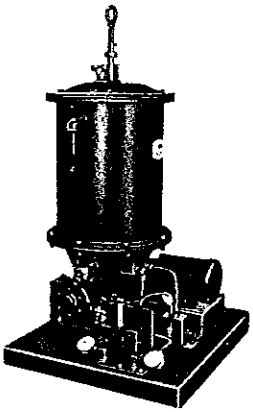
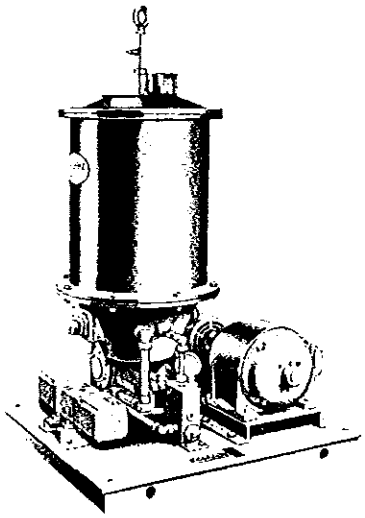
Farval® DUALINE
DC41 & 42 automatic
systems

BIJUR DELIMON
INTERNATIONAL

Farval



Models DC41
and DC42
automatic systems
description, parts lists



Bulletin DL1041

Farval Lubrication Systems, Inc.

A SUBSIDIARY OF VESPER CORPORATION

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Bijur

NOTICE: A protective cover or shelter is recommended for the central stations described herein when used outdoors.

SECTION DN

MODEL DC41 & DC42 AUTOMATIC SYSTEMS

INTRODUCTION & DESCRIPTION

FARVAL DUALINE DC41 and DC42 systems have been designed to meet the rigorous requirements of heavy industry. They can supply either oil or grease to such installations as bar mills, billet mills, blast furnaces, and sintering machines. The two systems have much in common. They use many of the same parts and have many similar operating characteristics. They differ in the way they alternately pressurize and relieve (reverse) the two supply lines as well as the way they control maximum system pressure and end the lube cycle. On DC41 systems (see Fig. 1.1), reversal is by a solenoid reversing valve and on DC42 systems (see Figs. 1.2 and 1.3) by a hydraulic reversing valve. On DC41 systems, pressure is controlled by a pressure switch (one is installed in each line) that actuates the reversing valve and stops the pump motor when system pressure rises to its setting. On DC42 systems, pressure is controlled by the reversing valve. The valve opens a micro switch stopping the pump motor when system pressure rises to its setting. Each system has a timer control tailored to meet its specific requirements. See Bulletins DL-1200 and DL-1210 for reversing valves and Bulletin 1800G for accessory equipment.

SPECIFICATIONS

Pump Description (Model DJ4-5): Type - Motor driven double piston type Capacity per stroke - .195 cu. in. Capacity per minute - 33 cu. in. with 1725 rpm motor thru 10:1 gear reducer and 1000 psig pressure. Relief Valve Setting (standard) - 2400 to 2500 psig.	Electric Motor Description: Size - 1 horsepower (Recommended frame size 143T or 145T) Speed - 1725 rpm Reservoir Description: Capacity is 100 or 200 lbs. for grease and 30 gal. for oil.

TABLE OF CONTENTS

HOW THE SYSTEMS OPERATE

The two systems operate in the following sequence:

- Timer starts pump motor after a preset interval. Pump builds enough pressure in one supply line to move all measuring valves in one direction. The other supply line is relieved to the reservoir.
- Pressure continues to increase. When it reaches the setting of the pressure control device, the reversing valve operates, relieving the pressurized supply line to the reservoir and directing the pump discharge to the other supply line for the next lube cycle. It also stops the pump motor.
- When the timer next starts the pump motor, the above sequence is repeated with the other supply line pressurized. The measuring valve pistons return to their initial position.

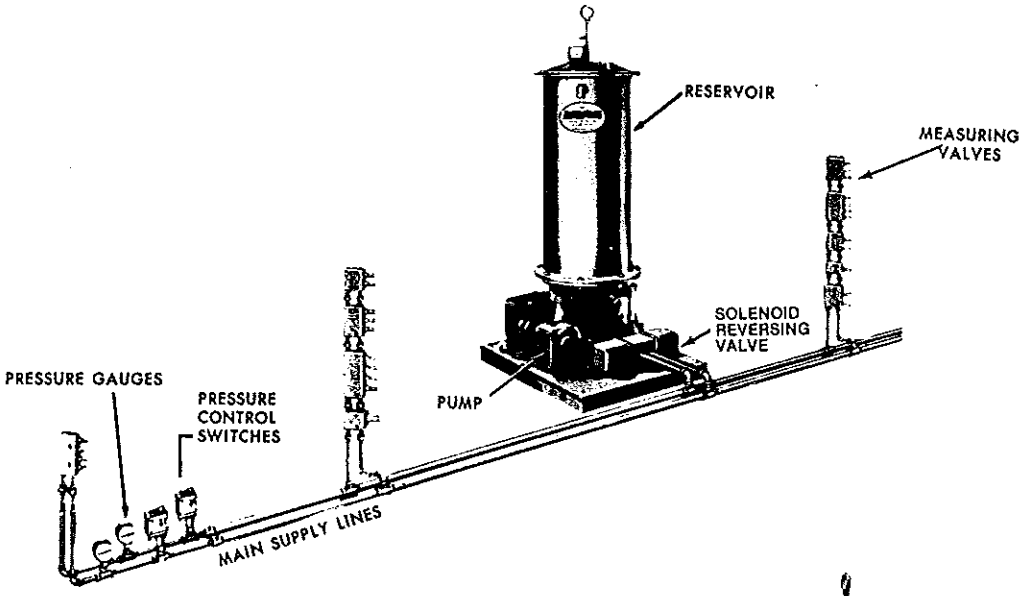


Fig. 1.1—DC41 end-of-line system.

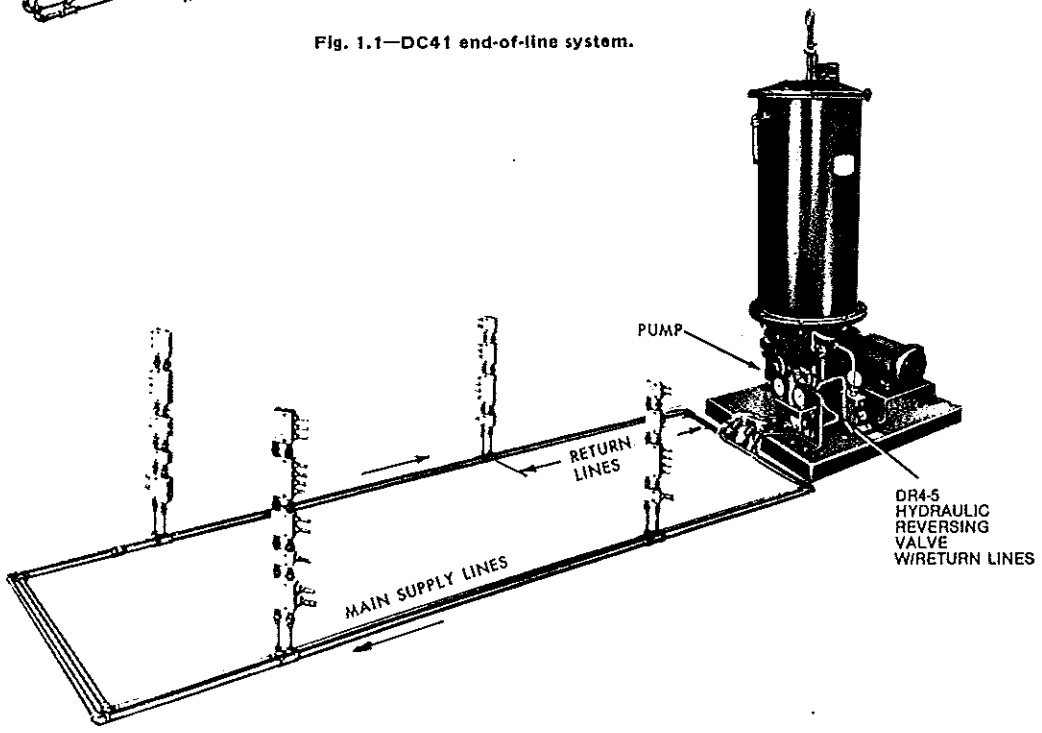


Fig. 1.2—DC42 loop system.

HOW THE SYSTEMS OPERATE

DC41 systems are always installed with a single set of lines as shown in Fig. 1.1 whereas DC42 systems can be installed as either loop or end-of-line systems. DC42 non-return system has a DR4-5 reversing valve, whereas a DC42 return system (loop) has a DR4-5 reversing valve (see Bulletin DL-1200 for details).

More on pressure switches is given in Manual DL300.

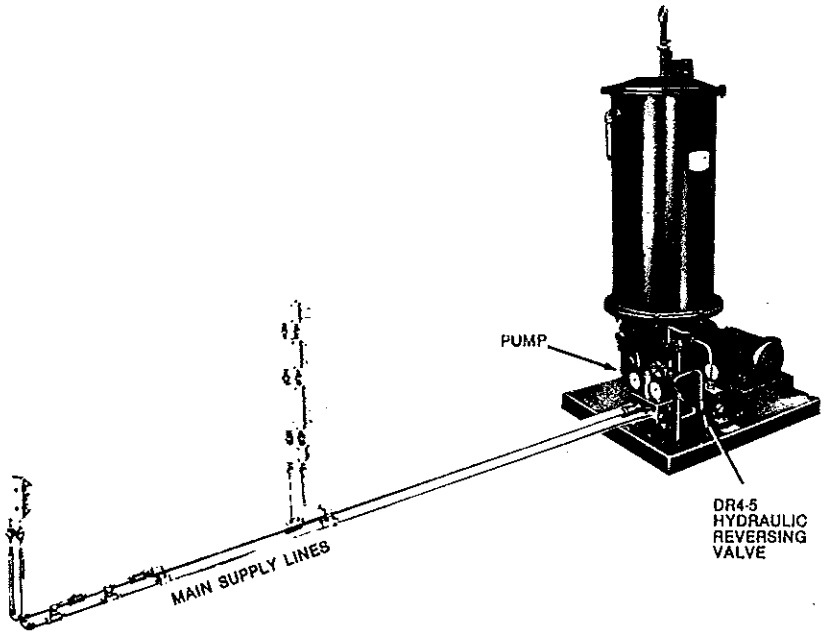


Fig. 1.3—DC42 non-return system.

HOW TO ORDER

The following table provides a check list of parts and assemblies needed for typical DC41 and DC42 systems.

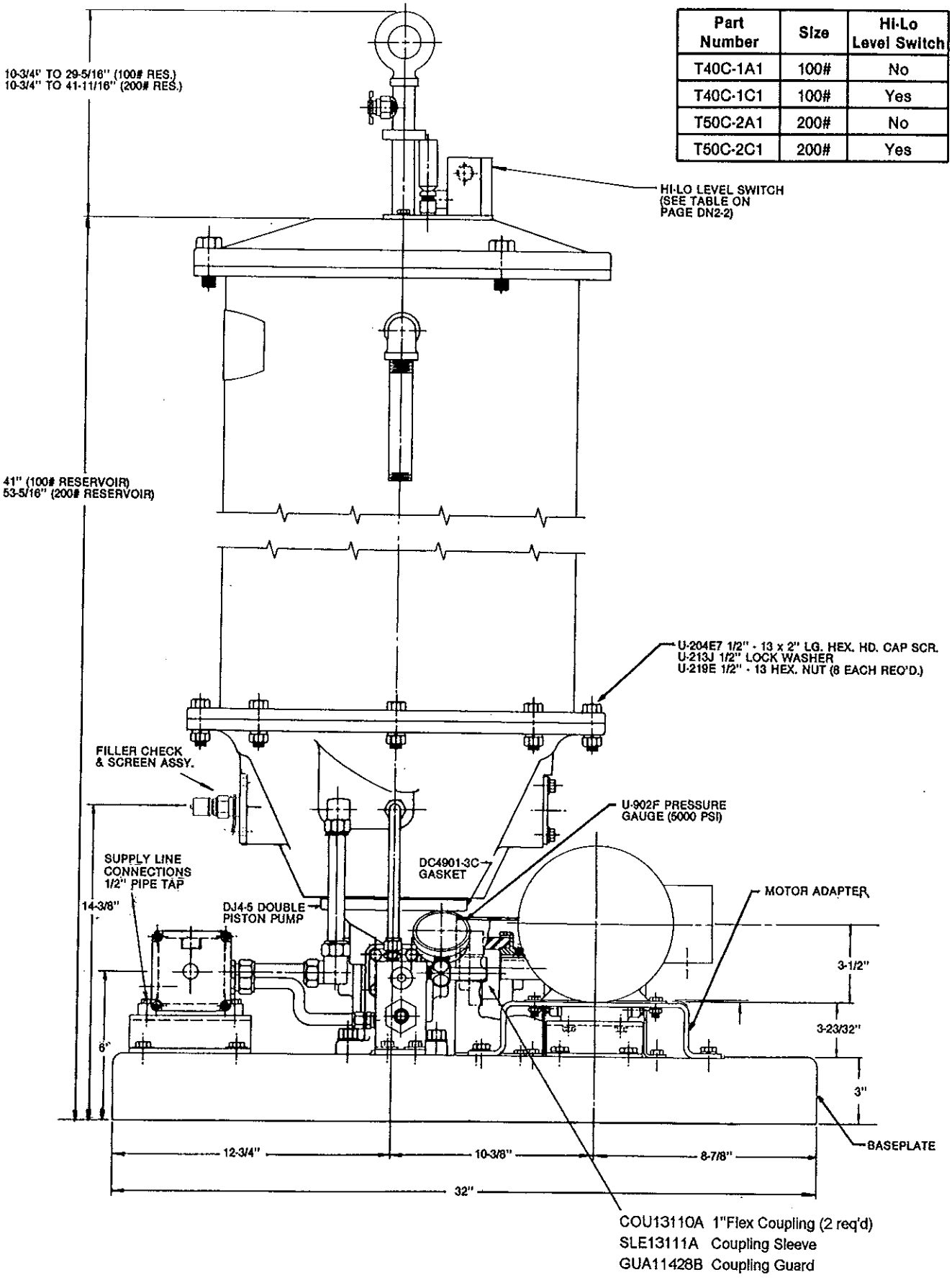
DESCRIPTION	ASSEMBLY NO.	REF. MANUAL NO.	REF. PAGE	DESCRIPTION	ASSEMBLY NO.	REF. MANUAL NO.	REF. PAGE
Central Stations				Reversing Valves &	DR4-5	DL-1200	
Grease Stations DC41	*	DL1041	DN2-1	Related Assemblies	FR10	DL-1210	
Grease Stations DC42	*	DL1041	DN2-3				
Oil Stations DC42	*	DL1041	DN2-5	**Support Equipment**			
Central Station Options				Fittings & Accessories		1800G	
Timer Control	SS2200/SS4500						
Bulk Fill Signal Kit for DC41 or DC42 Oil or Grease Systems	T40-1031	DL1041	DN3-3				
Distribution System							
Measuring Valves	*	DL600	DE1-1				
Tubing & Related Parts	*	1800G					
Pipe & Pipe Fittings	*	1800G					
DC41 Pressure Control							
Pressure Gauges	U-902F	1800G					
Pressure Switches	U-620D1	1800G					

*For part number see manual.

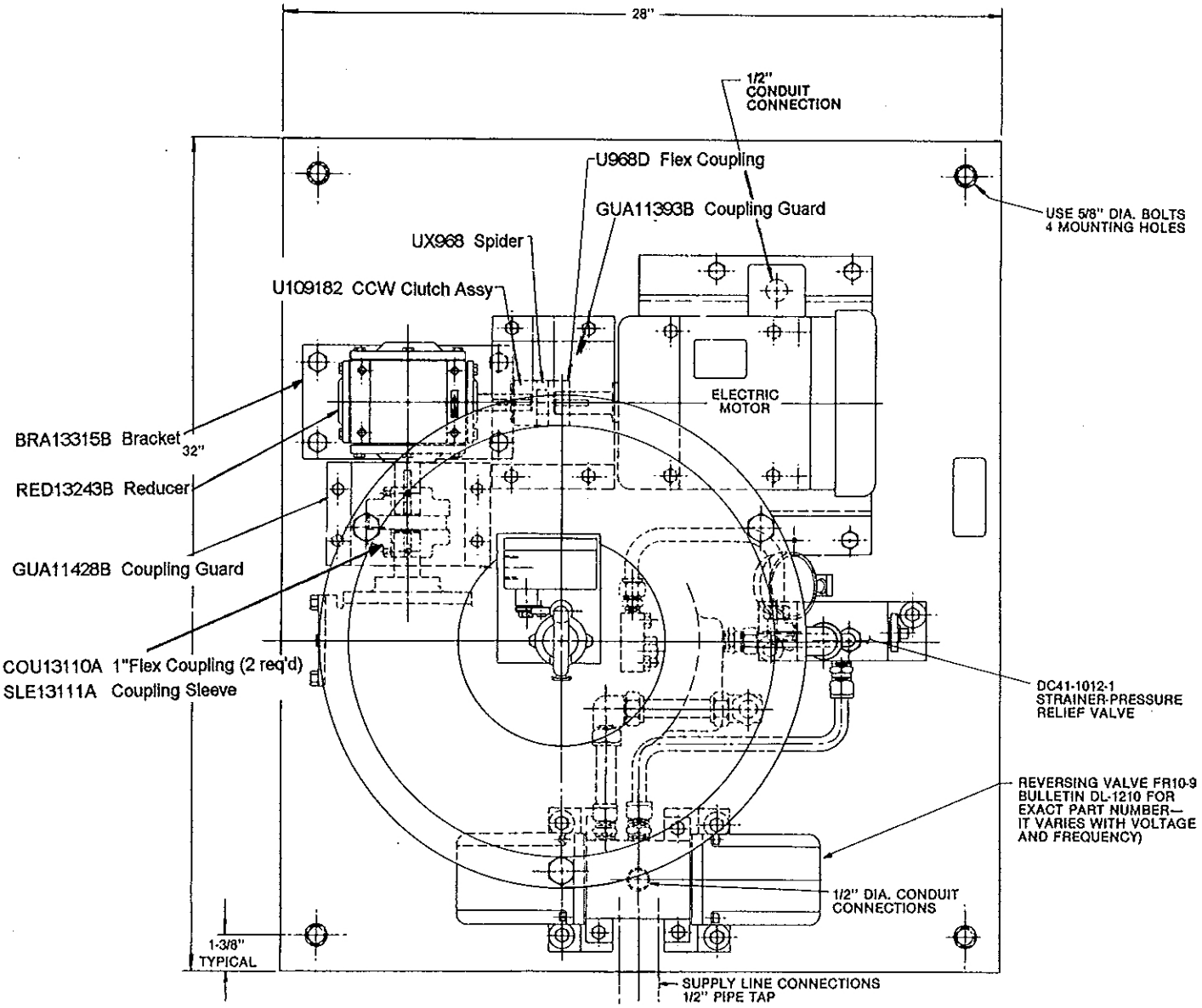
CENTRAL STATIONS—DC41—GREASE TYPE

RESERVOIR ASSEMBLIES

Part Number	Size	Hi-Lo Level Switch
T40C-1A1	100#	No
T40C-1C1	100#	Yes
T50C-2A1	200#	No
T50C-2C1	200#	Yes



CENTRAL STATIONS—DC41—GREASE TYPE



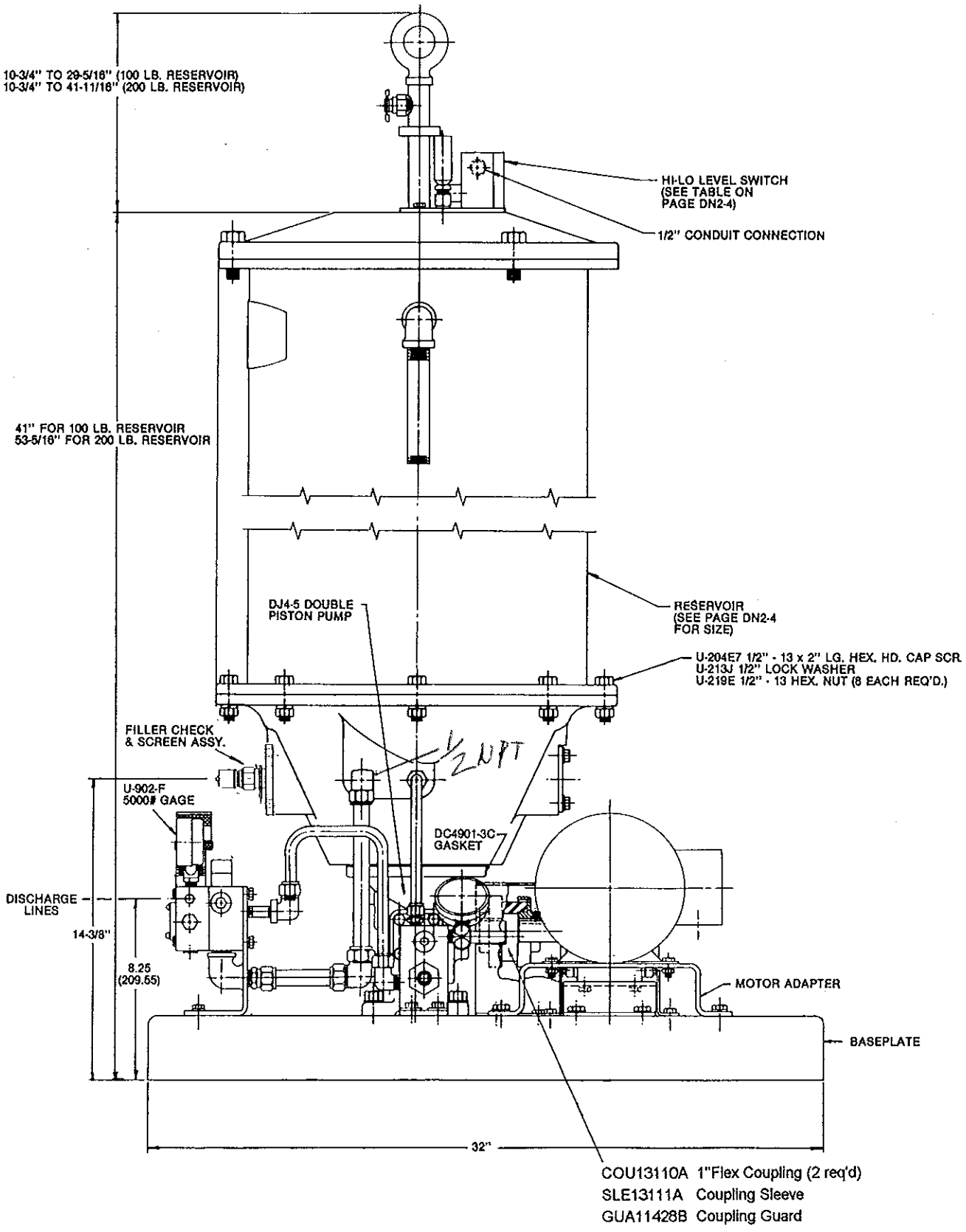
*PART NUMBER	RESERVOIR		HI-LO LEVEL SWITCH
	SIZE (POUNDS)	PART NUMBER	
DC41M-31A	100	T40C-1A1	No
DC41M-31C	100	T40C-1C1	Yes
DC41M-32A	200	T50C-2A1	No
DC41M-32C	200	T50C-2C1	Yes

***For station less motor, delete "M" from part number.**

Less Motor includes: Guard/Spider/Flex Coupling

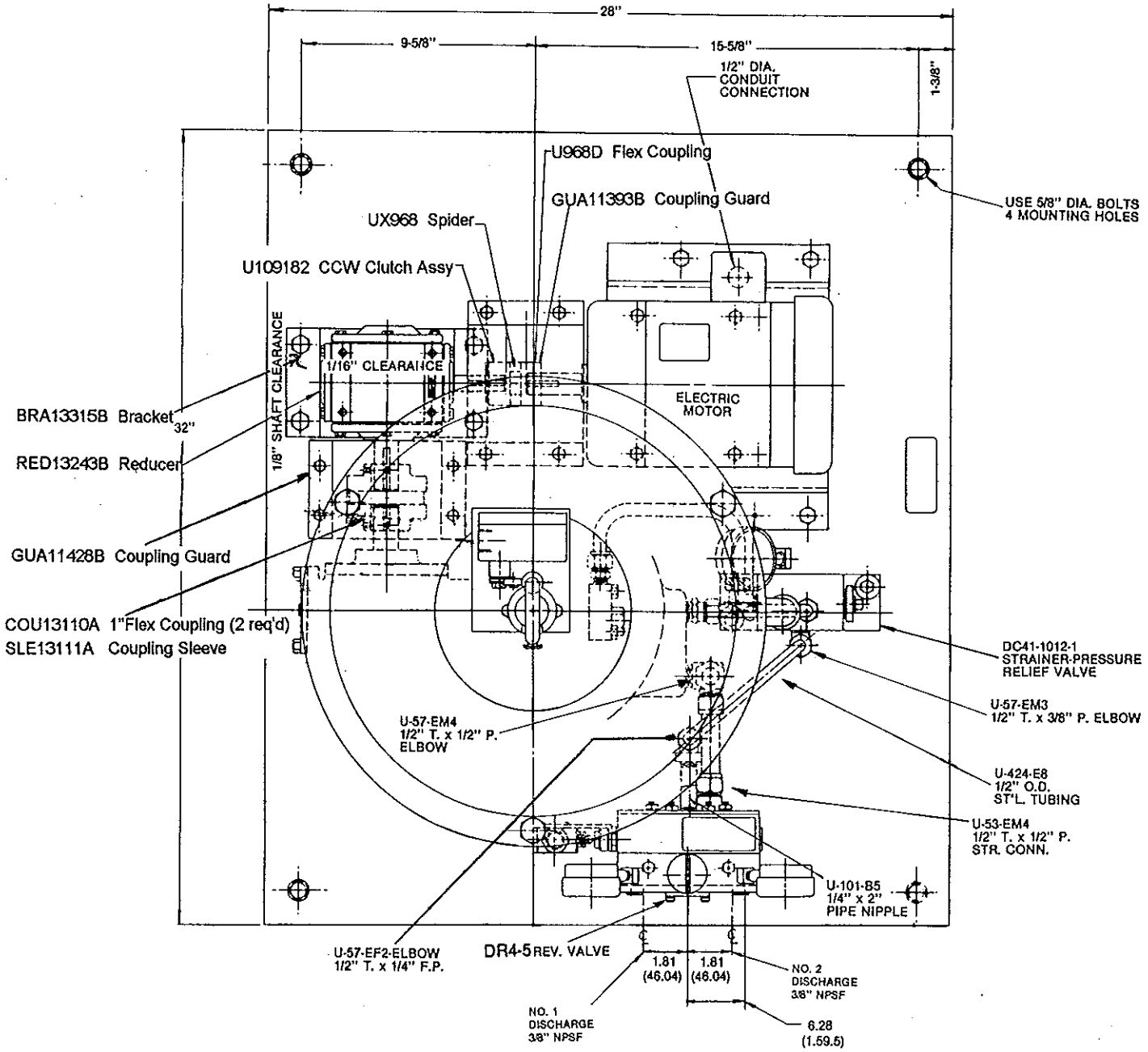
CENTRAL STATIONS—DC42—GREASE TYPE

The DC42 grease type station is shown below and on page DN2-4.



MODEL DC41 & DC42 AUTOMATIC SYSTEMS

CENTRAL STATIONS—DC42—GREASE TYPE



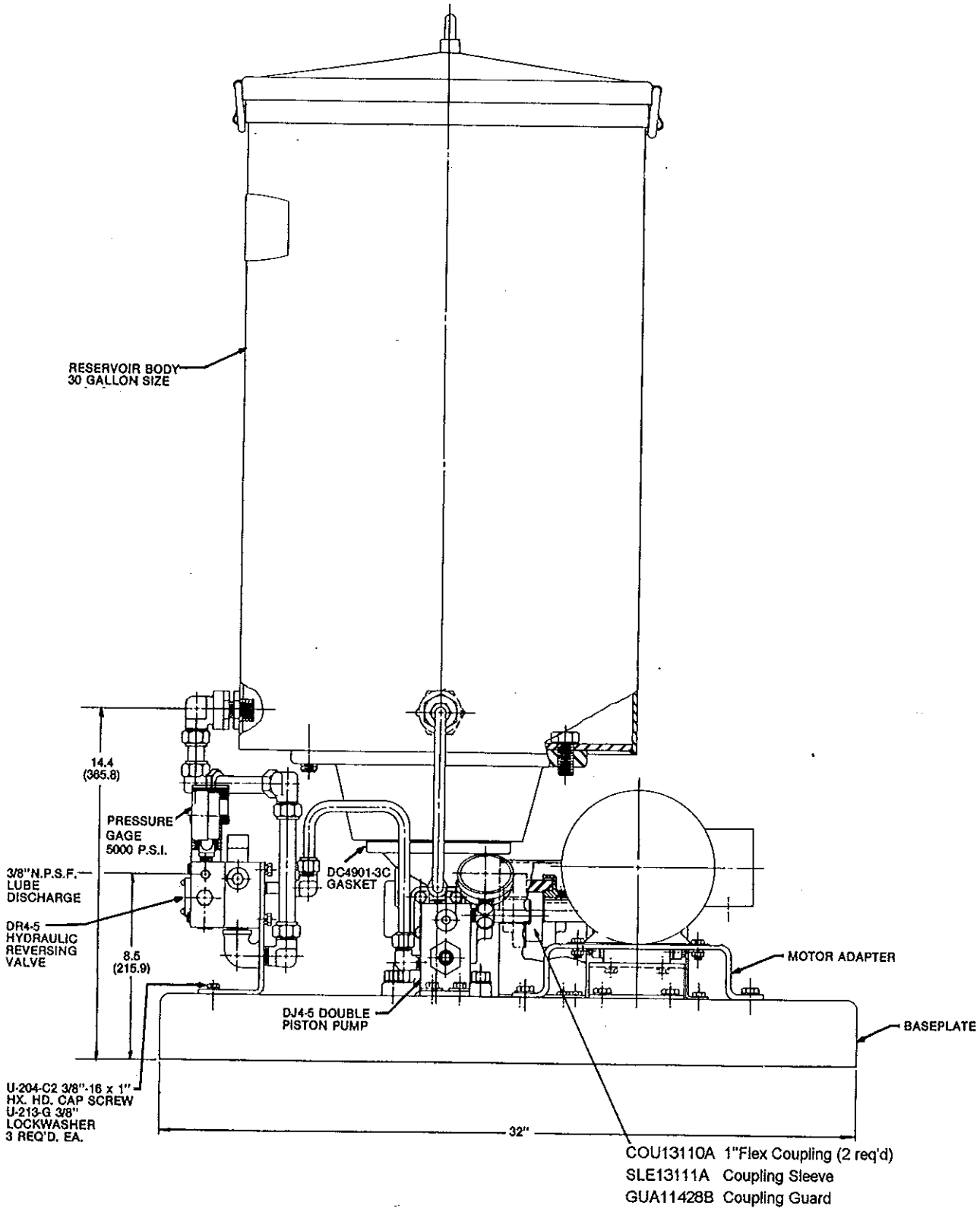
*PART NUMBER	RESERVOIR BODY		HI-LO LEVEL SWITCH	REVERSING VALVE NUMBER	REMARKS
	SIZE**	PART NUMBER			
DC42M-31A	100	T40C-1A1	No	DR4-5	For end-of-line and loop type systems.
DC42M-31C	100	T40C-1C1	Yes		
DC42M-32A	200	T50C-2A1	No		
DC42M-32C	200	T50C-2C1	Yes		

**Values shown are reservoir capacity in pounds.
*For stations less motor, delete "M" from part number.

CENTRAL STATIONS—DC42-OIL TYPE

RESERVOIR ASSEMBLIES

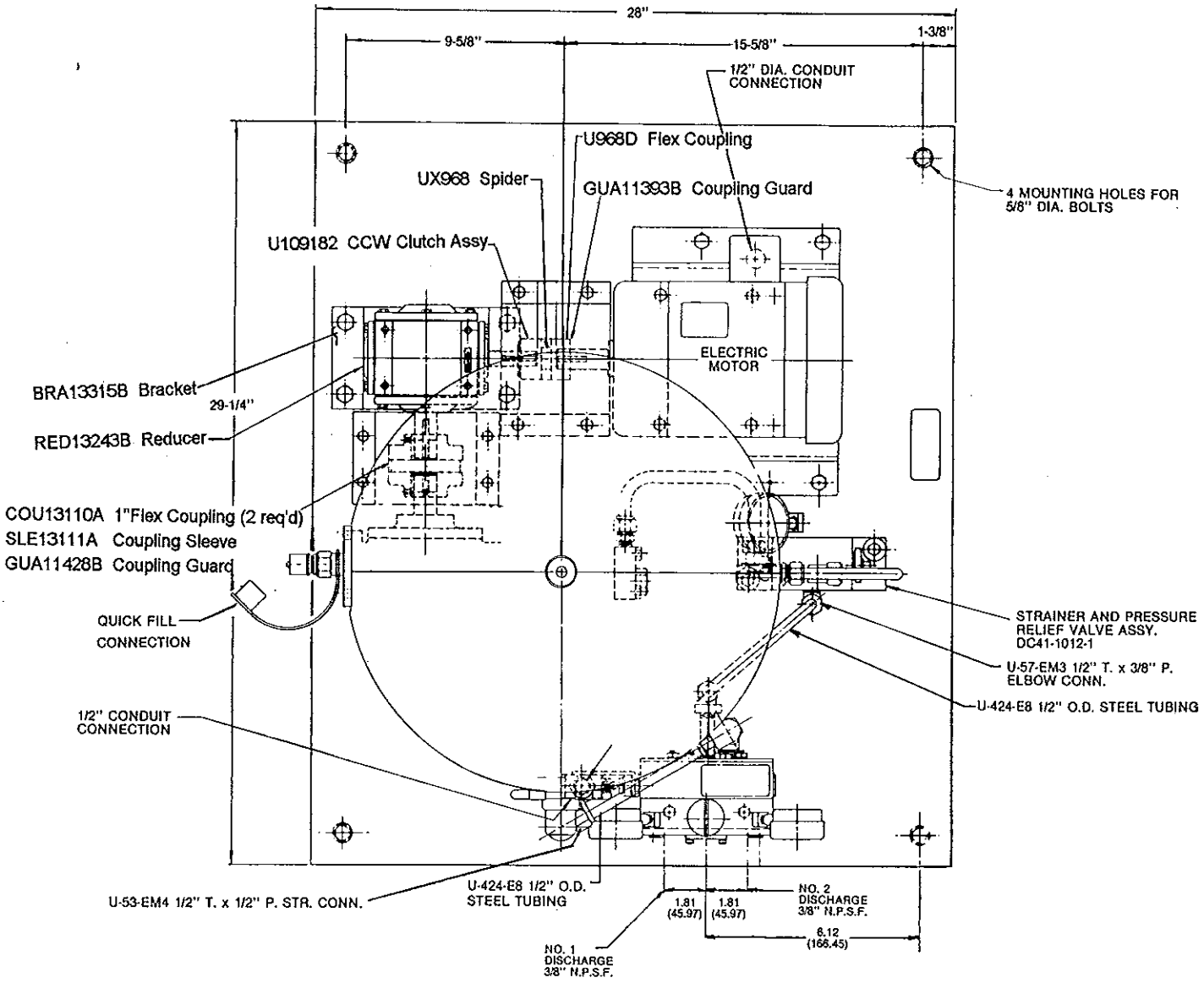
Part No.	Size	HI-LO LEVEL SW
T2015	30 Gallon	No
T2016	30 Gallon	Yes



STATION DC42M33B WITHOUT HI-LO LEVEL SWITCH.

MODEL DC41 & DC42 AUTOMATIC SYSTEMS

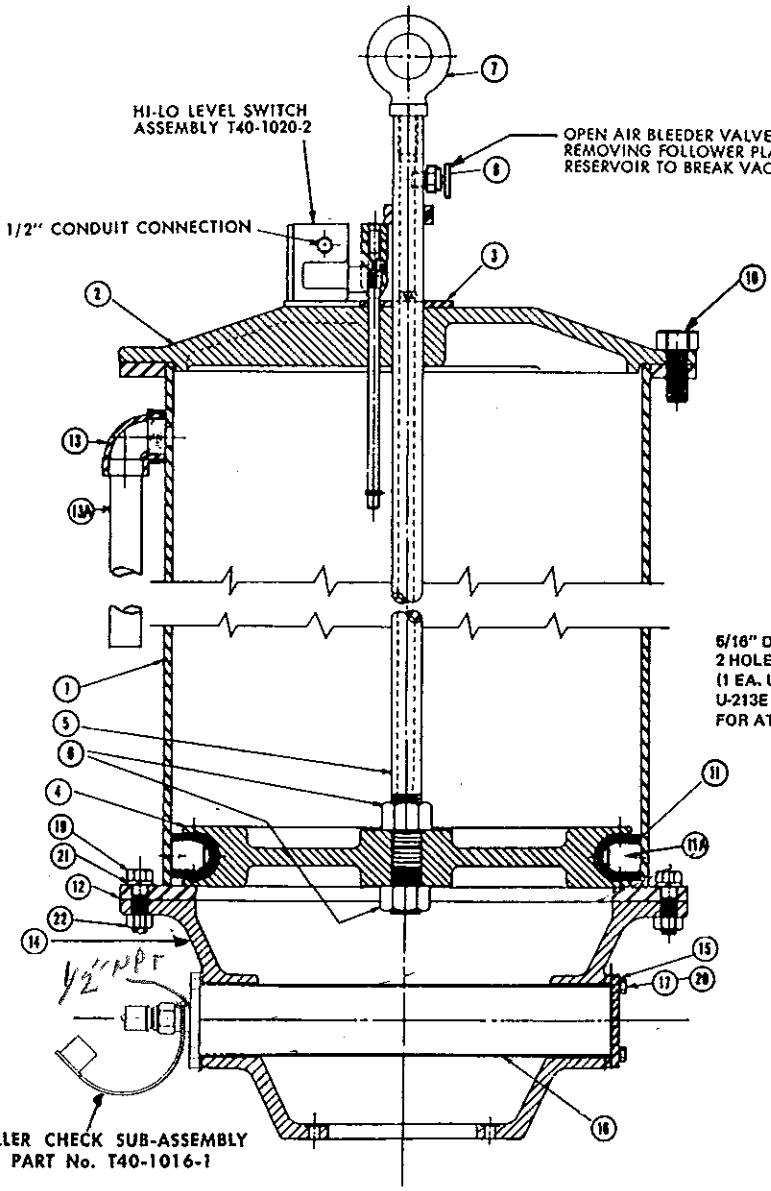
CENTRAL STATIONS—DC42—OIL TYPE

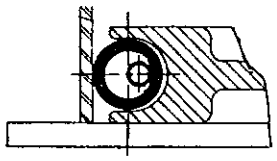


*PART NUMBER	RESERVOIR BODY		HI-LO LEVEL SWITCH
	SIZE (GALLONS)	PART NUMBER	
DC42M33B	30	T2015	No
DC42M33D	30	T2016	Yes

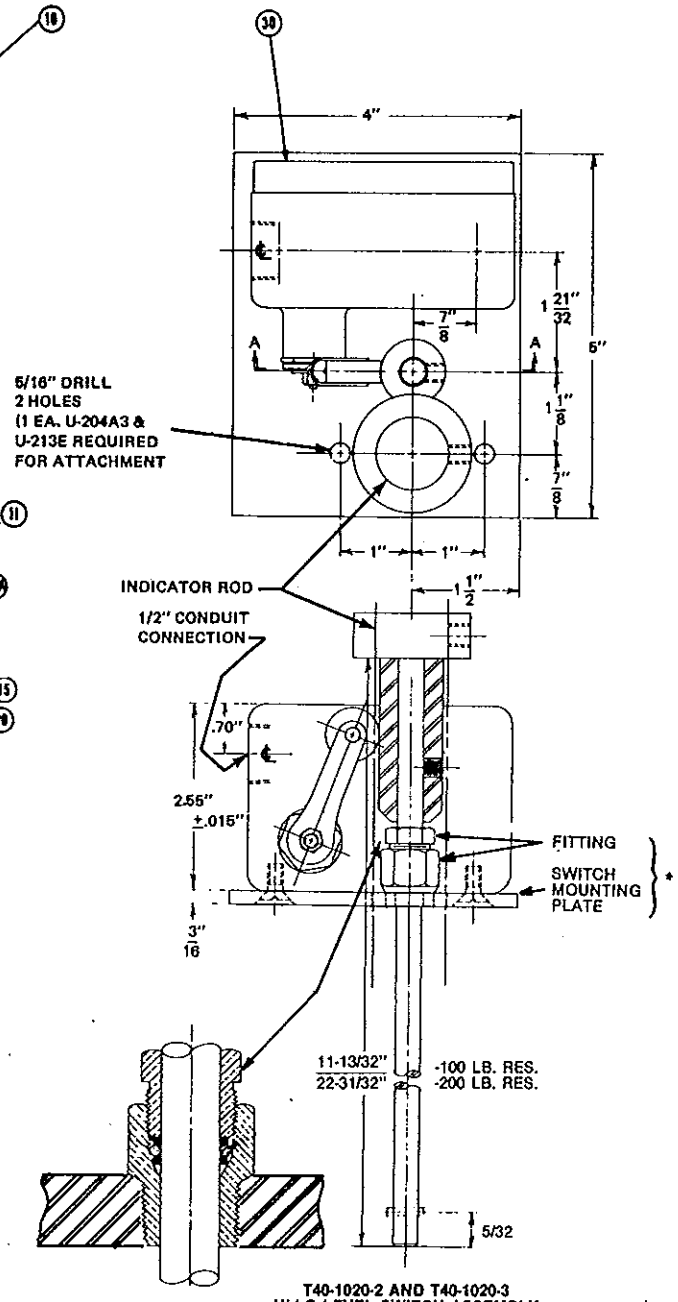
***For stations less motor, delete "M" from part number.**

Grease Reservoir Bodies T40C (100 Lb. Size) and T50C (200 lb. Size) - Cont.





RESERVOIR WITH "O" SHAPED SEAL (USED ON OLDER RESERVOIRS ONLY — REPLACE WITH "U" SHAPED SEAL WHEN SERVICE IS REQUIRED)



T40-1020-2 AND T40-1020-3 HI-LO LEVEL SWITCH ASSEMBLY

*THESE 2 ITEMS ARE SUPPLIED AS AN ASSEMBLY ONLY—ITEM 48. ITEM 49 & 50 ARE SUPPLIED SEPARATELY.

CENTRAL STATION SUBASSEMBLIES

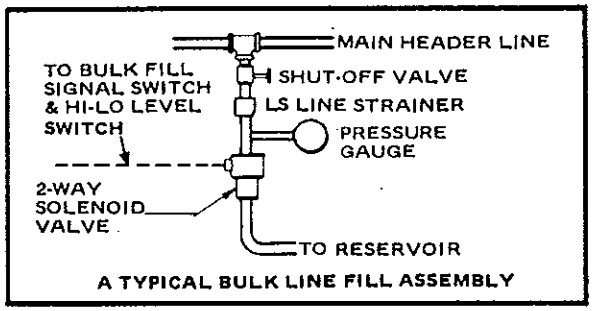
	ITEM NO.	NO. REQ.	PART NO.	DESCRIPTION
RESERVOIR ASSEMBLY	1	1	T40-1005-1	RESERVOIR BODY (100# SIZE)
		1	T50-1005-2	RESERVOIR BODY (200# SIZE)
	2	1	T40-1007-1	RESERVOIR COVER
	3	1	T40-1008-1	RETAINER (USED ONLY WITHOUT HI-LO LEVEL SWITCH)
	4**	1	T40-1010-1	RESERVOIR FOLLOWER PLATE
	5	1	T40-1011-1A	INDICATOR ROD (100# SIZE RESERVOIR)
		1	T50-1011-2A	INDICATOR ROD (200# SIZE RESERVOIR)
	6	2	U-220J	1"-14 HEX NUT
	7	1	U-232F	3/4"-10 STD. EYE BOLT
	8	1	U-127B	1/4" MPT AIR BLEEDER
	10	3	U-204F2	5/8"-11 x 1-3/4" LG. HEX. HD. CAP SCREW
	*11**	1	T40-1027-2	FOLLOWER SEAL
	*11A**	1	T40-1030-2	UNIVERSAL BAND CLAMP
	12	1	T40-1024-1	VELLUMOID GASKET
	13	1	U-1025	3/4" ELBOW
	13A	1	U-101E18	PIPE NIPPLE
RESERVOIR ADAPTER ASSEMBLY (T40C-1A2)	14	1	T40-1006-1	RESERVOIR ADAPTER
	15	1	T40-1014-1	CLOSED END COVER
	16	1	T40-1015-1	SCREEN
	17	4	U-204B5	5/16"-18 x 7/8" LG. HD. CAP SCREW
	18	4	U-204B10	5/16" x 5/8" HEX HD. CAP SCREW
	19	8	U-204E7	1/2"-13 x 2" LG. HEX HD. CAP SCREW
	20	8	U-1305E	5/16" LOCKWASHER
	21	8	U-213J	1/2" LOCKWASHER
	22	8	U-219E	1/2"-13 FINISHED HEX NUT
SUB ASS'Y	29	1	T40-1016-1	FILLER CHECK SUB-ASSEMBLY
	30	1	T40-1020-2	HI-LO LEVEL SWITCH ASSEMBLY

**Order Assembly T40-1026-3.

*To replace U shaped follower seals order items 11 and 11A. To replace O shaped seals order follower seal assembly T40-1026-3. The new plate is machined for the U shaped seals. Only use the old follower plate if the groove I.D. into which the seal fits is 12-11/16". (Some plates were machined to this dimension).

BULK LINE FILL ASSEMBLIES ON MODEL T40C RESERVOIRS

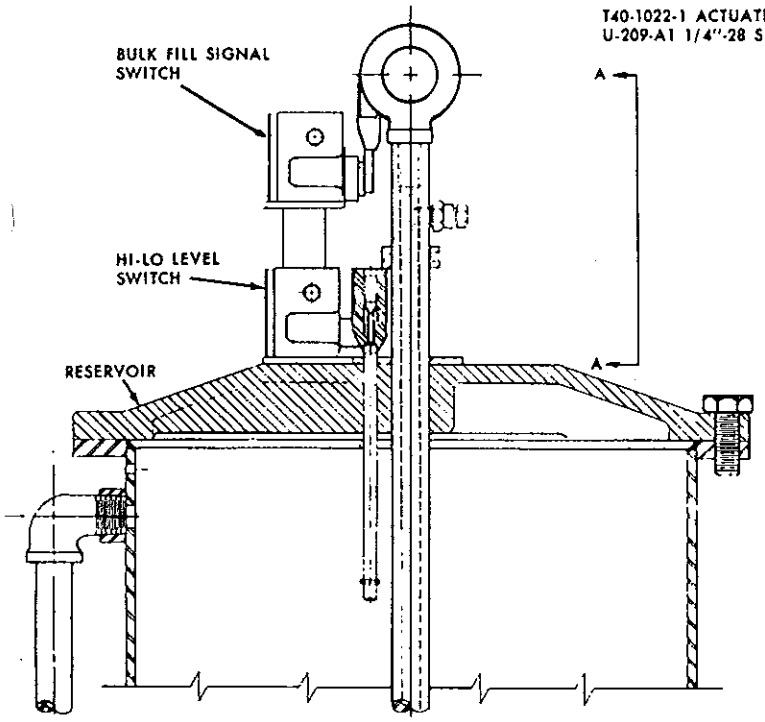
When bulk line fill assemblies are installed as shown in the box, the reservoir will be re-filled whenever the low level switch closes and energizes a solenoid valve. The station must be equipped with the standard Hi-Lo level switch and as an additional precaution, it is recommended that a bulk line fill signal also be installed. It warns when the reservoir over-fills because the solenoid valve has not closed properly. The bulk fill signal switch U-625 is installed above the Hi-Lo level switch U-625 as shown below. Actuating sleeve T40-1022-1 must be re-located. Bulk fill signal assemblies are furnished in kits (No. T40-1031) consisting of the parts listed in the table.

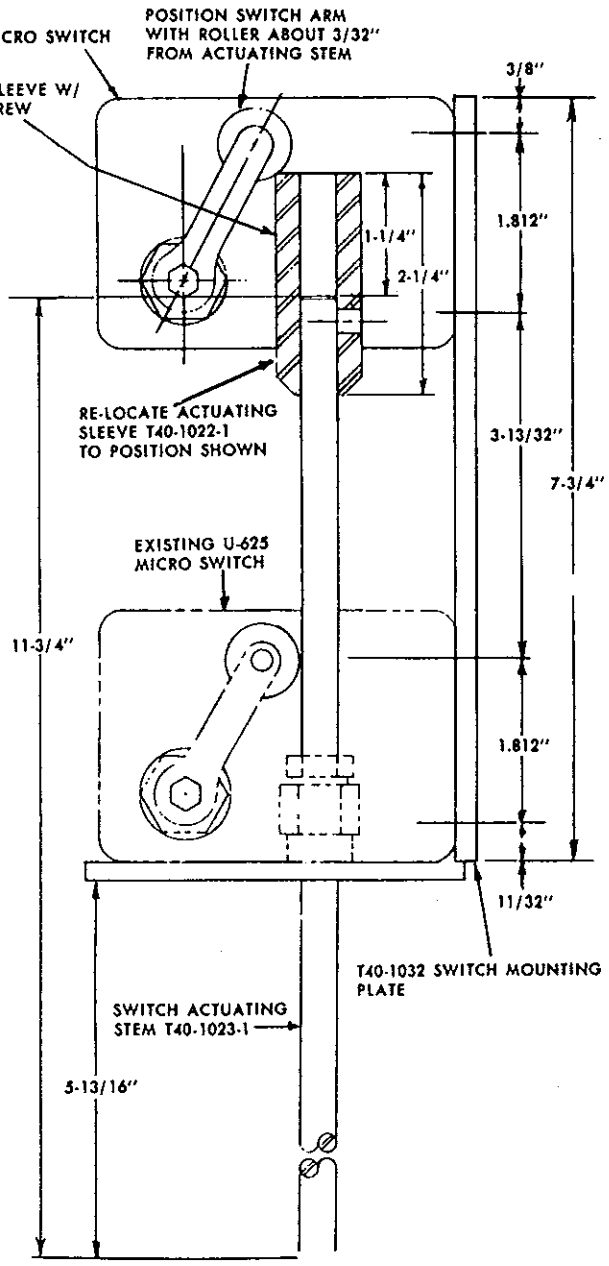


A TYPICAL BULK LINE FILL ASSEMBLY

BULK FILL SIGNAL KIT NO. T40-1031

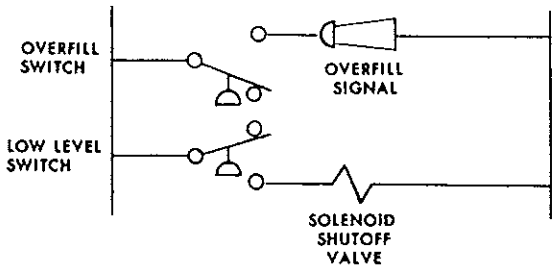
ITEM	QTY.	PART NO.	DESCRIPTION
1	1	T40-1032	Switch Mounting Plate
2	4	U-211G-6	No. 10-32 x 1/2" Round Head Machine Screw
3	4	U-213C	No. 10 Lockwasher
4	1	U-625	Micro-switch





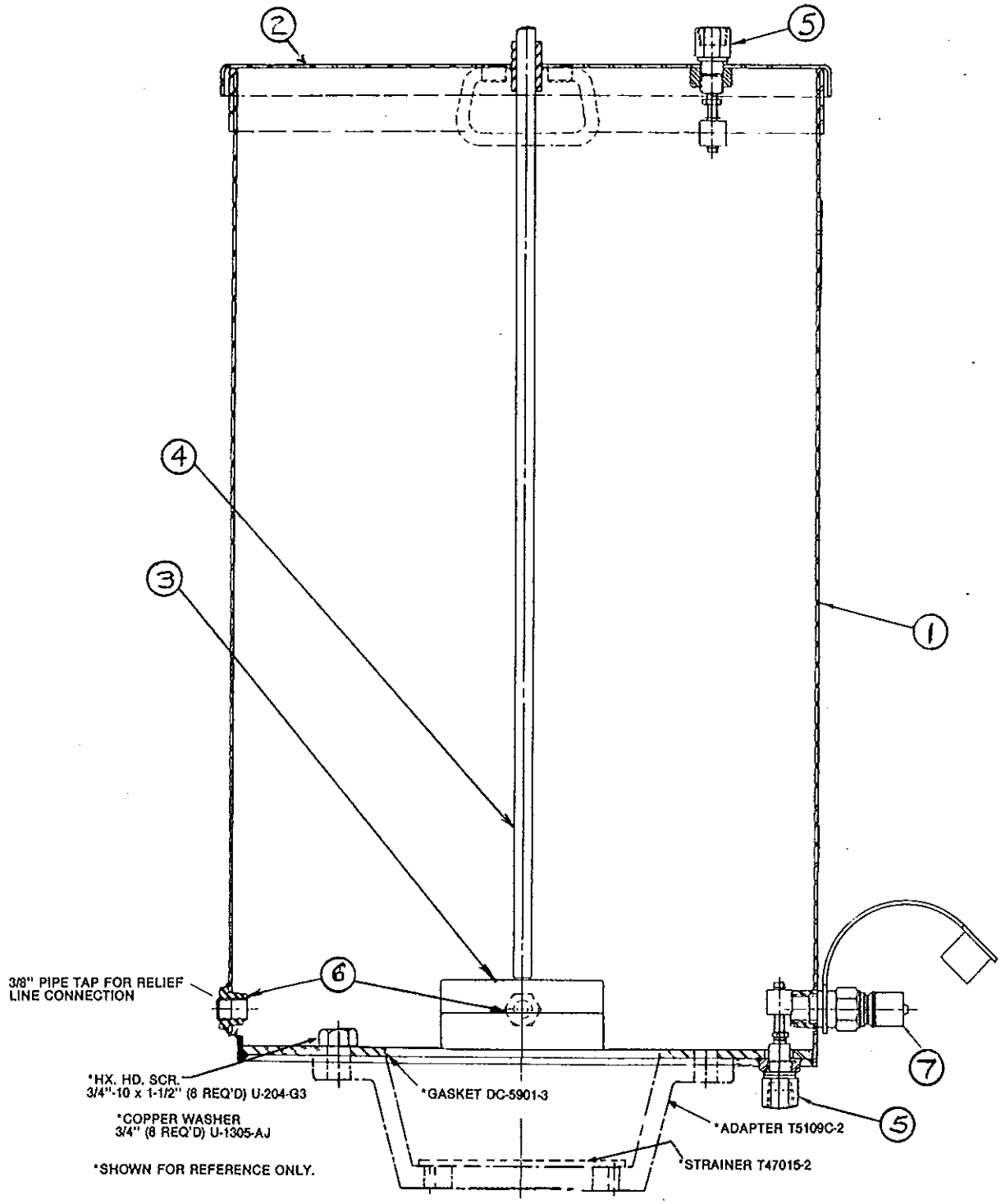
VIEW AA ENLARGED

WIRING DIAGRAM



30 Gallon Oil Reservoir Body T2015(w/o hi-lo sw) and T2016(w/hi-lo sw)

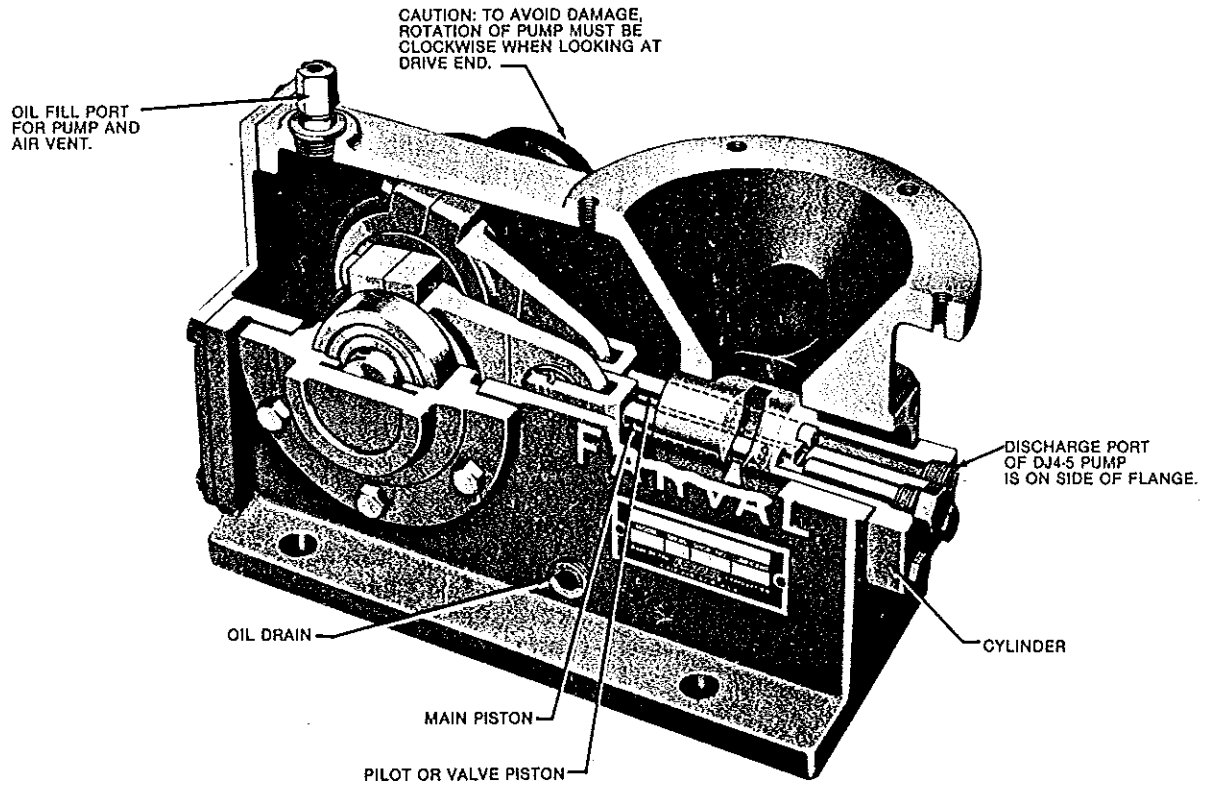
ITEM #	QTY	PART #	DESCRIPTION
1	1	BOD11748C	RESERVOIR BODY 30 GAL. STEEL
2	1	COV10394C	RESERVOIR COVER
3	1	FLO10862B	FLOAT
4	1	ROD11576B	ROD
5	2	LB10584	HI-LO SWITCH ASSEMBLY
6	2	U119CC	PIPE PLUG
7	1	U1919	OIL FILLER FITTING



CENTRAL STATION SUBASSEMBLIES

Pump Assembly

1. Description



CUTAWAY VIEW OF PUMP.

PUMP OUTPUT

PUMP NO.	OUTPUT PER STROKE		OUTPUT PER MINUTE*		MOTOR H.P.
	CU. IN.	FL. OZ.	CU. IN.	FL. OZ.	
DJ4-5	.195	.108	33	18.6	1

*Output per minute is for a pump driven by a motor operating at 1725 RPM. Pump is driven thru a 10:1 worm gear reduction unit.

Pump Assembly — Model DJ4-5

2. Parts List

ITEM NO.	QUANTITY DJ4-5	PART NO.	DESCRIPTION
1	1	DJ-4101	Housing—Pump
2	1	DJ-4102-3C	Clamping Plate—Open End
3	1	DJ-4103-146	End Plate
4	1	DJ-4104-3C	Clamping Plate—Closed End
5	2	*	Connecting Rod
6	2	*	Connecting Rod Cap
7	1	**	Eccentric Shaft
8	2	**	Eccentric
9	1	DJ-4403-5	Plug—Main Piston Bore
10	1	†	Pump Cylinder
11	1	†	Main Piston
12	1	†	Pilot Piston
13	1	DJ-4901	Shim—Pump Cylinder
14	1	DJ-4902	Set Clamping Plate Shims
15	1	DJ-4903-3	Gasket—End Plate—.015" Paper
16	2	AF-1007	#200 Roller Bearing
17	2	AF-1008	1986-1931 Timken Roller Bearing
18	1	U-104-D1	1/2" x 1/8" Reducer Bushing
19	1	U-106H	1-1/4" Std. Pipe Plug
20	1	U-119AC	1/8" Hex. Socket Pipe Plug
21	1	U-119CC	3/8" Hex. Socket Pipe Plug
22	2	U-201-A4	1/16" x 1-1/4" Cotter Pin
23	1	†	1/4" Hex. Socket Pipe Plug
24	4	*	5/16"—24 x 1-1/4" Std. Cap Screw
25	6	U-204-B5	5/16"—18 x 7/8" Hex. Head Mach. Screw
25A	4	U-204-B9	5/16"—18 x 1-1/2" Hex. Head Cap Screw
26	12	U-204-B5	5/16"—18 x 7/8" Hex. Head Mach. Screw
27	4	*	5/16" Lockwasher
28	1	U-217H	3/4" Gasket
30	1	†	Drive Plug
31	2	U-1207C	Drilled Wrist Pin
32	1	U-160	Air Vent
33	1	U-1312C	Nameplate
34	1	†	Outlet Adapter
35	1	WG-10263	Leather Oil Seal
36	1	**	3/16" x 3/16" x 1-7/16" Key—Both Ends Rd.
37	1	U-217-E	9/16" Gasket

Each of the following three groups of parts (except items 24, 27, 30 and 36 which can be ordered separately) are selectively fitted and must be replaced as a matched set:

* Order assembly DJ45063C to obtain these parts. (NOTE: 2pcs of assembly are Required if repairing DJ45)
** Order assembly DJ4404 to obtain these parts.
† Order assembly DJ45055K to obtain these parts.
DJ45 Reapir kit is p.n. 39898

Pump Assembly — Model DJ4-5

2. Parts List

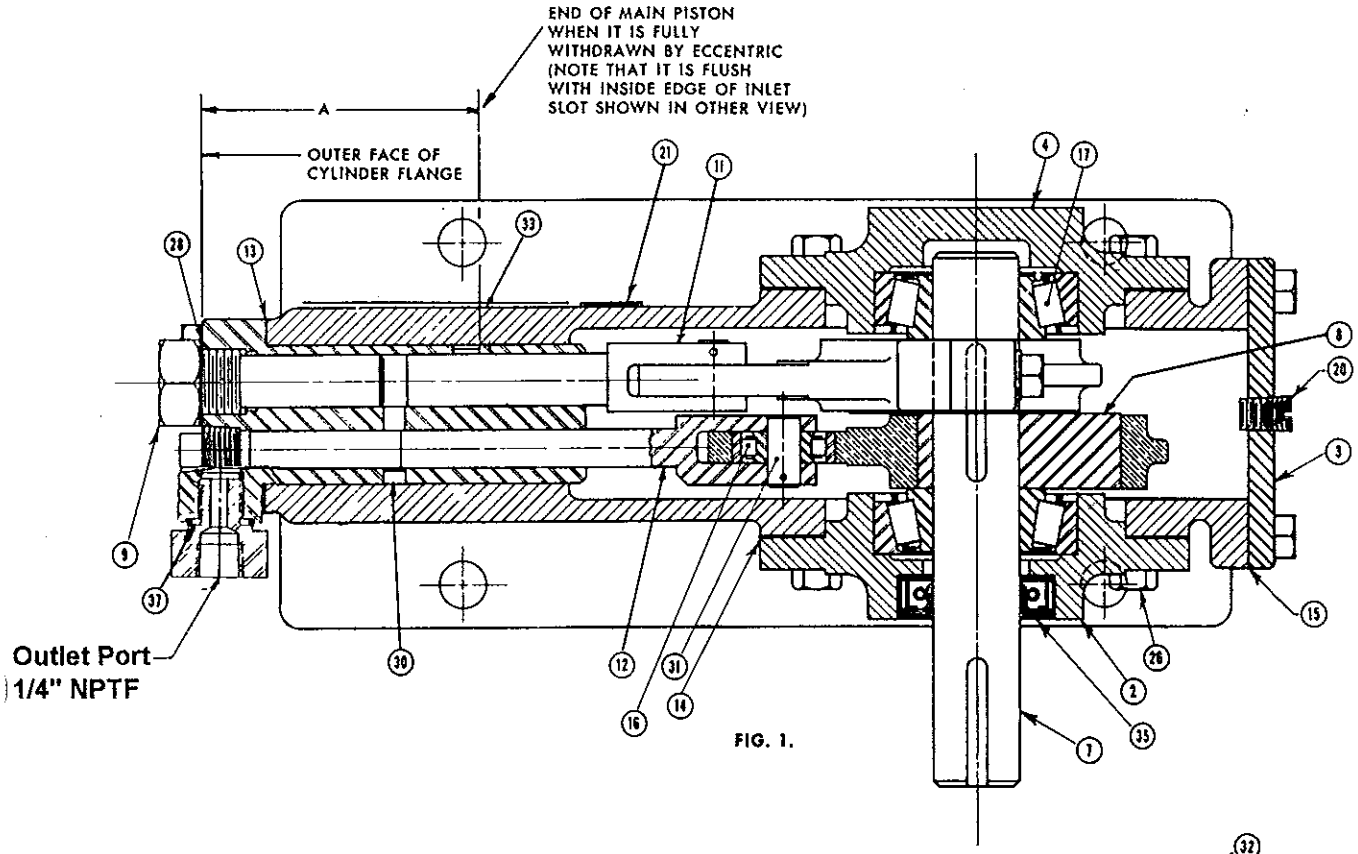


FIG. 1.

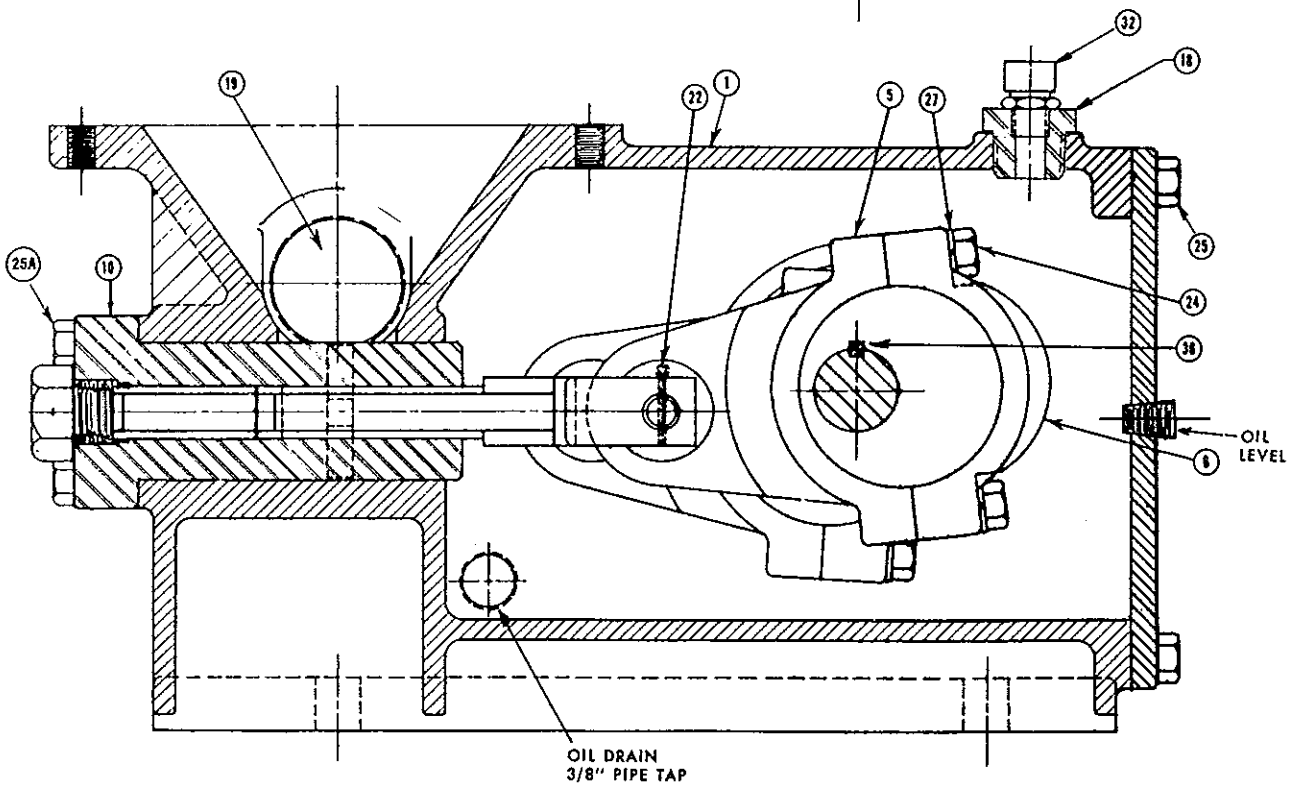
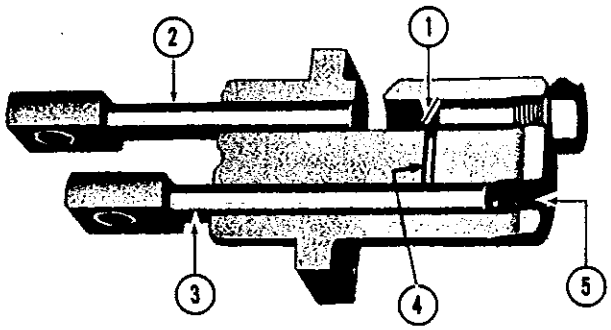


FIG. 2.

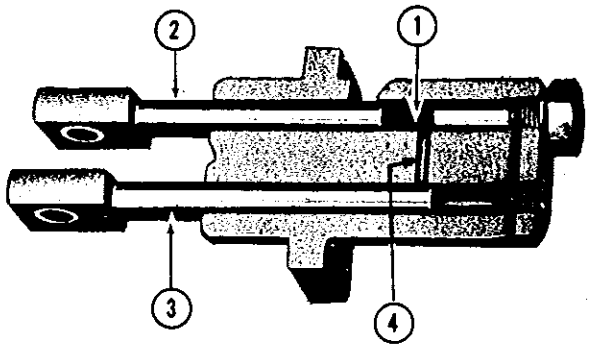
CENTRAL STATION SUBASSEMBLIES

Pump Assembly — Model DJ4-5

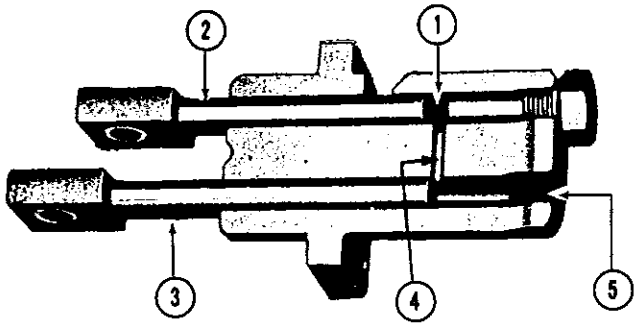
3. Piston Operating Sequence



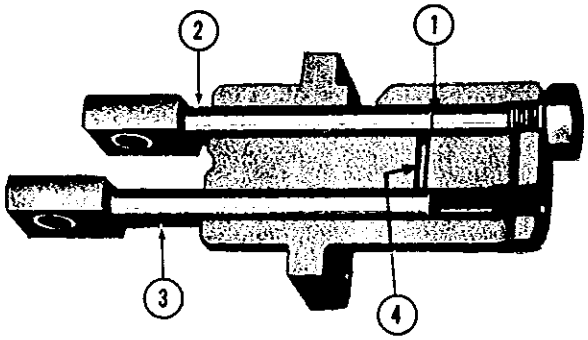
A. Lubricant enters main chamber (1) from reservoir when main piston (2) reaches extreme back stroke position. Valve piston (3) blocks discharge port (4) and outlet (5) to system supply line.



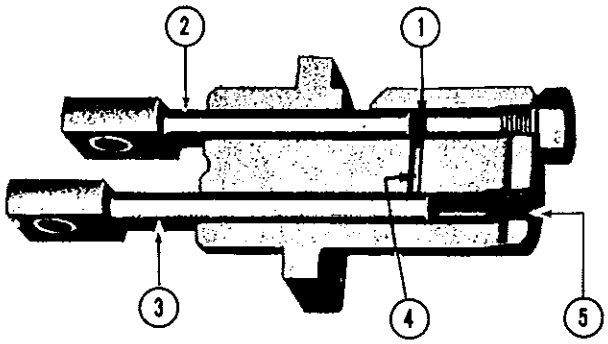
B. Main piston (2) moves right, exerting pressure on lubricant in main chamber (1), as valve piston (3) moves left to open discharge port (4).



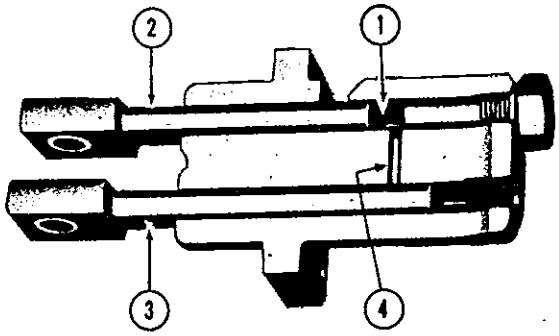
C. Main piston (2) continues right, forcing lubricant from main chamber (1) through discharge port (4) and outlet (5) to system supply line. Valve piston (3) continues left.



D. Main piston (2) reaches extreme forward stroke, exhausting all lubricant from main chamber (1). Valve piston (3) moves right to close discharge port (4).



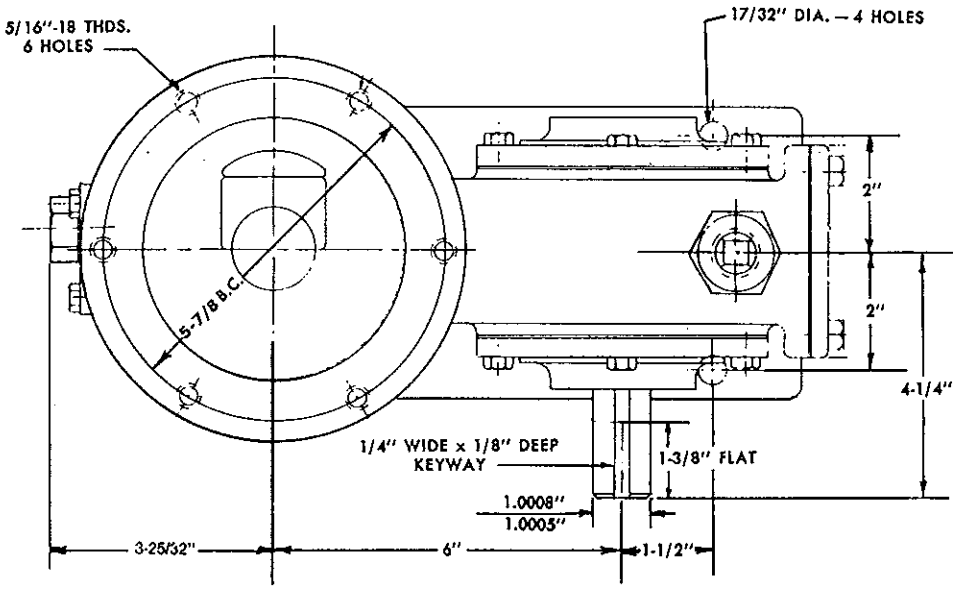
E. Main piston (2) moves left, creating vacuum in main chamber (1), while valve piston (3) continues right, blocking discharge port (4) and outlet (5) to system supply line.

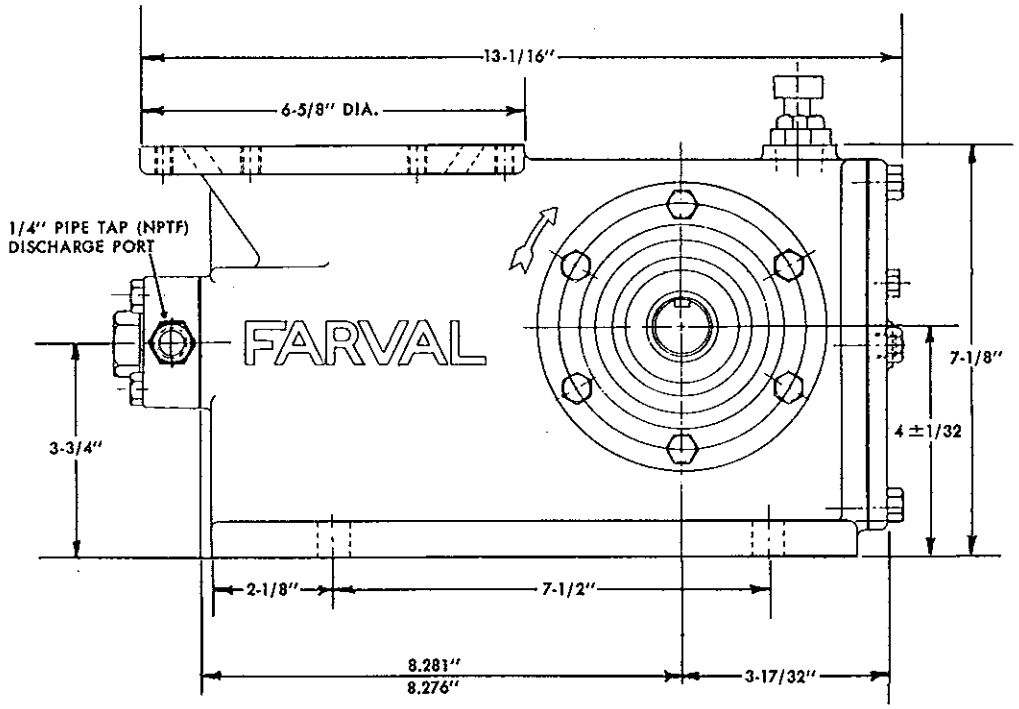


F. Main piston (2) continues left preparatory to opening lubricant port to main chamber (1). Valve piston keeps discharge port (4) closed. Sequence repeats when pistons reach original positions.

Pump Assembly — Model DJ4-5

4. Dimensions





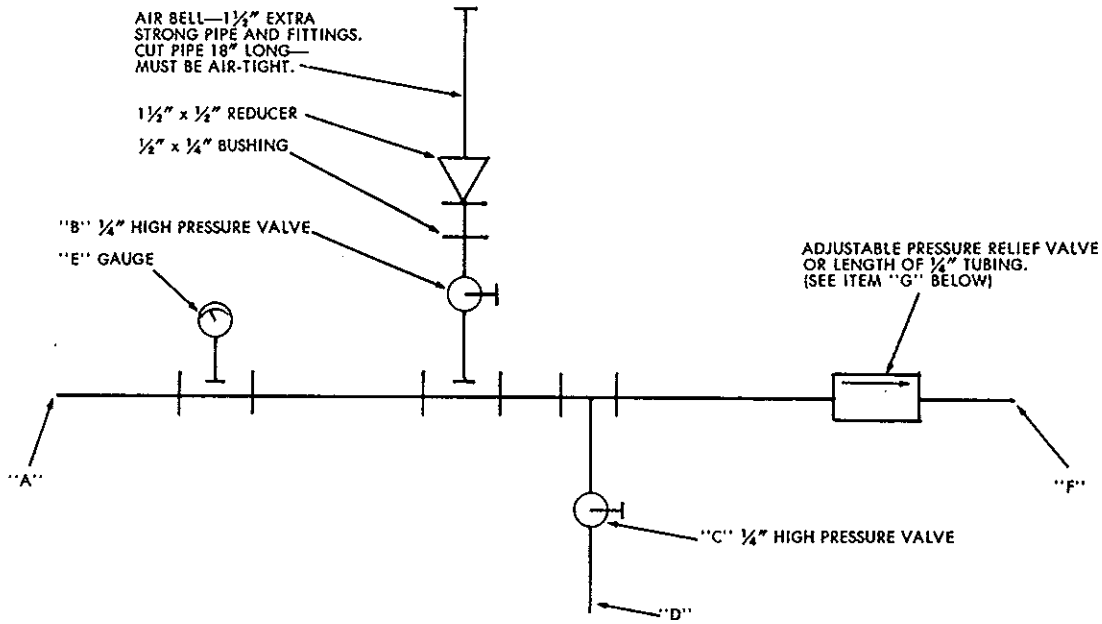
Pump Assembly — Model DJ4-5

5. Service and Maintenance

HOW TO TEST FOR WORN CYLINDERS AND PISTONS

It is recommended that this test be run after the central station has been identified as the source of the trouble as described on page DD1-1. Use NLGI #1 or #2 grease.

A. Connect test line at "A" (see diagram below) to the pump discharge port shown on page DN3-5. Do not connect it to the reversing valve discharge port.



B. Close valve "B", open valve "C" and start pump. Purge air until flow at "D" is steady.

C. Record weight of grease pumped during a two-minute period at zero pressure.

D. Close valve "C" and open valve "B". Adjust pressure relief valve until gauge "E" reads 1000 psi.

E. Operate until grease flows steadily at "F" and then record weight of grease pumped during a two-minute period at 1000 psi.

F. If the volumetric efficiency as calculated below is less than 90%, the piston-cylinder set is worn and should be replaced as described on the following page. Grease weights are from "C" and "E" above.

$$\text{Volumetric Efficiency} = \frac{\text{Weight of grease pumped at 1000 psi}}{\text{Weight of grease pumped at zero psi}}$$

G. The 1000 psi pressure can also be obtained by using a measured length of tubing in place of the relief valve. A suggested length (reduce if necessary) would be about 33 feet of ¼" x .032" wall tubing when pumping NLGI number 1 grease (pressure drop equals about 30 pounds per foot at 60°F.) or 16½ feet of ¼" x .032" wall tubing when pumping NLGI number 2 grease (pressure drop equals about 60 pounds per foot at 60°F.) A third method of producing the 1000 psi pressure is to substitute a short piece of tubing for the relief valve. Flatten one end of tubing.

CENTRAL STATION SUBASSEMBLIES

Pump Assembly — Model DJ4-5

5. Service and Maintenance - cont.

HOW TO REPLACE WORN CYLINDER AND PISTONS*

A. To make the job easier, remove pump reservoir assembly from baseplate and place on workbench. Drain reservoir of lube by removing plug (item 19 page DN3-7).

B. Drain oil from pump eccentric chamber and remove end plate (3).

C. Remove connecting rod screws (24) and connecting rod caps (6).

D. Remove bearing clamping plate (2), using care that shaft keyway does not damage seal (35). Rotate shaft until eccentrics (8) will slide out of connecting rods (5) and then remove shaft with eccentric intact. Pull connecting rod and piston assemblies out end plate (3) opening.

E. Re-assemble pump with new pistons and cylinder (inlet notch in cylinder must be toward top). Play in connecting rod caps can be eliminated by filing the caps. Insert cylinder shims (13) so that with cylinder bolts (25) and clamping plate bolts (26) tightened, dimension "A" on page DN3-7 is 3-7/16". Install bore plug (9).

F. Prime pump by pouring a small amount of oil into throat of pump. Turn input shaft (7) clockwise by hand (see arrow on housing). It should turn freely with a very slight bump being felt at one point in each revolution as the inlet port is closed. This is the overlap setting of the double plunger pump. The proper setting is to have **0.005" overlap.** This is extremely important in the life and efficiency of the pump. To arrive at the proper setting, it is necessary to add or remove shim stock from behind the cylinder flange. At the point where adding one piece of .005" shim stock will make the bump disappear, remove this .005" piece of shim stock and overlap setting should be accurate. As a final check, turn eccentric shaft with cylinder bolts tightened and be sure the very slight bump is present.

Note: Use Farval shim stock DJ4901 to avoid possible trouble caused by slight thickness changes after assembly. Cut the shim stock across one side to cylinder hole to avoid removal of cylinder when shimming.

G. Pump must be driven clockwise as shown by arrow on housing. To avoid damage, remove closure plug (9) before starting pump under power and until direction of rotation has been verified.

*Order kit DJ-4505-5K. Parts included are a new piston-cylinder set (items 10, 11 and 12 page DN3-7); bore plug DJ-4403-5 (9); shim stock DJ-4901 (13) (.005, .007, or .010 thick); 1/4" socket pipe plug (U-119-BC) (23); hex head cap screws U-204B9 (25A); and copper gasket U-217H (28).

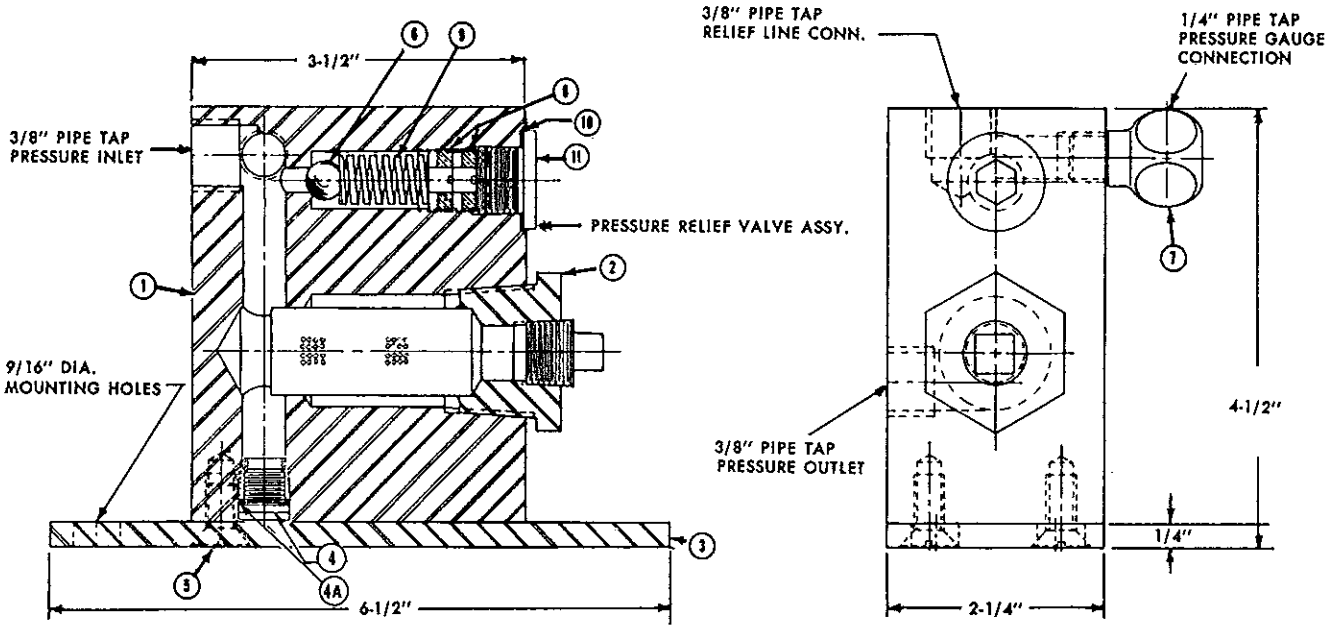
CENTRAL STATION SUBASSEMBLIES

Strainer and Pressure Relief Valve Assembly — Model DC41-1012-1

1. Application

Model DC41-1012-1 combination strainer and pressure relief valve assemblies are installed on DC41 and DC42 central stations.

2. Description



PARTS LIST

ITEM	QUANTITY	PART NO.	DESCRIPTION
1	1	DC41-1013-1	Body, Strainer and Relief Valve
2	1	DC41-1014-1	Strainer Screen Assembly
3	1	DC41-1015-1	Mounting Plate
4	1	U-1522-E	1/2-20 Closure Plug
4A	1	U-1305-V	1/2" Copper Washer
5	2	U-208J2	5/16"-18 x 5/8 Flat Hd. Machine Screw
6	1	U-230E	3/8" Steel Ball
7	1	U-1104B	1/4 Pipe Thread x 90 Deg. Street Ell
8	2	U-1202J	5/8-18 Flat Screw
9	1	200870	Helical Spring
10	1	U-1305S	49/64 Copper Washer
11	1	U-1522H	Closure Plug

The relief valve prevents damage to lines and fittings in case of stoppage. It is normally set at the factory to open at 2400 to 2500 psi and by-pass lube from pump back to reservoir. It can be set by connecting a hand gun with a pressure gauge to the pressure inlet port of the relief valve and adjusting retainer screws (8).