



ANDERSON GREENWOOD MARVAC FIG. 920 LOW PRESSURE PILOT OPERATED RELIEF VALVE INSTALLATION AND MAINTENANCE INSTRUCTIONS

Incorporating the MWP pilot, the Figure 920 is capable of providing both pressure and vacuum relief

1 INSTALLATION

Refer to Figures 1 and 2

1. This equipment will be supplied in a packing case and should be kept in the case for protection until the engineer is ready to install it.
2. Prior to installation the engineer should check that the equipment is not damaged, particularly the total pressure sensing tube. (item 17)
3. Remove the vacuum breaker cover and check there is no packing or foreign matter present inside the valve. Replace vacuum breaker cover and secure with cover screws.
4. Visually check inside the upper casting and remove any packing or foreign material if present.
5. When lifting the equipment care should be taken not to damage the stainless steel tubing (item 17) the protruding studs and the actual pilot valve itself (item 16).
6. Sizes 2" x 3", 3" x 4" and 4" x 6" can be lifted manually or by slings. Care should be taken not to hold the stainless steel tubing and actual pilot valve whilst lifting. All other sizes have three tapped bosses for lifting bolts.
7. The valve inlet should be gasketed and bolted to a flat machined horizontal flange.
8. The valve outlet should be gasketed and bolted to a flat machined vertical flange.

NOTE

On no account should the exhaust pipework be supported by the valve. These valves are not designed to carry external loads.

2 MAIN VALVE MAINTENANCE

Upper casting (pressure relief)

Refer to Figures 1 and 2

1. Remove pilot valve (Item 16) by releasing the upper nut (Item 25) and unscrew pilot valve from dome spinning (Item 10).
2. Release the cover screws (item 2) from the dome spinning (item 10) and remove the dome spinning without damaging the pilot diaphragm (item 11).
3. Remove the complete piston / pressure pallet assembly, taking care not to damage the dome seal (item 15) on the elastomer diaphragm. The PTFE seal tape will need replacing on the PFA diaphragm and the spinning will need cleaning.
4. Check the pilot diaphragm (item 11) and the PFA diaphragm under the pressure pallet for damage. Replace as necessary.
5. Release the bolts from the pressure seat (item 20) and remove the seat. Replace the PTFE seal (item 19).
6. Clean the inside of the casting, removing any dust or grit.
7. If necessary, replace pressure seat with new seal.
8. Clean the seating surfaces thoroughly with a suitable solvent.
9. If installed, remove the casing from the non-return valves, check the 2 x O-rings and replace if necessary.
10. Re-assemble the unit in reverse order.
11. If damaged or scratched, the exterior of the valve should be painted to prevent corrosion.

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Lower casting (weight loaded vacuum relief)

1. Remove cover (item 28) and remove pallet assembly, inspect the discs under the pallet seating for wear and replace as necessary. Inspect the valve seating and re-grind or replace as necessary.
2. Clean seating surface thoroughly with a suitable solvent.
3. Generally clean inside of valve and remove any foreign material.
4. Assemble pallet onto seat with lead disc if fitted.
5. Fit cover plate and secure with screws.

Lower casting (spring loaded vacuum relief)

1. Remove bonnet and note position of the adjustment screw.
2. Release lock nut and unscrew adjustment screw.
3. Remove spring bonnet and spring assembly.
4. Inspect pallet seating for wear, regrind as necessary. Clean surfaces thoroughly with a suitable solvent.
5. Generally clean inside of valve and remove any foreign material.
6. Assemble pallet onto seat, refit spring assembly and spring bonnet.
7. Reset adjustment screw to original position and tighten locknut, refit cap.
8. Check pressure relief setting. Test run and adjust as necessary.

NOTE

The efficiency of the valve depends on maintaining good seating surfaces and on the condition of the pilot diaphragm. Maintenance periods should be adjusted to suit service conditions. The exterior of all castings should be painted periodically to prevent corrosion.

3 SPARES

When spare parts are required the customer should quote the valve size, the serial number and the item number and material of the parts required. The valve size and serial number can be obtained from the valve identification label. The item number and description of the part can be obtained from the general arrangement drawing. Care should be taken to quote the correct material as the materials quoted in the general arrangements are not for hazardous conditions. The following items may require to be replaced periodically:

FIGURE 1

Main valve with fluoropolymer diaphragm (suitable for cryogenic & light loaded applications)

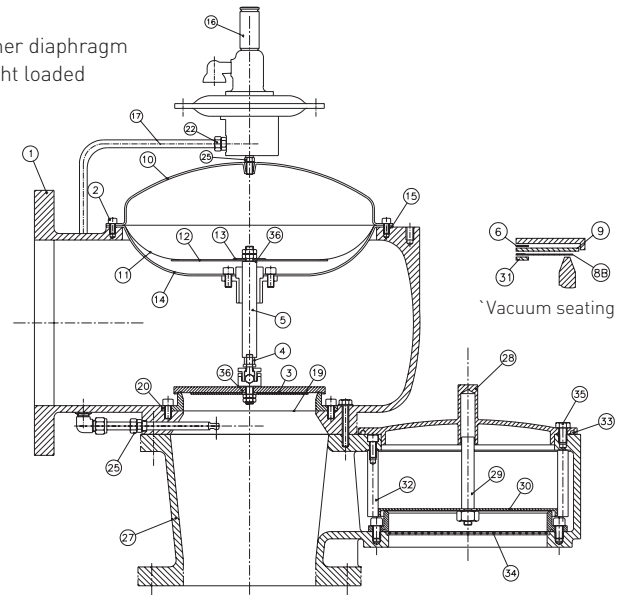
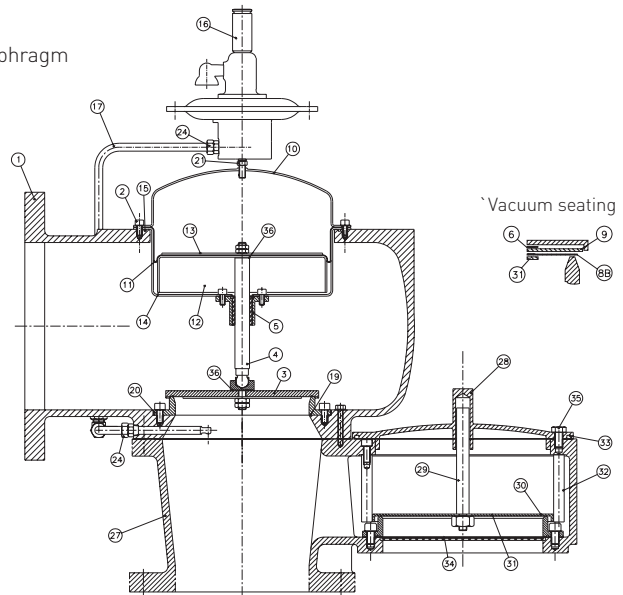


FIGURE 2

Main valve with rolling diaphragm



Main valve

- Item 6 Spacer disc
- Item 8 Pallet diaphragm
- Item 9 Diaphragm backing disc
- Item 11 Main valve diaphragm (elastomer) or (PFA)
- Item 15 Dome seal O-ring.
- Item 19 Seat seal
- Item 33 Vacuum cover O-ring
- Item 36 PTFE sealing washers 2 off.

If non-return valves installed:
O-ring seals (2 off)

Pilot valve

See Figure 4.

Items, 7, 8, 9, 10, 11, 21, 27, 37, 49, 50

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FIGURE 3 - MWP PILOT VALVE

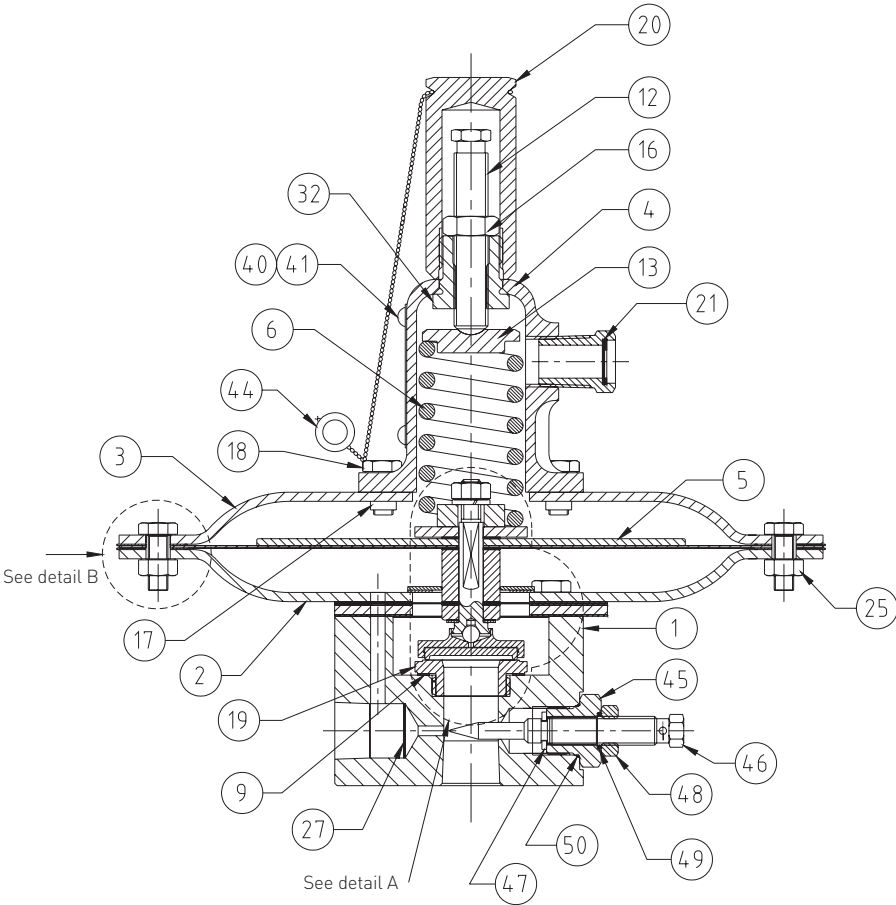
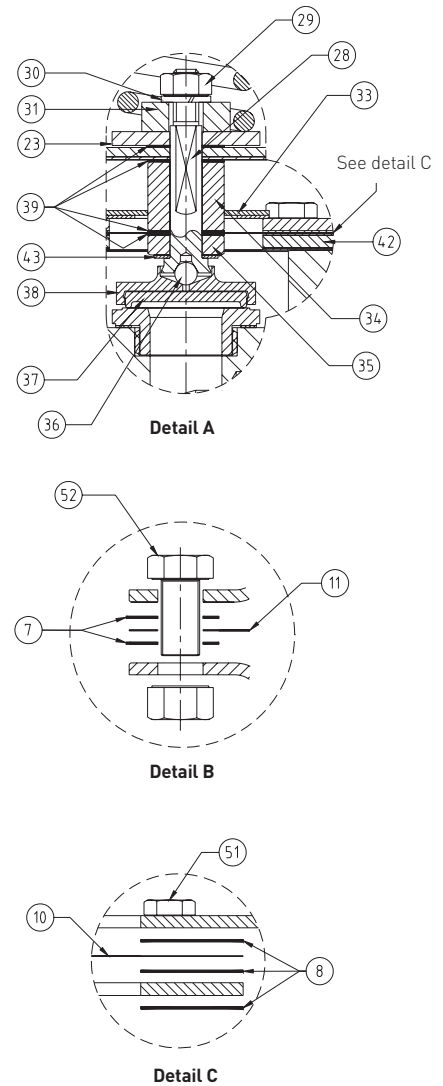


FIGURE 4 - MWP PILOT VALVE



PARTS LIST

Item	Description	Qty.	Item	Description	Qty.	Item	Description	Qty.
1	Body	1	19	Seat	1	38	Disc holder base	1
2	Case - lower	1	20	Cap	1	39	Gasket - spacer	4
3	Case - upper	1	21	Bug screen	1	40	Nameplate	1
4	Bonnet	1	23	Spacer - hex	1	41	Hammer drive screw	2
5	Sense plate	1	25	Nut - casing	12	42	Support plate	1
6	Spring	1	27	Screen - body inlet	1	43	Washer - spacer	1
7	Gasket - sense diaphragm	3	28	Spindle	1	44	Lead & wire seal	1
8	Gasket - body	3	29	Nut - spindle	1	45	Bushing - blowdown	1
9	Gasket - seat	1	30	Spring washer - spindle	1	46	Needle - blowdown	1
10	Diaphragm - spindle	1	31	Spring plate - lower	1	47	Retaining clip	1
11	Diaphragm - sense	1	32	Insert - bonnet	1	48	Locknut - blowdown	1
12	Adjusting screw	1	33	Check plate	1	49	O-ring	1
13	Spring plate - upper	1	34	Spacer - sense	1	50	Seal - blowdown	1
16	Locknut - adjusting screw	1	35	Spacer - spindle	1	51	Bolt - body	4
17	Nut - bonnet	4	36	Ball	1	52	Bolt - case	12
18	Bolt - bonnet	4	37	Disc	1			

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4 PILOT VALVE MAINTENANCE

Stripdown

During strip down, check each component carefully for wear, particularly the diaphragms and seals. The filter needs to be washed with cleaning solvent and blow shop air through the filter to ensure that the orifice behind is clear. Inspect the seat surfaces, minor scratches can be removed with 500 grit paper. The seat can be removed if damage is severe. If machining is carried out, ensure that the original profile is maintained. To facilitate assembly, place all parts in an orderly arrangement so the correct parts are assembled in the proper sequence. Refer to Figures 3 and 4.

Assembly

1. Prior to assembly, all components must be inspected visually, cleaned and de-burred as necessary. Ensure that all pressure transmission holes are clear.
2. Assemble the screwed fittings into both the body (1) and bonnet (4) using PTFE tape as a thread seal.
3. If the seat (19) has been removed, fit the gasket (9) under the seat (19) and screw into the body (1), tighten down securely.
4. Fit the spindle (78) / disc holder (38), ensure that the disc holder is free to pivot and that there is adequate movement. Fit the PTFE disc (37) into the holder (38). Lightly polish the disc to remove any sharp edges, the seating face profile should be hemispherical.
5. Fit the spacing washer (43), spacer (35) and spacer gasket (39) onto the spindle. Lightly lubricate both sides of the gasket (39).
6. Place disc assembly inside the body (1) and onto the seat (19).
7. Carefully assemble onto the body (1) ensuring that all the holes are in line, in the following order: body gasket (8) support plate (42) and the second body gasket (8). Placing a straight edge across the body there should be a 0.010"/0.015" gap above the spacer (35), shim as appropriate.
8. Fit spindle diaphragm (10), body gasket (8) ensuring that all the holes are in line.
9. Fit the lower case (2) and carefully tighten down onto the body (1) with 4 x bolts.
10. Fit onto the disc/spindle assembly in the following order: a gasket spacer (39) sense spacer (34). Fit the check plate (33) over the sense spacer (34), fit gasket spacer (39). Fit the sense diaphragm gasket (7) and diaphragm (11) fit another sense diaphragm gasket (7). Fit the sense plate (5) gasket spacer (39) hex spacer (23), fit the lower spring plate (31), spring washer (30) and spindle nut (29) and, making sure that all the bolt holes through the gasket and diaphragm are in line, tighten down the spindle assembly with the spindle nut (29) until lock washer becomes flat, do not over tighten.

Caution: do not distort the diaphragm when tightening the spindle nut.

11. Fit bonnet nuts (17) into the upper case (3).
12. Fit the upper case (3) and tighten securely with the 12 x bolts and nuts.
13. Assemble the spring (6) over the plate (31) and fit the upper spring plate (13).
14. Fit the bonnet insert into the bonnet.
15. Fit the bonnet (4) and tighten securely down with the 4 x bolts.
16. Fit the adjusting screw (12) and locknut (16). Apply 2/3 turns to the adjusting screw.
17. Assemble the blowdown adjustment screw assembly, parts 45/46/47/48/49 and 50. Screw this assembly into the body (1) until the blowdown needle (46) is screwed home fully, turn back 1-full turn and lock in position with the locknut (48).

Pilot set pressure adjustment

1. Install pilot on test stand, this should consist of a pressure vessel of approximately 3 liter capacity with pressure gauge, see figure 5. Turn set pressure adjustment screw clockwise until screw is near the end of its travel.
2. Increase supply pressure to desired set pressure and turn adjustment screw slowly counter clockwise until flow through pilot exhaust begins.
3. Continue to turn adjustment screw slowly counter clockwise until dome pressure gauge records a pressure equal to values shown in Table 1. As flow increases through pilot exhaust it is important to maintain supply pressure at a value equal to the set pressure.
4. Reduce supply pressure to 50% or less and tighten locknut on the adjustment screw.
5. Check set pressure 3 times to ensure consistency. Set pressure is defined as that supply pressure where dome pressure is equal to the values shown in Table 1.
6. Increase supply pressure to 90% of set pressure and check seat leakage, using a bubble tester as per API 527, there should be no leakage.
7. Check all gaskets and connections with soap solution to ensure that there is NO leakage.

NOTES

Final set pressure should be checked when the pilot is fitted onto the main valve and any necessary final adjustments to the pilot setting to achieve nameplate setting can then be made. Maximum difference between pilot and main valve set pressure is shown in Table 1. This should be checked when the pilot is assembled onto the main valve.

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Main valve set pressure adjustment

Fit the pilot to the main valve ensuring that the pitot pick up pipe is clear and the pitot is in direct line with the inlet flow stream.

Pressurize the inlet slowly. Gas will escape from the pilot exhaust when the pilot set pressure is reached. Continue to increase the inlet pressure until the main valve starts to open, adjust the pilot setting as appropriate to achieve main valve nameplate set pressure. Note the maximum allowable difference between pilot and main valve set pressure in Table 1. Do not exceed this value. If the value is exceeded adjust blowdown screw, (part number 46) clockwise, **DO NOT SCREW FULLY IN, MINIMUM SCREW SETTING: - 1/4 TURN.**

After test is complete, lead wire seal the cap to the bonnet bolt, lead wire seal the blow down adjusting screw to the body.

TABLE 1

Main valve set pressure	Dome pressure as a % of supply pressure to achieve set pressure	Maximum difference between pilot and main valve set pressure
Less than 1.0 psig (68.9 mbar)	35 - 45%	7%
1.0 psig through 15.0 psig (68.9 - 1035 mbar)	55 - 65%	5%

FIGURE 5 - OPTIONAL TEST SET-UP

