

Blakeborough Control Valves**Installation, Operation & Maintenance Manual****BV985 MK II Variable Orifice Desuperheater****SAFETY**

Safety - consult Blakeborough publication 'Safety' before starting any maintenance work.

The valve and actuator should be handled and installed with care. Consult publication 'Good Installation Practices' for details.

Before any maintenance work it is essential to ensure that the valve and actuator assembly is isolated and depressurised.

GENERAL

Maintenance such as diaphragm, packing, or trim replacement can be done without removing the valve from the line. Since most valve locations are not suited for repair operations, these instructions assume that the valve is taken to a workshop for servicing.

See the relevant instruction book supplement for actuator maintenance.

DESCRIPTION

Desuperheating is a convenient and efficient method of obtaining steam for process work from a superheated supply.

Superheated steam is passed through a section of pipe into which is fitted one or more spray nozzles depending upon capacity. These inject a fine spray of feed water into the steam, absorbing the heat from the steam and reducing the quantity of superheat. As the water is absorbed the steam supply is augmented.

The BV985 desuperheater provides an efficient method of desuperheating steam. To ensure efficient atomisation of the spray water the unit features a unique system of swirls. The spray water passes through the swirls in such a way as to ensure the formation of a fine spray which is readily absorbed into the superheated steam. The quantity of spraywater injected is controlled by the valve plug. The nozzle is usually operated by a pneumatic actuator complete with positioner.

INSTALLATION

The correct installation of the desuperheater is of prime importance with respect to ensuring good temperature control. The following guidelines are provided to ensure this is achieved.

The desuperheater should be installed in a straight length of pipe, ideally with a distance of 6 pipe diameters upstream. The minimum downstream length of straight pipe should be 4 metres. Where minimum distances cannot be met, long radius elbows should be used to minimise the potential for erosion caused by the impact of water particles moving at high velocity impinging on the pipe wall.

To ensure that the piping drains correctly, it should be arranged to fall in the direction of flow by 20mm per metre. An adequately sized condensate trap should be provided at the lowest point in the pipework.

In order to achieve successful desuperheating it is important that pipework is maintained at the proper temperature. To avoid heat loss and erroneous temperature measurements the steam pipework should be lagged.

The spraywater should be clean and free of contamination. It should be effectively filtered to less than 0.25mm.

The distance from the desuperheater to the temperature sensing element is very important and varies between 7.5 and 30 metres depending upon pipe size, enthalpy change and proximity of the conditioned temperature to saturation. Details for calculating the required distance are given in publication BC-2.

The temperature measuring element should be located in a straight length of pipe, at least 2 metres from the nearest bend. The temperature pocket should extend into the pipe by approximately 1/2 the diameter on pipe sizes up to 300mm, and by a 1/3 on sizes above 300mm.

The desuperheater is designed to give the maximum atomisation of the water but it cannot be assumed that full evaporation takes place within the desuperheater pipe. In general, where the pipework layout incorporates bends, etc., between the injection nozzle and the temperature sensing point, the distance is usually less, due to the increased turbulence created at the bends etc., than it would be if the pipework were straight. Unfortunately every plant is different and it is difficult to say exactly where temperature stabilisation will occur.

VALVE DISASSEMBLY

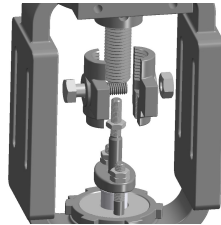
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1. Remove all instruments and any existing check nut from the end of the stem connector.
2. The valve plug must be off the seat ring while the stem connector is being separated. Apply air if necessary.

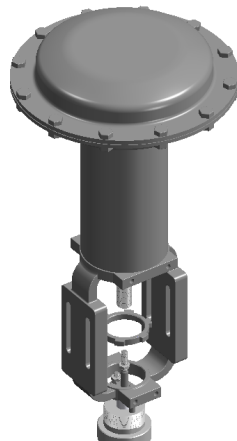
3. Remove the stem connector screw nut and partly remove the stem connector screw.



4. The two connector halves can then be sprung apart and removed from the actuator stem.

5. Disconnect the air supply and any electrical connections to the actuator.

6. Unscrew the hammer lug clamp nut (25) from the bonnet threads and lift the nut over the plug stem. The actuator is removed from the body as a unit, without disturbing the packing box bolting. The actuator yoke will pass over the packing flange.



7. Lift or hoist the actuator off the valve taking care to avoid damaging the plug stem, instruments, or tubing.

8. Refer to 'Packing Instructions' in separate bulletin.

9. Break the spot welds holding the retaining nut (46) to the nozzle body (1).

10. Unscrew the retaining nut (46). When the nut is allowed to drop onto the shoulder of the spray unit assembly (5) it will free the split retaining ring (45).

11. Withdraw the spray unit assembly (5) complete with plug and stem out of the nozzle body (1).

12. Remove the 'C' ring (44) from the top of the spray unit.

13. Break the spot welds holding the end cap (47) to the spray unit assembly (5).

14. Unscrew the end cap (47).

15. Withdraw the plug and stem (6 and 8) out of the spray unit assembly.

REMOVING THE SWIRLS

1. Unscrew the retaining ring (33).

2. Remove circlip (32).

3. Slide retainer (34) off the spray unit body (5).

4. Unscrew the spray insert (30) and swirl insert (31).

REPLACING THE SWIRLS

1. Screw the swirl insert (31) and spray insert (30) into the spray unit body (5).

2. Clean the spray unit body (5) and replace the retainer (34) over the swirls, locating on the pin orientation (35).

3. Replace the circlip (32) on the spray unit body (5).

4. Tighten the retaining ring (33) to lock the retainer (34) in place.

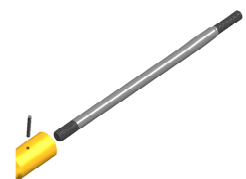
VALVE ASSEMBLY

Assembly of the stem and pin

1. Screw the plug tightly onto the stem.

2. Drill through the plug shank and stem.

3. Insert the pin. The new pin should be the same diameter as the original pin (19).



Completing the body assembly

1. Clean the desuperheater components thoroughly, particularly the nozzle body flange gasket surface.

2. Clean the inside of the nozzle body (1), particularly the spray unit location bore and the 'C' ring sealing surface.

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3. Insert the plug and stem (6 & 8) into the spray unit assembly (5).
4. Make sure the 'C' ring groove, in the spray unit assembly, is perfectly clean, replace 'C' ring (44).
5. Whilst guiding the plug stem up through the packing box, the spray unit assembly can now be pushed into the nozzle body (1).
6. With the split retaining ring (45) in position, screw the retaining nut (46) back onto the nozzle body (1).

NOTE: Before final tightening of the retaining nut is done, it is important to ensure that the orientation of the spray unit assembly relative to the water inlet flange is correct so that the unit sprays exactly downstream.

7. Finally tighten the retaining nut (46), ensuring the correct spray unit assembly orientation.
8. Spot weld the retaining nut (46) to the nozzle body (1).
9. Screw in the end cap (47) tightly and spot weld.
10. Pack the stuffing box (see packing instructions).

Mounting the actuator

1. Assemble and adjust the actuator as instructed in the appropriate actuator instructions.
2. Lower the actuator over the plug stem and packing flange to sit squarely on the bonnet.
3. Rotate the actuator to a convenient position, then screw the hammer lug clamp nut (25) onto the bonnet threads and tighten securely.
4. For connecting the actuator stem to the plug stem, the plug must be on its seat while the actuator stem is being connected.

Connecting the stem connector

1. Place the two halves of the stem connector, over the actuator and plug stems so that the ends of both stems are equidistant from the stem connector screw holes.

2. Replace the stem connector screw and tighten by hand ensuring that the stem connector threads are in proper engagement with the actuator stem and the valve plug stem.
3. Replace and tighten the nut by hand.

Note: It is not essential at this stage to ensure that the position marking slot in the indicator pointer, coincided with the 'shut' mark on the travel indicator scale, because the indicator scale position can be adjusted by loosening the two securing screws.

Establishing valve travel and seating tension

1. Maintain the actuator stem at its highest position of travel.
2. In case the plug was moved off the seat during the stem connection procedure: Prevent the stem connector from rotating, then unscrew the plug stem from the connector until the plug is firmly seated.
3. Move the plug off the seat then screw the plug stem an additional one half turn into the connector to ensure positive seating.
4. Tighten the connector screw securely.
5. Tighten the plug stem nut (39) securely.
6. Seat the valve plug firmly by means of the actuator.
7. Adjust the travel scale so that the 'shut' mark is opposite the travel pointer on the coupling.
8. Disconnect the air line used for assembly procedure then apply the check nut or attachments (if any) to the connector screw.

PARTS LIST	
1	BODY
5	SPRAY UNIT
6	VALVE PLUG*
8	PLUG STEM*
9	BRANCH FLANGE STUD
10	BRANCH FLANGE NUT
11	SUPPORT RING
12	PACKING RING*
14	PACKING FOLLOWER
15	PACKING FLANGE
16	LUBRICATOR PLUG
19	PLUG STEM PIN*
21	PACKING SPACER
23	PACKING STUD
24	PACKING STUD NUT
25	CLAMP NUT
30	SPRAY INSERT*
31	SWIRL INSERT*
32	RETAINING SLEEVE CIRCLIP
33	RETAINING RING
34	RETAINING SLEEVE
35	RETAINING SLEEVE PIN
39	STEM NUT
41	BODY GASKET*
44	'C' RING
45	SPLIT RETAINING RING
46	RETAINING NUT
47	END CAP
57	WASHER
* Recommended spares	
Refer to Packing Instructions for details of packings.	

