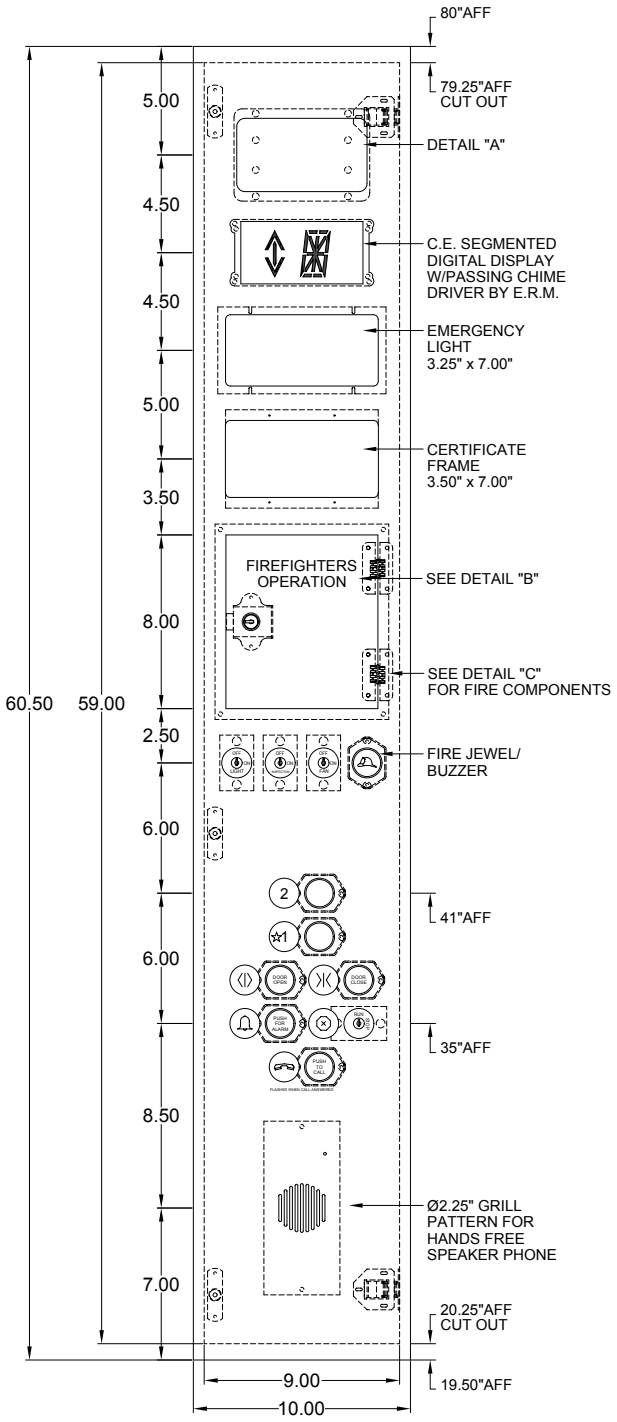


PLATE: 10.00" x 60.50"
BOX: 9.00" x 59.00" x 3.50"DP
(1) REQUIRED

CAR STATION NOTES:

-FACEPLATE: #11 GA. STAINLESS STEEL
W/#4 BRUSH FINISH

-LAMP VOLTAGE: 6V. LED

-SPEAKER GRILL: T.R.E.

-HINGE SIDE: RIGHT

-FASTENERS: PANEL LOCKS

-PUSH BUTTONS:
CA-92 E.R.M. STANDARD ROUND BUTTON:
Ø1.38" BLACK HALO W/ILLUMINATING
CALIFORNIA RAISED ROUND, PLASTIC CAP
BRAILLE: Ø1.38" RAISED WHITE CHARACTERS ON
BLACK BACKGROUND FLUSH MOUNTED INTO PANEL

-STOP SWITCHES: (ERM-J202)
E.R.M. KEY SWITCH / RED W / WHITE CHARACTERS
ALONG W / E.R.M. ROUND BRAILLE

-KEY SWITCHES: E.R.M. Ø1.393"
FIRE SERVICE OFF/ON HOLD (ERM-HW1002)
INSPECTION (ERM-J204)
FAN (ERM-J201)
LIGHT (ERM-J201)

-ENGRAVED GRAPHICS:
"NO SMOKING"... .75"BLK.
"CAPACITY 2500 LBS."... .25"BLK.
"FIREFIGHTERS' OPERATION"... .125"RED
"FLASHES WHEN CALL..."... .125"BLK.

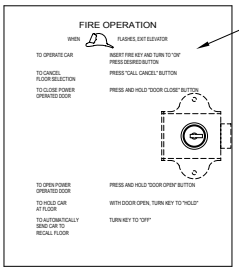
DETAIL "A"

NO SMOKING

CAPACITY 2500 LBS.

E.R.M. NO SMOKING INSERT
PART # 00P2001916

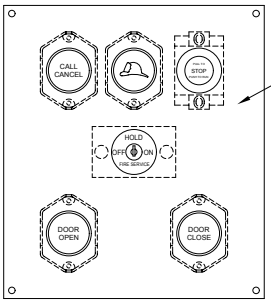
DETAIL "B"



BACK OF
7" x 8"
DOOR PANEL

ANSI PHASE II INSERT
PART # SPECIAL

DETAIL "C"



8" x 9"

Elevator Research &
Manufacturing Corp.
1417 ELWOOD ST.
LOS ANGELES, CA. 90021
PHONE: (213) 746 - 1914
FAX: (213) 749 - 1355

ASSEMBLY NOTES

PROJECT MODULAR ELEV.
2004 FIRE

DWG. BY	XXX	DWG. NO.
DWG. DATE	8/18/08	STD. RIGHT
		SHEET 1 OF 2

REVISIONS		
LTR	DESCRIPTIONS	DATE

CAR LANTERN:

-FACEPLATE: #11 GA. STAINLESS STEEL
W/#4 BRUSH FINISH

-LANTERN ARROWS:
2.50" x 2.50"
WHITE LEXAN TRANSLUCENT PLASTIC
EXTENDED .188" FROM FACEPLATE

-LAMP VOLTAGE: 24 VAC

-FASTENERS: TAMPERPROOF SCREWS

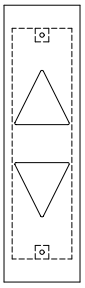


PLATE: 3.50" x 12.75"
BOX: 2.75" x 10.63" x 3.50"DP
(1) REQUIRED

HALL STATIONS:

-FACEPLATE: #11 GA. STAINLESS STEEL
W/#4 BRUSH FINISH

-LAMP VOLTAGE: 6V. LED

-PUSH BUTTONS: N/A

-KEY SWITCHES: E.R.M. Ø1.393"
FIRE SERVICE RESET/OFF/ON (ERM-HW1002)
ACCESS (ERM-J204)
CAR CALL: OFF/ON (ADAMS-AE102) MOMENTARY

-FASTENERS: TAMPERPROOF SCREWS

BEVELED EDGES

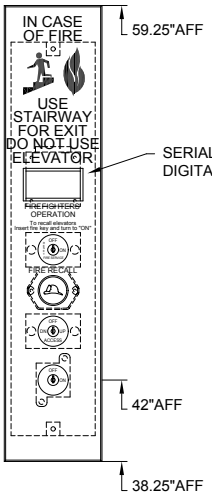


PLATE: 4.50" x 21.00"
BOX: 3.88" x 18.13" x 3.50"DP
(1) REQUIRED

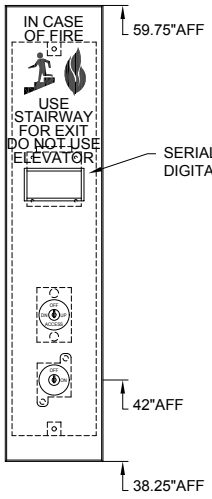


PLATE: 4.50" x 21.00"
BOX: 3.88" x 18.13" x 3.50"DP
(1) REQUIRED

Elevator Research & Manufacturing Corp.
1417 ELWOOD ST.
LOS ANGELES, CA. 90021
PHONE: (213) 746 - 1914
FAX: (213) 749 - 1355

ASSEMBLY NOTES

PROJECT: MODULAR ELEV. 2004 FIRE

DWG. BY	XXX	DWG. NO.
DWG. DATE	8/18/08	
		SHEET 2 OF 2

6.7 Phone Dialer

ADA EMERGENCY PHONES AND DIGITAL VIDEO SYSTEMS

Home

Support
Contact Us
Elevator Phones
Tower Phones
Call Boxes
Installation

Elevator Company

DL-3 AND AS-3 Series Elevator pho

Black Box
Self contained

Stainless Plate
or
Brass Plate

FUNCTIONS AND FEATURES:

The phone is a micro-controller based complete elevator or em system. It provides a wide range of functions and features tha adaptable for numerous applications. It provides the following features:

- TRE Communications can make custom sizes and meet mounting options for almost any installation! Just call us drawing.
- Easy to use, One button speakerphone for hands free c
- Programmable two number dialer stores 2 different num digits long each.
- Remote programming allows system programming from phone or cell phone.
- Local programming option for use when incoming line n be determined.
- Emergency phone numbers can be programmed with 1- unit may be used with PBX systems.
- Fully ADA (Americans with Disabilities Act) compliant
- Flashing LED to alert user that phone is operational.
- Programmable mute for dialing and voice messages so hear dialing or voice messages if desired.
- Momentary switch to activate. Does not require user to depressed.
- Programmable TIME OUT duration from 1 Minute To 9 M
- User recordable 12 second digital message for location identification and recordable 3 second instructional mes

TRE COMMUNICATIONS

DL-3 SERIES INSTALLATION AND PROGRAMMING GUIDE

Table of contents

TRE Communications Inc. Phone: (818) 509-0339 Fax: (818) 753-9820

www.trephones.com

DL-3 SERIES EMERGENCY PHONE
INSTALLATION AND OPERATING INSTRUCTIONS

These instructions allow you to program the phone for basic operation acceptable in most installations.

NOTE: This emergency phone is programmed by dialing into it from another phone. You can program from your cell phone if you have a strong uninterrupted connection. You must know the phone number of the elevator in order to program the phone. When the emergency phone answers use your keypad to enter the programming information shown below.

DL-3 and AS-3 SERIES QUICK PROGRAMMING GUIDE

NOTE: To bypass and retain current programming info for any programming step press the pound key (#). It is important that you firmly press each number on your keypad so the phone can hear it. Short quick entries can lead to incorrect programming.

1. Call the phone in the elevator.
2. Phone answers, “BEEP”
3. Enter access code **(3) (5) (8) (4) (2) (#)**
4. Phone acknowledges code accepted with a warbling sound and then 4 beeps - “BEEP- BEEP- BEEP- BEEP”.
5. Enter **FIRST** emergency number to call, then press (#)
6. Phone acknowledges first number accepted with an high and low tone and then 5 beeps - “BEEP-BEEP-BEEP-BEEP-BEEP”
7. Enter **SECOND** emergency number to call, then press (#)
8. Phone acknowledges second number accepted with a high and low tone then 2 beeps - “BEEP-BEEP”
9. Enter system info. (5) (3) (2) (0) (1) (1) (1) (1) (0) (0) (this is default setting)
10. Phone indicates data accepted with 6 beeps - “BEEP-BEEP-BEEP-BEEP-BEEP-BEEP”
11. If you are not using the location message press (#) otherwise
12. Press (*) (#) to record location message. Begin recording after you hear a single “BEEP”
13. Record the location message and press (#) when finished. Message can be up to 26 seconds.
14. Phone replays message back to you then there will be 6 beeps - “BEEP-BEEP-BEEP-BEEP-BEEP-BEEP”
15. If you wish to re-record announcement just repeat from step (12) now. Otherwise press (#) to accept message as recorded.
16. Phone responds with one beep. Press (#)
17. Phone activates 2-way communication to test speaker and mic. Press (#) to end programming and hang up.

FUNCTIONS AND FEATURES:

The phone is a micro-controller based complete elevator or emergency phone system. It provides a wide ranch of functions that make it adaptable for several applications. It provides the following functions and features:

1. Easy to use, one button speakerphone for hands free communications.
2. Programmable two number dialer stores 2 different numbers up to 16 digits long each.
3. Remote programming allows system programming from any location by phone or cell phone.
4. Emergency phone numbers can be programmed with 1-sec. Pauses so unit may be used with PBX systems.
5. Fully ADA (Americans with Disabilities Act) compliant
6. Flashing LED to alert user that phone is operational.
7. Programmable mute for dialing so user does not hear dialing if desired.
8. Momentary switch to activate. Does not require user to keep button depressed.
9. Programmable TIME OUT duration from 1 Minute To 9 Minutes.
10. User recordable 26 second digital message for location and elevator identification and recordable 4 second instructional message.
11. Location identification message can be retrieved by pressing (*) on touch-tone phone at any time during a call.
12. Programmable dialing loop for setting the number of times the phone will call each number when the line is not answered.
13. 5 digit access code allows security against unauthorized reprogramming.
14. Auto-answer mode allows emergency operator to call into the elevator.
15. Auto-mute during programming allows phone to be reprogrammed without disturbing anyone in the elevator.
16. Non-volatile memory circuits allows voice message, telephone number and programmed information to be retained without power of any kind for up to ten years. This means no batteries to replace.
17. Prank calls can be disconnected by pressing the (#) key on a touch-tone phone.
18. Phone hangs up automatically when the emergency operator hangs up the phone.

DL-3 DETAILED PROGRAMMING INSTRUCTIONS:

To program the phone, you must call the unit from a touch tone telephone. The phone must be the type that produces a continuous tone when a key is held down. Phones using “burst” type dialing will not work. Once the remote access code is entered the phone will automatically disconnect if it detects 7 seconds without any touch tone activity. Review the information that needs to be programmed before dialing the phone.

NOTE: Press (#) at any step to bypass and go to next step.

1) Call the telephone line connected to the phone.
2) Enter the remote access code (3) (5) (8) (4) (2) (#) on your touch tone phone. The unit will respond by beeping four times. This confirms that you are in REMOTE PROGRAM mode. This code is preset at the factory.
3) Enter the FIRST telephone number to dial. The number can be from 1 to 16 digits. (The STAR (*) key acts as a 1 sec. pause). When done press the (#) key to go to next step.
    a. Some telephone systems use a RING DOWN circuit. Ring-down circuits do not require the phone to dial a number. To program the phone so it will not dial but still play the message, enter (*) (#) instead of entering a phone number, you will repeat (*) (#) for second number also.
4) The phone will give a high and low tone and then beep five times after accepting the first telephone number. Program the SECOND telephone number the same way.
5) SYSTEM INFORMATION – The unit will “beep” twice to indicate that you are ready to enter the system information. System information is entered as a ten digit string. If you make a mistake before entering all ten digits, press the (#) key and the unit will let you restart.
6) The factory default system setup is 5320111100 (see below).

5	3	20	1	1	1	1	0	0
Amount of time before phone dials second number accepts 1 = 10 sec 2 = 20 sec etc.. up to 9 Recommend Do Not Adjust	Number of times phone dials both numbers when the call is not answered Accepts 1-9 Recommend Do Not Adjust	Length of time call will continue before auto hang-up 20 = 2 min 30 = 3 min 40 = 4 min etc. Max 9 min Recommend Do Not Adjust	tone or pulse dialing option 0=Pulse 1=Tone Recommend Do Not Adjust	Mute microphone during initial instructional message. 0=No 1=Yes Recommend Do Not Adjust	Message Options 0= two way talk - no messages and no second phone number 1= dial both phone numbers and message #1 and #2 both play (ADA & group 4 setting) 2= ring down setting No dialing or messages, 2 way talk 3= location message plays every 30 seconds and 2 way talk. No second phone number.	Allow speaker and microphone when calling into phone 0=No 1=Yes Recommend Do Not Adjust	Mute dial-out tones on speaker 0=No 1=Yes	Future use

Continued next page:

7) Once you have entered the 10-digit SYSTEM “A” INFO, the phone will “beep” six times.
8) Now you may change either the recorded messages or the system “B” information.
    a. To change the location announcement press (*) (#). The phone will “beep” once, then begin recording. Your message may be up to 26 seconds long. Press (#) when done.
    b. To change the 4 second instructional message press (1) (#) and record at beep. Message can be only 4 second long.
    c. When the recording is finished, the phone will give high & low tone and play back the newly-record the message. Press (#) if finished or follow above instructions to record again.
    d. To program system “B” information press (6)(#). Phone will beep. You must enter all 10 digits to complete. See chart below for options: Press (#) after you’re finished.

2	1	0	1	0	0	0	0	0	0
Rings before answer accepts 1-9 Recommend Do Not Adjust	Touch-tone Length 0 = 100ms 1 = 150ms 2 = 200ms Etc. Accepts 1-9 Recommend Do Not Adjust	Pulse dial speed 0 = 10 pps 1 = 20 pps Recommend Do Not Adjust	Disable hang up phone by pressing button 0 = no 1 = yes Recommend Do Not Adjust	Future use	Future use	Future use	Future use	Future use	Future use

9) Speaker and microphone can be tested now. When finished press (#) to hang up the phone.

CALLING FROM THE PHONE:

When the phone is programmed to play the messages:

When the button is firmly pressed the phone will dial the first telephone number and activate the LED to light solid. It will wait approximately 30 seconds. If nobody answers, it will call the second telephone number. It will repeat this procedure 3 times. If MUTE ON DIALING is enabled, the person in the elevator will not hear the touch tones.

When answered announcement #1 will play until the operator presses the (*) key, announcement #2, which has the location, will then play, when it is done the LED will start to flash and two-way communication will be enabled. The operator can retrieve the location again by pressing the (*) key at any time.

DISCONNECTING THE EMERGENCY PHONE:

If the operator determines that the call is accidental, they can force the phone to hang up by pressing the (#) key. If the operator hangs up the phone the phone will automatically hang up only on supervised phone lines, otherwise it will hang up after it times out (2 min default)

CALLING THE EMERGENCY PHONE:

When the system operator calls the phone, the phone will “beep” one time to confirm that it was answered. If the phone is set to factory default then you will have immediate two way communication. Play the location message by pressing (*) and hang up by pressing (#)

CONNECTIONS:

1. The button is connected to the 2 pin modular connector labeled “SW”.
2. The LED is connected to the 2 pins labeled “LED”. The LED is polarity sensitive so if it doesn’t work try reversing the connector.
3. The Phone line plugs into the RJ-11 type phone jack

ADJUSTMENTS:

1. SPEAKER VOLUME is set at factory to the midpoint of its adjustment range. Clockwise rotation increases the volume. DO NOT SET AT MAX OR UNIT MAY NOT FUNCTION PROPERLY!!
2. MIRCOPHONE SENSITIVITY is set at the factory to the midpoint of its adjustment range. Clockwise rotation increases sensitivity. DO NOT SET AT MAX OR UNIT MAY NOT FUNCTION PROPERLY!!
3. Set the microphone sensitivity so that a person standing anywhere in the elevator can be heard when talking at normal voice level. **If the volume on the microphone is too loud, feedback can occur.**
4. Adjust the speaker volume so that conversations can be heard any where in the elevator. **If the volume on speaker is too loud, feedback can occur.** Reduce the speaker volume to eliminate feedback.

FOR TECHNICAL SUPPORT CALL
TRE COMMUNICATIONS AT 1-818-509-0339
www.trephones.com

6.8 Fused Disconnect

H323N Cutoff switch

Enclosed Safety Switches

Catalog
3100CT0901
2009
Class 3100

CONTENTS

SQUARE D
by Schneider Electric

CONTENTS

NOTE: For information on **Replacement Parts** with specific part numbers, go to www.schneider-electric.us, click on Product FAQ's, enter the device catalog number, click SEARCH, then look for the information required.

Catalog Number Description

Number Segment	Character	Description	D	3	2	1	N	RB	—
Type of Switch	Fusible	L=Light duty							
		D=General duty							
		H=Heavy duty							
		DT=Double throw							
	Non-Fusible	DU=General duty							
		HU=Heavy duty							
		DTU=Double throw							
Blades–Switchable Poles	1	1 pole							
	2	2 poles							
	3	3 poles							
	4	4 poles							
	6	6 poles							
Voltage Rating[1]	1	120 Vac (plug fuse)							
	2	240 Vac							
	6	600 Vac							
Ampere Rating	1	30 A							
	2	60 A							
	3	100 A							
	4	200 A							
	5	400 A							
	6	600 A							
	7	800 A							
	8	1200 A							
Neutral	N	Factory-installed neutral (neutrals are field-installed on most general duty, heavy duty, and double throw safety switches).							
Enclosure	No suffix	NEMA Type 1							
	A	NEMA Type 12K							
	AWK	NEMA Type 12 (without K.O.)							
	DF	NEMA Type 4X Fiberglass reinforced polyester							
	DS	NEMA Types 4, 4X, and 5 (Type 304 stainless steel)							
	DX	NEMA Type 4X Krydon®							
	R	NEMA Type 3R							
	RB	NEMA Type 3R (bolt-on hub provision)							
	SS	NEMA Types 4, 4X, and 5 (Type 316 stainless steel)							
Factory Modifications	CLR	Class R fuse kit							
	EI or EI2	Electrical interlock kit							
	GL	Equipment ground lugs							
	GLC	Equipment ground lug, copper only							
	KI, KI2 or KIKI	1 or 2 Key interlocks							
	LK	Compression lugs (800 and 1200 A only)							
	NP	Phenolic legend plate							
	PB	Push buttons, pilot lights, selector switches. Customer must provide catalog number of control device to be installed							
	SLC	Copper lugs (30–600 A)							
	SP	Special paint colors							
	SPLO	Lock-on provision							
	VW	Viewing window							
	WA	Appleton interlocked receptacle							
	WC	Crouse-Hinds Arktite® interlocked receptacle							
	WH	Hubbellock™ interlocked receptacle							

[1] For dc ratings, see the latest catalog listing.

GENERAL DUTY SAFETY SWITCHES CONTENTS

Enclosures

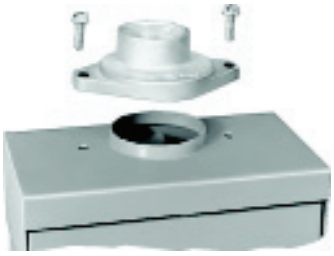
Enclosures are finished in gray, baked enamel that is electrodeposited on cleaned, phosphatized steel.

- NEMA Type 1 general purpose, indoor
- NEMA Type 3R general purpose, outdoor

Accessories

Rainproof Hubs

Bolt-on hubs for rainproof applications. Switches with RB suffix accept 3/4 through 2-1/2 inch bolt-on hubs. Switches with R suffix have blank endwalls.



RB Hub

Class R Fuse Kits

- For systems up to 100,000 rms symmetrical amperes
- See page 9 for selection

Class R Fuse Kits
Series F

Fuse Puller Kit
Series F

Fuse Puller Kits

Kit consists of three fuse pullers as required for a 3-pole fusible 60 A or 100 A general duty switch. Kits can be installed into 60 or 100 A Series F switches.

Table 1: Fuse Puller Kits

Switch Ampere Rating	Series Number	Fuse Puller Kit Catalog Number
60	F	FPK03
100	F	FPK0610

30 and 60 A

100 A

200 A

Grounding Kits

Equipment Grounding Kits

- Aluminum or copper conductors
- Field-installed

Table 2: Equipment Grounding Kits

Switch Ampere Rating	Catalog Number	Equipment Grounding Kit Catalog Number
30, Series E 60	PK3GTA1	(2) 12 Cu or (2) 10 Al or (1) 4 Al/Cu Max.
Series F 60	GTK03	(2) 12 Cu or (2) 10 Al or (1) 4 Al/Cu Max.
100	GTK0610	(2) 1/0 Al/Cu Max.
200	PK0GTA2	(2) 2/0 Al/Cu Max.
400, 600	PK0GTA2 (Two required)	(2) 2/0 Al/Cu Max. Per Lug
800	PK0GTA3	(6) 3/0 Al/Cu Max.

Electrical Interlock Kits

Electrical interlocks for Series F 100–200 A general duty safety switches and Series F 60 A fusible general duty safety switches are available in kit form for field installation. Each kit contains instructions for proper field mounting. A pivot arm operates from switch mechanism, breaking the control circuit before the main switch blades break. Switches with electrical interlocks installed are UL Listed,

Table 3: Electrical Interlock Kits

Switch Ampere Rating	Electrical Interlock Kit Catalog Number [1]
Fusible Series F 60	EIK031 or EIK032
Series F 100–200	EIK-1 or EIK-2

[1] Electrical interlock kit catalog numbers with -1 suffix indicate one normally open and one normally closed contact; -2 indicates two normally open and two normally closed contacts. Kits are UL Listed.

Table 4: Electrical Interlock Contact Ratings [1]

Interlock Type	AC 50 or 60 Hz				DC		
	Volts	Make	Break	Cont.	Volts	Make / Break	Cont.
1 N. O. / 1 N. C. Contact (-1 Suffix [2])	120	40.00 A	15.00 A	15.00 A	115	0.50 A	15.00 A
	240	20.00 A	10.00 A	15.00 A	230	0.25 A	15.00 A
	480	10.00 A	6.00 A	15.00 A	—	—	—
	600	8.00 A	5.00 A	15.00 A	600	0.05 A	15.00 A
2 N. O. / 2 N. C. Contacts (-2 Suffix [3])	120	30.00 A	3.00 A	10.00 A	115	1.00 A	10.00 A
	240	15.00 A	1.50 A	10.00 A	230	0.30 A	10.00 A
	480	7.50 A	0.75 A	10.00 A	—	—	—
	600	6.00 A	0.60 A	10.00 A	600	0.10 A	10.00 A

[1] Single-pole single-throw interlock kits are rated 1/2 hp at 110 and 220 Vac.

[2] -1 Suffix uses a 9007A01 limit switch.

[3] -2 Suffix uses a 9007C03 limit switch.

Optional Field-Installed Lug Kit

Kit consists of three line, three load, and two neutral lugs as required for a 3-pole 400 A or 600 A general duty switch. Kit can be installed on 400 A or 600 A Series E3 switches only.

Field-Installed Lug Kit for 400 and 600 A Devices

Table 5: Field-Installed Lug Kit

Switch Ampere Rating	Lug Kit Catalog Number	Wire Range/NEC®	Lug Wire Range
400 or 600 Series E3 [1]	GD4060LK	1-1/0-600 kcmil 2-1/0-500 kcmil 4-1/0-250 kcmil	2-1/0-600 kcmil 4-1/0-250 kcmil

[1] Not suitable for use on 400 A NEMA Type 3R.

Class J Fuse Kit

The Class J Fuse Kit consists of three Class J fuse adapters as required for a three-pole fusible 600 A general duty switch. Kit can be installed in 600 A Series E3 switches only (NEMA Type 1).

Table 6: Class J Fuse Kit

Switch Ampere Rating	Class J Kit Cat. No.
600 A Series E3	GDJK600

Application

General duty safety switches are designed for the following applications:

- Residential and light commercial applications
- Infrequent or moderate operations
- 240 Vac maximum
- Up to 100,000 rms symmetrical amperes, using appropriately rated Class R fuses and Class R Fuse Kits, or Class T or J fuses
- 30—800 A
- Horsepower rated
- Load-make, load-break rated for the switch current rating.

The light duty enclosed switch is ideal for home applications in disconnecting power to workshops, hobby rooms, furnaces and garages.

- Light duty—visible blades 10,000 A short circuit current rating
- 30 A fusible and non-fusible, 240 Vac
- Replacement parts not available
- Available with plug or cartridge fuse holders

L211N

NOTE: Switch is load make/break.

Standards

General duty safety switches are manufactured in accordance with these standards:

- UL 98, Standard for Enclosed and Dead Front Switches. UL Listed under File E2875
- NEMA Standards Publication KS1, Enclosed Switches
- Federal Specifications WS-865c for Type NDS (NEMA Type 1) and Type LD (NEMA Type 3R)

UL/CSA Listed Short Circuit Current Rating (RMS Symmetrical)

Switch Type	Fuse Class	Short Circuit Rating
Fusible	Plug	10 kA
	H	10 kA
	J	100 kA
	R	100 kA
	T	100 kA
Non-Fusible [1]	H	10 kA
	J	100 kA
	R	100 kA [2]
	T	100 kA

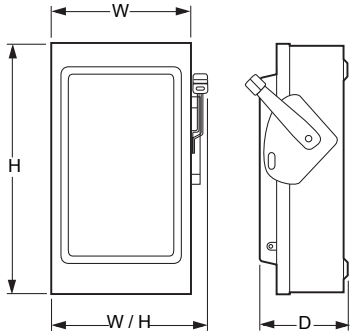
[1] The UL Listed short-circuit current rating for Square D® general duty non-fusible switches is based on the switch being used in conjunction with fuses. Evaluation of non-fusible switches in conjunction with molded case circuit breakers has not been performed. If a UL Listed short circuit current rating is required, this non-fusible switch must be replaced with a Square D general duty fusible safety switch, equipped with the appropriate class and size fusing. The UL Listed short circuit current rating of the fusible switch is typically as follows: when used with Classes H and K fuses—10 kA, Classes J and R fuses—100 kA. Consult the wiring diagram of the switch to verify the UL Listed short circuit current rating.

[2] 50 kA for 60 A non-fusible switch.

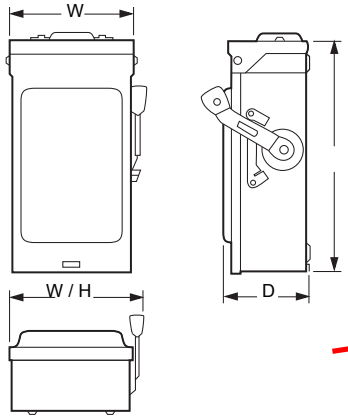
Table 7: Terminal Lug Data[1]

Ampere Rating	Conductors Per Phase	Wire Range Wire Bending Space Per NEC® Table 312.6 AWG/kcmil	Lug Wire Range AWG/kcmil
30	1	12–6 (Al) or 14–6 (Cu)	12–6 (Al) or 14–6 (Cu)
60	1	10–3 (Al) or 14–3 (Cu)	10–2 (Al) or 14–2 (Cu)
100	1	12–1 (Al) or 14–1 (Cu)	12–1/0 (Al) or 14–1/0 (Cu)
200	1	6–250 (Al/Cu)	6–300 (Al/Cu)
400 NEMA Type1	1 or 2	1/0–600 (Al/Cu) or 1/0–300 (Al/Cu)	(1) 1–750 (Al/Cu) or (2) 1/0–300 (Al/Cu)
400 NEMA Type 3	2	1/0–250 (Al/Cu)	(1) 1/0–600 (Al/Cu) or (2) 1/0–250 (Al/Cu)
600	2	4–500 (Al/Cu)	4–600 (Al/Cu)
800	3	3/0–500 (Al/Cu)	3/0–500 (Al/Cu)

[1] 30–100 A switches suitable for 60°C or 75°C conductors. 200–800 A switches suitable for 75°C conductors.



Typical NEMA Type 1



Typical NEMA Type 3R

Table 8: Switch Dimensions

Catalog Number	Series	H		W		W/H		D	
		in.	mm	in.	mm	in.	mm	in.	mm
L111N [1]	E2	7.63	194	5.00	127	6.13	156	4.00	102
L211N [1]	E2	7.63	194	5.00	127	6.13	156	4.00	102
L221N [1]	E2	7.63	194	5.00	127	6.13	156	4.00	102
D211N [1]	E3	9.25	235	6.75	171	7.25	184	3.63	92
D211NRB [1]	E2	9.63	245	7.25	184	7.75	197	3.75	95
D221N [1]	E3	9.25	235	6.75	171	7.25	184	3.63	92
D221NRB [1]	E3	9.63	245	7.25	184	7.75	197	3.75	95
D222N	F1	14.60	371	6.51	165	7.45	189	4.87	124
D222NRB	F1	14.88	378	6.63	168	7.45	189	4.87	124
D223N	F3	17.50	445	8.50	216	10.50	267	6.50	165
D223NRB	F3	17.50	445	8.50	216	10.50	267	6.50	165
D224N	F1	29.00	737	17.25	438	19.00	483	8.25	210
D224NRB	F1	29.25	743	17.25	438	19.00	483	8.25	210
D225N	E3	45.12	1146	24.00	610	24.88	632	8.88	226
D225NR	E3	30.63	778	21.38	543	22.25	565	10.13	257
D226N [1]	E3	49.13	1248	24.00	610	24.88	632	8.88	226
D226NR [1]	E3	49.13	1248	24.75	629	25.13	638	8.88	226
D321N [1]	E3	9.25	235	6.75	171	7.25	184	3.63	92
D321NRB [1]	E3	9.63	245	7.25	184	7.75	197	3.75	95
D322N	F1	14.60	371	6.51	165	7.45	189	4.87	124
D322NRB	F1	14.88	378	6.63	168	7.45	189	4.87	124
D323N	F3	17.50	445	8.50	216	10.50	267	6.50	165
D323NRB	F3	17.50	445	8.50	216	10.50	267	6.50	165
D324N	F1	29.00	737	17.25	438	19.00	483	8.25	210
D324NRB	F1	29.25	743	17.25	438	19.00	483	8.25	210
D325N [1]	E3	45.12	1146	24.00	610	24.88	632	8.88	226
D325NT [1]	E3	45.12	1146	24.00	610	24.88	632	8.88	226
D325NR	E1	30.63	778	21.38	543	22.25	565	10.13	257
D325NTR	E1	30.63	778	21.38	543	22.25	565	10.13	257
D326N [1]	E3	49.13	1248	24.00	610	24.88	632	8.88	226
D326NT [1]	E3	49.13	1248	24.00	610	24.88	632	8.88	226
D326NR	E1	49.13	1248	24.75	629	25.13	638	8.88	226
D326NTR	E1	49.13	1248	24.75	629	25.13	638	8.88	226
DU221RB [1]	E2	9.63	245	7.25	184	7.75	197	3.75	95
DU222RB [1]	E1	9.63	245	7.25	184	7.75	197	3.75	95
DU321 [1]	E2	9.25	235	6.75	171	7.25	184	3.63	92
DU321RB [1]	E2	9.63	245	7.25	184	7.75	197	3.75	95
DU322 [1]	E1	9.25	235	6.75	171	7.25	184	3.63	92
DU322RB [1]	E1	9.63	245	7.25	184	7.75	197	3.75	95
DU323	F1	17.50	445	8.50	216	10.50	267	6.50	165
DU323RB	F1	17.50	445	8.50	216	10.50	267	6.50	165
DU324	F1	29.00	737	17.25	438	19.00	483	8.25	210
DU324RB	F1	29.25	743	17.25	438	19.00	483	8.25	210
DU325 [1]	E3	45.12	1146	24.00	610	24.88	632	8.88	226
DU326 [1]	E3	49.13	1248	24.00	610	24.88	632	8.88	226
QO200TR [1]	G3	6.50	165	4.63	118	—	—	3.88	99
QO260NATS	E2	9.25	235	4.88	124	—	—	3.25	83
QO2000NRB	E1	14.00	356	7.75	197	—	—	4.50	114
QO2000NS [1]	E1	13.38	340	6.13	156	—	—	3.50	89
T327N [1]	E1	49.13	1248	24.00	610	24.88	632	8.88	226
T327NR [1]	E1	49.13	1248	24.75	629	25.13	638	8.88	226

[1] Does not have a cover draw as indicated in above drawing.

HEAVY DUTY SAFETY SWITCHES CONTENTS

Series F

Operating Mechanism
Series F

Visible Blades

Mechanical Lugs

Product Description

The Square D® brand Heavy Duty Safety Switch is designed to be tough, reliable and provide exceptional performance in the most grueling conditions; from commercial and institutional to industrial and manufacturing facilities. Square D F Series safety switches provide significantly higher levels of mechanical endurance than NEMA KS-1 requires. The design life of a Square D F-Series switch is a minimum of three times the NEMA requirement.

An abundance of copper is used in the heaviest current carrying power paths of all Square D Heavy Duty Safety Switches. The more copper for current carrying paths, the lower the temperature rise. Managing temperatures inside the switch is the key to providing greater service life.

All heavy duty safety switches feature a quick-make, quick-break operating mechanism, a dual cover interlock and a color-coded indicator handle.

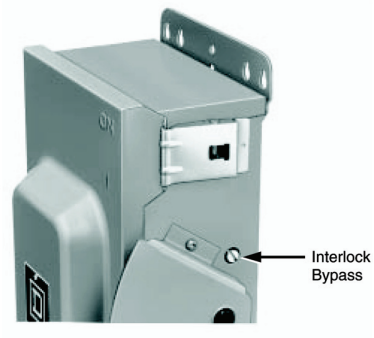
Configuration

- Two or three fusible switched poles with or without insulated, solid grounded neutral
- Four or six fusible switched poles without insulated, solid grounded neutral
- Two, three, four or six non-fusible, switched poles without insulated, solid grounded neutral
- Three fusible switched poles without insulated solid grounded neutral interlocked to Appleton®, Crouse-Hinds®, or Hubbellock™ receptacle
- Three non-fusible switched poles without insulated solid grounded neutral interlocked to Appleton, Crouse-Hinds, or Hubbellock receptacle

Construction

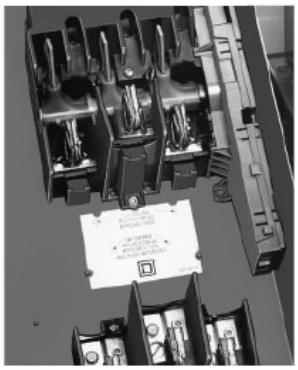
- Visible blades for positive blade position indication
- Optional viewing window allows visual verification of blade position without opening door; not available on NEMA Type 4X fiberglass reinforced polyester or Krydon® enclosures or NEMA Type 7 or 9 enclosures
- Red and black handle indication for switch position
- Series F handle, mechanism, and lock plate are field replaceable
- Series F Type 3R devices have side-opening covers
- Highly visible embossed ON-OFF marking
- Quick-make, quick-break, spring-driven operating mechanism
- Front removable mechanical lugs. Refer to page 28 for further lug data
  - — Standard lugs accommodate aluminum or copper cable termination
  - — Optional lugs accommodate copper only cable termination

NEMA Type 1 | NEMA Type 3R | NEMA Types 4, 4X, and 5 Stainless Steel | NEMA Type 12

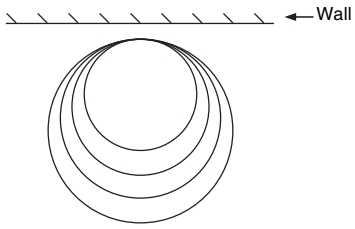


- Dual cover interlock keeps the cover closed when switch is ON. When the cover is open, it interlocks the switch OFF, unless the interlock is bypassed.
- Factory-installed fuse pullers on 30–100 A NEMA Types 4, 4X, and 5 stainless steel, NEMA Type 4X fiberglass reinforced polyester, Krydon and NEMA Types 12 or 12K switches. Available for field installation on 30–100 A F Series switches, NEMA Types 1 and 3R switches.
- Class J fuse provisions on 30 A–600 A, 600 V switches and 100–600 A, 240 V switches. 600 A devices require a mounting kit (catalog number H600J).
- 30–600 A switches are shipped with standard Class H fuse spacing. These switches will accept Class R fuses also. A field-installable rejection kit is available, which, when installed, rejects all but Class R fuses. See pages 23 through 26 for Class R fuse kits.
- Multiple padlock provision in OFF position (three padlocks).
- Lock-on provisions for factory or field modification.
- Tangential combination knockouts lessen the need for conduit offset bends.

Fuse Pullers



Class J Fuse Provisions
Alternate mounting holes make for easy conversion to Class J fuses.



Tangential Knockouts

Lock-off Provision with Optional Lock-off Guard Kit Installed

Enclosures

- NEMA Type 1 general purpose, indoor
- NEMA Type 3R rainproof, outdoor
- NEMA Types 4, 4X, 5 indoor or outdoor, watertight, dust-tight, and corrosion-resistant (Types 304 and 316 stainless steel)
- NEMA Type 4X indoor or outdoor, watertight and dust-tight, and corrosion-resistant (fiberglass reinforced polyester)
- NEMA Types 7 and 9 hazardous locations:
  - Class I, Groups C and D
  - Class II, Groups E, F and G
  - Class III
- NEMA Types 12 and12K indoor, dust-tight, and drip-proof
  NEMA Type 12 has no knockouts (suitable for outdoor use)
  NEMA Type 12K provided with knockouts

Applications

Heavy duty safety switches are designed for the following applications:

- Commercial and industrial installations
- Up to 600 Vac or 600 V dc maximum
- Up to 200,000 rms symmetrical amperes short circuit current
- 30—1200 A
- Horsepower ratings
- Load-make, load-break rated for the switch current rating
- Two or three fusible switched poles with or without insulated, grounded neutral
- Four or six fusible switched poles, neutral not available
- Two or three non-fusible, switched poles with or without insulated, grounded neutral
- Four non-fusible switched poles, neutral not available
- Six non-fusible switched poles, neutral not available
- Tested and approved for seismic applications

Standards

Heavy duty safety switches are manufactured in accordance with these standards:

- UL98, Standard for Enclosed and Dead Front Switches. UL Listed under File E2875, or E154828
- NEMA Standards Publication KS1, Enclosed Switches
- Federal Specifications WS-865c for Type HD

General dc and Photovoltaic Systems

NOTE: Heavy duty safety switches may be used on photovoltaic systems with a grounded feed. Refer to Figures 1B, 1D, 1F and 2 (negative grounding shown; positive grounded systems are similarly allowed). For ungrounded systems, see National Electrical Code® (NEC®) 690.35 (NEC 2008, NFPA 70).

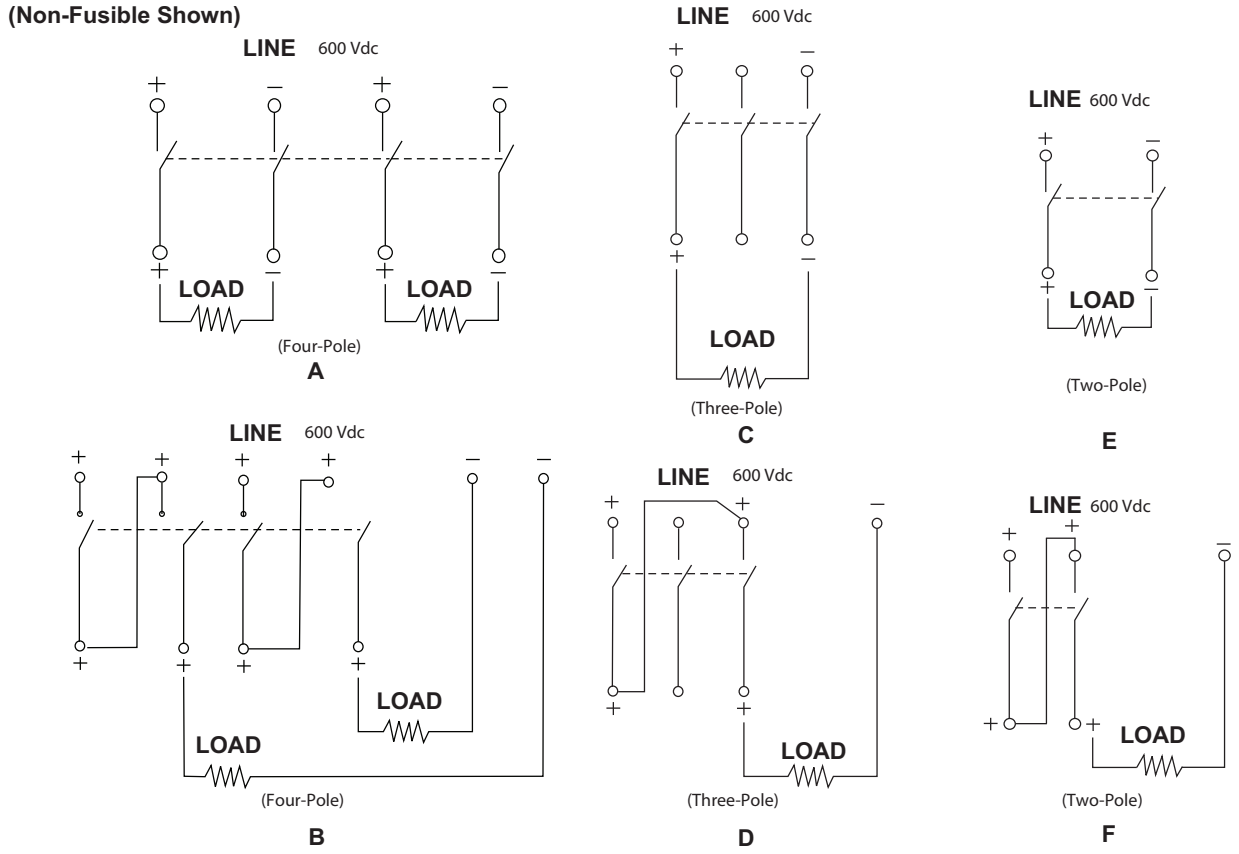
As a market leader and innovator in photovoltaic (PV) applications, we are proud to announce a catalog section dedicated to dc and PV safety switch applications. This section focuses on the Square D® brand UL approved Heavy Duty Safety Switch dc and PV wiring schemes. Additionally a UL witnessed and Square D self-certified PV wiring option is presented. This additional unlisted option provides a robust, cost effective option for PV systems.

All heavy duty safety switches with dc ratings (2-, 3- and 4-pole fusible and non-fusible) are Underwriters Laboratories (UL) Listed and CSA Certified for use on dc applications when wired as shown in Figure 1 (A, B, C, D, E, and F). UL Listed, CSA Certified (Files E2875 and E154282). Additionally:

- Heavy duty safety switches are rated for 600 Vdc maximum open circuit voltage.
- Non-fusible safety switches may carry 100 percent of the nameplate current rating.
- Fusible safety switches may carry 80 percent of nameplate current rating (continuous use).
- Heavy duty switches are dc horsepower rated as indicated on the safety switch wiring diagram.
- Heavy duty switches have a 10,000 ampere dc short-circuit rating at 600 Vdc unless otherwise stated on the switch wiring diagram. Consult factory for short circuit current ratings at 250 Vdc.
- Refer to current Square D Digest for lug wire range of heavy duty switches.

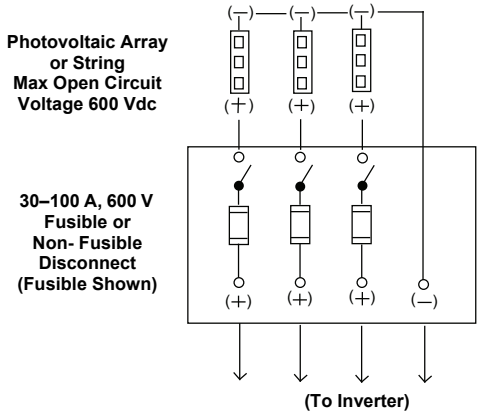
Figure 1: General dc and Photovoltaic Systems, Fusible and Non-Fusible Wiring Diagram

(Non-Fusible Shown)



Alternate Photovoltaic System Wiring, Evaluated and Self-Certified by Schneider Electric (Not UL Listed)

Figure 2: Grounded Feed per NEC Article 690



- Connect negative photovoltaic line (-) to case inside inverter for negative grounded system.
- Positive grounded systems are similarly allowed.
- For ungrounded systems, see NEC 690.35 (NEC2008, NFPA70).

Current Ratings

Switch Nameplate 600 V	Switch dc Rating per Pole [1]	Photovoltaic Maximum Circuit Current [2]	Photovoltaic Short-Circuit Current (I_{sc})
30 A	20 A	16 A dc per pole	12.8 A (20/1.56)
60 A	60 A	48 A dc per pole	38 A (60/1.56)
100 A	100 A	80 A dc per pole	64 A (100/1.56)

1 The switch per pole rating must be at least the photovoltaic maximum circuit current multiplied by 125%.

2 From NEC 2008 and NFPA 70, Article 690.8: the photovoltaic maximum circuit current is I_{sc} multiplied by 125%.

- If a non-fusible disconnect is used, the inverter must not be capable of backfeeding currents into a short circuit or fault in the photovoltaic array or string.
- One inverter may be connected to each pole of the switch.
- Refer to current Square D Digest for lug wire range of heavy duty switches.

Special Applications

- Rainproof Bolt-On Hubs
- Electrical Interlock Kits
  - — Available factory- or field-installed
  - — Pivot arm operates from switch mechanism, breaking the control circuit before the main switch blades break
  - — Switches with electrical interlocks installed are UL Listed
- Watertight Hubs
- Class R Fuse Kits
- Internal Barrier Kits
  - — Provide an additional barrier that helps prevent accidental contact with live parts
  - — Field-installed transparent barriers do not restrict visual inspection of the switch
  - — Barriers provide IEC529 IP2X “finger safe” protection when door of enclosed disconnect switch is open
  - — Convenient door allows use of test probes without accessing fuses
  - — Allows for replacement of fuses without removing barrier

  NOTE: Barrier can also be used with a skirt kit to enclose a panel mounted Type 9422 disconnect.
- Key Interlock Systems
  - — Factory-installed only
  - — Interlocks are used to prevent the authorized operator from making an unauthorized operation
  - — Not available on hazardous location devices (NEMA Types 7 or 9) or fiberglass reinforced polyester (NEMA Type 4X)
  - — UL Listed
- Lock-On Provisions
  - — Provision for one 3/8 in. hasp padlock is available factory-installed on NEMA Types 1, 3R, 4, 4X and 5 stainless steel and 12 switches
  - — This modification will allow the switch to be locked in the “ON” position
  - — UL Listed
- Special Paint
  - — Available painted with special safety colors: safety red, safety orange, safety yellow, safety green, safety blue, safety purple, black or white
  - — All colors comply with OSHA Standard 1910.144 and ANSI Specification Z535.1 for marking physical hazards
- Phenolic Legend Plate
  - — Available engraved and mounted on all heavy duty safety switches, except NEMA Types 7 and 9
  - — Legend engraved in 1/4 in. high white letters on black background
  - — Customer must provide legend
  - — UL Listed

Accessories

Square D brand heavy duty safety switches manufactured by Schneider Electric are UL Listed for use with the following accessories:

Hubs

Bolt-On Hubs

Bolt-on hubs for rainproof applications. Switches with RB suffix accept 3/4 in. through 2-1/2 in. bolt-on hubs. Switches with R suffix have blank top endwalls.

Table 9: Rainproof Bolt-On Hubs—For Use on NEMA Type 3R Enclosures

Conduit Size	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4	Closing Cap
Hub Cat. Number	B075	B100	B125	B150	B200	B250	B300	B350	B400	BCAP

NEMA Type 3R rainproof enclosures with catalog number ending in RB have a bolt-on closing cap factory-installed. Order bolt-on hubs separately from table above. Hubs through size 2-1/2 in. can be directly installed on RB devices. Devices requiring 3 in. or larger hubs must have holes cut in the field. Gaskets are provided on 3 in. and larger hubs. All hubs are UL Listed for indoor and rainproof applications and suitable for use with conduit having ANSI standard taper pipe thread.

Watertight Hubs

Watertight hubs are zinc or chrome plated for field-installation on NEMA Types 3R, 4, 4X, 5, and 12 stainless steel switches and Type 12 enclosures.

Table 10: Watertight Hubs

Conduit Trade Size	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	3-1/2	4
Standard Zinc Hub Cat. Number	H050	H075	H100	H125	H150	H200	H250	H300	H350	H400
Chrome Plated Hub Cat. Number	H050CP	H075CP	H100CP	H125CP	H150CP	H200CP	—	—	—	—

Class R Fuse Kits

Class R Fuse Kits

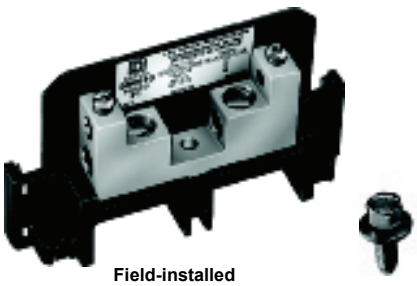
For systems up to 200,000 rms symmetrical amperes provide rejection for all other fuse types. See pages 23 through 27 for catalog numbers.

Solid Neutral Assemblies

Factory or field-installed insulated, grounded solid neutral assemblies. See pages 23 through 26 for catalog numbers.

Equipment Grounding Kits

Equipment grounding kits available for factory- or field-installation. See pages 23 through 26 for catalog numbers.



Field-installed
Insulated, Grounded Neutral

Field-installed
Equipment Grounding Kit

Electrical Interlock Kits

Electrical interlocks for heavy duty safety switches through 1200 A are available factory installed or in kit form for field installation. A pivot arm operates from the switch mechanism, breaking the control circuit before the main switch blades break. Switches with electrical interlock accessories installed are UL Listed. See pages 23 through 26 for catalog numbers.

Table 11: Electrical Interlock Contact Ratings [1]

Interlock Type	ac 50 or 60 Hz				dc		
	Volts	Make	Break	Cont.	Volts	Make and Break	Cont.
1 N.O./ 1 N.C Contact (-1 Suffix)	120 240 480 600	40.0 A 20.0 A 10.0 A 8.0 A	15.0 A 10.0 A 6.0 A 5.0 A	15.0 A 15.0 A 15.0 A 15.0 A	115 230 — 600	0.50 A 0.25 A — 0.05 A	15.0 A 15.0 A — 15.0 A
2 N.O./ 2 N.C Contact (-2 Suffix)	120 240 480 600	30.0 A 15.0 A 7.5 A 6.0 A	3.0 A 1.5 A 0.75 A 0.60 A	10.0 A 10.0 A 10.0 A 10.0 A	115 230 — 600	1.00 A 0.30 A — 0.10 A	10.0 A 10.0 A — 10.0 A

[1] Single-pole single-throw interlock kits are rated 1/2 hp at 110 and 220 Vac.

-1 Suffix uses a 9007A01 limit switch.

-2 Suffix uses a 9007C03 limit switch.

Fuse Puller Kits

Kit consists of three fuse pullers as required for a three-pole fusible 240 V or 600 V heavy duty switch. Kits can be installed in switches manufactured after February, 1980. Fuse pullers are supplied as standard equipment on NEMA Types 12 and 12K; NEMA Types 4, 4X, 5 stainless steel; NEMA Type 4X fiberglass reinforced polyester, and Krydon® switches through 100 A. See pages 23 through 26 for catalog numbers.

Optional Compression Lugs

Refer to page 28 for applicable options.

Key Interlock System

Key Interlock System

Interlocks are used to prevent the authorized operator from making an unauthorized operation. The key interlock system is a simple and easy method of applying individual key interlock units and assemblies to the above equipment so as to require operation in a predetermined sequence. UL Listed.

They are not available on hazardous location devices (NEMA Types 7 or 9) or fiberglass reinforced polyester (NEMA Type 4X).

Use these suffixes on switch catalog numbers:

- KI = 1 lock per switch
- KI2 = 1 lock with 2 cylinders per switch
- KIKI = 2 separate locks per switch

NOTE: Factory-installed only on heavy duty safety switches.

Lock-Off Guard Shown

Internal Barrier

Lock-Off Guard

Available field-installed only, the lock-off guard works by covering the lockout/tagout opening whenever the switch is in the ON position. This prevents a padlock from being inadvertently inserted into the switch lockplate. The device is designed to help prevent accidental misapplication of a lockout device. These kits are marked cURus (UL Component Recognized) for field-installation.

Table 12: Lock-Off Guard Applications

Switch Rating	Kit Catalog Number
30 A	LOGK1
60 A 240 V	
60 A 600 V	LOGK2
100 and 200 A	

Internal Barrier Kits

Internal Barrier Kits provide an additional barrier that helps prevent accidental contact with live parts. Field-installed transparent barriers do not restrict visual inspection of the switch. Barriers provide IEC529 IP2X “finger safe” protection when door of enclosed disconnect switch is open. Convenient door allows use of test probes without accessing fuses and replacement of fuses without removing barrier. Barrier can also be used with the skirt kit to enclose a panel mounted Type 9422 disconnect.

Table 13: Internal Barrier Kits

Catalog Number	Description	Safety Switch Application (F Series Only)	9422 Type T Disconnect Application
SS03	Interior Barrier for 30 A Safety Switch[1]	240 / 600 Vac – 30 A 240 Vac – 60 A	NA
SS06	Interior Barrier for 60 A Safety Switch, 30 or 60 A 9422 Switch	600 Vac – 60 A	600 Vac – 30 A 600 Vac – 60 A
SS10	Interior Barrier for 100 A Safety Switch or 100 A 9422 Switch	240 / 600 Vac – 100 A	600 Vac – 100 A
SS20	Interior Barrier for 200 A Safety Switch	240 / 600 Vac – 200 A	NA
SS0306SK	Skirt Kit to Enclose 30 or 60 A 9422 Switch (requires SS06)	NA	600 Vac – 30 A 600 Vac – 60 A
SS10SK	Skirt Kit to Enclose 100 A 9422 Switch (requires SS10)	NA	600 Vac – 100 A

[1] Requires arc shield on 240 V switches be changed to 600 V arc suppressor.

Table 14: Accessories for Current Series Heavy Duty Safety Switches

Catalog Number	Series	Electrical Interlock (1 Contact)	Electrical Interlocks (2 Contacts)	Class R Kits	Solid Neutral (Al/Cu)	Solid Neutral (Cu Only)	Grounding Kit (Al)	Grounding Kit (Cu)	Fuse Puller	Receptacle Plugs
H322A	F6	EIK031	EIK032	RFK03L	SN03	SN03C	GTK03	Std.	Std.	N/A
H322AWK	F6	EIK031	EIK032	RFK03L	SN03	SN03C	GTK03	GTK03C	Std.	N/A
H322DS	F6	EK3061	EIK3062	HRK30	H60SN	H360SNC	PK3GTA1	GTK03C	Std.	N/A
H322N	F5	EIK031	EK032	RFK03L	Std.	SN03C	GTK03	PKO6GTC1	FPK03	N/A
H322NRB	F5	EIK031	EIK032	RFK03L	Std.	SN03C	GTK03	GTK03C	FPK03	N/A
H323A	F6	EIK1	EIK2	RFK10	SN0610	SN0610C	GTK0610	GTK0610C	Std.	N/A
H323AWK	F6	EIK1	EIK2	RFK10	SN0610	SN0610C	GTK0610	GTK0610C	Std.	N/A
H323DS	F6	EK10201	EIK10202	HRK1020	H100SN	H100SNC	PKOGTA2	PKOGTC2	Std.	N/A
H323N	F5	EIK1	EIK2	RFK10	Std.	SN0610C	GTK0610	GTK0610C	FPK0610	N/A
H323NRB	F5	EIK1	EIK2	RFK10	Std.	SN0610C	GTK0610	GTK0610C	FPK0610	N/A
H324A	F6	EK10201	EIK10202	HRK1020	H200SN	H200SNC	PKOGTA2	PKOGTC2	N/A	N/A
H324AWK	F6	EK10201	EIK10202	HRK1020	H200SN	H200SNC	PKOGTA2	PKOGTC2	N/A	N/A
H324DS	F6	EK10201	EIK10202	HRK1020	H200SN	H200SNC	PKOGTA2	PKOGTC2	N/A	N/A
H324N	F5	EK10201	EIK10202	HRK1020	Std.	H200SNC	PKOGTA2	PKOGTA2	N/A	N/A
H324NRB	F5	EK10201	EIK10202	HRK1020	Std.	H200SNC	PKOGTA2	PKOGTC2	N/A	N/A
H325	E4	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H325AWK	E4	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H325DS	E4	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H325N	E4	EIK40601	EIK40602	HRK4060	Std.	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H325NAWK	E4	EIK40601	EIK40602	HRK4060	H600SN	Std.	PKOGTA2	PKOGTC3	N/A	N/A
H325NDS	E4	EIK40601	EIK40602	HRK4060	H600SN	Std.	PKOGTA2	PKOGTC3	N/A	N/A
H325NR	E4	EIK40601	EIK40602	HRK4060	Std.	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H325R	E4	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H326	E1	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H326AWK	E2	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H326DS	E2	EIK40601	EIK40602	HRK4060	Std.	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H326N	E4	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H326NAWK	E4	EIK40601	EIK40602	HRK4060	H600SN	Std.	PKOGTA2	PKOGTC3	N/A	N/A
H326NDS	E4	EIK40601	EIK40602	HRK4060	H600SN	Std.	PKOGTA2	PKOGTC3	N/A	N/A
H326NR	E4	EIK40601	EIK40602	HRK4060	Std.	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H326R	E4	EIK40601	EIK40602	HRK4060	H600SN	H600SNC	PKOGTA2	PKOGTC3	N/A	N/A
H327	E4	EIK40601	EIK40602	N/A	H800SNE4	N/A	PKOGTA7	N/A	N/A	N/A
H327AWK	E4	EIK40601	EIK40602	HRK4060	H800SNE4	N/A	PKOGTA7	N/A	N/A	N/A
H327N	E4	EIK40601	EIK40602	HRK4060	Std.	N/A	PKOGTA7	N/A	N/A	N/A
H327NAWK	E4	EIK40601	EIK40602	HRK4060	Std.	N/A	PKOGTA7	N/A	N/A	N/A
H327NR	E4	EIK40601	EIK40602	HRK4060	Std.	N/A	PKOGTA7	N/A	N/A	N/A
H327R	E4	EIK40601	EIK40602	N/A	H800SNE4	N/A	PKOGTA7	N/A	N/A	N/A
H328	E4	EIK40601	EIK40602	N/A	H1200SNE4	N/A	PKOGTA8	N/A	N/A	N/A
H328AWK	E4	EIK40601	EIK40602	N/A	H1200SNE4	N/A	PKOGTA8	N/A	N/A	N/A
H328N	E4	EIK40601	EIK40602	N/A	Std.	N/A	PKOGTA8	N/A	N/A	N/A
H328NAWK	E4	EIK40601	EIK40602	N/A	Std.	N/A	PKOGTA8	N/A	N/A	N/A
H328NR	E4	EIK40601	EIK40602	N/A	Std.	N/A	PKOGTA8	N/A	N/A	N/A
H328R	E4	EIK40601	EIK40602	N/A	H1200SNE4	N/A	PKOGTA8	N/A	N/A	N/A
H361	F5	EIK031	EIK032	RFK060	SN03	SN03C	GTK03	GTK03C	FPK03	N/A
H361-2A	F6	EIK1	EIK2	RFK06	SN0610	SN0610C	GTK0610	GTK0610C	Std.	N/A
H361-2AWK	F6	EIK1	EIK2	RFK06	SN0610	SN0610C.	GTK0610	GTK0610C	Std.	N/A
H361A	F6	EIK031	EIK032	RFK03H	SN03	SN03C	GTK03	GTK03C	Std.	N/A
H361AWA	F7	EIK1	EIK2	RFK06	N/A	N/A	N/A	Std.	Std.	ACP3034BC
H361AWC	F7	EIK1	EIK2	RFK06	N/A	N/A	N/A	Std.	Std.	APJ3485
H361AWK	F6	EIK031	EIK032	RFK03H	SN03	H03C	GTK03	GTK03C	Std.	N/A
H361DF	F1	9999TC10	9999TC20	RKF06	H60SN	H60SNC	Std.	N/A	N/A	N/A
H361DS	F6	EK3001	EIK032	HRK30H	H60SN	H60SNC	PK3GTA1	PKOGTC1	N/A	N/A
H361DSWC	F7	EK3001	EIK032	HRK30H	N/A	N/A	N/A	Std.	Std.	APJ3485
H361DSWA	F7	K3001	EIK032	HRK30H	N/A	N/A	N/A	Std.	Std.	ACP3034BC
H361DX	F1	9999TC10	EIK2	RFK06	H60SN	H60SNC	Std.	N/A	Std.	N/A
H361N	F5	EIK031	EIK2	RFK03H	Std.	SN03C	GTK03	GTK03C	FPK03	N/A
H361NRB	F5	EIK031	EIK032	RFK03H	Std.	SN03C	GTK03	GTK03C	FPK03	N/A
H361RB	F5	EIK031	EIK0322	RFK03H	SN03	SN03C	GTK03	GTK03C	FPK03	N/A
H361WA	F6	EIK1	EIK2	RFK06	N/A	N/A	Std.	N/A	FPK0610	ACP3034BC
H361WC	F6	EIK1	EIK2	RFK06	SN0610	SN0610C	Std.	N/A	FPK0610	APJ3485
H362	F5	EIK1	EIK2	RFK06H	SN0610	SN0610C	GTK0610	GTK0610C	FPK0610	N/A
H362A	F6	EIK1	EIK2	RFK06H	SN0610	SN0610C	GTK0610	GTK0610C	Std.	N/A
H362AWA	F5	EIK1	EIK2	RFK06H	SN0610	SN0610C	GTK0610	GTK0610C	Std.	ACP6034BC
H362AWC	F5	EIK1	EIK2	RFK06H	SN0610	SN0610C	GTK0610	GTK0610C	Std.	APJ6485
H362AWH	F5	EIK1	EIK2	RFK06H	SN0610	SN0610C	GTK0610	GTK0610C	Std.	SD12781
H362AWK	F6	EIK1	EIK2	RFK06H	SN0610	SN0610C	GTK0610	GTK0610C	Std.	N/A
H362DF	F1	9999TC10	9999TC20	RFK06H	H60SN	H60SNC	Std.	N/A	Std.	N/A
H362DS	F6	EK3061	EK3062	HRK60H	H60SN	H60SNC	PK3GTA1	PKOGTC1	Std.	N/A
H362DSWA	F7	EK3061	EK3062	HRK60H	N/A	N/A	N/A	Std.	Std.	ACP6034BC
H362DSWK	F7	EK3061	EK3062	HRK60H	N/A	N/A	N/A	Std.	Std.	APJ6485
H362DS	F1	9999TC10	9999TC20	RFK06H	H60SN	H60SNC	Std.	N/A	Std.	N/A
H362N	F5	EIK1	EK032	RFK06H	Std.	SN0610C	GTK0610	GTK0610C	FPK0610	N/A

Continued on next page

General Information

UL Listed Maximum Short Circuit Current Ratings—AC Only

NOTE: Consult the wiring diagram of the switch to verify the UL Listed short circuit current rating.

Table 15: Fusible Short Circuit Current Ratings

Heavy Duty Safety Switch Type	UL Listed Fuse Class	UL Listed Short Circuit Current Ratings
Fusible	H, K	10 kA
	R, J, L	200 kA [1]

1 On 600 V 200 A switches, 100,000 A max. on corner grounded delta when protected by Class J or R fuses.

Table 16: Non-Fusible Safety Switches

Heavy Duty Safety Switch Type	Switch Rating (A) [1]	Fuse or Circuit Breaker Type [2]	3-Phase		
			240 Vac	480 Vac	600 Vac
Non-Fusible Switches	All	Any brand circuit breaker	Up to 10 kA		
		H, K			
		R,T,J.L	200 kA	200 kA	200 kA
	30–100	H [3]	65 kA	35 kA	25 kA
	30–100	FA	14 kA	14 kA	14 kA
	30–100	FH	18 kA	18 kA	18 kA
	200	H, J [3]	65 kA	35 kA	25 kA
	200	KA	22 kA	22 kA	22 kA
	400	LA			
	600	MA			
	200	KH	25 kA	25 kA	25 kA
	400	LH			
	600	MH			

1 Applies to NEMA Types 1, 3R, 4X stainless, 12 switches.
2 Ampere rating of fuse or circuit breaker not to exceed switch ampere rating.
3 All H and J circuit breakers are acceptable, but will only support the noted Short Circuit Current Rating.

Table 17: Terminal Lug Data (NEMA Types 1, 3R, 4, 4X, 5, 7, 9, 12) [1]

Rating (A)	Conductors Per Phase and Neutral	Wire Range Wire Bending Space Per NEC Table 312.6 AWG/kcmil	Lug Wire Range AWG/kcmil	Optional Versa-Crimp® Compression Lug Field-Installed [2]
30 [3]	1	12–6 (Al) or 14–6 (Cu)	12–2 (Al) or 14–2 (Cu)	—
	2	14–10 (Cu) solid or 14–10 (Cu) stranded		
60 [4]	1	14–3 (Al) or 14–3 (Cu)	12–2 (Al) or 14–2 (Cu)	—
100	1	12–1/0 (Al) or 14–1/0 (Cu)	12–1/0 (Al) or 14–1/0 (Cu)	VCEL02114S1
200 [5]	1	6–250 (Al/Cu)	6–300 (Al/Cu)	VCEL030516H1
400	1 or 2	1/0–750 (Al/Cu) [6] or 1/0–300 (Al/Cu)	1/0–750 (Al/Cu) and 1/0–300 (Al/Cu)	VCEL07512H1 or VCEL030516H1 [7] and VCEL05012H1
600	2	3/0–500 (Al/Cu)	3/0–500 (Al/Cu)	VCEL05012H1
800	3	3/0–750 (Al/Cu)	3/0–750 (Al/Cu)	H8LKE2 [8]
1200	4	3/0–750 (Al/Cu)	3/0–750 (Al/Cu)	H12LKE2 [8]

1 30–100 A switches suitable for 60°C or 75°C conductors. 200–1200 A switches suitable for 75°C conductors.
2 For NEMA Types 1 and 3R only.
3 HU461AWK— 14–6 AWG (Cu).
4 H60XFA— 14–6 AWG (Cu).
5 H225XKA— 4 AWG–300 kcmil (Cu).
6 Maximum wire range is (1) 600 kcmil or (2) 300 kcmil Al/Cu on NEMA Type 4X Stainless and NEMA Type 12.
7 Order two PK516KN mounting kits when installing VCEL030516H1 lugs. Only one kit is required on two-pole switches.
8 See Digest 175 page 13, 800 and 1200 A compression lug kits for additional information.

Table 20: 100 A Heavy Duty Ratings

Catalog Number	Series	120 Vac		240 Vac				480 Vac				600 Vac				Vdc			240 Vac		480 Vac		600 Vac	
		Std.	Max.	Std.		Max.		Std.		Max.		Std.		Max.		Max. hp Ratings			Std.	Max.	Std.	Max.	Std.	Max.
		1Ø	1Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	1Ø	3Ø	125	250	600	2Ø	2Ø	2Ø	2Ø	2Ø	2Ø
H223DS	F6	—	—	7-1/2	—	15	—	—	—	—	—	—	—	—	—	—	20	—	—	—	—	—	—	—
H223AWK	F6	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H223A	F6	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H223N	F5	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H223NRB	F5	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H323DS	F6	—	—	—	15	—	30	—	—	—	—	—	—	—	—	—	20	—	—	—	—	—	—	—
H323A	F6	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H323AWK	F6	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H323N	F5	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H323NRB	F5	—	—	7-1/2[1]	15[2]	15[1]	30[2]	—	—	—	—	—	—	—	—	—	20[3]	—	—	—	—	—	—	—
H363	F5	—	—	—	—	—	—	10[1]	25[2]	30[1]	60[2]	—	30	—	75	—	50	30	—	—	—	—	—	—
H363RB	F5	—	—	—	—	—	—	10[1]	25[2]	30[1]	60[2]	—	30	—	75	—	50	30	—	—	—	—	—	—
H363DS	F6	—	—	—	—	—	—	—	25	—	60	—	30	—	75	—	—	30	—	—	—	—	—	—
H363A	F6	—	—	—	—	—	—	10[1]	25[2]	30[1]	60[2]	—	30	—	75	—	50	30	—	—	—	—	—	—
H363AWK	F6	—	—	—	—	—	—	10[1]	25[2]	30[1]	60[2]	—	30	—	75	—	50	30	—	—	—	—	—	—
H363N	F5	—	—	—	—	—	—	10[1]	25[2]	30[1]	60[2]	—	30	—	75	—	50	30	—	—	—	—	—	—
H363NRB	F5	—	—	—	—	—	—	10[1]	25[2]	30[1]	60[2]	—	30	—	75	—	50	30	—	—	—	—	—	—
H463	F5	—	—	—	15	—	30	—	25	—	60	—	30	—	75	—	20[3]	30	7-1/2	20	15	40	20	50
H463DS	F6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
H463AWK	F6	—	—	—	15	—	30	—	25	—	60	—	30	—	75	—	20[3]	30	7-1/2	20	15	40	20	50
H663DS	F6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
H663AWK	F6	—	—	—	15	—	30	—	25	—	60	—	30	—	75	—	—	—	—	—	—	—	—	—
HU363	F5	—	7-1/2	—	—	20[1]	40[2 6]	—	—	40[1]	75[5 6]	—	—	40[1]	75[6]	7-1/2	20	50	—	—	—	—	—	—
HU363RB	F5	—	7-1/2	—	—	20[1]	40[2 6]	—	—	40[1]	75[5 6]	—	—	40[1]	75[6]	7-1/2	20	50	—	—	—	—	—	—
HU363DS	F6	—	10[1]	—	—	15[1]	40[4]	—	—	30[1]	75	—	—	40[1]	75[4]	10	20	—	—	—	—	—	—	—
HU363A	F6	—	7-1/2	—	—	20[1]	40[2 6]	—	—	40[1]	75[5 6]	—	—	40[1]	75[6]	7-1/2	20	50	—	—	—	—	—	—
HU363AWK	F6	—	7-1/2	—	—	20[1]	40[2 6]	—	—	40[1]	75[5 6]	—	—	40[1]	75[6]	7-1/2	20	50	—	—	—	—	—	—
HU463	F5	—	—	—	—	—	40	—	—	—	75	—	—	—	75	—	20	30	—	30	—	50	—	50
HU463DS	F6	—	—	—	—	—	40	—	—	—	75	—	—	—	75	—	20	30	—	30	—	50	—	50
HU463AWK	F6	—	—	—	—	—	40	—	—	—	75	—	—	—	75	—	20	30	—	30	—	50	—	50
HU663DS	F6	—	—	—	—	—	40	—	—	—	75	—	—	—	75	—	—	—	—	—	—	—	—	—
HU663AWK	F6	—	—	—	—	—	40	—	—	—	75	—	—	—	75	—	—	—	—	—	—	—	—	—

1 Use both outer switching poles.

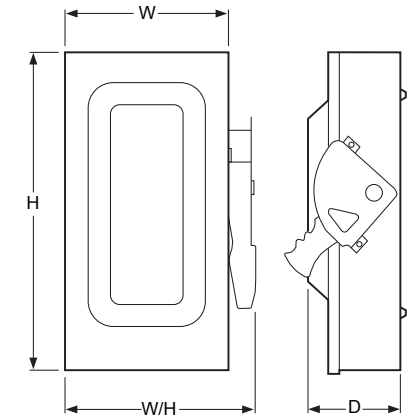
2 For corner grounded delta only, install neutral and use switching poles for ungrounded conductors.

3 Standard hp rating.

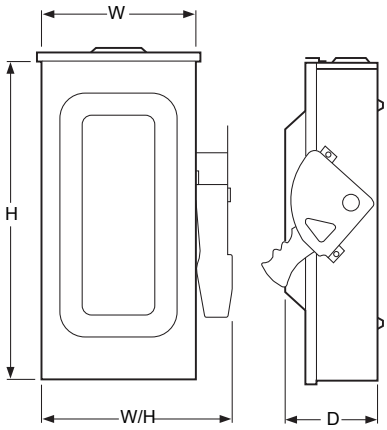
4 Use 75°C No. 1 copper conductor only.

5 60 hp maximum on corner grounded delta.

6 Use 75°C N.O. 4 Cu or N.O. 2 Al conductors.



Typical NEMA Type 1



Typical NEMA Type 3R

Table 28: Dimensions

Catalog Number	Series	Approximate Dimensions							
		H		W		W/H		D	
		in.	mm	in.	mm	in.	mm	in.	mm
H221N	F5	14.60	371	6.50	165	7.55	192	4.88	124
H221NRB		14.88	378	6.63	168	7.55	192	4.88	124
H222N		14.60	371	6.50	165	7.55	192	4.88	124
H222NRB		14.88	378	6.63	168	7.55	192	4.88	124
H223N	F5	21.25	540	8.50	216	10.50	267	6.38	162
H223NRB		21.25	540	8.50	216	10.50	267	6.38	162
H224N		29.00	737	17.13	435	18.50	470	8.25	210
H224NRB		29.25	743	17.25	438	18.63	473	8.50	216
H225, N	E4	50.25	1276	27.63	702	27.63	702	10.13	257
H225NR, R		50.31	1278	27.88	708	27.88	708	10.13	257
H226, N		50.25	1276	27.63	702	27.63	702	10.13	257
H226NR, R		50.31	1278	27.88	708	27.88	708	10.13	257
H227, N	E4	69.13	1756	36.62	930	36.62	930	17.75	451
H227NR, R		69.13	1756	36.62	930	36.62	930	17.75	451
H228, N		69.13	1756	36.62	930	36.62	930	17.75	451
H228NR, R		69.13	1756	36.62	930	36.62	930	17.75	451
H265	E4	50.25	1276	27.63	702	27.63	702	10.13	257
H265R		50.31	1278	27.88	708	27.88	708	10.13	257
H266		50.25	1276	27.63	702	27.63	702	10.13	257
H266R		50.31	1278	27.88	708	27.88	708	10.13	257
H267	E4	69.13	1756	36.62	930	36.62	930	17.75	451
H267R		69.13	1756	36.62	930	36.62	930	17.75	451
H268		69.13	1756	36.62	930	36.62	930	17.75	451
H268R		69.13	1756	36.62	930	36.62	930	17.75	451
H321N	F5	14.60	371	6.50	165	7.55	192	4.88	124
H321NRB		14.88	378	6.63	168	7.55	192	4.88	124
H322N		14.60	371	6.50	165	7.55	192	4.88	124
H322NRB		14.88	378	6.63	168	7.55	192	4.88	124
H323N	F5	21.25	540	8.50	216	10.50	267	6.38	162
H323NRB		21.25	540	8.50	216	10.50	267	6.38	162
H324N		29.00	737	17.13	435	18.50	470	8.25	210
H324NRB		29.25	743	17.25	438	18.63	473	8.50	216
H325, N	E4	50.25	1276	27.63	702	27.63	702	10.13	257
H325R, NR		50.31	1278	27.88	708	27.88	708	10.13	257
H326, N		50.25	1276	27.63	702	27.63	702	10.13	257
H326R, NR		50.31	1278	27.88	708	27.88	708	10.13	257
H327, N	E4	69.13	1756	36.62	930	36.62	930	17.75	451
H327R, NR		69.13	1756	36.62	930	36.62	930	17.75	451
H328, N		69.13	1756	36.62	930	36.62	930	17.75	451
H328R, NR		69.13	1756	36.62	930	36.62	930	17.75	451
H361, N	F5	14.60	371	6.50	165	7.55	192	4.88	124
H361-2		17.50	445	9.00	229	10.50	267	6.38	162
H361NRB, RB		14.88	378	6.63	168	7.55	192	4.88	124
H361WA	F6	18.19	462	9.00	229	10.50	267	6.81	173
H361WC		18.19	462	9.00	229	10.50	267	6.81	173
H362, N	F5	17.50	445	9.00	229	10.50	267	6.38	162
H362NRB, RB		17.50	445	9.00	229	10.50	267	6.38	162
H362WA	F6	18.19	462	9.00	229	10.50	267	6.81	173
H362WC		16.75	425	9.00	229	10.50	267	7.00	178
H362WH	F5	18.19	462	9.00	229	10.50	267	6.81	173
H363, N		21.25	540	8.50	216	10.50	267	6.38	162
H363NRB, RB		21.25	540	8.50	216	10.50		6.38	162
H363WA	F6	21.85	462	9.00	229	10.50	267	6.81	173
H363WC		21.85	555	9.00	229	10.50	267	6.81	173

Product Data Sheet

H323N

Safety Switch , Fusible, 240VAC/250VDC, 3-Pole, General Purpose (Indoor)

List Price	$842.00 USD
Availability	**Stock Item:** This item is normally stocked in our distribution facility.

Technical Characteristics

Disconnect Type	Fusible
Type of Duty	Heavy Duty
Enclosure Rating	NEMA 1
Action	Single Throw
Short Circuit Current Rating	10kA (Class H or K) - 200kA (Class R,J or L)
Ampere Rating	100A
Enclosure Type	General Purpose (Indoor)
Mounting Type	Surface
Enclosure Material	Steel
Number of Poles	3-Pole
Approvals	UL Listed
Terminal Type	Lugs
Factory Installed Neutral	Yes
Electrical Interlock	None
Maximum Voltage Rating	240VAC/250VDC
Wire Size	#12 to #1/0 AWG(Al) or #14 to #1/0 AWG(Cu)
Depth	6.38 Inches
Height	21.25 Inches
Width	8.50 Inches

Shipping and Ordering

Category	00008 - Safety Switch, Heavy Duty, 2 & 3 Pole, 30-200 Amp, Indoor
Discount Schedule	DE1
Article Number	785901480464
Package Quantity	1
Weight	17.9 lbs.
Availability Code	S
Returnability	Y

As standards, specifications, and designs change from time to time, please ask for confirmation of the information given in this document.

TR-R & TRS-R Time-delay/Class RK5

The industry's most popular fuse for motor circuit protection

With advanced material technology added to the existing product, the Tri-Onic® TR and TRS current-limiting time-delay fuses are engineered for overcurrent protection of motors and transformers, service entrance equipment, feeder and branch circuits. Tri-Onic fuse's proven time-delay characteristic safely handles harmless starting currents and inrush currents associated with today's motors and transformers. Now available with optional SmartSpot® blown fuse indication technology.

Features/Benefits:

- Optional solid state SmartSpot blown fuse indicator
- Time-delay for motor start-ups and transformer inrush currents without nuisance opening
- Current-limiting for low peak let-thru current
- Rejection-style design prevents replacement errors (when used with recommended fuse blocks)
- Easy-to-read label for quick brand recognition and replacement
- Metal-embossed date and catalog number for traceability and lasting identification
- Fiberglass body provides dimensional stability in harsh industrial settings
- High-grade silica filler ensures fast arc quenching and high current limitation

Highlights:

- Time-delay
- Current-limiting
- AC & DC rated

Applications:

- Motor circuits
- Mains
- Feeders
- Branch circuits
- Transformers
- Service entrance equipment
- General-purpose equipment

Ratings:

TR-R

Volts : 250VAC
: 250VDC (.1-2.8A; 35-400A)
: 160VDC (3-30A; 450-600A)
Amps : 1/10 to 600A
IR : 200kA I.R. AC / 20kA I.R. DC

TRS-R

Volts : 600VAC
: 600VDC (.1-12A; 70-600A)
: 300VDC (15-60A)
Amps : 1/10 to 600A
IR : 200kA I.R. AC / 20kA I.R. DC

Approvals:

- UL listed to standard 248-12 File E2137
- CSA certified to standard C22.2 no. 248.12
- DC listed to UL standard 248 TRS only

TR-R & TRS-R Time-delay/Class RK5

Catalog Numbers (amps)

250V			600V		
TR1/10R*	TR3-1/2R*	TR50R	TRS1/10R*	TRS3-1/2R*	TRS50R
TR15/100R*	TR4R*	TR60R	TRS15/100R*	TRS4R*	TRS60R
TR2/10R*	TR4-1/2R*	TR70R	TRS2/10R*	TRS4-1/2R*	TRS70R
TR3/10R*	TR5R*	TR75R*	TRS3/10R*	TRS5R*	TRS75R*
TR4/10R*	TR5-6/10R*	TR80R	TRS4/10R*	TRS5-6/10R*	TRS80R
TR1/2R*	TR6R*	TRS90R	TRS1/2R*	TRS6R*	TRS90R
TR6/10R*	TR6-1/4R*	TR100R	TRS6/10R*	TRS6-1/4R*	TRS100R
TR8/10R*	TR7R*	TR110R	TRS8/10R*	TRS7R*	TRS110R
TR1R*	TR8R	TR125R	TRS1R*	TRS8R	TRS125R
TR1-1/8R*	TR9R	TR150R	TRS1-1/8R*	TRS9R	TRS150R
TR1-1/4R*	TR10R	TR175R	TRS1-1/4R*	TRS10R	TRS175R
TR1-4/10R*	TR12R	TR200R	TRS1-4/10R*	TRS12R	TRS200R
TR1-6/10R*	TR15R	TR225R	TRS1-6/10R*	TRS15R	TRS225R
TR1-8/10R*	TR17-1/2R	TR250R	TRS1-8/10R*	TRS17-1/2R	TRS250R
TR2R*	TR20R	TR300R	TRS2R*	TRS20R	TRS300R
TR2-1/4R*	TR25R	TR350R	TRS2-1/4R*	TRS25R	TRS350R
TR2-1/2R*	TR30R	TR400R	TRS2-1/2R*	TRS30R	TRS400R
TR2-8/10R*	TR35R	TR450R	TRS2-8/10R*	TRS35R	TRS450R
TR3R*	TR40R	TR500R	TRS3R*	TRS40R	TRS500R
TR3-2/10R*	TR45R	TR600R	TRS3-2/10R*	TRS45R	TRS600R

Note: Optional blown fuse visual indication available. To order, place "ID" at the end of the catalog number. Example: #TRS30RID
** Not available with optional blow fuse indicator.*
Tin plated end caps are available on Non-ID fuses less than 60A. Example Part # TRP30R, TRSP30R

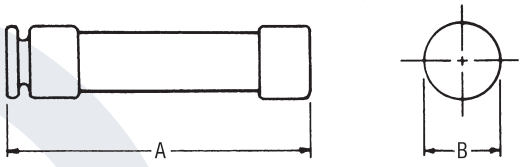
Recommended Fuse Blocks With Box Connectors For Tri-Onic® Class RK5 Fuses

Fuse Ampere Rating	Catalog Number 250V 1-Pole	250V 3 -Pole	600V 1-Pole	600V 3-Pole
0-30	20306R	20308R	60306R	60308R
31-60	20606R	20608R	60606R	60608R
61-100	21036R	21038R	61036R	61038R
101-200	22001R	22003R	62001R	62003R
201-400	24001R	24003R	64001R	64003R
401-600	2631R	2633R	6631R	6633R

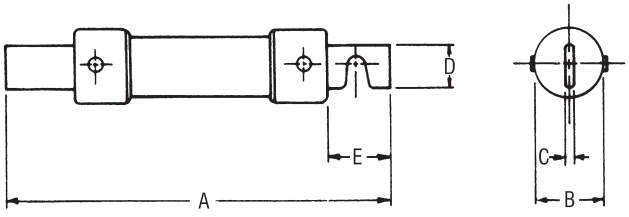
A variety of pole configurations and termination provisions are available. Refer to Section H for details.

Dimensions

Ampere Rating	A In.	A mm	B In.	B mm	C In.	C mm	D In.	D mm	E In.	E mm
250V-TR Fuses										
0-30	2	51	9/16	14	-	-	-	-	-	-
31-60	3	76	13/16	21	-	-	-	-	-	-
61-100	5-7/8	149	1-1/16	27	1/8	3	3/4	19	1	25
101-200	7-1/8	181	1-9/16	40	3/16	5	1-1/8	28	1-3/8	35
201-400	8-5/8	219	2-1/16	53	1/4	6	1-5/8	41	1-7/8	48
401-600	10-3/8	264	2-9/16	66	1/4	6	2	51	2-1/4	57
600V-TRS Fuses										
0-30	5	127	13/16	21	-	-	-	-	-	-
31-60	5-1/2	139	1-1/16	27	-	-	-	-	-	-
61-100	7-7/8	200	1-5/16	34	1/8	3	3/4	19	1	25
101-200	9-5/8	244	1-13/16	46	3/16	5	1-1/8	28	1-3/8	35
201-400	11-5/8	295	2-9/16	66	1/4	6	1-5/8	41	1-7/8	48
401-600	13-3/8	340	3-1/8	80	1/4	6	2	51	2-1/4	57



0-60A



61-600A

6.9 Hoistway Cable

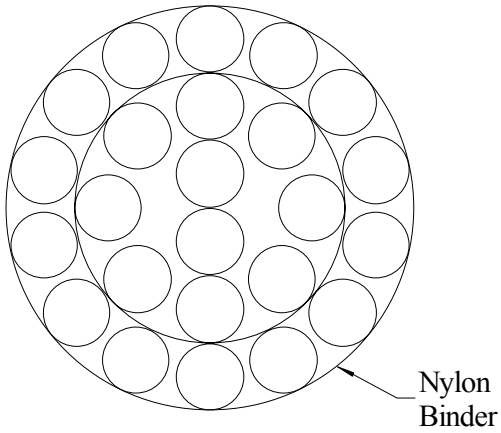
JAMES MONROE WIRE AND CABLE CORPORATION

GENERAL PRODUCT SPECIFICATION
Phone 800-316-8877 Fax 978-368-1275
www.jamesmonroewire.com

Description: Twenty-Four 18 AWG Singles, Hoistway Cable
Unshielded/Unjacketed

Date: 8/17/2006
JM Part Number: JMC-HC2418
Alt Part Number: TBD

Cable Diagram



Components

Twenty-Four 18 AWG Singles

Conductor:	18 AWG, 16/30 bare copper	.045"
Insulation:	.030" nominal wall of PVC (see color code)	.105"

Overall Cable Construction

Cabling:	Twenty-Four Conductors twisted together with no fillers	.630"
Binder:	Nylon with an open spiral wrap	.630"

Print

Each conductor will be printed as follows:

JAMES MONROE W&C E96512 (UL) & LL41103 (CSA) FT1 HOISTWAY CABLE 18 AWG 60C 600V

Color Code

Example of numerical print: **1-ONE**

1 - 10:	Yel w/numerical print "1" - "10"	21 - 24:	Brn w/numerical print "21" - "24"
11 - 20:	Org w/numerical print "11" - "20"		

Requirements

Temperature:	60C	Approvals:	UL Hoistway	CSA Hoistway
Voltage:	600V		NEC Compliant	

Written By:	rjc	8/17/2006	Rev. 0	Initial Issue
Revised By:	scs	6/9/2009	Rev. 1	Added Temperature to Print Legend
Revised By:				
Revised By:				

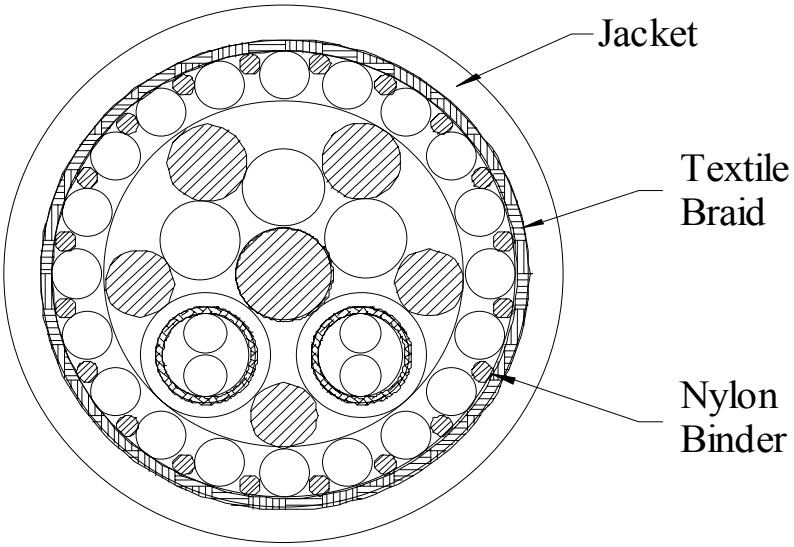
JAMES MONROE WIRE AND CABLE CORPORATION

GENERAL PRODUCT SPECIFICATION
Phone 800-316-8877 Fax 978-368-1275
www.jamesmonroewire.com

Description: Twenty-Seven Conductor Composite, Traveling Cable Jute Core,Textile Braid, and PVC Jacket

Date: 1/12/2006
JM Part Number: JMC-TCJC27
Alt Part Number: TBD

Cable Diagram



Components

Component A: Three 14 AWG Singles

Conductor:	14 AWG, 41/30 bare copper	
Insulation:	.032" nominal wall of PVC (see color code)	.136"

Component B: Twenty 18 AWG Singles

Conductor:	18 AWG, 16/30 bare copper	
Insulation:	.020" nominal wall of PVC (see color code)	.085"

Component C: Two 20 AWG Shielded, Jacketed Pairs

Conductor:	20 AWG, 10/30 bare copper	
Insulation:	.020" nominal wall of PVC (see color code)	
Pair Twist:	Two 20 AWG singles twisted together	
Shield:	36 AWG bare copper braid, 85% coverage	
Jacket:	.025" nominal wall of PVC (see color code)	.226" (major axis)

Overall Cable Construction

Cabling:	Components A, B, and C cabled around a jute core with jute fillers in the interstices	
Binder:	Nylon with an open spiral wrap	
Braid:	Textile braid, 100% coverage	
Jacket:	.060" nominal wall of Black PVC	.920"

Print

JAMES MONROE W&C ETT TCJC27 JC 3-14 AWG(2.08MM2) + 20-18 AWG(.824MM2) + 4-20 AWG(.519MM2) E82930 (UL) - 60C 300V - LL41103 (CSA) FT1
LOT NUMBER SEQUENTIAL FOOTAGE

- Continued on Page 2 -

Written By:	rjc	1/12/2006	Rev. 0	Initial Issue
Revised By:	scs	3/16/2011	Rev. 1	Revised Print Legend
Revised By:				
Revised By:				

Description: Twenty-Seven Conductor Composite, Traveling Cable Jute Core,Textile Braid, and PVC Jacket

Date: 1/12/2006
JM Part Number: JMC-TCJC27
Alt Part Number: TBD

- Continued from Page 1 -

Color Code Example of numerical print: **1-ONE**

Component A:	1:	Blk w/numerical print "1"	3:	Grn w/numerical print "3"
	2:	Wht w/numerical print "2"		
Component B:	1 - 10:	Yel w/numerical print "1" - "10"	11 - 20:	Org w/numerical print "11" - "20"

Component C: Each Pair: One Red and One White conductor with Pair jackets as follows:

Pair 1: Red Pair 2: Black

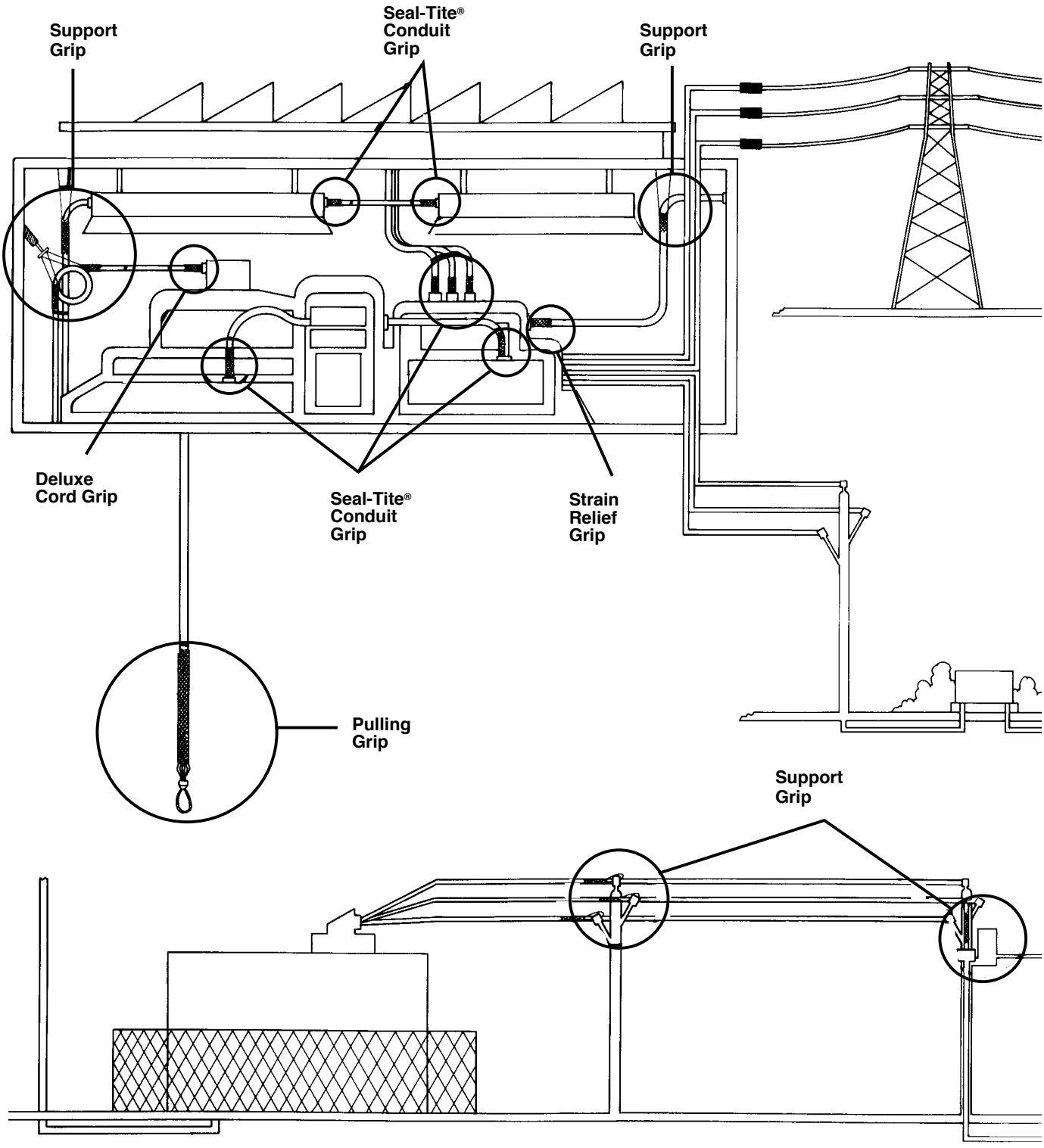
Requirements

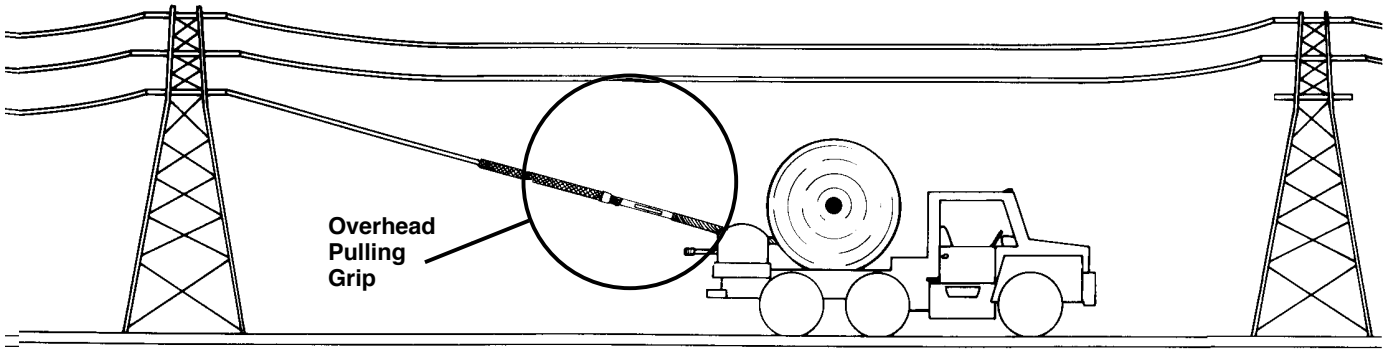
Temperature:	60C	Approvals:	UL Type ETT	CSA Type ETT
Voltage:	300V		NEC Compliant	CSA, FT1

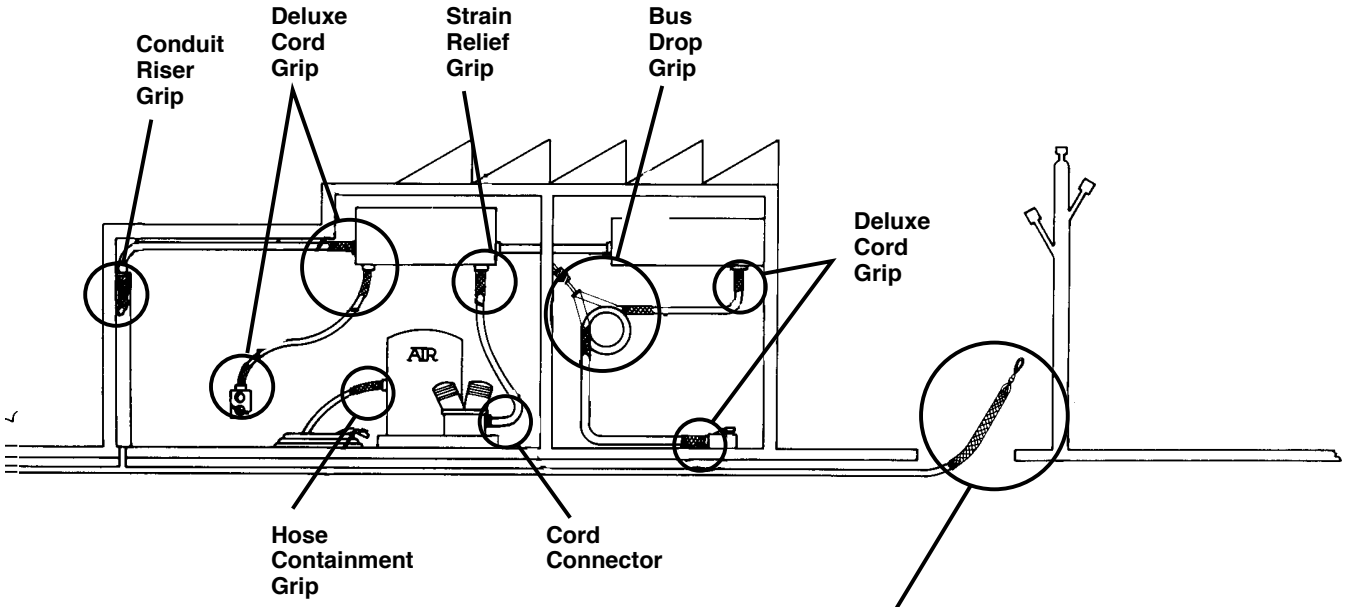
6.10 Traveling Cable

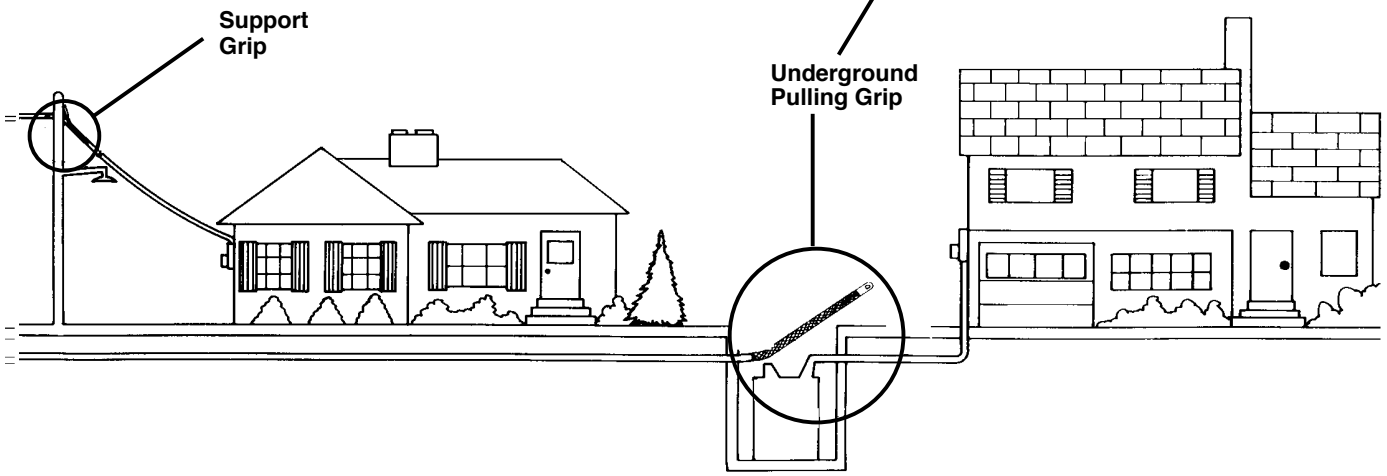
Section T
Wire Management Products

Index


Support Grip
Seal-Tite® Conduit Grip
Support Grip
Deluxe Cord Grip
Seal-Tite® Conduit Grip
Strain Relief Grip
Pulling Grip
Support Grip


Overhead
Pulling
Grip


Conduit
Riser
Grip
Deluxe
Cord
Grip
Strain
Relief
Grip
Bus
Drop
Grip
Deluxe
Cord
Grip
AIR
Hose
Containment
Grip
Cord
Connector


Support
Grip
Underground
Pulling Grip

Wire Management Products

Pulling Grips

Kellems® Pulling Grips

Overhead, Underground, Commercial Construction, Specialty

Support Grips

Standard Duty Support

Single Eye, Single Weave, Tin-Coated Bronze

Single Eye, Closed Mesh*

For permanent support when cable end is available to be installed through grip.

Cable Diameter Range Inches (cm)	Approx. Breaking Strength Lbs. (N)	E Inches (cm)	M Inches (cm)	Catalog Numbers
.50”-.62” (1.27-1.57)	530 (2,357)	7” (17.78)	10” (25.40)	**02201013**
.63”-.74” (1.60-1.88)	790 (3,514)	8” (20.32)	10” (25.40)	**02201014**
.75”-.99” (1.90-2.51)	1,020 (4,537)	8” (20.32)	13” (33.02)	**02201015**
1.00”-1.24” (2.54-3.15)	1,610 (7,161)	9” (22.86)	14” (35.56)	**02201017**
1.25”-1.49” (3.17-3.78)	1,610 (7,161)	10” (25.40)	15” (38.10)	**02201018**
1.50”-1.74” (3.81-4.42)	1,610 (7,161)	12” (30.48)	17” (43.18)	**02201019**
1.75”-1.99” (4.44-5.05)	2,150 (9,563)	14” (35.56)	19” (48.26)	**02201020**
2.00”-2.49” (5.08-6.32)	3,260 (14,500)	16” (40.64)	21” (53.34)	**02201021**
2.50”-2.99” (6.35-7.59)	3,260 (14,500)	18” (45.72)	23” (58.42)	**02201022**
3.00”-3.49” (7.62-8.86)	4,900 (21,795)	21” (53.34)	25” (63.50)	**02201023**
3.50”-3.99” (8.89-10.13)	4,900 (21,795)	24” (60.96)	27” (68.58)	**02201024**

Single Eye, Split Mesh, Lace Closing*

For permanent support when cable end is not available.

Cable Diameter Range Inches (cm)	Approx. Breaking Strength Lbs. (N)	E Inches (cm)	M Inches (cm)	Catalog Numbers
.50”-.62” (1.27-1.57)	530 (2,357)	7” (17.78)	10” (25.40)	**02202013**
.63”-.74” (1.60-1.88)	790 (3,514)	8” (20.32)	10” (25.40)	**02202014**
.75”-.99” (1.90-2.51)	1,020 (4,537)	8” (20.32)	13” (33.02)	**02202015**
1.00”-1.24” (2.54-3.15)	1,610 (7,161)	9” (22.86)	14” (35.56)	**02202017**
1.25”-1.49” (3.17-3.78)	1,610 (7,161)	10” (25.40)	15” (38.10)	**02202018**
1.50”-1.74” (3.81-4.42)	1,610 (7,161)	12” (30.48)	17” (43.18)	**02202019**
1.75”-1.99” (4.44-5.05)	2,150 (9,563)	14” (35.56)	19” (48.26)	**02202020**
2.00”-2.49” (5.08-6.32)	3,260 (14,500)	16” (40.64)	21” (53.34)	**02202021**
2.50”-2.99” (6.35-7.59)	3,260 (14,500)	18” (45.72)	23” (58.42)	**02202022**
3.00”-3.49” (7.62-8.86)	4,900 (21,795)	21” (53.34)	25” (63.50)	**02202023**
3.50”-3.99” (8.89-10.13)	4,900 (21,795)	24” (60.96)	27” (68.58)	**02202024**

Single Eye, Split Mesh, Rod Closing*

For support when cable end is not available.

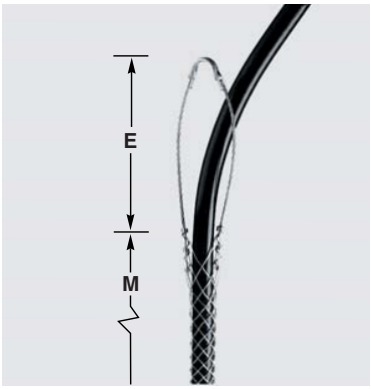
Cable Diameter Range Inches (cm)	Approx. Breaking Strength Lbs. (N)	E Inches (cm)	M Inches (cm)	Catalog Numbers
.50”-.62” (1.27-1.57)	790 (3,514)	7” (17.78)	8 1/2” (21.59)	**02203013**
.63”-.74” (1.60-1.88)	790 (3,514)	8” (20.32)	8 1/2” (21.59)	**02203014**
.75”-.99” (1.90-2.51)	1,020 (4,537)	8” (20.32)	10 1/2” (26.67)	**02203015**
1.00”-1.24” (2.54-3.15)	1,610 (7,161)	9” (22.86)	12 1/2” (31.75)	**02203017**
1.25”-1.49” (3.17-3.78)	1,610 (7,161)	10” (25.40)	14 1/2” (36.83)	**02203018**
1.50”-1.74” (3.81-4.42)	1,610 (7,161)	12” (30.48)	15 1/2” (39.37)	**02203019**
1.75”-1.99” (4.44-5.05)	2,150 (9,563)	14” (35.56)	16 1/2” (41.91)	**02203020**
2.00”-2.49” (5.08-6.32)	3,260 (14,500)	16” (40.64)	19 1/2” (49.53)	**02203021**
2.50”-2.99” (6.35-7.59)	3,260 (14,500)	18” (45.72)	21 1/2” (54.61)	**02203022**
3.00”-3.49” (7.62-8.86)	5,750 (25,576)	21” (53.34)	23 1/2” (59.69)	**02203023**
3.50”-3.99” (8.89-10.13)	5,750 (25,576)	24” (60.96)	25 1/2” (64.77)	**02203024**

E-Eye length *M-Mesh length at nominal diameter*

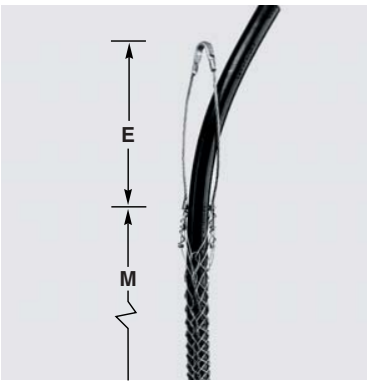
** Change catalog number from 022 to 024 for stainless steel. Consult factory for availability.*

IMPORTANT!

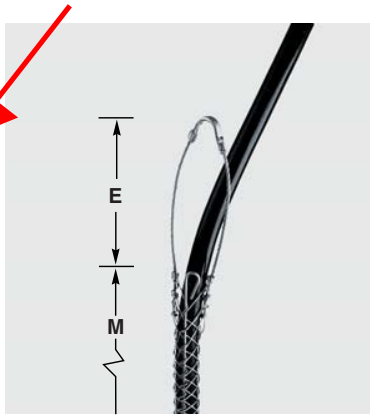
It is important that you read all breaking strength, safety and technical data relating to this product on pages T-43 through T-48.



Single Eye, Closed Mesh



Single Eye, Split Mesh, Lace Closing

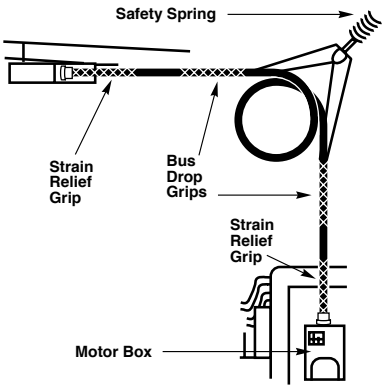


Single Eye, Split Mesh, Rod Closing

Kellems® Grips For Cable Support

Technical Section

Bus Drop Grips



Bus Drop Grips and Safety Springs

Kellems Bus Drop Grips are offered with either a single eye or universal bale attachment. The mesh is single weave galvanized steel with the patented wide range construction. They are suitable for indoor use only.

Application

Bus Drop Grips provide a safe, easy and economical method to support flexible cord or bus drop cable at bus duct and other industrial areas.

Benefits

- Easily installed.
- Absorb tension, vibration and pull with no cable damage.
- Patented mesh construction.

Safety Spring

Springs can be used with single eye grips by disassembling drawbar from coil, placing through eye and replacing drawbar.

Kellems® Grips For Cable Support

Technical Section

Kellems Support Grips

Kellems Support Grips are used to hold the weight of electrical cable as it hangs in a vertical, sloping or horizontal position. Electrical cable must be supported, or its dead weight can cause excessive strain or pullout at the connections resulting in power failure. Support grips also absorb additional strain from flexure, vibration, expansion and contraction. Kellems Support Grips listed in this catalog are made of high grade, non-magnetic tin-coated bronze strand. Stainless steel grips, made of alloy 302–304 SST for severe service or unusual environmental conditions, are available on request.

Select the Correct Support Grip

Each Kellems grip is designed to work on a specific range of cable diameters.

Step 1	Refer to the Kellems chart below to determine the grip style best suited for your application.
Step 2	Determine your cable outside diameter.
Step 3	Find the grip size that encompasses your cable diameter.
Step 4	Whenever possible, use a closed mesh that assembles over the cable end. If the cable end is not available, use a split mesh.
Step 5	Where available, select an eye style that suits your needs.
Step 6	Select the proper material—tinned bronze or stainless steel*.
Step 7	Estimate the tension to be put on the grip, establish the working load you require and compare this to the listed approximate breaking strength of the grip to insure that the grip will be strong enough. Refer to page L-84 for safety and working load considerations.

Caution: It is very important to comply with all of the following precautions.

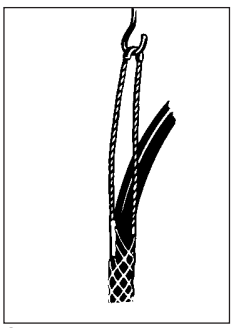
1. Support grips are to be installed by a qualified individual in accordance with all applicable national and local safety, electrical and rigging codes.
2. Ensure that the correct grip is selected for your specific needs.
3. Do not use a support grip for any application other than supporting cable.
4. Thoroughly examine the grip for damage. Do not use a damaged grip.
5. Ensure that the recommended work load of the grip is suitable for the application. Never use grips at their approximated rated breaking strength. A safety factor of 10 is recommended for support grips.
6. Do not alter grips in any way. For example, do not flatten, straighten, bend or otherwise modify eye tubes, hooks, links or strand equalizers.
7. Do not attach any type of hook, clamp or other hardware directly to the stranded bale of a “U” eye support grip. The formed eye tube is the only acceptable means of attachment to external hardware..
8. Always apply 2 bands at 1” and 2” respectively, from the tail end of the mesh to guard against accidental release of the grip. Accidental release can occur if an object contracts and pushes against the tail end of the mesh, thereby expanding and releasing it’s hold.

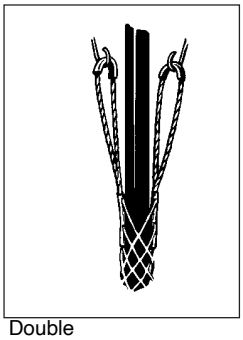
Support Grip Selection Chart

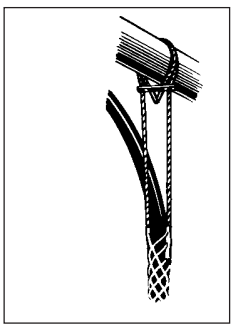
Grip Styles	Application	Page
Closed mesh	Standard, permanent support, cable end available.	T-30 to T-33
Split lace closing	Standard, permanent support, cable end unavailable.	T-30 to T-33
Split rod closing	Standard, temporary support, cable end unavailable. Tape or band tail end of wire mesh grip after positioning for permanent support.	T-30 to T-33
Material*	Tin-coated bronze standard or stainless steel by special request.	T-30 to T-42
Standard support grips	Support vertical runs to 99 ft. loads to 600 lbs.	T-30 to T-33
Heavy duty grips	Support vertical runs over 100 ft loads over 600 lbs.	T-34, T-35
Service drop	Light duty to support service entrance cable.	T-36, T-37
Bus drop	Light duty support, indoors only, on Bus drop cable.	T-38
Conduit riser	Support cable runs in rigid (Schedule 40) conduit.	T-39 to T-42
Fiber optic cable support grips	Support fiber optic cable.	T-53

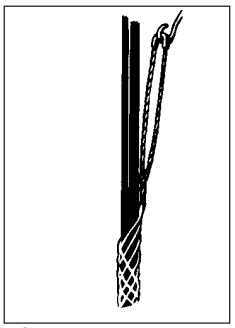
**Most catalog listed support grips are made of tin-coated bronze strand. To order stainless steel support grips, change the first three catalog number digits from 022-XX-XXX to 024-XX-XXX. Consult factory for details.*

Eye Styles


Single


Double


Universal


Offset

Dimensions in Inches (mm)

Safety And Working Load Factors For Wire Mesh Grips

The broad application of Kellems grips on a wide variety of objects requires that adequate safety factors be used to establish working loads. The approximate breaking strength of a Kellems grip represents an average calculation based on data established from actual direct tension testing done in our engineering laboratories.

It is impossible to catalog or guarantee a safety factor suitable for all applications as operating conditions are never the same. The tension, diameter, movement, number of objects gripped, gripping surface, and the attachments used are just some of the factors which vary with each application. These factors, together with the effects of abrasion, corrosion, prior use or abuse and any other variables of a specific application, must be considered by the user and the grip replaced as appropriate. Where the conditions of the application are not well defined or known, or where risk of injury to persons or property is involved, a greater safety factor should be utilized.

Under normal conditions, Kellems' recommended factor of safety is five for catalog listed pulling grips, and ten for catalog listed support grips. The factory should be consulted for specific application recommendations where strength and holding power are important factors.

Any warranty as to quality, performance or fitness for use of grips is always premised on the condition that the published breaking strengths apply only to new, unused grips, and that such products are properly stored, handled, used, maintained, and inspected by the user at a frequency appropriate for the use and condition of the grip.

Examples

Grip Style	Approx. Breaking Strength Lbs. (N)	Safety Factor	Max. Rec. Load Lbs. (N)	Catalog Numbers
Pulling Grips	27,200 (120,986)	5	5,440 (24,197)	**03301027**
Support	1,610 (7,161)	10	161 (716)	**02202019**

The maximum recommended working load is the tension to be exerted on the grip in application with a margin of safety to take care of unforeseen and unusual circumstances.

It is the end-user's decision to determine how much of a safety factor is acceptable for the application.

The metric unit of measure (force) for breaking strength and load is newtons (N). To convert from newtons to the metric unit of weight (kilograms) the conversion factor is 9.808 newtons/kilogram.

Support Grip Materials

Material	Feature	Grip Type
Tin-coated bronze wire	Corrosion resistant for normal outside areas	Support grips
	Non-magnetic	Service drop grips
	Moderate strength	Conduit riser grips
Stainless steel wire (302-304)	High strength	Support grips
	Corrosion resistant	Service drop grips
Galvanized steel wire	Slightly magnetic	Bus drop grips
	Not subject to continuous outside environment	Bus drop grips

Approvals

CSA Certifications are indicated on appropriate product catalog pages.

Note: It is always recommended that the tail end of the grip be banded after the installation on the cable to prevent accidental release of the mesh.

Split Support Grip Lace Closing Instructions

Single Weave Grips should be laced with single strand lacing; double weave with double strand. Lacing strands should be the same material as the grip. Kellems supplies the appropriate lacing with each grip.

1. Start the lacing at the lead or anchoring end of the grip. Thread the lacings through the first two loops of the split and pull through until the lacings are centered at this point. Lace as you would your shoe, crossing the lacings before lacing the next two loops.
2. Don't pull lacing too tight. Leave a space between adjoining loops approximately equal to the width of one diamond of the mesh.
3. Twist the lacing strands tightly together at the tail end of the grip.
4. Wrap the ends of the lacings once or twice tightly around the tail of the grip, twisting the ends together securely. Excess lace can be cut off.





Split Support Grip Rod Closing Instructions

The stainless steel rod is a precise built-in feature which makes threading easy and fast. The strands of the mesh pass around the rod and match up with the strands from the opposite direction. The rod does not touch the cable at any point and therefore cannot cut the cable. Rod Closing Grips are reusable. They may be removed and reused as many times as desired.

1. **Fast to install**
   Wrap the grip around the cable and thread the rod through the pre-formed loops with a corkscrew motion, using the curved end of the rod to engage the loops.
2. The action required is a steady push and twist simultaneously. The fingers of the left hand are used to bring the loops together just ahead of the hook on the end of the rod.
3. To remove, simply pull the rod out.




Kellems® Grips For Cable Support
Technical Section

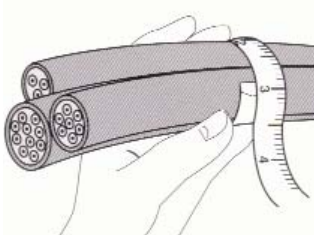
Multiple Cable Selection Charts for Cables of Unequal Diameters

How to choose the correct grip size:

1. Find the Grip Circumference Range by measuring the circumference of the bundle of different diameter cables to be gripped (see illustration).

2. Divide the bundle circumference by 3.14 to determine the diameter.

3. Choose a grip offering a range of cable diameters the same as the cable diameter.



For Conduit Riser Grips Only†

For Cables of Equal Diameters

Under "Number of Cables in One Grip," find diameter of your single cable in vertical column. Read the grip diameter range to the right.

If your diameter is the maximum of the range shown, go to the next larger size for Split Grips, stay with the same size for Closed Grips.

Example: 3 cables, each with .85" (2.16cm) diameter, for a Closed Grip select the 1.50"-1.74" (3.81cm-4.42cm) range, for a Split Grip select the 1.75"-1.99" (4.44cm-5.05cm) range.

Number of Cables in One Grip

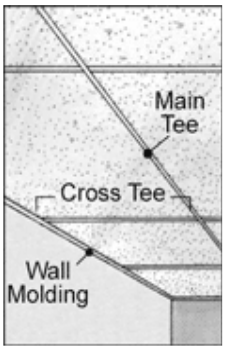
2	3	4	5	6 and 7	8	9	Grip Dia. Range Inches (cm)
.30-.38 (.76-.97)	.25-.31 (.63-.79)	.22-.27 (.56-.69)	.19-.24 (.48-.61)	.17-.22 (.43-.56)	.15-.19 (.38-.48)	.14-.18 (.36-.46)	.50-.61 (1.27-1.55)
.38-.44 (.97-1.12)	.31-.36 (.79-.91)	.27-.31 (.69-.79)	.24-.29 (.61-.74)	.22-.26 (.56-.66)	.19-.23 (.48-.58)	.18-.21 (.46-.53)	.62-.74 (1.57-1.88)
.44-.59 (1.12-1.50)	.36-.49 (.91-1.24)	.31-.42 (.79-1.07)	.29-.38 (.74-.97)	.26-.34 (.66-.86)	.23-.31 (.58-.79)	.21-.28 (.53-.71)	.75-.99 (1.90-2.51)
.59-.75 (1.50-1.90)	.49-.63 (1.24-1.60)	.42-.54 (1.07-1.37)	.38-.48 (.97-1.22)	.34-.43 (.86-1.09)	.31-.39 (.79-.99)	.28-.35 (.71-.89)	1.00-1.24 (2.54-3.15)
.75-.90 (1.90-2.29)	.63-.76 (1.60-1.93)	.54-.65 (1.37-1.65)	.48-.58 (1.22-1.47)	.43-.52 (1.09-1.32)	.39-.46 (.99-1.17)	.35-.42 (.89-1.07)	1.25-1.49 (3.17-3.78)
.90-1.07 (2.29-2.72)	.76-.89 (1.93-2.26)	.65-.77 (1.65-1.96)	.58-.67 (1.47-1.70)	.52-.60 (1.32-1.52)	.46-.54 (1.17-1.37)	.42-.49 (1.07-1.24)	1.50-1.74 (3.81-4.42)
1.07-1.22 (2.72-3.10)	.89-1.02 (2.26-2.59)	.77-.88 (1.96-2.24)	.67-.77 (1.70-1.96)	.60-.69 (1.52-1.75)	.54-.62 (1.37-1.57)	.49-.56 (1.24-1.42)	1.75-1.99 (4.44-5.05)
1.22-1.53 (3.10-3.89)	1.02-1.28 (2.59-3.25)	.88-1.10 (2.24-2.79)	.77-.96 (1.96-2.44)	.69-.86 (1.75-2.18)	.62-.77 (1.57-1.96)	.56-.71 (1.42-1.80)	2.00-2.49 (5.08-6.32)
1.53-1.83 (3.89-4.65)	1.28-1.53 (3.25-3.89)	1.10-1.32 (2.79-3.35)	.96-1.16 (2.44-2.95)	.86-1.03 (2.18-2.62)	.77-.93 (1.96-2.36)	.71-.85 (1.80-2.16)	2.50-2.99 (6.35-7.59)
1.83-2.14 (4.65-5.44)	1.53-1.79 (3.89-4.55)	1.32-1.54 (3.35-3.91)	1.16-1.35 (2.95-3.43)	1.03-1.20 (2.62-3.05)	.93-1.08 (2.36-2.74)	.85-.99 (2.16-2.51)	3.00-3.49 (7.62-8.86)
2.14-2.44 (5.44-6.20)	1.79-2.05 (4.55-5.21)	1.54-1.76 (3.91-4.47)	1.35-1.54 (3.43-3.91)	1.20-1.37 (3.05-3.48)	1.08-1.24 (2.74-3.15)	.99-1.13 (2.51-2.87)	3.50-3.99 (8.89-10.13)
2.44-2.75 (6.20-6.98)	2.05-2.30 (5.21-5.84)	1.76-1.98 (4.47-5.03)	1.54-1.74 (3.91-4.42)	1.37-1.55 (3.48-3.94)	1.24-1.39 (3.15-3.53)	1.13-1.27 (2.87-3.23)	4.00-4.49 (10.16-11.40)
2.75-3.06 (6.98-7.77)	2.30-2.56 (5.84-6.50)	1.98-2.20 (5.03-5.59)	1.74-1.93 (4.42-4.90)	1.55-1.72 (3.94-4.37)	1.39-1.55 (3.53-3.94)	1.27-1.41 (3.23-3.58)	4.50-4.99 (11.43-12.67)

**This chart is not to be used for Conduit Riser Grips. Refer to the chart for Conduit Riser multiple cable section.*

Note: It is always recommended that, when multiple cables are installed in a support grip, the tail end of the grip be banded or tightly taped after installation on the cable bundle.

7.1 Ceiling Grid / Egg Crate Panels

Framing for Suspended Ceiling Tiles



Use these components to design your own frame to support ceiling tiles (sold above). For indoor use. Color is white.

Main and **cross tees** snap together. **Wall molding** secures the frame you've made to the wall. **Hanger rods** are made of 12 12 ft. long, and are used to suspend and secure your frame from the ceiling.

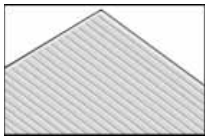
Steel—The main and cross tees are approved for use in various UL fire-rated ceiling assemblies. The wall molding and hange be fire rated and won't reduce the overall fire protection of the ceiling system.

Corrosion-Resistant Aluminum—These components withstand higher humidity than our steel components, but are not fire ra in food processing areas.

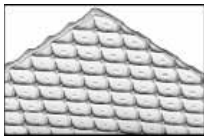
			Steel			Corrosion-Resistant Aluminum	
	Wd.	Lg.		Each	Lg.		Each
Main Tee	15/16"	12 ft.	62765T31	$7.90	12 ft.	8014T51	$18.54
Cross Tee	15/16"	4 ft.	62765T32	2.47	4 ft.	8014T52	6.18
Cross Tee	15/16"	2 ft.	62765T33	1.24	2 ft.	8014T53	3.08
Wall Molding	7/8"	12 ft.	62765T34	5.02	10 ft.	8014T54	8.66
Hanger Rods (10/Pkg.)			62765T65	Pkg. $8.48			

Light Diffusers

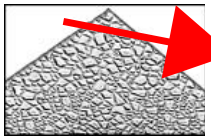
Smooth



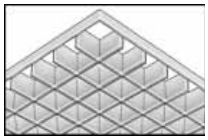
Grooved



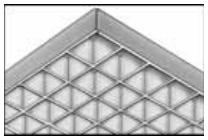
Prismatic



Cracked Ice



Egg Crate



Parabolic

Cut these 2 ft. × 4 ft diffusers to size with a saw.

Keep bulbs hidden behind ***smooth***, ***grooved***, ***prismatic*** or ***cracked ice diffusers.*** *Smooth* models reduce shadows and reflected light. *Smooth* and *grooved* models distribute light evenly.

For maximum light output, and free air circulation which cools operating temperature, choose the open cell design of ***egg crate*** or ***parabolic diffusers*** (also called louver panels). *Parabolic* models are mirrored to reflect light and reduce glare.

Acrylic panels have UV stabilizers to prevent yellowing. *Polystyrene* panels are the most economical but have a tendency to yellow over time. *Polyester* panels do not yellow and are stronger than acrylic. *Polycarbonate* panels are suitable for rough-service environments. *Aluminum* panels are more rigid and noncombustible.

Material	Color/ Finish	Panel Thick.	Cell Size, Lg. × Wd. × Dp.	Mini Package Pkg. Qty.	Mini Package	Mini Package Per Pkg.	Standard Package Pkg. Qty.	Standard Package	Standard Package Per Pkg.
Smooth									
Acrylic	White	5/64″	—	2	1624K54	$84.94	10	1624K29	$261.73
Grooved									
Acrylic	Clear	5/64″	—	2	1624K36	97.02	10	1624K38	320.20
Acrylic	Clear	7/64″	—	2	1624K37	123.53	10	1624K39	403.92
Prismatic									
Polystyrene	Clear	3/32″	—	2	1624K48	33.56	10	1624K18	94.47
Acrylic	Clear	7/64″	—	2	1624K49	45.21	10	1624K24	118.86
Polyester	Clear	1/8″	—	2	1624K55	67.64	10	1624K56	242.05
Polycarbonate	Clear	1/8″	—	2	1624K3	109.62	—	—	—
Cracked Ice									
Polystyrene	Clear	5/64″	—	2	1624K51	35.63	20	1624K25	175.23
Acrylic	Clear	5/64″	—	2	1624K52	50.55	25	1624K26	392.91
Egg Crate									
Polystyrene	White	3/8″	1/2″ × 1/2″ × 3/8″	2	1624K45	30.32	5	1624K15	53.79
Polystyrene	White	1/2″	1/2″ × 1/2″ × 1/2″	2	1624K44	37.44	5	1624K14	76.09
Acrylic	White	3/8″	1/2″ × 1/2″ × 3/8″	2	1624K47	53.16	5	1624K17	87.98
Acrylic	White	1/2″	1/2″ × 1/2″ × 1/2″	2	1624K46	76.56	5	1624K16	121.31
Aluminum	White	1/2″	1/2″ × 1/2″ × 1/2″	2	14655K11	88.07	5	14655K1	167.53
Aluminum	Silver	1/2″	1/2″ × 1/2″ × 1/2″	2	14655K12	69.84	5	14655K2	137.94
Parabolic									
Polystyrene	Silver	7/16″	5/8″ × 5/8″ × 7/16″	2	1624K27	75.31	—	—	—

7.2 Lighting

LITHONIA LIGHTING®

Catalog Number	
Notes	Type

FEATURES & SPECIFICATIONS

INTENDED USE

Intended for unit or row installations, surface or suspended mounting.

ATTRIBUTES

Designed exclusively for use with T8 lamps, electronic ballasts and sockets.

CONSTRUCTION

Standard channel, die formed from Code-guage steel.

Sturdy Channel cover secured by captive quarter turnlatch for easy access to wireway.

End plate and channel connector furnished with each fixture.

Housing formed from Cold rolled steel.

FINISH

Five Stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance.

Painted parts finished with high-gloss, baked white polyester.

ELECTRICAL SYSTEM

Thermally-protected, resetting, Class P, UL Listed, CSA Certified ballast is standard.

Available in Tandem wired lengths.

Luminaire is suitable for damp locations. AWM, TFN or THHN wire used throughout, rated for required temperatures.

LISTING

UL Listed to US and Canadian safety standards. Optional: Mexico NOM.

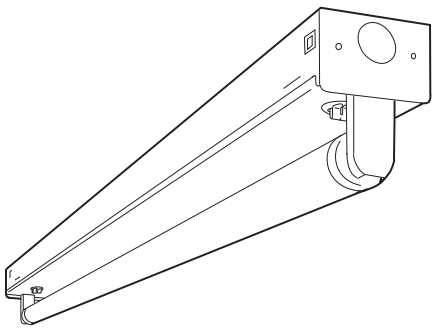
WARRANTY

Guaranteed for one year against mechanical defects in manufacture.

Standard Strip

S

Linear Lamp and Compact Fluorescent
1 Lamp



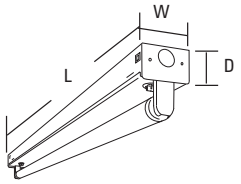
Specifications

Length: 18 (457), 24 (610)
36 (914), 48 (1219)
72 (1829) or 96 (2438)

Width: 2-3/4 (70)

Depth: 1-3/4 (45)

All dimensions are inches (millimeters).



ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold).**
Example: S 1 32 MVOLT GEB10IS

S	1			
Series	Number of lamps	Lamp type	Voltage	Options
S Standard strip[1]	**1**	25 25W T8 (36")	120	**GEB10IS T8 electronic ballast, ≤ 10% THD, instant start (T8 only)**
For tandem double-length unit, add prefix T. Example: TS	Not included	CF27 27W TT5 (15")	277	GEB10RS T8 electronic ballast, ≤ 10% THD, rapid start
		17 17W T8 (24")	347	BILP IS High-efficiency .78 bf (low)
		32 32W T8 (48")	**MVOLT**	GEB Electronic ballasts, ≤20% THD.
		CF39 39W TT5 (18")	Others available	GLR Internal fast-blow fuse (add X for external)
		CF40 40W TT5 (24")		GMF Internal slow-blow fuse (add X for external)
		60T8 40W T8 (60")		CS3 6' cordset, NEMA L5-15P SJT, twist-lock plug, 120V
				PLF__ Plug in wiring, specify number of branch circuits and hot wires (A-black, B-Red, C-Blue, AB or AC)
				NOM NOM Certified

Accessories

Order as separate catalog numbers.

SQ_	Swivel-stem hanger (specify length in 2" increments).
1B	Ceiling spacer (adjusts from 1-1/2" to 2-1/2" from ceiling).
WGS	Wireguard, 4' white, for unshielded S strip.[1]
WGSSMR	Wireguard, 4' white, for S strip with SSMR reflector.[1]
WGSASR	Wireguard, 4' white, for S strip with SASR reflector.[1]
SSMR 48WH	Symmetric reflector, 4' white. [1]
SASR 48WH	Asymmetric reflector, 4' white.[1]
S48WG	Wireguard, 4' white, Canada only
SSMRCF 24WH	Symmetric reflector, 2' white.*
SASRCF 24WH	Asymmetric reflector, 2' white.*
TSASRCF 24WH	Asymmetric reflector, 2' white, for TS 1 CF18.*

*Other lengths available. Replace **24** in catalog number with length in inches. Other finishes available. Replace **WH** in catalog number with **SSR** or other finish.

NOTES:

1 Order two for 8' fixtures.

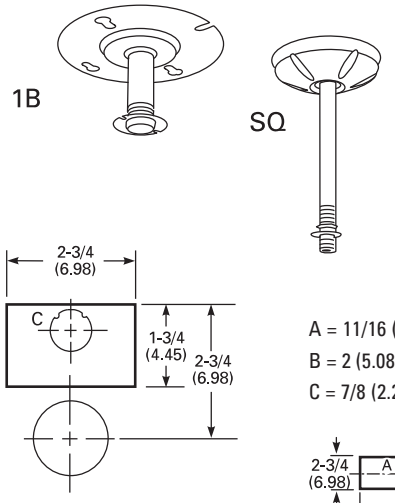
MOUNTING DATA

For unit or row installation, surface or stem mounting.

Unit installation — Minimum of two hangers required.

Row installation — One hanger per channel plus one per row required.

See ACCESSORIES below for hanging devices.

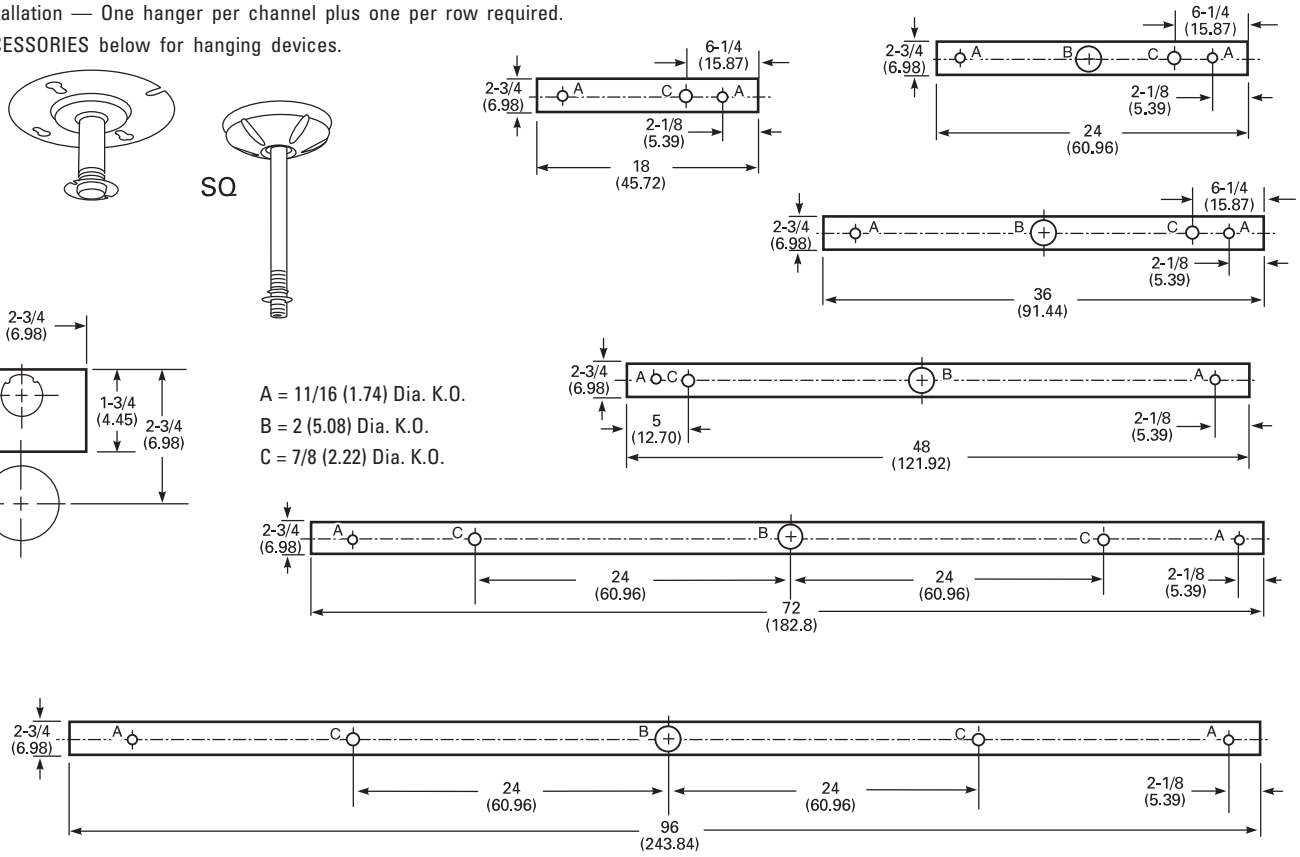


A = 11/16 (1.74) Dia. K.O.

B = 2 (5.08) Dia. K.O.

C = 7/8 (2.22) Dia. K.O.

DIMENSIONS



PHOTOMETRICS

Calculated using the zonal cavity method in accordance with IESNA LM41 procedure. Floor reflectances are 20%. Lamp configurations shown are typical. Full photometric data on these and other configurations available upon request.

S 1 32

Report LTL 5725

S/MH (along) 1.2 (across) 1.6

Coefficient of Utilization

Ceiling	80%			70%			50%		
Wall	70%	50%	30%	70%	50%	30%	50%	30%	10%
1	97	91	86	92	87	82	79	75	72
2	87	77	70	82	74	67	67	61	56
3	78	67	58	74	64	56	58	52	46
4	71	59	50	67	56	48	51	44	38
5	65	51	42	61	49	41	45	37	32
10	43	30	22	41	28	21	26	20	15

Zonal Lumens Summary

Zone	Lumens	%Lamp	%Fixture
0-30	388	13.4	13.9
0-40	660	22.8	23.7
0-60	1307	45.1	46.9
0-90	2176	75.0	78.1
90-180	609	21.0	21.9
0-180	2786	96.1	100.0

Energy (Calculated in accordance with NEMA standard LE-5)

LER.FL	ANNUAL ENERGY COST*	LAMP DESCRIPTION	LAMP LUMENS	BALLAST FACTOR	INPUT WATTS
94.7	$2.53	(1) F3278/735	2800	.88	25

* Comparative yearly lighting energy cost per 1000 lumens

LITHONIA LIGHTING®

An AcuityBrands Company

Sheet #: S-TT5-T8

Lithonia Lighting
Fluorescent
One Lithonia Way, Conyers, GA 30012
Phone: 800-858-7763
www.lithonia.com

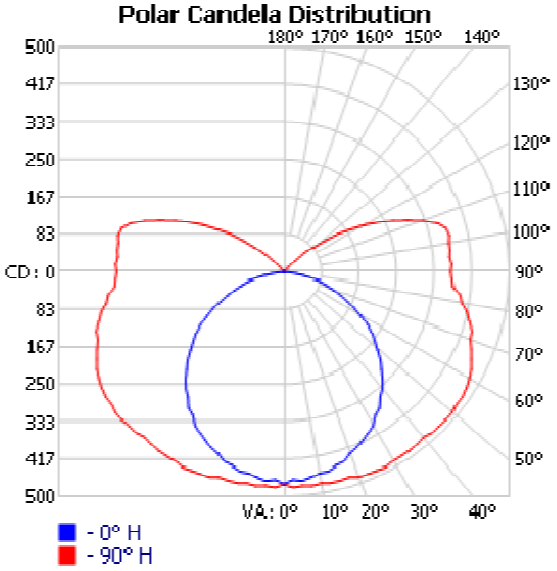
LITHONIA LIGHTING®

AcuityBrands. Lighting

S 1 32 - INDOOR PHOTOMETRIC REPORT

TEST #:	LTL5725
CATALOG #:	S 1 32
LUMINAIRE:	STANDARD STRIPLIGHT 4' 1 LAMP T8
LAMP:	ONE 32-WATT T8 LINEAR FLUORESCENT.
LAMP OUTPUT:	1 lamp(s), rated Lumens/lamp: 2900
INPUT WATTAGE:	38
LUMINOUS OPENING:	Rectangle (L: 4ft, W: 0.24ft)

TER Catagory:	Striplight
TER Value:	37
CIE Class:	Semi-Direct
Max Cd:	490.0 at Horizontal: 90°, Vertical: 27.5°
Spacing Criterion:	@ 0 = 1.24
	@ 90 = 1.57
Efficiency:	**96%**



AVERAGE LUMINANCE (CD/M2)

	0	22.5	45	67.5	90
0	5292	5292	5292	5292	5292
45	4852	5486	6501	7373	7706
55	4672	5630	7487	8934	9461
65	4165	6235	9286	11461	12178
75	3509	7668	12910	17112	18455
85	1801	14280	31519	43869	48500

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

Effective Floor Cavity Reflectance: 20%

RCC %:	80				70				50			30			10			0
RW %:	70	50	30	0	70	50	30	0	50	30	20	50	30	20	50	30	20	0
RCR: 0	1.09	1.09	1.09	1.09	1.04	1.04	1.04	.75	.95	.95	.95	.87	.87	.87	.79	.79	.79	.75
1	.96	.90	.84	.79	.91	.85	.80	.56	.77	.73	.70	.70	.67	.64	.63	.61	.58	.55
2	.86	.76	.68	.62	.81	.72	.65	.44	.65	.60	.55	.59	.54	.50	.53	.49	.46	.43
3	.77	.66	.57	.49	.73	.62	.54	.36	.56	.50	.44	.51	.45	.41	.46	.41	.37	.34
4	.70	.57	.48	.41	.66	.55	.46	.30	.49	.42	.37	.45	.39	.34	.40	.35	.31	.28
5	.64	.51	.41	.34	.60	.48	.40	.25	.44	.37	.31	.40	.34	.29	.36	.31	.26	.24
6	.59	.45	.36	.29	.56	.43	.35	.22	.39	.32	.27	.36	.29	.25	.32	.27	.23	.20
7	.54	.41	.32	.26	.51	.39	.31	.19	.35	.28	.23	.32	.26	.22	.29	.24	.20	.18
8	.50	.37	.28	.23	.48	.35	.27	.17	.32	.25	.20	.29	.23	.19	.27	.22	.18	.16
9	.47	.34	.25	.20	.44	.32	.25	.15	.30	.23	.18	.27	.21	.17	.25	.20	.16	.14
10	.44	.31	.23	.18	.42	.30	.22	.14	.27	.21	.16	.25	.19	.15	.23	.18	.14	.12

ZONAL LUMEN SUMMARY

Zone	Lumens	% Lamp	% Luminaire
0-30	387.2	13.4%	13.9%
0-40	657.9	22.7%	23.6%
0-60	1,303.6	45%	46.8%
60-90	873.0	30.1%	31.4%
70-100	779.6	26.9%	28%
90-120	551.0	19%	19.8%
0-90	2,176.7	75.1%	78.2%
90-180	608.0	21%	21.8%
0-180	2,784.6	96%	100%

LUMENS PER ZONE

Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	45.0	1.6%	90-100	234.1	8.4%
10-20	132.3	4.8%	100-110	199.1	7.2%
20-30	210.0	7.5%	110-120	117.9	4.2%
30-40	270.7	9.7%	120-130	48.9	1.8%
40-50	312.3	11.2%	130-140	7.8	0.3%
50-60	333.4	12.0%	140-150	0	0%
60-70	327.5	11.8%	150-160	0.1	0%
70-80	296.4	10.6%	160-170	0.1	0%
80-90	249.2	8.9%	170-180	0.0	0%

CANDELA TABLE - TYPE C

	0	22.5	45	67.5	90
0	472	472	472	472	472
5	467	464	473	474	477
10	454	463	475	475	477
15	447	455	471	481	481
20	430	444	465	477	486
25	413	430	459	480	487
30	395	410	450	478	486
35	370	391	440	471	486
40	340	368	426	467	481
45	306	346	410	465	486
50	271	319	397	459	488
55	239	288	383	457	484
60	198	261	366	448	475
65	157	235	350	432	459
70	117	206	323	414	440
75	81	177	298	395	426
80	44	142	276	367	401
85	14	111	245	341	377
90	0	99	239	334	371
95	2	105	237	335	370
100	0	81	233	335	373
105	0	43	206	331	373
110	0	13	154	282	330
115	0	0	111	227	268
120	0	8	67	167	207
125	0	0	27	110	148
130	0	0	0	59	86
135	0	0	0	14	35
140	0	0	0	0	0
145	0	0	0	0	0
150	0	0	0	0	0
155	0	0	0	0	0
160	0	0	0	0	0
165	0	0	8	0	0
170	0	0	0	0	0
175	0	0	0	4	0
180	1	1	1	1	0

7.3 Bulb Protector

McMASTER-CARR. OVER 480,000 PRODUCTS

Need help finding a product?
E-mail or call (562) 463-4277.

Fluorescent Light Bulb Safety Shields

Prevent broken glass from falling into your work space. These shields slip over bulbs to contain the glass if a bulb breaks. Each has two end caps with holes so it's easy to connect to the bulb holders. Shields are made of transparent polycarbonate, unless otherwise indicated. *Shield for T5 bulbs* works with miniature bi-pin base bulbs; *shields for T8* and *T12 bulbs* work with medium bi-pin base and single-pin base bulbs, unless otherwise indicated. FDA and USDA compliant, and meet OSHA requirements and NEC standards.

Shields for high-output bulbs and **shields for very-high-output bulbs** work with recessed double-contact bases.

UV filtering shields are made of transparent acrylic. They filter out rays from 0 to 385 nanometers.

			Shields				Replacement End Caps			
					Each				Each	
For Bulb Length	Fits Bulb Trade Number	Available Colors	Pkg. Qty.		Partial Pkg.	Full Pkg.	Pkg. Qty.		Partial Pkg.	Full Pkg.
Shields for T12 (1 1/2" Dia.) Bulbs										
48"	F40T12	Clear	24	1626K31	$3.17	$2.84	48	1626K13	$0.61	$0.48
48"	F40T12	Amber	24	1626K37	5.84	5.25	48	1626K13	.61	.48
48"	F40T12	Green	24	1626K35	5.84	5.25	48	1626K13	.61	.48
48"	F40T12	Red	24	1626K33	5.84	5.25	48	1626K13	.61	.48
48"	F40T12	Yellow Bug Light	24	1626K45	5.84	5.25	48	1626K13	.61	.48
96"	F96T12	Clear	24	1626K32	6.88	6.09	48	1626K13	.61	.48
96"	F96T12	Amber	24	1626K38	10.64	9.57	48	1626K13	.61	.48
96"	F96T12	Green	24	1626K36	10.64	9.57	48	1626K13	.61	.48
96"	F96T12	Red	24	1626K34	10.64	9.57	48	1626K13	.61	.48
96"	F96T12	Yellow Bug Light	24	1626K55	10.64	9.57	48	1626K13	.61	.48
Shields for T12 (1 1/2" Dia.) High-Output Bulbs										
96"	F96T12/HO	Clear	24	1626K84	9.18	8.26	48	1626K13	.61	.48
Shields for T12 (1 1/2" Dia.) Very-High-Output Bulbs										
96"	F96T12/VHO	Clear	24	1626K85	9.17	8.26	48	1626K13	.61	.48
Shields for T8 (1" Dia.) Bulbs										
48"	F32T8	Clear	24	1626K61	2.82	2.53	48	1626K11	.61	.48
48"	F32T8	Amber	24	1626K77	5.36	4.83	48	1626K11	.61	.48
48"	F32T8	Green	24	1626K75	5.36	4.83	48	1626K11	.61	.48
48"	F32T8	Red	24	1626K73	5.36	4.83	48	1626K11	.61	.48
48"	F32T8	Yellow Bug Light	24	1626K65	5.36	4.83	48	1626K11	.61	.48
96"	F96T8	Clear	24	1626K62	6.66	5.76	48	1626K11	.61	.48
Shields for T5 (5/8" Dia.) Bulbs										
48"	F28T5	Clear	24	1626K29	3.60	3.23	48	1626K12	1.06	.84
UV Filtering Shields for T12 (1 1/2" Dia.) Bulbs										
48"	F40T12	Clear	24	1626K81	12.50	11.25	48	1626K13	.61	.48
96"	F96T12	Clear	24	1626K83	23.50	21.14	48	1626K13	.61	.48
UV Filtering Shields for T8 (1" Dia.) Bulbs										
48"	F32T8	Clear	24	1626K71	11.72	10.56	48	1626K11	.61	.48

Replacement Heat Sink Screen for HO and VHO Shields (50/Pkg.) 1626K14 Each $1.04

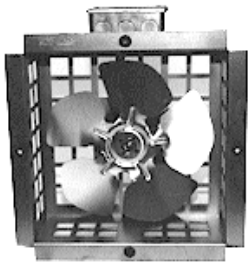
Fluorescent Light Bulb Safety Shields

Prevent broken glass from falling into your work space. These shields slip over bulbs to contain the glass if a bulb breaks.

7.4 Fan

AC, DC FANS AND PARTS

AC fans engineered for maximum air distribution, our fans are totally enclosed, prelubricated, and easy to install. The 12" x 12" x 4-1/4" 16 gauge steel cage houses a low rpm motor with 5 blade fan which is both quiet and dependable. The 12" diameter, welded steel housing moves up to 375 cubic feet of air per minute. Operates on 115V or 220V AC power.



SSF3, TSF1

TSFE1420

Model SSF3	Single speed	380 CFM	115V AC	12" x 12", 4-1/4" High
Model SSF3C	Single speed	380 CFM	115V AC	7/16" diameter holes
Model SSFE	Single speed	325 CFM	220VAC, 50-60 HZ	12" x 12", 4-1/4" High
Model TSF1	Two speed	345-300 CFM	115VAC	12" x 12", 4-1/4" High
Model TSF1C	Two speed	345-300 CFM	115VAC	7/16" diameter holes
Model TSFE	Two speed	325-290 CFM	220VAC, 50-60 HZ	12" x 12", 4-1/4" High
Model SSF3R	Single speed	380 CFM	115VAC	12" diameter, 4-1/2" High
Model TSFE1420	Two speed	375 CFM	115VAC	12" diameter, 4-1/2" High
Model TSFE1424	Two speed	375 CFM	115VAC	12" diameter, 3-1/2" High

REPLACEMENT PARTS

Model 21FN001	Single speed fan motor
Model 21FN002	Two speed fan motor
Model A01FN001	Two speed suction blade
Model A01FN002	Single speed suction blade
Model A01FN003	Single speed push blade

STAND-BY EMERGENCY VENTILATION FOR GLASS ELEVATORS

Ideal for use in glass elevators exposed to direct sunlight. Our fan with emergency power source is designed to exceed the minimum ANSI A17.1-1989 Section 204.2C requirement of one hour.

SSF4DC

PP/SSF4DC

Model SSF4DC
- 12V DC fan
- 300 CFM free air

Model PP/SSF4DC
Replacement Emergency Power Supply

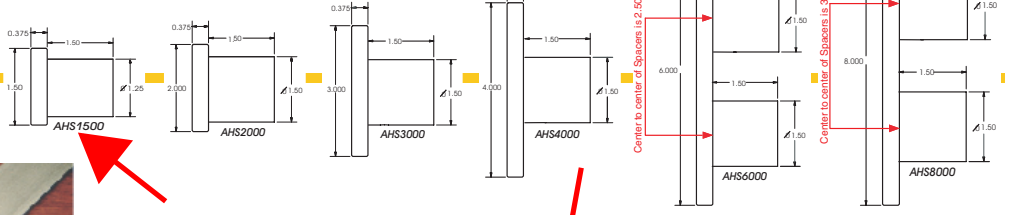
7.5 SS Grab Bar

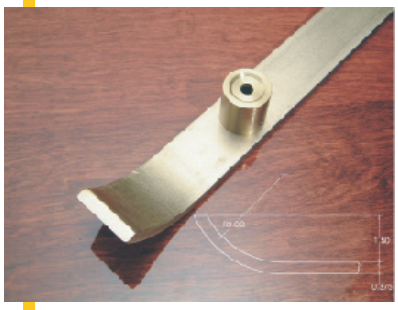
SOLID FLAT BAR HANDRAILS

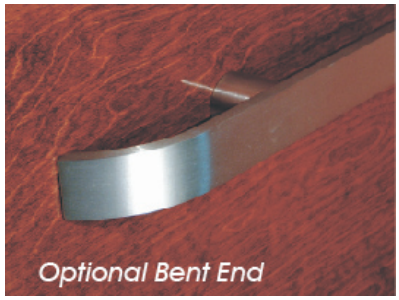
STAINLESS • BRONZE • BRASS

Heavy-duty Design: Rugged Solid Flat Bar handrail can withstand the daily use and abuse of any passenger or freight elevator. This line of handrail takes full advantage of our standard CNC precision-machined components. The result is another durable handrail product line manufactured directly from your measurements and specifications on our easy-to-use worksheets. Our accuracy matches your measurements and your standards.

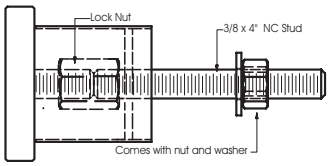
Options & Features



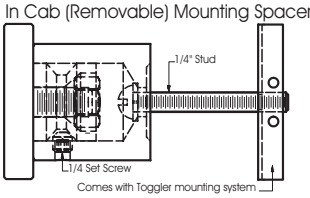


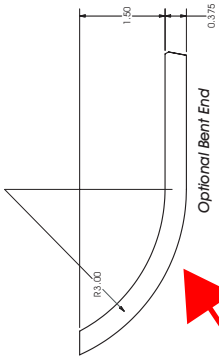


Exterior Cab Mounting Spacer



In Cab (Removable) Mounting Spacer





SOLID FLAT BAR HANDRAIL ORDERING INFORMATION	
1.5" width	
Part #	Description
AHS1500S	Solid flat stainless #4-brushed
AHS1500SP	Solid flat stainless #8-polished
AHS1500YB	Solid flat yellow brass #4-brushed
AHS1500YBP	Solid flat yellow brass #8-polished
AHS1500B	Solid flat bronze #4-brushed
AHS1500BP	Solid flat bronze #8-polished
2" width	
AHS2000S	Solid flat stainless #4-brushed
AHS2000SP	Solid flat stainless #8-polished
AHS2000YB	Solid flat yellow brass #4-brushed
AHS2000YBP	Solid flat yellow brass #8-polished
AHS2000B	Solid flat bronze #4-brushed
AHS2000BP	Solid flat bronze #8-polished
3" width	
AHS3000S	Solid flat stainless #4-brushed
AHS3000SP	Solid flat stainless #8-polished
AHS3000YB	Solid flat yellow brass #4-brushed
AHS3000YBP	Solid flat yellow brass #8-polished
AHS3000B	Solid flat bronze #4-brushed
AHS3000BP	Solid flat bronze #8-polished
4" width / 6" width / 8" width	
AHS4000S / AHS6000S	Solid flat stainless #4-brushed
AHS4000YB / AHS6000YB	Solid flat yellow brass #4-brushed
AHS4000B / AHS6000B	Solid flat bronze #4-brushed
AHS8000S	Solid flat stainless #4-brushed ONLY

7.6 Swivel Guides

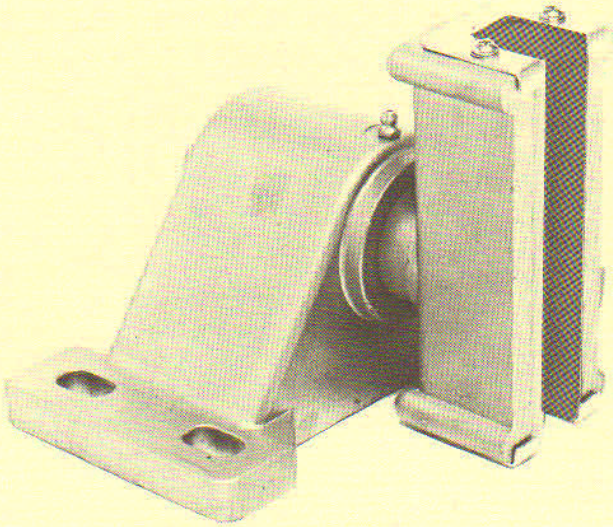
ELEVATOR

PRODUCTS

DESIGN & MANUFACTURING

P. O. BOX 572
GROVER BEACH, CA 93483
(805) 481-3378

Single Swivel Guides

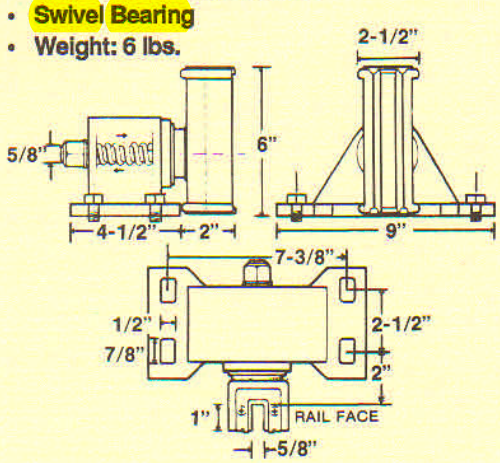


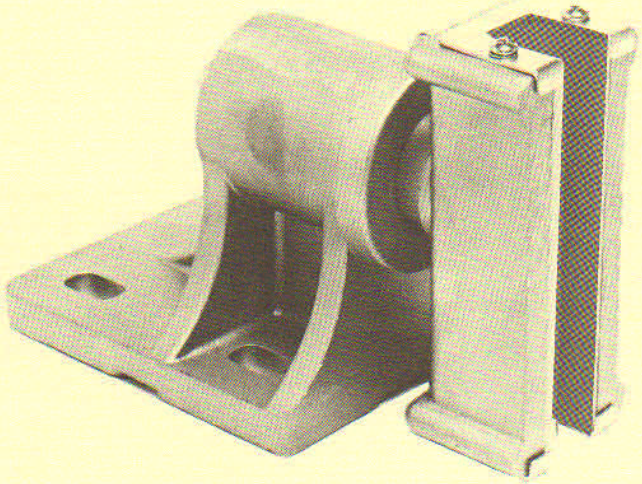
Model No. 815SS (Single Swivel)

Rated capacity is a gross load of 8,000 lbs. per shoe. The spring loaded shoe hugs the rail at all times. The swivel shoe is designed for automatic. alignment. The gibs can be replaced without removing the base from mounting.

Materials

- **Shoe: Energy Efficient Aluminum**
- **Gib: UHMW - Polyethylene**
- **Swivel Bearing**
- **Weight: 6 lbs.**



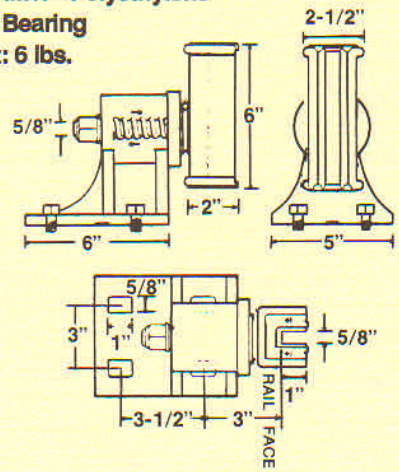


Model No. 816SS (Single Swivel)

Rated capacity is a gross load of 10,000 lbs. per shoe. The spring loaded shoe hugs the rail at all times. The swivel shoe is designed for automatic alignment. The gibs can be replaced without removing the base from mounting.

Materials

- **Shoe: Energy Efficient Aluminum**
- **Gib: UHMW - Polyethylene**
- **Swivel Bearing**
- **Weight: 6 lbs.**



ELPRO

Elevator Products

...designed and manufactured for the industry professional

8.1 Light Moisture Resistant

Vandal-Resistant Wall and Ceiling Lights

A

B

C

An impact- and tamper-resistant exterior protects these lights from vandals. Each light has a clear prismatic polycarbonate lens, has tamperproof screws, and is fully gasketed. You'll need a T15 pin-in-head Torx driver to remove screws (see page 2835). Lights are ideal for heavy traffic, high-abuse areas both indoors and out. They can be mounted over a standard electrical box (mounting hardware not included). Lights operate on 120 VAC (high-pressure sodium lights also operate on 277 VAC) and have hardwire connections. UL and C-UL listed for wet locations. Bulbs are sold separately.

Styles A and *B* have a white steel housing. *Style C* has a bronze-colored aluminum housing.

Bulb Type	O'all Size, Lg. × Wd. × Dp.	Min. Start Temp.	Lights Each		Bulbs No. Req'd	Watts per Bulb	Pkg. Qty.		Per Pkg.
Wall Lights									
A Incandescent	8 1/2" × 5 7/8" × 3 3/4"	—	1669K75	$31.24	1	75	2	1728K98	$7.24
A Fluorescent	8 1/2" × 5 7/8" × 3 3/4"	0° F	1669K47	43.48	1	7	1	1528K91	3.53
A Fluorescent	8 1/2" × 5 7/8" × 3 3/4"	0° F	1669K48	52.94	2	7	1	1528K91	3.53
A Fluorescent	12" × 6" × 3 7/8"	+32° F	1669K51	67.69	2	13	1	1528K93	3.53
Ceiling Lights									
B Incandescent	12 1/8" × 12 1/8" × 4 3/4"	—	1697K74	52.48	2	75	2	1728K98	7.24
B Fluorescent	12 1/8" × 12 1/8" × 4 3/4"	+32° F	1697K69	83.86	2	13	1	1528K93	3.53
Wall/Ceiling Lights									
B Incandescent	8 5/8" × 8 5/8" × 3 3/4"	—	1697K65	48.95	1	75	2	1728K98	7.24
B Fluorescent	8 5/8" × 8 5/8" × 3 3/4"	0° F	1697K71	74.40	2	7	1	1528K91	3.53
C High-Pressure Sodium	9" × 9" × 7 1/8"	–40° F	1687K54	185.29	1	70	1	8293K57	24.94
C High-Pressure Sodium	9" × 9" × 7 1/8"	–40° F	1697K66	216.02	1	100	1	8293K58	26.59
C High-Pressure Sodium	12 3/8" × 12 3/8" × 8 7/8"	–40° F	1687K84	234.29	1	100	1	8293K58	26.59
C High-Pressure Sodium	12 3/8" × 12 3/8" × 8 7/8"	–40° F	1687K86	254.55	1	150	1	8293K59	24.94

Wet-Location Lights

Ceiling Mount

Wall Mount

Stem Mount

Moisture, dirt, and insects are no match for these lights. All are gasketed to resist moisture, have a heat-resistant glass globe, and are suitable for indoor and outdoor use. Lights have hardwire connections, have female threaded hubs for conduit connections (see listing for thread type and size), and operate on 120 VAC. Mounting hardware is not included. *Note:* These lights are not recommended for hazardous locations.

Bulbs are not included, unless otherwise indicated.

Aluminum lights have rugged construction with stainless steel hardware. UL listed for wet locations and C-UL listed.

Ceiling and *wall lights* include a 4" dia. electrical box for mounting.

Aluminum vaportight lights have rugged construction with stainless steel hardware. Minimum start temperature is 0° F. Lights include a plug-in compact fluorescent bulb and a 6" dia. electrical box for mounting. UL listed for wet locations and C-UL listed.

Fiberglass vaportight lights are rated NEMA 4X, so they're made to perform in dusty, wet, and corrosive environments. CSA certified to UL standards for marine luminaries.

Ceiling and *wall lights* have a built-in 4" dia. electrical box for mounting.

Lights

Mount	O'all Size, Dia. × Ht.	Hub Size	Lights Each		Bulbs Max. Watts	Pkg. Qty.		Per Pkg.
Aluminum Lights — *Incandescent*								
Ceiling	4 1/4" × 9 1/8"	1/2" NPT	14915K53	$31.15	100	2	1728K91	$7.18
Ceiling	4 1/4" × 9 1/8"	3/4" NPT	14915K57	35.25	100	2	1728K91	7.18
Ceiling	5 1/4" × 10 7/8"	1/2" NPT	14915K61	47.70	200	1	1728K77	3.09
Ceiling	5 1/4" × 10 7/8"	3/4" NPT	14915K63	40.16	200	1	1728K77	3.09
Wall	7 1/4" × 9 3/4"	1/2" NPT	14915K54	36.07	100	2	1728K91	7.18
Wall	7 1/2" × 11 3/8"	1/2" NPT	14915K66	57.38	200	1	1728K77	3.09
Stem	4 3/8" × 9 3/4"	1/2" NPT	14915K55	35.24	100	2	1728K91	7.18
Stem	5 3/8" × 10 7/8"	1/2" NPT	14915K59	45.90	200	1	1728K77	3.09
Aluminum Vaportight Lights — *Fluorescent*								
Ceiling	6" × 9 3/4"	1/2" NPS	15005K43	167.90	26	1	1528K61	13.55
Wall	7 7/8" × 10 3/8"	1/2" NPS	15005K44	177.10	26	1	1528K61	13.55
Fiberglass Vaportight Lights — *Incandescent*								
Ceiling	4 3/4" × 10 7/8"	3/4" NPT	14835K96	97.25	150	2	1506K54	10.32
Wall	7 1/4" × 12 1/4"	3/4" NPT	14835K94	124.40	150	2	1506K54	10.32
Stem	4 1/2" × 11 1/4"	3/4" NPT	14835K95	90.89	150	2	1506K54	10.32

Replacement Glass Globes

Color	Max. Watts		Each
For 14915K53, K54, K55, K57, and 15005K43, K44			
Clear	100	14915K41	$9.73
Blue	60	14915K42	21.02
Green	60	14915K44	22.05
Red	60	14915K43	24.10
PTFE-Coated Clear	100	14915K39	22.14
For 14915K59, K61, K63, K66			
Clear	200	14915K45	13.17
Blue	75	14915K46	30.29
Green	75	14915K48	29.60
Red	75	14915K47	37.86

Hazardous-Location Incandescent Lights

Ceiling Mount (1576K13)

Wall Mount (1586K87)

Use these lights indoors and out. Each has an aluminum housing, a heat-resistant glass globe, and a 3/4" NPT female conduit hub for hardwire connections. Bulbs are sold separately.

Class I, Div. 1 Hazardous-Location Lights — These lights are a great choice for refining and manufacturing plants, marine loading and fuel transfer terminals, and other wet locations. Housing is rated NEMA 4X for corrosion resistance and has a tan finish. Lights operate on up to 250 VAC. UL listed for Class I, Div. 1 and Div. 2, Groups C and D; Class II, Div. 1 and 2, Groups E, F, and G; and Class III, Div. 1 and 2. CSA certified.

Ceiling light has 5/16" dia. mounting holes; *wall light* has 1/4" dia. mounting holes.

Class I, Div. 2 Hazardous-Location Lights — Suited to illuminate walkways, tunnels, loading docks, exits, and stairwells. Housing has a gray finish. Lights operate on 120 VAC. UL listed for Class I, Div. 2, Groups A, B, C, and D. They're also CSA certified and rated NEMA 4.

Ceiling and *stem lights* use the 3/4" NPT female conduit hub for mounting; *wall light* has 9/32" dia. mounting holes.

Mount	O'all Size, Dia. × Ht.	Lights Each		Bulbs Max. Watts	Pkg. Qty.		Per Pkg.
Class I, Div. 1 Hazardous-Location Lights							
Ceiling	7 1/2" × 14 3/8"	1576K13	$280.98	150	2	1506K54	$10.32
Wall	14 1/2" × 15 7/8"	1576K12	331.65	150	2	1506K54	10.32
Class I, Div. 2 Hazardous-Location Lights							
Ceiling	4 1/4" × 10 1/8"	1586K85	105.40	150	2	1506K54	10.32
Ceiling	5 1/2" × 13 1/8"	1586K45	126.55	300	1	1728K78	3.77
Wall	7" × 12 3/8"	1586K87	128.65	150	2	1506K54	10.32
Stem	4 1/4" × 9 3/4"	1586K84	87.46	150	2	1506K54	10.32

Bulbs for 120 VAC. For 250 VAC (100 max. watts), please order 8358K45 (page 670).

8.2 GFCI Outlet

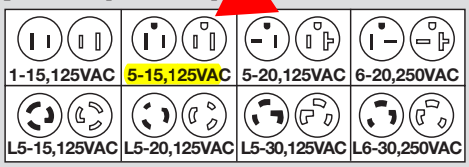
Ground Fault Circuit Interrupters

For information about AWG, see page 784. For information about cord types, see page 792.

About Ground Fault Circuit Interrupters (GFCIs)

Just as circuit breakers and fuses protect equipment, ground fault circuit interrupters (GFCIs) protect people from electrical faults. The most common causes of electrical faults are loose electrical contacts in cords and equipment, moisture, and wire insulation damage. GFCIs act like fast-acting circuit breakers. After they sense small imbalances in the circuit caused by current leakage, they shut off electricity within 25 milliseconds at a ground fault current level between 4 and 6 mA (milliamperes).

The diagrams at right show the NEMA configurations for plugs (represented by solid slots) and receptacles/connectors (represented by hollow slots). NEMA styles that start with an "L" are turn-lock plugs and receptacles.



NEMA Plug and Receptacle Styles

GFCI Receptacles

These high-impact-resistant thermoplastic receptacles provide ground fault protection and reliable performance in industrial environments. They protect all outlets on the same circuit down line from the installed location and can be wired from the back or side. Include test and reset buttons.

All ***box mount*** install in a standard outlet box and are supplied with a wall plate. ***Hospital grade box mount*** meet UL 498 for hospital grade requirements and have a green indicator light.

To Order: Please specify brown, ivory, or white.

DIN rail mount install on 35 mm DIN rail. Color is black.

Box Mount with Wall Plate

DIN Rail Mount

NEMA Style	VAC	Amps		
***Box Mount**—UL listed*				
5-15	125	15	**7160K73**	$14.55
5-20	125	20	**7160K74**	16.36
***Hospital Grade Box Mount**—UL listed*				
5-15	125	15	**7160K75**	22.63
5-20	125	20	**7160K76**	24.28
***DIN Rail Mount**—UL recognized*				
5-15	125	15	**7656T11**	81.80

Outlet to GFCI Outlet Converters

Convert standard three-prong (NEMA 5-15) wall outlets into GFCI protected outlets. A manual reset prevents unexpected start-up. Self-test feature allows simulated ground fault and resetting. Converters are polycarbonate and have three-prong (NEMA 5-15) outlets. UL listed.

With One Outlet

With Five Outlets

	VAC	Amps	Color		
With One Outlet	120	15	White	**6975K63**	$19.48
With One Outlet	120	15	Yellow	**6975K632**	20.33
With Five Outlets	125	15	White	**6975K73**	23.30

GFCI Extension Cords

Note: The 20-amp plugs (5-20, 6-20) are not compatible with 15-amp receptacles (5-15, 6-15). For example, a 5-20 plug will not fit a 5-15 receptacle.

Get GFCI protection when GFCI outlets aren't available. Cords have an inline (unless noted) GFCI with a polycarbonate housing. Manual reset prevents unexpected start-up. Self-test allows simulated ground fault and resetting. All cords are type SJTW and 9″ from the GFCI to the plug. Color is high-visibility yellow. For indoor and outdoor use. UL listed and CSA certified.

NEMA Style	VAC	Amps	AWG	O'all Lg.		
5-15	120	15	12/3	1 ft.	**7348K67**★	$33.63
5-15	120	15	12/3	6 ft.	**7348K68**★	41.11
5-15	120	15	14/3	2 ft.	**7348K48**●	45.95
5-15	120	15	14/3	2 ft.	**7348K49**	41.85
5-15	120	15	14/3	6 ft.	**7348K51**	49.40
5-15	120	15	14/3	25 ft.	**7348K52**	62.81
5-20	120	20	12/3	2 ft.	**7348K53**	52.72
5-20	120	20	12/3	6 ft.	**7348K55**	69.88
5-20	120	20	12/3	25 ft.	**7348K57**	96.84
6-20	240	20	12/3	2 ft.	**7348K54**	79.98
6-20	240	20	12/3	6 ft.	**7348K56**	86.28
6-20	240	20	12/3	25 ft.	**7348K58**	110.13
L5-15	120	15	14/3	2 ft.	**7348K43**	58.56
L5-20	120	20	12/3	2 ft.	**7348K44**	76.15
L5-20	120	20	12/3	6 ft.	**7348K45**	84.31
L5-30	120	30	10/3	2 ft.	**7348K41**	145.53
L5-30	120	30	10/3	6 ft.	**7348K62**	155.42
L5-30	120	30	10/3	25 ft.	**7348K63**	191.87
L6-30	240	30	10/3	3 ft.	**7348K42**	161.19
L6-30	240	30	10/3	6 ft.	**7348K65**	178.33
L6-30	240	30	10/3	25 ft.	**7348K66**	202.45

★ Has GFCI 90° plug instead of inline GFCI. ● Lighted outlet.

Electrical Cord to GFCI Electrical Cord Converters

Hardwire these converters to any (0.30″ to 0.46″) cord to create a GFCI electrical cord. A manual reset prevents unexpected start-up. Housing is high-visibility yellow polycarbonate. 7228K11 has a 90° three-prong (NEMA 5-15) plug and comes with a small tube of silicone sealant to rainproof your cord connection. 7228K12 and 7228K13 are inline GFCI units; simply cut your cord and hardwire both ends. 7228K13 is a dual-voltage model that accepts 120 and 240 VAC.

90° GFCI Plug

Inline GFCI

90° GFCI Plug (120 VAC, 15 amps)	**7228K11**	$34.47
Inline GFCI (120 VAC, 20 amps)	**7228K12**	45.95
Dual-Voltage Inline GFCI (120/240 VAC, 20 amps)	**7228K13**	63.77

Triple Outlet GFCI Extension Cords

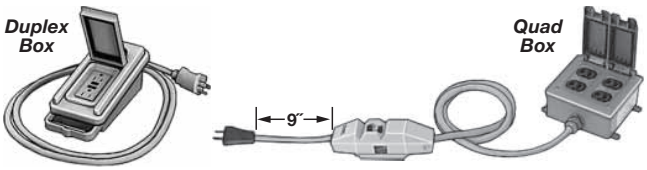
73495K16

A trio of NEMA 5-15 connectors that let you protect up to three pieces of equipment. Manual reset prevents unexpected start-up. All cords are type SJTW with polycarbonate GFCI housing and a 90° plug, unless noted. For indoor and outdoor use. UL listed and CSA certified.

O'all Lg.	NEMA Style	VAC	Amps	AWG		
2 ft.	5-15	120	15	12/3	**73495K11**	$42.96
2 ft.	5-15	120	15	12/3	**73495K16**♥	37.36
2 ft.	5-15	120	15	12/3	**73495K17**●	44.48
6 ft.	5-15	120	15	12/3	**73495K12**	44.80
25 ft.	5-15	120	15	12/3	**73495K13**	59.06
50 ft.	5-15	120	15	12/3	**73495K14**	88.28
99 ft.	5-15	120	15	12/3	**73495K15**	147.16

♥ Has an inline GFCI instead of a 90° GFCI plug. ● Lighted outlet.

Portable GFCI Outlet Boxes



Take GFCI outlets wherever permanent GFCI outlets are unavailable. Boxes include an impact-resistant thermoplastic housing with cover, test and manual reset buttons, and cord with NEMA plug. UL listed.

Duplex boxes have two ground fault protected receptacles. 7683K85 has a type SJTW cord; 7683K86 and K88 have type SJEOW cords.

Quad boxes have four ground fault protected receptacles and type SJTW cords.

Quad boxes with 90° plug allow for more space in tight areas and have type SJTW cords.

NEMA Style	VAC	Amps	AWG	Cord Lg.		
Duplex Boxes						
5-15	120	15	12/3	6 ft.	**7683K85**	$62.62
5-15	120	15	14/3	25 ft.	**7683K86**	75.01
5-15	120	15	14/3	50 ft.	**7683K88**	84.18
Quad Boxes						
5-15	120	15	12/3	6 ft.	**7048K31**	97.80
5-20	120	20	12/3	6 ft.	**7048K32**	147.33
5-20◢	120	20	12/3	6 ft.	**7048K33**	164.78
Quad Boxes with 90° Plug						
5-15	120	15	12/3	2 ft.	**7048K34**	85.33
5-15	120	15	12/3	6 ft.	**7048K35**	90.87

◢ Has two NEMA 5-20 straight-blade outlets, one NEMA L5-20 turn-lock outlet, and one NEMA L5-20 turn-lock plug.

8.3 Light Switch

Light Switches

More durable than residential-grade switches, these specification-grade switches are ideal for incandescent, halogen, fluorescent, and high-intensity discharge lighting. They are also great for AC motor loads up to 80% of the amp rating. They stay switched (maintained) and have screw-terminal connections and a grounding terminal. Can be back- or side-wired and fit standard single-device (single-gang) wall boxes and plates. Wall plates are sold separately on this page (included with high security key actuated switches). UL listed and CSA certified. *3-way switches* are used in pairs to control one electrical device from two locations (one switch per location). *4-way switches* are used with two 3-way switches to control one electrical device from three or more locations.

Key-actuated switches include a key that is removable in the on and off positions. ***High-security key-actuated switches*** use a hard-to-duplicate circular key to provide better security. Key is removable in the on and off positions. ***Switch lockout*** mounts on wall switch to secure either a toggle- or rocker-style switch in an on or off position. When secured with a padlock (not included), the red transparent cover is closed and the switch is inoperable. Max. shackle diameter is 5/16".

To Order: Please specify color where necessary.

Light Switches

No. of Circuits Switched	No. of Terminals	Amp Rating @ 120/277 VAC	Available Colors♣		Each
Toggle					
1 (Single Pole)	2	15	Wh, Iv, Br	7030K32	$11.25
1 (Single Pole)	2	20	Wh, Iv, Br	7030K35	17.77
1 (Single Pole)	2	30	Iv, Br	7030K38	25.92
2 (Double Pole)	4	15	Wh, Iv, Br	7030K33	14.18
2 (Double Pole)	4	20	Wh, Iv, Br	7030K36	21.60
2 (Double Pole)	4	30	Wh, Iv, Br	7030K39	34.28
3-Way	3	15	Wh, Iv, Br	7030K34	16.82
3-Way	3	20	Wh, Iv, Br	7030K37	20.32
3-Way	3	30	Iv, Br	7030K43	34.68
4-Way	4	15	Wh, Iv, Br	7030K41	44.08
4-Way	4	20	Wh, Iv, Br	7030K51	50.93
Illuminated Toggle—*Glow When Off*					
1 (Single Pole)	2	15	Ivory	7030K27	20.28
1 (Single Pole)	2	20	Ivory	7030K29	31.69
3-Way	3	15	Ivory	7030K28	32.03
3-Way	3	20	Ivory	7030K31	36.03
Illuminated Toggle—*Glow When On*					
1 (Single Pole)	2	15♠	Clear	7030K54	$22.35
1 (Single Pole)	2	20♠	Clear	7030K57	30.90
Rocker					
1 (Single Pole)	2	15	Wh, Iv	7030K45	8.18
1 (Single Pole)	2	20	Wh, Iv	7030K52	12.76
3-Way	3	15	Wh, Iv	7030K46	11.11
3-Way	3	20	Wh, Iv	7030K53	16.51
Key Actuated					
1 (Single Pole)	2	15	Gray	7030K64	13.51
1 (Single Pole)	2	20	Gray	7030K67	21.30
2 (Double Pole)	4	20	Gray	7030K68	24.84
3-Way	3	15	Gray	7030K66	19.73
3-Way	3	20	Gray	7030K69	22.49
Replacement Key				7030K99	2.31
High Security Key Actuated					
1 (Single Pole)	3	20	SS	7977T25	59.07
2 (Double Pole)	5	20	SS	7977T35	67.53
Replacement Key				7977T99	3.37

♣ Wh=White, Iv=Ivory, Br=Brown, Cl=Clear, Gr=Gray, SS=Stainless Steel. ♠ Not rated @ 277 VAC.

Switch Lockout

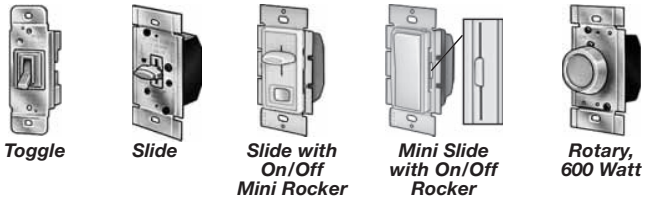
4¾" Lg. × 1¾" Wd. × 1" Dp. — 12135A72 **Each** $7.52

Incandescent Light Dimmers

Save money while setting your lights at the appropriate level. In addition to reducing energy consumption, these rugged dimmers, when dimmed, extend the life of your bulbs by reducing the heat they produce. Dimmers replace standard light switches and fit standard single-device (single-gang) wall boxes and plates. Wall plates are not included (unless noted) and are sold separately on this page. All dimmers have radio frequency interference (RFI) suppression. They come with wire leads (except toggle and illuminated toggle switches, which have screw terminals) and are UL listed and CSA certified (unless noted). *3-way switches* are used in pairs to control one device from multiple locations (one switch per location).

Toggle—Move toggle up and down to dim and brighten—it stays put in any position to maintain a desired lighting level. ***Slide***—Slide to desired lighting level, or slide to "off." ***Slide with On/Off Mini Rocker*** and ***Mini Slide with On/Off Rocker***—Turn lights on and off with a separate rocker so you can immediately return to a desired lighting level. Specification grade. ***Rotary***—All are specification grade. *600-watt models* are push-on and push-off with rotary dimming. *1,000-, 1,500-,* and *2,000-watt models* switch off power when turned all the way to the left.

To Order: Please specify color where necessary.



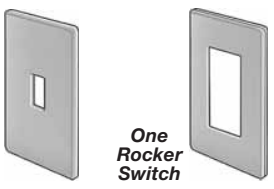
No. of Circuits Switched	No. of Terminals	Watt Rating @ 120 VAC	Available Colors		Each
Toggle					
1 (Single Pole)	2	600	White, Ivory	7233K11	$16.26
1 (Single Pole)	2	1,000	White, Ivory	7233K12	45.61
3-Way	3	600	Ivory	7233K93	20.18
Illuminated Toggle—*Glow When Off*					
1 (Single Pole)	2	600	Ivory	7233K85	20.18
Slide					
1 (Single Pole)	2	600	White, Ivory	7083K15	13.42
1 (Single Pole)	2	1,000	White, Ivory	7083K19	42.00
Slide with On/Off Mini Rocker					
1 (Single Pole)	2	600	White, Ivory	7083K35	21.11
1 (Single Pole)	2	1,000	White, Ivory	7083K36	71.48
Mini Slide with On/Off Rocker					
1 (Single Pole)	2	600	White, Ivory	7233K21	$31.00
1 (Single Pole)	2	1,000	White, Ivory	7233K22	89.20
Rotary					
1 (Single Pole)	2	600	White, Ivory	7083K23	6.38
1 (Single Pole)	2	1,000✓	Ivory	7083K21	209.54
1 (Single Pole)	2	1,000	Brushed Gold	7083K16	35.82
1 (Single Pole)	2	1,500	Brushed Gold	7083K17	64.28
1 (Single Pole)	2	2,000✓	Ivory	7083K24	361.15
1 (Single Pole)	2	2,000	Brushed Gold	7083K18	97.97
3-Way	3	600	White	7083K13	9.45

✓ Not UL listed or CSA certified; watt rating @ 277 VAC.

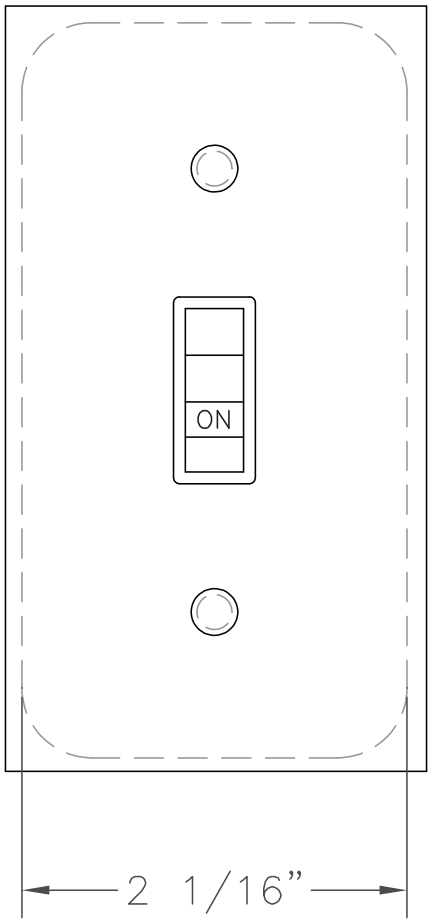
Contemporary Wall Plates

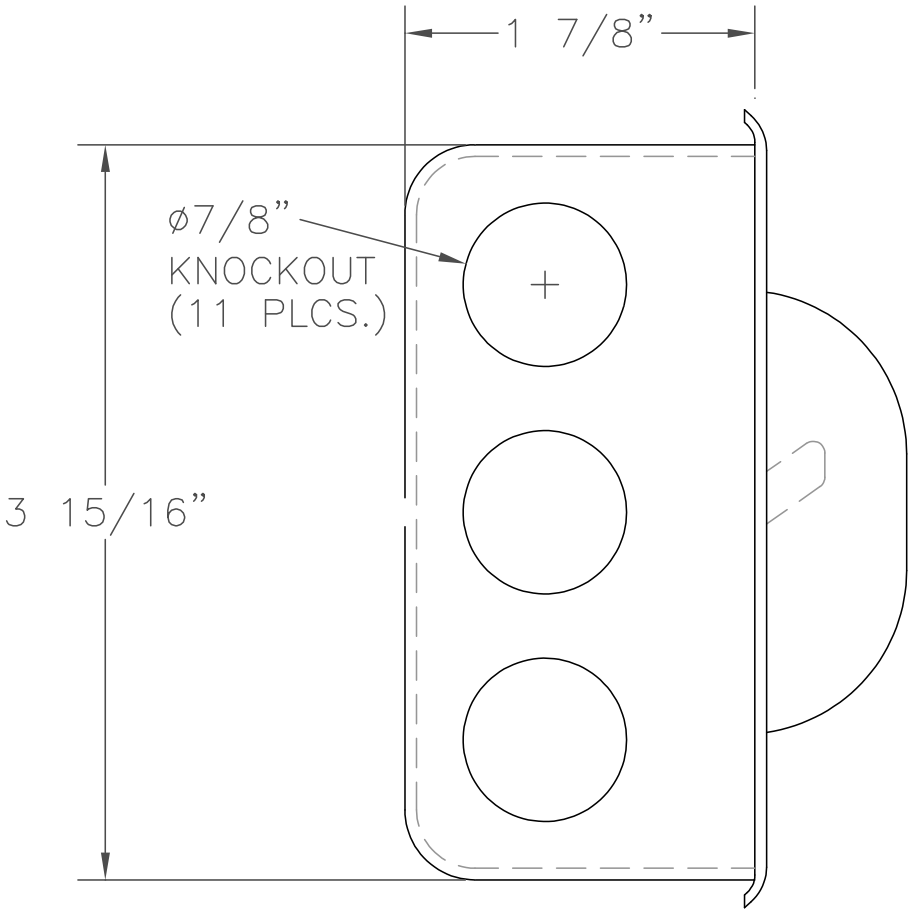
Give your wall switches and dimmers a smooth, attractive appearance. These two-piece wall plates have a snap-on cover that hides screws. Wall plates for rocker switches also fit GFCI receptacles. For additional wall plates see page 816. **To Order:** Please specify color.

For Use With	Ht. × Wd.	Available Colors		Each
One Toggle or Rotary Switch (1 Gang)	4.56" × 2.88"	White, Ivory	6343T13	$4.90
Two Toggle or Rotary Switches (2 Gang)	4.56" × 4.63"	White, Ivory	6343T14	9.80
One Rocker Switch (1 Gang)	4.69" × 2.94"	White, Ivory	6343T11	4.80
Two Rocker Switches (2 Gang)	4.69" × 4.75"	White, Ivory	6343T12	9.61



8.4 Pit Safety Switch





NOTES:

- Run/Stop in 1/2" Permanent Raised Letters
- Cast Aluminum Cover
- CSA Approved (CSA B 44.1/ASME A17.5)

QUALITY ELEVATOR PRODUCTS, INC.
7845 N. Merrimac Ave. Morton Grove, Il 60053
(847) 581-0085, FAX: (847) 581-0095

CUSTOMER:	**SCALE:** 1" = 1"
	DATE: 09-20-99
	DRAWN BY: AF
TITLE: PIT SWITCH, MODEL PS2	**DRAWING NO.** PS2

9.1 Lighting

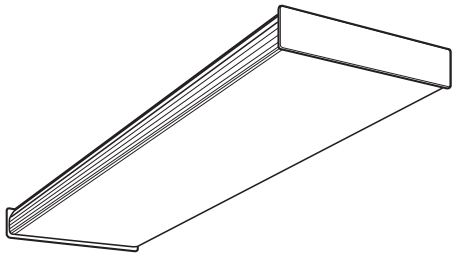
LITHONIA LIGHTING®

Catalog Number	
Notes	Type

FEATURES & SPECIFICATIONS

Square-Basket Wraparound

SB



NARROW BODY
2', 4' or 8' lengths
2 lamps

INTENDED USE

For applications that require the clean appearance of a flat-bottom diffuser. Provides high light levels for storage rooms, offices or retail applications. **Certain airborne contaminants can diminish integrity of acrylic.** **Click here for Acrylic Environmental Compatibility table for suitable uses.**

ATTRIBUTES

Linear side prisms control brightness, pyramidal bottom prisms minimize lamp image. Diffuser hinges open from either side for easy maintenance. Full depth, white enamel end plates.

CONSTRUCTION

Die-formed from code gauge cold-rolled steel. Channel cover snaps into place without the use of tools. Full end cap factory installed to reduce job site labor. Diffuser is extruded clear acrylic.

FINISH

Five-stage iron-phosphate pretreatment ensures superior paint adhesion and rust resistance. Finished with high-gloss, baked white enamel.

ELECTRICAL SYSTEM

Thermally protected, resetting, Class P, HPF, UL listed, CSA Certified ballast is standard. Energy saving and electronic ballasts are sound rated A.

Luminaire is suitable for damp locations. AWM, TFN or THHN wire used throughout, rated for required temperatures.

INSTALLATION

For surface or stem mounting, individual or row installation.

LISTING

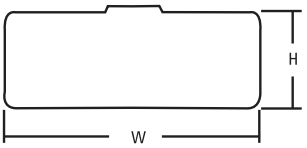
UL Listed (standard). Optional: Canada CSA or cUL. Mexico NOM.

WARRANTY

Guaranteed for one year against mechanical defects in manufacture.

Specifications

Length: 24" (610), 48" (1219) or 96" (2348)
Width: 8-5/16" (212)
Height: 2-7/8" (73)



All dimensions are inches (millimeters). Specifications subject to change without notice.

ORDERING INFORMATION

For shortest lead times, configure product using **standard options (shown in bold).**
Example: SB 2 32 MVOLT GEB10IS

SB 2

Series/No. lamps	Lamp type	Voltage	Options
SB 2 2 lamps, 8-1/3" wide	17 17W T8 (24")	120	Shipped installed in fixture
For tandem double-length unit, add prefix T.	**32 32W T8 (48")**	277	**GEB10IS T8 electronic ballast, ≤10 THD, instant start**
Example: TSB		347	GEB10PS T8 electronic ballast, ≤10% THD, program start
		MVOLT[1]	EL Emergency battery pack (nominal 300 lumens, see Life Safety section)
			EL14 Emergency battery pack (nominal 1200 lumens, see Life Safety section)
			GLR Internal fast-blow fusing[3]
			GMF Internal slow-blow fusing[3]
			RIF1 Radio interference filter (1 per fixture)
			LSC Lens safety clips (2 per fixture)
			RE 120V residential electronic ballast[4]
			CSA Listed and labeled to comply with Canadian standards
			NOM NOM Certified
			SSR Specular silver interior finish (95% reflective)
			BDP Ballast disconnect plug (meets codes that require in-fixture disconnect)
			Accessories (Order as separate catalog number.)
			SQ_ Swivel stem hanger (specify length in 2" increments)
			1B Ceiling spacer (1-1/2" to 2-1/2" from ceiling)
			DSH24 Double stem hanger for 4' fixtures, 24" stems[2]

NOTES:
1 Electronic ballast 120 through 277V only.
2 Only available on 2-lamp 4' SB fixtures.
3 Must specify voltage, 120V or 277V.
4 Must specify voltage, 120V. Energy Star® qualified.

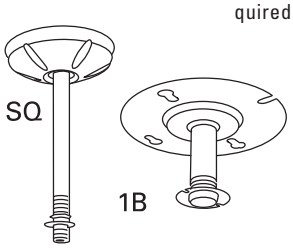
SB Square Basket Wraparound, Narrow Body

MOUNTING DATA

For unit or row installation. Surface or stem mounting.

UNIT INSTALLATION — Minimum of two hangers required.

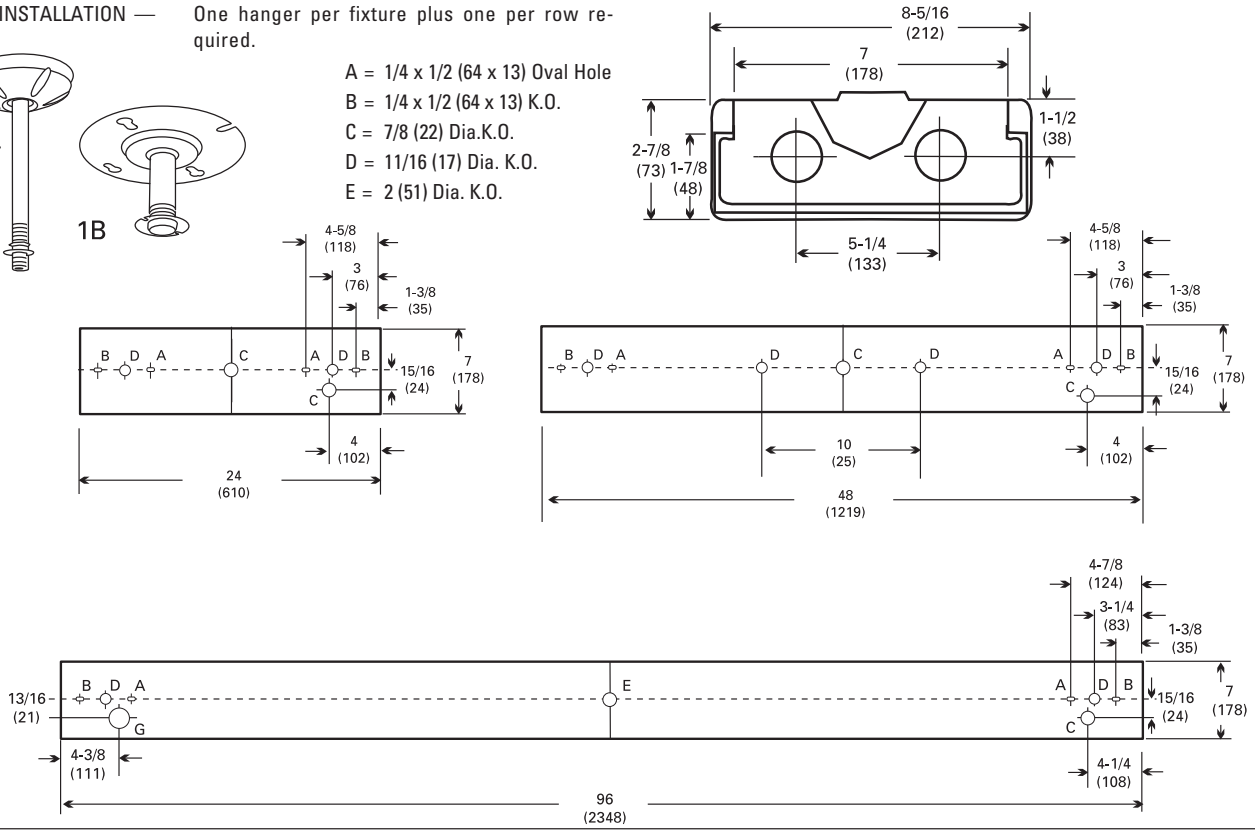
ROW INSTALLATION — One hanger per fixture plus one per row required.



A = 1/4 x 1/2 (64 x 13) Oval Hole
B = 1/4 x 1/2 (64 x 13) K.O.
C = 7/8 (22) Dia.K.O.
D = 11/16 (17) Dia. K.O.
E = 2 (51) Dia. K.O.

DIMENSIONS

All dimensions are inches (millimeters). Specifications subject to change without notice.



PHOTOMETRICS

Calculated using the zonal cavity method in accordance with IESNA LM41 procedure. Floor reflectances are 20%. Lamp configurations shown are typical. All data based on 25°C. Full photometric data on these and other configurations available upon request.

SB 2 32

Report LTL 5048 – Lumens per lamp = 3050

S/MH (along) 1.2 (across) 1.3

Coefficient of Utilization

Ceiling		80%			70%			50%			0%
Wall	70%	50%	30%	70%	50%	30%	50%	30%	10%	0%
0	87	87	87	84	84	84	78	78	78	65
1	80	76	73	77	74	71	69	67	65	55
2	73	67	63	70	65	61	61	57	54	47
3	67	60	54	65	58	53	55	50	47	41
4	62	54	47	59	52	46	49	44	40	35
5	57	48	41	55	46	40	44	39	35	30
6	52	43	37	50	42	36	39	34	30	27
7	48	39	32	47	38	32	36	30	27	23
8	45	35	29	43	34	28	32	27	23	20
9	41	31	25	40	30	25	29	24	20	18
10	38	28	23	37	28	22	26	21	18	15

Zonal Lumens Summary

Zone	Lumens	%Lamp	%Fixture
0-30	1179	19.3	25.7
0-40	1927	31.6	42.0
0-60	3195	52.4	69.7
0-90	3984	65.3	86.9
90-180	601	9.9	13.1
0-180	4586	75.2	100.0

LITHONIA LIGHTING®
An AcuityBrands Company

Sheet #: SB-N

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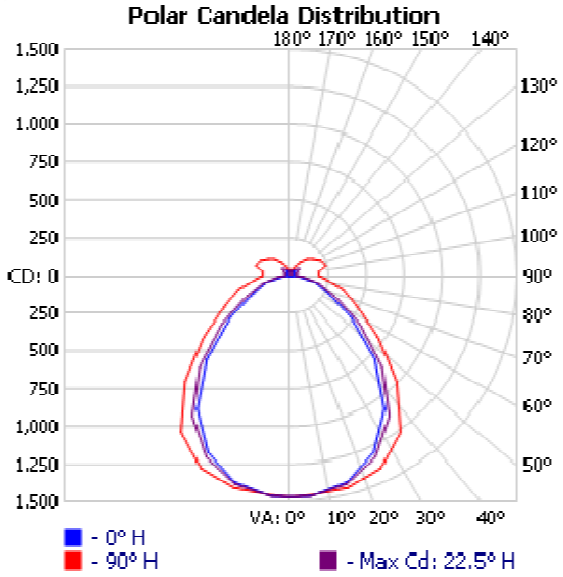
www.lithonia.com

9.2 Photometrics

SB 2 32 MVOLT GEB10IS - INDOOR PHOTOMETRIC REPORT

TEST #:	L5048.IES
CATALOG #:	SB 2 32 MVOLT GEB10IS
LUMINAIRE:	SQUARE BASKET WRAP, 8 3/8" 2LP T8 PRISMATIC ELEC
LAMP CAT #:	32 WATT
LAMP:	TWO 32-WATT T8 LINEAR FLUORESCENT.
LAMP OUTPUT:	2 LAMP(S), RATED LUMENS/LAMP: 3050
BALLASTCAT:	GEB10IS
INPUT WATTAGE:	58
LUMINOUS OPENING:	RECTANGLE (L: 4FT, W: 0.67FT)
TER CATAGORY:	SURFACE MOUNT, LINEAR
TER VALUE:	67
CIE CLASS:	SEMI-DIRECT
MAX CD:	1,471.0 AT HORIZONTAL: 22.5°, VERTICAL: 5°
SPACING CRITERION:	@ 0 = 1.21
	@ 90 = 1.34
EFFICIENCY:	**75%**



AVERAGE LUMINANCE (CD/M2)

	0	22.5	45	67.5	90
0	5904	5904	5904	5904	5904
45	4482	4862	5362	5612	5612
55	3417	3893	4496	4790	4923
65	2575	3013	3592	4296	4590
75	2607	2902	3600	4888	5540
85	2396	3733	5853	8940	10553

COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE: 20%

RCC %:	80				70				50			30			10			0
RW %:	70	50	30	0	70	50	30	0	50	30	20	50	30	20	50	30	20	0
RCR: 0	.87	.87	.87	.87	.84	.84	.84	.65	.78	.78	.78	.72	.72	.72	.67	.67	.67	.65
1	.79	.76	.72	.70	.76	.73	.70	.55	.68	.66	.64	.63	.62	.60	.59	.58	.56	.54
2	.72	.66	.61	.57	.69	.64	.59	.47	.60	.56	.53	.56	.53	.50	.52	.50	.48	.46
3	.66	.58	.53	.48	.63	.57	.51	.40	.53	.48	.45	.50	.46	.43	.47	.43	.41	.39
4	.61	.52	.46	.41	.58	.50	.45	.35	.47	.42	.38	.44	.40	.37	.42	.38	.35	.33
5	.56	.47	.40	.35	.54	.45	.39	.30	.43	.37	.33	.40	.36	.32	.38	.34	.31	.29
6	.52	.42	.36	.31	.50	.41	.35	.27	.39	.33	.29	.36	.32	.28	.34	.30	.27	.26
7	.48	.38	.32	.27	.46	.37	.31	.24	.35	.30	.26	.33	.29	.25	.31	.27	.24	.23
8	.45	.35	.29	.24	.43	.34	.28	.22	.32	.27	.23	.30	.26	.23	.29	.25	.22	.20
9	.42	.32	.26	.22	.40	.31	.26	.20	.30	.25	.21	.28	.24	.21	.27	.23	.20	.18
10	.39	.30	.24	.20	.38	.29	.23	.18	.27	.23	.19	.26	.22	.19	.25	.21	.18	.17

ZONAL LUMEN SUMMARY

ZONE	LUMENS	% LAMP	% LUMINAIRE
0-30	1,178.9	19.3%	25.8%
0-40	1,927.1	31.6%	42.1%
0-60	3,194.6	52.4%	69.8%
60-90	778.6	12.8%	17%
70-100	503.3	8.3%	11%
90-120	349.1	5.7%	7.6%
0-90	3,973.1	65.1%	86.9%
90-180	601.1	9.9%	13.1%
0-180	4,574.3	75%	100%

LUMENS PER ZONE

ZONE	LUMENS	% TOTAL	ZONE	LUMENS	% TOTAL
0-10	140.0	3.1%	90-100	102.9	2.3%
10-20	408.1	8.9%	100-110	120.2	2.6%
20-30	630.8	13.8%	110-120	125.9	2.8%
30-40	748.2	16.4%	120-130	103.8	2.3%
40-50	711.8	15.6%	130-140	74.6	1.6%
50-60	555.7	12.1%	140-150	40.2	0.9%
60-70	378.2	8.3%	150-160	21.6	0.5%
70-80	263.5	5.8%	160-170	9.6	0.2%
80-90	136.8	3.0%	170-180	2.1	0%

CANDELA TABLE - TYPE C

	0	22.5	45	67.5	90
0	1470	1470	1470	1470	1470
5	1469	1471	1465	1465	1461
15	1419	1428	1438	1456	1454
25	1297	1329	1368	1401	1410
35	1082	1134	1200	1256	1266
45	789	856	944	988	988
55	488	556	642	684	703
65	271	317	378	452	483
75	168	187	232	315	357
85	52	81	127	194	229
90	0	37	93	156	188
95	0	36	90	158	185
105	9	37	97	196	240
115	22	47	135	204	221
125	31	69	120	168	181
135	31	55	104	138	146
145	31	43	61	88	97
155	25	39	47	59	59
165	22	28	37	39	41
175	22	22	22	22	23
180	24	24	24	24	0

Reported data calculated from manufacturer's data file, based on IESNA recommended methods.
Report generated on 3/28/2011, using the 'Indoor' template.

9.3 Bulb Safety Shields

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Fluorescent Light Bulb Safety Shields

Prevent broken glass from falling into your work space. These shields slip over bulbs to contain the glass if a bulb breaks. Each has two end caps with holes so it's easy to connect to the bulb holders. Shields are made of transparent polycarbonate, unless otherwise indicated. *Shield for T5 bulbs* works with miniature bi-pin base bulbs; *shields for T8* and *T12 bulbs* work with medium bi-pin base and single-pin base bulbs, unless otherwise indicated. FDA and USDA compliant, and meet OSHA requirements and NEC standards.

Shields for high-output bulbs and **shields for very-high-output bulbs** work with recessed double-contact bases.

UV filtering shields are made of transparent acrylic. They filter out rays from 0 to 385 nanometers.

			Shields				Replacement End Caps			
					Each				Each	
For Bulb Length	Fits Bulb Trade Number	Available Colors	Pkg. Qty.		Partial Pkg.	Full Pkg.	Pkg. Qty.		Partial Pkg.	Full Pkg.
Shields for T12 (1 1/2" Dia.) Bulbs										
48"	F40T12	Clear	24	1626K31	$3.17	$2.84	48	1626K13	$0.61	$0.48
48"	F40T12	Amber	24	1626K37	5.84	5.25	48	1626K13	.61	.48
48"	F40T12	Green	24	1626K35	5.84	5.25	48	1626K13	.61	.48
48"	F40T12	Red	24	1626K33	5.84	5.25	48	1626K13	.61	.48
48"	F40T12	Yellow Bug Light	24	1626K45	5.84	5.25	48	1626K13	.61	.48
96"	F96T12	Clear	24	1626K32	6.88	6.09	48	1626K13	.61	.48
96"	F96T12	Amber	24	1626K38	10.64	9.57	48	1626K13	.61	.48
96"	F96T12	Green	24	1626K36	10.64	9.57	48	1626K13	.61	.48
96"	F96T12	Red	24	1626K34	10.64	9.57	48	1626K13	.61	.48
96"	F96T12	Yellow Bug Light	24	1626K55	10.64	9.57	48	1626K13	.61	.48
Shields for T12 (1 1/2" Dia.) High-Output Bulbs										
96"	F96T12/HO	Clear	24	1626K84	9.18	8.26	48	1626K13	.61	.48
Shields for T12 (1 1/2" Dia.) Very-High-Output Bulbs										
96"	F96T12/VHO	Clear	24	1626K85	9.17	8.26	48	1626K13	.61	.48
Shields for T8 (1" Dia.) Bulbs										
48"	F32T8	Clear	24	1626K61	2.82	2.53	48	1626K11	.61	.48
48"	F32T8	Amber	24	1626K77	5.36	4.83	48	1626K11	.61	.48
48"	F32T8	Green	24	1626K75	5.36	4.83	48	1626K11	.61	.48
48"	F32T8	Red	24	1626K73	5.36	4.83	48	1626K11	.61	.48
48"	F32T8	Yellow Bug Light	24	1626K65	5.36	4.83	48	1626K11	.61	.48
96"	F96T8	Clear	24	1626K62	6.66	5.76	48	1626K11	.61	.48
Shields for T5 (5/8" Dia.) Bulbs										
48"	F28T5	Clear	24	1626K29	3.60	3.23	48	1626K12	1.06	.84
UV Filtering Shields for T12 (1 1/2" Dia.) Bulbs										
48"	F40T12	Clear	24	1626K81	12.50	11.25	48	1626K13	.61	.48
96"	F96T12	Clear	24	1626K83	23.50	21.14	48	1626K13	.61	.48
UV Filtering Shields for T8 (1" Dia.) Bulbs										
48"	F32T8	Clear	24	1626K71	11.72	10.56	48	1626K11	.61	.48

Replacement Heat Sink Screen for HO and VHO Shields (50/Pkg.) 1626K14 Each $1.04

Fluorescent Light Bulb Safety Shields

Prevent broken glass from falling into your work space. These shields slip over bulbs to contain the glass if a bulb breaks.

9.4 GFCI Outlet

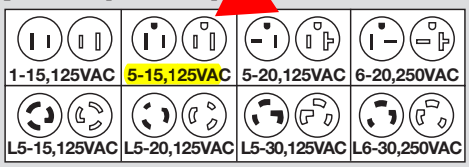
Ground Fault Circuit Interrupters

For information about AWG, see page 784. For information about cord types, see page 792.

About Ground Fault Circuit Interrupters (GFCIs)

Just as circuit breakers and fuses protect equipment, ground fault circuit interrupters (GFCIs) protect people from electrical faults. The most common causes of electrical faults are loose electrical contacts in cords and equipment, moisture, and wire insulation damage. GFCIs act like fast-acting circuit breakers. After they sense small imbalances in the circuit caused by current leakage, they shut off electricity within 25 milliseconds at a ground fault current level between 4 and 6 mA (milliamperes).

The diagrams at right show the NEMA configurations for plugs (represented by solid slots) and receptacles/connectors (represented by hollow slots). NEMA styles that start with an "L" are turn-lock plugs and receptacles.



NEMA Plug and Receptacle Styles

GFCI Receptacles

These high-impact-resistant thermoplastic receptacles provide ground fault protection and reliable performance in industrial environments. They protect all outlets on the same circuit down line from the installed location and can be wired from the back or side. Include test and reset buttons.

All ***box mount*** install in a standard outlet box and are supplied with a wall plate. ***Hospital grade box mount*** meet UL 498 for hospital grade requirements and have a green indicator light.

To Order: Please specify brown, ivory, or white.

DIN rail mount install on 35 mm DIN rail. Color is black.

Box Mount with Wall Plate

DIN Rail Mount

NEMA Style	VAC	Amps		
***Box Mount**—UL listed*				
5-15	125	15	**7160K73**	$14.55
5-20	125	20	**7160K74**	16.36
***Hospital Grade Box Mount**—UL listed*				
5-15	125	15	**7160K75**	22.63
5-20	125	20	**7160K76**	24.28
***DIN Rail Mount**—UL recognized*				
5-15	125	15	**7656T11**	81.80

Outlet to GFCI Outlet Converters

Convert standard three-prong (NEMA 5-15) wall outlets into GFCI protected outlets. A manual reset prevents unexpected start-up. Self-test feature allows simulated ground fault and resetting. Converters are polycarbonate and have three-prong (NEMA 5-15) outlets. UL listed.

With One Outlet

With Five Outlets

	VAC	Amps	Color		
With One Outlet	120	15	White	**6975K63**	$19.48
With One Outlet	120	15	Yellow	**6975K632**	20.33
With Five Outlets	125	15	White	**6975K73**	23.30

GFCI Extension Cords

Note: The 20-amp plugs (5-20, 6-20) are not compatible with 15-amp receptacles (5-15, 6-15). For example, a 5-20 plug will not fit a 5-15 receptacle.

Get GFCI protection when GFCI outlets aren't available. Cords have an inline (unless noted) GFCI with a polycarbonate housing. Manual reset prevents unexpected start-up. Self-test allows simulated ground fault and resetting. All cords are type SJTW and 9″ from the GFCI to the plug. Color is high-visibility yellow. For indoor and outdoor use. UL listed and CSA certified.

NEMA Style	VAC	Amps	AWG	O'all Lg.		
5-15	120	15	12/3	1 ft.	**7348K67**★	$33.63
5-15	120	15	12/3	6 ft.	**7348K68**★	41.11
5-15	120	15	14/3	2 ft.	**7348K48**●	45.95
5-15	120	15	14/3	2 ft.	**7348K49**	41.85
5-15	120	15	14/3	6 ft.	**7348K51**	49.40
5-15	120	15	14/3	25 ft.	**7348K52**	62.81
5-20	120	20	12/3	2 ft.	**7348K53**	52.72
5-20	120	20	12/3	6 ft.	**7348K55**	69.88
5-20	120	20	12/3	25 ft.	**7348K57**	96.84
6-20	240	20	12/3	2 ft.	**7348K54**	79.98
6-20	240	20	12/3	6 ft.	**7348K56**	86.28
6-20	240	20	12/3	25 ft.	**7348K58**	110.13
L5-15	120	15	14/3	2 ft.	**7348K43**	58.56
L5-20	120	20	12/3	2 ft.	**7348K44**	76.15
L5-20	120	20	12/3	6 ft.	**7348K45**	84.31
L5-30	120	30	10/3	2 ft.	**7348K41**	145.53
L5-30	120	30	10/3	6 ft.	**7348K62**	155.42
L5-30	120	30	10/3	25 ft.	**7348K63**	191.87
L6-30	240	30	10/3	3 ft.	**7348K42**	161.19
L6-30	240	30	10/3	6 ft.	**7348K65**	178.33
L6-30	240	30	10/3	25 ft.	**7348K66**	202.45

★ Has GFCI 90° plug instead of inline GFCI. ● Lighted outlet.

Electrical Cord to GFCI Electrical Cord Converters

Hardwire these converters to any (0.30″ to 0.46″) cord to create a GFCI electrical cord. A manual reset prevents unexpected start-up. Housing is high-visibility yellow polycarbonate. 7228K11 has a 90° three-prong (NEMA 5-15) plug and comes with a small tube of silicone sealant to rainproof your cord connection. 7228K12 and 7228K13 are inline GFCI units; simply cut your cord and hardwire both ends. 7228K13 is a dual-voltage model that accepts 120 and 240 VAC.

90° GFCI Plug

Inline GFCI

90° GFCI Plug (120 VAC, 15 amps)	**7228K11**	$34.47
Inline GFCI (120 VAC, 20 amps)	**7228K12**	45.95
Dual-Voltage Inline GFCI (120/240 VAC, 20 amps)	**7228K13**	63.77

Triple Outlet GFCI Extension Cords

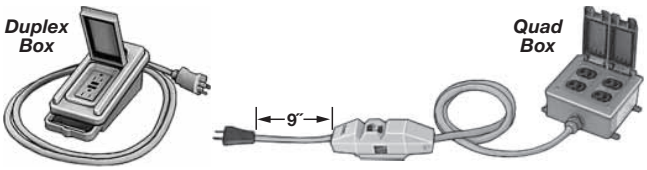
73495K16

A trio of NEMA 5-15 connectors that let you protect up to three pieces of equipment. Manual reset prevents unexpected start-up. All cords are type SJTW with polycarbonate GFCI housing and a 90° plug, unless noted. For indoor and outdoor use. UL listed and CSA certified.

O'all Lg.	NEMA Style	VAC	Amps	AWG		
2 ft.	5-15	120	15	12/3	**73495K11**	$42.96
2 ft.	5-15	120	15	12/3	**73495K16**♥	37.36
2 ft.	5-15	120	15	12/3	**73495K17**●	44.48
6 ft.	5-15	120	15	12/3	**73495K12**	44.80
25 ft.	5-15	120	15	12/3	**73495K13**	59.06
50 ft.	5-15	120	15	12/3	**73495K14**	88.28
99 ft.	5-15	120	15	12/3	**73495K15**	147.16

♥ Has an inline GFCI instead of a 90° GFCI plug. ● Lighted outlet.

Portable GFCI Outlet Boxes



Take GFCI outlets wherever permanent GFCI outlets are unavailable. Boxes include an impact-resistant thermoplastic housing with cover, test and manual reset buttons, and cord with NEMA plug. UL listed.

Duplex boxes have two ground fault protected receptacles. 7683K85 has a type SJTW cord; 7683K86 and K88 have type SJEOW cords.

Quad boxes have four ground fault protected receptacles and type SJTW cords.

Quad boxes with 90° plug allow for more space in tight areas and have type SJTW cords.

NEMA Style	VAC	Amps	AWG	Cord Lg.		
Duplex Boxes						
5-15	120	15	12/3	6 ft.	**7683K85**	$62.62
5-15	120	15	14/3	25 ft.	**7683K86**	75.01
5-15	120	15	14/3	50 ft.	**7683K88**	84.18
Quad Boxes						
5-15	120	15	12/3	6 ft.	**7048K31**	97.80
5-20	120	20	12/3	6 ft.	**7048K32**	147.33
5-20◢	120	20	12/3	6 ft.	**7048K33**	164.78
Quad Boxes with 90° Plug						
5-15	120	15	12/3	2 ft.	**7048K34**	85.33
5-15	120	15	12/3	6 ft.	**7048K35**	90.87

◢ Has two NEMA 5-20 straight-blade outlets, one NEMA L5-20 turn-lock outlet, and one NEMA L5-20 turn-lock plug.

9.5 Light Switch

Light Switches

More durable than residential-grade switches, these specification-grade switches are ideal for incandescent, halogen, fluorescent, and high-intensity discharge lighting. They are also great for AC motor loads up to 80% of the amp rating. They stay switched (maintained) and have screw-terminal connections and a grounding terminal. Can be back- or side-wired and fit standard single-device (single-gang) wall boxes and plates. Wall plates are sold separately on this page (included with high security key actuated switches). UL listed and CSA certified. *3-way switches* are used in pairs to control one electrical device from two locations (one switch per location). *4-way switches* are used with two 3-way switches to control one electrical device from three or more locations.

Key-actuated switches include a key that is removable in the on and off positions. ***High-security key-actuated switches*** use a hard-to-duplicate circular key to provide better security. Key is removable in the on and off positions. ***Switch lockout*** mounts on wall switch to secure either a toggle- or rocker-style switch in an on or off position. When secured with a padlock (not included), the red transparent cover is closed and the switch is inoperable. Max. shackle diameter is 5/16".

To Order: Please specify color where necessary.

Light Switches

No. of Circuits Switched	No. of Terminals	Amp Rating @ 120/277 VAC	Available Colors♣		Each
Toggle					
1 (Single Pole)	2	15	Wh, Iv, Br	7030K32	$11.25
1 (Single Pole)	2	20	Wh, Iv, Br	7030K35	17.77
1 (Single Pole)	2	30	Iv, Br	7030K38	25.92
2 (Double Pole)	4	15	Wh, Iv, Br	7030K33	14.18
2 (Double Pole)	4	20	Wh, Iv, Br	7030K36	21.60
2 (Double Pole)	4	30	Wh, Iv, Br	7030K39	34.28
3-Way	3	15	Wh, Iv, Br	7030K34	16.82
3-Way	3	20	Wh, Iv, Br	7030K37	20.32
3-Way	3	30	Iv, Br	7030K43	34.68
4-Way	4	15	Wh, Iv, Br	7030K41	44.08
4-Way	4	20	Wh, Iv, Br	7030K51	50.93
Illuminated Toggle—*Glow When Off*					
1 (Single Pole)	2	15	Ivory	7030K27	20.28
1 (Single Pole)	2	20	Ivory	7030K29	31.69
3-Way	3	15	Ivory	7030K28	32.03
3-Way	3	20	Ivory	7030K31	36.03
Illuminated Toggle—*Glow When On*					
1 (Single Pole)	2	15♠	Clear	7030K54	$22.35
1 (Single Pole)	2	20♠	Clear	7030K57	30.90
Rocker					
1 (Single Pole)	2	15	Wh, Iv	7030K45	8.18
1 (Single Pole)	2	20	Wh, Iv	7030K52	12.76
3-Way	3	15	Wh, Iv	7030K46	11.11
3-Way	3	20	Wh, Iv	7030K53	16.51
Key Actuated					
1 (Single Pole)	2	15	Gray	7030K64	13.51
1 (Single Pole)	2	20	Gray	7030K67	21.30
2 (Double Pole)	4	20	Gray	7030K68	24.84
3-Way	3	15	Gray	7030K66	19.73
3-Way	3	20	Gray	7030K69	22.49
Replacement Key				7030K99	2.31
High Security Key Actuated					
1 (Single Pole)	3	20	SS	7977T25	59.07
2 (Double Pole)	5	20	SS	7977T35	67.53
Replacement Key				7977T99	3.37

♣ Wh=White, Iv=Ivory, Br=Brown, Cl=Clear, Gr=Gray, SS=Stainless Steel. ♠ Not rated @ 277 VAC.

Switch Lockout

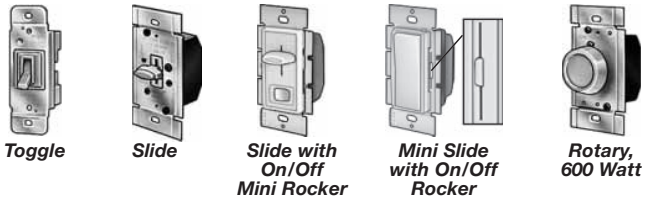
4¾" Lg. × 1¾" Wd. × 1" Dp. — 12135A72 **Each** $7.52

Incandescent Light Dimmers

Save money while setting your lights at the appropriate level. In addition to reducing energy consumption, these rugged dimmers, when dimmed, extend the life of your bulbs by reducing the heat they produce. Dimmers replace standard light switches and fit standard single-device (single-gang) wall boxes and plates. Wall plates are not included (unless noted) and are sold separately on this page. All dimmers have radio frequency interference (RFI) suppression. They come with wire leads (except toggle and illuminated toggle switches, which have screw terminals) and are UL listed and CSA certified (unless noted). *3-way switches* are used in pairs to control one device from multiple locations (one switch per location).

Toggle—Move toggle up and down to dim and brighten—it stays put in any position to maintain a desired lighting level. ***Slide***—Slide to desired lighting level, or slide to "off." ***Slide with On/Off Mini Rocker*** and ***Mini Slide with On/Off Rocker***—Turn lights on and off with a separate rocker so you can immediately return to a desired lighting level. Specification grade. ***Rotary***—All are specification grade. *600-watt models* are push-on and push-off with rotary dimming. *1,000-, 1,500-,* and *2,000-watt models* switch off power when turned all the way to the left.

To Order: Please specify color where necessary.



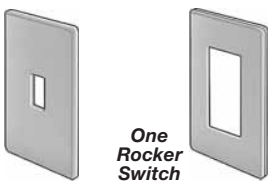
No. of Circuits Switched	No. of Terminals	Watt Rating @ 120 VAC	Available Colors		Each
Toggle					
1 (Single Pole)	2	600	White, Ivory	7233K11	$16.26
1 (Single Pole)	2	1,000	White, Ivory	7233K12	45.61
3-Way	3	600	Ivory	7233K93	20.18
Illuminated Toggle—*Glow When Off*					
1 (Single Pole)	2	600	Ivory	7233K85	20.18
Slide					
1 (Single Pole)	2	600	White, Ivory	7083K15	13.42
1 (Single Pole)	2	1,000	White, Ivory	7083K19	42.00
Slide with On/Off Mini Rocker					
1 (Single Pole)	2	600	White, Ivory	7083K35	21.11
1 (Single Pole)	2	1,000	White, Ivory	7083K36	71.48
Mini Slide with On/Off Rocker					
1 (Single Pole)	2	600	White, Ivory	7233K21	$31.00
1 (Single Pole)	2	1,000	White, Ivory	7233K22	89.20
Rotary					
1 (Single Pole)	2	600	White, Ivory	7083K23	6.38
1 (Single Pole)	2	1,000✓	Ivory	7083K21	209.54
1 (Single Pole)	2	1,000	Brushed Gold	7083K16	35.82
1 (Single Pole)	2	1,500	Brushed Gold	7083K17	64.28
1 (Single Pole)	2	2,000✓	Ivory	7083K24	361.15
1 (Single Pole)	2	2,000	Brushed Gold	7083K18	97.97
3-Way	3	600	White	7083K13	9.45

✓ Not UL listed or CSA certified; watt rating @ 277 VAC.

Contemporary Wall Plates

Give your wall switches and dimmers a smooth, attractive appearance. These two-piece wall plates have a snap-on cover that hides screws. Wall plates for rocker switches also fit GFCI receptacles. For additional wall plates see page 816. **To Order:** Please specify color.

For Use With	Ht. × Wd.	Available Colors		Each
One Toggle or Rotary Switch (1 Gang)	4.56" × 2.88"	White, Ivory	6343T13	$4.90
Two Toggle or Rotary Switches (2 Gang)	4.56" × 4.63"	White, Ivory	6343T14	9.80
One Rocker Switch (1 Gang)	4.69" × 2.94"	White, Ivory	6343T11	4.80
Two Rocker Switches (2 Gang)	4.69" × 4.75"	White, Ivory	6343T12	9.61



10.1 Fire Rated Steel Doors

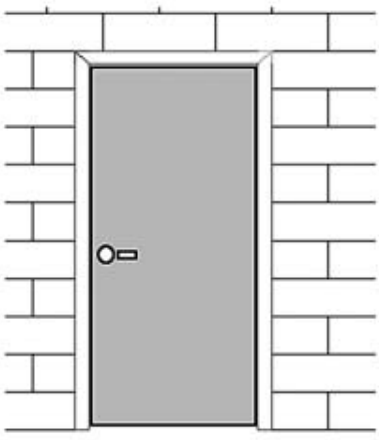
SINGLE DOORS WITH SINGLE POINT LOCKS AND LATCHES

Maximum Rating	Door Series	Maximum Door Size		
		UL	ITS/WHI	FM
3 Hr Max	L18, L16	4'0" x 10'0"	4'0" x 8'0"	4'0" x 8'0"
	L14	4'0" x 10'0"	4'0" x 7'2"	4'0" x 8'0"
	B18, B16	4'0" x 10'0"	N/A	N/A
	T18, T16, T14	4'0" x 9'0"	N/A	4'0" x 8'0"
	T20	3'0" X 8′0"	N/A	N/A
	SL18	4'0" x 8'0"	4'0" x 8'0"	N/A
	B14	4'0" x 8'0"	N/A	N/A
	TH16, TH14	4'0" x 8'0"	N/A	N/A
	H16, H14	4'0" x 8'0"	N/A	N/A
	HE16 (E6)	3'0" x 8'0"	N/A	N/A
	CE18, CE16 (E6)	3'0" x 8'0"	N/A	N/A
	L-20	3'0" x 7'2"	3'0" x 7'2"	N/A
	SL-20	3'0" x 7'2"	3'0" x 7'2"	N/A
	CE18* (E6)	3'8" x 7'0"	N/A	N/A
	HE16 (E6)	3'0" x 7'0"	N/A	N/A
	CE20 (E6)	3'0" x 7'0"	N/A	N/A
	CE18, CE16 (E6)	3'0" x 7'0"	N/A	N/A
1-1/2 Hr (90 min) Max	L18, L16	4'0" x 10'0"	4'0" x 9'0"	4'0" x 8'0"
	B14	4'0" x 10'0"	N/A	N/A
	L20	3'0" x 8'0"	3'0" x 8'0"	N/A
	SL20	3'0" x 8'0"	3'0" x 8'0"	N/A
	CE20 (E6)	3'0" x 8'0"	N/A	N/A
3/4 Hr (45 min) Max	A16 (FG2, FG3)	4'0" x 8'0"	N/A	N/A
20 Min without Hose Stream	A16 (FG)	4'0" x 8'0"	N/A	N/A

NOTES:

1. For maximum rating and glass size requirements refer to glass light information

* 2. **Embossed 6 panel CE18** series door design is available and listed up to and including 3′ 8″ X 7′ 0″ door size. All other CE series doors designs are available as noted above.

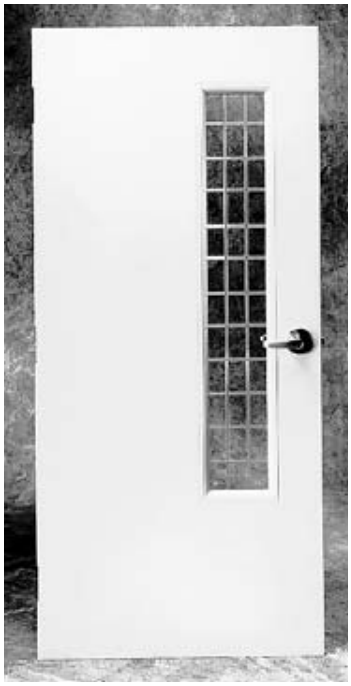


Minimum Hardware Requirements:

- Single point lock/latch

  Example: 161, 61L, 160, 160-4, 86, 86ED, 86 w/sectional trim
- Closer
- Approved hinges

Details are subject to change without prior notice.



ABOUT THE PRODUCT:

The L20, L18 and L16 Series Flush Doors are designed to meet the architectural requirements for full flush doors. The L14 Series Flush Doors are designed to meet the architectural requirements for maximum duty full flush doors. Refer to Section 11 (Architectural) for specifications and the selection and usage guide of the appropriate door constructions.

This premium door construction combines the strength and dimensional stability of steel with the structural integrity of the laminate core. The continuous bonding of core to steel face sheets provides an attractive, flat door, free of face welding marks. Tests have proven that the L Series Door has high resistance to impact damage, low thermal conductivity and high STC ratings.

To meet application, specification and performance requirements, the L Series Door offers a wide range of specifiable options including sizes, glass light designs and hardware (mechanical, pneumatic, electrical) preparations.

L-Series Doors are 1-3/4″ (45mm) thick.

INSTALLATION:

1. Installation shall conform to the published Steelcraft installation instructions, ANSI A250.11-2001 (formerly SDI 105) *Recommended Erection Instructions for Steel Frames and HMMA 840s*.

2. Fire Rated Assemblies must be in accordance with NFPA Pamphlet 80. The *Authority Having* Jurisdiction is the final authority on issues related to the installation and use of installed Fire Rated Doors.

FEATURES AND BENEFITS:

Steelcraft's L Series Doors offer the following standard unique features, which enhance long term performance and durability:

1. **Core Systems** that enhance the structural integrity of the door:
   - **Honeycomb (standard) –** 1″ (25mm) cell kraft honeycomb configuration that increases structural integrity while reducing overall weight
   - **Polystyrene (optional) –** enhanced thermal performance
   - **Polyurethane (optional) –** extreme thermal performance

2. **Full Height, Epoxy Filled Mechanical Interlock Edges** provide structural support and stability the full height of the door edges. Available edge options:
   - **Visible Edge Seam** (standard) – full height, epoxy filled mechanical Interlocked edges
   - **Filled Seam –** optional edge seam epoxy filled and finished smooth. Includes tack welds above and below edge cutouts for hinges, locks, etc.
   - **Welded Edge Seam –** optional edge seam welded with 1″ (25mm) long weld, 6″ (51mm) on center, epoxy filled between welds and finished smooth; available on L18, L16 and L14 doors.

3. **Universal Hinge Preparations** (patented) allow for easy field conversion from standard weight .134″ (3.3mm) hinges to heavy weight .180″ (4.7mm) hinges.

4. **14 Gage [0.067″ (1.7mm)] Inverted Top and Bottom Channels** provide stability and protection for the top and bottom edges from abuse.

5. **Beveled Hinge and Lock Edges** allow for tighter installation tolerances, ensure easier operation and eliminate binding and sticking.

6. **Recessed Dezigner™ Glass Trim** provides a clean, neat and flush finish with the door surface.

7. **Factory Applied Baked-On Rust Inhibiting Primer** paint in accordance with ANSI A250.10-1998.

SPECIFICATION COMPLIANCE:

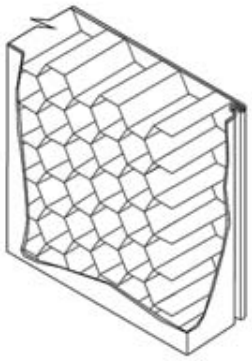
1. Door construction for Steelcraft L Series Full Flush Doors meets the requirements of ANSI A250.8-2003 (SDI 100).

2. Hardware preparations and reinforcements are in accordance with ANSI A250.6-2003. Locations are in accordance with ANSI/DHI A115 unless otherwise stated.

FIRE RATINGS:

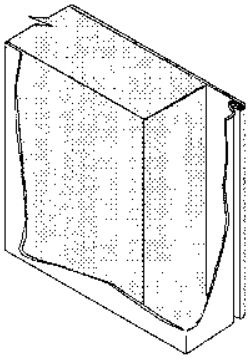
L Series Doors meet the broadest fire rating requirements. They are listed for installations requiring compliance to both neutral pressure testing (ASTM E152 and UL-10B) and positive pressure standards (UBC 7-2 and UL-10C).

Rigid Honeycomb



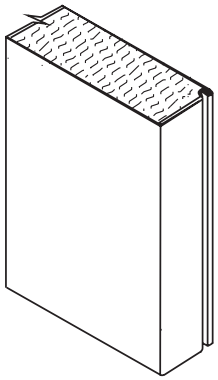
Standard Laminated Honeycomb Core
- 1" (25mm) cell, 99 pound Kraft honeycomb
- Honeycomb surfaces sanded for maximum adhesion
- Impregnated with phenolic resin (resists mildew and vermin)
- Laminated to both face sheets with contact adhesive
- Assembled door is run through high pressure pinch rollers, achieving ultimate bond

Optional cores are polystyrene or polyurethane

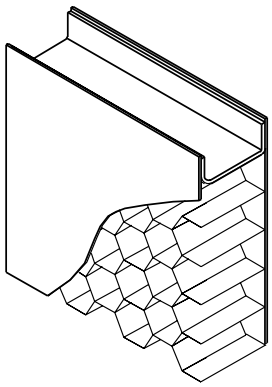


Optional Polystyrene Core
- 1 pound (453.6g) per ft^3 density slab
- Laminated to both face sheets with contact adhesive
- Labeled applications

Optional Polyurethane Core
- 1.8 pound (816.5g) per ft^3 density slab
- Laminated to both face sheets with contact adhesive
- Non-Labeled applications



Standard Premium Edge Construction
- Beveled hinge & lock edges
- Full height mechanical interlock with epoxy adhesive
- Visible edge seam standard
- Seamless edge optional



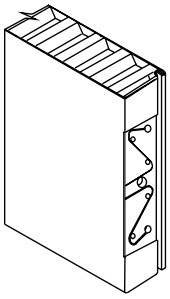
Standard Rigid 14 Gage End Channel Construction
- 14 gage inverted galvannealed top & bottom channels
- Projection welded to both face sheets
- Optional 24 gage galvannealed top caps

DOOR APPLICATION AND USAGE

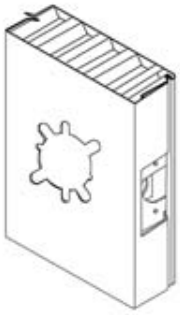
Series	Steel Thickness	Opening	Usage Frequency	
L20	20 Ga (0.8mm)	Interior - Cold Rolled Steel	Standard Duty	Light Commercial applications with minimal use and abuse
L20	20 Ga (0.8mm)	Exterior - Galvannealled Steel	(CIVIL APPLICATION)	
L18	18 Ga (1.0mm)	Interior - Cold Rolled Steel	Heavy Duty	Heavy Commercial & Institutional applications with high use
L18	18 Ga (1.0mm)	Exterior - Galvannealled Steel		
L16	16 Ga (1.3mm)	Interior - Cold Rolled Steel	Extra Heavy Duty	Extra HeavyCommercial applications with potential of very high use
L16	16 Ga (1.3mm)	Exterior - Galvannealled Steel	(MIL APPLICATION)	
L14	14 Ga (1.7mm)	Interior - Cold Rolled Steel	Maximum Duty	Extra HeavyCommercial applications with extremely high use
L14	14 Ga (1.7mm)	Exterior - Galvannealled Steel		

STANDARD HARDWARE PREPARATIONS

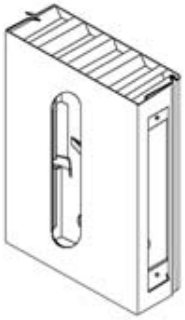
Typical hardware applications shown. Refer to section 8 for more details.



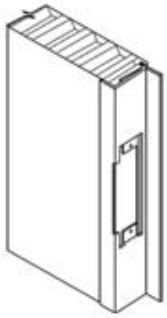
Universal Mortise Hinge Prep
7 Gage Universal hinge reinforcement



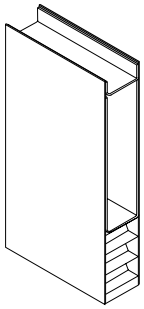
61L Lock



86 Lock



Inactive Leaf ASA Strike Prep with Astragal attached



Optional 14 Gage Closer Reinforcement

Standard: mortised and reinforced for

- Patented Universal hinge preparations allow for easy field conversion from standard 4-1/2″ (114mm) x .134″ (3.3mm) standard weight hinges to 4-1/2″ (114mm) x .180″ (4.7mm) heavy weight hinges. Optional hinge preparation for 5″ (127mm) x .146″ (3.7mm) standard weight hinges or for 5″ (127mm) x .190″ (4.8mm) heavy weight hinges is also available.
- A multitude of standard lock preparations are available. The cylindrical 161, 61L and mortise 86 lock preps are the most commonly used active leaf preparations. The 4 7/8 (124mm) strike prep is the most commonly used inactive leaf preparation.
- Optional reinforcements for surface and concealed Closers are available.
- Special hardware applications are available.

Door Sizes and ANSI A250.8 Conversions

Steelcraft product selection for L Series Doors has been matched to ANSI/SDI Level and Model designations.

- In accordance with ANSI A250.8, core material is not specific to the level or model designations. Core material selection is specified based on preference and application.
- Recommended minimum frame gage also applies to the frequency of operation of the opening.

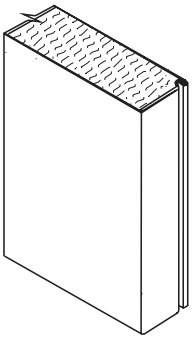
Series	ANSI A250.8 - SDI 100			Edge Construction Options	Maximum Sizes		Recommended Gage of Frame
	Level	Model	Description		Single	Pair	
Level 1 - Light Commercial							
L20	1	1	Full Flush	Visible	3'-0" x 8'-0" 914mm x 2438mm	6'-0" x 8'-0" 1829mm x 2438mm	18 Gage [0.042" (1.0mm)]
LF20		2	Seamless	Epoxy Filled			16 Gage [0.053" (1.3mm)]
Level 2 - Heavy Duty Commercial & Institutional							
L18	2	1	Full Flush	Visible	4'-0" x 10'-0" 1219mm x 3048mm	8'-0" x 10'-0" 2438mm x 3048mm	16 Gage [0.053" (1.3mm)]
LF18		2	Seamless	Epoxy Filled			
LW18		2	Seamless	Welded			
Level 3 - Extra Heavy Duty Commercial & Institutional							
L16	3	1	Full Flush	Visible	4'-0" x 10'-0" 1219mm x 3048mm	8'-0" x 10'-0" 2438mm x 3048mm	16 Gage [0.053" (1.3mm)]
LF16		2	Seamless	Epoxy Filled			14 Gage [0.067" (1.7mm)]
LW16		2	Seamless	Welded			
Level 4 - Maximum Duty Commercial & Institutional							
L14	4	1	Full Flush	Visible	4'-0" x 10'-0" 1219mm x 3048mm	8'-0" x 10'-0" 2438mm x 3048mm	14 Gage [0.067" (1.7mm)]
LF14		2	Seamless	Epoxy Filled			
LW14		2	Seamless	Welded			

DOOR EDGE CONSTRUCTION:

Optional Edge Seams available in the L Series doors:

- L - Standard feature includes visible edge seams with full height interlocked edges.
- LF – the mechanical edge seam is filled and finished prior to applying the factory primer.
- LW – the mechanical edge seam is welded and finished prior to applying the factory primer.

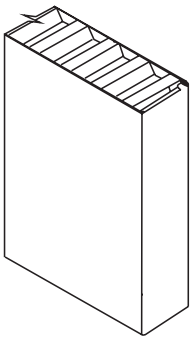
Standard Visible Seamless



L Series Visible Seam Features

- Full height mechanical interlock
- Interlock filled with epoxy adhesive
- Visible edge seam

Optional Seamless Edge



LF Series Seam Filled Features

- Full height mechanical interlock
- Interlock filled with epoxy adhesive
- Edge seam is epoxy filled and finished
- No visible edge seam

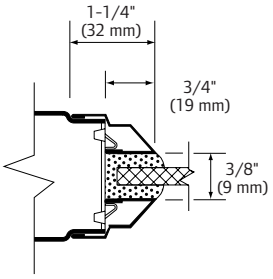
LW Series Seam Welded Features

- Full height mechanical interlock
- Edge seam is welded 1″ (25mm) long, 6″ (152mm) on center.
- No visible edge seam

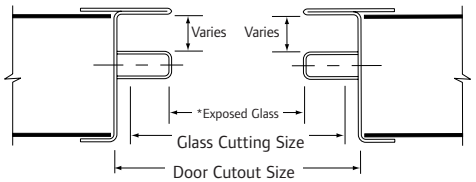
GLASS LIGHT OPTIONS – REFER TO THE LIGHTS AND LOUVERS SECTION FOR FURTHER DETAILS AND OPTIONS

Standard Dezigner® Trim for 1/4″ Thick Glass

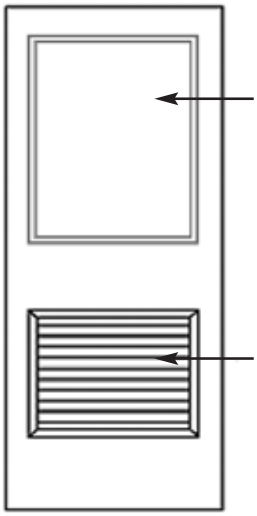
- optional 1/2″ Thick Glass



Typical Optional Overlapping Steel Trim for Glass Over 1/4″ to 5/8″ or 3/4″ to 1″ Thick

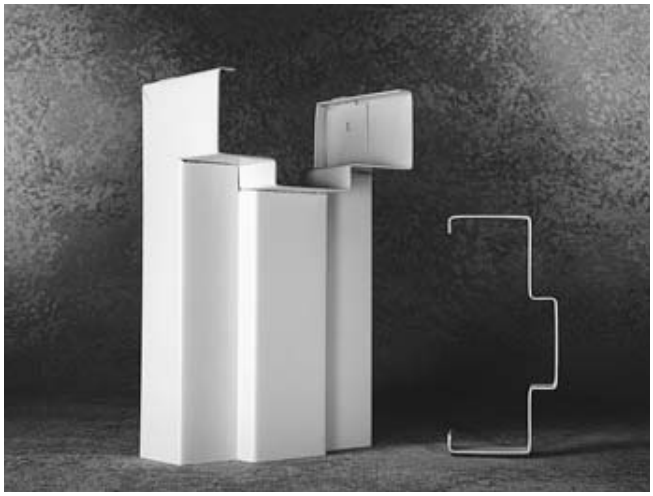


Divider Muntins Are Not Available



Note: Glazing type and thickness vary per job requirements.

Note: Louver size and type vary per requirements.



ABOUT THE PRODUCT:

F Series 3 Sided Flush Frames are designed to meet requirements for light to maximum duty applications in both commercial and institutional buildings. They are installed in both interior and exterior locations, and in virtually all types of buildings and wall constructions. These frames are to be installed as part of the wall framing sequence. They can be specified and supplied as KD (knock-down) for field assembly prior to installation or welded for installation as a complete unit.

INSTALLATION:

1. Installation shall conform to the published Steelcraft installation instructions, ANSI A250.11-2001 (formerly SDI 105) *Recommended Erection Instructions for Steel Frames and HMMA 840.*

2. Fire Rated Assemblies must be in accordance with NFPA Pamphlet 80. The *Authority Having Jurisdiction* is the final authority in issues related to the installation and use of installed Fire Rated Doors.

FEATURES AND BENEFITS:

Steelcraft F Series Flush Frames offer the following unique features, which enhance long term functionality and durability:

1. **Die-mitered corner connections** Die-mitered corner connection at the head and jamb insure an attractive, tight and closed mitered connection. The miter includes 4 corner tabs designed with concealed connection eliminating the need for continuous profile welding.
2. **Patented universal hinge preparations** allow for easy field conversion from standard weight .134″ (3.3mm) thick hinges to heavy weight .180″ (4.7mm) hinges.
3. **Adjustable base anchors** allow for installation adjustment when the floor is not level.
4. **Factory prepared** for field installed silencers.
5. **Factory applied baked on rust inhibiting primer** in accordance with ANSI A250.10-1998 (R2004).

SPECIFICATION COMPLIANCE:

1. Overall frame construction for the Steelcraft F-Series Flush Frames meets the requirements of ANSI A250.8-2003 (commonly referred to as SDI-100).

2. Hardware preparations and reinforcements are in accordance with ANSI A250.6-2003. Locations are in accordance with ANSI/DHI A115 .

FIRE RATINGS:

The F-Series Flush Frames meet the broadest fire rating requirements. They are listed for installations requiring compliance to both neutral pressure testing (ASTM E152 and UL 10B) and positive pressure standards (UBC 7-2 and UL 10C). Refer to the **Fire Rated Section** of this manual for particular listings.

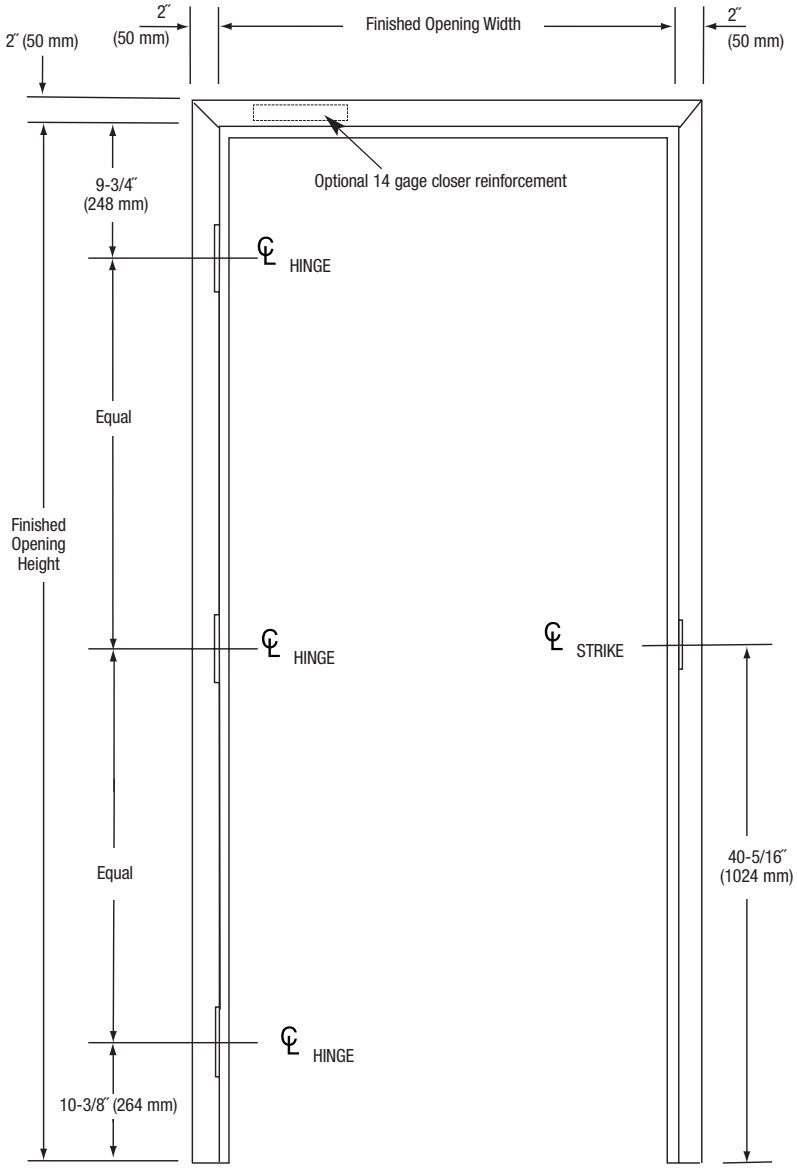
APPLICATIONS:

F-Series Frames are typically installed in wall construction types as defined in the chart below:

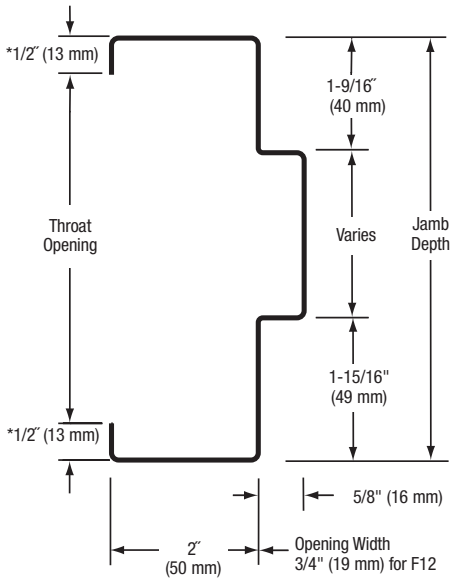
FRAME APPLICATIONS

Profile	Steel Thickness	Wall Construction	Typical Wall Anchors
F16	16 Gage [0.053" (1.3mm)]	Wood or Steel Stud	Lock-in Stud Anchor
		Masonry	Wire Masonry
		Existing Masonry	Bolted Through Soffit
F14	14 Gage [0.067" (1.7mm)]	Wood or Steel Stud	Lock-in Stud Anchor
		Masonry	Wire Masonry
		Existing Masonry	Bolted Through Soffit
F12	12 Gage [0.093" (2.3mm)]	Wood or Steel Stud	Welded Stud Anchors
		Masonry	Wire Masonry
		Existing Masonry	Bolted Through Soffit

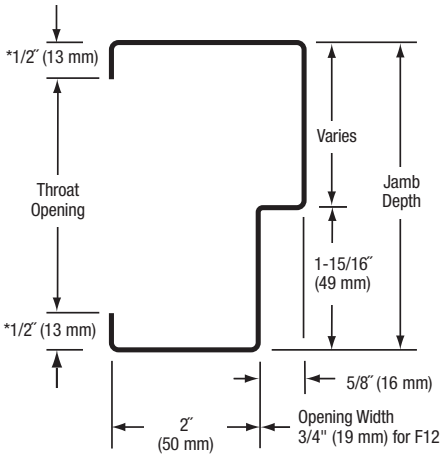
Elevation



Standard Double Rabbet Frame



Single Rabbet Frame



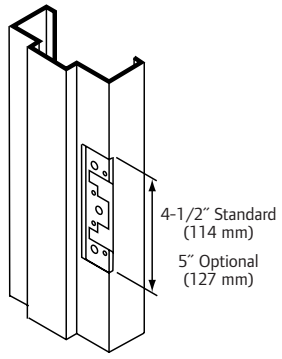
* 7/16″ (11mm) on 5-3/4″ frame depth

FRAME SIZING OPTIONS

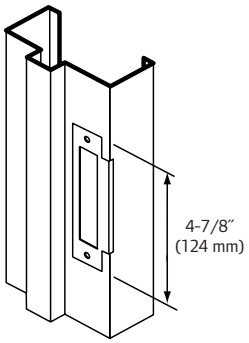
SERIES	MAXIMUM OPENING SIZE		JAMB DEPTH AVAILABILITY (profile)				STANDARD PROFILE DIMENSIONS (Variations Available)			CORNERS
	Single	Pair	SINGLE RABBET		DOUBLE RABBET		FACE	STOP	RETURNS	STANDARD
			Minimum	Maximum	Minimum	Maximum				
F16 F14	5′-0″ x 11′-0″ (1524mm x 3353mm)	10′-0″ x 11′-0″ (2439mm x 3353mm)	3″ (76mm)	20″ (508mm)	4-3/4″ (121mm)	20″ (508mm)	2″ (50mm)	5/8″ (16mm)	1/2″* (13mm)	DIE MITERED with four (4) concealed tabs interlocking head and jambs
F12	4′-0″ x 8′-0″ (1524mm x 3353mm)	8′-0″ x 8′-0″ (2439mm x 3353mm)	N/A (76mm)	N/A (508mm)	4-3/4″ (121mm)	14-3/4″ (375mm)	2″ (50mm)	3/4″ (19mm)	1/2″ (13mm)	Square cut for welded corners

*except 5-3/4" (146mm) depth, which is 7/16" (11mm) N/A - Not Available

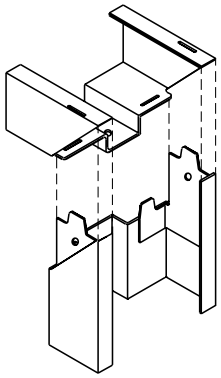
Universal Mortise Hinge Prep



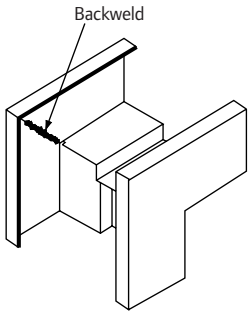
4⅞″ Strike Prep (ASA)



KD Corner Detail



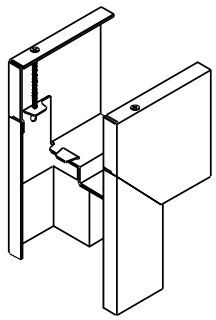
Welded Corner



GENERAL NOTES:

1. Variations in jamb depths available in 1/8″ (3mm) increments.
2. All F Series frames are supplied standard with masonry wire or lock-in jamb anchors and adjustable base anchors. Anchors are designed for maximum wall/frame engagement and installation flexibility.
3. F Series Frames are to be installed as part of the wall framing sequence.
4. Depending on environmental and usage conditions the steel can be either cold rolled or galvannealed. Galvannealed steel is recommended for all exterior applications.

Optional 4″ (102mm) Face Head Detail

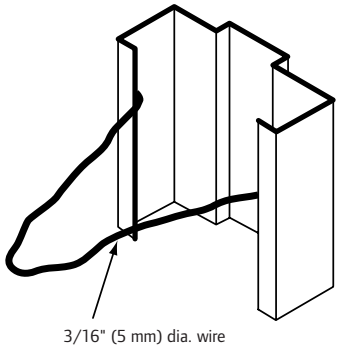


FRAME OPTIONS

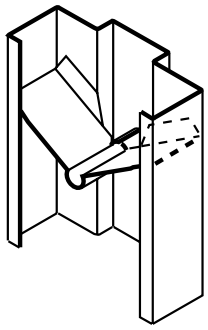
SERIES	FRAME PROFILE		CORNER CONNECTIONS				4″ (102mm) HEADS
			KD (Knock-Down)		SUA (Set-Up & Weld)		
	SINGLE RABBET	DOUBLE RABBET	SINGLE RABBET	DOUBLE RABBET	SINGLE RABBET	DOUBLE RABBET	
F16	Typically for walls less than 3-3/4″ (95mm) thick. Minimum walls thickness 2″ (51mm)	Typically for walls 3-3/4″ (95mm) thickness or greater	3 interlocking corner tabs per factory die-miter. See the "KD Corner Detail	4 interlocking corner tabs per factory die-miter. See the "KD Corner Detail	Available when specified, and in accordance with ANSI A250.8-2003 (SDI 100).		Die-mitered for use with 2″ (51mm) face double rabbet jambs. Available when specified for KD or SUA applications.
F14							
F12	N/A		N/A	N/A	Standard Saw Cut and welded, and in accordance with ANSI A250.8-2003 (SDI 100)		For use with 2″ (51mm) face double rabbet jambs.

N/A = Not Available

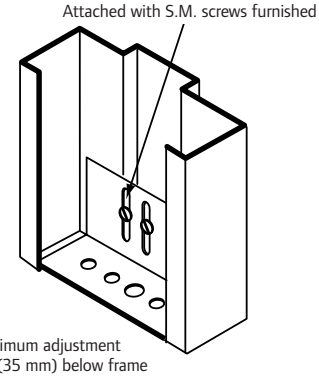
Wire Masonry Anchor



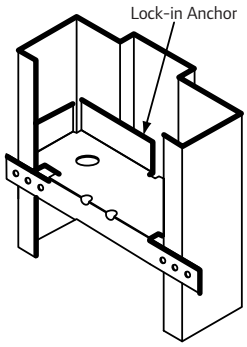
Existing Wall Anchor



Adjustable Base Anchor



Anchor for Wood Stud Partition



Anchoring and Installation Notes:

1. **F16 and F14-Series Commercial and Institutional Frames** are supplied standard with masonry wire or lock-in jamb anchors and adjustable base anchors. Anchors are designed for maximum wall/frame engagement and installation flexibility.
2. **For anchoring applications, refer to section 2.4 of this manual.**
3. **Installation Caution Notice – Grouted Frames:**
   - When temperature conditions necessitate an additive to be used in the mortar to prevent freezing, the contractor installing the frames must coat the inside of frames in the field with a corrosion resistant coating per SDI 105.
   - When frames are to be grouted full, silencers must be field installed prior to grouting.
   - Steel frames, including fire rated frames, do not require grouting. Grouting is not recommended for frames in drywall.
4. All fire rated frames must be installed in accordance with NFPA Pamphlet 80 and the *Authority Having Jurisdiction*.

FRAMING APPLICATIONS

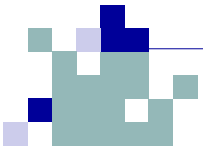
SERIES	Steel Type	Building Type	Opening	Usage Frequency[1]	KD[4] Corner	SUA[5] Corner	Applications
F16	Non-Galvannealed[2]	Institutional and Commercial	Interior	Heavy to Extra Heavy Duty	✓	✓	Typical Building Conditions
	Galvannealed[3]		Mainly Exterior				High Humidity and/or Weather Exposure
F14	Non-Galvannealed[2]	Institutional and Commercial	Interior	Extra Heavy to Maximum Duty	✓	✓	Typical Building Conditions
	Galvannealed[3]		Mainly Exterior				High Humidity and/or Weather Exposure
F12	Galvannealed	Institutional and Commercial	Interior and Exterior	Maximum Duty	N/A	✓	Maximum Traffic Building Conditions
							High Humidity and/or Weather Exposure

[1] Usage frequency is based on ANSI A250.8-2003
[2] Commercial quality cold rolled steel
[3] Reinforcements for galvannealed frames are also galvannealed
[4] Knock-Down for field assembly prior to installation
[5] Set-up and Welded for installation as a pre-welded unit

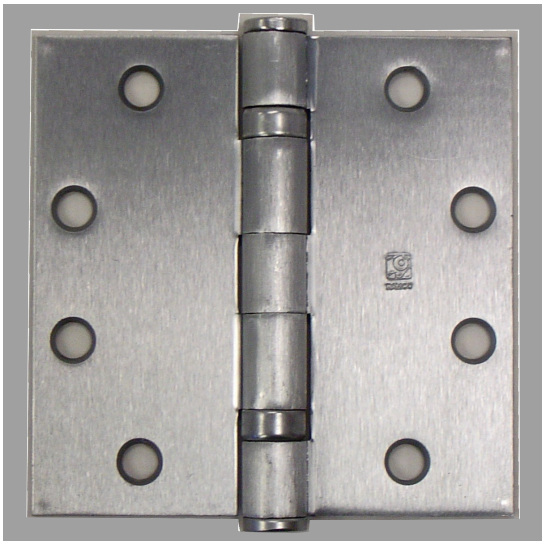
10.2 Ramco BB Hinges

RAMCO Hardware, Inc.

COMMERCIAL HINGES



Full Mortise Hinges



BB79

2 Ball Bearing ● Standard Weight ● Template
For use on medium weight doors or doors with medium frequency usage

BB79 Steel with Steel pin

- Hinge testing conforms to ANSI 156.1
- Dimensions and tolerances conform to ANSI—156.7
- BB79 steel description conforms to ANSI—A8112

Size (inches)	Size (mm)	Gauge
4 x 4	102 x 102	0.129
4.5 x 4	114 x 102	0.134
4.5 x 4.5	114 x 114	0.134
5 x 4.5	127 x 114	0.145
5 x 5	127 x 127	0.145

BB79 Hinge shown in US26D finish

RAMCO

10.3 Ramco 3000 Closer

3000 Series Door Closer

- **HEAVY DUTY**, EXTRA-STRENGTH ACTION
- COMPLIES WITH ANSI 156.4 GRADE 1 REQUIREMENTS
- DOUBLE LEVER ARM
- CONFORMS TO UL 10C AND UBC 7-2 (1997)
- ADJUSTABLE BACK CHECK FUNCTION
- PVC COVER STANDARD
- PARALLEL ARM BRACKET STANDARD
- 50 YEAR GUARANTEE

3000
Adjustable Spring Power

Features

Free Size
Non-Sized closer with spring power adjustable from size 1-6.

Easy Speed Control
Separate regulating valves for door speed (closing and latching speed).

Adjustable Back Check

Versatile Mounting Applications
Non-handed reversible and can be mounted in **regular, top jamb and parallel arm** applications.

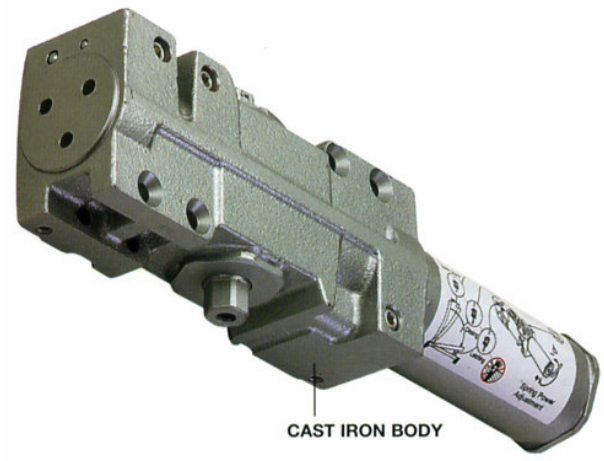
Extra-Strength Cast Iron Body
3000 Series bodies are heavy duty for long-lasting, durable applications.

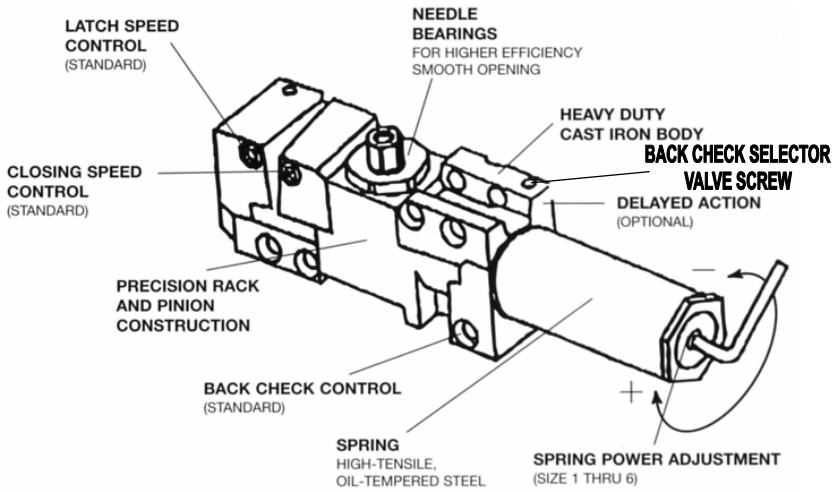
Super Smooth Operation
Installed precision needle bearing and heat treated pinion for high efficiency and smooth operation.

UL Listed, Conforms to standards
UL10C and UBC 7-2-1997

RAMCO

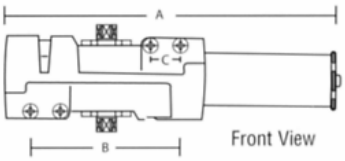
3000 Series Door Closer





Dimensions

A.	Length of Closer Body	11”
B.	Horizontal Mounting	5”
C.	Vertical Mounting Holes	1”
D.	Width of Closer Body	2 ¾”
E.	Projection from Door	2”



Finishes

Exterior Door Width

24" 30" 36" 42" 48"

Size 3 | Size 4 | Size 5 | Size 6

Minimum Door Width

Interior Door Width

24" 34" 38" 48" 54" 60"

Size 2 | Size 3 | Size 4 | Size 5 | Size 6

Minimum Door Width—Adjustable Size 1-6

UL Listed, Conforms to standards UL10C and UBC 7-2-1997

RAMCO

9000 Series Door Closer

(Adjustable Spring Power)

COMPLIES WITH ANSI 156.4 GRADE 1 AND ADA REQUIREMENTS

INTELLIGENT COMMERCIAL USE SIZE FREE DOOR CLOSERS

CONFORMS TO UL 10C AND UBC 7-2 (1997)

ADJUSTABLE BACK CHECK FUNCTION STANDARD

PVC COVER STANDARD

PARALLEL ARM BRACKET STANDARD

50-YEAR GUARANTEE

Features

FREE SIZE
Non-sized closer with spring power adjustable from size 2-6 (Optional Barrier Free (BF) Closer 1/2-4).

EASY SPEED CONTROL
Separate regulating valves for door speed (closing and latching speed).

ADJUSTABLE BACK CHECK

VERSATILE MOUNTING APPLICATIONS
Non-handed reversible and can be mounted in the REGULAR, TOP JAMB and PARALLEL ARM application.

HIGH STRENGTH CAST ALUMINUM BODY
9000 series bodies are constructed of a special aluminum alloy for non-corrosive, long lasting durable housing.

SUPER SMOOTH OPERATION
Installed precision needle bearing and heat treated pinion for high efficiency and smooth operations.

Finishes

(FULL COVERS)

- Aluminum
- Duranodic
- Gold
- Polished Brass (US3)
- Polished Chrome (US26)

CLASSIFICATION & GLOSSARY

9000-PBC:	Size 2 thru 6
9000-PBF:	Size 1/2 thru 4
9000-PDA:	Size 2 thru 6
9000-PBF/DA:	Size 1/2 thru 4
P:	Parallel Arm Bracket
BC:	Adjustable Back Check
BF:	Barrier Free function for elderly and/or handicapped
DA:	Delayed Action function for elderly and/or handicapped
BF/DA:	Combined model of BF/DA

FUNCTION
Barrier-Free, Delayed Action and Combination: Door Closers for the Handicapped and Elderly

ANSI A117.1-1992 Barrier Free
ANSI A156.4-1992 Delayed Action

BARRIER FREE (LOW OPENING RESISTANCE)
Closer available with a lighter powered spring to provide acceptable door control and low opening resistance for the handicapped and elderly.
(Multi-size 1/2 thru 4)

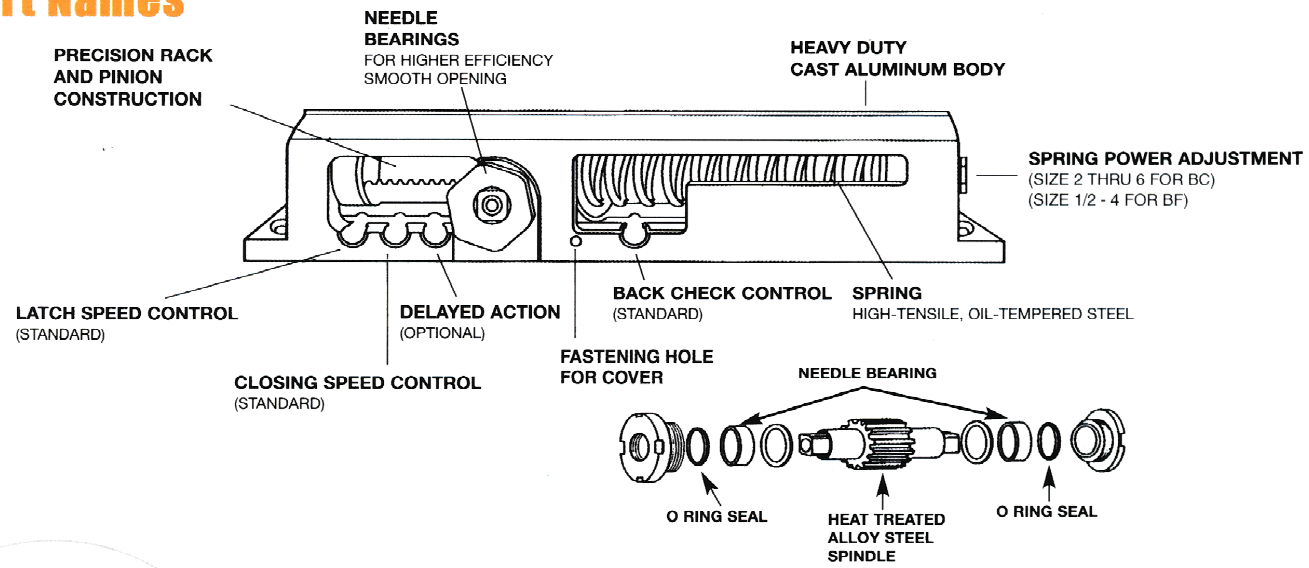
DELAYED ACTION
The door will stay open at least 20 seconds before closing, which allows for the handicapped and elderly to pass through more easily. (Multi-size 2 thru 6)

COMBINED BF/DA
Provides the Barrier Free (BF) and Delayed Action (DA) functions at the same time for easier opening and passage.
(Multi-size 1/2 thru 4)

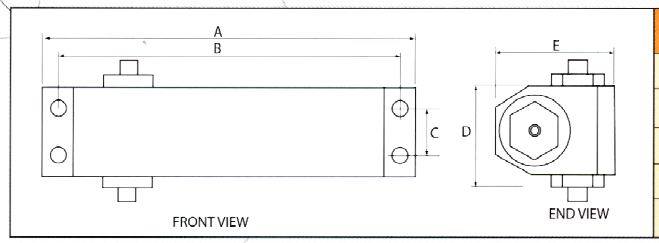
RAMCO Hardware, Inc.
2443 W. 208th Street, Suite E-5
Torrance, CA 90501
310-782-1157
310-782-1772 fax
www.ramcohardware.com

10.4 Cal Royal Lockset

Part Names



Dimensions



Description	Size
A: Length of closer body	11 23/32" (298mm)
B: Horizontal mounting holes	11 3/32" (282mm)
C: Vertical mounting holes	3/4" (19mm)
D:Closer body height	1 27/32" (47mm)
E: Projection from door	2 3/8" (60mm)

Door Closure Sections

Door Closer Size		Clockwise Turns of Adjusting Nut		Applicable Door Size			
9000-PBC 9000-PDA (SIZE 2-6)	9000-PBF 9000-PBF/DA (SIZE 1/2 -4)	9000-PBC 9000-PDA (SIZE 2-6)	9000-PBF 9000-PBF/DA (SIZE 1/2 -4)	Interior	Exterior Swing Out	Exterior Swing in	Applicable Door Weight
Not Recommended-Use 9000-PBF	1/2	N/A	-3*	28" (0.71m)	24" (0.61m)	20" (0.50m)	22-33 lbs (10-15kg)
Not Recommended-Use 9000-PBF	1	N/A	0 (factory set)	32" (0.81m)	28" (0.71m)	24" (0.61m)	33-66 lbs (15-30kg)
2	2	-3*	3	36" (0.91m)	32" (0.81m)	28" (0.71m)	66-99 lbs (30-45kg)
3	3	0 (factory set)	6	42" (1.07m)	36" (0.91m)	32" (0.81m)	99-143 lbs (45-65kg)
4	4	3	9	48" (1.22m)	42" (1.07m)	36" (0.91m)	143-187 lbs (65-85kg)
5	Not Recommended-Use 9000-PBF	6	N/A	54" (1.37m)	48" (1.22m)	42" (1.07m)	187-264 lbs (85-120kg)
6	Not Recommended-Use 9000-PBF	9	N/A	58" (1.47m)	52" (1.32m)	48" (1.22m)	264-330 lbs (120-150kg)

* Counter clockwise

9000 Series Comparison Chart

RAMCO	LCN	NORTON	YALE	DORMA	SARGENT	RIXSON	CORBIN	RUSSWIN
9000	4041/1460	8501	5501	7600FMC	1230-0/1250-0	2200	120	2820

LISTED 89CJ
CONFORMS TO UL 10C
AND UBC 7-2 (1977)

RAMCO Hardware, Inc.
2443 W. 208th Street, Suite E-5
Torrance, CA 90501
310-782-1157
310-782-1772 fax
www.ramcohardware.com

CAL-ROYAL

P R O D U C T S, I N C.

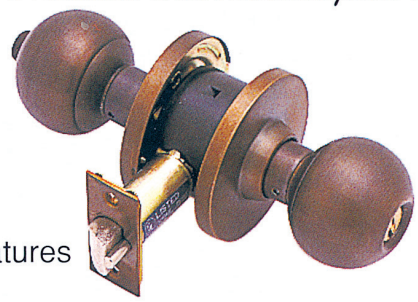
BA SERIES
ANSI GRADE 2
CYLINDRICAL LOCKSETS

UL LISTED, UL10C, UBC 7-2-1997

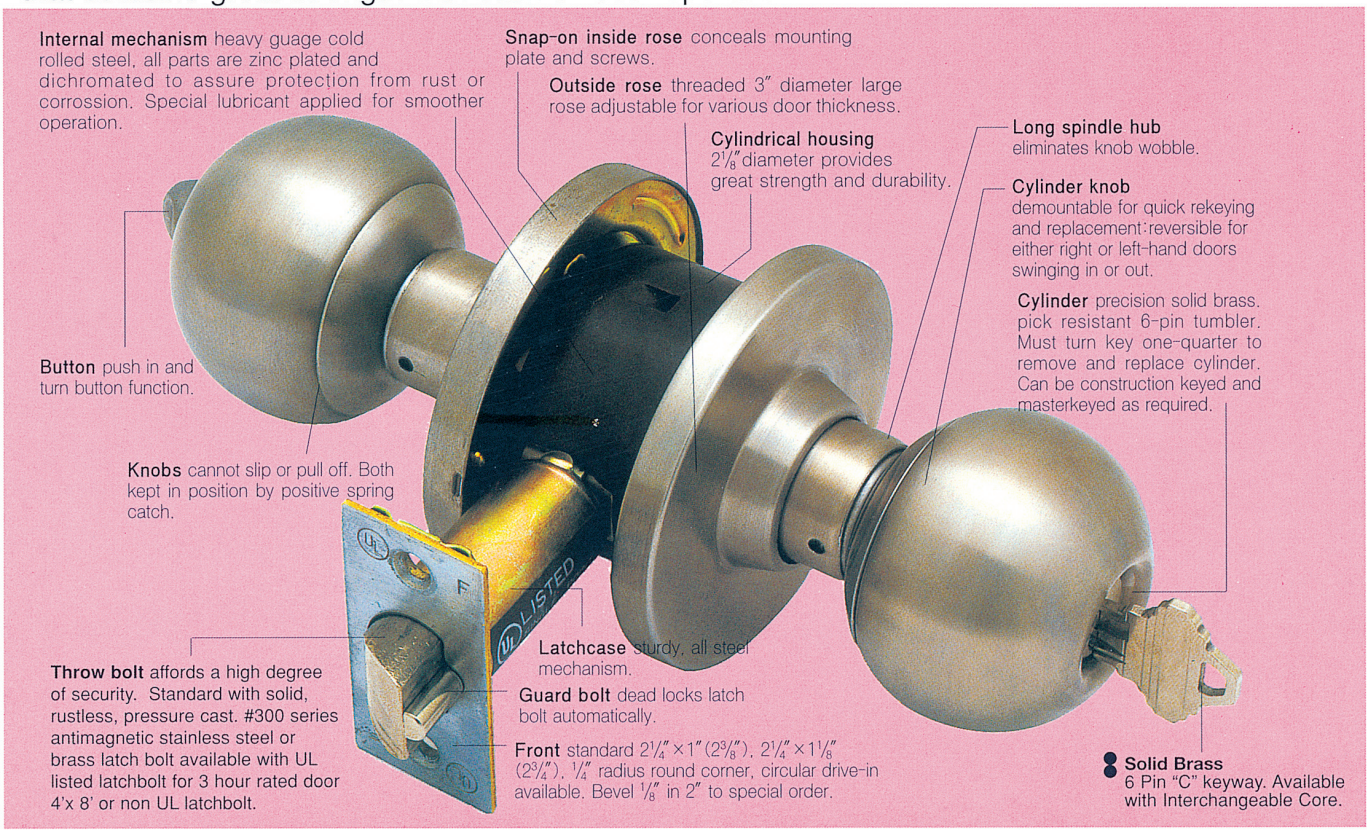
Available With Interchangeable Core

BARRINGTON

QUALITY DESIGNED AND ENGINEERED FOR RESIDENTIAL AND COMMERCIAL BUILDINGS



CONSTRUCTION FEATURES: This is an inside look at one of Cal-Royal's heavy duty locksets. Many superior construction features that combine great strength with satin smooth operation.



Plymouth and Tulip styles (equivalent to schlage "A Series) are available. Subject to leadtime.

CROSS REFERENCE INFORMATION

"BARRINGTON" BA STANDARD DUTY CYLINDRICAL LOCKS-ANSI GRADE 2

FUNCTION	CAL-ROYAL BA	SCHLAGE A	CORBIN 5600	RUSSWIN 3300	SARGENT 6 LINE	YALE 5300	ARROW 151	PDQ SV	ANSI NO.	FED. NO.
Entrance	BA-00	A53PD	5651	3340	6GO5	5307	151	SV116	F81-2	160A
Privacy	BA-20	A40S	5620		6U65		157	SV176	F76-2	160L
Passage	BA-30	A10S	5610	3310	36U15	5301	156	SV126	F75-2	160N
Storeroom	BA-05	A80PD	5657	3352	6G04	5305	151F	SV115	F86-2	160D
Classroom	BA-03	A70PD	5655	3340⁵/8FCI	6G37	5308	151S	SV148	F84-2	160R
Double Cyl.	BA-04	A66D	—	3340⁵/8	—	5316	—	SV137	—	—
Sgl. Dummy	BA-40	A170	½DT		6U93	355	125	SV211	F79-2	—
Hotel	BA-HI	A85PD	5629	3342	6G50	5322	151H	SV161	F93-2	160H
Closet	BA-60	A25D	5611	3316	6G15-3	5328	156CB	SV125	—	—

CAL-ROYAL BARRINGTON SERIES SPECIFICATIONS AND FUNCTIONS

SPECIFICATIONS

Exposed Trim: Wrought brass, bronze or stainless steel.
Door Ranges: Adjustable for 1⅜" to 1¾" door thickness.
Backset: Standard 2¾". 2⅜", 3¾" or 5" extension available.
Strikes: ANSI strike (standard) 4⅞" x 1¼". Optional T or full lip strike available.
Finishes: US32D, US10B, US3, US10.
Other finishes not shown available subject to quantity and leadtime.
Keying: 6-pin "C" keyway. 2 keys per lock.

Additional Keyways: Schlage E, Russwin D1, Corbin 60, Sargent LA, Falcon/Weiser E, Arrow, Yale GA, and Yale 8. Can also accept Medeco, Assa, and Kaba High Security Cylinders.
Bore Diameter: 1" for latch. 2⅛" for lock housing.
Interchangeable Core: Interchangeable core locks will accept compatible 6 or7 pin core with BEST, FALCON and ARROW. Prefix "IC" before part number. Available combinated or uncombinated. Temporary construction cores available. Factory keying with control key and masterkey available.

Cal-Royal heavy duty cylindrical lock meets or exceeds requirements of BHMA/ANSI A156.2 series 4000 for grade 2 (FF-H-106C)

FUNCTIONS

● INDICATES FUNCTION AVAILABLE WITH INTERCHANGEABLE CORE

KEYED LOCKS

CODE NO.	DESCRIPTIONS	ANSI
● BA-01	**ENTRANCE LOCK** PUSH BUTTON Pushing button in inside knob locks outside knob. Turning inside knob or operating key in outside knob releases button automatically. Closing door does not release button. Button may be fixed in locked position by turning to horizontal position. Inside knob always free. Latch bot automatically deadlocks when door is closed.	F82-2
● BA-00	**ENTRANCE LOCK** TURN BUTTON Pushing turn-button in inside knob locks outside knob. Turning inside knob or operating key in outside knob or operating key in outside knob releases button automatically. Closing door does not release button. Button may be fixed in locked position by turning to horizontal position. Inside knob always free. Latchbolt automatically deadlocks when door is closed.	F82-2
BA-02	**STORE LOCK** Dead locking latch bolt operated by knob from either side except when outside knob is locked from outside by key. When outside knob is locked, latch bolt is operated by key in outside knob or by rotating inside knob.	F91-2
● BA-03	**CLASSROOM LOCK** Dead locking latch bolt operated by knob from either side except when outside knob is locked from outside by key. When outside knob is locked, latch bolt is operated by key in outside knob or by rotating inside knob.	F84-2
BA-04	**COMMUNICATING LOCK** Dead locking latch bolt operated by knob from either side. Turning key in either knob locks or by rotation inside knob. Outside knob is always fixed.	F80-2
● BA-05	**STOREROOM LOCK** Dead locking latch bolt operated by key in outside knob or by rotating inside knob. Outside knob is always fixed.	F86-2
BA-06	**VESTIBULE LOCK** Dead locking latch bolt operated by knob from either side except when outside knob is locked by key from inside, latch bolt may be retracted by key in outside knob or by rotating inside knob.	F88-2
BA-07	**SERVICE STATION LOCK** Dead locking latch bolt operated by knob from either side except when outside knob is locked by push button inside. Key outside, rotating inside knob or closing door releases push button unlocking outside knob except when slotted push button is in a locked position. Inside knob always operates.	F92-2
BA-08	**CORRIDOR LOCK** Dead locking latch bolt operated by knob from either side except when outside knob is locked by key in outside knob or by push button in inside. Key in outside knob locks or unlocks outside knob. Rotation inside knob releases push button. Closing door releases push button. Inside knob always operates.	F90-2

KEYED LOCKS

CODE NO.	DESCRIPTIONS	ANSI
BA-09	**INSTITUTION LOCK** Dead locking latch bolt operated by key in knob from either side. Both knob always fixed.	F87-2
BA-H1	**HOTEL-MOTEL LOCK** Dead locking latch bolt operated by knob from inside at all times. Outside knob always fixed. Latch bolt operated by key from outside except when push button inside is operated thus shutting out all keys except emergency key. Inside push button provides lockout feature by keeping indicator thrown. Turning inside knob or closing door releases indicator and shut out feature.	F93-1

KEYLESS LOCKS

CODE NO.	DESCRIPTIONS	ANSI
BA-10	**PATIO LOCK** Dead locking latch bolt operated by knob from either side. Outside knob is locked by push button inside and unlocked by rotating inside knob or closing door.	F77-2
BA-20	**PRIVACY LOCK** Latch bolt operated by knob from either side. Outside knob is locked by push button inside and unlocked by emergency release outside, rotating inside knob or closing door.	F76-2
BA-20H	**HOSPITAL PRIVACY LOCK** Latch bolt operated by knob from either side. Outside knob is locked by push button inside and unlocked by turn-button outside, rotating inside knob or closing door.	
BA-30	**PASSAGE LATCH** Latch bolt operated by knob from either side at all times.	F75-2
BA-60	**EXIT LOCK** Dead locking latch bolt operated from inside only. Outer knob always fixed.	F89-2
BA-50	**EXIT LOCK** Dead locking latch bolt operated from inside only. Blank plate outside. Specify door thickness: 1⅜" or 1¾".	

DUMMY TRIM

BA-40	**SINGLE DUMMY TRIM** Single dummy trim for one side of door. Pull only.	

Refer to price list for functions and finishes in stock. All other functions and finishes not listed are available on special order.

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Distributed by:

11 Manufacturer's Standard One Year Limited Warranty

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Standard One Year Limited Warranty

The Fastrack Modular Elevator System as manufactured by Modular Elevator Manufacturing bears the following warranty:

Part 1 Components Manufactured by Modular Elevator Manufacturing

Modular Elevator Manufacturing warrants that all component materials and workmanship from defects in materials and workmanship for a period of twelve (12) months from date of substantial completion of equipment installation.
Modular Elevator Manufacturing's obligation in this respect is limited to furnishing on an exchange bases, and/or field repair or correction of defective work which has been properly reported by the purchaser as having been in his opinion defective, and is so found by Modular Elevator Manufacturing upon return of part(s) and/or inspection thereof.

Part 2 Components Manufactured by Others

Modular Elevator Manufacturing warrants that all component parts purchased by Modular Elevator Manufacturing and used in conjunction with the elevator system shall be free from defects in materials and workmanship for a period of twelve (12) months from date of substantial completion of equipment installation.
Modular Elevator Manufacturing's obligation in this respect is limited to furnishing on an exchange basis, FOB shipping point, replacement part(s) which have been properly reported by the purchaser as having been, in his opinion, defective, and are so found by Modular Elevator Manufacturing upon return of part(s) and inspection thereof.

Modular Elevator Manufacturing shall not be liable for injury, loss, damage, or other cost, direct or consequential, arising out of the use of, or the inability of the purchaser to use the product. Lack of proper and routine maintenance shall void this warranty. Before using or furnishing to another for their use, purchaser shall determine the suitability of the product for its intended use and purchaser assumes all risks and liabilities in connection therewith. Furthermore, Modular Elevator Manufacturing shall not be liable for any labor cost incurred by corrective work, repairs, replacement of defective parts or otherwise without written authorization by an authorized employee of Modular Elevator Manufacturing.

THE FOREGOING WARRANTY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE. All parts sales are final, subject to existing warranty provisions.