

## Surge Anticipating Control Valve

(Sizes 1½-24"; DN40-600)

### Description

The Model 735-M Surge Anticipating Control Valve is an off-line hydraulically operated, diaphragm actuated control valve. The valve, sensing the discharge line pressure, opens in response to the pressure drop associated with abrupt pump stoppage. The pre-opened valve dissipates the returning high pressure wave, eliminating the surge. The 735-M smoothly closes drip tight as quickly as the relief feature allows, while preventing closing surge. The 735-M also relieves excessive system pressure that rises above maximum pre-set.

### Installation

1. Ensure enough space around the valve assembly for future maintenance and adjustments.
2. Design the installation of the valve on a Tee branching off the pipeline, downstream from the BERMAD 740 Pump Control Valve or other check-valve.
3. Prior to valve installation, flush the pipeline to insure flow of clean fluid through the valve.
4. For future maintenance, install Isolation gate valves upstream (and downstream if not releasing to atmosphere) from Bermad control valve.
5. Install the valve in the pipeline with the valve flow direction arrow in the actual flow direction. Use the lifting ring provided on the main valve cover for installing the valve.
6. For best performance, it is recommended to install the valve horizontally and upright.
7. Prepare a ½ - 2" female threaded "Remote Sensing & Operating Pressure Port" (RS&OPP); consist of a cock-valve and a filter, at a location on the main discharge line, downstream from the pumps manifold, where flow velocity is less effected by the 735-M relief flow. Install a ½" female thread adaptor at the valve-side end of the control & sensing tube.
8. Pull a ½ - 2" tube, from the "RS&OPP", to the valve. Ensure tube protection by a covered cable-canal. Apply a fixed effective tubes route.  
**Note:** The size of the "RS&OPP", the cock-valve, the filter and the tube might vary according to 735-M size, quantity and the tube length.
9. Connect the control & sensing tube end to the 3W cock valve [6], using 1/2" copper or reinforced plastic tube.
10. After installation carefully inspect/correct any damaged accessories, piping, tubing, or fittings.

### Commissioning & Calibration

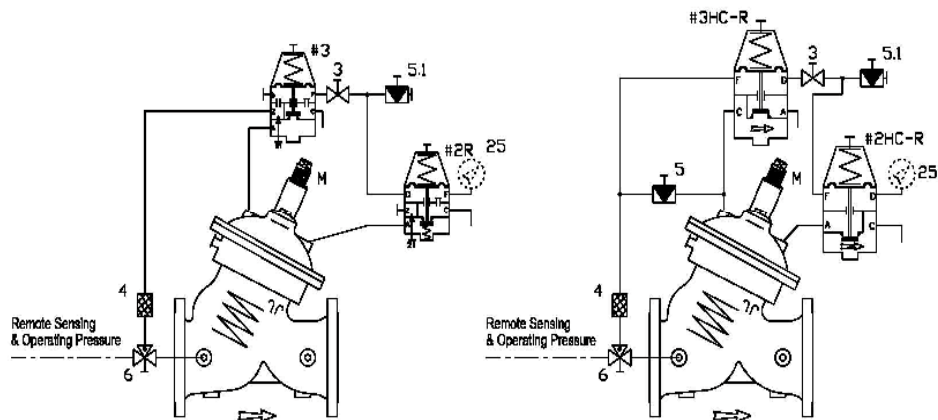
1. It is recommended that 3W cock valve [6] will connect the "Remote Sensing & Operating Pressure Port" (RS&OPP) to the control circuit (according to arrow on the handle). If "RS&OPP" is unavailable, confirm that 3W cock valve [6] is connecting valve upstream to the control circuit.
2. Close completely the 735-M upstream & downstream isolating valves and partially the pump discharge Isolating valve. Start the pump and fill-up, in a slow and controlled manner, the discharge line downstream from the pump check valve (PCV).
3. Confirm the discharge line is full, and that air was released from the line, open fully the downstream isolating valve and turn off the pump. Confirm that the line remains full through the whole setting process.
4. The Model 735-M is factory set according to the following:
  - 4.1. High Pressure (HP) Pilot (#3 or #3HC-R): 1.0 bar above design discharge pressure.
  - 4.2. Low Pressure (LP) Pilot (#2 or #2HC-R): 80% of system hydrostatic pressure (pumps - off; line - full).
5. Open the 735-M upstream and downstream isolating valves.  
**Note:** When discharge line pressure is above the 735-M HP pilot setting and/or below the 735-M LP pilot, the valve is partially/fully open. Prevent discharge line emptying by turning HP pilot adjusting screw Clock-Wiese to full spring compression and LP pilot adjusting screw Counter-Clock-Wiese to non spring compression.
6. Vent air from the 735-M control loop by loosening cover tube fitting at the highest point, allowing all air to bleed. Retighten the tube fitting eyebolt.
7. To change settings, follow the steps described below:
  - 7.1. Set Low Pressure Pilot
    - 7.1.1. Confirm that the line pressure, shown at pressure gauge (25) is the designed hydrostatic pressure (pumps - off; line - full).
    - 7.1.2. Confirm cock valve (3) is open (Handle parallel to valve body) and slowly open needle valve (5.1), reducing the pressure in gauge (25) to 80% of system hydrostatic pressure.
    - 7.1.3. Unlock LP pilot locking nut & slowly turn the adjusting screw CW until it starts bleeding and the valve starts opening.
    - 7.1.4. Turn back the adjusting screw CCW until bleeding stops & the valve closes & seal. Close the LP pilot lock nut.
    - 7.1.5. Check LP pilot setting by opening and closing needle valve (5.1). Close needle valve (5.1) and its lock nut.
  - 7.2. Set High Pressure Pilot
    - 7.2.1. Start the pump/s and confirm the pressure in gauge 25 is the designed discharge pressure.

- 7.2.2. Unlock HP pilot locking nut & slowly turn the adjusting screw CCW until it starts bleeding and the valve starts opening, re-tighten the setting screw until the 735-M seals again plus 1/4 – 1/2 turn and lock the locking nut.
- 7.3. **Set Valve Flow Steam** **Note: Only adjust the flow stem when the valve is closed**
  - 7.3.1. Release the 735-M flow steam lock-nut and turn the flow steam CW to its full stroke.
  - 7.3.2. While counting turns, completely open the 735-M flow steam CCW. Re-close the 735-M flow steam 40% of the turns counted. Re-secure the lock-nut.
8. Needle Valve [21] and/or [5] controls valve closing speed.
9. The 735-M automatically stops closing process, should closing process causes system pressure rise. Thus providing an "ABS" closing characteristics.

## Control Drawing

### PARTS LIST

3	2W Cock Valve
4	Control Filter
5	Needle Valve
5.1	Needle Valve
6	3W Cock Valve
#3	2W P.S. Pilot
#2R	2W P.R. Pilot, Remote Sensing
#3HC-R	2W P.S. High Capacity Pilot
#2HC-R	2W P.R. High Capacity Pilot R. Sensing
25	Pressure Gauge (Not Installed)
M	Mechanical Closure
----- Not Supplied By BERMAD	



Sizes 4"; DN100 & Below

Sizes 6"; DN150 & Above

## Trouble-Shooting

1. **Valve fails to Open:** Check inlet pressure to be above HP pilot setting or below LP pilot setting, check cock valve 3 & needle valve 5.1 status, confirm flow steam is 60% open.
2. **Valve fails to Close:** Check inlet pressure to be below HP pilot setting or above LP pilot setting, check cock valve 3 & needle valve 5.1 status, check cock valve 6 status & confirm the external control pressure is per design, clean control filter & detect for clogged ports or fittings, check if any debris trapped in the main valve, confirm diaphragm is not leaking.

## Preventative Maintenance

1. System operating conditions that effect on the valve should be checked periodically to determine the required preventative maintenance schedule.
2. Maintenance instructions:
  - 2.1. Tools required:
    - 2.1.1. Metric and imperial wrenches
    - 2.1.2. Anti seize grease
  - 2.2. Visual inspection to locate leaks and external damages
  - 2.3. Functional inspection including: closing, opening and regulation.
  - 2.4. Close upstream and downstream isolating valves (and external operating pressure when used).
  - 2.5. Once the valve is fully isolated vent pressure by loosening a plug or a fitting.
  - 2.6. Open the stud nuts and remove the actuator as one unit from the valve body. Disassemble necessary control tubs.
  - 2.7. It is highly recommended to stock a reserve actuator assembly for each size. This allows minimum system field work and system down time.
  - 2.8. Disassemble the actuator and examine its parts carefully for signs of wear, corrosion, or any other abnormal conditions.
  - 2.9. Replace worn parts and all the Elastomers. Lubricate the bolts and studs threads with Anti seize grease.

## Spare parts

Bermad has a convenient and easy to use ordering guide for valve spare-parts and control system components. For solenoid valves refer to model and S/N on solenoid tags.

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