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I & M Mark 978M Precision Hand Metering Valve

Installation & Maintenance Instructions for Mark 978M Sanitary Control Valve

Please read these instructions carefully!

Your Steriflow product will provide you with long, trouble free service if it is correctly installed and maintained. Spending a few minutes now reading these instructions can save hours of trouble and downtime later. When making repairs, use only genuine Steriflow Valve parts, available for immediate shipment from the factory.

Valve Installation

1. The Valve is designed for sanitary service and should be installed in a clean system. As such, strainers at the valve inlet to protect the valve should not be necessary.
2. For **angle body valves**, the valve is normally installed with inlet vertical on the bottom, and outlet horizontal to provide the best drainage inside the valve. This is recommended only for drainage considerations: the valve will function in any position. For optional **INLINE Series valves**, the valve must be installed on horizontal pipe in an upright position with the top plane of the actuator parallel to the floor.
3. Steam control valves are best located at a high point in the piping system with the take-off out of the top of the steam header. This minimizes the possibility of water in the valve.
4. For best control, 3'0" straight sections of pipe should be installed on either side of the valve.
5. Use caution in tightening commercial sanitary fittings. Over-tightening can cause the gasket to extrude into the flow passage.
6. If possible, install a relief valve downstream from the MK978M. Set at about 15% above the control pressure.
7. In gas or vapor service, select outlet piping at least one pipe size larger than the inlet.
8. Operate the MK978 within pressure/temperature ratings on the nameplate. Refer to catalog for additional details.
9. Provide proper air pressure to actuator. Valves with positioners: 20 psig supply for 3-15 range, 40 psig supply for 6-30 range; valves without positioners: 40 psig supply to controller.

Start-Up

The Mark 978M has been pre-set at the factory. However, finer adjustments may be required to compensate for pressure drop conditions of the application.

1. With the inlet, outlet, and bypass shutoff valves closed, and no pressure in the downstream line, fully open the outlet shutoff valve. Slowly open the inlet valve just enough to start flow through the MK978M. Increase flow gradually by slowly opening the inlet shutoff valve. Do not fully open the inlet valve until you are sure that you have positive control using the MK978M.
2. To shutoff the line fluid, close the inlet shutoff valve first, followed by the outlet shutoff valve.

Preparing for Maintenance

Warning: be sure that there is not pressure in the valve before loosening any fitting or joint.

1. Close inlet shutoff valve and bypass valve.
2. Open the MK978M.
3. Allow pressure to bleed off downstream.
4. When pressure gauge shows there is no pressure in the valve, close outlet shutoff valve.
5. When lubricant is needed, use one that is compatible with both your process and the valve's seal material (see nameplate). Jordan uses, and recommends, Bostic NEVER-SEEZ, white food grade with PTFE, catalog #NSWT-14 (improved version without mineral oils). Refer to appropriate drawings when performing maintenance.

Seal Replacement

The MK978M can be ordered with two different diaphragm seals: an o-ring version with a gasket to seal the body to bonnet joint., and a diaphragm sealed version with an o-ring backup.

Body / Bonnet Gasket Replacement (only on the O-ring version, not diaphragm version)

½" – 1"

1. The MK978M must be in the open position. The soft seat plug assembly or the hard plug (2) must be off the seat.
2. Remove the SHCS (12) and separate the bonnet (5) from the valve body (1).
3. Remove the old gasket. Lubricate sealing surface in body (1), install new gasket, and reassemble.

1-½" – 2"

1. The MK978M must be in the open position. The soft seat plug assembly (2,3,4) or the hard plug (2) must be off the seat.
2. Remove the HHCS (16) and separate the bonnet

(15) from the valve body (1).

3. 3. Remove the old gasket. Lubricate sealing surface in body (1), install new gasket, and reassemble.

Stem and Knob Stem O-Rings

½" – 1"

1. The MK978M must be in the open position. The soft seat plug assembly or the hard plug (2) must be off the seat.
2. Remove the knob bolt (9). Remove the knob (14). Loosen the knob stem (7).
3. Remove the knob cap (10). Remove the Insert hold down (6) and stem bushing (11).
4. Remove the SHCS (12) and separate the bonnet (5) from the valve body (1).
5. Remove the o-ring (4) from the bonnet (5).
6. Remove the knob stem (7) from the knob cap (10).
7. Remove the o-ring (8) from the knob stem (7).
8. Replace bonnet (5) back onto valve body (1) over the upper stem (3), diaphragm (13), and plug/plug assembly (2).
9. Place a small amount of anti-seize of each of the 4 Socket Head Cap Screws [SHCS] (12). Install SHCS (12) through the bonnet (5) and into the body (1). Torque SCHS (12) to 150 in-lbs. Confirm that the stem/plug assembly does not rotate between the body (1) and Bonnet (5) once SHCS (12) are torqued.
10. Place a small amount of Krytox on o-ring (4) and place in the bonnet (5) around the stem/plug assembly.
11. Insert the stem bushing (11) in the bonnet (5) around the stem/plug assembly and on top of the o-ring (4).
12. Place a small amount of Krytox on o-ring (8) and install in the o-ring grove of knob stem (7).
13. Install the knob stem (7) into the knob cap (10) from the top.
14. Place insert hold down (6) on top bonnet (5). Apply a small amount of Loctite 290 to the threads of the bonnet (5). Thread the knob cap (10) onto the bonnet (5) threads and tighten to hard stop.
15. The top of the knob stem (7) should be sticking up far enough at this point to engage the knob stem (7) flats. Using a small adjustable wrench tighten the knob stem (7) onto the upper stem (3) to a hard stop. Joint is inside the knob cap (10) and not visible. Care should be taken to not overtighten this joint, it could cause the diaphragm (13) seal between the body (1) and bonnet (5) to be compromised.
16. Apply a small amount of anti-seize to the top of external threads of the knob cap (10). Thread the knob (14) onto the knob cap (10). Thread down so that the knob (14) and knob stem (7) are in physical contact with one another.
17. Thread the knob bolt (9) through the knob (14) into the knob stem (7) and tighten to a hard stop.

1-½" – 2"

1. The MK978M must be in the open position. The soft seat plug assembly (2,3,4) or the hard plug (2) must be off the seat.
2. Remove the knob bolt (11). Remove the knob (12). Loosen the knob stem (10).
3. Remove the knob cap (7). Remove the locking ring (8) and stem bushing (6).
4. Remove the HHCS (16) and separate the bonnet (15) from the valve body (1).
5. Remove the o-ring (14) from the bonnet (15).
6. Remove the knob stem (10) from the knob cap (7).
7. Remove the o-ring (9) from the knob stem (10).
8. Replace bonnet (15) onto valve body (1) over the stem/diaphragm/plug assembly.
9. Place a small amount of anti-seize of each of the 6 Hex Head Cap Screws [HHCS] (16). Install HHCS (16) through the bonnet (15) and into the body (1). Torque HCHS (16) to 150 in-lbs. Confirm that the stem/plug assembly does not rotate between the body (1) and bonnet (15) once HHCS (16) are torqued.
10. Place a small amount of Krytox on o-ring (14) and place in the bonnet (15) around the stem/plug assembly.
11. Insert the stem bushing (6) in the bonnet (15) around the assembly from step 2.3 and on top of the o-ring (14). Install the locking ring (8) onto the bonnet (15) and tighten to hard stop.
12. Place a small amount of Krytox on o-ring (9) and install in the o-ring grove of knob stem (10).
13. Install the knob stem (10) into the knob cap (7) from the top.
14. Apply a small amount of Loctite 290 to the threads of the bonnet (15). Thread the knob cap (7) onto the bonnet (5) threads and tighten to hard stop.
15. The top of the knob stem (7) should be sticking up far enough at this point to engage the knob stem (10) flats. Using a small adjustable wrench tighten the knob stem (10) onto the upper stem (13) to a hard stop. Joint is inside the knob cap (7) and not visible. Care should be taken to not overtighten this joint, it could cause the diaphragm (5) seal between the body (1) and bonnet (15) to be compromised.
16. Apply a small amount of anti-seize to the top of external threads of the knob cap (7). Thread the knob (12) onto the knob cap (7). Thread down so that the knob (12) and knob stem (10) are in physical contact with one another.
17. Thread the knob bolt (11) through the knob (12) into the knob stem (10) and tighten to a hard stop.

Diaphragm Replacement

½" – 1"

1. The MK978M must be in the open position. The soft seat plug assembly or the hard plug (2) must be off the seat.

2. Remove the knob bolt (9). Remove the knob (14). Loosen the knob stem (7).
3. Remove the knob cap (10). Remove the Insert hold down (6) and stem bushing (11).
4. Remove the SHCS (12) and separate the bonnet (5) from the valve body (1).
5. Remove the stem/plug/diaphragm assembly from the valve body (1).
6. Using one wrench on the upper stem (3) and one on the plug/plug assembly (2) loose the parts to remove the diaphragm (13).
7. Replace the diaphragm (13) with a new one supplied by your Steriflow Representative.
8. Assemble plug/plug assembly (2), new diaphragm (13), and upper stem (3). Place diaphragm (13) on threads of upper stem (3), then thread upper stem (3) into plug/plug assembly (2) until diaphragm (13) starts to slight deform into an umbrella shape. Threads are self-locking, so no Loctite is necessary.
9. Replace the stem/diaphragm/plug assembly into the valve body (1).
10. Replace bonnet (5) back onto valve body (1) over the upper stem (3), diaphragm (13), and plug/plug assembly (2).
11. Place a small amount of anti-seize of each of the 4 Socket Head Cap Screws [SHCS] (12). Install SHCS (12) through the bonnet (5) and into the body (1). Torque SCHS (12) to 150 in-lbs. Confirm that the stem/plug assembly does not rotate between the body (1) and Bonnet (5) once SHCS (12) are torqued.
12. Place a small amount of Krytox on o-ring (4) and place in the bonnet (5) around the stem/plug assembly.
13. Insert the stem bushing (11) in the bonnet (5) around the stem/plug assembly and on top of the o-ring (4).
14. Place a small amount of Krytox on o-ring (8) and install in the o-ring grove of knob stem (7).
15. Install the knob stem (7) into the knob cap (10) from the top.
16. Place insert hold down (6) on top bonnet (5). Apply a small amount of Loctite 290 to the threads of the bonnet (5). Thread the knob cap (10) onto the bonnet (5) threads and tighten to hard stop.
17. The top of the knob stem (7) should be sticking up far enough at this point to engage the knob stem (7) flats. Using a small adjustable wrench tighten the knob stem (7) onto the upper stem (3) to a hard stop. Joint is inside the knob cap (10) and not visible. Care should be taken to not overtighten this joint, it could cause the diaphragm (13) seal between the body (1) and bonnet (5) to be compromised.
18. Apply a small amount of anti-seize to the top of external threads of the knob cap (10). Thread the knob (14) onto the knob cap (10). Thread down so that the knob (14) and knob stem (7) are in physical contact with one another.
19. Thread the knob bolt (9) through the knob (14) into the knob stem (7) and tighten to a hard stop.

1-½" – 2"

1. The MK978M must be in the open position. The soft seat plug assembly (2,3,4) or the hard plug (2) must be off the seat.
2. Remove the knob bolt (11). Remove the knob (12). Loosen the knob stem (10).
3. Remove the knob cap (7). Remove the locking ring (8) and stem bushing (6).
4. Remove the HHCS (16) and separate the bonnet (15) from the valve body (1).
5. Remove the stem/plug/diaphragm assembly from the valve body (1).
6. Using one wrench on the upper stem (13) and one on the plug/plug assembly (2) loose the parts to remove the diaphragm (5).
7. Replace the diaphragm (5) with a new one supplied by your Steriflow Representative.
8. Assemble plug/plug assembly (2), new diaphragm (5), and upper stem (13). Place diaphragm (5) on threads of upper stem (13), then thread upper stem (13) into plug/plug assembly (2) until diaphragm (5) starts to slight deform into an umbrella shape. Threads are self-locking, so no Loctite is necessary.
9. Replace the stem/diaphragm/plug assembly into the valve body (1).
10. Replace bonnet (15) onto valve body (1) over the stem/diaphragm/plug assembly.
11. Place a small amount of anti-seize of each of the 6 Hex Head Cap Screws [HHCS] (16). Install HHCS (16) through the bonnet (15) and into the body (1). Torque HCHS (16) to 150 in-lbs. Confirm that the stem/plug assembly does not rotate between the body (1) and bonnet (15) once HHCS (16) are torqued.
12. Place a small amount of Krytox on o-ring (14) and place in the bonnet (15) around the stem/plug assembly.
13. Insert the stem bushing (6) in the bonnet (15) around the assembly from step 2.3 and on top of the o-ring (14). Install the locking ring (8) onto the bonnet (15) and tighten to hard stop.
14. Place a small amount of Krytox on o-ring (9) and install in the o-ring grove of knob stem (10).
15. Install the knob stem (10) into the knob cap (7) from the top.
16. Apply a small amount of Loctite 290 to the threads of the bonnet (15). Thread the knob cap (7) onto the bonnet (5) threads and tighten to hard stop.
17. The top of the knob stem (7) should be sticking up far enough at this point to engage the knob stem (10) flats. Using a small adjustable wrench tighten the knob stem (10) onto the upper stem (13) to a hard stop. Joint is inside the knob cap (7) and not visible. Care should be taken to not overtighten this joint, it could cause the diaphragm (5) seal between the body (1) and bonnet (15) to be compromised.

18. Apply a small amount of anti-seize to the top of external threads of the knob cap (7). Thread the knob (12) onto the knob cap (7). Thread down so that the knob (12) and knob stem (10) are in physical contact with one another.
19. Thread the knob bolt (11) through the knob (12) into the knob stem (10) and tighten to a hard stop.

Troubleshooting

If You Experience Erratic Control:

- Oversizing can cause cycling or hunting – recalculate required Cv.
- Undersizing can cause the control point to drop off under peak loads – increase trim size.
- Improper trim characteristic.
- Steam traps may need reconditioning.
- Safety relief valves may be leaking.
- There may be foreign matter in the valve preventing full plug movement.

If You Experience Insufficient Flow:

- Check shutoff valves to be sure they are fully open.
- Inlet pressure to the valve may be insufficient to provide the needed flow – check the inlet pressure with a pressure gauge.
- Steam traps may need reconditioning; foreign material in the trim may prevent the valve from passing its full capacity.
- Diaphragm failure will be noticed by leakage through the bonnet weep hole and may prevent valve from opening fully.

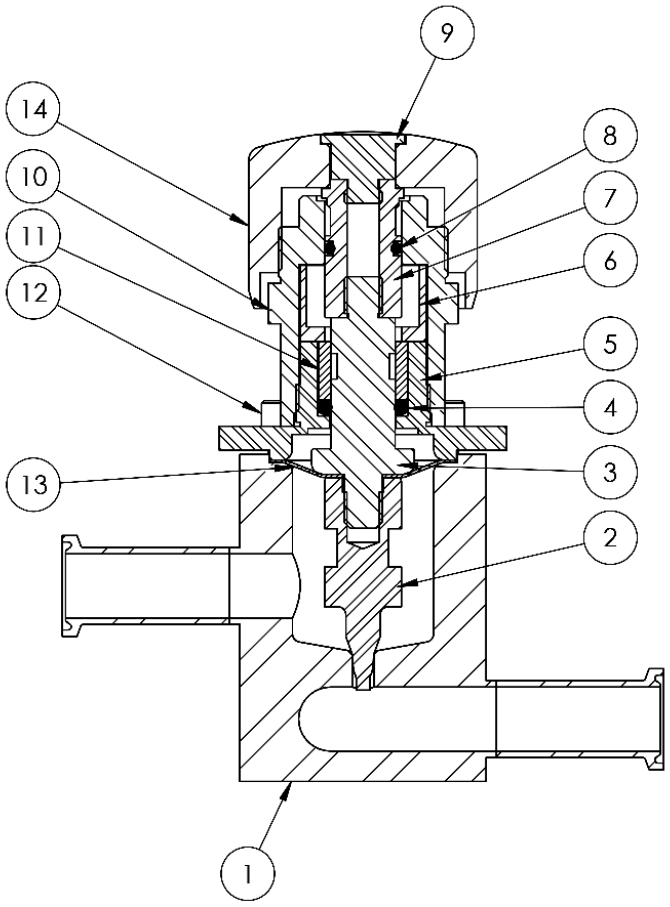
If You Experience Overpressure (Outlet):

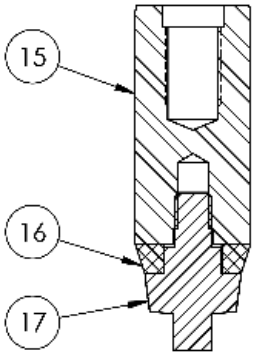
- Foreign material in the trim can prevent the valve from shutting off.
- Diaphragm failure will be noticed by leakage through the bonnet weep hole and may prevent valve from closing fully.
- Hard seated valves may not be capable of tight shutoff (leakage would cause downstream pressure to rise).
- Overranging the valve – use smaller Cv.

If You Experience Leakage:

- Excessive pressure drop across the valve could prevent the valve from shutting off properly – check the catalog ratings for the maximum allowable pressure drop for your trim and valve size.
- Hard seated valves may not be capable of tight shutoff (leakage would cause downstream pressure to rise).
- Overranging the valve – use smaller Cv.

Illustration and Parts List ½" – 1"

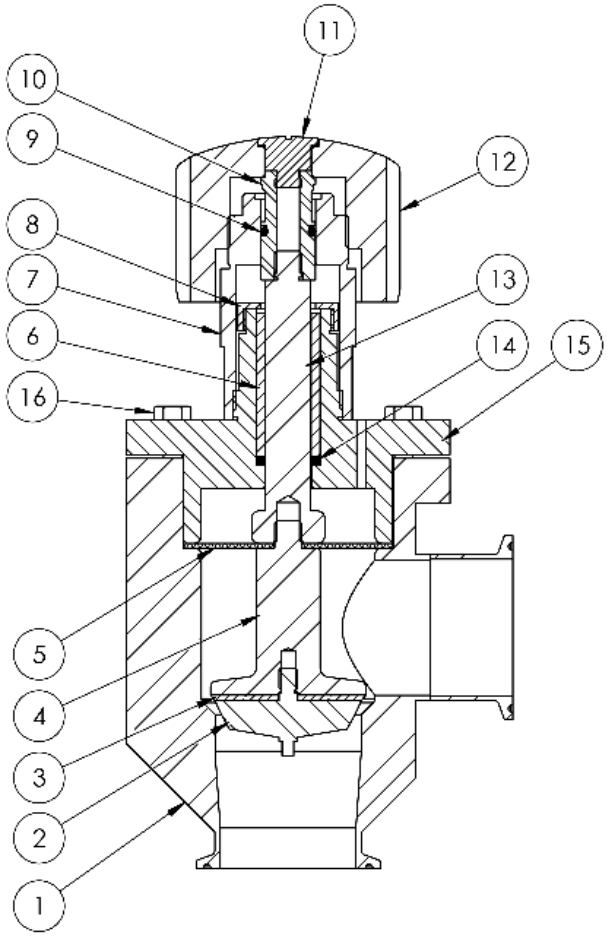




Soft Seat Plug Assembly

Item	Description	Qty.
1	Body	1
2	Plug / Plug Assembly	1
3	Upper Stem	1
4	O-Ring	1
5	Bonnet	1
6	Insert Hold Down	1
7	Knob Stem	1
8	O-Ring	1
9	Knob Bolt	1
10	Knob Cap	1
11	Stem Bushing	1
12	SHCS	4
13	Diaphragm	1
14	Knob	1
15	Upper Plug	1
16	Soft Seat Insert	1
17	Plug Tip	1

Illustration and Parts List 1-½" – 2"



Item	Description	Qty.
1	Body	1
2	Plug Tip	1
3	Soft Seat Insert	1
4	Upper Plug	1
5	Diaphragm	1
6	Stem Bushing	1
7	Cap	1
8	Locking Ring	1
9	O-Ring - 113	1
10	Knob Stem	1
11	Knob Bolt	1
12	Knob	1
13	Upper Stem	1
14	O-Ring - 208	1
15	Bonnet	1
16	HHCS 1/4 - 20	6

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