

SECTION 33 12 16.05 – ELECTRONIC ACTUATED PRESSURE REDUCING VALVES AND ACCESSORIES

PART 1 - GENERAL

1.1 THE REQUIREMENT

- A. The Electronic Actuated Pressure Reducing Valve (PRV) shall maintain a constant downstream pressure regardless of changing flow rate and/or inlet pressure and shall be capable of remotely changing this pressure as directed by the hydraulic pressure reducing pilot and integral electronic actuator.

1.2 CONTRACTOR SUBMITTALS

- A. For the materials and equipment items supplied under the provisions of this Section, the Contractor shall submit copies of the manufacturer's product specifications and performance details according to the requirements of MASS Section 10.05 Article 5.6.
- B. Provide complete process diagram with accessories as required for each PRV.
- C. Warranty: Valve manufacturer shall warrant the valve and all factory installed appurtenances to be free of defects in material and workmanship for a period of three years from date of project substantial completion.

PART 2 - PRODUCTS

2.1 MAIN VALVE

- A. Manufacturer: PRV and accessories shall be as manufactured by CLA-VAL series 390, 3690 or approved equal.
- B. The Electronic Actuated Pressure Reducing Valve (PRV) shall maintain a constant downstream pressure regardless of changing flow rate and/or inlet pressure and shall be capable of remotely changing this pressure as directed by the hydraulic pressure reducing pilot and integral electronic actuator (CRD-33). A pressure sustaining function shall also be provided (CRL or CRL-33).
- C. The valve shall be globe pattern. The valve shall consist of three major components: the body, with seat installed; the cover, with bearings installed; and the diaphragm assembly. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the main valve or pilot controls.
 - 1. Main Valve Body
 - a. No separate chambers shall be allowed between the main valve cover and body. Valve body and cover shall be of cast material. Ductile Iron is

standard and other materials shall be available. No fabrication or welding shall be used in the manufacturing process.

- b. The valve shall contain a resilient, synthetic rubber disc, with a rectangular cross-section contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. No O-ring type discs (circular, square, or quad type) shall be permitted as the seating surface. The disc guide shall be of the contoured type to permit smooth transition of flow and shall hold the disc firmly in place. The disc retainer shall be of a sturdy one-piece design capable of withstanding opening and closing shocks. It must have straight edge sides and a radius at the top edge to prevent excessive diaphragm wear as the diaphragm flexes across this surface. No hourglass-shaped disc retainers shall be permitted and no V-type or slotted type disc guides shall be used.

2. Diaphragm

- a. The diaphragm assembly containing a non-magnetic 303 stainless steel stem with sufficient diameter to withstand high hydraulic pressures shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. No center guides shall be permitted. The stem shall be drilled and tapped in the cover end to receive and affix such accessories as may be deemed necessary. The diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure.
- b. The flexible, non-wicking, FDA approved diaphragm shall consist of nylon fabric bonded with synthetic rubber compatible with the operating fluid. The center hole for the main valve stem must be sealed by the vulcanized process or a rubber grommet sealing the center stem hole from the operating pressure. The diaphragm must withstand a Mullins Burst Test of a minimum of 600 psi per layer of nylon fabric and shall be cycle tested 100,000 times to insure longevity. The diaphragm shall not be used as the seating surface. The diaphragm shall be fully supported in the valve body and cover by machined surfaces which support no less than one-half of the total surface area of the diaphragm in either the fully opened or fully closed position.

3. Valve Cover

- a. The main valve seat and the stem bearing in the valve cover shall be removable. The cover bearing and seat in 6-inch and smaller size valves shall be threaded into the cover and body. The valve seat in 8-inch and larger size valves shall be retained by flat head machine screws for ease of maintenance. The lower bearing of the valve stem shall be contained concentrically within the seat and shall be exposed to the flow on all sides to avoid deposits. To insure proper alignment of the valve stem, the valve body and cover shall be machined with a locating lip. No "pinned" covers to the valve body shall be permitted. Cover bearing, disc retainer, and seat shall be made of the same material. All necessary repairs and/or modifications other than replacement of the main valve body shall be possible without removing the valve from the pipeline. Packing glands and/or stuffing boxes shall not be permitted and components including cast material shall be of North American manufacture.

2.2 ELECTRONIC ACTUATED PRESSURE REDUCING / SUSTAINING PILOT CONTROL SYSTEM (PCV)

- A. Manufacturer: Cla-Val CRD-33 (Reducing), CRL-33 (Sustaining)
- B. The Electronic Actuated Pressure Reducing / Sustaining Pilot Controls shall have an integral hydraulic pilot and electronic controller contained in a submersible enclosure to provide interface between remote telemetry and valve set-point control.
- C. It will compare a remote analog command signal with an internal position sensor signal and adjust the hydraulic pilot control spring mechanism to a new set-point position.
- D. Remote analog signal input shall be isolated and reverse polarity protected. 4-20 mA actuator position feedback output shall be supplied standard.
- E. A second command control input shall be from dry-contact switch closure for clockwise or counter clockwise actuator rotation.
- F. Assembly shall be factory calibrated to the spring range listed for each PRV below.
- G. If power fails, the control pilot valve shall continue to control main valve to last set-point command.
- H. Manual bypass shall be included.
- I. If the Remote Set-Point signal is lost the actuator shall be programmable to go to either the 4mA, Last, or 20mA command set-point. No mechanical adjustments shall be necessary to the actuator.
- J. The low and high position range adjustment shall be accomplished only with valve manufacturer's components and instructions to be supplied in a separate kit.
- K. Provide Manufacturers software and special USB communication cable.
- L. PCV range shall be as listed below.
- M. The assembly shall be supplied with 30 feet of cable.

2.3 MANUAL DOWNSTREAM SURGE PILOT (PRESSURE RELIEF VALVE)

- A. Manufacturer CLA VAL model CRL
- B. The downstream surge pilot is normally held closed by the force of the compression spring above the diaphragm. Control pressure is applied under the diaphragm. When the controlling pressure exceeds the spring setting, the disc is lifted off its seat, permitting flow through the control. When control pressure drops below the spring setting, the spring forces the control back to its normally closed position. The

controlling pressure is applied to the chamber beneath the diaphragm through a sensing port on the downstream surge pilot control valve.

- C. Pressure adjustment shall consist of turning the adjusting screw to vary the spring pressure on the diaphragm. To prevent tampering, the adjustment cap can be wire sealed by using the lock wire holes provided in the cap and cover.
- D. Valve range shall be as listed below.

2.4 VALVE MOUNTED FLOW METER

- A. Manufacturer Cla-Val X144 e-FlowMeter or approved equal.
- B. Function
 - 1. The flow meter shall be a vortex shedding insertion flow meter, designed to be installed in the inlet tapping of the PRV to provide accurate flow measurement data.
 - 2. The flow meter shall be configured so that it can either be retrofitted into an existing Cla-Val PRV or factory installed in a new Cla-Val PRV.
- C. Meter Characteristics
 - 1. The flow meter configuration shall include a threaded swivel insert with measurement cylinder, fittings and electronics housing fabricated from stainless steel and shall have no moving parts.
 - 2. The meter shall be configured so that it can be inserted into valve body inlet tappings as small as 1/2-inch, and then rotated using a tool provided with the unit by the manufacturer. The rotation of the measurement cylinder shall be parallel with the flow direction through the valve. The flow meter shall be capable of being installed in valves from 2 through 16-inch.
 - 3. Flow shall be measured using the vortex shedding methodology, employing a bluff body within the measurement cylinder that causes vortices to be generated. The vortices shall be, in turn, counted by an internal piezoelectric sensor that communicates with the integral circuit board located in the meter head. The flow meter shall be IP-68 submersible.
 - 4. The flow meter shall have been subjected to performance testing by at least one independent laboratory. The laboratory test results shall illustrate that flow data measured by the flow meter is accurate to within +/- 2% of full scale.
 - 5. The flow meter's power requirement shall be 12/24 VDC, 0.7 watts minimum. It shall be capable of connecting with most commercially available data loggers.
- D. Installation
 - 1. The flow meter shall be capable of being installed in either inlet tapping of a Cla-Val main valve body using an insertion tool that is provided with the flow meter. Installation shall be performed in accordance with the manufacturer's IOM Manual or the Quick Start and Wiring Instructions which must be shipped with the unit.
 - 2. Provisions shall be made for bleeding pressure from the valve prior to installation using main line isolation valves installed on the inlet and outlet sides of the valve.

3. A 30-foot cable shall be provided with the flow meter to complete wiring. Field wiring shall be done in accordance with the manufacturer's IOM Manual or the Quick Start and Wiring Instructions which must be shipped with the unit.

E. Signal Interface

1. The flow meter shall be 4-20 mA loop powered and capable of communicating with SCADA, a remote mounted display or other communication devices such as a mobile telephone. The flow data signal shall be converted to 4-20mA, pulse or digital pulse, depending on the application. The flow meter's Analog Range (4-20mA Scaling) shall be set at the factory prior to shipping.

F. Factory Settings and Field Adjustment

1. Factory settings must be adjustable in the field without removal of the meter or the valve from the pipeline using a cable and downloadable, proprietary software from the manufacturer.

G. Maintenance

1. The flow meter must be removable for inspection, cleaning and maintenance. The internal sensor and measurement cylinder with integral bluff body shall be replaceable using replacement parts or repairs kit available through the original manufacturer.

2.5 SOLENOID AND PILOT VALVE (100-01 HYTROL, REVERSE FLOW) ASSEMBLIES

- A. Solenoid valves shall be designed for not less than 0 to 116 psi differential pressure. Enclosures shall be NEMA 4X. All coil ratings shall be 24 VDC, class H insulation, continuous duty. Solenoid valves shall be **ASCO 8320P172**.
- B. Actuating valves for main valve potable water pilot service shall have brass or stainless steel body with screwed ends, stainless steel trim and spring, Teflon or other resilient seals with material best suited for the temperature and fluid handled. Valve bodies shall be **Cla-Val 100-01-203H**.
- C. Each device shall consist of an assembly of a solenoid valve as specified in Paragraph A above, and valve body as specified in Paragraph B above. Connect the solenoid valve to the valve body with a 1/8" x 1-1/2" brass nipple.
- D. Provide solenoid assemblies for all new PRV valves and existing PRV valves that are getting new controls and as shown on the drawings.
- E. Spares: Provide two (2) spare solenoid valves, only as specified in Paragraph A above.

2.6 VALVE LIMIT SWITCH (OFF SEAT INDICATOR)

- A. Manufacturer: Cla-Val X105LCW, or equal, compatible with the type of valve.
- B. Switches shall be single-pole double-throw (SPDT).

- C. Provide a complete assembly, including:
 - 1. rising stem,
 - 2. bushing,
 - 3. mounting bracket,
 - 4. adjustable locking collar, and
 - 5. mechanical modifications required for installation.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install pressure reducing valves per manufacturer's recommendations.
- B. Contractor shall be responsible for making final adjustments to the PRV's so they function properly within the operating pressure and flow of the water system.
- C. A direct factory representative for the valve manufacturer shall be made available for start-up service, inspection and necessary adjustments.
- D. Components shall be protected at the Site from loss, damage, and the effects of weather. Stations shall be stored in an indoor, dry location. Heating shall be provided in areas subject to corrosion and humidity.
- E. Conduit, conductors, and terminations shall be installed in accordance with Section 26 05 00 – Electrical Work, General.
- F. Solenoid valves shall be securely supported and connected to hydraulic control valve harnesses .
- G. Solenoid and Control valves shall be independently supported using stainless steel hardware and shall not rely on control valve harness for support. The CONTRACTOR shall submit support details to the ENGINEER for approval prior to installation.

3.2 PRV STATION INSTALLATION

This is a TYPICAL listing for this article detailing valve and accessories

- A. Booster Station XX PRV's
 - 1. New 4-inch PRV shall be a Cla-Val Model number 394G-05BCDMPSKCX electronic interface pressure reducing and pressure sustaining valve, or approved equal. Valve shall include:
 - a. a manual hydraulic bypass,
 - b. a solenoid override,
 - c. (3) X141 pressure gauges,
 - d. ductile iron body with stainless steel trim,

- e. 150 pound flange ends, epoxy coated interior and exterior,
 - f. 15-75 PSI spring range on CRD33 & CRD pressure reducing pilot control,
 - g. 20-200 PSI spring range on the CRL pressure sustaining pilot control with
 - h. X105LCW Valve off seat position indicator, and
 - i. X144 e-FlowMeter factory installed.
2. New 8-inch PRV shall be a Cla-Val Model number 394G-05BCDMPSKCX electronic interface pressure reducing and pressure sustaining valve, or approved equal. Valve shall include
- a. a manual hydraulic bypass,
 - b. a solenoid override,
 - c. (3) X141 pressure gauges,
 - d. ductile iron body with stainless steel trim,
 - e. 150 pound flange ends, epoxy coated interior and exterior,
 - f. 15-75 PSI spring range on CRD33 & CRD pressure reducing pilot control and
 - g. 20-200 PSI spring range on the CRL pressure sustaining pilot control with
 - h. X105LCW Valve off seat position indicator, and
 - i. X144 e-FlowMeter factory installed.
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