

Installation and Service Instructions for 87,000 Series (Crane Duty) (rev. B)

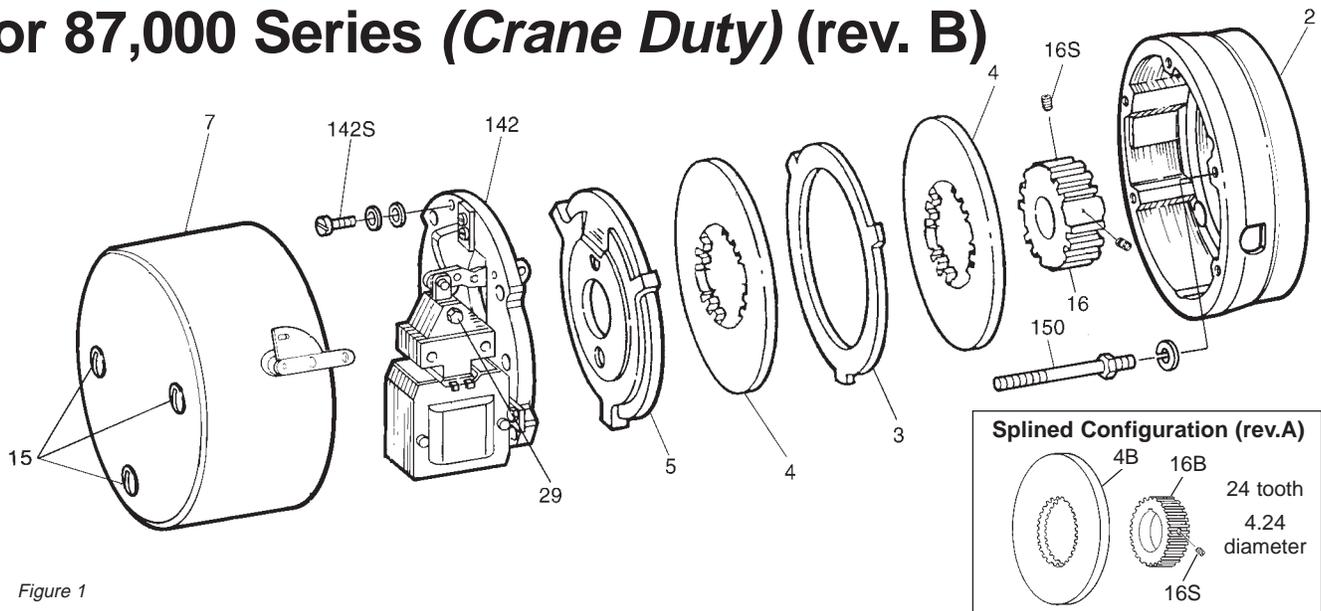


Figure 1

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 install 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.

- 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. Manual release does not reset automatically. When release has been used, it must be manually reset before operating the brake electrically.

11. Do not lubricate any parts of the brake.

12. Do not adjust brake torque. The nominal static torque is factory pre-set and should not be altered.

General Description

The 87,000 Series is a spring-set, electrically released disc brake for controlled stopping and holding of a load. It is self-adjusting for friction disc wear and mounts directly to a NEMA C-face motor with 8-1/2" (AK) register and a 7-1/4" (AJ) bolt circle.

The brake is provided with a manual release lever. When the motor is off and the load is to be moved without energizing the motor, the manual release lever should be used. This removes the holding torque from the

motor shaft, allowing it to rotate manually. The brake will remain in the manual release position until the release lever is returned manually to its set position. A brake interlock switch is designed into the brake to prevent the motor from driving through a set brake. Depending on model number this switch may be either a microswitch or proximity switch.

I. Installation Procedure

- A. Remove housing nuts (15) and housing (7).
- B. Depress solenoid plunger (29) and wire tie plunger (29) to frame (79).
- C. Remove entire support plate assembly (142) by evenly unscrewing screws (142S). Remove screws, conical spring washers, and flat washers if supplied.
- D. Remove pressure plate (5), friction disc (4), and stationary disc (3).

Note 1: Brake with single friction disc do not have stationary discs (3). Vertically mounted brakes have special spring requirements. One disc vertical below brakes do not require springs. Refer to Instruction Sheet P/N 8-078-937-06 for proper assembly of vertical mounting components.

E. Attach endplate (2) to NEMA C-face of motor using four 1/2" diameter socket head cap screws (not supplied) torque per manufacturer's specifications. (Head of cap screws must not project above friction surface.) If foot mounted, secure foot mounting bracket to foundation. The use of dowels to insure permanent alignment is recommended. Foot, machine or C-face mounted brakes must be carefully aligned within .004" on concentricity and face runout. Shaft runout should be within .002" T.I.R. Maximum permissible shaft endfloat is .020".

Note 2: If motor is to be ceiling mounted after assembly, entire brake will have to be rotated 180° or "upside down" so it will be

positioned with solenoid plunger (29) above frame when final assembly is mounted on ceiling. Similarly, for horizontal wall mounting, rotate 90°.

Note 3: A dimple drilled into the motor shaft for the hub set screw (16S), 90° from the key is recommended for vertical mounting.

F. Position hub and tight fitting key (not supplied) 3/4" from outer register face of motor end bell. Torque both 3/8" set screws to 290 lb-in.

If brake utilizes vertical mounting springs, do not assemble them when measuring for hub location.

G. Reassemble friction disc (be sure friction discs slide freely), springs (if vertical), stationary discs, and pressure plate in correct sequence and position. All parts must slide freely.

H. Mount support plate assembly, torque screws to 50 in-lbs in endplate. Conical spring washer installed under the screw head. Flat washer used under the conical spring washer only with aluminum support plate. Be sure that assembly is mounted with the solenoid in a vertical position (plunger above frame) as shown when brake is horizontal. If the self-adjust assembly has allowed the mechanism to over-adjust, it will have to be reset before mounting support plate. In this case, the lever arm (17) throat will be near, or touching, the pinion (32) teeth. Refer to Figure 6 and *Self-adjust Maintenance*. Loosen pressure spring cap screw (19) until pressure spring (11) is free, mount support plate assembly to endplate and retighten spring cap screw until snug. Do not overtighten! Torque to a maximum of 8 ft-lbs.

I. Manually lift solenoid plunger to maximum travel, and release. Complete electrical connection. (See Section on *Electrical Connection of Brake*.) Depress solenoid plunger manually or electrically, and allow it to snap up. Repeat this process several times to set air gap on solenoid. (Check *Self-adjust Maintenance* Section for proper gap measurement, or corrective action of improper gap.)

J. Install new housing gasket; replace housing; install new o-rings under housing nuts and tighten housing nuts to 50 in-lbs.

II. Electrical Connection of Brake

CAUTION 1: Inverter Motor and Special Control Systems. This brake contains either a single phase AC coil or DC coil that requires instantaneous power within ± 10% of rating at the coil. A separate power source is required when this brake is used in conjunction with a motor or control system that limits voltage or current input (i.e. inverter motors) or causes a ramping of the power supply.

CAUTION 2: Class H coils with terminals. Do not bend lead wire crimp connection as this causes a fatigue in the metal which may break under vibration.

Note 1: Brake coil connections described here cover common motor connections. For nonstandard motor or control connections, contact respective supplier or Stearns Division.

Note 2: Be sure lead wires to coil are not tight or pinched, and that leads will not be rubbed by friction disc, trapped between solenoid plunger and frame, caught between lever arm and endplate, or by linkage.

Note 3: On brakes with space heater, connect to appropriate power source. Heater is to be energized continuously, even during storage or rusting may occur.

Note 4: After connection, apply pipe thread sealant to conduit pipe plugs.

A. AC coils, single or dual voltage

Note: Wiring has been factory prerouted and secured to the support plate. Refer to drawing SC-586 for Stearns Form 2 or SC-586-01 for Stearns Form 3 for proper lead wire routing.

- Dual voltage coils may be factory preconnected for high voltage with wire nuts. Checking coil connection is suggested. Four lead style are marked on leads for connection per Figure 2. Two unmarked leads mean preconnection made for high voltage. Reconnect coil for appropriate voltage as shown in Figure 2. Bring out line leads.

AC Voltage Coil Connection

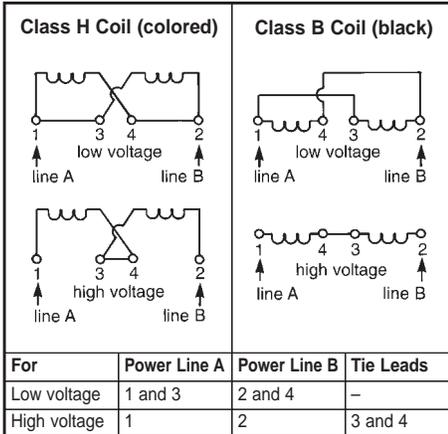


Figure 2

- On single voltage coils, connect coil to any two leads on single or three-phase motors of the same voltage as the brake. Refer to brake nameplate and coil number for correct voltage and frequency. See Figure 2 for dual voltage coil connection and connect to any two leads of single or three-phase motor of the same voltage. The brake can also be wired to external switch contacts providing proper voltage other than that used to control the motor. Normally, the motor and brake contacts are interlocked.

B. Connecting AC solenoid coils on dual voltage 230/460 three-phase motors

To use a 230 volt coil (or a 230/460 dual voltage coil connected for 230 volts) with a 230/460 dual voltage three-phase motor, the brake leads are connected across two motor

terminals as shown in Figures 3 and 4 or other equivalent combinations. If a 230 volt brake coil is connected as shown in Figures 3 and 4 the motor can be operated on either 230 volts or 460 volts with no effect on brake operation.

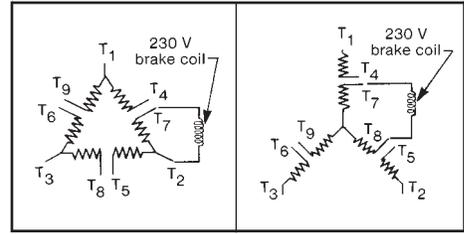


Figure 3

Figure 4

C. DC coils

- All Stearns DC coils are single voltage and have dual windings, a high current pull-in winding, and a low current holding winding. See Figure 5. An electronic switch with internal timing circuit is used to switch the coil from high current to low current. Due to the high initial current demand of a DC solenoid, a separate DC power source of adequate current capacity is usually required.

DC Voltage Coil Connection

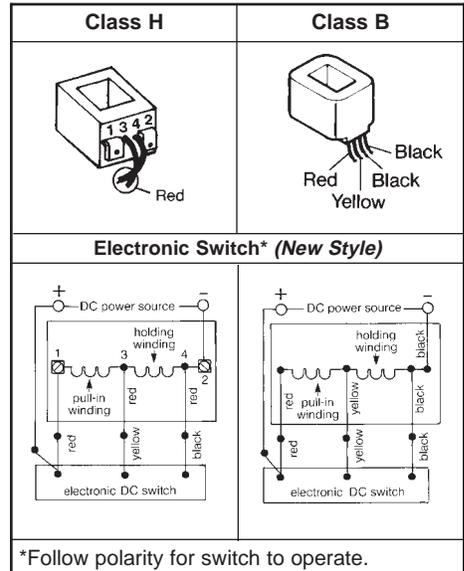


Figure 5

Caution! Never use a series resistor to drop power supply voltage to solenoid coil as brake malfunction will result!

- Connect proper power to the two terminals or two outside wires of the coil as shown in Figure 5. (Polarity must be maintained.)

III. General Maintenance

Warning! Any mechanism or load held in position by the brake should be secured to prevent possible injury to personnel or damage to equipment before any disassembly of the brake is attempted or the manual release lever is operated on the brake. Observe all cautions listed at the beginning of this manual.

Note 1: Any time the brake housing is removed, the housing gasket and housing

nut o-rings must be replaced with new gaskets to protect the integrity of the seal.

Note 2: Gaskets are to be kept free of oil, diesel and other industrial fluids. If degradation of gasket material takes place, the seating surfaces must be cleaned and gaskets must be replaced with new gaskets.

Note 3: Replacement part kits for many items are available and contain retrofit instructions.

A. Coil replacement

All standard NEMA AC voltage coils are available in kits. Select coil kit from appropriate replacement parts list for the particular brake series being serviced.

All standard NEMA DC voltage coils are available in assemblies and may also be obtained from appropriate parts list.

B. Friction disc replacement

Note: Replace friction disc in single disc brakes when wear surface area is one-half the original disc thickness. In multiple disc brakes, replace all friction discs when throat of lever arm (17) is within 1/16" of touching teeth of pinion (32).

1. Observe cautions and warnings preceding *Installation Procedure*, in Section I. Follow Step A, then disconnect solenoid lead wires.
2. Continue with Steps B through D and Steps G through J. Be sure to reconnect coil leads before replacing housing (J).

C. Self-adjust maintenance

(See Figure 6)

Since the self-adjust brake automatically adjusts itself for friction disc wear, maintenance is held to a minimum. The solenoid is factory set with a 7/8" (22 mm) to 15/16" (24 mm) air gap, and requires no resetting, even when changing friction discs. Measure air gap with brake fully assembled without housing.

Note: To measure solenoid air gap on vertically mounted brakes, grasp solenoid link to hold plunger in a free horizontal position and move toward solenoid frame until spring pressure is felt. Holding firmly in this position, measure air gap between mating (ground) surface on solenoid frame and solenoid plunger. Adjust to proper gap and check gap by again holding plunger as directed.

The gap is determined by the position of wrap spring stop (76). The normal operating gap is 7/8" (22 mm) to 15/16" (24 mm). Should this change, follow the steps listed:

1. If (stop) screws (76S) had been loosened and retightened, the air gap may require resetting. The gap is measured between mating surfaces of plunger (2) and solenoid frame (79), and may be increased by raising slightly, or decreased by lowering slightly, wrap spring stop (76). Be sure to retighten (stop) screws (76S) to 50 in-lbs. Manually lift plunger to maximum travel and release. Depress plunger, manually or electrically, and allow it to snap up. Repeat several times, then

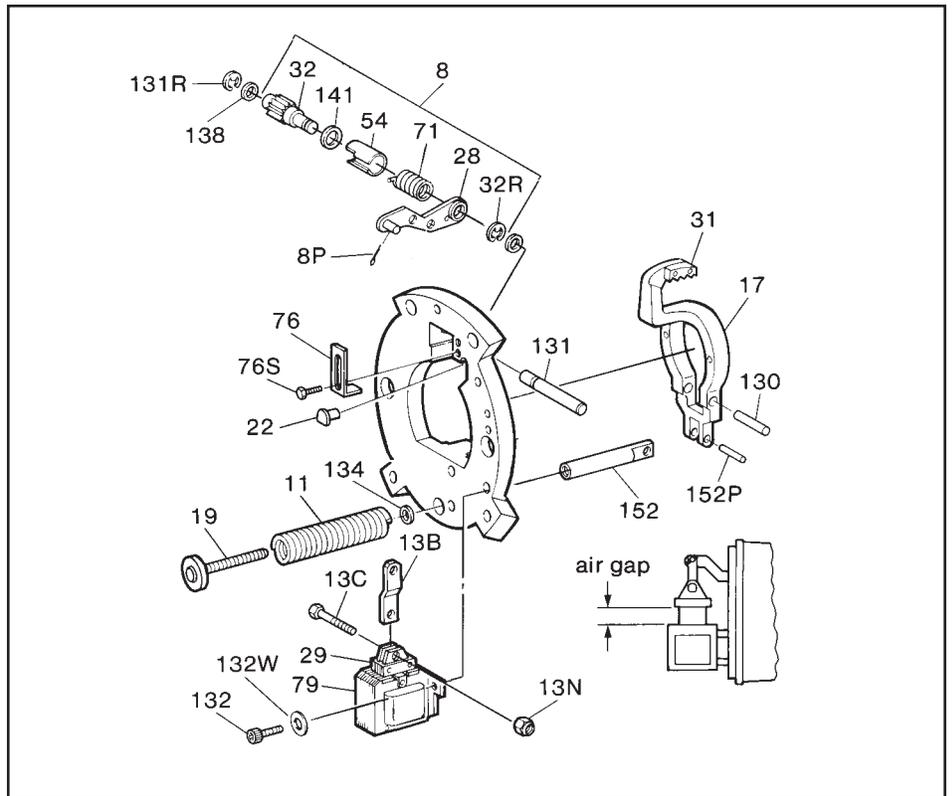


Figure 6

- recheck air gap. (For vertically mounted brakes refer to Note in Section III under Item C).
2. Tang of wrap spring (71) must be below, and must make contact with, wrap spring stop (76) when solenoid lever (28) is manually raised. If stop is bent outward, allowing tang to bypass it, rebend to square position, assemble correctly, and reset solenoid air gap as described in Paragraph 1.
 3. Should air gap disappear due to overheating, oil or other lubricant may have been applied to solenoid lever and pinion assembly (8). Remove support plate assembly (142). Loosen pressure spring nut (19) until pressure spring (11) is free. Remove cotter pin (8P) from solenoid lever (28) and retaining ring (131R) from pivot pin (131). Note location of spacer washer (138) if used, and push pivot pin out to free affected assembly. Remove retaining ring (32R) from pinion (32) and disassemble. Parts should be thoroughly cleaned in a solvent that does not leave a film M.E.K. or equivalent. Dry all parts thoroughly and reassemble. Rotate pinion and wrap spring clockwise until tang (A) is aligned with centerline of the upper hole of the lever arm. Refer to Figure 7. Reassemble in reverse order. Do not retighten cap screw (19) until support plate assembly is mounted on endplate. Refer to Steps H and I of

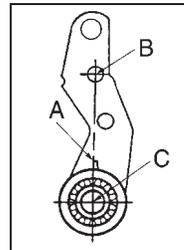


Figure 7

Installation Procedure to complete assembly.

4. Check condition and positioning of pinion (32) and rack (part of lever arm assembly, 17). Replace parts as necessary with complete assemblies. See following Sections.

D. Solenoid lever and pinion assembly replacement

If pinion (32) teeth are worn, replace entire assembly (8). Consult appropriate parts list for kit number. Check sector gear of lever arm (17) for wear.

E. Lever arm replacement - Series 87,000

If sector gear teeth of lever arm (17) are worn, replace entire lever arm assembly available as a kit from appropriate repair parts list. Also check pinion (32) teeth for wear. See Item 8.

IV. Troubleshooting

A. If brake does not stop properly or overheats, check the following:

1. Is manual release engaged, and is motor energized?
2. Friction discs may be excessively worn, charred or broken.
3. Hub may have become loose and shifted on shaft.
4. Is hub clean and do friction discs slide freely.
5. Are controls which govern start of braking cycles operating properly?
6. Are limit switches, electric eyes, etc. functioning properly?

7. On vertically mounted brakes, are springs in place of disc pack? See P/N 8-078-937-05 (Sheet 301.3).
8. If brake is floor mounted, check alignment. See Section I, Step E.
9. Pressure spring may be improperly assembled or broken.
10. Is solenoid air gap adjusted correctly? See *Self-adjust Maintenance*, Section III, Item C.
11. Check linkage for binding. The approximate pressure applied to the top of the solenoid link to move plunger is:

#5 coil	3 lbs
#6 coil (15 lb-ft)	5-1/2 lbs
#6 coil (25 lb-ft)	9 lbs
#8 coil	16 lbs

If excessive force is required, determine cause of binding and correct. Do not overlook bent, worn or broken plunger guides as a possible cause for binding.

12. Solenoid lever stop (22) must be in place on support plate.
 13. Solenoid may not be energizing and releasing the brake. Check voltage at the coil and compare to the coil and/or nameplate voltage rating.
 14. Whether brake is AC or DC a voltage drop may be occurring. If excessive drop in voltage is noted, check wire size of power source. Correct as needed.
- Note:** A method to check voltage at coil is to insert a block of wood of the approximate thickness of the solenoid air gap between the solenoid frame and plunger. (The block will prevent brake from releasing when coil is energized.) Connect voltmeter leads at the coil terminals or lead wires. Energize coil. Voltmeter needle will not fluctuate and reading can be taken. Reading should be taken immediately and the coil de-energized to prevent overheating of the coil. Compare voltage reading with coil rating.
15. Check slots of endplate for wear at the areas where stationary discs are in contact. Grooves in the slots can cause hang-up or even breakage of each of stationary discs. If grooving is noted, replace endplate.

16. Check that heads of mounting bolts do not extend above wear surface of endplate.
17. On vertical brakes with cast iron endplates, check the vertical mounting pins to be sure shoulder of pin is flush with wear surface of endplate. Be sure pins are straight and pressure plate and stationary disc(s) are free to slide on the pins. Be sure springs and spacers are installed in proper order. See P/N 8-078-937-05 (Sheet 301.3).
18. Check pressure spring length to insure correct compressed height. Original spring lengths are given in the following Table so that correct setting may be verified and corrected if necessary. With worn friction discs, add amount of wear to the approximate spring length shown.

Torque (lb-ft)	Compressed Spring Length
10	3-17/32" (90 mm)
15	3-9/16" (91 mm)
25	3-3/8" (86 mm)
35	3-3/8" (86 mm)
50	3-3/8" (86 mm)
75	3-3/8" (86 mm)
105	3-3/8" (86 mm)

19. If a heater is supplied and excess rusting has occurred in brake, check power source to heater to be sure it is operating and that heater is not burned out.
20. If stopping time is more than two seconds (rule of thumb) and/or the application is more than five stops per minute, check thermal requirements of load versus thermal rating of brake.

B. If brake hums, solenoid pulls in slowly, or coil burns out, check the following:

1. Voltage supply at coil versus coil rating.
2. Is solenoid air gap excessive? See *Self-adjust Maintenance*.
3. Shading coils may be broken.

4. Plunger guides may be excessively worn. Does solenoid plunger rub on solenoid frame laminations? If so, replace plunger guides.
5. Solenoid frame and plunger may be excessively worn.
6. Is solenoid dirty?
7. Solenoid mounting screws may have become loose, causing frame to shift and plunger to seat improperly.
8. Sector gear and pinion teeth may be jamming due to excessive tooth wear.
9. Excessive voltage drop when motor starts. Check size of lead wires for motor starting current and solenoid inrush current. See Section IV-A, Items 11, 12 and 14.

C. If brake is noisy during stopping:

1. Check mounting face runout, mounting rabbet eccentricity and shaft runout. See *Installation Procedure*, Section I, Step E. Correct as required.
2. Check for signs of the outside diameter of the friction disc(s) rubbing on the inside diameter of the endplate. This would indicate brake is eccentric with respect to the motor shaft and/or the shaft is deflecting during a stop. Check alignment and shaft diameter. Also check for worn motor bearings. If realignment does not correct the problem, a larger diameter shaft may be required. Shaft deflection may also be caused by excessive overhang of brake from motor bearing. Additional shaft support may be required.
3. In cases where motor shaft extends through a fan casing or guard, the clearance hole may not be adequate. Rubbing of the shaft may occur causing a noise during a stop. If required, enlarge clearance hole.
4. Check for bad motor bearings. Replace if necessary. Check for excessive shaft endfloat. Correct as required.

