

# 110.OA

Bulletin No. M-103-B



## **Warning**

Forward this manual to the person responsible for Installation, Operation and Maintenance of the product described herein. Without access to this information, faulty Installation, Operation or Maintenance may result in personal injury or equipment damage.

# "SC" & "SA" Installation and Mounting Instructions of Airflex<sup>®</sup> Magnetic Clutches & Brakes



## **Caution:**

### **Use Only Genuine Airflex<sup>®</sup> Replacement Parts**

The Airflex Division of Eaton Corporation recommends the use of genuine Airflex replacement parts. The use of non-genuine Airflex replacement parts could result in substandard product performance, and may void your Eaton warranty. For optimum performance, contact Airflex:

In the U.S.A. and Canada: (800) 233-5890  
Outside the U.S.A. and Canada: (216) 281-2211

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# **EAT•N**



## INSTALLATION AND MOUNTING INSTRUCTIONS

### AIRFLEX MAGNETIC CLUTCHES

The Airflex Magnetic Clutch is a precision built unit and when applied and installed properly will give years of trouble free operation. Installation is neither difficult nor costly, yet many cases of clutch failure can be attributed to improper installation. The following are some basic rules or guides for proper mounting. Observance of these rules will normally insure satisfactory installation and operation.

1.) **ALIGNMENT** is very important. The Airflex Magnetic Clutch is **not** a flexible coupling and cannot be used as such. Whether mounted as a coupling, on a through shaft, or in any other fashion, the concentricity between the driven gear shaft and the clutch body shaft must be within .003 T.I.R.

2.) **AXIAL MOVEMENT** of the clutch body and driven gear must be prevented. If the clutch body and driven gear are allowed to come in contact, the resulting mechanical interference will cause drag and overheating with resultant clutch failure. If the clutch body and driven gear are allowed to move away from each other, the friction discs will drop off of the driven gear resulting in loss of torque and eventual clutch failure. The correct location of the driven gear with respect to the clutch body is shown as Dimension M-8 on Dimension Sheet MAL-171.

Suggested methods to prevent axial movement are to be found on succeeding pages.

3.) **CLUTCH HOLDING ARM** should be restrained from moving because it keeps the stationary coil housing from rotating, however, it should be held loosely (not rigidly) to preclude the possibility of pre-loading the stationary coil housing bearing.

4.) **FOREIGN MATTER** such as abrasive dust, chips, grit, and water should be kept out of the clutch. When running in oil, this is not usually a problem. When running dry this sometimes is a problem and some sort of shielding for the clutch may be necessary. Foreign material in the disc pack can greatly accelerate disc pack wear. Accumulations of foreign material in the close running clearances of the clutch can cause binding, overheating and eventual clutch failure.

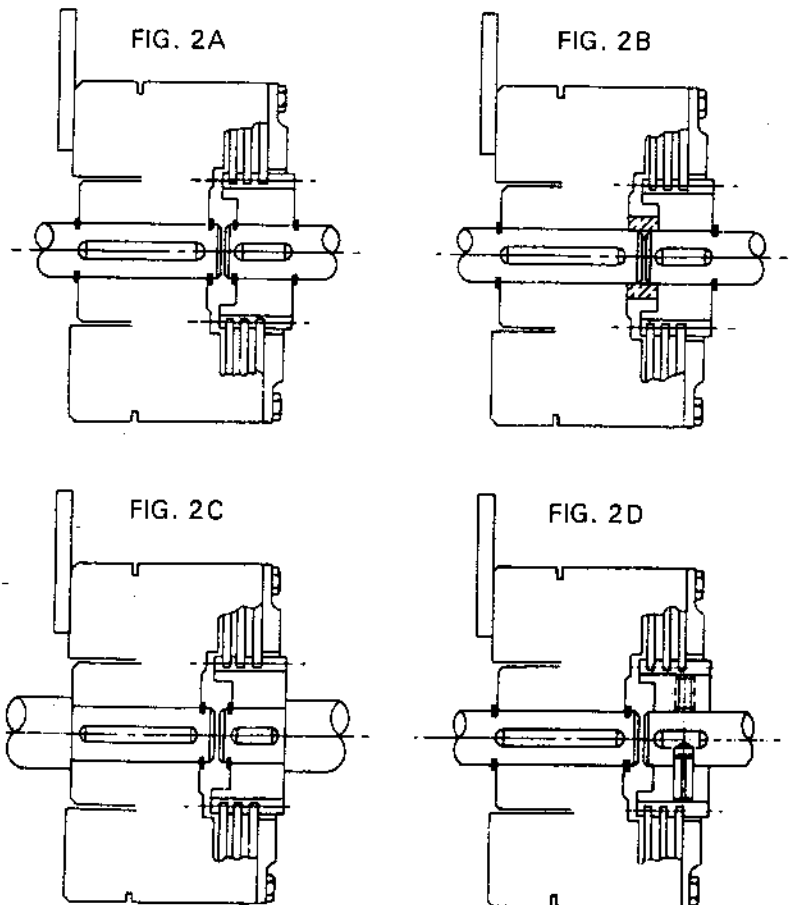
5.) **ELECTRICAL CONNECTION** is made by connecting the two clutch leads to a direct current power source of the correct voltage and current capacity. The rated D.C. voltage and D.C. amps. are shown on the name plate of the clutch. This data is also tabulated on Data Sheet MAL-171-2. 90 volts is standard. Usually, the D.C. power supply is obtained from an alternating current supply and a single phase full wave bridge type rectifier, which is obtainable from the Airflex Plant. More detailed information can be found in Bulletin M-103-D.

When the Airflex Clutch is used in an enclosed oil filled housing, the leads can be conveniently brought out of the housing through a rubber grommeted lead outlet bushing such as the Pyle-National Company "sealing type cable grip".

The coil of the Airflex Clutch is completely encapsulated in an epoxy resin and the leads are insulated with oil and water resistant poly-vinyl compound. These leads are then sealed in the coil. Hence, no special precautions are required to protect the coil and leads when the Airflex Clutch is used in oil.

#### SUGGESTED MOUNTING ARRANGEMENTS

**AXIAL MOVEMENT:** Clutch body and driven gear can be held axially on the shaft by means of four snap rings as shown in Figure 2A, by two snap rings and a loose bronze spacer as in Figure 2B, a combination of shaft shoulders and snap rings as in Figure 2C, or by snap rings and a drive pin (or set screw) as in Figure 2D. Set screw holes are optional and are not included in the standard gear.



### CLUTCH-PULLEY OR CLUTCH-GEAR MOUNTING

A common mounting arrangement is to secure the clutch body to a pulley or gear as in Figure 2E. In this case the pulley or gear and the clutch will be bearing mounted on the shaft. When the clutch is energized, the shaft will be driven by the pulley and clutch.

The clutch body which is the high inertia portion of the clutch, rotates constantly and the low inertia driven gear and friction discs are the portion of the clutch which is accelerated each time the clutch is energized. The clutch can be supplied with the standard bolt circle as shown in Table 2.1A. The pulley and clutch body must be restrained from moving axially and space must be provided between clutch body and pulley for the holding arm.

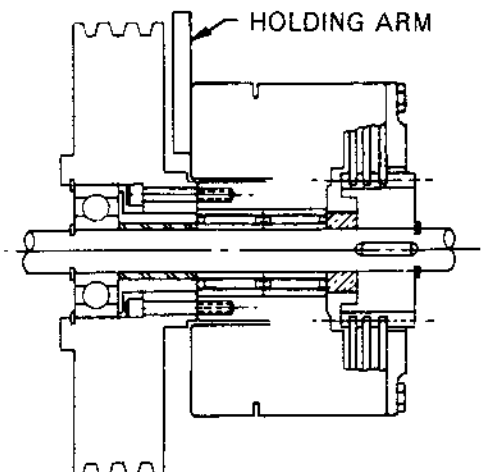


FIG. 2E

### CLUTCHES USED FOR SPEED SELECTION

The arrangement shown in Figure 2F is very commonly used in various types of transmissions to obtain electrical speed selection. Shaft "A" and all three clutch bodies rotate continuously and the proper speed is selected by energizing the appropriate clutch. Note that the high inertia clutch bodies rotate continuously and the low inertia driven gears are accelerated in each case.

The spur gears and the clutch driven gears can be pinned or bolted together. When the bore in the gears is so large that there is insufficient stock between the bore and the root diameter for pins or bolts, the two gears can be cut as one piece.

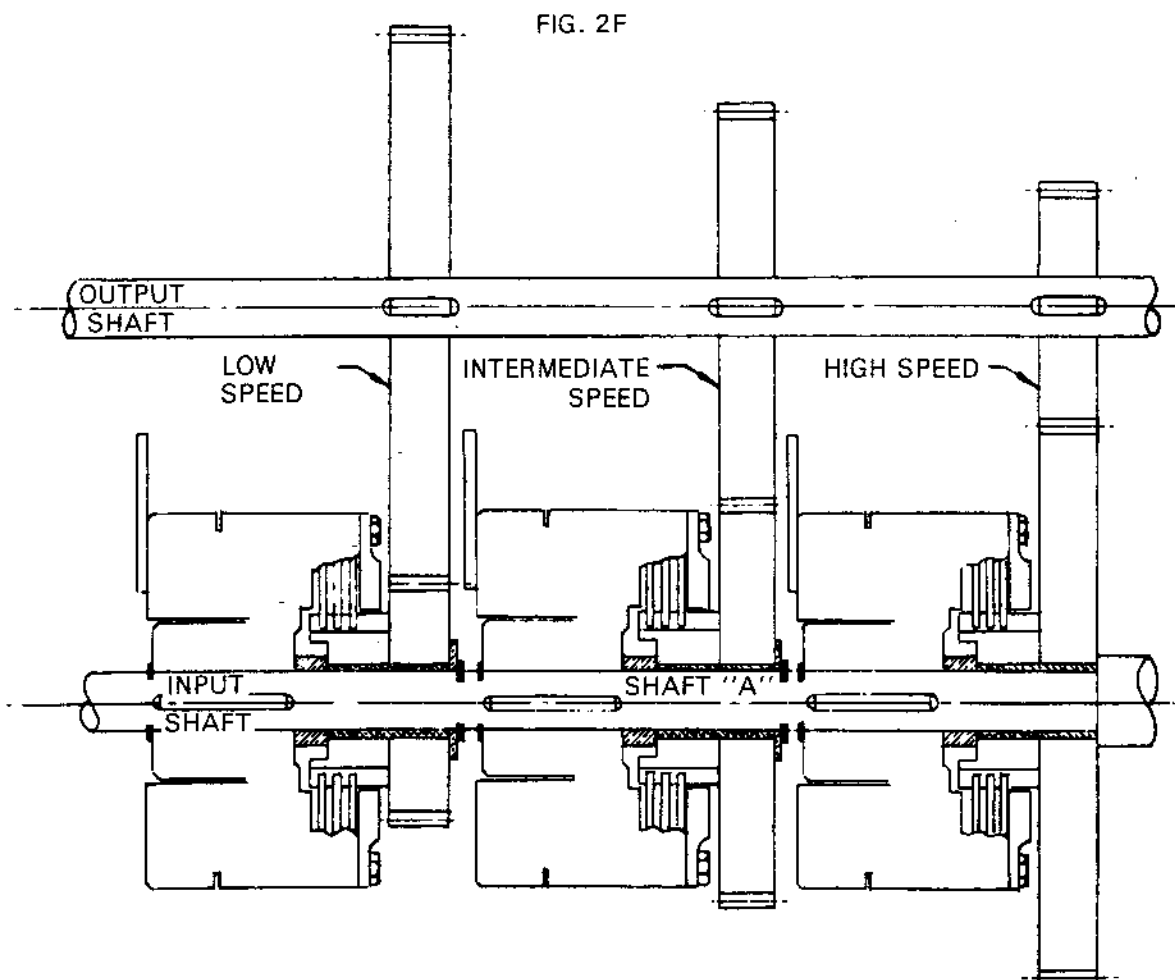


FIG. 2F

## CLUTCHES USED FOR A REVERSING DRIVE

Figure 2G illustrates a common arrangement for a reversing drive. Shaft "A" and both clutches rotate continuously and the desired direction of rotation of the output shaft "B" is obtained by energizing the appropriate clutch. Where other machine considerations allow, the same result could be obtained by eliminating the idler gear and substituting a pair of pulleys and a belt for one set of gears. Again the high inertia portion of the drive rotates continuously.

The same remarks concerning the fastening of the spur and clutch driven gears apply to this drive as applied to the "Speed Selection Drive."

Also note that approximately 1/4 inch can be saved by locating the clutches back-to-back and staggering the location of the holding arms. In some cases this will also simplify bringing out the clutch leads and restraining the clutch holding arm.

### POWER BRAKE

The Airflex, Magnetic Type SC Clutch can be utilized as a power brake as illustrated in Figure 2Ha. Also available is the Airflex Magnetic Type SA Flange Mounted Power Brake illustrated in Figure 2Hb. When the Type SC Clutch is ordered from the factory as a power brake, the stationary coil housing bearing is replaced by a spacer and mounting holes are drilled and tapped in the clutch body. The clutch body is then bolted to a stationary machine member and all of the clutch is stationary except the driven gear and friction discs. The clutch body must be bored for clearance over the shaft. Recommended bolt circles and bolt sizes are specified in Table 2.1A.

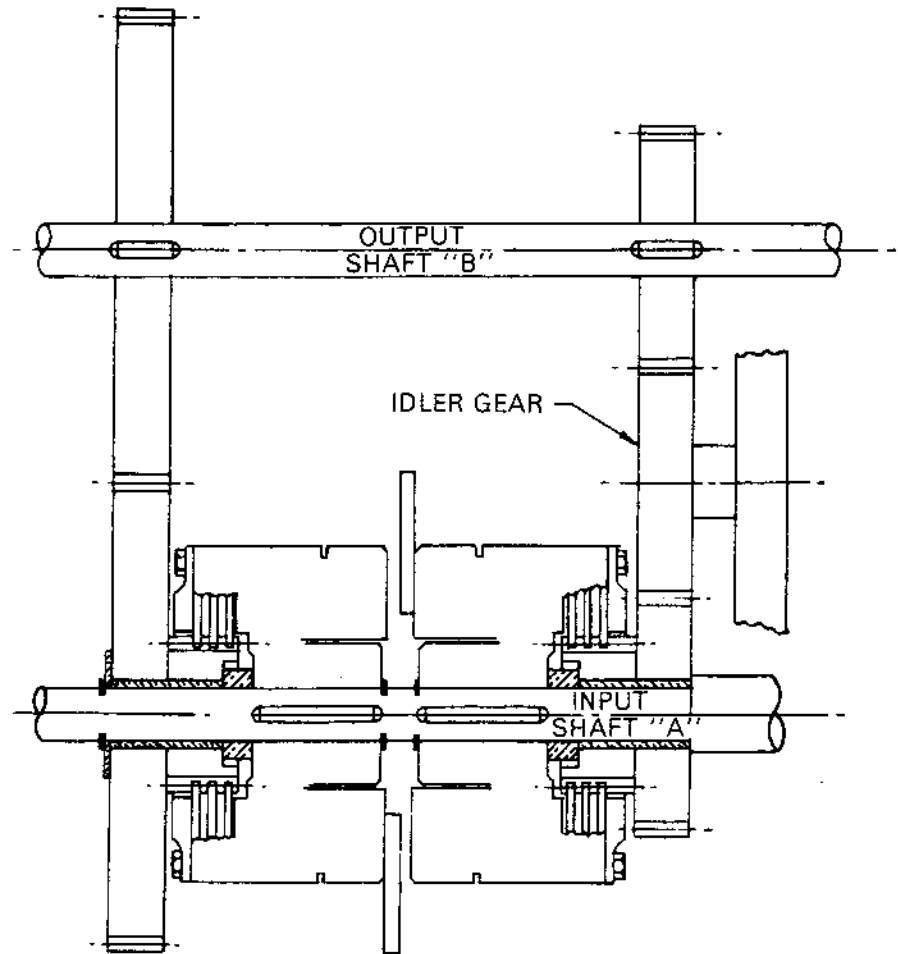


FIG. 2G

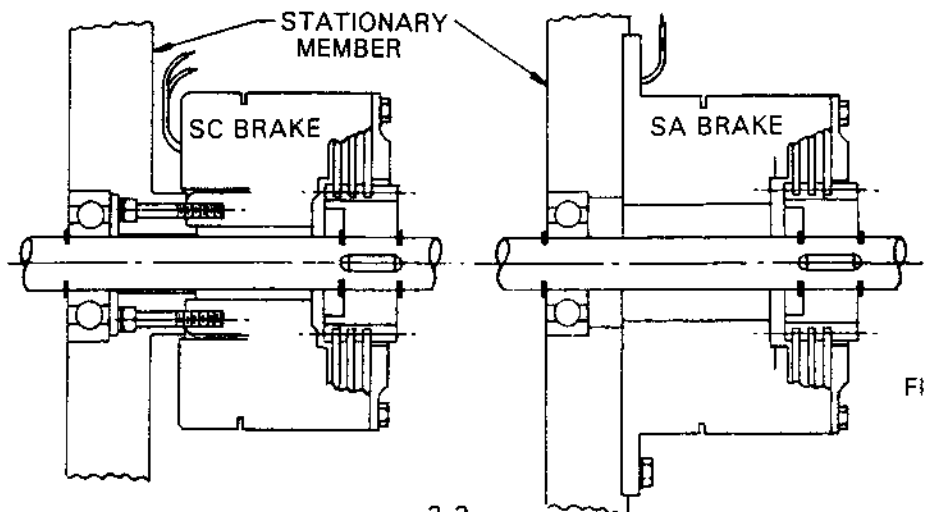


FIG. 2Ha

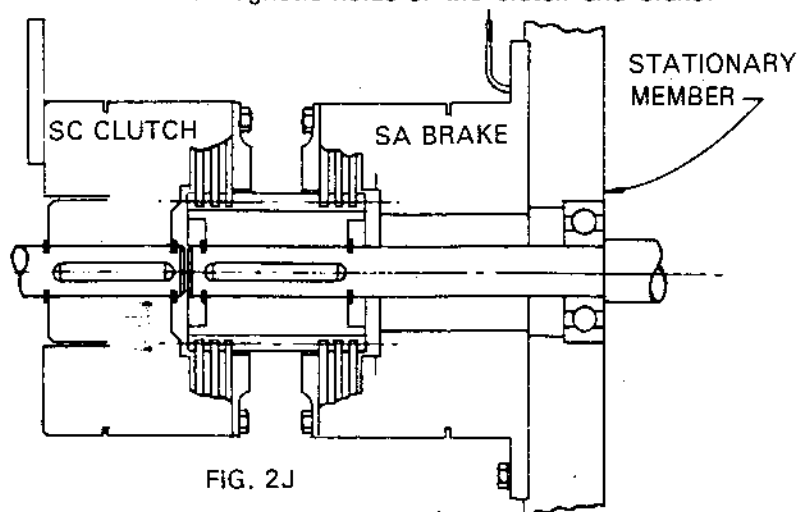
FIG. 2Hb

The type SA power brake is provided with a non-magnetic flange. The brake is secured to a stationary machine member by means of the flange and the driven gear is keyed to the shaft. The brake can be accurately aligned with the shaft by either the outside or inside register diameter on the flange. Because it is specifically designed for use as a brake, the SA type brake should be used whenever possible. Complete dimensions are shown on MAL-171-7.

In either case, a register must be provided on the stationary machine member to assure a concentricity of at least .003 T.I.R. between the two brake members.

### CLUTCH-BRAKE COMBINATION

A typical clutch-power brake combination utilizing a common gear is illustrated in Figure 2J. At least 1/4 inch and preferably 1/2 inch clearance between the clutch and brake should be provided to eliminate the interaction between the magnetic fields of the clutch and brake.



Care must be exercised in designing and mounting of the clutch and power brake to maintain concentricity between the driving and driven parts of the clutch and brake to within .003 T.I.R.

### ENVIRONMENT

The Airflex Magnetic Clutch is designed to operate in either a dry environment or in oil. When practical, operation in oil is preferred because of better cooling, better bearing lubrication, and greatly decreased disc pack wear in oil.

As mentioned previously, when operating dry, the clutch must be protected from contamination by foreign material such as abrasive particles, water, grease and oil, etc.

When operating in oil, an oil spray or mist is the best means of providing the oil. The clutches can be arranged to dip in the oil but, care should be taken so that the oil level and speed of rotation do not combine to generate excessive heat through churning of the oil.

The most satisfactory oil for use with the Airflex Magnetic Clutch is a plain mineral oil with an S.A.E. 10 to 20 viscosity. Conventional additives such as rust inhibitors, oxidation inhibitors, and anti-foam agents will not affect clutch operation but, oils with sulfur, chlorine, lead, or sulfurized fatty materials should be avoided.

Typical oils which meet the above specifications are Mobil D.T.E. light or heavy medium (Socony Mobil Oil Company), or most automatic transmission oils.

### ADDITIONAL CONSIDERATIONS

Whenever possible, the clutch should be mounted so that the high inertia portion of the clutch is rotating continuously and the low inertia portion is the one to be accelerated. This will help to reduce clutch heating and accelerating time during cyclic operation.

Whenever the clutch body or coil housing is mounted to a stationary machine member, it is desirable to mount it on a non-magnetic material. When possible, portions of the machine made of magnetic material should be kept at least 1/4 inch away from clutch. This is particularly important near the clutch air gap. When leakage magnetic flux must be minimized because of other machine considerations, the shaft and machine housing should be made of non-magnetic material. Some non-magnetic materials commonly used are aluminum, brass, copper, bronze and zinc. Shafting can be made of the "300" series of non-magnetic stainless steels. Many high nickel alloys such as "k", "kr", and "s" monel are also non-magnetic as is Inconel.

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**RECOMMENDED CLUTCH MOUNTING HOLES**  
**TABLE 2.1A**

CLUTCH	UN-SPLINED BODY					SPLINED BUSHING					DRIVEN GEAR					
	A	B			C	A	B			C	A	B			C	
		SIZE	DEPTH	NO. REQ'D			SIZE	DEPTH	NO. REQ'D			SIZE	DEPTH	NO. REQ'D		
SC-225	13/16	1-64NC-2	3/16	4	5/8	19/32	1-64NC-2	3/16	4	7/16	23/32	1-64NC-2	3/16	4	9/16	
SC-275	1	3-48NC-2	1/4	4	13/16	11/16	3-48NC-2	1/4	4	1/2	29/32	3-48NC-2	1/4	4	23/32	
SC-325	1 5/16	5-40NC-2	5/16	4	1 1/16	7/8	5-40NC-2	5/16	4	5/8	1 1/8	5-40NC-2	5/16	4	7/8	
SC-375	1 5/8	8-32NC-2	3/8	4	1 5/16	1 1/16	8-32NC-2	3/8	6	3/4	1 17/32	5-40NC-2	5/16	6	1 9/32	
SC-450	2	10-24NC-2	3/8	4	1 5/8	1 3/8	10-24NC-2	3/8	6	1	1 27/32	8-32NC-2	3/8	6	1 1/2	
SC-550	2 5/8	1/4-20NC-2	1/2	4	2 1/8	2	-20NC-2	1/2	6	1 1/2	2	1/4-20NC-2	1/2	6	1 1/2	
SC-650	3 1/8	5/16-18NC-2	5/8	4	2 1/2	2 1/4	-18NC-2	5/8	6	1 5/8	2 3/8	5/16-18NC-2	5/8	6	1 3/4	
SC-775	3 3/8	3/8-16NC-2	3/4	6	2 5/8	2 1/2	-16NC-2	3/4	6	1 3/4	2 15/16	3/8-16NC-2	5/8	6	2 3/16	
SC-825	3 3/4	7/16-14NC-2	7/8	6	2 3/8	2 3/8	-14NC-2	7/8	6	1 1/2	2 13/16	7/16-14NC-2	3/4	6	1 15/16	
SC-950	4 3/8	7/16-14NC-2	7/8	6	3 1/2						3 1/4	1/2-13NC-2	7/8	6	2 3/4	
SC-1000	4 5/8	1/2-13NC-2	1	6	3 5/8						3 3/4	5/8-11NC-2	7/8	6	2 1/2	
SC-1150	4 3/8	5/8-11NC-2	1 1/4	6	3 1/8		NOT MANUFACTURED					4 3/16	5/8-11NC-2	1 1/8	6	2 15/16
SC-1325	5 1/16	3/4-10NC-2	1 1/2	6	3 9/16						5 1/16	3/4-10NC-2	1 1/2	6	3 9/16	

The table above lists the dimensions of the recommended clutch mounting holes. The data at the left covers mounting holes which can be made directly in the clutch body. The data in the middle covers the mounting holes which can be provided in the clutch body splined bushing and data at right shows driven gear mounting holes. Note that maximum bores for each condition are shown.

Call or write for additional information Eaton Corporation, **Industrial Drives Division**, 9919 Clinton Road, Cleveland, Ohio 44111.





## **EATON PRODUCT WARRANTY**

Subject to the conditions stated herein, Eaton Corporation warrants to the Purchaser that each new Airflex Product manufactured by Eaton will be free from failures caused by defects in material and workmanship, and will deliver its rated capacity, for a period of twelve (12) months from the date of shipment to Purchaser, provided such Product is properly installed, properly maintained, operated under normal conditions and with competent supervision. Warranty claims shall be made in writing and the part or parts shall, if requested by Airflex Division, be returned prepaid to the Airflex Division for inspection. Upon a determination that a defect exists, Eaton shall thereupon correct any defect, at its option either by repairing any defective part or parts or by making available at Eaton's plant a repaired or replacement part. This warranty does not extend to normal wear parts or components of the Product, such as friction material and friction surfaces.

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In no event shall Eaton be liable for special, incidental or consequential damages. Eaton's liability arising out of the supplying of such Product, or its use, whether in warranty, contract or otherwise, shall in no case exceed the cost of correcting defects in the Products as herein provided. Upon expiration of the twelve (12) month period, all such liability shall terminate. THE FOREGOING SHALL CONSTITUTE THE SOLE REMEDY OF PURCHASER AND THE SOLE LIABILITY OF EATON.

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