

# OPERATOR'S MANUAL

INCLUDING: OPERATION, INSTALLATION & MAINTENANCE

## CYCLE COUNTER KITS (CLOSED ELECTRICAL CONTACT TYPE) FOR DIAPHRAGM PUMPS

67168

67169 67391

67170 67392

67390 67393

RELEASED: 11-26-97

REVISED: 8-10-10

(REV. G)

### CYCLE COUNTER KITS

67168 for 1/2" diaphragm pumps (see page 1).  
67169 for 1", 1-1/2" and 2" diaphragm pumps (see page 2).  
67170 for 2" and 3" metallic diaphragm pumps (see page 2).  
67390 for 1" and 1-1/2" diaphragm pumps (see page 3).  
67391 for 2" and 3" diaphragm pumps (see page 3).  
67392 for 1" and 1-1/2" aluminum diaphragm pumps (see page 4).  
67393 for 2" and 3" aluminum diaphragm pumps (see page 4).

### GENERAL DESCRIPTION

The ARO diaphragm pump cycle counter kits provide a closed contact output each time the pump completes a cycle. This signal may be used to record cycles for maintenance purposes or batching if the discharge volume of each complete cycle is known. Some parts of the pump must be replaced with those included in the kits to enable the activation of the switch.

### OPERATION

Maximum Operating Voltage - 200 V DC.

Switching Current - 0.5 Amps

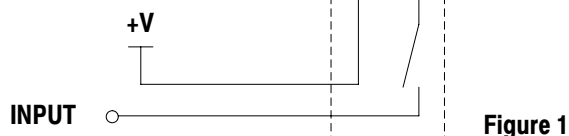
Once the kit is installed in the pump, it may be interfaced with a control device in the following ways:

As a SOURCING switch (see figure 1) for use with PLC's.

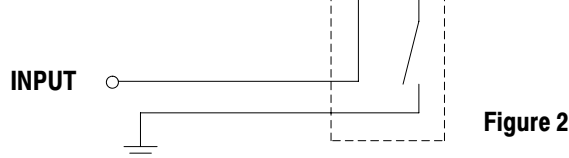
As a SINKING switch (see figure 2) for use with PLC's.

As a closed contact switch (see figure 3) for use with meters.

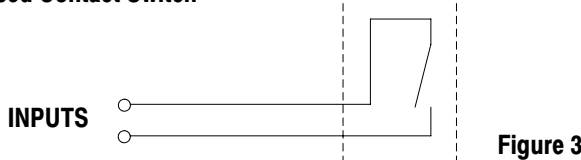
#### Sourcing Switch



#### Sinking Switch



#### Closed Contact Switch



### 67168 COUNTER INSTALLATION

#### 1/2" DIAPHRAGM PUMP

For use on the following models: 66605X-XXX, PD05P-XXX-XXX and PM05P-CSS-XXX-A02.

Refer to figure 4. NOTE: Apply Key-Lube grease (93706-1) to all "O" rings, "U" cups and mating parts.

1. Remove (134) bolts from the major valve and remove (135) valve block.
2. Remove (141) valve plate and (140) valve insert from the valve block.
3. Remove (136) plug and (111) spool and replace with 67157 spool assembly and 94654 sensor assembly from kit as shown.
4. Replace (140) valve insert and (141) valve plate in valve block. NOTE: Assemble (140) valve insert with "dished" side toward (141) valve plate.
5. Attach (135) valve block to (101) motor body, using (133) washers and (134) bolts. NOTE: Torque to 15 - 20 in. lbs (1.7 - 2.3 Nm).

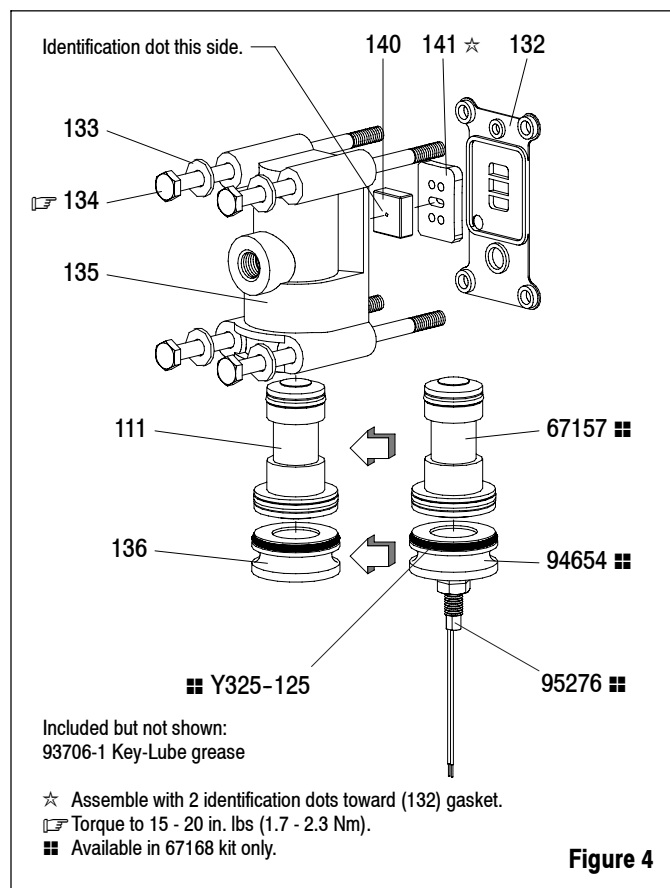


Figure 4

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## 67390 COUNTER INSTALLATION

### 1" AND 1-1/2" DIAPHRAGM PUMP

For use on the following non-metallic models: PD10E-XXX-XXX, PD10P-XXX-XXX, PE10P-XXX-XXX, PD15E-XXX-XXX, PD15P-XXX-XXX and PE15P-XXX-XXX.

Also for use on the following metallic models: PD10R-XXX-XXX, PE10R-XXX-XXX, PM10R-CSS-XXX-A02, PD15R-XXX-XXX, PE15R-XXX-XXX and PM15R-CSS-XXX-A02.

Refer to figure 7. NOTE: Apply Lubriplate FML-2 grease (94276) to all "O" rings, "U" cups and mating parts upon assembly.

1. Remove (134) screws and remove (135) valve block.
2. Insert a small flat blade screwdriver into the notch in the side of (135) valve block and push in on tab to remove (233) adapter plate, releasing (140) valve insert, (141) valve plate and (200) gasket.
3. Remove (236) nuts from the major valve and remove (107) end plate.
4. Remove (136) end cap and (111) spool and replace with 67394 spool assembly as shown.
5. Place 95276 sensor and 96581 mounting plug thru hole in (107) end plate.
6. Install (137) gasket on (136) end cap and assemble end cap and (107) end plate to (135) valve block, securing (105) screws and (236) nuts. NOTE: Torque (105) screws to 35 - 40 in. lbs (4.0 - 4.5 Nm).
7. Install (140) valve insert and (141) valve plate in (135) valve block. NOTE: Assemble (140) valve insert with "dished" side toward (141) valve plate. Assemble (141) valve plate with part number identification toward (140) valve insert.
8. Assemble (200) gasket and (233) adapter plate to (135) valve block. NOTE: Assemble (233) adapter plate with notched side down.
9. Attach (135) valve block to (101) motor body, using (133) washers and (134) bolts. NOTE: Torque to 35 - 40 in. lbs (4.0 - 4.5 Nm).

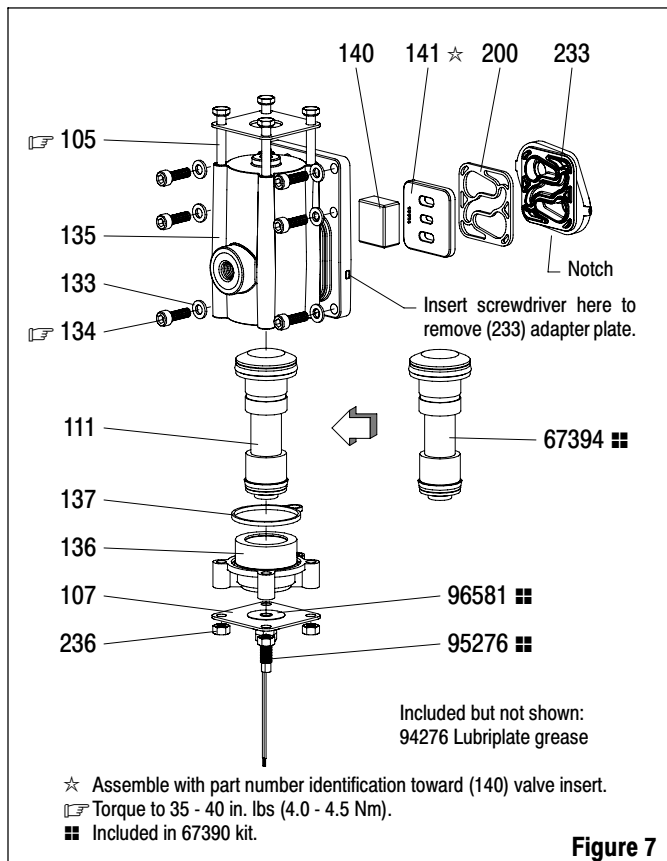


Figure 7

## 67391 COUNTER INSTALLATION

### 2" AND 3" DIAPHRAGM PUMP

For use on the following non-metallic models: PD20E-XXX-XXX, PD20P-XXX-XXX and PE20P-XXX-XXX.

Also for use on the following metallic models: PD20R-XXX-XXX, PD20Y-XXX-XXX, PD20R-XXX-XXX-B, PE20R-XXX-XXX-B, PD20Y-XXX-XXX-B, PE20Y-XXX-XXX-B, PF20R-XXX-XXX, PF20Y-XXX-XXX, PF20R-XXX-XXX-B, PF20Y-XXX-XXX-B, PM20R-CSS-XXX-A02, PM20R-CSS-XXX-B02, PD30R-XXX-XXX-B, PD30R-XXX-XXX-C, PE30R-XXX-XXX-C, PM30R-CSS-XXX-B02 and PM30R-CSS-XXX-C02.

Refer to figure 8. NOTE: Apply Lubriplate FML-2 grease (94276) to all "O" rings, "U" cups and mating parts upon assembly.

1. Remove (134) screws and remove (135) valve block.
2. Remove (233) adapter plate, releasing (140) valve insert, (141) valve plate and (200) gasket.
3. Remove (236) nuts from the major valve and remove (107) end plate.
4. Remove (136) end cap and (111) spool and replace with 67395 spool assembly as shown.
5. Place 95276 sensor and 96582 mounting plug thru hole in (107) end plate.
6. Install (137) "O" ring on (136) end cap and assemble end cap and (107) end plate to (135) valve block, securing with (105) screws and (236) nuts. NOTE: Torque (105) screws to 15 - 20 in. lbs (1.7 - 2.3 Nm).
7. Install (140) valve insert and (141) valve plate in (135) valve block. NOTE: Assemble (140) valve insert with "dished" side toward (141) valve plate. Assemble (141) valve plate with identification dots toward (199 and 200) gaskets.
8. Assemble (232, 243 and 244) "O" rings, (199 and 200) gaskets and (233) adapter plate to (135) valve block.
9. Attach (135) valve block and components to (101) motor body, using (133) washers and (134) bolts. NOTE: Torque to 40 - 50 in. lbs (4.5 - 5.6 Nm).

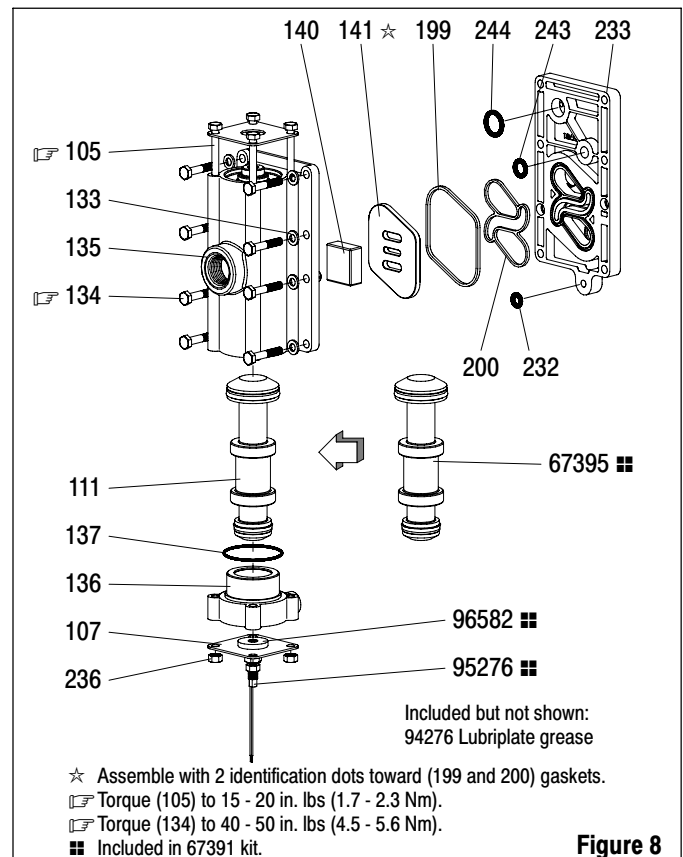


Figure 8

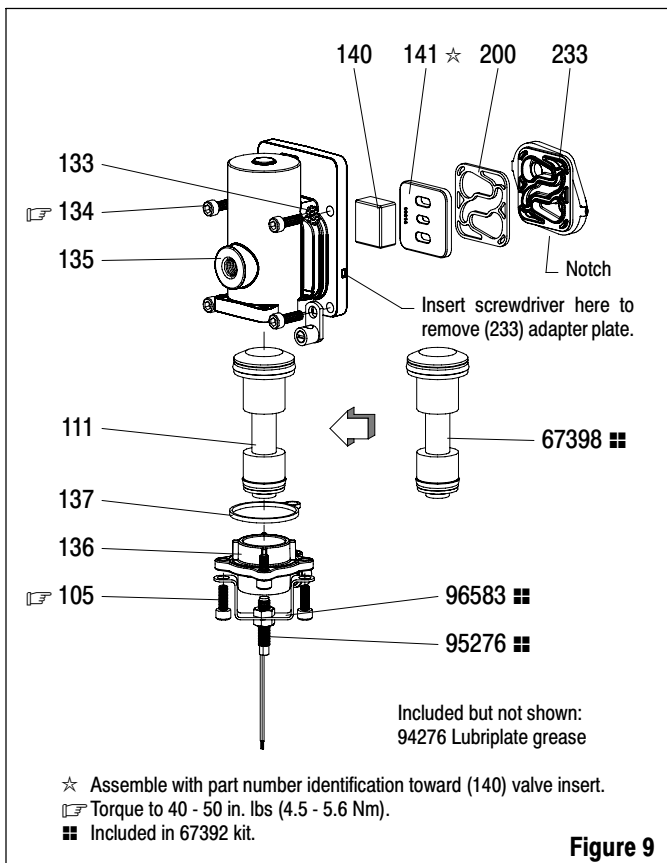
## 67392 COUNTER INSTALLATION

### 1" AND 1-1/2" ALUMINUM DIAPHRAGM PUMP

For use on the following aluminum models: PD10A-XXX-XXX, PE10A-XXX-XXX, PM10A-CSS-XXX-A02, PW10A-XXX-XXX, PD15A-XXX-XXX, PE15A-XXX-XXX and PM15A-CSS-XXX-A02.

Refer to figure 9. NOTE: Apply Lubriplate FML-2 grease (94276) to all "O" rings, "U" cups and mating parts upon assembly.

1. Remove (134) screws and remove (135) valve block.
2. Insert a small flat blade screwdriver into the notch in the side of (135) valve block and push in on tab to remove (233) adapter plate, releasing (140) valve insert, (141) valve plate and (200) gasket.
3. Remove (105) screws, releasing (136) end cap and (137) gasket.
4. Remove (111) spool and replace with 67398 spool assembly as shown.
5. Install (137) gasket on (136) end cap and assemble end cap, 96583 bracket and 95276 sensor to (135) valve block, securing with (105) screws. NOTE: Torque (105) screws to 40 - 50 in. lbs (4.5 - 5.6 Nm).
6. Install (140) valve insert and (141) valve plate in (135) valve block. NOTE: Assemble (140) valve insert with "dished" side toward (141) valve plate. Assemble (141) valve plate with part number identification toward (140) valve insert.
7. Assemble (200) gasket and (233) adapter plate to (135) valve block. NOTE: Assemble (233) adapter plate with notched side down.
8. Attach (135) valve block to (101) motor body, using (133) washers and (134) bolts. NOTE: Torque to 40 - 50 in. lbs (4.5 - 5.6 Nm).



## 67393 COUNTER INSTALLATION

### 2" AND 3" ALUMINUM DIAPHRAGM PUMP

For use on the following aluminum models: PD20A-XXX-XXX-B, PE20A-XXX-XXX-B, PF20A-XXX-XXX-B, PM20A-CSS-XXX-B02, PP20A-XXX-XXX, PD30A-XXX-XXX-C, PE30A-XXX-XXX-C, PM30A-CSS-XXX-C02 and PP30A-XXX-XXX.

Refer to figure 10. NOTE: Apply Lubriplate FML-2 grease (94276) to all "O" rings, "U" cups and mating parts upon assembly.

1. Remove (134) screws and remove (135) valve block and components.
2. Remove (240) screws to remove (233) adapter plate, releasing (140) valve insert, (141) valve plate, (199, 200 and 241) gaskets and (243 and 244) "O" rings.
3. Remove (105) screws, releasing (136) end cap and (137 and 242) "O" rings.
4. Remove (111) spool and replace with 67395 spool assembly as shown.
5. Install (137 and 242) "O" rings on (136) end cap and assemble end cap, 96584 bracket and 95276 sensor to (135) valve block, securing with (105) screws. NOTE: Torque screws to 40 - 50 in. lbs (4.5 - 5.6 Nm).
6. Install (140) valve insert and (141) valve plate in (135) valve block. NOTE: Assemble (140) valve insert with "dished" side toward (141) valve plate. Assemble (141) valve plate with identification dots toward (199 and 200) gaskets.
7. Assemble (199, 200 and 241) gaskets, (243 and 244) "O" rings and (233) adapter plate to (135) valve block. NOTE: Assemble (233) adapter plate to (135) valve block, securing with (240) screws. NOTE: Torque screws to 40 - 50 in. lbs (4.5 - 5.6 Nm).
8. Attach (135) valve block to (101) motor body, using (133) washers and (134) bolts. NOTE: Torque to 40 - 50 in. lbs (4.5 - 5.6 Nm).

