

SERIES 1400, TYPE 72-15 NON-INDICATING PNEUMATIC LEVEL CONTROLLER

I. GENERAL DESCRIPTION

A. TYPE

1. Type 72-15 Pneumatic controllers mount directly to Type 71-06 Level controls to provide a pneumatic signal, proportional to the change in liquid level, liquid density or liquid interface.

B. INSTALLATION (72-15)

1. Use clean, dry supply air for controller operation. Remove protective pipe plugs.
2. Blow out all instrument air lines.
3. Pipe instrument air regulator to supply connection in controller case.
4. Install instrument piping to controller output pressure connection.

C. ADJUSTMENT

1. Before putting unit into operation, always check Torque Tube Assembly (item 12) for "loss of torque" as outlined below.
 - a. Remove Inspection Flange (item 3), insert screw driver underneath Torque Arm Assembly (item 14) and lift to see if displacement oscillates freely.
2. If the displacement element failed to respond properly, reset Torque Tube Assembly (item 12) as follows:
 - a. Remove Controller Case (item 2). (see Fig.4)
 - b. Loosen Cap Screws (item 10) that hold the Torsion Tube Housing (item 11) to the Torsion Tube Housing Flange (item 9).
 - c. Place open end wrench on the exposed end of the Torsion Tube Assembly (item 12) and turn wrench until torsion tube assumes full weight of the displacement element. The Torque Arm Assembly 9 item 14) should be centered in Housing (item 2) and Displacement Element free from obstructions.

- d. While holding wrench on torsion tube, UNIFORMLY tighten Cap Screws (item 10). Recheck Torque per par. C 1a.
- e. Make sure Clip Spring (item 8) is properly seated and screws (item 6) are tight before reinstalling parts.

D. CALIBRATION

NOTE

Read instruction decal on inside of controller case door and on Grav-O-Dex face before putting unit into operation.

1. Use water at approximately 60 degrees F. to operate displacement element, set water level at mid-point on element.
2. Loosen set screws on Grav-O-Dex shaft, set points "A" & "B" line up points using level device. Tighten set screws parallel to top of case.
3. Select position at point "A" or "B" and set gravity at 1.0 on Grav-O-Dex. Read instruction decals. (Fig 4A)
4. Turn on air supply. Supply pressure of 18 psi as indicated on Supply Gage (item 4) for controller with 3 to 15 psi range is recommended by the factory. 35 psi supply pressure is recommended for controllers with 6 to 30 psi range.
5. Move Nozzle Assembly (item 7) to 100% "PROP" on Curve Piece (item 9). Turn adjustable nozzle to 15 psi.
6. When water level reaches weld bead on displacement element, check position of nozzle on proportional band scale. If nozzle is not a 100% "PROP" on curve piece, loosen two (2) screws on outer edge of curve piece, slide scale to line up pointer at 100% on curve piece and tighten screws.
7. Repeat steps D3 through D6 until pointer lines up at 100% proportional band setting on curve piece without making further adjustments to curve piece.

Caution: Before disassembly or maintenance, all pressures in this device must be relieved. Failure to relieve pressures may result in personal injury or device damage. The resulting uncontrolled venting or spilling of line fluids may cause personal injury, loss of process control or environmental contamination.

8. Determine type and specific gravity of medium. Set Grav-O-Dex as follows:
 - a. At difference of specific gravity for interface service.
 - b. At design service temperature of medium.
 - c. At average specific gravity at design temperatures of medium, based on specific gravity at low temperature and high temperature.
9. Move nozzle valve to desired location on curve piece. Use Table 1 to determine proportional band setting for specific gravities above or below 0.5

TABLE 1						
Specific Gravity	Grav-O-Dex Setting .7	Proportional Band Setting Req'd				
		100%	75%	50%	25%	10%
		Compensating Prop Band Setting				
1.8	1.5		90%	60%	30%	18%
0.4	0.5	80%	60	40	20	8
0.3	0.5	60	45	30	15	6
0.2	0.5	40	30	20	10	
0.1	0.5	20	15	10		

10. Replace inspection cover flange. If controller case is left hand mounted, adjustments are made for 3 psi output with the linkage at position "A" and 15 psi output with the linkage at position "B". Other control ranges can be obtained by following the above procedure.

II. OPERATION

1. POWER RELAY UNIT

Instrument air is supplied through an instrument air regulator for controller operation. Supply pressures of 18 psig for controller with 3-15 psig output and 35 psig for controller with 6-30 psig output as indicated on the supply gauges (item 4) are recommended by the factory. Supply air passes through a bleed orifice in the nozzle assembly (item 7) and bleeds to atmosphere through the nozzle as long as the curve-piece (item 9) is held off the nozzle by rotational movement of the Grav-O-Dex. As the rotating Grav-O-Dex and linkage lower the curve piece to contact the nozzle valve, the restricted bleed through the nozzle valve becomes less than the bleed through the restricted orifice. This causes pressure to build up in the diaphragm area, and opens the supply valve (item 9) admitting Supply air to the opposing diaphragm in the form of controller output to the control valve actuator. As the control pressure returns to the

control set point, the sensing element repositions the curve piece which lets the nozzle valve bleed to atmosphere. This reduces the pressure in the supply line to permit relay diaphragms to actuate both the supply valve and the bleed valve at balanced positions.

2. FEED BACK BELLOWS ASSEMBLY

A change in controller output pressure, causes the bellows (item 6) to expand or contract, resulting in a proportional feedback action. This moves the curve piece to either open or close the nozzle valve. The bellows is equipped with a spring and safety travel stop to prevent rupture when subjected to excessive pressure. Bellows spring rate and travel stop are different on controllers with 3-15 psig and 6-30 psig output.

3. ACTION-CURVE PIECE LINKAGE

A rotational movement on the Grav-O-Dex is relayed through mechanical linkage to the power unit. The key element is a curve piece (item 9) that is connected to the Grav-O-Dex. The two scales on the curve piece are in percent, with SNAP producing on-off control and PROP producing throttling control. A manually adjustable nozzle valve (item 7) sets the controller output pressure at the desired position. The nozzle valve is equipped with a thimble type adjustment with click type friction lock to assure a positive setting against system vibration.

III. MAINTENANCE

A. SERVICING INSTRUCTION (72-15) CONTROLLER

1. TO DISMANTLE THE CONTROLLER

For replacement of parts or cleaning purposes, the sequence of dismantling should be followed. Improper dismantling may result in unnecessary damage and expense.

- a. Shut off instrument air Supply.
- b. Remove screw at position "A" or "B" on Grav-O-Dex Disc (item 21).
- c. Remove retainer (item 3) from curve piece (item 9) with tru-arc pliers. Remove bellows arm (item 10) with retaining pin and lift out curve piece.
- d. Remove bellows screw (item 5) and bellows (item 6).
- e. Remove screw at the bottom of the nozzle

assembly (item 7) and lift out orifice cleaner assembly (item 12) and nozzle valve.

- f. Take out the 5 screws (item 8) through the controller cap plate.
- g. Remove the controller cap plate (item 11), diaphragm assembly (item 18) and ratio plate (item 17). If the plate tends to stick to the controller body, insert a screw driver between the plate and body to loosen. Use extra care to prevent damage to the gasket surfaces.
- h. Remove the inner valve assembly (item 19)

2. TO SERVICE AND REASSEMBLE CONTROLLER

After parts have been cleaned and inspected as noted below, replace parts in reverse sequence. Any parts showing excessive wear or damage should be replaced by new parts. Care should be taken to see that metal chips and burrs do not get into the controller. After each individual part has been reinstalled, check moving parts to see that they move freely. **DO NOT FORCE** the parts into position (this may effect the calibration of the controller).

- a. Clean the valve body, making certain all ports are open and free of foreign material.
- b. Clean and install the inner valve assembly (item 19). Check the ball and springs for excessive wear.
- c. Install the bleed spring (item 20).
- d. The two diaphragms are installed as an assembly, and dismantling of the diaphragm assembly (item 18) is not recommended by the factory. Clean the breathe holes in the ratio plate (item 17). Insert the ratio plate between the diaphragms with the flat side of the plate next to the lower diaphragm.
- e. Place the complete diaphragm assembly on the valve body.
- f. Install the controller cap and tighten the 5 screws (item 8).
- g. Install the nozzle valve assembly (item 7). Make sure the o-ring (item 15) and gasket (item 13) are installed and properly seated.
- h. Replacer the bellows assembly (item 6), make sure both gaskets are in place.
- i. Install the curve piece by inserting the retainer

(item 3) through the hole in the bellows and curve piece. Install the retainer key with true arc pliers.

- j. Connect link on curve piece to the Grav-O-Dex assembly. Check the required controller operation to make sure the proper position is selected.
- k. Apply instrument air to the controller at the desired pressure setting (see instruction on inside of cover plate) and check all parts to see that they function properly.
- l. During normal controller operation, press clean out button (item 12) occasionally to prevent clogging of the nozzle valve.
- m. Check the pipe plug (item 16) in the bottom of the controller case. This plug should be removed to permit vent gas to escape from the controller case.

B. SERVICING INSTRUCTIONS (71-06 LEVEL CONTROLS)

1. TO DISASSEMBLE FOR REPLACEMENT OF PARTS

When dismantling and servicing Type 71-06 Level Controls for replacement of parts, support the Displacement Element (item 1) in a fixed vertical position so that the Torque Arm Assembly (item 14) is centered in the float cage housing.

- a. Shut in liquid level control system.
- b. Shut off air supply to level controller and disconnect air supply tubing from case.
- c. Disconnect linkage between Grav-O-Dex (item 21) and Curve Piece (item 9).
- d. Loosen set screw that holds Grav-O-Dex to Torque Tube Assembly (item 12) and remove Grav-O-Dex.
- e. Remove 4 screws that hold controller case (item 2) to the Torsion Tube Housing Flange (item 9) and lift off controller case.
- f. Remove Cap Screws (item 10) from Inspection Flange (item 3) and both ends of Torsion Tube Housing (item 11).
- g. Lift off Torque Tube Assembly (item 12), if torque tube is corroded to Connector Block (item 7) tap the rounded end of the torque tube lightly to loosen.
- h. If necessary to replace Clip Spring (item 8),

loosen Screws (item 6) on top and bottom of Clip Spring and lift out clip spring.

2. TO SERVICE AND REASSEMBLE

Clean torsion tube housing flange and inspection flange, check for scratches on gasket surfaces. Check and replace Torsion Tube Housing Gaskets (item 13) if necessary. Clean out sediment deposits from housing and remove corroded particles from all parts. Check blunt end of torsion tube for scratches.

- a. Insert blunt end of Torsion Tube Assembly into Connection Block (item 7), make sure pin in torsion tube seats in slot on connector block.
- b. Install gaskets, inspection flange and Torsion Tube Housing.
- c. Replace Torsion Tube Housing Flange with cap screws hand tightened.
- d. Use open end wrench on exposed flat portion of torsion tube and turn until torsion assumes full weight of displacement element.
- e. Check Torque Arm Assembly (item 14) to see that torque arm is still centered in housing cage.
- f. Tighten cap screw of Torsion Tube Housing and remove support for displacement element.
- g. Replace controller case, instrument tubing and instrument air regulator.
- h. Before replacing Grav-O-Dex make sure liquid level does not contact displacement element.
- i. Replace Grav-O-Dex and set pointer at specific gravity of liquid.
- j. Line up points "A" & "B" on Grav-O-Dex in a horizontal line and hand tighten set screw on Grav-O-Dex.
- k. To select position for linkage from curve piece to Grav-O-Dex, read decal instructions on Grav-O-Dex.
- l. Install Grav-O-Dex per paragraph II C.

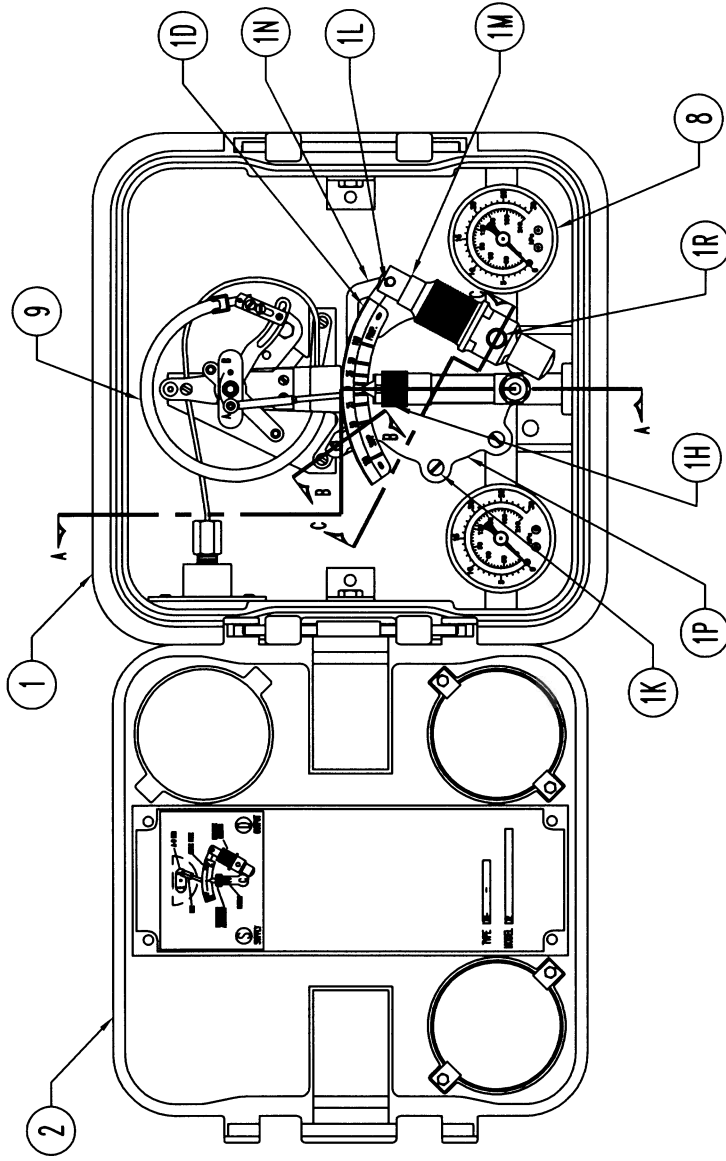
Solutions through engineered products.



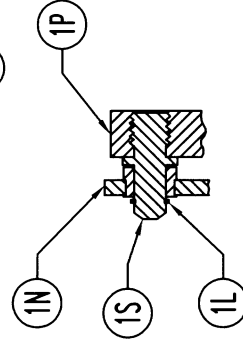
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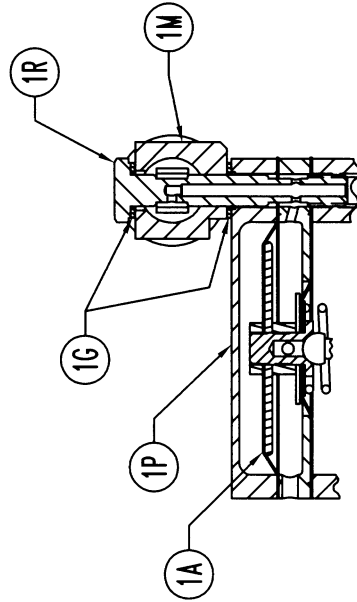
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specifications and/or prices are subject to change without notice or obligation.*



SECTION A-A



SECTION B-B



SECTION C-C

4 5 6 7 10 — NOT SHOWN

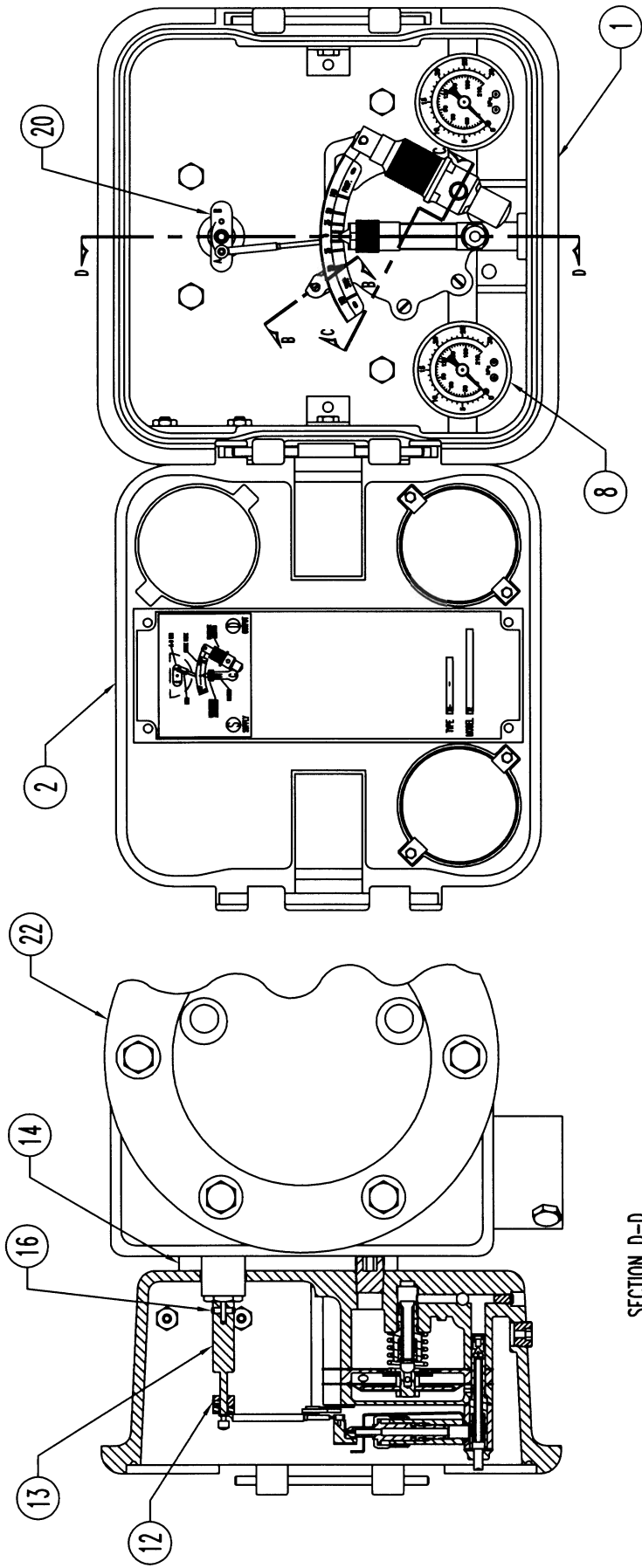
SERIES 4400 PRESSURE CONTROLLER

(72-14-1)

SHEET 1 OF 5

DRAWN BY: CS6 DATE: 09-10-03 DCN RELEASE NO: 13379 DRAWING NO: 4400-114





SECTION D-D

4 5 6 7 11 15 17 18 19 21 — NOT SHOWN

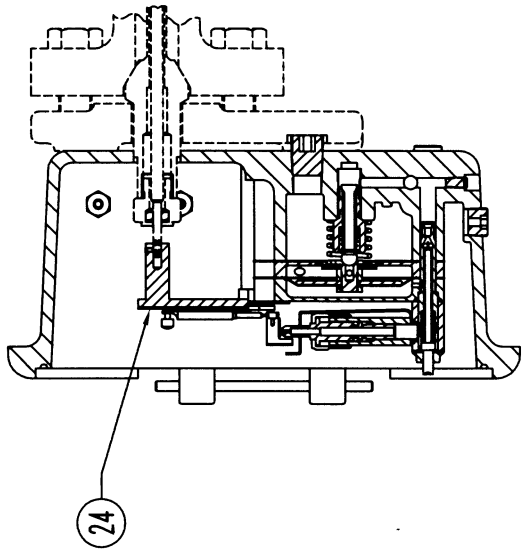
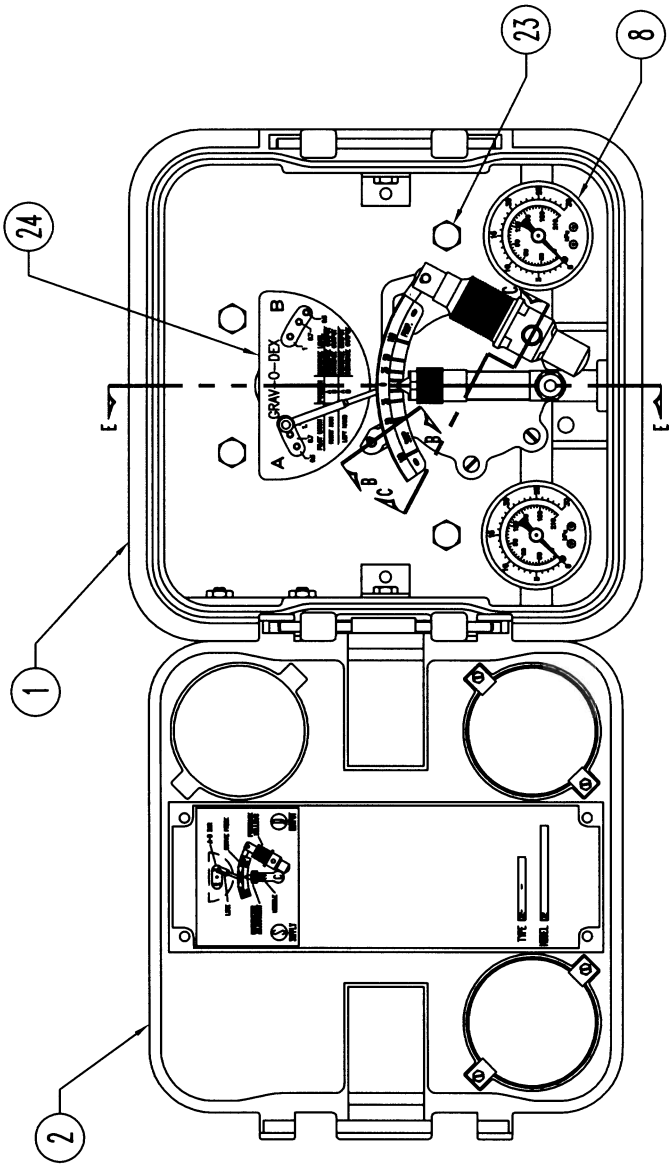
SERIES 4400 DIFFERENTIAL PRESSURE CONTROLLER

(72-14-3/8)

SHEET 2 OF 5

DRAWN BY	DATE	DCN	RELEASE NO.
CSC	09-10-03	13379	4400-114





SECTION E-E

5 6 7 15 — NOT SHOWN

SERIES 1400 LIQUID LEVEL CONTROLLER
(72-15-1)

SHEET 3 OF 5

DRAWING NO. 4400-114
DCN RELEASE NO. 13379
DATE 09-10-03
GSC



ITEM	DESCRIPTION	MATERIAL	STOCK NUMBER	QTY.
2	COVER ASSEMBLY F/CONTROLLER CASE WASHER FLAT Z50 CLIP GLASS WINDOW KNOB LATCH COVER CONTROLLER SPRING LATCH 1.125 LG SPRING LATCH Z50-Z80NF X .75 LG FLATE LATCH COVER 1.00 X 1.25 COVER LATCH CONSISTING OF: INMEDIATE INSTRUCTION CONTROLLER BANK/MB GASKET GLASS WINDOW GLASS WINDOW COVER SCR THRD CUT 4-40NF X .187 LG HEX HD COVER CONTROLLER UNMCHD CONNECTOR SOCKET MOUNTING CONSISTING OF: FLATE HIG F/CONNECTION SOCKET SCREW DOME TYPE U X .19 LG INMEDIATE CONTROLLER KORRESEL LOGO INMEDIATE CONTROLLER 4300/4400 F/DATA CASE PRESSURE .12 OB 1.50	30895-72-14-0100-10	1	
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		30105-301055	2	
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		30105-301055	2	
		30100-301060	2	
		30105-301065	1	
		301070-301070	2	
22	DIFFERENTIAL SEA. ZSPT F/72-14-1 ONLY (OPTIONAL) *SPECTRY PRESSURE RANGE & CAPILLARY LENGTH*	30895-72-14-0100-10	1	
		312730	2	
		30105-301035	4	
		30100-72-14-0104-10	2	
		30105-301045	2	
		30100-301050	2	
		30105-301055	2	
		30100-301060	2	
		30105-301065	1	
		301070-301070	2	
23	DIFFERENTIAL SEA. ZSPT F/72-14-1 ONLY (OPTIONAL) *SPECTRY PRESSURE RANGE & CAPILLARY LENGTH*	30895-72-14-0100-10	1	
		312730	2	
		30105-301035	4	
		30100-72-14-0104-10	2	
		30105-301045	2	
		30100-301050	2	
		30105-301055	2	
		30100-301060	2	
		30105-301065	1	
		301070-301070	2	
24	DIFFERENTIAL SEA. ZSPT F/72-14-1 ONLY (OPTIONAL) *SPECTRY PRESSURE RANGE & CAPILLARY LENGTH*	30895-72-14-0100-10	1	
		312730	2	
		30105-301035	4	
		30100-72-14-0104-10	2	
		30105-301045	2	
		30100-301050	2	
		30105-301055	2	
		30100-301060	2	
		30105-301065	1	
		301070-301070	2	