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Pressure Regulator Valves - Dowty Rotol Types C3651Y and C6940Y, Mk A

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PRESSURE REGULATOR VALVES, TYPE C 3651Y AND C 6940Y, MKA (DOWTY ROTOL)

BY COMMAND OF THE DEFENCE COUNCIL

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Introduction

1. The pressure regulator valve described in para. 1 to 9 is a basic type and variations of it are given in para.10 to 13. These valves operate to maintain a high pressure on the inlet side, which is tapped into the supply line to one component or system, and at the same time allow fluid to pass through the valve, at a relatively low pressure, to operate another component or system.

DESCRIPTION

2. The body accommodates a cylinder (13), a plug (22) and two adapters (4, 16). Both adapters are fitted with bonded seals. The cylinder retains a flanged valve seat (15) over a seal (17) and houses a spring-loaded valve assembly. The valve assembly is retained by an adjustable end cap (8) screwed over the cylinder and secured by a locknut (11).

3. The valve assembly consists of a piston valve (19), a piston (12) and a spring (5). A central stem on the piston slides in a gland ring (7) retained in a gland housing (9) by a spacer (10) and the spring (5). The spacer also retains a sealing ring (6) fitted to the housing. The cylinder is sealed by a sealing ring (14).

4. The plug (22) contains a non-return valve assembly consisting of a ball (20), a spring (2) and a spider plate (21). The plug retains a seating washer (3) and is sealed by a sealing ring (1).

Principle of operation

5. (1) The spring (5) is adjusted so that fluid entering at the adapter (16) will not lift the piston valve (19) until the fluid pressure reaches a predetermined value. Above this pressure the valve lifts only a slight amount so long as the pressure required in the output line at the adapter (4), is relatively low.

(2) If the output pressure increases, however, it reacts separately on the piston (12), through the area afforded by the glanded piston stem. This enables the piston valve (19)to lift further and permit a greater flow to the

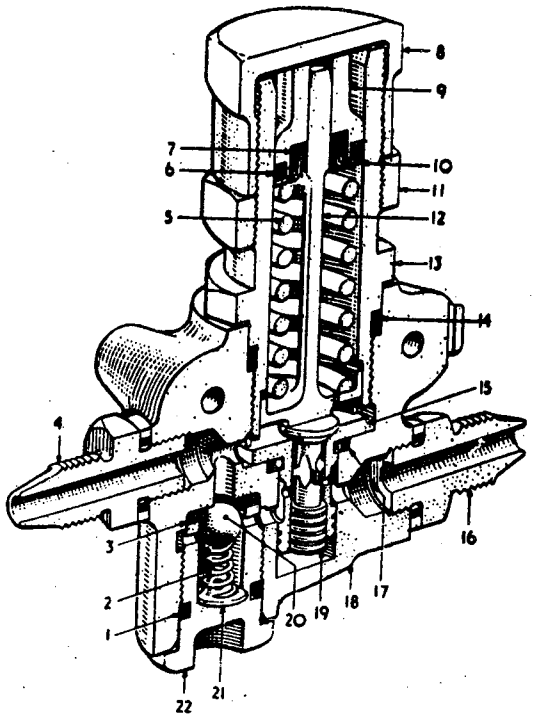

Fig.1 Pressure regulator valve

output line to supply requirements. As the valve lift fluctuates according to conditions on the output side, a small chamber is provided below the piston valve which fills with fluid to give a cushioning effect and prevent "chattering". Under the above conditions, the ball valve (20) remains seated and fluid can only pass through the piston valve.

(3) When flow is reversed, fluid enters at the adapter (4) and has a clear passage through the unit to the adapter (16) by way of the ball valve (20), a groove in the stem of the valve seat (15) and inter-connecting holes.

SERVICING

Leakage

6. If seepage occurs past any seal fitted to prevent external leakage, the faulty seal will be self-evident. Renew the seal.

7. Leakage past the seal (17) or the seating washer (3) will cause loss of pressure in the pipe line connected to the adapter (16). The appropriate seal should be renewed. The spring (2) should also be checked for damage or fatigue.

Dismantling

8. (1) Remove the adapters (4, 16) together with the bonded sealing washers.

(2) Slacken the locknut (11) and remove the end cap (8) and the locknut from the cylinder (13).

TABLE 1

Special tools

Reference numerals are to fig. 1

Stores Ref.	Part No.	Description
27Q/12299	ST 1666	Assembly post for sealing ring (1)
27Q/	ST 172	Assembly post for sealing ring (14)
27Q/11800	3651 Y 9	Seating washer for test.

(3) Withdraw the gland housing (9), the spacer (10) and the spring (5). Remove the sealing ring (6) and the gland ring (7).

(4) Unscrew and remove the cylinder (13) from the body (18). Withdraw the piston (12) and remove the seal (14).

(5) Withdraw the piston valve (19) and the valve seat (15). Remove the seal (17).

(6) Unscrew and remove the plug (22), and withdraw the spider plate (21), the spring (2), the ball (20) and the seating washer (3).

(7) Remove the seal (1) from the plug.

Assembling

9. (1) Insert the seal (17) and the valve seat (15) in the body (18) and position the piston valve (19) to the seat.

(2) Fit the seal (14) to the cylinder (13) and insert the piston (12) in the cylinder. Screw the cylinder into the body.

(3) Position the spring (5) and the spacer (10) in the cylinder.

(4) Fit the sealing ring (6) and the gland ring (7) in the gland housing (9).

(5) Insert the housing in the cylinder and over the stem of the piston (12).

(6) Fit the locknut (11) to the cylinder and screw on the end cap (8). Do not tighten the locknut against the end cap until the tests have been completed.

(7) Insert the seating washer (3) in the body with the chamfered face innermost. Fit the sealing ring (1) to the plug (22).

(8) Insert the spider plate (21), the spring (2) and the ball (20) into the plug (22) in that order. Screw the plug into the body.

(9) Fit the adapters (4) and (16) together with the bonded sealing washers.

(10) After final assembly and test, tighten the locknut (11) and lock the end cap (8), the locknut, the cylinder (13) and adapter (16) together with wire. Lock the adapter (4) to the plug (22) with wire.

PRESSURE REGULATOR VALVE, TYPE C 3651Y

Introduction

10. This valve is identical to the type described in para. 1 to 9.

TEST SCHEDULE

11. A static hydraulic test rig is required.

(1) Connect the test rig coupling to the adapter (16) and operate the rig to a pressure between 103·425 and 106·873 bar (1,500 and 1,550 lbf/in^2). Fluid should flow from the adapter (4). To adjust the valve to operate at this pressure, slacken the locknut (11) and adjust the end cap (8).

(2) Gradually decrease the pressure and note the pressure at which fluid ceases to flow from the adapter (4). This pressure should not be less than 60 per cent. of the lifting pressure of 103·425 and 106·873 bar (1,500 to 1,550 lbf/in^2). Release the pressure. The valve should be operated several times before the final adjustment. Tighten the locknut (11).

(3) Operate the rig up to and within 5 per cent. of the lifting pressure. Leakage from the adapter (4) should not exceed 10 drops per minute.

(4) Increase the pressure. Fluid should flow freely from the adapter (4) when the valve lifts. Release the pressure.

(5) Blank off the adapter (4) with a pressure gauge and operate the rig to the lifting pressure. Pressure at the test rig and the pressure gauge should be equal.

(6) Increase the pressure to 279·248 bar (4,050 lbf/in^2). Leakage should not occur. Release the pressure at the test rig and the pressure at the gauge should fall rapidly to 1·379 bar (20 lbf/in^2) maximum.

(7) Repeat the test (3). Release the pressure, disconnect the test rig coupling and remove the pressure gauge.

(8) Connect the test rig coupling to the adapter (4) and operate the rig. Fluid should flow freely from the adapter (16) at a pressure of 1·379 bar (20 lbf/in^2) maximum. Release the pressure and disconnect the test rig coupling.

PRESSURE REGULATOR VALVE, TYPE C 6940Y Mk.A

Introduction

12. This valve is similar to that described in para.1 to 9, with the exception of the gland housing which is slightly different in shape. The pressure figure to which the unit is tested is also higher.

TEST SCHEDULE

13. A static hydraulic test rig is required.

(1) Connect the test rig supply line to the adapter (16) and apply a pressure between 103·425 and 106·873 bar (1,500 and 1,550 lbf/in^2). Fluid should flow from the adapter (4). To adjust the valve to operate at this pressure,

slacken the locknut (11) and adjust the end cap (8).

(2) Gradually decrease the pressure and note the pressure at which fluid ceases to flow from the adapter (4). This pressure should not be less than 60 per cent of the lifting pressure of 103·425 and 106·873 bar (1,500 to 1,550 lbf/in^2). Release the pressure. The valve should be operated several times to ensure correct functioning before making the final adjustment. Tighten the locknut (11).

(3) Apply a pressure up to and within 5 per cent of the lifting pressure. Leakage from the adapter (4) should not exceed 0·38 cubic centimetres per minute.

(4) Increase the pressure. Fluid should flow freely from the adapter (4) when the valve lifts. Release the pressure.

(5) Blank off the adapter (4) with a pressure gauge and raise the pressure to between 103·425 and 106·873 bar (1,500 and 1,550 lbf/in^2). Pressures at both connections should then be equal.

(6) Increase the pressure slowly to 455·07 bar (6,600 lbf/in^2). Leakage is not permissible. Release the pressure at the test rig, and the pressure at the gauge should fall rapidly to 1·379 bar (20 lbf/in^2) maximum.

(7) Remove the gauge from the adapter (4) and repeat the test (3).

(8) Connect the test rig supply line to the adapter (4) and operate the test rig. Fluid should flow freely from the adapter (16) at a pressure of 1·379 bar (20 lbf/in^2) maximum. Release the pressure and disconnect the test rig supply line.