

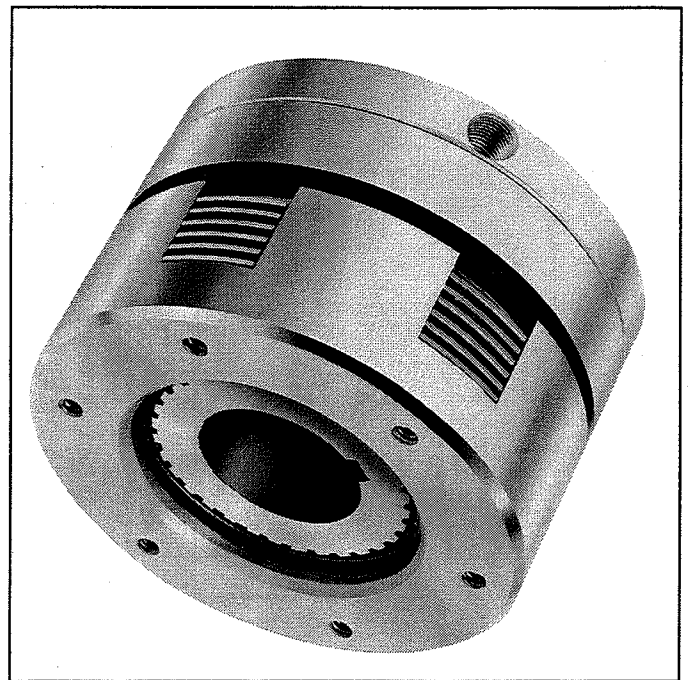
**HY 13000**



**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.

# Installation, Operation and Maintenance of Airflex<sup>®</sup> AS and AR Hydraulic Clutch and Brake Assemblies



**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:

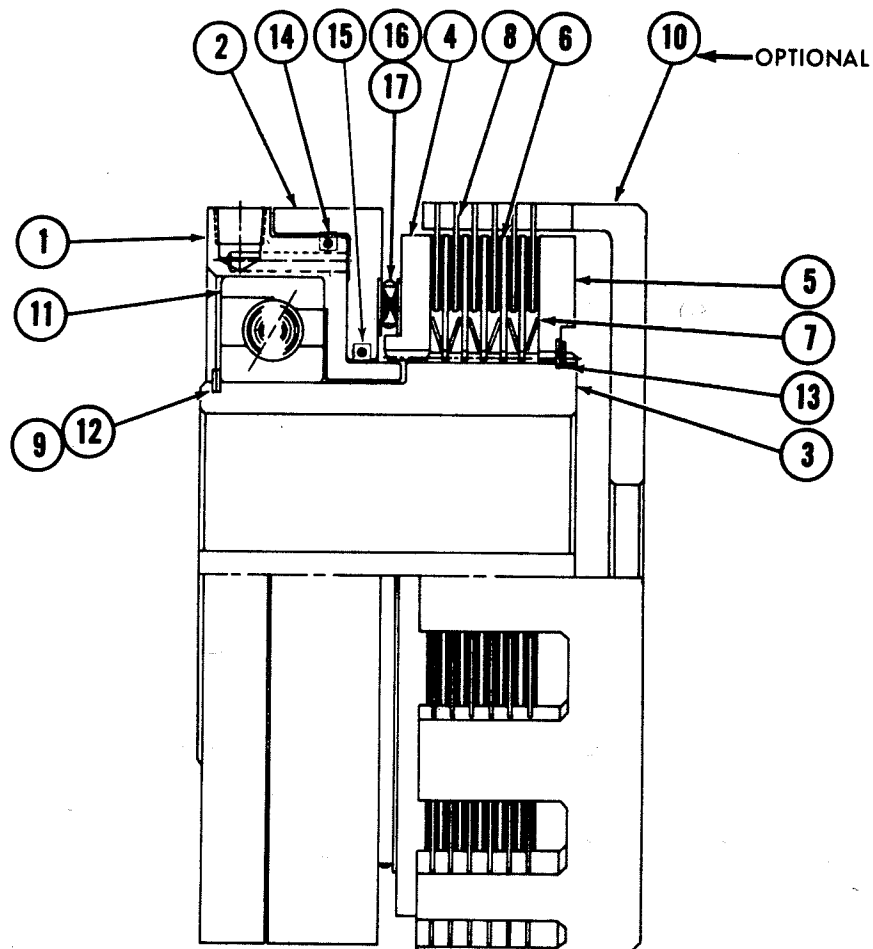
In the U.S.A. and Canada: (800) 233-5926  
Outside the U.S.A. and Canada: (216) 281-2211

**EATON**

**204108**

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# COMPONENT PARTS FOR AIRFLEX MODEL "AS" HYDRAULIC CLUTCH



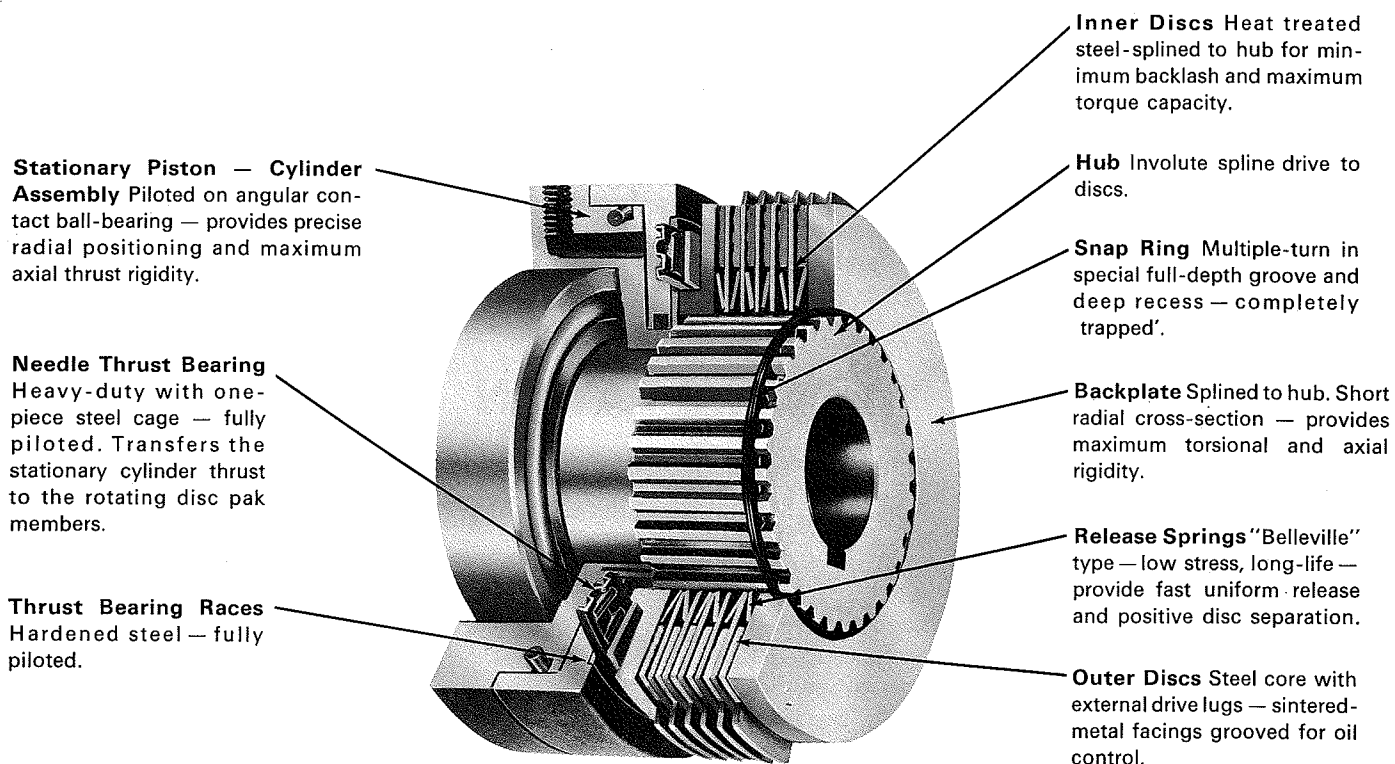
ITEM	QUAN.	PART DESCRIPTION
1	1	CYLINDER
2	1	PISTON
3	1	HUB
4	1	PRESSURE PLATE
5	1	BACKPLATE
6	5	SEPARATOR DISC
7	6	RELEASE SPRING
8	6	FRICTION DISC ASSEMBLY
9	1	SHIM
* 10	1	DRIVE CUP
11	1	BALL BEARING
12	1	SNAP RING
13	1	SNAP RING
14	1	"O" RING
15	1	"O" RING
16	2	THRUST RACE
17	1	THRUST BEARING

NOTE: FOR PART NUMBERS SEE SECTION IV.

**\*NOTE:**

STANDARD DRIVE CUP CAN BE FURNISHED AT AN EXTRA COST, THE DRIVE CUP IS FURNISHED BY CUSTOMER REQUEST ONLY, AND IS TO BE REWORKED FOR MOUNTING BY CUSTOMER.

## MODEL "AS" CLUTCH PART DESCRIPTION



Stationary or rotating actuator types. / Air or hydraulic actuation. / Compact, one-piece design! Maximum torque capacity in minimum size package. / In O. D.'s from 3 3/4" to 9 3/4"; shaft sizes from 3/4" to 4 1/4"; torque ratings to 3,400 lb.-ft. / Wide choice of mountings. Automatic bearing lubrication of hydraulic models. / Operating speed limited only by hydraulic system flow into and out of clutch. / "Belleville" springs for fast and smooth disc disengagement.

## I. OPERATION

(Model "AS" Clutch)

### A. DESCRIPTION

The model AS clutches provide extremely high torque capacities and large bore capability in a minimum size "package", thus permitting space saving, torsionally-rigid transmission designs, with easy clutch installation and actuation. High capacity bearings provide long B-10 bearing life (clutch performance curves available upon request).

### B. HOW IT WORKS

The hub (3) is normally fastened to the driving member and the drive cup(10) is fastened to the driven member. This is recommended so that the high inertia portion of the clutch will be rotating at all times. The stationary cylinder (1) has provision for power connection.

Air or hydraulic pressure creates a force between the piston (2) and cylinder (1). The piston moves towards the disc pack. This motion is transferred

through the thrust bearing (17) to the pressure plate (4).

The pressure plate then clamps the disc pack assembly forming a torsionally rigid connection between the clutch hub and the drive cup. The friction discs (8) transmit the torque through tangs on their O.D. and the separator discs (6) are splined on the I.D. to fit the driving hub. When the pressure is released, the release springs (7) separate the discs and force the piston back to its original position thus releasing the disc pack.

### C. APPLICATION CONSIDERATIONS

Speed of operation is limited only by the capacity of the hydraulic system to transfer oil into and out of the clutch. For maximum speed of operation or high-speed cycling applications, short, large oil lines and large valve orifice sizes should be provided to avoid restricting oil flow. Various hydraulic circuit modifications can be made to pro-

vide special effects such as "soft" starts, "tailored" engagements, etc. Consult the local Eaton representative.

For load acceleration applications involving considerable clutch slippage either continuous, single-start or hi-cycle, provision must be made to avoid overheating of the clutches.

The heat generated by slippage is determined by the slip torque level, operating rpm, and slip time.

If the rate-time generation of heat exceeds the rate-time dissipation capacity of the system, overheating and failure will occur. Since the primary heat dissipation factors, such as type and design of enclosure, ambient temperature, type and amount of oil cooling etc. are determined by the overall transmission design, published clutch thermal capacity ratings can be extremely misleading. For specific thermal capacity recommendations consult the factory.

## II. INSTALLATION

(Model "AS" Clutch)

### A. MOUNTING

Normally, the clutch hub will be keyed to the driving shaft and the drive cup will be fastened to, or be an integral part of, the driven member. Spline bores on the clutch hub are available, but require special consultation with the factory. Our standard practice is to bore the clutch hub to a tolerance of  $+0.001 - 0.000$ . Clutch and drive cup positioning is important in order to maintain proper friction disc engagement. Refer to Airflex bulletin ML-271-A or M-107-D for dimensions and specifications. Misalignment between the clutch and drive cup should not exceed .005 T.I.R.

### B. SUPPLY LINE CONNECTIONS

The stationary cylinder-piston design of the type AS clutch permits a simple and direct connection from the actuating valve to the clutch. The connection must be flexible to avoid applying any external loading to the clutch bearings. Clutch should be mounted with input port centered on top.

### C. LUBRICATION PROVISION

#### 1. OIL OPERATION

The standard Model AS's are designed for wet (in-oil) transmission applications and for actuation with lube-type oils. The actuator section incorporates an automatic lubricating device, enabling a small amount of oil to bleed into the clutch bearings. This bearing lube leakage oil is expelled into the transmission sump and returns to the transmission oil system.

#### 2. AIR OPERATION

Clutches specified for air operation will not include the automatic lube orifice and are completely sealed. Lubrication of the clutch bearings during air actuation must be provided by splash, spray, or directed-tube means. Also, air systems should incorporate airline lubrication provision.

## III. MAINTENANCE

(Model "AS" Clutch)

### A. DISASSEMBLY

Place the clutch with backplate (5) down on a suitable spacer approximately one inch thick. The spacer must support the backplate, but must have clearance for the hub portion of the clutch. Remove the snap ring (12) on the bearing end of the clutch. Retain any spacers (9) if they are behind the snap ring. Apply pressure to the hub until it clears the inner race of the bearing. The piston and

cylinder can now be removed as a unit. The rest of the clutch can now be disassembled from the hub. The last item to come off is the snap ring (13) on the backplate side of the hub.

Disassemble the piston from the cylinder by suitable means, then remove the ball bearing (11), and "O" ring (14) from the cylinder. Remove "O" ring (15) from the piston.

## B. EXAMINATION

Clean all parts so that a proper examination can be conducted. All oil and residue should be removed.

Check the friction discs (8) and separator discs (6) for flatness, surface wear, heat damage and general wear or damaged lugs and splines. Replace discs as required. We recommend replacing both separator discs and friction discs at the same time. The "Belleville" type release springs (7) should also be replaced when replacing the disc pack.

Since bearing quality and condition is difficult to judge by visual examination, we recommend replacing the ball bearing (11), the thrust bearing (17) and the thrust races (16) during rebuilding.

The "O" ring seals (14) and (15) should always be replaced when rebuilding the unit.

The condition of the remainder of the parts should be noted and worn or damaged parts replaced as required.

## C. ASSEMBLY

Install snap ring (13) on the back plate end of the clutch hub, then position the hub with this end down. Slide the backplate (5) down and make sure that the second counterbore in the plate fits over the snap ring. Now, starting with a friction disc, stack the disc pack according to the layout on the "Model 'AS' Component Parts" page. Install the pressure plate (4), making sure that the splines on the I.D. mesh with the splines on the hub. Place one of the thrust races (16) and the thrust bearing (17) on the pressure plate making sure to position them properly on the extension of the pressure plate.

The next step is the piston and cylinder assembly. **NOTE:** Cover all "O" ring rubbing surfaces and grooves with "Mobil DTE 25" or the clutch actuating fluid before assembling these parts.

Install the new "O" ring in the piston and cylinder and press the ball bearing (11) into the cylinder. Use "Loctite" bearing mount if necessary. **CAUTION:** When installing bearing make sure that the wide opening is towards the outside. This bearing will take thrust in one direction only and incorrect installation will result in rapid failure. Press only on the outer race when installing. Align the piston and cylinder in the proper position and press the piston onto the cylinder with hand pressure to avoid any "cocking" or "binding" of parts.

Now, position the second thrust race (16) on the thrust bearing. Slide the piston and cylinder assembly onto the clutch hub and press the I.D. of the ball bearing to advance the assembly down the hub. **IMPORTANT NOTE:** Make sure that the race for the thrust bearing is properly seated in the counterbore on the piston face.

Press the inner race of the ball bearing beyond the snap ring groove. Use "Loctite" bearing mount if necessary. Replace shims (9) (if any) then snap ring (12).

With the clutch properly assembled, the friction discs should be free and loose between the separator discs with no drag or bind. The piston cylinder assembly should rotate freely on clutch hub with no drag or bind.

## D. REPAIR KITS

Components of the AS clutch that are subject to wear are available in two repair kits. Disc repair package No. 1 and Bearing repair package No. 2 are for either factory or customer installation. Consult factory for prices.

### DISC REPAIR PACKAGE NO. 1

Basic "AS" Series, Repair Kit:

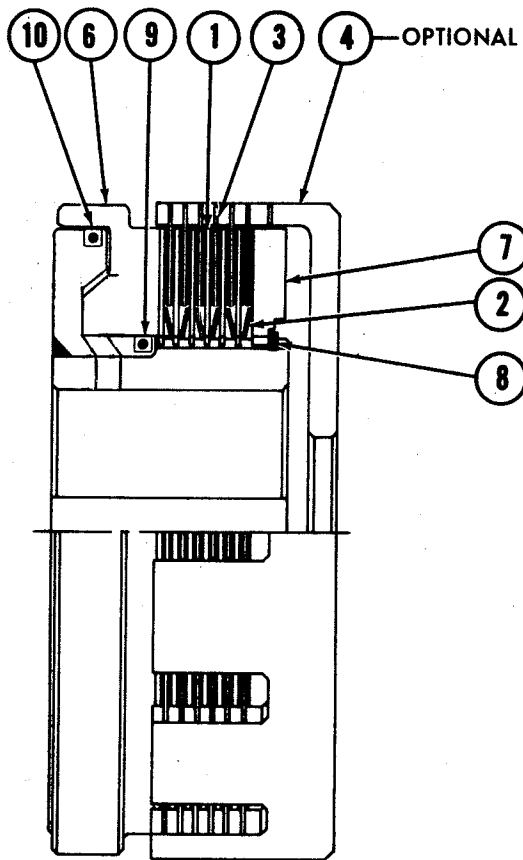
- 6 Friction Discs
- 5 Separator Discs
- 6 Belleville Springs
- 1 Backing Plate
- 1 Snap Ring
- 2 "O" Ring Seals
- 1 Bearing Snap Ring

### BEARING REPAIR PACKAGE NO. 2

Basic "AS" Series Bearing Replacement  
Kit:

- 1 Angular Contact Ball Bearing
- 1 Needle Thrust Bearing
- 2 Needle Bearing Races
- 2 "O" Ring Seals
- 1 Bearing Snap Ring
- 1 Backing Plate Snap Ring

# COMPONENT PARTS FOR AIRFLEX MODEL "AR" HYDRAULIC CLUTCH



ITEM	QUAN.	PART DESCRIPTION
1	6	SEPARATOR DISC
2	6	RELEASE SPRING
3	6	FRICION DISC ASSEMBLY
* 4	1	DRIVE CUP
5	1	HUB ASSEMBLY
6	1	PISTON
7	1	BACKPLATE
8	1	SNAP RING
9	1	"O" RING
10	1	"O" RING

NOTE: FOR PART NUMBERS SEE SECTION IV.

**\*NOTE:**

STANDARD DRIVE CUP CAN BE FURNISHED AT AN EXTRA COST, THE DRIVE CUP IS FURNISHED BY CUSTOMER REQUEST ONLY, AND IS TO BE REWORKED FOR MOUNTING BY CUSTOMER.

# I. OPERATION

(Model "AR" Clutch or Brake)

## A. DESCRIPTION

Style AR requires through-the-shaft power connection since the hub and piston rotate with the shaft. This style provides maximum torque capacity in minimum space and large bore size for maximum torsional stiffness. It is ideal for brake applications. Maximum recommended operating pressure is 225 psi.

very similar to that of the AS. Refer to "Model 'AR' Component Parts" page.

Air or hydraulic fluid enters through the shaft and through an inlet port in the hub (5). This forces the piston (6) to move and engage the disc pack. The rotary forces are transmitted through the disc pack just as in the type AS clutch. Disengagement of the clutch also takes place as in the AS clutch.

## B. HOW IT WORKS

The operating principle of the type "AR" clutch is

## C. APPLICATION CONSIDERATIONS

Same as for model AS clutch.

# II. INSTALLATION

(Model "AR" Clutch or Brake)

## A. MOUNTING

Normally, the clutch hub (5) is keyed to the driving shaft and the drive cup is fastened to the driven member. A .001 press fit is recommended

between the hub and shaft to prevent oil leakage. The inlet port in the "AR" hub must line up with the port in the shaft. A rotary seal union is used to bring the actuating medium into the shaft.

# III. MAINTENANCE

(Model "AR" Clutch or Brake)

## A. DISASSEMBLY

Apply pressure to back plate (7) to compress disc pack. Remove snap ring(8). Once snap ring holding the backplate has been removed, backplate, disc pack and piston (6) will slide off splined hub. The "O" ring seals (9 and 10) can then be removed from the hub assembly.

Install the new seals (9 and 10) in the hub assembly. Align the piston (6) and hub assembly (5) in the proper position and press the piston onto the hub with hand pressure to avoid any "cocking" or binding of parts.

## B. EXAMINATION

Follow the procedure outlined for the AS clutch when examining parts.

Now starting with a separator disc (1) stack the disc pack as shown on backplate (7). Apply pressure to the back plate until the snap ring groove in the hub is fully visible. Install snap ring (8).

## C. ASSEMBLY

**NOTE:** Cover all "O" ring rubbing surfaces and grooves with "Mobile DTE 25" or the clutch actuating fluid before assembling clutch.

With the clutch properly assembled the friction discs should be free and loose between the separator discs with no drag or bind.

## D. REPAIR KITS

Components of the AR clutch or brake that are subject to wear are available in one repair kit. Disc

repair package No. 3 is for either factory or customer installation. Consult factory for prices.

**DISC REPAIR  
PACKAGE NO. 3**

**Basic "AR" Series Repair Kit:**

- 6 Friction Discs
- 6 Separator Discs
- 6 Belleville Springs
- 2 "O" Ring Seals
- 1 Snap Ring

**E. APPLICATION AND ORDERING FACTS**

Model "AS" and "AR" clutches.

1. These clutches are designed for oil bath operation.
2. Clutches are to be either air or hydraulically

operated (customer must specify on order which type of operation he is designing).

3. Model "AS" clutches incorporate automatic leakage for bearing lubrication on oil powered applications.
4. Model "AS" clutches powered by air pressure must have auxiliary lube arrangement for bearings. (The automatic lube feature must be removed from all model "AS" clutches being operated by air pressure.)
5. Customer's order must specify bore and keyway dimensions.

In any correspondence regarding Airflex equipment, always refer to model type and size noted on a decal. Also, refer to the serial number stamped on the clutch.

Call or write Eaton Corporation, Industrial Drives Division, Airflex Plant, 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.

## **LIMITATION OF WARRANTY**

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER WRITTEN, ORAL OR IMPLIED. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY EXCLUDED.

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.