



VERTICAL RECIPROCATING CONVEYOR

OWNERS & MAINTENANCE MANUAL



The maintenance of Matot Drum Dumbwaiters should only be performed by qualified, experienced, and trained elevator installers. Working in the dumbwaiter hoistway and on dumbwaiter equipment can be hazardous. All Safety Rules associated with installing elevator type equipment must be followed at all times. Proper protective equipment must be used at all times during maintenance and repair of the dumbwaiter equipment.

Read this manual carefully. Be thoroughly familiar with all parts and procedures before attempting any maintenance or repair functions on this equipment.



MATOT, INC.

MAINTENANCE AND PARTS

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GENERAL OPERATION OF STANDARD ELECTRIC VRCS:

The VRC unit has an automatic call and send operation. Momentary pressure applied to the Pushbutton will operate the unit. There is typically a full bank of buttons at each landing for each floor served. These buttons are used to call and send the car to different floors.

The car will stop automatically at the landing it is sent or called to by means of limit switches. The switches may be mechanical, photoelectric, or proximity type switches. The switches or their switching device, (cams, reflectors, or metal targets) are adjustable and will typically stop the car within ¼" of the door sill level.

Final Terminal limits are provided to stop the car should a normal stopping switch fail.

Positive mechanical stops are provided at terminal landings on all units that do not have spring buffers. In the event that the normal limits and the Final Terminal limits fail, the car will strike the solid stops before any part of the car strikes the overhead or the pit equipment.

When the car arrives at its destination, there is a pre-set delay of 10 seconds (non-interference timer), during which time the car cannot be called away from the landing. This time delay is used to allow ample time for a user to open the hoistway doors before the car can be called away.

The doors and gates are manually operated. The doors are equipped with electro-mechanical interlocks that prevent operation of the unit unless all hoistway doors have been closed. In the event that a hoistway door or car gate has been left open, the signal buzzer on the car will sound and the in-use light will illuminate when a Pushbutton is pressed.

Drum VRCs have a slack cable device that shuts the unit down when slack in the hoisting cable is sensed. The switch has a manual reset that must be pressed to put the unit back in service.

Signal Operation When Applicable

COMBINATION DOOR OPEN/ IN-USE LIGHT:

The in-use light in each pushbutton station will be illuminated each time the car is in transit. The light will remain lit until the car reaches the destination floor and the doors are opened or the non-interference has timed out. The light will also illuminate if a pushbutton is pressed and a hoistway door or car gate has been left open.

CAR ARRIVAL CHIME:

The car arrival chimes enunciates the arrival of the car at the destination floor. The chime can be wired to sound once or twice.

CAR HERE LIGHT:

When the car reaches a designated floor the car here jewel will be illuminated. The light will remain on while the hoistway door is in the closed position or until the car leaves the floor.

DOOR OPEN BUZZER:

The buzzer will sound each time a pushbutton is pressed and any hoistway door or car gate is in the open position.

OPERATION OF SPECIAL EQUIPMENT

POWER GATE AND DOORS:

Power gate and doors have two basic methods of operation. The first method is that the door and gate are opened by momentarily pushing the **Door Open** button on the control station, which causes the gate to engage the door, and then opens the door and gate together. To close the door and gate the **Door Close** button is pressed and held until the door and gate are fully closed. If pressure on the button is removed before the door and gate are in the closed position, the gate will stop and the button will have to be pressed again to fully close the door. The car may then be called or sent to another floor.

The second method is automatic opening. When the car arrives at the destination floor the gate engages the door and both the gate and door open together. The gate may then be closed by pressing and holding the Door Closed button as described previously, or after a set time period, a door closing buzzer will sound prior to closing, and then the door and gate will close automatically. After closing, the car is then ready to be sent or called to another floor.

POWER GATE ONLY:

When a unit is supplied with only a power operated gate the gate opening and closing is controlled by the operation of the hoistway door. When the hoistway door is opened manually the gate then proceeds to open. When the hoistway door is closed the gate then closes and the car is then ready to be sent or called to another floor.

RETIRING CAM:

The retiring cam is actuated when a floor button is pressed. When the Cam retires, the locked contacts of the Hoistway door Interlock are closed and the car then proceeds to the destination floor. Upon arrival at the destination floor the cam relaxes and unlocks the hoistway door.

ILLUMINATED PUSHBUTTONS:

The buttons used to call and send the VRC will illuminate when the button is pressed. The button will remain illuminated until the car reaches the designated floor.

KEYED STATIONS:

All or some stations on a VRC unit may be furnished with a key on/off. This allows only authorized personnel to use the unit.

HEPA FILTER SYSTEMS:

Filter units are supplied to Matot by end user. Matot then designs the required sheet metal enclosure and mounts the filter system to the car top. These systems may be set up to filter air from the hoistway or to re-circulate the air in the VRC car.

CYLINDER LOCKS:

These locks may be provided to keep unauthorized users from opening the hoistway doors. The cylinder locks are BEST brand and are supplied with a construction core. Locks may then be keyed to match existing key systems.

SUGGESTED MAINTENANCE

This information is to be used only by **Qualified Elevator Service Personnel** in properly maintaining VRC components.

DISCONNECT AND LOCK OUT POWER BEFORE PERFORMING MAINTENANCE ON THE UNIT!

CONTROL EQUIPMENT:

Pushbuttons, Hoistway Switches, Controller components, and Interlock contacts do not require any regular attention as long as the equipment is functioning properly.

Depending on the environment, the inside of the control cabinet may need to be cleaned periodically.

MOTOR:

Standard single speed motors 1hp to 3hp have shielded bearings and will not require lubrication. Special purpose motors such as Vector or DC types may have grease fittings and will require periodic lubrication, see Motor supplement sheets for information.

BRAKE:

The amount of usage the VRC receives will determine how often adjustment will have to be made. Brake discs or shoes should be replaced when wear adjustments have reached near the maximum.

SPEED REDUCER:

See Speed Reducer service bulletin for lubrication instructions.

CABLE DRUM:

Drum does not require regular maintenance.

TRACTION SHEAVES:

Inspect Drive Sheave every six months for excessive wear. Sheaves must be replaced if the undercut of the groove no longer exists.

Flange bearings and Pillow block bearings are sealed and require no regular maintenance.

HOIST CABLE AND FITTINGS:

Inspect cable at least twice a year. If cable(s) has broken strands, kinks, or bent portions replace the cable(s) immediately. Check and tighten, if necessary, rope clips.

HOISTWAY DOORS:

Chain deflecting sheaves have sealed bearings and require no lubrication. Roller chain should be lightly lubricated every six months. Interlock keeper should be checked on each maintenance call to verify that the keeper is securely fastened to door panel and is engaging the interlock properly.

GUIDE RAILS:

Guide rails should be kept clean and free of excess grease or oil. Lightly lubricate the guide rails every 90 days. Only a thin film of lubricant is necessary on actual wear surfaces. We recommend the use of Nylube No. 150 Paste or any other equivalent rail lube.

SUGGESTED MAINTENANCE (CONTINUED)

OVERHEAD DEFLECTING SHEAVE:

Drum below units utilize a cable deflecting sheave that is mounted to, or near, the top of the guide rails. On Residential Light Duty units this sheave is equipped with a sintered bronze bushing which requires a few drops of light grade machine oil every 6 months. Model series 100 units utilize a sheave with a needle bearing and grease fitting. The sheave should be inspected every 6 months and lubricated with a No. 2 cup grease if necessary. Pump grease into fitting until it squeezes out around the hub.

VRC CAR:

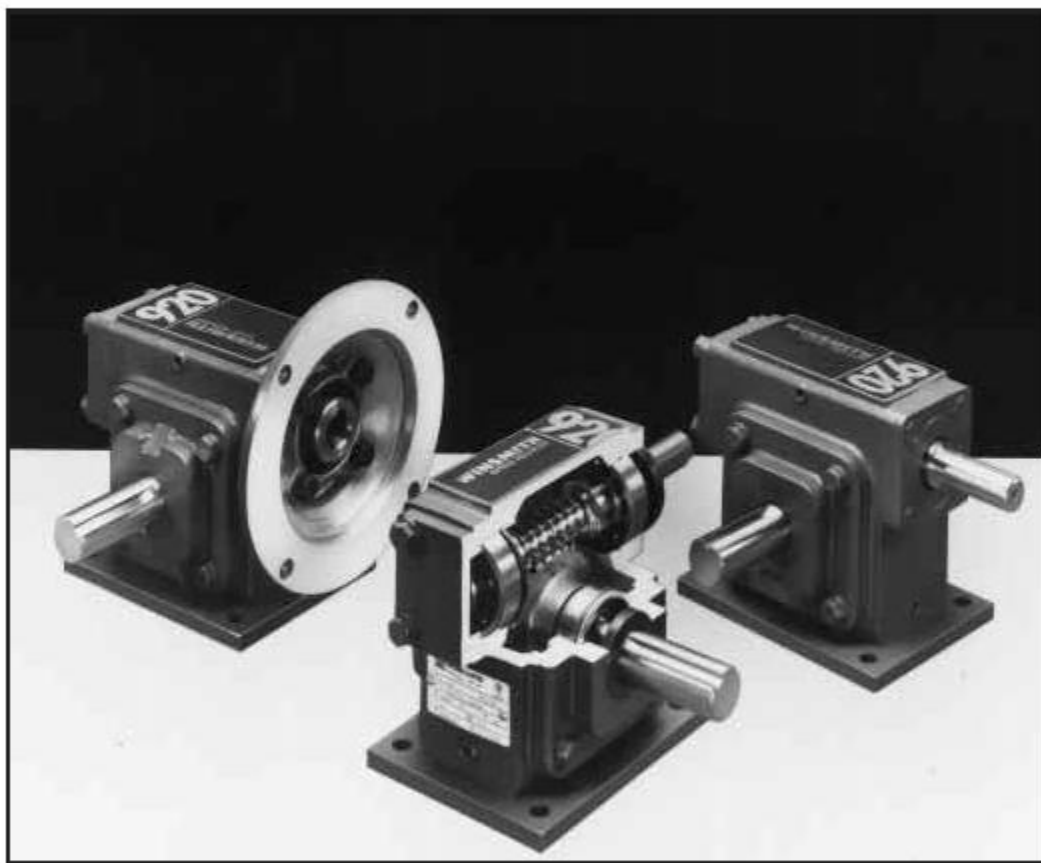
The Car for drum below units will typically have 2 deflecting sheaves mounted to the car top. These sheaves are equipped with a sintered bronze bushing which requires a few drops of light grade machine oil every 6 months.

The Car for drum overhead units will typically have 1 deflecting sheave mounted to the car top. This sheave is equipped with a needle bearing and grease fitting. The sheave should be inspected every 6 months and lubricated with a No. 2 cup grease if necessary. Pump grease into the fitting until it squeezes out around the hub.

CAR GUIDE SHOES:

Shoes should be checked on each maintenance call for excessive wear. Worn guide shoes can affect the proper camming of hoistway switches and create potential problems.

D-90[®] TYPE SE[®] SPEED REDUCERS



Installation, Operation, and Lubrication Instructions

This Engineering Service Bulletin is designed to enable users to obtain the best possible performance from their WINSMITH[®] Speed Reducers.

I. SELECTION

The selection of the appropriate speed reducer for a given application requires that all factors affecting the operation of the unit be given careful consideration. Service factors must be applied to catalog ratings depending on the type of prime mover used, severity of the application and duration of daily service. If you have any questions relative to the suitability of your WINSMITH® speed reducer for your particular application, refer to the selection section of the appropriate WINSMITH catalog, or contact your WINSMITH representative or distributor.

II. INSTALLATION

1. Shaft Alignment

A. The various drive members (motor, speed reducer, couplings, sprockets, sheaves, gears, etc.) should be aligned as accurately as possible to guard against unusual stresses and overloads imposed by misalignment.

B. If a prime mover shaft is to be directly connected to the high speed (input) shaft or if the slow speed (output) shaft is to be directly connected to the driven shaft, flexible couplings should be used. It should be remembered that even flexible couplings have limited ability to accommodate misalignment. Care must be taken at installation to insure that shaft alignments are within the limits recommended by the coupling manufacturer. Use of a rigid coupling to connect speed reducer shafts to other drive components is not recommended as it is almost impossible to obtain exact alignment between two shafts.

C. A common base plate supporting the motor and reducer will help preserve the original alignment between reducer and motor shafts. If a structural steel base is used, the plate should be at least equal in thickness to the diameter of the bolts used to fasten the speed reducer to the base plate. Also, for sufficient rigidity, the design in general including angle or channel members should be substantial enough to prevent flexing under vibration. After the first week or two of operation all of the bolts and nuts used to fasten the reducer and motor, pedestal, etc., to the base plate should be retightened. Vibration tends to loosen the nuts even if tight initially. Dowelling the motor and speed reducer to the base plate will help insure that alignment is maintained.

2. Mounting Positions

A. Single reduction units are designed to accommodate most standard mounting positions.

Figure 1 illustrates the utility plug locations for each based on model. All standard single reduction models are equipped with an internal splash shield located near the worm. This shield deflects the oil from the vent, preventing leakage when the vent plug is adjacent to the worm (as on the DT or DV standard mounting). When this location is used as a drain (as on the DV sidewall, worm under), drainage will be better facilitated if done at or near the operating temperature. Filling from this location is not recommended, as the shield will impede the oil flow rate. Bearings are splash lubricated provided the input speed is 1160 RPM or greater. Contact the factory when input speeds fall below this.

B. Double reduction models are built to accommodate one mounting position as specified during order entry. Standard mounting positions, furnished unless otherwise specified, are shown in Figure 2 which also illustrates the utility plug locations. Note that the mounting position relates to the main housing orientation. Standard units have an oil level common to both housings and do not use an intermediate oil seal. The vent plug is located in the main housing where the slower worm speed eliminates the need for a vent shield. Grease fittings (not shown in Figure 2) are used to lubricate bearings when oil splash does not serve this purpose (as with the DV or DL upper slow speed bearing).

3. Venting

During operation, the heat generated by the gearbox will cause the air and lubricant inside the unit to expand. A vent plug is used to equalize the resulting pressure, the location of which is dependent on the model and mounting position. Before putting the unit into service, review Figures 1 and 2 and relocate the vent plug (if necessary) as shown for the appropriate model and mounting position. Double reduction models (Figure 2) are vented in the main housing only. To prevent loss of oil during shipment, the vent plug includes a brass pin which must be removed prior to operation. If a speed reducer is installed in an atmosphere containing exceptional amounts of moisture or dust, a shielded or hooded vent plug should be used. For intermittent duty applications, where the operating temperature does not rise more than about 20 degrees F, internal pressure build-up is minimal and venting is not necessary. Some models are available with an optional internal expansion chamber allowing units to be totally sealed.

Contact us for more details.

4. C-Flange Motor Mounting Procedures

A. Mounting Motor to C-Flange Reducer With Hollow Input Shaft

Check motor and reducer mounting registers for nicks that would interfere with assembly. Remove if necessary.

Remove protective plastic plug from reducer input shaft. The bore has been coated with an anti-seize compound.

Align the motor shaft and key with keyway in bore and slide motor up to flange.

Position the motor conduit box as desired.

Using the fasteners supplied, secure the motor to the reducer. Draw down evenly so as not to bend the motor shaft. Tighten fasteners to 200 inch pounds.

B. Mounting Motor to C-Flange Reducer With Coupling Adaptor

Check motor and reducer mounting registers for nicks that would interfere with assembly. Remove if necessary.

When assembling the motor and coupling, the coupling halves should be equally spaced on each shaft to insure adequate engagement. The following describes a method for doing this.

First determine the assembled shaft clearance by measuring the distance from the C-Flange face to the reducer shaft end and subtracting the motor shaft length. Mount and secure the motor shaft coupling half with the spider end extending one half the clearance distance beyond the motor shaft.

Mount the reducer coupling half and coupling spider on reducer shaft in its approximate position but do not secure.

Locate the motor conduit box in the desired position and secure the motor to the reducer flange using the fasteners provided. Tighten to about 200 inch pounds.

Using the access hole in the flange, slide the coupling together and tighten the set screw.

5. Unit Assembly/Disassembly

Instructions

Contact the factory for an instruction manual.

III. LUBRICATION & MAINTENANCE

1. Factory Filling

WINSMITH speed reducers are oil filled at the factory to the proper level for the standard mounting position as shown in Figures 1 or 2. The oil level should be checked and adjusted (if necessary) **prior to operation, using the oil level plug provided and while the unit is oriented in its operating position.**

2. Ambient Temperature

If the operating ambient temperature is other than 51-95°F, then refer to lubrication chart and refill the unit with the correct grade based on actual ambient temperatures and operating speed. See item 3 for additional information regarding oil changes.

3. Oil Changing

When changing oil for any reason, it should be remembered that oils of various types may not be compatible. Therefore, when changing to a different oil, it is recommended that the housing be completely drained and thoroughly flushed with a light flushing oil prior to refilling with the appropriate lubricant. The oil level should be rechecked after a short period of operation and adjusted, if necessary. When changing double reduction models, each housing should be drained and filled independently, even though there may be a common level.

A. Initial Oil Change

The oil in a new speed reducer should be changed at the end of 250 hours of operation. (30 days for 8 hour per day service, 15 days for 16 hour service, 10 days for 24 hour service).

B. Subsequent Oil Changes

Under normal conditions, after the initial oil change, the oil should be changed after every 2500 hours of operation, or every six months, whichever occurs first. Under severe conditions (rapid temperature changes, moist, dirty or corrosive environment) it may be necessary to change oil at intervals of one to three months. Periodic examination of oil samples taken from the unit will help establish the appropriate interval.

C. Synthetic Oils

Synthetic lubricants can be advantageous over mineral oils in that they generally are more stable, have a longer life, and operate over a wider temperature range. These oils are appropriate for any application but are especially useful when units are subjected to low start-up temperatures or high operating temperatures. However, continuous operation above 225°F may cause damage to seals or other components. It is recommended that the initial oil be changed or filtered after the first 1500 hours of operation to remove metal particles that accumulate during break-in. Subsequent oil changes should be made after 5000 hours operation if units are operating in a clean environment.

This can be extended to 10,000 hours if using new reformulated Mobil SHC lubricants (orange in color) and the lubricant remains free of contamination over this period. See comments under 3B for more severe ambient conditions.

4. Long Term Storage or Infrequent Operation

If a speed reducer is to stand idle for an extended period of time, either prior to installation or during use, it is recommended that the unit be filled completely with oil to protect interior parts from rust corrosion due to internal condensation. Be sure to drain the oil to the proper level before placing the speed reducer in service. A long term storage option is available on new units. Contact us for details.

5. Grease Fittings

Some units are equipped with grease fittings to lubricate bearings not adequately lubricated by the oil splash. These fittings must be lubricated every 3-6 months depending on operating conditions.

Bearing greases must be compatible with the type of gear lubricant being used (ie. mineral, synthetic, food grade, etc.) For mineral oils, use a high quality lithium base NLGI #2 bearing grease. For synthetic oils, use a synthetic bearing grease such as Mobil Synthetic Universal grease, Mobilith SHC 100 or a suitable equivalent. For food grade lubricants, use Chevron FM grease, NLGI 2, or equivalent.

6. Low Input Speeds (Under 1160 RPM)

When input speeds are less than 1160 RPM, grease fittings will be required to lubricate any bearings not partially covered by the normal oil level. Such units are considered non-standard and necessitate factory modification. If this low speed operating condition exists and units are without the appropriate grease fittings, please contact the factory.

7. Oil Temperature

Speed reducers in normal operation can generate temperatures up to 200°F depending on the type of reducer and the severity of the application (loading, duration of service, ambient temperatures).

Excessive oil temperatures may be the result of one or more of the following factors:

A. Overloads

Overloads may be due to the original unit selection being too small for the application, or increased loads on the speed reducer to a point where its rating is exceeded after it has been in service for a period of time. Always check the speed reducer rating when increasing driven loads or increasing the horsepower rating of the motor or other prime mover.

B. Overfilling or Underfilling

If a speed reducer is overfilled with oil, the energy used in churning the excessive oil can result in overheating. If this occurs, shut down the drive, remove the oil level plug and allow oil to drain until

oil ceases to drain from the level hole, reinstall the oil level plug and restart the drive. If the speed reducer is underfilled, the resultant friction can cause overheating and possible damage. If this occurs, fill the speed reducer to the oil level plug hole and check the gearing for excessive wear.

C. Inadequate Cooling

In order to dissipate internally generated heat, the speed reducer must be installed in such a way that air can circulate freely. Tightly confined areas (inside cabinets, etc.) should be avoided.

If this is not possible, forced air cooling by means of a separate blower should be used.

8. Oil Seals

Although WINSMITH uses high quality oil seals and precision ground shafts to provide a superior seal contact surface, it is possible that circumstances beyond WINSMITH's control can cause oil seal leakage (damage during shipment or installation, etc.). When replacing a shaft oil seal, using the following suggestions will help to insure leak-free operation and long seal life.

A. When installing a new seal, cover the keyway and any other surface discontinuity with smooth tape to protect the seal lip from being damaged.

B. A sealant should be used between the O.D. of the seal and the I.D. of the bore into which the seal is installed. The seal bore should also be free of any burrs, nicks, or scratches.

C. Be sure that the seal is not cocked in the seal bore. The outer face of the seal should be flush with the surface into which it is mounted

STANDARD MOUNTING POSITIONS **D-90[®] TYPE SE[®]**

BASIC MODEL	TRADITIONAL MOUNTING	INVERTED MOUNTING	ADDITIONAL MOUNTING POSITIONS			
			INPUT SHAFT HORIZONTAL		INPUT SHAFT VERTICAL	
DB DD DJ DN DT DU WS WT WU						
DV						
DL		SPECIAL Contact the Factory				
DBF			SPECIAL Contact the Factory			
DBN DBR DBU						

Note: Single Reduction 935 and 943 standard models are supplied with grease fittings on the input shaft to insure bearing lubrication for all mounting positions.

F = Fill Plug

V = Vent Plug

L = Level Plug

D = Drain Plug

GF = Grease Fitting

Figure 1. Single Reduction Models

DOUBLE REDUCTION* WORM/WORM		DOUBLE REDUCTION* HELICAL/WORM	
OTHER ATTACHMENT HOUSING POSITIONS		OTHER ATTACHMENT HOUSING POSITIONS	

Plug locations apply to motorized units also.

Contact the factory when input speeds are less than 1160 RPM to insure proper lubrication.

*Double Reduction units are not universal mounting. Mountings other than standard require a special outline.

Figure 2. Double Reduction Models

Lubricants

Worm Gear Reducers

For special applications that involve severe ambient temperature extremes or a seasonal oil requirement, WINSMITH, based on extensive testing and field experience, recommends the use of Mobil SHC synthetic lubricants.

Ambient Temperature	-30 to 15°F	16 to 50°F	51 to 95°F	51 to 95°F	96 to 131°F	96 to 131°F
Final Stage Worm Speed*	up to 2000 FPM	up to 2000 FPM	up to 450 FPM	above 450 FPM	up to 450 FPM	above 450 FPM
ISO Viscosity Grade	220	460	680	460	680	460*
AGMA Lubricant No.	5S**	#1 Compounded***	#8 Compounded***	#7 Compounded***	8 S**	7S**

Mobil	SHC 630	600W Super Cylinder	Extra Hecla Super	600W Super Cylinder	SHC 636	SHC 634
American Lubricants	SHC-90W	AGMA #7 Gear Oil	AGMA #8 Gear Oil	AGMA #7 Gear Oil	N/A	N/A
Castrol	Tribol 800/220	Tribol 1105-7C	Tribol 1105-8C	Tribol 1105-7C	Tribol 800/680	Tribol 800/460
Chevron	Tegra 220	Cylinder Oil W460	Cylinder Oil W680	Cylinder Oil W460	Tegra 680	Tegra 460
Conoco	Syncon R & O 220	Inca Oil 460	Inca Oil 680	Inca Oil 460	N/A	Syncon R & O 460
Exxon (Esso)	Teresstic SHP 220	Spartan EP 460	Spartan EP 680	Spartan EP 460	Teresstic SHP 680	Teresstic SHP 460
Fiske Brothers	SPO-MG	SPO-277	SPO-288	SPO-277	N/A	N/A
Shell	Omala RL 220	Valvata J 460	Valvata J 680	Valvata J 460	Omala RL 680	Omala RL 460
Totaco	Pinnacle 220	Vanguard 460	Vanguard 680	Vanguard 460	Pinnacle 680	Pinnacle 460

**synthetic oil

***3% to 10% fatty or synthetic oils or mild EP additives

Lubricant selections are provided by the lubricant manufacturer based on AGMA recommended viscosity grades.

Viscosity grades are based on Lubrication Standard ANSI/AGMA 9005-D94.

*The sliding velocity in feet per minute (FPM) for standard ratios is determined by multiplying the speed of the worm in RPM by the factor from the following table. For selecting the proper lubricant, use the speed of the worm in the final stage (input RPM divided by the first stage ratio).

Nominal Ratio												
SIZE	5	7.5	10	15	20	25	30	40	50	60	80	100
910	0.153	—	0.137	0.133	0.122	0.116	0.132	0.121	0.115	—	—	—
913	0.231	0.189	0.183	0.179	0.171	0.165	0.178	0.169	0.164	0.161	—	—
917	0.303	0.229	0.201	0.193	0.180	0.172	0.189	0.176	0.170	0.166	0.161	0.133
920	0.347	0.263	0.225	0.216	0.202	0.191	0.215	0.200	0.188	0.182	0.164	0.161
924	0.412	0.312	0.261	0.256	0.236	0.223	0.249	0.231	0.216	0.210	0.201	0.196
926	0.455	0.345	0.283	0.276	0.254	0.238	0.269	0.249	0.234	0.225	0.215	0.210
930	0.520	0.395	0.327	0.317	0.291	0.273	0.307	0.285	0.269	0.258	0.246	0.241
935	0.607	0.461	0.427	0.412	0.373	0.349	0.403	0.367	0.345	0.330	0.311	0.299
943	0.633	0.588	0.568	0.553	0.507	0.558	0.544	0.501	0.475	0.457	0.435	0.422



PEERLESS-WINSMITH, INC.

SPRINGVILLE OPERATIONS • 172 EATON STREET, P.O. BOX 530, SPRINGVILLE, NY 14141-0530

PHONE: 716/592-9310 • FAX: 716/592-9546

<http://www.winsmith.com> e-mail=winsmith@winsmith.com



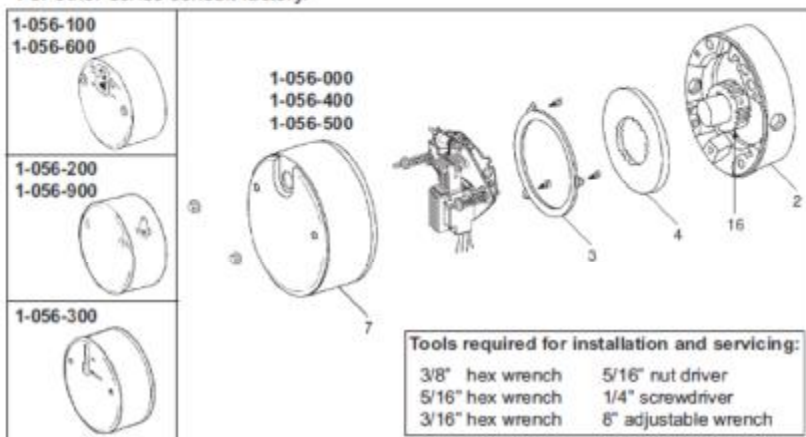
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Stearns® Spring-Set Disc Brakes

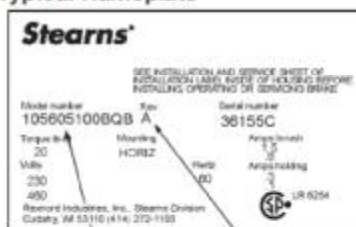
P/N 8-078-905-60
effective 09/21/06

Installation and Service Instructions for 1-056-X00* Series (all revisions) Manual Adjust Brakes

*This sheet includes Series 1-056,000; 1-056,100; 1-056,200;
1-056,300; 1-056,400; 1-056,500; 1-056,600 and 1-056,900.
For other series consult factory.



Typical Nameplate



Important

Please read these instructions carefully before installing, operating, or servicing your Stearns Brake. Failure to comply with these instructions could cause injury to personnel and/or damage to property if the brake is installed or operated incorrectly. For definition of limited warranty/liability, contact Rexnord Industries, LLC, Stearns Division, 5150 S. International Dr., Cudahy, WI 53110, (414) 272-1100.

Caution

1. Installation and servicing must be made in compliance with all local safety codes including Occupational Safety and Health Act (OSHA). All wiring and electrical connections must comply with the National Electric Code (NEC) and local electric codes in effect.
2. Do not operate the brake in atmospheres containing explosive gases or dusts.

3. To prevent an electrical hazard, disconnect power source before working on the brake. If power disconnect point is out of sight, lock disconnect in the off position and tag to prevent accidental application of power.

4. Make certain power source conforms to the requirements specified on the brake nameplate.
5. Be careful when touching the exterior of an operating brake. Allow sufficient time for brake to cool before disassembly. Surfaces may be hot enough to be painful or cause injury.
6. Do not operate brake with housing removed. All moving parts should be guarded.
7. Installation and servicing should be performed only by qualified personnel familiar with the construction and operation of the brake.
8. For proper performance and operation, only genuine Stearns parts should be used for repairs and replacements.

9. After usage, the brake interior will contain burnt and degraded friction material dust. This dust must be removed before servicing or adjusting the brake.

DO NOT BLOW OFF DUST using an air hose. It is important to avoid dispersing dust into the air or inhaling it, as this may be dangerous to your health.

For replacement parts refer to sheets:

Series	Sheet Part No.
1-056-000	8-078-906-00
1-056-100	8-078-906-01
1-056-200	8-078-906-02
1-056-300	8-078-906-03
1-056-400	8-078-906-04
1-056-500	8-078-906-05
1-056-600	8-078-906-06
1-056-900	8-078-906-09

Also available at www.rexnord.com

- a) Wear a filtered mask or a respirator while removing dust from the inside of a brake.

- b) Use a vacuum cleaner or a soft brush to remove dust from the brake. When brushing, avoid causing the dust to become airborne. Collect the dust in a container, such as a bag, which can be sealed off.

10. **Caution!** While the brake is equipped with a manual release to allow manual shaft rotation, the motor should not be run with the manual release engaged, to avoid overheating the friction disc(s).

General Description

These series of brakes are spring-set, electrically released. They contain one or more rotating friction discs (4) driven by a hub (16) mounted on the motor or other shaft.

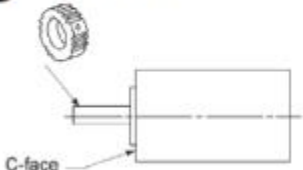
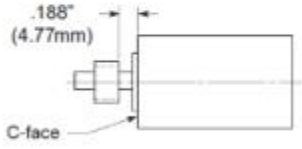
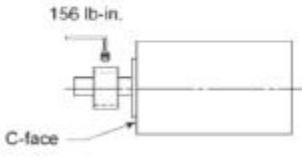
Operating Principle

These series contain one or more friction discs (4) assembled alternately between the endplate (2) friction surface, stationary disc(s) (3) and pressure plate (also called stationary disc) (3). The stationary disc(s) are restrained from rotating by being keyed into the endplate. With the brake released, all disc pack components are free to slide axially and the friction disc(s) to rotate.

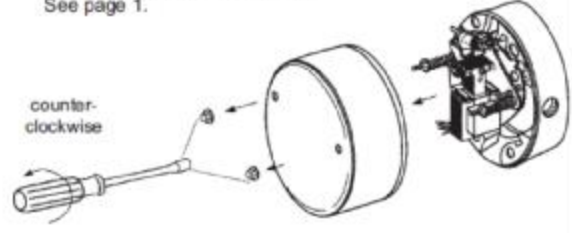
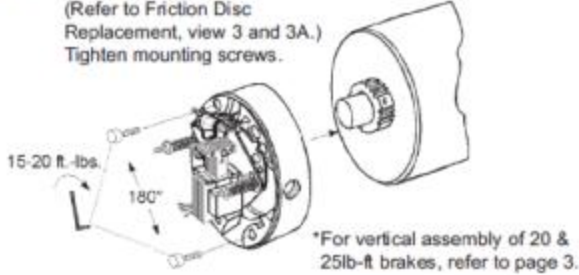
Brake release occurs when the solenoid coil is electrically energized, causing the solenoid plunger to travel a specified distance and through a lever system, overcoming the pressure spring force. This action releases the clamping force on the disc pack, thereby allowing the friction disc(s) and brake hub to rotate.

Brake sets and torque is produced when electric current to the solenoid coil is interrupted, thereby collapsing the solenoid magnetic field. The solenoid plunger returns to its original de-energized position allowing the lever arm to move forward by virtue of the compressed torque springs. This action compresses the disc pack components which applies a retarding torque to the brake hub and ultimately restores the brake to a spring-set static condition.

BRAKE MOUNTING (Manual Adjust) 1-056-X00

- 1** Place hub on motor shaft.
 
- 2** Position hub on shaft as shown.
 
- 3** Tighten set screws to motor shaft.
 
- 4** Remove brake housing.

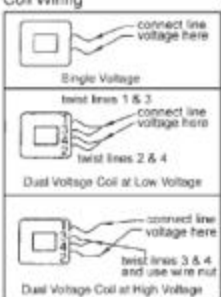
Housings vary by series number. See page 1.


- 5** Slide endplate over hub noting position of stabilizer clips, if used. (Refer to Friction Disc Replacement, view 3 and 3A.) Tighten mounting screws.
 

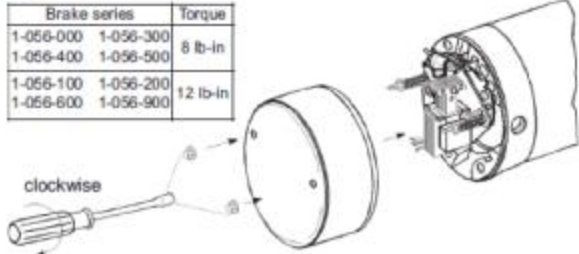
*For vertical assembly of 20 & 25lb-ft brakes, refer to page 3.
- 6** AC coils are 50/60 Hz, single phase rated. Power supply to coil must not have current or frequency limiting output that is less than the coil requirement.
 - Connect leadwires to power source. Verify voltage rating* per nametag on coil.
 - Keep wiring away from pinch points and moving components.

* For DC voltages see sheet 8-078-950-00.

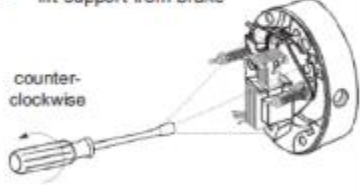
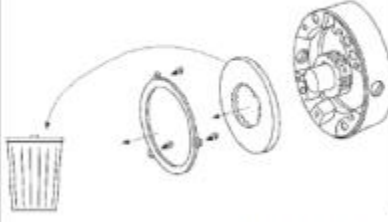
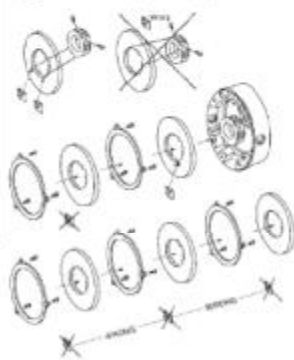
Coil Wiring


- 7** Replace brake housing and tighten to torque specified below:

Brake series	Torque
1-056-000 1-056-300	8 lb-in
1-056-400 1-056-500	12 lb-in
1-056-100 1-056-200	12 lb-in
1-056-600 1-056-900	12 lb-in



FRICION DISC REPLACEMENT SERIES 1-056-X00

- 1** Remove support plate screws and lift support from brake.
 
- 2** Remove and discard old friction disc.
 
- 3** Install new friction disc(s) and stationary disc(s) as shown.
 


Note: Stabilizer clips should never be located over the set screws of the hub.

Single disc brakes always use two stabilizer clips, locate at 90° from each other.

Double disc brakes typically will not require stabilizer clips, however there are some special modifications that will use them.

Rev A & B may have these clips may have these clips located 1 per disc, and should never be positioned in line with each other.

Rev C will have only one clip, used on the inner-most disc. No clip will be used on the outer-most disc.

Three disc brakes will never use stabilizer clips on friction discs.
- 4** Reposition support plate on endplate and tighten mounting screws to 55 lb-in.
 

Note: Friction discs can wear to 1/2 their original thickness, or .093"

AIR GAP ADJUSTMENT 1-056-X00

As friction disc wear the air gap will increase. When plunger gets to the reset position, the air gap must be adjusted.

- 1** To increase air gap, turn both adjusting screws (10) counterclockwise. Use 3/16 hex wrench, or flat screwdriver on older models.

56,X00 Series Air Gap* (REV A & B)

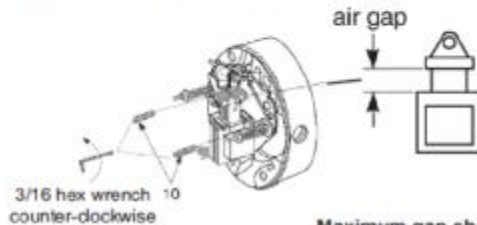
Disc	Torque	Min/Max
1	1.5, 3 & 6	.38" ± .09"
2	10 & 15	.45" ± .09"
3	20 & 25	.50" ± .09"

*±.03"

56,X00 Series Air Gap* (REV C)

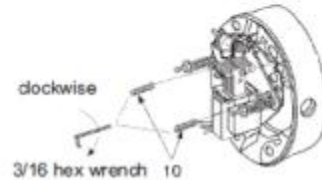
Disc	Torque	Min/Max
2	3, 6, 10 & 15	.45" ± .09"
3	20 & 25	.50" ± .09"

*±.03"



Maximum gap should not exceed .69"

- 2** To decrease air gap, turn both adjusting screws (10) clockwise.



COIL REPLACEMENT SERIES 1-056-X00

Remove housing and disconnect power and wiring to coil.

- 1** Insert screwdriver between support plate and lever arm and pry forward.



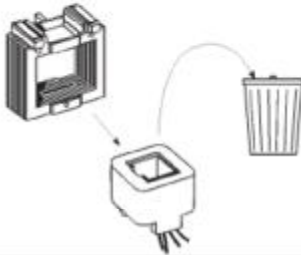
- 2** Lift plunger/solenoid lever assembly out of coil.



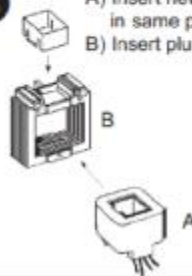
- 3** Remove plunger guide.



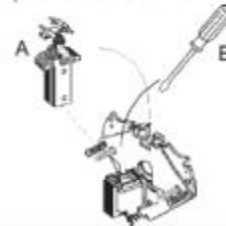
- 4** Discard coil.



- 5** A) Insert new coil. (Lead wires in same position as old coil.)
B) Insert plunger guide.



- 6** A) Re-insert plunger into coil; drop pivot pin into cradle of support plate.
B) Remove screwdriver.



Reconnect coil and replace housing per installation instructions, page 2.

VERTICAL SPRING ASSEMBLY 1-056-X00

Vertical Brake Assembly

Single disc brakes are universal mount and do not require separator springs. Double disc brakes are universal mount but require separator springs which are preassembled to the stationary disc. These discs are inserted spring first into the brake. Refer to figure 5A below.

2 Friction Disc

Vertical Above
Vertical Below

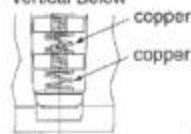


Figure 5A

Installation Procedure for 20 and 25 lb-ft brakes if mounted vertical to motor shaft (These brakes are factory assembled for horizontal operation.) Remove support plate by loosening the three mounting screws.

Remove stationary discs and friction discs. Using the spring kit provided with this brake, insert three springs of identical color into each stationary disc hole. Springs are inserted from the side opposite the indent mark (see Figure 5B). Stationary disc should be placed on a clean flat surface with a clearance hole to allow the tip of the spring to extend through the bottom side of the stationary plate. Using the 1/8" pin provided and a hammer, drive the spring until the large coil diameter bottoms out against the disc.

Reassemble the disc pack with the stationary discs in the proper arrangement shown in Figure 5C.

Mount support plate and torque screws evenly to 55 lb-in.

20, 25 lb-ft Horizontal

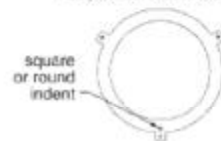


Figure 5B

3 Friction Disc

Vertical Above

Vertical Below

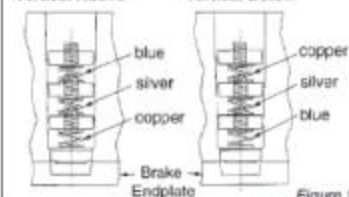


Figure 5C

TORQUE ADJUSTMENT

Torque Adjustment

Brake is factory set for nominal rated static torque which is maximum torque. Torque may be decreased up to 50% for increased stopping times up to 2 second stop time.

The torque on the 1-1/2 lb-ft brake may not be reduced.

Turn both spring adjustment screws (11), Figure 6, equal amounts counterclockwise to decrease torque. See Table A for torque reduction permissible amounts.

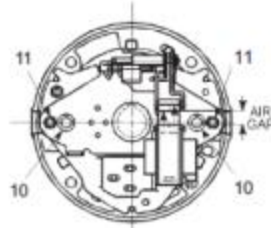


Figure 6

TABLE A

Nominal Static Torque (lb-ft)	Original Spring Height (inches)	Maximum Counter-clockwise Turns	% Torque Reduction per Turn
1-1/2	1.56"	-	-
3	1.50"	5-1/2	9%
6	1.50"		
10	1.56"		
15	1.56"		
20	1.56"		
25	1.50"		

TROUBLESHOOTING

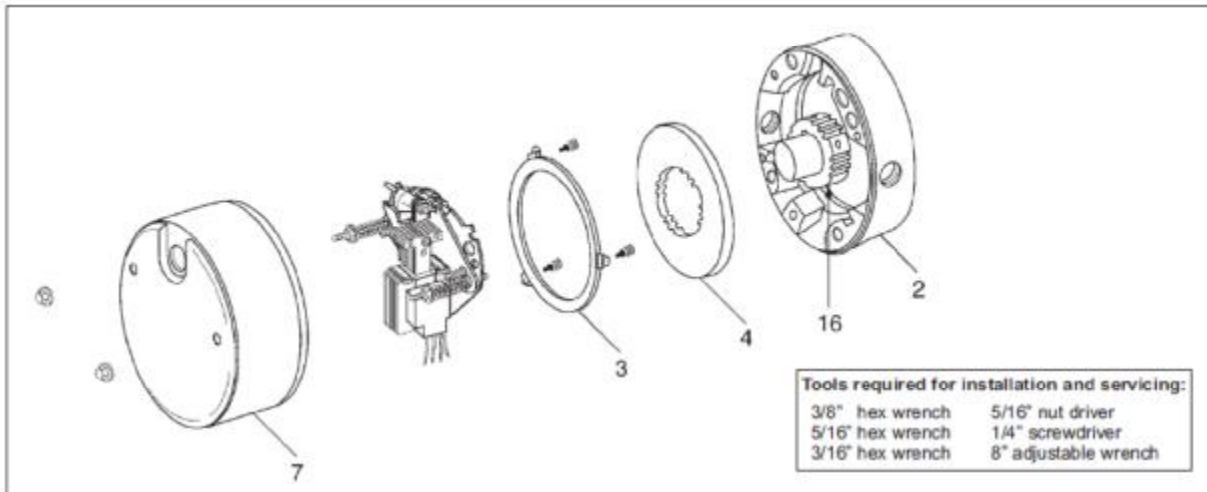
COIL FAILURE		EXCESSIVE WEAR / OVERHEATING	
SUPPLY VOLTAGE CAUSE	SUPPLY VOLTAGE CORRECTION	AIR GAP CAUSE	AIR GAP CORRECTION
Line voltage >110% of coil rating	Reduce voltage or replace with proper rated coil	Low solenoid air gap	Reset air gap (refer to Air Gap Adjustment)
AC input on a DC coil	Replace rectifier or replace with proper rated coil.	Disc pack dragging	Inspect endplate, hub and discs for dirt, burrs, wiring and other sources of interference preventing disc "float"
Excessive voltage drop during inrush time	Increase current rating of power supply.	CYCLE RATE CAUSE	CYCLE RATE CORRECTION
WIRING CAUSE	WIRING CORRECTION	Brake "jogging" exceeding coil cycle rate	Reduce cycle rate or consider alternate control method
Leadwires interfering with plunger pull-in	Reroute wiring away from plunger and other moving components.	Thermal capacity is being exceeded	Reduce cycle rate, use alternate control method or increase brake size
Excessive voltage drop during inrush time	Increase leadwires size from power supply	ALIGNMENT CAUSE	ALIGNMENT CORRECTION
Coil leadwire shorted to ground	Replace coil or leadwire and protect with wire sleeving	Broke endplate not concentric to motor C-Face	Motor register must be within .004" on concentricity.
SOLENOID ASSEMBLY CAUSE	SOLENOID ASSEMBLY CORRECTION	Motor shaft runout is excessive	Must be within .002"; runout; consult motor manufacturer
Plunger not seating flush against solenoid frame	Loosen solenoid mounting screws and reposition frame to allow full face contact	Brake is being operated on a incline greater than 15° above or below horizontal	Vertical separator springs must be used to prevent discs from becoming cocked
Plunger cocked in coil preventing pull-in	Realign solenoid frame	WORN PARTS CAUSE	WORN PARTS CORRECTION
Excessive solenoid/plunger wear at mating surface	Replace solenoid assembly	Friction disc excessively worn (disc can wear to 1/2 original thickness or .093")	Replace friction discs.
Broken shading coils	Replace solenoid assembly	Endplate, stationary disc or pressure plate warped	Replace warped or worn component
WORN PARTS CAUSE	WORN PARTS CORRECTION	Linkages and/or pivot pins worn	Replace all worn components
Excessive wear of solenoid link arm and/or shoulder bolt	Replace link arm and link bolt; also inspect plunger thru-hole for elongation	Motor shaft endfloat excessive	Endfloat must not exceed .020"; consult motor manufacturer
Plunger guides worn down and interfering with plunger movement	Replace guides	HUB CAUSE	HUB CORRECTION
APPLICATION CAUSE	APPLICATION CORRECTION	Burr on hub interfering with disc "float"	File off burr
Machinery cycle rate is exceeding brake rating	Reduce brake cycle rate or use alternate control method	Set screw backed out and interfering with disc	Retighten set screw; use Loctite® 242 to help secure
High ambient temperature (>110%) and thermal load exceeding coil insulation rating	Use Class H rated coil and /or find alternate method of cooling brake	MISCELLANEOUS	MISCELLANEOUS
Brake coil wired with windings of an Inverter motor or other voltage/current limiting device	Wire coil to dedicated power source with instantaneous coil rated voltage	Solenoid plunger not pulling completely	Check line voltage (±10% of nameplate rating) or replace worn solenoid assembly
Wiring is restricting disc pack movement		Wiring is restricting disc pack movement	Reroute wiring
MISCELLANEOUS CAUSE	MISCELLANEOUS CORRECTION	Excessive stop time (2 seconds or greater)	Increase brake size/torque or use alternate control method
Wrong or over tightened torque	Replace with proper spring or refer to Installation section for proper spring height	High Ambient temperature (in excess of 110°F)	Reduce cycle rate or use alternate method of cooling
Excessive air gap	Reset, refer to Installation Section 4		

Rexnord Industries, LLC., Stearns Division, 5150 S. International Dr., Cudahy, WI 53110, (414) 272-1100 Fax: (414) 277-4364 www.rexnord.com

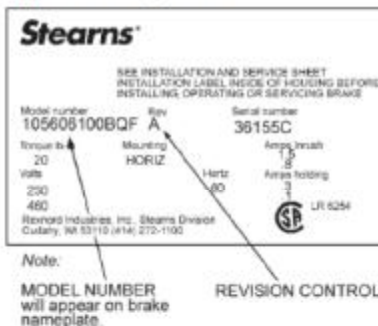
Parts List

for 1-056-000 Series (rev. A, B & C)
Manual Adjust Brakes

For Installation and Service instructions refer to sheet part number 8-078-905-60. Instructions and parts list also available at www.rexnord.com.



Typical Nameplate



Important

Please read these instructions carefully before installing, operating, or servicing your Stearns Brake. Failure to comply with these instructions could cause injury to personnel and/or damage to property if the brake is installed or operated incorrectly. For definition of limited warranty/liability, contact Rexnord Industries, Inc., Stearns Division, 5150 S. International Dr., Cudahy, WI 53110, (414) 272-1100.

Caution

1. Installation and servicing must be made in compliance with all local safety codes including Occupational Safety and Health Act (OSHA). All wiring and electrical connections must comply with the National Electric Code (NEC) and local electric codes in effect.

2. Do not operate the brake in atmospheres containing explosive gases or dusts.
3. To prevent an electrical hazard, disconnect power source before working on the brake. If power disconnect point is out of sight, lock disconnect in the *off* position and tag to prevent accidental application of power.
4. Make certain power source conforms to the requirements specified on the brake nameplate.
5. Be careful when touching the exterior of an operating brake. Allow sufficient time for brake to cool before disassembly. Surfaces may be hot enough to be painful or cause injury.
6. Do not operate brake with housing removed. All moving parts should be guarded.
7. Installation and servicing should be performed only by qualified personnel familiar with the construction and operation of the brake.
8. For proper performance and operation, only genuine Stearns parts should be used for repairs and replacements.
9. After usage, the brake interior will contain burnt and degraded friction material dust. This dust must be removed before servicing or adjusting the brake.

DO NOT BLOW OFF DUST using an air hose. It is important to avoid dispersing dust into the air or inhaling it, as this may be dangerous to your health.

- Wear a filtered mask or a respirator while removing dust from the inside of a brake.
- Use a vacuum cleaner or a soft brush to remove dust from the brake. When brushing, avoid causing the dust to become airborne. Collect the dust in a container, such as a bag, which can be sealed off.

Information required when ordering replacement parts:

- Give part number of parts or kits needed, brake model number, and brake serial number. The brake model and serial number may identify special brakes not covered by this parts list
- When ordering hubs, specify shaft diameter (hub bore) and keyway.

•Enclosure is specified as follows:

NEMA 2 (formerly referred to as standard)
NEMA 4 (formerly referred to as DTWP dust-tight waterproof)
NEMA 4X (formerly referred to as BISSC washdown)

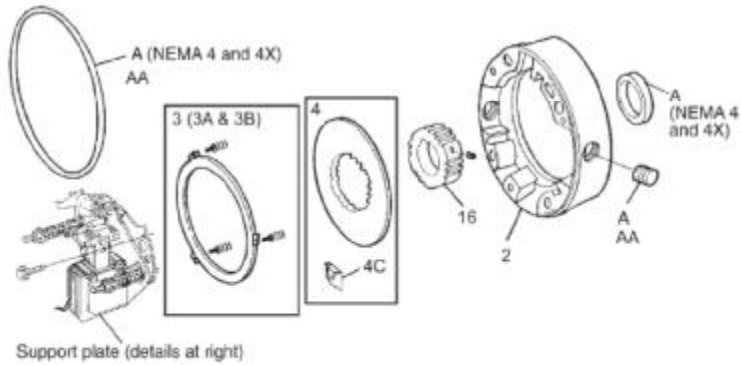
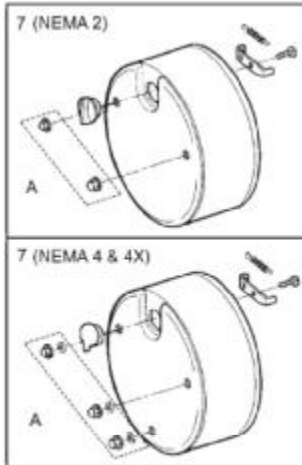


TABLE 1
Components of Standard AC or DC Brake

Item	Description		Part Number ↓	1-056-001-0	1-056-002-0	1-056-004-0	1-056-021-0	1-056-022-0	1-056-024-0	1-056-031-0	1-056-032-0	1-056-034-0	1-056-041-0	1-056-042-0	1-056-044-0	1-056-051-0	1-056-052-0	1-056-054-0
A	Hardware kit - NEMA 2 Hardware kit - NEMA 4 Hardware kit - NEMA 4X		5-66-1001-00 5-66-1002-00 5-66-1003-00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AA	Plug/Gasket kit ** Close couple	— NEMA 4 — NEMA 4X — NEMA 4 3 disc — NEMA 4X 3 disc	5-63-0532-00 5-63-0533-00 5-63-0534-00 5-63-0535-00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	Housing & release knob kit — NEMA 2 Housing & release knob kit — NEMA 4 Housing & release knob kit — NEMA 4X		5-66-8756-00 5-66-8757-00 5-66-8758-00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Not Shown	Release knob kit		5-63-5503-00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	Stationary disc kit (1 disc universal 3 disc horizontal)		5-66-8354-00	1	1	1	1	1	1							3	3	3
3A	Stationary disc kit (2 disc universal)		5-66-8355-00							1	1	1	1	1	1	1	1	1
3B	Stationary disc kit (3 disc universal)		5-66-8356-00													1	1	1
Not Shown	Vertical Spring Kit (3 disc)		5-63-0525-00													1	1	1
4	Friction disc kit		5-66-8462-00	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3
4C	Stabilizing clip (part of 5-66-8462-00)			2	2	2	2	2	2	*	*	*	*	*	*	*	*	*
DP	Disc pack kit — 1 disc Disc pack kit — 2 disc Disc pack kit — 3 disc		5-66-8601-00 5-66-8602-00 5-66-8603-00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	Hub and set screw assembly 1 & 2 disc (NEMA 2)	5/8 bore 7/8 bore 1-1/8 bore	5-16-5150-00-01B 5-16-5150-00-01D 5-16-5150-00-01E	1 1 1		1 1 1	1 1 1		1 1 1	1 1 1		1 1 1						
	Hub and set screw assembly 1 disc (NEMA 4 & 4X)	5/8 bore 7/8 bore 1-1/8 bore	5-16-5151-00-01B 5-16-5151-00-01D 5-16-5151-00-01E	1 1 1	1 1 1	1 1 1	1 1 1		1 1 1	1 1 1								
	Hub and set screw assembly 3 disc (NEMA 2) and 2 & 3 disc (NEMA 4 & 4X)	5/8 bore 7/8 bore 1-1/8 bore	5-16-5153-00-01B 5-16-5153-00-01D 5-16-5153-00-01E						1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1
2	Endplate and stationary disc assembly	1 & 2 disc (NEMA 2) 3 disc (NEMA 2) 1 disc (NEMA 4) 2 & 3 disc (NEMA 4) 1 disc (NEMA 4X) 2 & 3 disc (NEMA 4X)	5-02-5031-00 5-02-5032-00 5-02-5033-00 5-02-5034-00 5-02-5037-00 5-02-5038-00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

* Certain multiple friction disc model numbers require a single stabilizer clip (D1) added to each friction disc. If your brake has these clips, they must be replaced when the friction disc is replaced. This clip is included as part of the friction disc kit 5-66-8462-00.

** Close coupled brakes identified by 8 in the 8th digit. example: 1-056-XXX-8X.

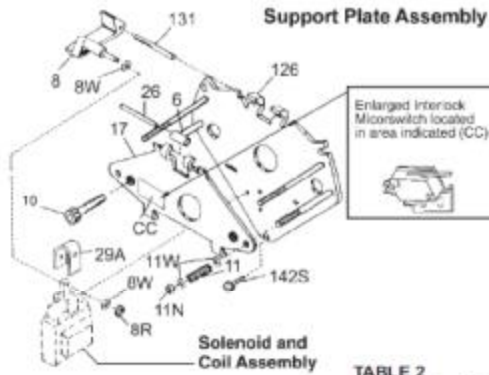


TABLE 2
Components of Support Plate
and Coil Assembly

Item	Description		Part Number ↓	5-42-5001-00-04	5-42-5001-00-14	5-42-5005-00-04	5-42-5005-00-14	5-42-5007-00-04	5-42-5007-00-14	5-42-5009-00-04	5-42-5009-00-14	5-42-5011-00-04	5-42-5011-00-14
6	Bearing		8-006-501-00	1	1	1	1	1	1	1	1	1	1
8	Solenoid lever		8-008-504-05	1	1	1	1	1	1	1	1	1	1
8R	Retaining ring		9-03-0057-00	1	1	1	1	1	1	1	1	1	1
8W	Spacer		9-45-0168-00	2	2	2	2	2	2	2	2	2	2
11N	Torque adjustment nut		9-40-3928-00	2	2	2	2	2	2	2	2	2	2
10	Wear adjustment screw		9-17-8420-00	2	2	2	2	2	2	2	2	2	2
11	Pressure spring		9-70-1215-00	2	2								
11W	Pressure spring		9-70-1523-00			2	2	2	2				
	Pressure spring		9-70-1524-00							2	2	2	2
	Spring washer		9-46-0010-00			4	4	4	4	4	4	4	4
17	Lever arm and stop nut assy.		5-17-5011-00	1	1	1	1	1	1	1	1	1	1
26	Bearing pin		9-29-4826-00	1	1	1	1	1	1	1	1	1	1
29A	Plunger stop		8-094-503-00	1	1	1	1	1	1	1	1	1	1
126	Support plate and spring stud assembly (2 housing studs)		5-26-5019-00	1		1		1		1		1	
	Support plate and spring stud assembly (3 housing studs)		5-26-5020-00		1		1		1		1		1
131	Pivot pin		9-29-4836-00	1	1	1	1	1	1	1	1	1	1
142S	Mounting screws		9-25-9013-00	3	3	3	3	3	3	3	3	3	3
AC Brakes													
Z	No. 4 solenoid kit (rev A & B) (rev B & C)		5-66-5042-00		1		1		1		1		1
			5-96-5042-01		1		1		1		1		1
AC	No. 4 coil kit 60 Hz	115/230 Vac	5-66-6407-33		1								
		230/460 Vac	5-66-6409-33		1								
		115 Vac	5-66-6401-33		1								
		230 Vac	5-66-6402-33		1								
		460 Vac	5-66-6404-33		1								
	No. K4 coil kit 60 Hz	575 Vac	5-66-6405-33		1								
		115/230 Vac	5-66-6457-33			1	1						
		230/460 Vac	5-66-6459-33			1	1						
		115 Vac	5-66-6451-33			1	1						
		230 Vac	5-66-6452-33			1	1						
	No. K4+ coil kit 60 Hz	460 Vac	5-66-6454-33			1	1						
		575 Vac	5-66-6455-33			1	1						
		115/230 Vac	5-66-6407-23						1	1			
		230/460 Vac	5-66-6409-23						1	1			
		115 Vac	5-66-6401-23						1	1			
	No. M4+ coil kit 60 Hz	230 Vac	5-66-6402-23						1	1			
		460 Vac	5-66-6404-23						1	1			
		575 Vac	5-66-6405-23						1	1			
		115/230 Vac	5-66-6457-23									1	1
		230/460 Vac	5-66-6459-23									1	1
CC	Brake release interlock switch (optional)	115 Vac	5-66-6451-23										
		230 Vac	5-66-6452-23										
		460 Vac	5-66-6454-23										
		575 Vac	5-66-6455-23										
DC Brakes													
AD	No. 4 + coil assembly	115 Vdc	5-96-6416-43		1								
		230 Vdc	5-96-6417-43		1								
		115 Vdc	5-96-6416-23				1	1					
		230 Vdc	5-96-6417-23				1	1					
BD	No. M4 + coil assembly	115 Vdc	5-96-6466-23						1	1			
		230 Vdc	5-96-6467-23						1	1			
		115 Vdc	5-96-6446-43									1	1
		230 Vdc	5-96-6447-43									1	1
	Electronic DC switch kit	24/28 Vdc	5-57-5712-15		1		1		1		1		1
		115 Vdc	5-57-5716-15		1		1		1		1		1
		230 Vdc	5-57-5717-15		1		1		1		1		1

Solenoid and Coil Assembly

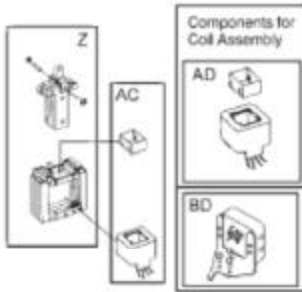


TABLE 3
Contents of Kits and Assemblies

Item	Kit Description
A	Hardware kit -- NEMA 2 (5-66-1001-00) 2 -- Housing acorn nuts 2 -- Conduit plugs
	Hardware kit -- NEMA 4 (5-66-1002-00) Hardware kit -- NEMA 4X (5-66-1003-00) 3 -- Housing nuts 3 -- Housing nut gaskets 1 -- Endplate oil seal 2 -- Endplate hole plugs 1 -- Housing to endplate "U" gasket 2 -- Endplate conduit pipe plugs
7	Housing & release knob kit (5-66-875X-00) 1 -- Housing and release knob assembly 2 or 3 -- Housing nuts 3 -- Housing nut gasket (NEMA 4 and 4X)
3	Stationary disc kit (5-66-8355-00) 1 -- Stationary disc
3A	Stationary disc kit (5-66-8354-00) 2 -- Stationary discs with springs
3B	Stationary disc kit (5-66-8356-00) 3 -- Stationary discs with springs
4	Friction disc kit (5-66-8462-00) 1 -- Friction disc 2 -- Stabilizing clips
DP	Disc pack kit (5-66-860X-00) 1, 2 or 3 -- Friction disc(s) 1, 2 or 3 -- Stationary disc(s) 2 -- Stabilizing clips (5-66-8601-00 only) 3, 6 or 9 -- Stationary disc separator springs
16	Hub and screw assembly -- all types, all boxes (5-16-515X-00) 1 -- Brake hub 2 -- Set screws
Z	No. 4 solenoid kit (5-66-5042-00) (5-96-5042-01) 1 -- Plunger 1 -- Solenoid link 1 -- Frame (including mounting bracket) 1 -- Solenoid link cap screw 1 -- Solenoid link nut 3 -- Solenoid mounting screws
AC AD	No. 4 AC coil kit (5-66-64-XX-XX3) and DC coil assembly (5-96-640X-XX3) Coil / Top Plunger guide / Wire nut
BD	DC switch kit (5-57-571X-15) 1 -- Electronic switch 1 -- Mounting bracket 3 -- Bracket mounting screws 4 -- Switch mounting screws 4 -- Nuts 4 -- Lock washers 5 -- Crimp connectors
CC	Brake release interlock switch (5-57-5526-00) 1 -- Microswitch 1 -- Mounting bracket 2 -- Bracket mounting screws 2 -- Switch mounting screws 2 -- Lock washers 2 -- Nuts 2 -- Lead wire assembly

Optional Modification Kits

TABLE 4

Catalog Mod Number	Description	Part Number ↓	Torque (lb-ft)	1.5, 3 & 6	10 & 15	20 & 25
M4	Brass Stationary Disc	8-003-513-02	1	2	3	
M13	Space Heater 115 Vac 230 Vac	5-27-2004-00 5-27-2005-00	1	1	1	
M17	Terminal Strip	5-63-0524-00	1	1	1	
M21	Vertical Spring Kit (2 disc) (3 disc)	5-63-0539-00 5-63-0525-00		1		1

Catalog Mod Number	Description	Part Number ↓	Torque (lb-ft)	1.5 & 3	6 & 10	15 & 20	25
M6	No. 4 Class 'H' coil kit 115 Vac 230 Vac 460 Vac 575 Vac 60 Hz	5-96-6407-05	1				
		5-96-6409-05	1				
		5-96-6401-05	1				
		5-96-6402-05	1				
		5-96-6404-05	1				
		5-96-6405-05	1				
	No. K4 Class 'H' coil kit 115 Vac 230 Vac 460 Vac 575 Vac 60 Hz	5-96-6457-05		1			
		5-96-6459-05		1			
		5-96-6451-05		1			
		5-96-6452-05		1			
		5-96-6454-05		1			
		5-96-6455-05		1			
	No. K4+ Class 'H' coil kit 115 Vac 230 Vac 460 Vac 575 Vac 60 Hz	5-96-6407-25			1		
		5-96-6409-25			1		
		5-96-6401-25			1		
		5-96-6402-25			1		
		5-96-6404-25			1		
		5-96-6405-25			1		
	No. M4+ Class 'H' coil kit 115 Vac 230 Vac 460 Vac 575 Vac 60 Hz	5-96-6457-25				1	
		5-96-6459-25				1	
		5-96-6451-25				1	
		5-96-6452-25				1	
		5-96-6454-25				1	
		5-96-6455-25				1	



Rexnord Industries, LLC
Steams Division
5150 S. International Drive
Cudahy, Wisconsin 53110
(414) 272-1100 Fax: (414) 277-4364 www.rexnord.com

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PHASE MONITOR RELAYS

Phase Loss, Phase Reversal, Phase Unbalance, and Under/Over Voltage
PMP Series Plug-in



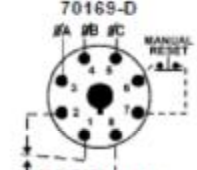
- Universal voltage range of 208-480V on PMPU provides the flexibility to cover a variety of applications with one unit
- Protects against phase loss, phase reversal, phase unbalance, undervoltage and overvoltage
- Variety of user-selectable and adjustable settings for the ultimate in three-phase protection
- Automatic or Manual Reset
- Multi-Color LED indicates normal condition and provides fault indication to simplify troubleshooting
- Compact plug-in case utilizing industry-standard 8 pin octal socket
- 10A SPDT output contacts

•    LISTED
(with appropriate socket)

The PMP Series Phase Monitor Relays utilize a microprocessor-based design to provide protection against phase loss, phase reversal, phase unbalance, undervoltage and overvoltage. The PMPU is a universal voltage product that works on any three-phase system voltage from 208-480V (a separate 120V version is available). These devices are designed to be compatible with most Wye or Delta systems. In Wye systems, a connection to a neutral is not required. PMP Series products protect against unbalanced voltages or single phasing regardless of any regenerative voltages.

The relay is energized when the phase sequence and all voltages are correct. Any one of five fault conditions will de-energize the relay. As standard, re-energization is automatic upon correction of the fault condition. Manual reset is available if a momentary N.C. switch is wired to the appropriate terminals. A multi-color LED indicates normal condition and also provides specific fault indication to simplify troubleshooting.

The PMP Series offers a variety of user-adjustable settings. The percent phase unbalance is adjustable from 2-10%, and also has a "Disable" setting for those applications where poor voltage conditions could cause nuisance tripping. The undervoltage drop-out can be set at 80-95% of operating voltage (overvoltage setting is fixed at 110% of nominal). The adjustable time delay drop-out on undervoltage (0.1-20 seconds) eliminates nuisance tripping caused by momentary voltage fluctuations. There is also an adjustable time delay (1-300 seconds) on both power up and restart after a fault has been cleared.

MOUNTING STYLE	OPERATING VOLTAGE 50/60 Hz	PRODUCT NUMBER	WRING/SOCKET ■
Plug-in	120V	PMP120	8 Pin Octal 70169-D
	208-480V	PMPU *	 DIAGRAM 104

* Requires a 600V-rated socket when used on system voltages greater than 300V.

■ See Pages 81 & 82 for Sockets & Accessories.

MACROMATIC

800-238-7474

www.macromatic.com

sales@macromatic.com

PHASE MONITOR RELAYS

Phase Loss, Phase Reversal, Phase Unbalance, and Under/Over Voltage
PMP Series Plug-in
Application Data & Dimensions

Application Data

Phase Loss:

Unit trips on loss of any Phase A, B or C.

Phase Reversal:

Unit trips if rotation (sequence) of the three phases is anything other than A-B-C.

Undervoltage:

Adjustable from 80-95% of nominal voltage. Unit trips when the average of all three lines is less than the adjusted set point for a period longer than the adjustable time delay drop-out.

Overvoltage:

Fixed at 110% of nominal voltage. Unit trips when the average of all three lines is greater than the fixed set point for a period longer than the time delay drop-out.

Phase Unbalance:

Adjustable from 2 - 10% unbalance. Unit trips when any one of the three lines deviates from the average of all three lines by more than the adjusted set point. There is also a "Disable" setting adjustment that will turn off the Phase Unbalance Protection if nuisance tripping is a problem.

Output Contacts:

SPDT: 10A @ 240V AC/30V DC, 1/2HP @ 240V AC

Life:

Mechanical: 10,000,000 operations

Full Load: 100,000 operations

Response Times:

Power Up & Restart After Fault: 1 - 300 seconds adjustable
Drop-out Due to Fault:

Phase Loss & Reversal	100ms fixed
Phase Unbalance	2 seconds fixed
Undervoltage	0.1 - 20 seconds adjustable
Overvoltage	Fixed Time Based on Inverse Time Curve

Hysteresis:

2 - 3%

Load (Burden):

Less than 3VA

Temperature:

-28° to 65°C (-20° to 150°F)

Mounting:

Uses an 8 pin octal socket. Requires a 600V-rated socket when used on system voltages greater than 300V (Macromatic Product Number 70169-D—see Page 81).

Indicator LED:

LED Status	Indicator
Green Steady	Normal / Relay ON
Green Flashing	Power Up / Restart Delay
Red Steady	Unbalance
Red Flashing	Undervoltage / Overvoltage
Amber Steady	Reversal
Amber Flashing	Loss
Green / Red Alternating	Undervoltage / Overvoltage Trip Pending
Red / Amber Alternating*	Nominal Voltage Set Error

* Applies to 208-480V units only.

Reset:

As standard, reset is automatic upon correction of fault. When a momentary-contact N.C. switch is wired across the Manual Reset terminals (6 & 7), the unit switches to manual reset mode and remote manual reset is available.

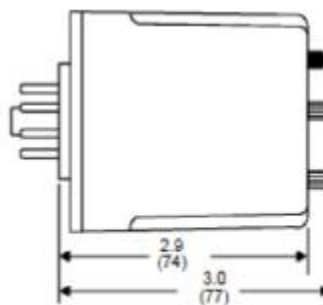
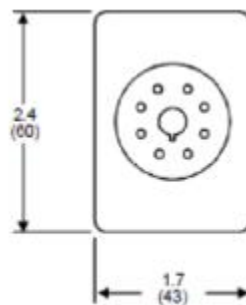
Approvals:



Low Voltage & EMC Directives
EN50947-1, EN50947-5-1



Dimensions



All Dimensions in
Inches (Millimeters)

Pushbutton Identification & Ordering

History

Over the past 30+ years Matot has used 3 different Suppliers for our standard nema-1 fixtures. During the 1970's an up through 1995 the supplier was "Inland" Industries. From 1995 into 2002 the supplier was "Adams" Elevator Equipment Co. From 2002 to current, the supplier has been "Innovation" Industries.

Identification

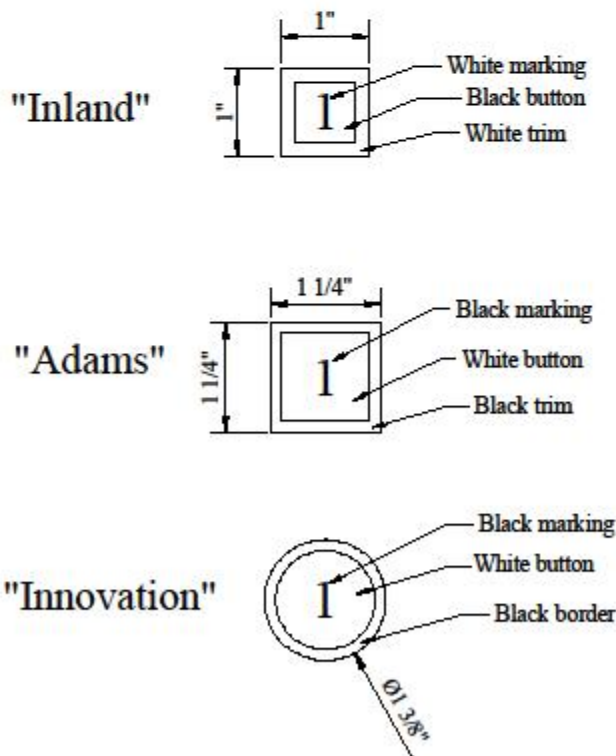
View the details below to identify the brand of fixture you have.

Ordering Parts

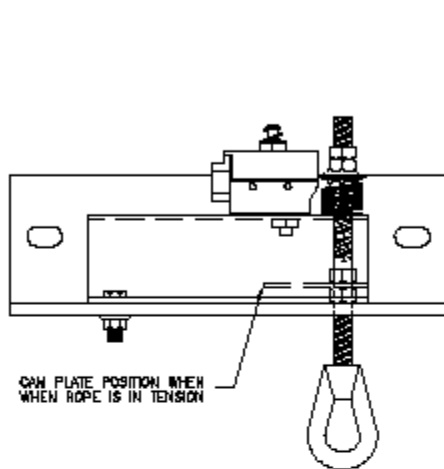
Inland components can be procured through Quality Elevator Products (800-222-3688)

Adams components can be procured through Adams Elevator equipment (800-929-9247)

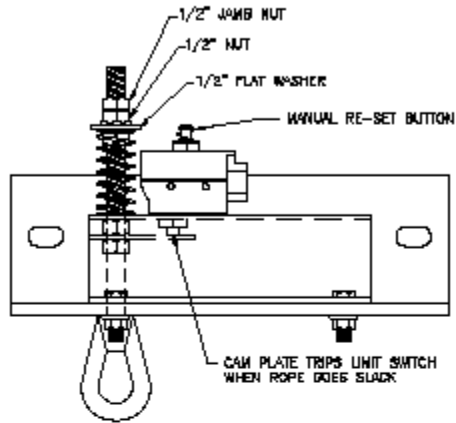
Due to the durability of the Innovation products, we do not carry a stock of replacement parts. However, with a credit card and completion of a short registration form, you can order parts directly from their web site at www.innovationind.com



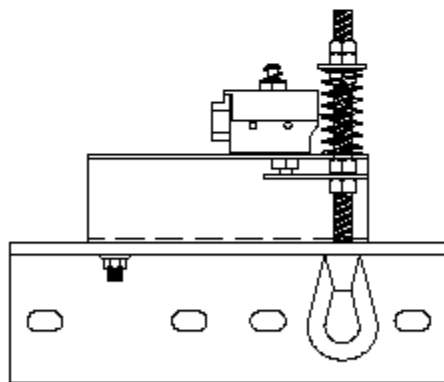
SLACK CABLE ASSEMBLIES



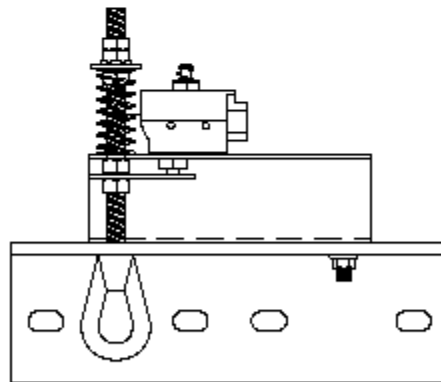
ITEM # H08475
DRUM OVERHEAD "RIGHT" HAND
(SHOWN IN RUNNING POSITION)



ITEM # H08485
DRUM OVERHEAD "LEFT" HAND
(SHOWN IN SLACK ROPE CONDITION)



ITEM # H08470
DRUM BELOW "RIGHT" HAND
(SHOWN IN SLACK ROPE CONDITION)



ITEM # H08480
DRUM BELOW "LEFT" HAND
(SHOWN IN SLACK ROPE CONDITION)

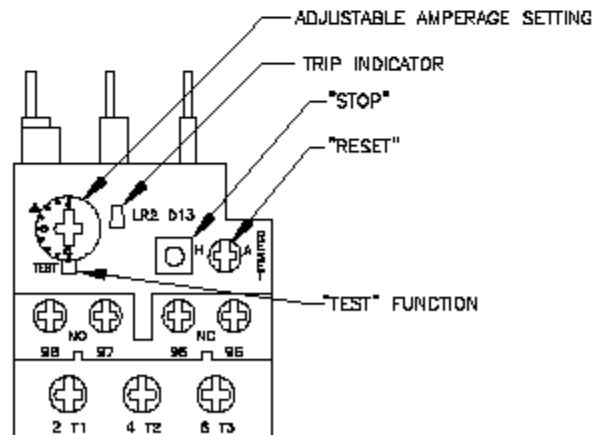
MOTOR OVERLOAD INFORMATION

IF OVERLOAD RELAY TRIPS	
A. Check AC line for low voltage or single phase condition.	
B. Check unit for overloading, excessive friction or obstruction.	
C. Check wiring connections, loose connections can cause overheating which could trip out the Overload.	
D. Inspect motor, motor starters, & overload for abnormal conditions Replace if needed.	
E. Reset overload and attempt a new start, observe equipment for any abnormal conditions.	

WHEN ORDERING OR REPLACING AN OVERLOAD, REFER TO THE PARTS LISTING ON PAGE 62 TO GET THE CORRECT PART NUMBER.

FEATURES (REFERENCE DIAGRAM BELOW)

"Reset"	Manual or Automatic	Should be set for Manual Reset
Trip indication	Located on top of overload	Orange flag appears in window
"Stop" function	Stop button on top of Overload	Actuates the N/C contact
"Test" function	Activated by pressing the button with small screwdriver	Operating the "Test" button allows simulation of the Overload in the tripped condition





The HG-1, Electrical/Mechanical Contact Switch, is intended for use with Single Sliding Vertical Rise elevator hoistway doors. They are wired in series with all the other door switches in the hoistway and the electrical control circuit of the elevator so as to produce an overall electrical safety loop. In addition to this circuit closing system, there is a mechanical latch which locks the door in the closed position when the car has started to leave the floor. The HG-1 interlock has a single contact and is used with a stationary cam.

****These are made for either Right Hand or Left Hand mounting interlocks. The hand is determined by standing inside the elevator looking out. The side on which the lock is to be mounted (Left or Right) is the hand to be ordered.***

Description

These locks consist of an adapter plate to be mounted to the door frame inside the hoistway. The adapter plate is screwed to the switch housing. This housing includes the contact making assembly, shafts and cam. At the top of the housing is a roller arm shaft with an adjustable roller arm. A conduit connection hole in the bottom of the housing is for wiring to the contact terminals. A cover is provided for the housing.

Operation

When the elevator stops at the landing, the Cam (Stationary or Retiring) on the elevator strikes the interlock roller arm, opening the lock. The hoistway door then slides vertically upward and the locking bar mounted on the door mechanically opens the contacts. When the door is closed the locking bar descends, closing the contacts.



The HG-2, Electrical/Mechanical Contact Switch, is intended for use with Single Sliding Vertical Rise elevator hoistway doors. They are wired in series with all the other door switches in the hoistway and the electrical control circuit of the elevator so as to produce an overall electrical safety loop. In addition to this circuit closing system, there is a mechanical latch which locks the door in the closed position when the car has started to leave the floor. The HG-2 has two contacts and is used with a retiring cam.

****These are made for either Right-Hand or Left-Hand mounting interlocks. The hand is determined by standing inside the elevator looking out. The side on which the lock is to be mounted (Left or Right) is the hand to be ordered.***

Description

These locks consist of an adapter plate to be mounted to the door frame inside the hoistway. The adapter plate is screwed to the switch housing. This housing includes the contact making assembly, shafts and cam. At the top of the housing is a roller arm shaft with an adjustable roller arm. A conduit connection hole in the bottom of the housing is for wiring to the contact terminals. A cover is provided for the housing.

Operation

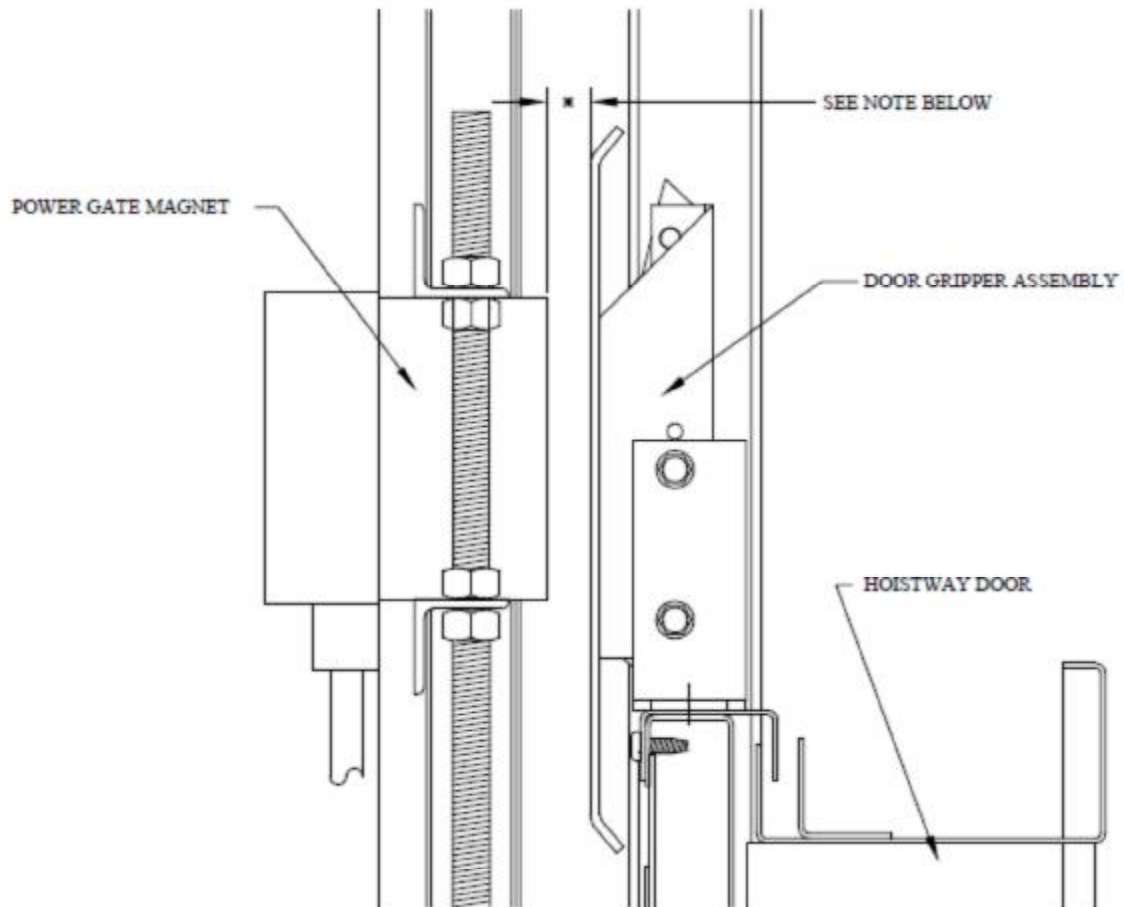
When the elevator stops at the landing, the Cam (Stationary or Retiring) on the elevator strikes the interlock roller arm, opening the lock. The hoistway door then slides vertically upward and the locking bar mounted on the door mechanically opens the contacts. When the door is closed the locking bar descends, closing the

POWER GATE/DOOR ADJUSTMENT PROCEDURES

In order to achieve proper and consistent operation of the power gate & door system the following adjustment procedures should be followed. Details are included for reference.

1. Set door grippers per **Fig. PGD001**
2. Verify the Magnet switch “MLS” is adjusted per **Fig. PDG002**
3. Set the Gate speed control at “5” or “6” (located in the Controller)
4. Initiate a Door Open sequence and adjust, if necessary, the “GOL” switch. The switch should be set so that the gate opens about ½” to 1” further than the hoistway door, i.e. 48” door opening, 49” gate opening. The door will reach its full open position and then the gripper plate will slide along the magnet face until the “GOL” limit is triggered. This is required in order to maintain an accurate and consistent closing of the gate and doors. Note: on Bi-parting equipment a ½” of movement on the “GOL” switch equals a 1” change in the gate open dimension. **See Fig. PGD003 for switch identification.**
5. Initiate a Door Closed sequence and adjust, if necessary, the “GCL” switch so that the gate and door fully close. The door panels will close first and then the gate will close as the gripper plate slides along the magnet face until the gate fully closes. When properly adjusted the doors will consistently close correctly. **See Fig. PGD003 for switch identification.**
6. If the door gripper fails to fall away from the magnet after the gate is fully closed, check the reverse voltage supplied to the magnet. The voltage should be between 20 and 24 VDC. If the voltage is greater than 24 VDC then an adjustment must be made. This voltage can be adjusted via a potentiometer located in the controller.

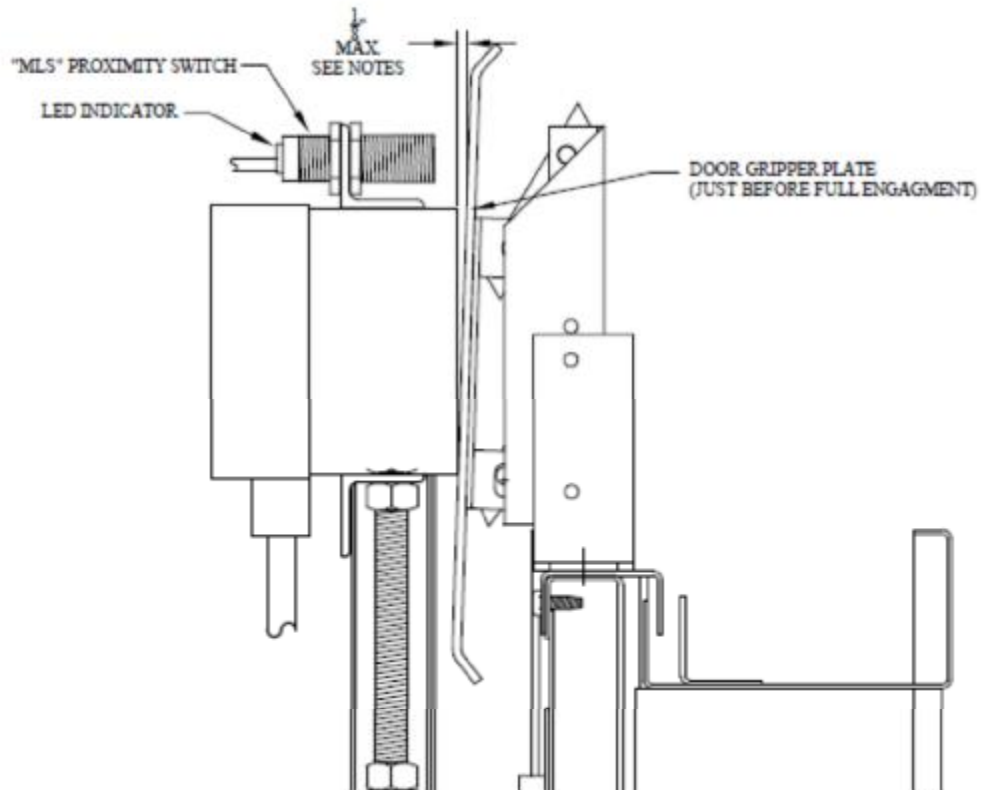
FIG. PGD001



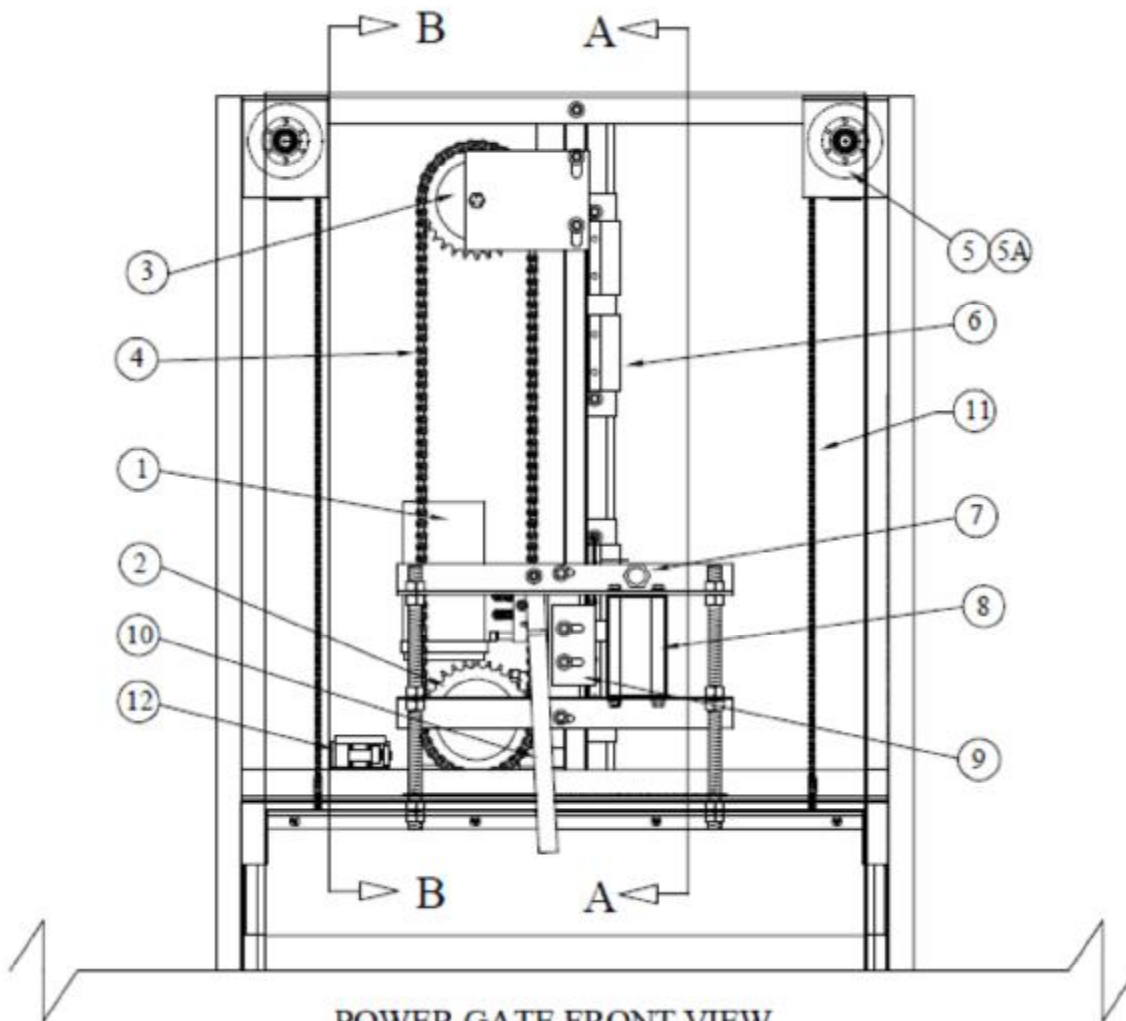
GRIPPER SETTING DETAIL FOR POWER GATE & DOOR

* AFTER CAR IS INSTALLED AND DOORS ARE SET, THE RUNNING CLEARANCE BETWEEN THE POWER GATE MAGNET AND THE DOOR GRIPPER HAS TO BE 1/2" TO 5/8". THE MOUNTING BRACKET FOR THE GRIPPER ASSEMBLY IS SLOTTED TO ALLOW FOR ADJUSTMENT.

FIG. PGD002

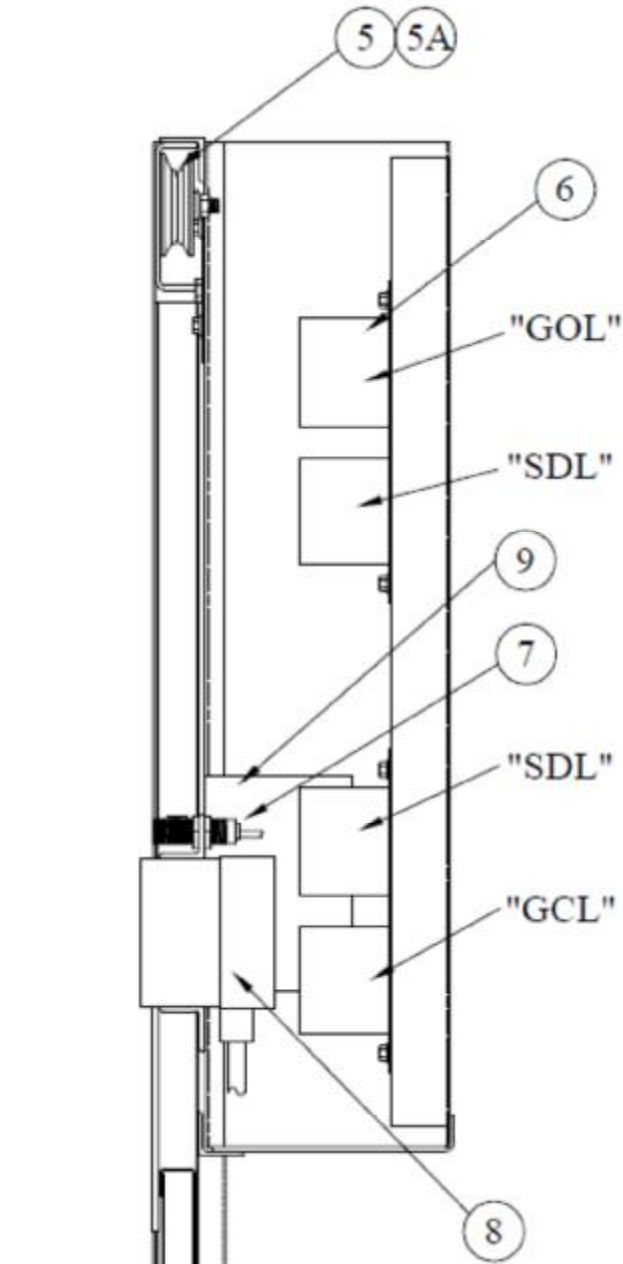


- 1) FOR PROPER OPERATION THE "MLS SWITCH MAY NEED ADJUSTMENT.
- 2) WHEN MAGNET IS ENERGIZED THE PLATE OF THE DOOR GRIPPER WILL MOVE TOWARDS THE MAGNET. TYPICALLY THE BOTTOM OF THE PLATE WILL CONTACT THE MAGNET FIRST AND THEN THE TOP PORTION OF THE PLATE WILL COMPLETE IT'S MOVEMENT. WHEN THE PROXIMITY SWITCH SENSES THE PLATE THE GATE WILL START OPENING.
- 3) TO INSURE PROPER OPERATION, THE "MLS" SWITCH SHOULD BE SET TO SENSE THE PLATE WHEN THE TOP OF THE PLATE IS NO MORE THAN 1/8" FROM THE MAGNET. THE LED INDICATOR WILL LIGHT WHEN THE PLATE IS DETECTED.



**POWER GATE FRONT VIEW
(BI-PARTING GATE SHOWN)**

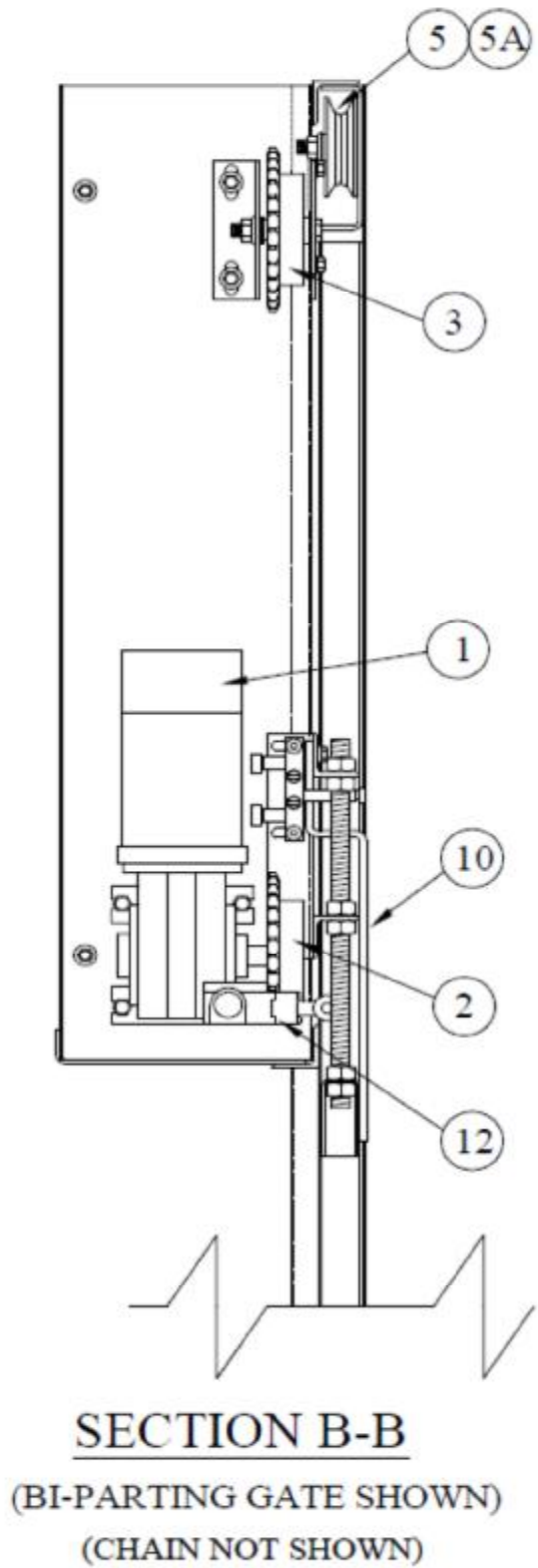
ITEM	MATOT #	QTY./GATE	DESCRIPTION
1	C02110	1	GEARMOTOR, 1/8 HP, 130 VDC, 62 RPM, 55 IN/LB
2	E12900	1	POWER GATE DRIVE SPROCKET
3	J01950	1	POWER GATE IDLER SPROCKET
4	E05700	1	#40 ROLLER CHAIN
5	E09300	2	PULLEY, CHAIN DEFLECTING, (BI-PARTING GATE ONLY)
5A	E09350	2	PULLEY, CHAIN DEFLECTING, (SLIDE-UP GATE ONLY)
6	F02600	4	MAGNETIC REED SWITCH
7	D09000	1	PROXIMITY SWITCH, "MLS"
8	C01200	1	MAGNET, POWER DOOR, 110 VDC, BI-POLAR (POWER DOORS ONLY)
9	J02150	1	VANE, GATE POSITION LIMIT
10	J02175	1	MANUAL CLUTCH RELEASE LEVER
11	VARIES	2	#410 ROLLER CHAIN, (LENGTH VARIES WITH GATE HEIGHT & TYPE)
12	F02400	1	GATE SWITCH
NOT SHOWN	D10010	1	RIBBON SWITCH, REVERSING EDGE



SECTION A-A

(BI-PARTING GATE SHOWN)

ITEM	MATOT #	QTY./GATE	DESCRIPTION
5	E09300	2	PULLEY, CHAIN DEFLECTING, (BI-PARTING GATE ONLY)
5A	E09350	2	PULLEY, CHAIN DEFLECTING, (SLIDE-UP GATE ONLY)
6	F02600	4	MAGNETIC REED SWITCH
7	D09000	1	PROXIMITY SWITCH, "MLS"
8	C01200	1	MAGNET, POWER DOOR, 110 VDC, BI-POLAR (POWER DOORS ONLY)
9	J02150	1	VANE, GATE POSITION LIMIT
10	J02175	1	MANUAL CLUTCH RELEASE LEVER
NOT SHOWN	D10010	1	RIBBON SWITCH, REVERSING EDGE



ITEM	MATOT #	QTY./GATE	DESCRIPTION
1	C02110	1	GEARMOTOR, 1/8 HP, 130 VDC, 62 RPM, 55 IN/LB
2	E12900	1	POWER GATE DRIVE SPROCKET
3	J01950	1	POWER GATE IDLER SPROCKET
5	E09300	2	PULLEY, CHAIN DEFLECTING, (BI-PARTING GATE ONLY)
5A	E09350	2	PULLEY, CHAIN DEFLECTING, (SLIDE-UP GATE ONLY)
10	J02175	1	MANUAL CLUTCH RELEASE LEVER
12	F02400	1	GATE SWITCH
NOT SHOWN	D10010	1	RIBBON SWITCH, REVERSING EDGE

POWER GATE & DOOR TROUBLE SHOOTING GUIDE	
SYMPTOMS	ACTION
DOOR GRIPPER NOT ATTRACTED BY GATE MAGNET	1) SEE STEP 1 IN ADJUSTMENT PROCEDURES 2) VERIFY MAGNET IS ENERGIZED 3) CALL MATOT FOR ASSISTANCE
GATE MAGNET PICKS GRIPPER PLATE BUT GATE & DOOR DO NOT OPEN	1) SEE STEP 2 IN ADJUSTMENT PROCEDURES 2) VERIFY THAT "MLS" SWITCH HAS POWER 3) VERIFY THAT "MLS" SWITCH IS FUNCTIONING 4) VERIFY THAT MOTOR IS BEING POWERED 5) CALL MATOT FOR ASSISTANCE
GATE MOTOR IS RUNNING BUT GATE & DOOR DO NOT OPEN	1) MAKE SURE MANUAL CLUTCH RELEASE IS NOT ENGAGED 2) CHECK CONNECTION & KEYWAY AT DRIVE SPROCKET 3) CALL MATOT FOR ASSISTANCE
GATE STARTS TO OPEN BEFORE FULLY ENGAGING DOOR	1) SEE STEP 2 IN ADJUSTMENT PROCEDURES
GATE & DOOR NOT FULLY OPENING	1) SEE STEP 4 IN ADJUSTMENT PROCEDURES
GATE & DOOR NOT FULLY CLOSING	1) SEE STEP 5 IN ADJUSTMENT PROCEDURES
GATE & DOOR CLOSE BUT MOTOR IS STILL RUNNING	1) SEE STEP 5 IN ADJUSTMENT PROCEDURES 2) VERIFY "GCL" SWITCH IS OPERATING 3) CALL MATOT FOR ASSISTANCE
DOOR & GATE ARE NOT CLOSING CONSISTENTLY	1) SEE STEPS 3 THRU 5 IN ADJUSTMENT PROCEDURES 2) CALL MATOT FOR ASSISTANCE
GRIPPER PLATE DOES NOT FALL AWAY FROM GATE MAGNET AFTER GATE & DOOR IS CLOSED	1) SEE STEP 6 IN ADJUSTMENT PROCEDURES 2) CALL MATOT FOR ASSISTANCE

SYSTEM TROUBLE SHOOTING GUIDE		
This guide is intended to assist only qualified elevator personnel in properly servicing equipment		
PROBLEM	POSSIBLE CAUSE	REMEDY
Dumbwaiter does not move when button is pushed	Hoistway or car door open	Close door, check and/or replace contact switch
	Main line disconnect switch open	Determine reason switch is open, remedy, close switch
	Dumbwaiter on final limits	Determine cause of overtravel, remedy, manually reset
	Defective pushbutton	Replace
	Pushbutton wired incorrectly	Check wiring and correct as needed
	Motor overload tripped	Determine cause, remedy, reset at the controller
	Control circuit fuses defective	Replace
	"Motor Run" timer tripped	Determine reason timed out, remedy, reset timer
	Power Gate & Door not adjusted correctly	See adjustment procedures
Dumbwaiter does not stop level with door sill	Limit switches out of adjustment	Adjust limits
	Limit switch cam out of adjustment	Adjust cam for proper contact with switches
	Defective limit switch	Replace
	Leveling magnet incorrectly located	Adjust Leveling magnet
Dumbwaiter stops at undetermined location	Broken cable device has set	Verify cause before resetting the safety
	Slack cable switch tripped	Verify cause before resetting the switch
	Obstruction in hoistway	Remove obstruction
	Motor overload tripped	Determine reason, remedy, reset overload
Noisy operation	Noisy bearing in overhead sheave	Lubricate or replace
	Noisy bearing in car deflector	Lubricate or replace
	Car rubbing in hoistway	Check running clearances and make adjustments
	Noisy Brake	Adjust per instructions
	Noisy reducer	Remove brass pin in vent plug, or grease end bearings, or check oil level, or check for correct lubricant, replace if necessary

HOIST MACHINE	MATOT #
MOTORS	
BRAKEMOTOR, 56 C-FACE, 1 HP, 1PH, 110-120 VOLT, 1725 RPM	C01905B
BRAKEMOTOR, 56 C-FACE, 1HP, 3PH, 1725 RPM, 208-220/480 VOLT	C01915B
BRAKEMOTOR, 56 C-FACE, 2 HP, 3PH, 1725 RPM, 208-220/480 VOLT	C01925B
BRAKEMOTOR, 56 C-FACE, 2 HP, 3PH, 1725 RPM, 600 VOLT	C01945B
BRAKEMOTOR, 182 TC-FACE, 3 HP, 3PH, 1725 RPM, 208-220/480 VOLT	C01930B
BRAKEMOTOR, 182-184 TC-FACE, 3HP, 3PH, 1725 RPM, 600 VOLT	C01940B
REDUCERS	
WINSMITH, 930 MDT, 50:1, 56C INPUT, STANDARD L-R OUTPUT	C02511-04
WINSMITH, 930 MDT, 60:1, 56C INPUT, STANDARD L-R OUTPUT (LIGHT DUTY UNITS ONLY)	C02526
WINSMITH, 930 CDT, 145:1, 56C INPUT, STANDARD L-R OUTPUT	C02515
WINSMITH, 935 MDT, 50:1, 182TC INPUT, STANDARD L-R OUTPUT	C02911-04
WINSMITH, 935 CDT, 40:1, 145TC INPUT, STANDARD L-R OUTPUT	C02915
DRUMS / SHEAVES	
6 1/2" DIA. DRUM, 3/16" GROOVES, LEFT HAND THREADS, 1 3/8" BORE, (LIGHT DUTY UNITS)	PD6552L
10" DIA. DRUM, 3/16" GROOVES, RIGHT HAND THREADS, Q1 TAPER, UP TO 28' OF TRAVEL	PD1052RP
10" DIA. DRUM, 3/16" GROOVES, LEFT HAND THREADS, Q1 TAPER, UP TO 28' OF TRAVEL	PD1052LP
10" DIA. DRUM, 3/16" GROOVES, RIGHT HAND THREADS, Q1 TAPER, >28' TO 50' OF TRAVEL	PD1077RP
10" DIA. DRUM, 3/16" GROOVES, LEFT HAND THREADS, Q1 TAPER, >28' TO 50' OF TRAVEL	PD1077LP
CONTROLLER	
FUSE, 1 AMP	D01998
FUSE, 2 AMP	D01999
FUSE, 3 AMP	D02000
RELAY, 120 VAC, 4 POLE	D04310
RELAY, 24 VAC, 4 POLE	D04125
RELAY, 12 VDC, 4 POLE	D04150
RELAY MOUNTING BASE	SD06600
PHASE MONITOR, 208/240-460 VOLT	D04600
REVERSING CONTACTOR, TELEMECANIQUE #LC2-D18G7	D06105-03
CONTACTOR, TELEMECANIQUE #LC1-D1800, #2 N.O. & 2 N.C.	D06300-03
CONTACTOR, TELEMECANIQUE #LC1-D18, 3 N.O. POWER & 1 N.O. AUX.	D06618
PLC, MICRO SMART, 9 IN & 7 OUT, IDEC # FC4A-C16R2	D50000
PLC, MICRO SMART, 14 IN & 10 OUT, IDEC # FC4A-C24R2	D51000
PLC, MICRO SMART SLIM 12-IN, 8-OUT, IDEC #FC41-D20RS1	D51025
PLC EXPANSION CARD 4-IN 4-OUT, IDEC #FC4A-M08BR1	D51050
PLC EXPANSION CARD 8 IN, IDEC #FC4A-N08B1	D51100
PLC EXPANSION CARD 16 IN, IDEC #FC4A-N16B1	D51150
PLC EXPANSION CARD 8 OUT, IDEC #FC4A-R081	D51200
PLC EXPANSION CARD 16 OUT, IDEC #FC4A-R161	D51250
OVERLOAD, TELEMECANIQUE, 1.6-2.5A	D02600-03
OVERLOAD, TELEMECANIQUE, 2.5-4.0A	D02700-03
OVERLOAD, TELEMECANIQUE, 4.0-6.0A	D02750-03
OVERLOAD, TELEMECANIQUE, 5.5-8.0A	D02800-03
OVERLOAD, TELEMECANIQUE, 7.0-10.0A	D02900-03
OVERLOAD, TELEMECANIQUE, 9.0-13.0A	D02950-03
OVERLOAD, TELEMECANIQUE, 12.0-18.0A	D03000-03
OVERLOAD, TELEMECANIQUE, 18.0-25.0A	D03100-03

CAR	MATOT #
GUIDE SHOE, T-RAIL, 5/8" GROOVE, 2 3/8" LONG, NYLATRON G-S WITH STEEL CASING	H01820C
GUIDE SHOE, CHANNEL RAIL, 1/4" GROOVE, 2 3/8" LONG, NYLATRON G-S WITH STEEL CASE	H01800C
8" DIA. DEFLECTING SHEAVE, OILITE BUSHING	E09620
8" DIA. DEFLECTING SHEAVE, NEEDLE BEARING	E09610
NEEDLE BEARING INNER RACE	E01200
NEEDLE BEARING OUTER SLEAVE	E01100
SWITCH, BROKEN ROPE DETECTION	F02200
BUZZER, DOOR OPEN SIGNAL	C00300
10 CONDUCTOR TRAVEL CABLE (ORDER QTY IN FEET)	D10320
20 CONDUCTOR TRAVEL CABLE (ORDER QTY IN FEET)	D10340
30 CONDUCTOR TRAVEL CABLE (ORDER QTY IN FEET)	D10341
RETIRING CAM	C02000
GATE	
CHAIN PULLEY FOR BI-PARTING GATE	E09300
CHAIN PULLEY FOR SLIDE-UP GATE	E09350
GATE SWITCH, TELEMECANIQUE # XCKT2518N12	F02400-07
POWER GATE COMPONENTS (SEE PAGES 47 THRU 49)	
HOISTWAY	
LIMIT SWITCH, NORMAL FLOOR STOP, TELEMECANIQUE # XCK-J10541H7	F02250
HOIST CABLE, 3/16"- 7 X 19 GALVANIZED AIRCRAFT	E03900
HOIST CABLE, 1/4"- 7 X 19 GALVANIZED AIRCRAFT	E04000
SLACK CABLE SWITCH WITH MANUAL RESET	F02700
SLACK CABLE ASSEMBLY, DRUM OVERHEAD, RIGHT HAND	H08475
SLACK CABLE ASSEMBLY, DRUM OVERHEAD, LEFT HAND	H08485
SLACK CABLE ASSEMBLY, DRUM BELOW, RIGHT HAND	H08470
SLACK CABLE ASSEMBLY, DRUM BELOW, LEFT HAND	H08480