



Pressure Management

PRESSURE REDUCING

| WATER CONSERVATION

| SMART NETWORKS



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Introduction

Water leakage from pipes, joints and fittings within distribution networks is determined by several factors including material of construction, ground conditions, age, and pressure.

Sudden pipe failures are easy to detect if water escapes above ground, whereas smaller leaks commonly seep into the ground undetected. The cumulative volume of water loss can be considerable, however, the cost of fixing large numbers of small leaks is often considered uneconomic to repair.

Pressure is related to leakage and burst frequency. A key part of a water companies activity is to fix leaks and as importantly, to try and stop them before they occur. This is why pressure management is so important as high pressure in water mains can lead to leaks and bursts.

Great benefits can be derived by keeping the operational pressure close to the minimum allowed by standard regulations. The subdivision of water distribution networks into small areas, called District Metered Areas. (DMAs), have been successfully implemented in the last three decades for the management of pressure and leakage. They are separated by boundary valves that are closed to form small, metered areas typically with between 1000 and 2500* connections which are supplied from a single point (Figure 1). This allows easy monitoring of flow and the management of pressure.

Pressure management refers to a DMA under the active management of a pressure control regime. Before pressure management can be implemented within a DMA, it is necessary to establish the location of the property which will experience the lowest pressure. Typically, this will be located at the highest elevation or the point furthest away from the pressure source. The name given to this location is the Critical Point.

**If the number of connections per district are too high it can be difficult to pinpoint the culprit areas where leakage has increased.*

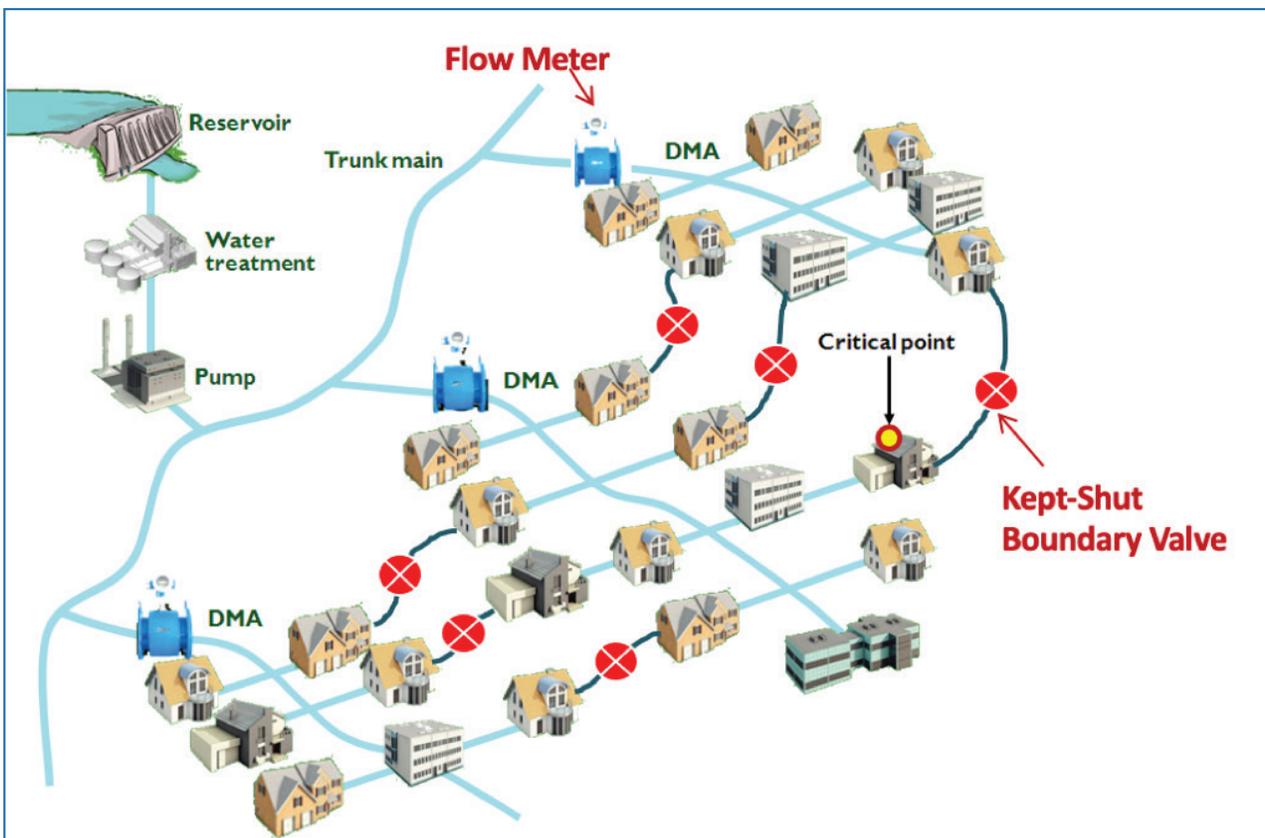


Figure 1 - Segregated DMAs

Pressure Management

Pressure variations can occur within a DMA for a variety of reasons, these include:

- Water consumption - water pressure is usually at its highest during the night when demand is low. When demand is high, for instance in the morning or evening and during dry spells, the water pressure is at its lowest.
- Consumers location - for example, the length of pipe from a reservoir or water tower, or how high the reservoir or water tower is above the point of demand. Properties in low elevations receive higher water pressure and those in higher elevations receive lower water pressure (Figure 2).

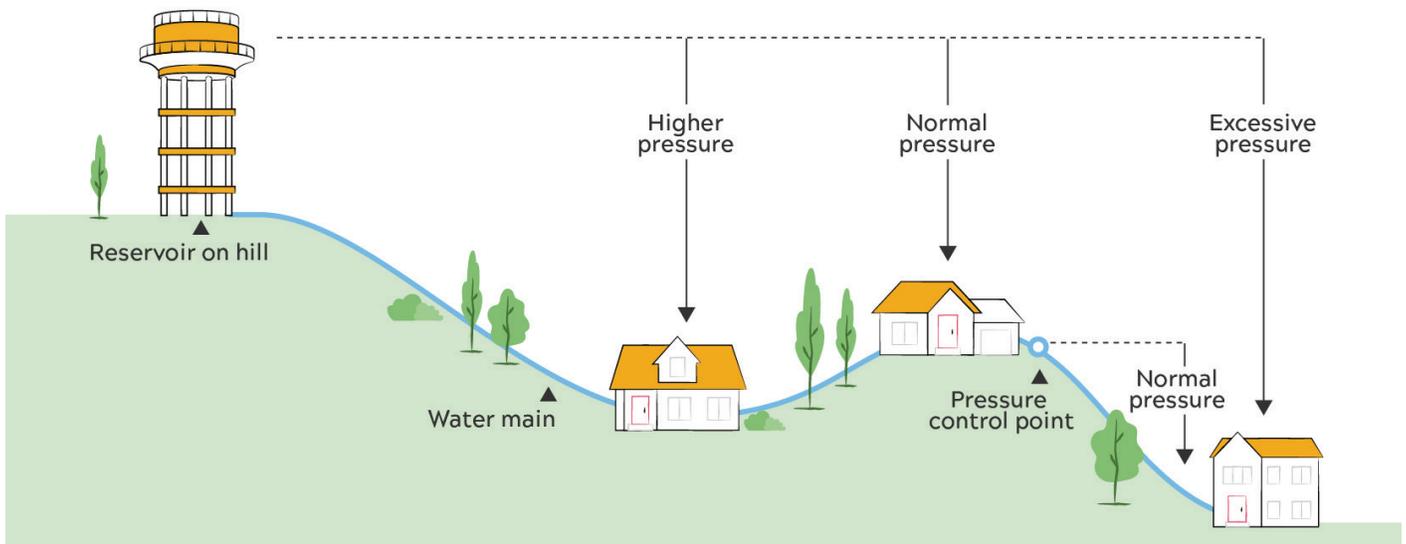


Figure 2

Pressure Management

The combination of Pressure reducing valves (PRV's) and pressure monitoring points are used to adjust water pressure helping to achieve consistent and lower water pressures under all operating conditions (Figure 3).

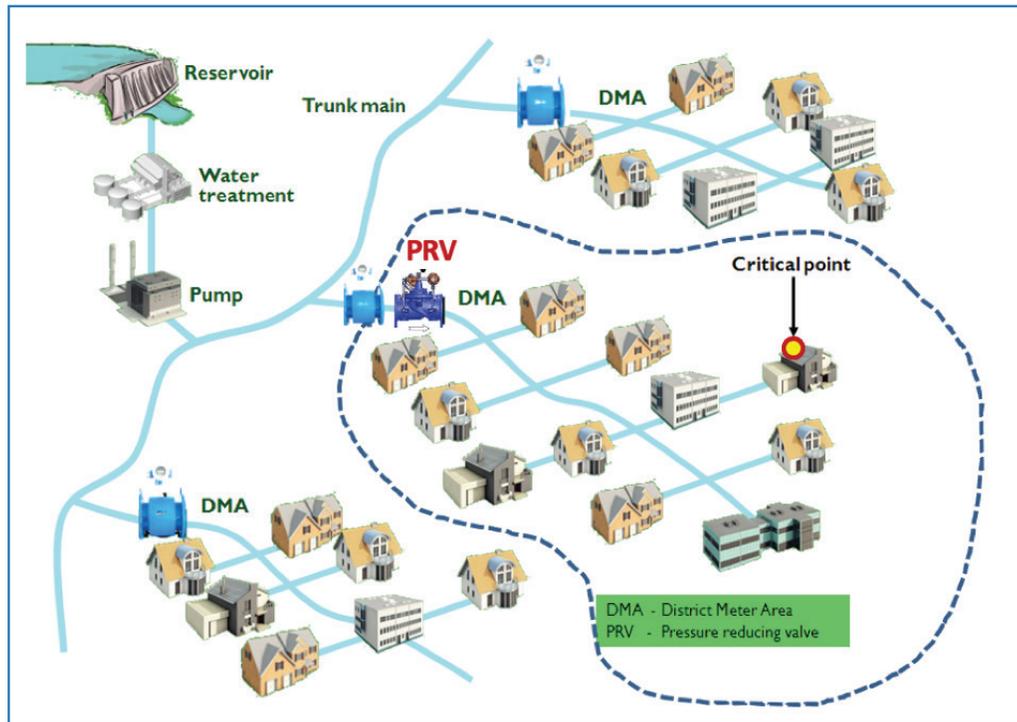


Figure 3 - Pressure managed DMA

Pressure Management

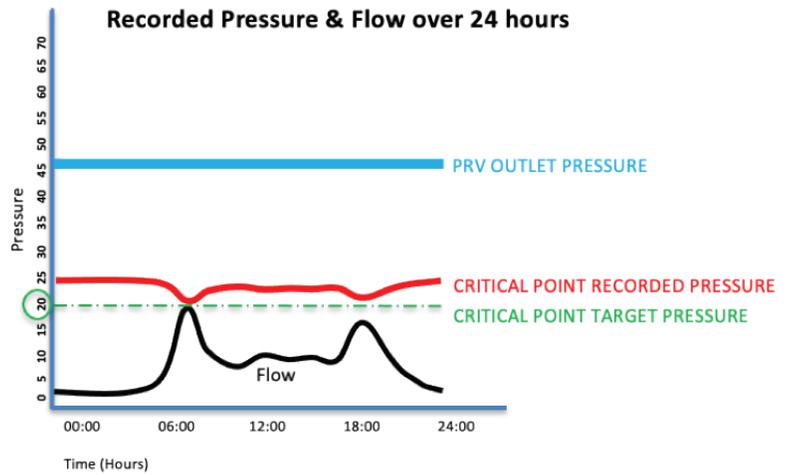
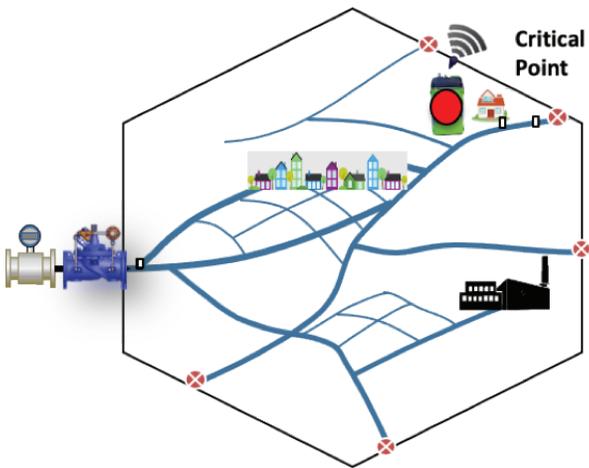


Figure 4

Benefits of Pressure Management

- Minimise leakage
- Reduce pipe breaks/extends asset life
- Improve energy efficiency
- Reduces operation and maintenance costs

- **Commercial win**

- Lower energy costs - more water is conserved, so lower pumping costs
- Reduced water production cost – less water treatment
- Lower operation costs - less need for excavation work to repair broken mains
- Capital deferment – reducing leakage defers capital expenditure on constructing new reservoirs/Dams and extend asset life.

- **Water conservation**

- Leakage reduction – particularly small fittings and joints.
- Reduced pipe break frequency
- Demand management - managing pressure related consumption (e.g during periods of drought)

- **Customer service**

- Reduce excessive pressure and subsequential damage
- Water supplies are more reliable with fewer interruptions
- System calmness - Provide a constant level of service to customers

PRV performance and reliability are important to ensuring the system is resilient and stable under all operating conditions.

Two basic categories of valve are available, fixed outlet or flow modulated.

Fixed outlet

Fixed outlet valves attempt to provide a constant pressure at the outlet of the PRV independent of the flow. The accuracy of regulating performance varies from valve type and manufacturer.

Flow modulating valve

Flow modulated valves provide an increase in pressure at the outlet as flow increases in an attempt to compensate for pipeline frictional losses increasing with water demand downstream of the PRV. This ensures the CP point remains at a relatively constant pressure 24/7.

Single Feed PRV Zones

A single feed PRV zones is a distribution zone which is supplied from a single point only. In contrast to a multi-feed system, this has the effect of increasing the hydraulic losses, and for this reason the general practice is to select small zones of approximately 1000 properties.

Multiple feed Zones

The installation of multiple feed zones is complex and may require complex mathematical models for optimal performance.

Smart Networks

Intelligent devices fitted to pressure control valves offer the following advantages:

- Diagnose problems
- Prioritise maintenance
- Optimise performance

The Cla-Val Advantage

Cla-Val electronic interface control valves combine the efficiency of hydraulic control with advanced electronics to provide the optimum remote control solution.

Pressure management allows water distribution systems to operate at peak performance and is one of the most reliable ways to save water.

Cla-Val Water Savings Valves are the ideal solution to effectively optimize water distribution pipeline pressures to achieve water savings.

Cla-Val Pressure management valves are the ideal solution to effectively optimize water distribution pressures and help achieve water savings. Benefits include:

1. Hydraulically operated – Powered by the excess energy of the water system. This offers greater security than mains powered alternatives
2. Reliability = Low maintenance costs = reduced payback period
3. Pressure stability - under all operating conditions, necessary for advanced pressure control e.g flow modulation
4. Accurate control of set-point – to minimise pressure variability within the district.

Two-Stage pressure control provides extra pressure when demand is high and is ideal for small water districts.

Examples include:

- High customer demand
- Large seasonal variations
- Fire demand
- Industrial users

A variety of pressure switching methods are available. Hydraulic switching where pressure goes high when the valve reaches a pre-set position then returns to normal pressure as flow reduces. Rules based outlet pressures can also be selected using either a mains power or a battery powered Cla-Val valve controller. Depending on your requirements, the rules can either be set locally (on device), or remotely from the office via Cla-Val Link2Valves.com platform. Data can also be recorded around the PRV including pressures, flow etc. This will provide valuable insights into the valve performance.

Pressure modulation control valves regulate the downstream pressure based on time rules or a flow input and incorporates a data recording capability. Flow based pressure management is typically used to compensate for frictional losses within the distribution network to maintain a relatively constant pressure at the critical point under all operating conditions. Control profiles can be programmed either on-device or uploaded remotely.

Cla-Val 99 Series are fully programmable Pressure Management Control Valves. These Hybrid Hydraulic-Electronic control valves automatically adjust the downstream pressure based on time and/or demand. The combination of an electronically actuated hydraulic pilot and advanced electronic controllers allows advanced regulation rules, while maintaining full hydraulic control.

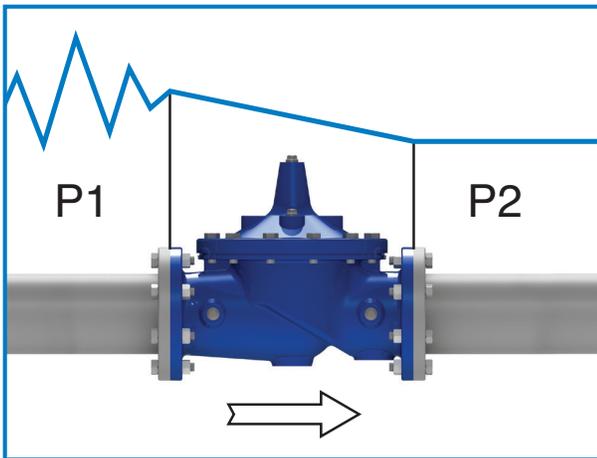
This highly flexible pressure management solution helps maintain system efficiency 24 hours a day.



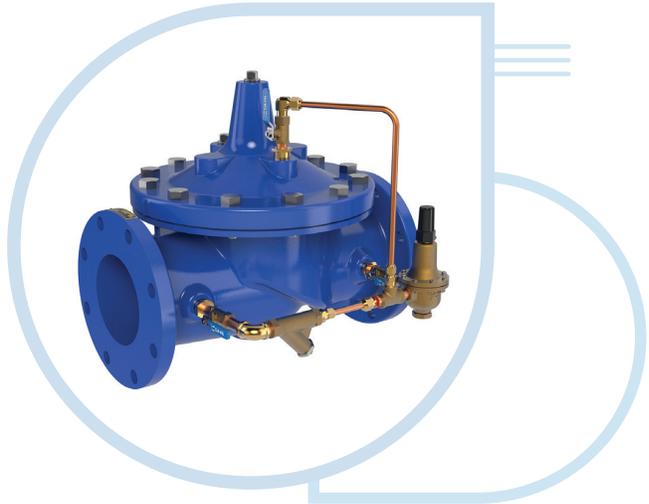
PRODUCT FEATURES

- Completely Automatic Operation
- Easy Adjustment and Maintenance
- Fully Supported Frictionless Diaphragm
- Meets NSF/ANSI 372 Lead Reduction Mandate

DIMENSIONS



The Cla-Val 90 Series automatically reduces a higher inlet pressure to a constant downstream pressure (Pressure Reducing Control) regardless of changing flow rate and/or varying inlet pressure.

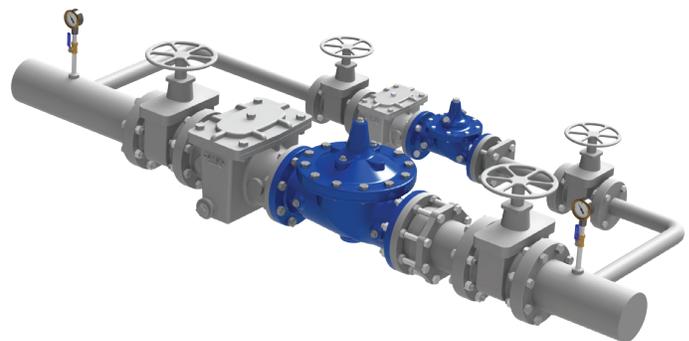


SYSTEM SOLUTIONS

- Cla-Val offers system solutions to prevent cavitation, noise, corrosion, mineral build-up, flow metering, and electronic valve control, to name a few solutions.
- Optional features including but not limited to; solenoid shut-off, check feature, return flow, and remote sensing.
- Contact Cla-Val for full line of options!

TYPICAL APPLICATION

- The Cla-Val 90 Series is designed to maintain downstream pressure to a pre-set limit.
- Typical Pressure Reducing Valve station using two valves in parallel to handle a wide range of high and low flow demands.
- A downstream pressure relief valve is also recommended for this type of application.

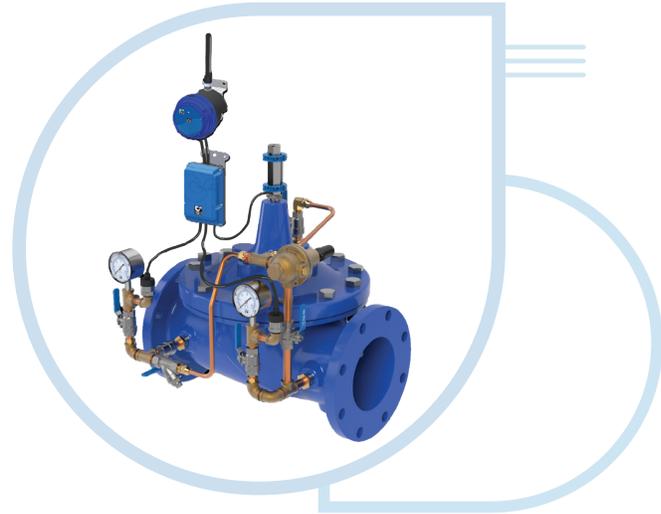


PRODUCT FEATURES

- The Cla-Val Model XP2F-CV35 Data Logger & Flow Metering Package is comprised of the CV-Log-35 Data Logger, the e-Lift-35 Valve Position Transmitter, and two X141-PTV Pressure Transmitter assemblies.
- Turns your Cla-Val valve into an all encompassing Instrumentation package that includes Upstream Pressure, Downstream Pressure, Valve Position Instantaneous Flow and Totalized Flow.
- When deployed across the system network the XP2F-CV35 package allows for insight into pressure, leakage, flow and system distribution management.
- Inlet Pressure, Outlet Pressure, Valve Position, Flow, and Totalized Flow are retransmitted to Cla-Val Link2Valves Asset Management for data viewing and analysis .

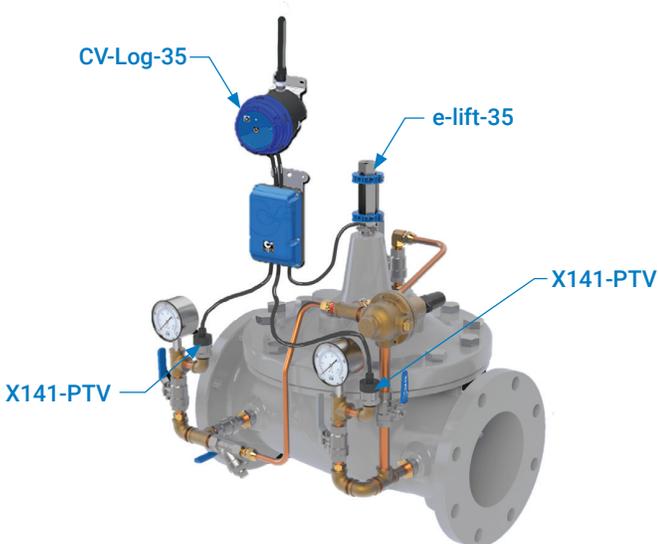
The Cla-Val Model XP2F:

- Is Easily Retrofitted onto Existing Valves
- Has Minimal Upstream/Downstream Straight Pipe Requirements
- Local configuration through Wi-Fi from PC, Tablet or Smartphone
- No Software is Needed
- Easy Field Calibration and Commissioning
- Low Maintenance/Minimal Fluid Contact



SPECIFICATIONS

- **Power Requirements:** Internal lithium battery
Option: High capacity lithium external battery
- **Options:** Option: External power supply (6-30 VDC)
- **Inputs:** 4x Analog
Type: Ratiometric, 0-5V & 0-10V
2x Digital
Type: Dry Contact or Pulse



PRODUCT FEATURES

- Up to 6x data acquisition channels
- Data communication via 4G and 2G
- Local configuration through Wi-Fi from PC, Tablet or Smartphone
- Interface to Cla-Val Link2Valves™ for data visualization and remote configuration
- Standard 5-year* autonomy and 10-year* external high-capacity battery option

MAIN FUNCTION

Cla-Val CV-Log-35 is an ultra-low power advanced data logger with 6x acquisition channels (4 analog inputs and 2 digital inputs). Acquired data is stored in a large internal memory and can optionally be sent to a remote server of your choice, through the new generation 4G communication network, optimized for data communication (IoT). Alternatively, the product can be connected to the Cla-Val **Link2Valves™** platform for an easy and complete integration.

The CV-Log-35 implements powerful processors, embedding advanced intelligence, such as Cla-Val use of proprietary algorithm program to calculate a flow measurement based on inlet/outlet pressures and valve position.

The CV-Log-35 is an easy-to-use product, allowing quick and easy installation, thanks to a compact and ergonomic design, and longtime Cla-Val field proofed experience. No need for cables or special software installation to access the product; the CV-Log-35 is easily configured via a wireless interface from your smartphone, tablet, or computer.

Cla-Val CV-Log-35 embeds a standard lithium battery, providing a long usage time. The product battery life can even be extended with the optional external high-capacity battery option.



SPECIFICATIONS

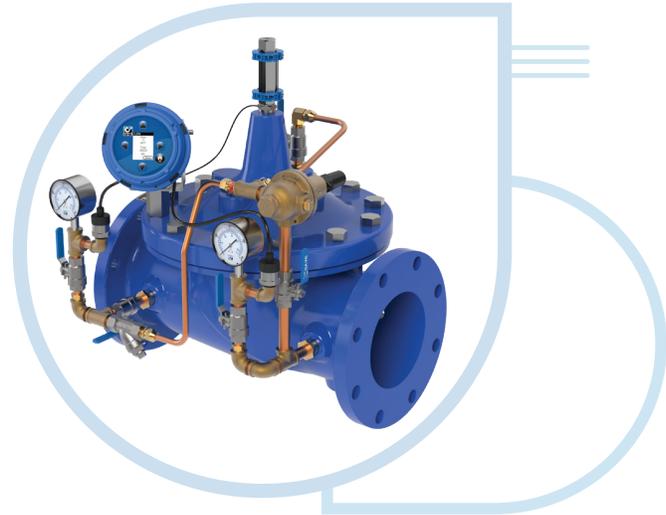
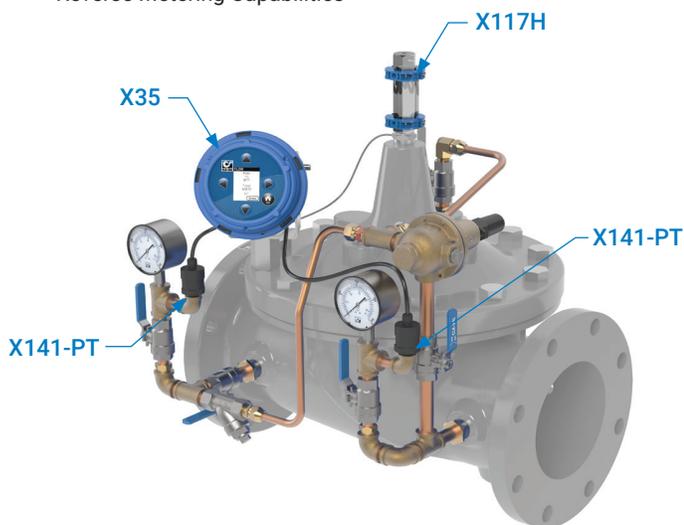
- Power Supply:**
 - Internal lithium battery (accessible)
 - Option: high-capacity lithium external battery
 - Option: external power supply (6-30 VDC)
- Inputs:**
 - 4x analog (Ratiometric, 0-5 V / 0-10 V)
 - 2x digital (dry contact or pulse)
- Logger & Data Storage:**
 - Configurable logging interval
 - Memory: 16 MB Flash + 8 GB Micro-SD
 - Interface to Link2Valves™ for remote data access and configuration (optional)
 - Communication to custom server
- User Interface:**
 - Wi-Fi 802.11n/ac for local configuration
 - Interface to Cla-Val Link2Valves™ for remote configuration
- Data Communication:**
 - 4G (LTE-M1, NB-IoT) and 2G (GPRS)
 - Micro SIM card (accessible)
 - Extendable antenna with flexible cable
- Embedded Intelligence:**
 - Flow Totalizer
 - Cla-Val Valve Flow Measurement (Requires Inlet/Outlet Pressure and Valve Position Sensor)
- Housing & General:**
 - Dimensions: Ø 5.2in x L 5.1 in (Ø 132 mm x L 130 mm) no antenna, no bracket
 - Easy opening system without screws or tools
 - Material: PC / ABS plastic UV resistant
 - Protection: IP68 (2 m, 1 month)
 - Operating Temperature: 14°F to 158°F (-10°C to 70°C)
 - Storage Temperature: 4°F to 176°F (-20°C to 80°C)

PRODUCT FEATURES

- The Cla-Val Model XP2F-X35 Data Acquisition and Metering Package is comprised of the X35 Data Module, the X117H Valve Position Transmitter, and two X141-PT Pressure Transmitter assemblies.
- Turns your Cla-Val valve into an all encompassing Instrumentation package that includes Upstream Pressure, Downstream Pressure, Valve Position Instantaneous Flow and Totalized Flow.
- When deployed across the system network the XP2F-X35 package allows for insight into pressure, leakage, flow and system distribution management.
- Inlet Pressure, Outlet Pressure, Valve Position, Flow, and Totalized Flow can be retransmitted to SCADA or AMI System and logged to the Internal SD Card.

The Cla-Val Model XP2F-X35:

- Is Easily Retrofitted onto Existing Valves
- Has Minimal Upstream/Downstream Straight Pipe Requirements
- Local configuration via local display or through WIFI from PC, Tablet or Smartphone
- No Software is Needed
- Easy Field Calibration and Commissioning
- Low Maintenance/Minimal Fluid Contact Forward and Reverse Metering Capabilities



SPECIFICATIONS

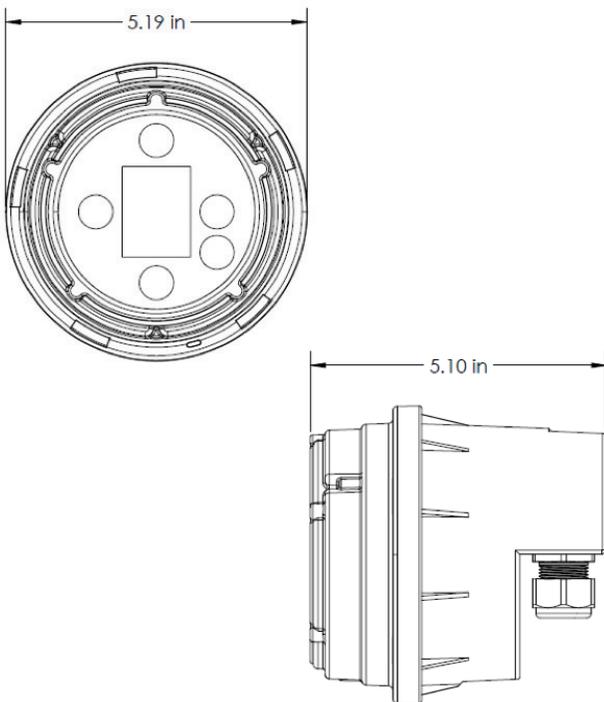
- **Power Requirements:** Voltage: 9-24 VDC Input
- **Inputs:** 4x Analog Inputs
Type: 4-20mA
Optionally Provides Loop Power
- **Outputs:** 4x Analog Outputs
Type: 4-20mA
Provides Loop Power
1x Digital Output
Type: Dry Contact

PRODUCT FEATURES

- The Cla-Val Model X35 accepts Upstream Pressure, Downstream Pressure, Valve Position Data while simultaneously calculating the flow measurement by Cla-Val's proprietary algorithm
- Inlet Pressure, Outlet Pressure, Valve Position, Flow, and Totalized Flow can be retransmitted to SCADA or AMI System and logged to the Internal SD Card
- The X35 is equipped with additional 4-20mA input(s) that can accept field instrumentation signals to be retransmitted or logged to the SD card
- All field instrumentation can easily be viewed in real time through the local display or PC, Tablet or Smartphone via WIFI platform to allow for easy setup, troubleshooting or adjustments



DIMENSIONS



SPECIFICATIONS

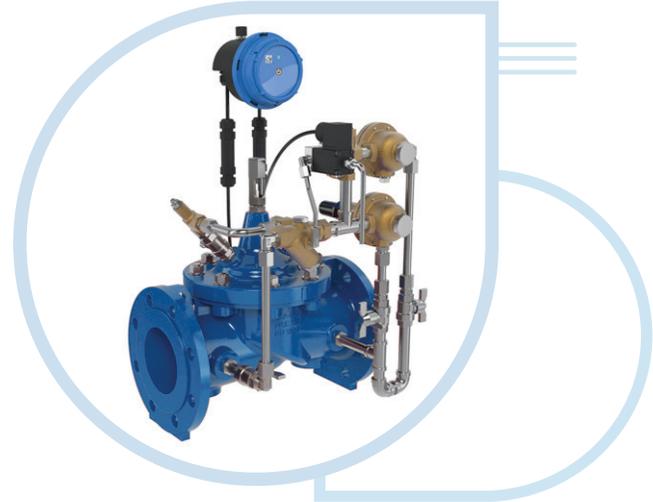
- Power Requirements:**
Voltage: 9-24 VDC Input
Power Consumption
Display Off: 2.2 Watts*
Display On: 3.3 Watts*
* Not Including Transmitters
Reverse Polarity Protection
- Data Storage:**
32GB SD Card
Periodic Logging of Real Time Data
CSV File Format
- Temperature Range:**
Operating Temperature: 14°F to 158°F (-10C to 70C)
Storage Temperature: -4°F to 176°F (-20C to 80C)
- Enclosure & Display:**
IP-68 Water Resistant up to 6.6 ft (2m) for 1 Month
- Inputs:**
4x Analog Inputs
Type: 4-20mA
Optionally Provides Loop Power
- Mounting:**
Available Mounted on Valve or Remote
- Outputs:**
4x Analog Outputs
Type: 4-20mA
Provides Loop Power
1x Digital Output
Application: Flow Totalizer Pulse
Type: Dry Contact
- User Interface:**
Wi-Fi 802.11n/ac for local configuration
Local Display with Five Buttons

PRODUCT FEATURES

- Completely Automatic Operation
- Easy Adjustment and Maintenance
- Fully Supported Frictionless Diaphragm
- Meets NSF/ANSI 372 Lead Reduction Mandate

MAIN FUNCTION

The Cla-Val 90 Series Multi-Stage Pressure Reducing allows selection between multiple different pressure reducing set points. Typically, one pilot reduces to high pressure and the other to a low pressure. However additional solenoid(s) and pilot(s) can be added to increase the amount of setpoints or alternatively solenoid(s) can be added to add such functionality as fully venting the valve open on low inlet pressure. A programmed controller selects the active pilot that commands the main valve. The valve maintains its outlet pressure despite inlet pressure fluctuations and downstream demand changes.

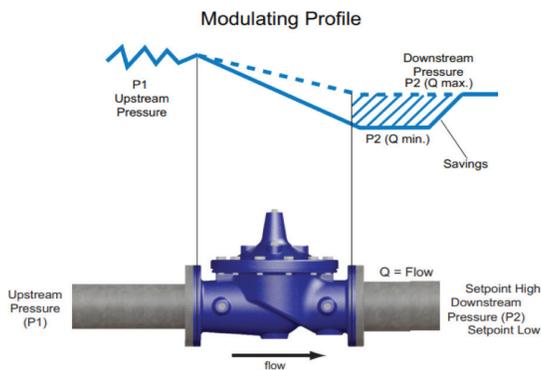


SYSTEM SOLUTIONS

- Cla-Val offers system solutions to prevent cavitation, noise, corrosion, mineral build-up, flow metering, and electronic valve control, to name a few solutions.
- Optional features including but not limited to; solenoid shut-off, check feature, return flow, and remote sensing

TYPICAL APPLICATION

- Cla-Val 90 Series Multi-Stage Pressure Reducing is recommended for applications where downstream pressure requires precise control and exhibit demand changes over a period. In leak prevention applications, the 90 series offers a simple solution to control multiple set pressures in one distribution zone. For moments of high demand the high-pressure adjustment pilot is activated. For moments of low demand the low-pressure adjustment pilot is activated.



PRODUCT FEATURES

- Up to 6x data acquisition channels
- 2x latching solenoid outputs actionable based on time, flow and/or pressure
- Integrated Multi-Channel Datalogger
- Data communication via 4G and 2G
- Interface to CLA-VAL Link2Valves™ for data visualization and remote configuration
- Local configuration through Wi-Fi from PC, Tablet or Smartphone
- Internal or External Battery operated, or external power supply compatible

MAIN FUNCTION

The Cla-Val D35 is an ultra-low power autonomous Electronic Valve Controller capable of simple or advanced rules-based output commands to control valves in locations where no electrical energy is available.

The D35 incorporates powerful processor, embedding advanced intelligence, such as Cla-Val use of proprietary algorithm program to calculate a flow measurement based on inlet/outlet pressure and valve position inputs.

Additionally, The D35 controller incorporates pre-loaded valve applications **ValvApps™**, which can be customized for a wide variety of valve functions. Scaling of variables and parameters are configurable to fine tune the valve for smooth regulation.

Its large internal memory allows data logging over the product full lifetime, and the D35 can optionally implement data communication through the new generation 4G network, optimized for data communication (IoT). The product can then be connected to the Cla-Val **Link2Valves™** platform for an easy and complete integration, or to any custom FTP server.

Cla-Val D35 embeds a standard lithium battery, providing a long usage time. The product battery life can even be extended with the optional external high-capacity battery option. Alternatively it can be powered via and external power supply.



SPECIFICATIONS

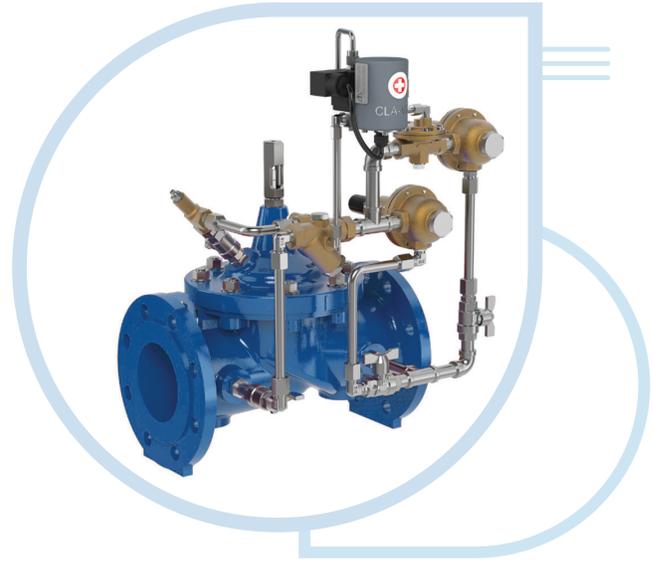
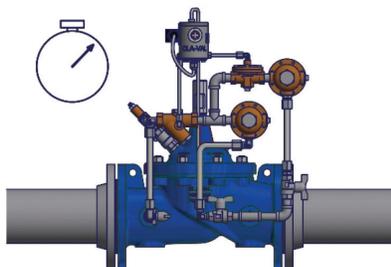
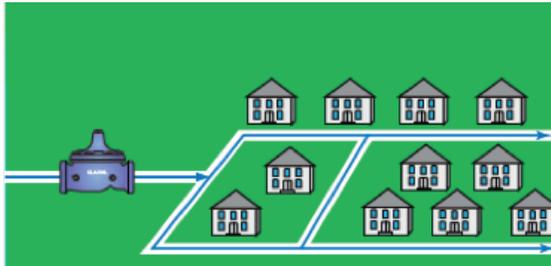
- Power Supply:**
 - Internal lithium battery (accessible)
 - Option: high-capacity lithium external battery
 - Option: external power supply (5-30 VDC)
- Inputs:**
 - 4x analog (Ratiometric, 0-5 V / 0-10 V)
 - 2x digital (dry contact or pulse)
- Outputs:**
 - 2x latching solenoids (6 VDC)
 - 1x digital (dry contact or pulse)
- Logger & Data Storage:**
 - Configurable logging interval
 - Memory: 16 MB Flash + 8 GB Micro-SD
 - Interface to Link2Valves™ for remote data access and configuration (optional)
 - Communication to custom server
- User Interface:**
 - Wi-Fi 802.11n/ac for local configuration
 - Interface to CLA-VAL Link2Valves™ for remote configuration
- Data Communication:**
 - 4G (LTE-M1, NB-IoT) and 2G (GPRS)
 - Micro SIM card (accessible)
 - Extendable antenna with flexible cable
- Embedded Intelligence:**
 - Flow Totalizer
 - Cla-Val Valve Flow Measurement (Requires Inlet/Outlet Pressure and Valve Position Sensor)
 - Application Customized ValveApps
- Housing & General:**
 - Dimensions: Ø 5.2in x L 5.1in (Ø 132 mm x L 130 mm) no antenna, no bracket
 - Easy opening system without screws or tools
 - Material: PC / ABS plastic UV resistant
 - Protection: IP68 (2 m, 1 month)
 - Operating Temperature: 14°F to 158°F (-10°C to 70°C)
 - Storage Temperature: 4°F to 176°F (10°C to 70°C)

PRODUCT FEATURES

- Ideal for Remote Valve Location Control
- Completely Automatic Operation
- Programmable autonomous battery controller
- Easy Adjustment and Maintenance
- Fully Supported Frictionless Diaphragm

MAIN FUNCTION

The Cla-Val 97 Series allows selection between two different pressure reducing set points. Typically, one pilot reduces to high pressure and the other to a low pressure. The programmed timer controller selects the active pilot that commands the main valve. The valve maintains its outlet pressure despite inlet pressure fluctuations and downstream demand changes. The change between both pilots is done by means of a solenoid contained in the timer, so that, according to a pre-established schedule, the required pressure is obtained according to the flow demand. The setpoint of the reducing pilots can be easily changed on field. The programming of the timer are done through software that can be downloaded free of charge from the Cla-Val website. The package is powered by a long-life lithium battery.



SYSTEM SOLUTIONS

- CLA-VAL offers system solutions to prevent cavitation, noise, corrosion, mineral build-up, flow metering, and electronic valve control, to name a few solutions.
- Optional features including but not limited to; solenoid shut-off, check feature, return flow, and remote sensing.

TYPICAL APPLICATION

The Cla-Val 97 series valve is recommended for applications where downstream pressure requires precise control and exhibit demand changes over a period. In leak prevention applications, the 97 series offers a simple solution to control multiple set pressures in one distribution zone. For moments of high demand, the high-pressure adjustment pilot is activated. For moments of low demand, the low-pressure adjustment pilot is activated.

PRODUCT FEATURES

- Ideal for remote valve location control
- Precise valve on-off control
- Used for Pressure Management and Water Quality Control applications
- Combines with pressure, flow or level control
- Direct control of valve opening and closing 6x times daily
- Completely self-contained
- Programmable daylight savings times
- Two Year Battery Life
- Retains stored data even after battery is depleted

MAIN FUNCTION

The Cla-Val CTC-33 Electronic Timer Control is a battery powered, programmable on-off control used for opening and closing of self-contained solenoid which can manipulate the Cla-Val main valves for a multitude of applications according to time schedule. Up to six opening and closing times per day can be set for a weekly schedule. The CTC-33 offers powerful valve control for remote locations and valve automation applications.

Pressure Management / Water Savings

The CTC-33 Timer Control is used for pressure management applications in water distribution systems where SCADA control is not available. A Cla-Val pressure control valve equipped with the CTC-33 Timer can be setup to change pressure during periods of high and low demand according to pre-set schedule to reduce leaks and pipe burst frequency, while delivering adequate supply.

Maintaining Water Quality

The CTC-33 Electronic Timer Control can be used with Cla-Val control valves to automate circulating water requirements in distribution system applications. Valve opening and closing time of day and duration can be set according to system requirements for convenient flushing and circulating during times of low flow to optimize water quality.



SPECIFICATIONS

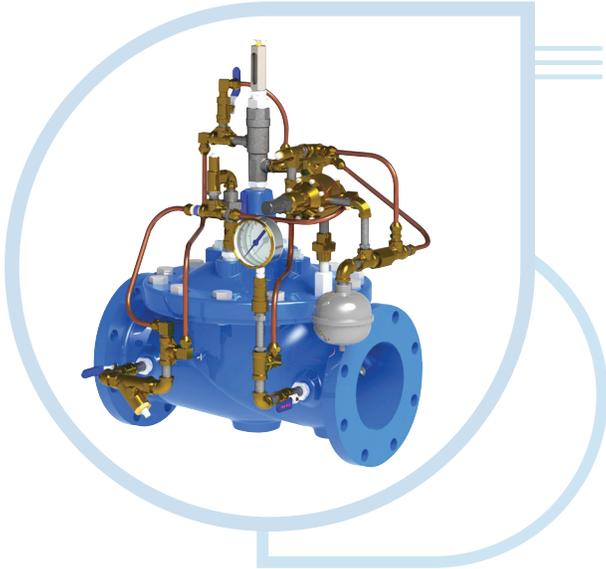
- **Maximum Pressure:** 232 psi (16 bar)
- **Temperature Range:** 14° - 176°F (-10° - +80°C)
Battery: 14° - 140°F (-10° - +60°C)
- **Enclosure Protection:** IP68; Validated 1 month at 0.2 bar (2m water depth)
- **Battery Type:** Lithium 9V/PP3
(Lifetime: ~2 years for 2 actions/day @ 20°C)
- **Solenoid:** 3-Way Bi-Stable
Orifice Size: 0.05 in (1.2mm)
Voltage: 6VDC (minimum)
- **Rules:** Up to 6 actions (3X opening-closing per day) • Time and calendar
- **Fluids:** Water
- **Port Size:** 1/8-inch FNPT Threaded
- **Materials:**
 - Electronic Enclosure: PVC
 - Solenoid Body: Stainless Steel
 - Seals: NBR

PRODUCT FEATURES

- Completely Automatic Operation
- Easy Adjustment and Maintenance
- Fully Supported Frictionless Diaphragm
- Meets NSF/ANSI 372 Lead Reduction Mandate

MAIN FUNCTION

■ The Cla-Val 98 Series is a pressure reducing valve that uses two downstream set points to achieve optimum system pressure; i.e. the capability delivering only the pressure that is needed to meet current demand. A high pressure set point is selected for high flow demand and a low pressure set point is selected for low demand. This dual set point arrangement allows for reduction in water consumption as well as unintentional water loss by keeping system piping from being over-pressurized during periods of low demand. It does this without inhibiting adequate pressure during high or fire demand. The design is 100% hydraulic and, in addition, to the dual pressure set points, the transition point at which the pressure changes based on the flow is also adjustable. The patented design of the valve allows for smooth transition from one set point to the other, providing optimum performance and measurable water savings by reducing consumption, minimizing leaks and lessening the potential for pipe breaks.

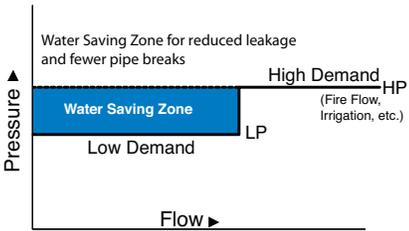
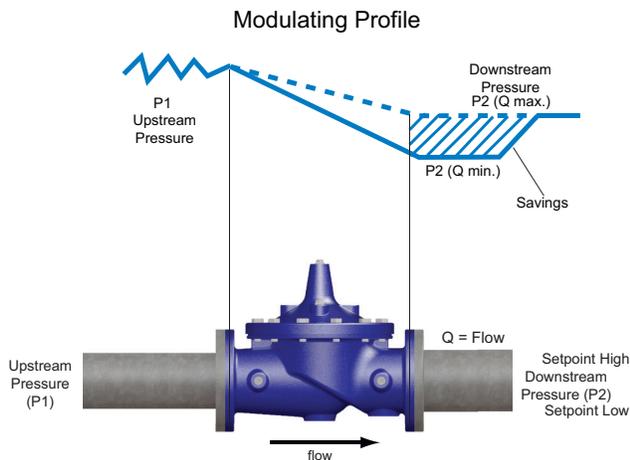


SYSTEM SOLUTIONS

- CLA-VAL offers system solutions to prevent cavitation, noise, corrosion, mineral build-up, flow metering, and electronic valve control, to name a few solutions.
- Optional features including but not limited to; solenoid shut-off, check feature, return flow, and remote sensing.
- Contact CLA-VAL for full line of options!

TYPICAL APPLICATIONS

■ A dual system pressure with reduced system pressure during low demand periods is illustrated in the chart. At low flows, a minimum pressure is maintained and as flow increases to the switch point, delivery pressure increases to the maximum pressure set point for switch. The point between low pressure and high pressure setpoints is adjustable to fine-tune the valve to system requirements. The “water saving zone” below maximum pressure line represents valve effectiveness in reducing water losses and frequency of pipe breaks in a system.



PRODUCT FEATURES

- Innovative autonomous pressure modulation solution
- Extremely easy setup and retrofit onto existing Cla-Val Pressure Reducing Valves (PRV)
- On site wireless configuration from any smartphone, tablet, or PC
- Data communication via 4G and 2G
- Battery-operated with 5-year autonomy
- IP68 protection

MAIN FUNCTION

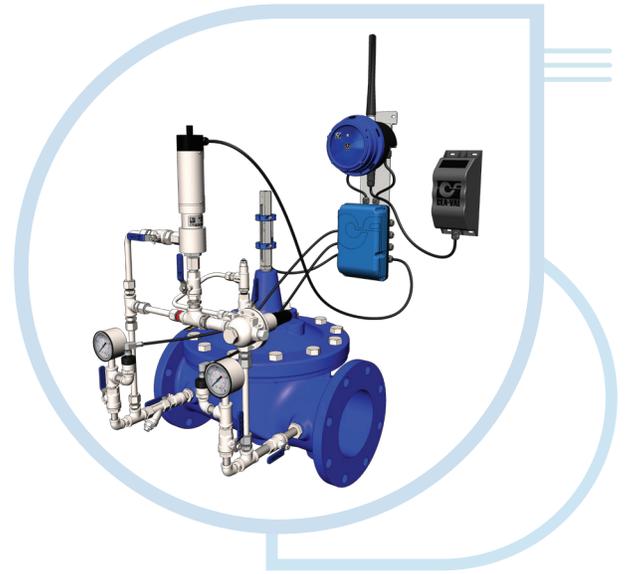
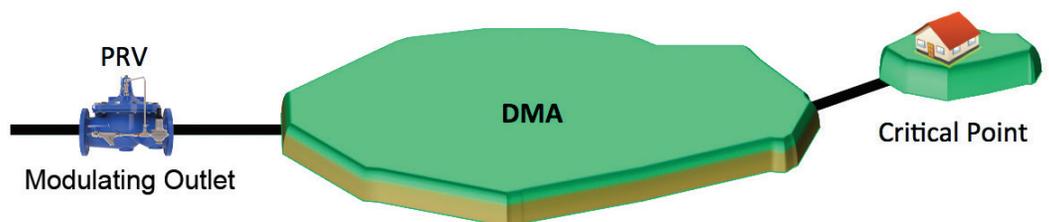
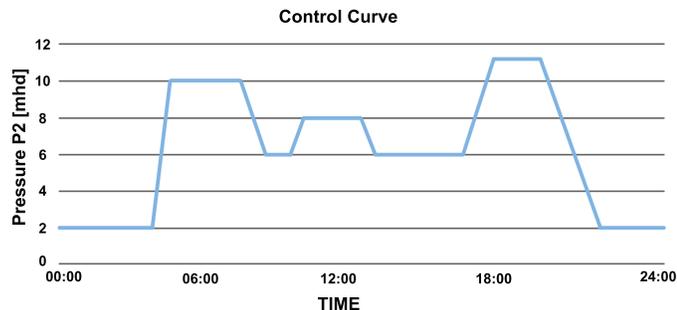
The Cla-Val 99 Series is an innovative pressure management solution, bringing pressure modulation to a new level of excellence.

It fulfills the needs for an ultra-low-power, very easy to install and set up pressure modulation solution, capable of advanced hydraulic regulation in locations where very low or no electrical energy is available. In addition is equipped with Cla-Val's proprietary algorithm program to calculate flow measurement based on inlet/outlet pressure and valve position inputs.

The Cla-Val 99 Series is based on a standard Cla-Val 90 Series Pressure Reducing Valve (PRV) but with the addition of Cla-Val Model MD35 PRV Modulation Controller coupled with Cla-Val Model M35 PRV Modulation Actuator which allows automatic adjustment to downstream pressure according to water network conditions. The Cla-Val 99 Series offers an easy graphical interface to define a pressure regulation profile as a function of time or flow. Multiple Control Curves can be created, allowing specific adaptations such as seasonal or weekend adjustments.

The combination of precise, field proven, Cla-Val Model CRD Pressure Reducing hydraulic pilot, and the easy-to-use Cla-Val 99 Series upgrade, allows advanced regulation while keeping full hydraulic control.

A Cla-Val retrofit kit can be used to transform a standard existing Cla-Val into a 99 Series PRV Pressure Modulation Valve.



SYSTEM SOLUTIONS

- Cla-Val 99 Series PRV Pressure Modulation solution offers both very precise regulation and easy setup.
- Based on standard Cla-Val 90 Series hydraulic PRV, the addition of a variable orifice at the inlet allows varying the pressure set point at the outlet of the valve varied modulating range, fully regulated by Cla-Val Model CRD hydraulic pilot.

TYPICAL APPLICATIONS

- Time vs. Downstream Pressure Modulation
- Flow vs Downstream Pressure Modulation
- Critical Point Pressure Modulation
- Flow Monitoring
- No Power Available

PRODUCT FEATURES

- Up to 6x data acquisition channels
- M35 actuator control output actionable based on time, flow and/or pressure
- 2x latching solenoid outputs actionable based on time, flow and/or pressure
- Integrated Multi-Channel Datalogger
- Data communication via 4G and 2G
- Interface to CLA-VAL Link2Valves for data visualization and remote configuration
- Local configuration through Wi-Fi from PC, Tablet or Smartphone
- External Battery operated, or external power supply compatible

MAIN FUNCTION

The Cla-Val MD35 is an innovative pressure management solution, bringing pressure modulation to a new level of excellence.

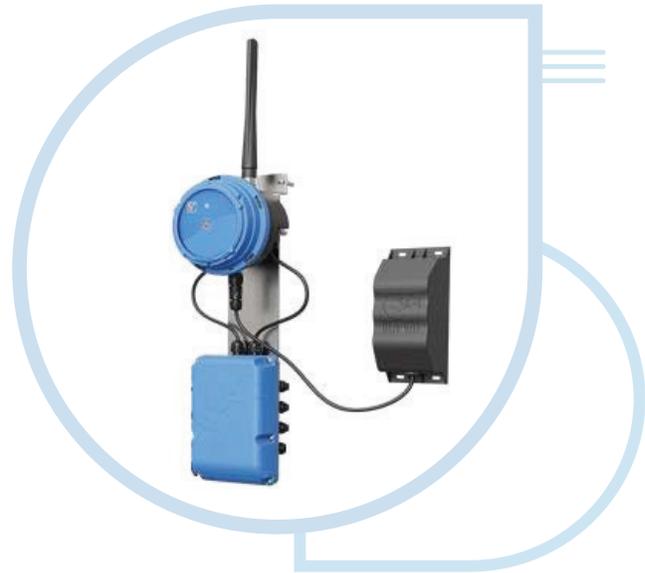
It fulfills the needs for an ultra-low-power, very easy to install and set up pressure modulation solution, capable of advanced hydraulic regulation in locations where very low or no electrical energy is available.

The MD35 incorporates powerful processor, embedding advanced intelligence, such as Cla-Val use of proprietary algorithm program to calculate a flow measurement based on inlet/outlet pressure and valve position inputs.

Additionally, The MD35 controller incorporates pre-loaded valve applications **ValvApps™**, which can be customized for a wide variety of valve functions. Scaling of variables and parameters are configurable to fine tune the valve for smooth regulation.

Its large internal memory allows data logging over the product full lifetime, and the D35 can optionally implement data communication through the new generation 4G network, optimized for data communication (IoT). The product can then be connected to the Cla-Val Link2Valves platform for an easy and complete integration, or to any custom FTP server.

Cla-Val MD35 offers a standard lithium battery, providing a long usage time. Alternatively, it can be powered via and external power supply.



SPECIFICATIONS

Power Supply:

- High-capacity lithium external battery
- Option: External power supply (6-24 VDC)

Inputs:

- 4x analog (Ratiometric, 0-5 V / 0-10 V)
- 2x digital (dry contact or pulse)

Outputs:

- 1x M35 actuator control (I2C interface)
- 2x latching solenoids (6 VDC)
- 1x digital (dry contact or pulse)

Logger & Data Storage:

- Configurable logging interval
- Memory: 8 GB Micro-SD
- Interface to Link2Valves for remote data access and configuration (optional)
- Communication to custom server

User Interface:

- Wi-Fi 802.11n/ac for local configuration
- Interface to CLA-VAL Link2Valves for remote configuration

Data Communication:

- 4G (LTE-M1, NB-IoT) and 2G (GPRS)
- Micro SIM card (accessible)
- Extendable antenna with flexible cable

Embedded Intelligence:

- Flow Totalizer
- Cla-Val Valve Flow Measurement (Requires Inlet/Outlet Pressure and Valve Position Sensor)
- Application Customized ValveApps

Housing & General:

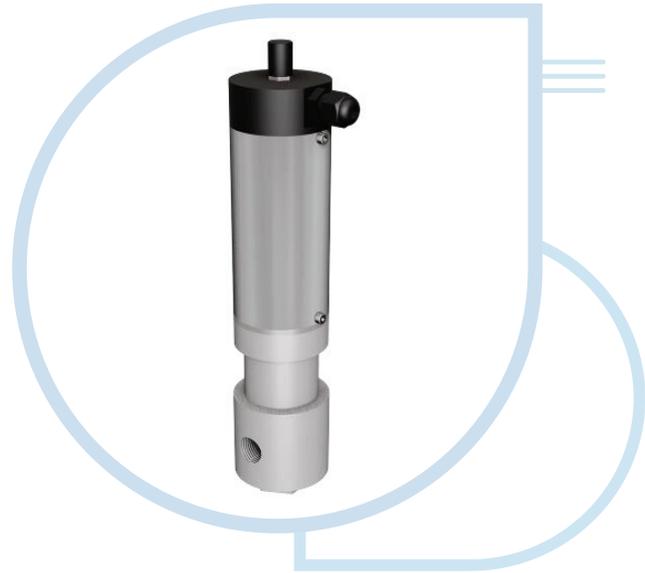
- Dimensions: I 6.1in L 5.1in x H 23.6in (I 155 mm x L 130 mm x H 601mm)
- Easy opening system without screws or tools
- Material: PC / ABS plastic UV resistant
- Protection: IP68 (2 m, 1 month)
- Operating Temperature: 14°F to 158°F (-10°C to 70°C)
- Storage Temperature: 4°F to 176°F (-20°C to 80°C)

PRODUCT FEATURES

- Seamless Interfacing with MD35 PRV Modulation Controller
- Integration with Cla-Val 99 Series Control Valves
- Ultra Low Power Usage

MAIN FUNCTION

The Cla-Val M35 is an ultra-low power autonomous PRV modulation actuator that when paired with the MD35 PRV Modulation controller can be set up for a pressure modulation solution, capable of advanced hydraulic regulation in locations where very low or no electrical energy is available.



SPECIFICATIONS

Interface:

- User interface
- Command signal (I2C)
- Position feedback (I2C)
- Calibration
- Power supply (5VDC)

Firmware Update:

- Computer software interface
- Dedicated cable

Housing & General:

- Ø 1.96in x L 9.88in (Ø 50 mm x L 251 mm)
- Protection : IP 68 (2m, 1 month)

PRODUCT FEATURES

- Provides remote or local setpoint control for valves in a variety of fluid applications
- Highly accurate and stable valve control
- Controller is supplied with pre-loaded ValvApps™ for most common valve functions
- Custom ValvApps™ can be created for Multi-Function Control
- Simple Control Curves graphical programming
- High resolution color screen graphics with color-coded indicators
- Communications via standard 4-20 mA retransmission and relays or by Modbus RTU/TCP
- Internal logging : programmable and download to USB
- Less than 3 Watts power: solar or hydro powered remote valve control
- Simple and intuitive programming and set-up
- Option of: IP-65 NEMA Type 4 Housing Enclosure
IP-68 Submersible (verified by independent lab)
Panel Mount (fits 1/4 DIN or surface mount)

MAIN FUNCTION

The Cla-Val VC-22D is designed to provide state of the art valve control for a variety of fluid control parameters. Intuitive programming screens allow easy and fast programming for standard and customized applications such as flow, pressure, level, or position. Complete capabilities allow either stand-alone operation or easy integration into SCADA systems with standard wired signals or Modbus (TCP or RTU) communications.

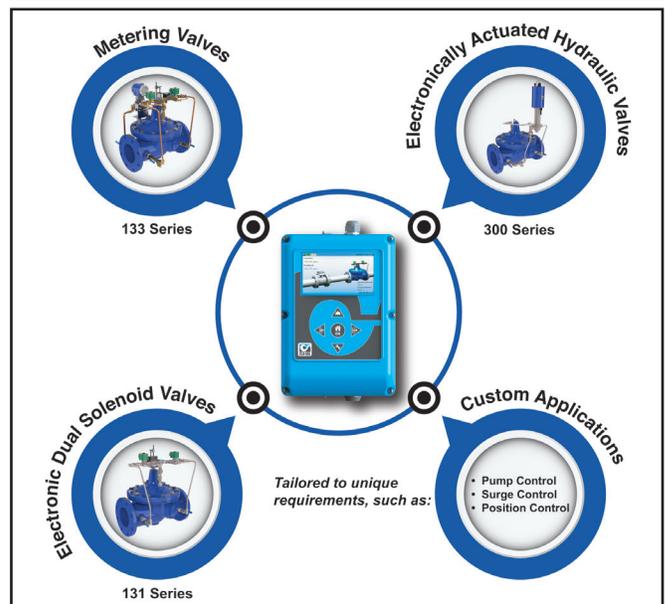
For ease of use, the controller is pre-loaded with a wide variety of typical valve applications (**ValvApps™**). Additional custom ValvApps™ can be created by Cla-Val to meet any operational requirement. For example 2 or 3 modulating control functions can be combined into one custom **ValveApp™**.



Pre-Loaded Typical ValvApps™ include:

- Flow Control with Mag Meter or e-Flowmeter Feedback
- Pressure Control with Upstream or Downstream Feedback
- Position Control with Position Feedback
- Modulating Level Control with Level and Position or Flow Feedback
- Metering Valve with Position and DP or P1-P2 Feedback
- Ratio Control with 2 Flowmeter feedbacks
- Altitude On/Off Level Control with Delayed Opening and Level Feedback
- Pressure Management with CRD-34 Electronic Pilots and Flow Feedback

Controller Applications



VALVE FUNCTIONS



PID Control

Used in maintaining a control valve at setpoint, multiple PID loops can be programmed with each of them offering local or remote setpoints. A real-time chart view helps to visualize valve response and fine tune valve response. Programmable setpoint ramping prevents hydraulic shocks.



Actions

Used to take "action" (or alarms) when programmable conditions (1 or 2) are met by forcing an output relay, solenoid, or 4-20 mA output. The closing relay can be used to send an alarm to SCADA. Up to four actions can be programmed including deadband.



Retransmission

Used to retransmit any input signal, variable, or calculation to a SCADA system. Up to four input signals such as pressure, flow, or level can be redirected through the 4-20 mA outputs.



DP Metering

A built-in function to calculate flowrate based on valve position and DP. The returned flow value can be displayed and controlled without a separate flow meter. A metering ValvApp with this feature is included in the standard internal library. All standard Cla-Val valve sizes curves are included.



Control Curves

Offers an easy way to create a relationship between two system variables. Using graphical functions, the user draws the control curve relationship linking pressure, flow, level, and/or time directly on the screen. Up to four control curves allowing independent pump control valve opening and closing or tailored modulating level control.



Totalizer

Keeps track of total volume as a function of time. Customizable units & reset functionality allow for simplified set-up and configuration. Can be used for volume (or batch) control applications limiting water volume taken from supplier per day or into tank trucks.



Data Logging and Log File

All input and output values are logged according to a programmable schedule. Default logging is every 5 minutes but can be as low as 1 minute or at customized intervals. 4 GB SD card memory allows greater than 80,000,000 values storage. Data is stored in MS-Excel (CSV) readable format. Transfer is by USB.

SPECIFICATIONS

Power Requirements:

- 12 24 VDC Input
- Consumption: 1.5 W standby, 3 W in use
- Max 32 VDC over voltage protection
- Reverse polarity and short circuit protection

Inputs:

- 6x Analog 4-20 mA
- 6x Digital (dry contact max 5 VDC @ 0.1A - 100 Hz max)
- Reverse polarity and short circuit protection
- Optocoupler isolation @ CMR 1000 V - 2 wires insulated

Outputs:

- 4x 4-20 mA Analog
- 2x Solenoid solid state relay 24 VDC @ 0.5 A - binary or proportional
- 1A Fuse protection provided
- 2x Mechanical relay 24 VDC - 240 VAC @ 1 A max.
- Reverse polarity & short circuit protection

Control Parameters:

- Proportional band 0-100% / independent opening and closing
- Deadband 0 - full scale
- Cycle time 0 - 60 sec
- Integral and Derivative available
- Output limits - % of Cycle Time / Independent opening and closing
- Multi-zone tuning - up to 4 zones
- 4x PID loops
- 4x Actions or Alarms - 1 or 2 triggering conditions
- 4x Control Curves (graphically programmed)
- Setpoint ramping
- Input signal filter 0-100%
- Flow Totalizer (usable for volume control)

Logging & Data Storage:

- Configurable logging intervals
- Real-time back-up on 4 GB SD card
- Memory protection 10 year lithium battery
- CSV file format MS-Excel compatible
- File transfer to USB memory

Communications:

- Modbus TCP / Ethernet
- Modbus RTU / RS-485
- USB
- VNC
- GPRS modem quad band (consult factory)

Enclosure & Display:

IP-65 Enclosure

- 1/2" NPT Conduit Connections
- IIP-65 NEMA Type 4

IP-68 Enclosure

- Water tight cable glands
- Water resistant up to 2 meters for 1 month

Panel Mount Enclosure

- IP-20
- Surface mount or 1/4" DIN rail mount
- 8.75" (223 mm) H x 6" (153 mm) W x 3.5" (89 mm) D
- Weight 3 lbs (1.4 kg)
- PC / ABS plastic UV resistant
- USB, Ethernet
- 5 mechanical pushbuttons
- Silicon sealed polycarbonate screen
- 4.3" color display 480 x 272 - 24 bit
- Password 5-digit
- Mounting bracket - anodized aluminum
- Temperature range 14 to 158 F (-10 to 70 C)
- PCB coating - 90% RH, non condensing

Optional External AC/DC Power Converter:

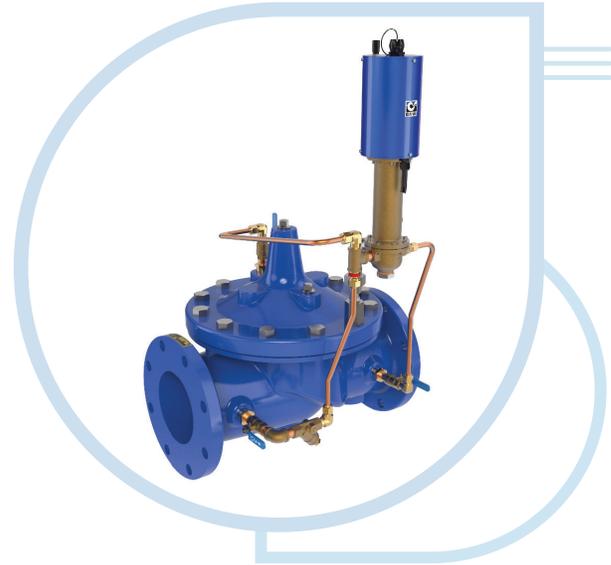
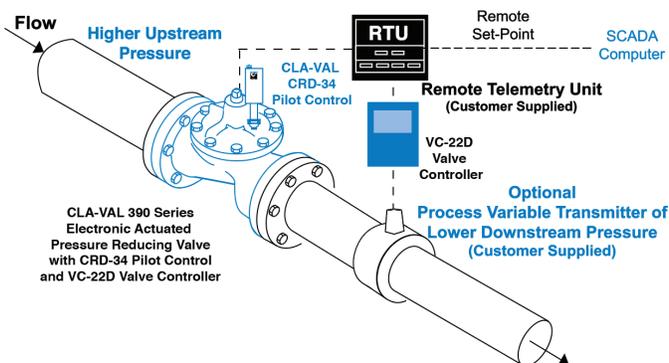
- Modbus TCP / Ethernet
- Modbus RTU / RS-485
- USB
- VNC
- GPRS modem quad band (consult factory)

PRODUCT FEATURES

- Simplified Remote Valve Set-Point Control
- Ideal for use with VC-22D Electronic Valve Controller
- 12 to 24 VDC Input Power
- Isolated Input
- Reverse Polarity Protection
- IP-68 (Submersible)

MAIN FUNCTION

- The Cla-Val 390 Series Electronic Actuated Pressure Reducing Control Valve combines precise control of field proven Cla-Val hydraulic pilots and simple, remote valve control.
- The Cla-Val 390 Series automatically reduces a higher inlet pressure to a steady lower downstream pressure regardless of changing flow rate and/or varying inlet pressure. This valve is an accurate, pilot-operated regulator capable of holding downstream pressure to a pre-determined limit. The valve uses a CRD-34 pilot control, consisting of a hydraulic pilot and integral controller, that accepts a remote set-point command input and makes set-point adjustments to the pilot.
- If check feature ("D") is added, and pressure reversal occurs, the valve closes to prevent return flow.



SYSTEM SOLUTIONS

- The recommended control method is simple remote set-point change from an RTU (Remote Telemetry Unit) to the CRD-34 where the 4-20 mA command signal is ranged to specific pressure range. Internal continuous electronic monitoring of actuator position results in virtually instantaneous position change with no backlash or dithering when control signal is changed. In the event of a power or control input failure, the CRD-34 pilot remains in hydraulic control virtually assuring system stability under changing conditions.

TYPICAL APPLICATION

- The Cla-Val 390 Series maintains downstream pressure and require this pressure to be changed from a remote location. It can be an effective solution for lowering costs associated with "confined space" requirements by eliminating the need for entry in valve structure for setpoint adjustment. It is also ideal for pressure management and can be programmed to minimum nighttime and optimum daytime pressures.

PRODUCT FEATURES

- Manage all your valves and track maintenance evolution over time with access to service documents
- Monitor Remote Valve Data such as Pressures, Flows and Valve Positions
- Customize views, overlay multiple device's data, complete math function analysis all allowing deeper information of interest
- Interface your system to **Link2Valves™** via a secured API (Application Programming Interface)
- Entirely secured environment (pen tested)
- No subscriptions fees or software downloads



MAIN FUNCTION

Asset Management

The Cla-Val **Link2Valves™** is a valve-oriented web platform, designed to managing regulation sites and valve assets over their lifetime. At any time and from everywhere, access sites information and valve details, such as geographical location, pictures, valve brand, model number, etc.

Link2Valves™ provides an overview of the valve maintenance status, helping the planification of interventions as well as accessing service history details.

Monitoring

Visualize valve sensors and get valve specific information and health indicator status remotely, ensuring proper regulation.

Organization and Users Management

Create user groups within the organization and manage levels of access to the various sites and/or valve assets for an optimal control, from a purely visual role to a more advanced operator, able to interact with a valve remotely.

SPECIFICATIONS

Browser:

Link2Valves™ is compatible with all recent major web browsers. Minimum version recommended.

- Firefox 16 (2012)
- Chrome 4 (2012)
- Opera 12.1 (2012)
- Edge 12 (2012)

User Interface:

- Custom Time Zone
- Website available in various languages
- Download or export of *.CSV data files.
- Custom data display graphs

Database:

- Application Programming Interface (API) option
- Secured partitioning between organizations.
- Possibility to recover all historical data at any time.

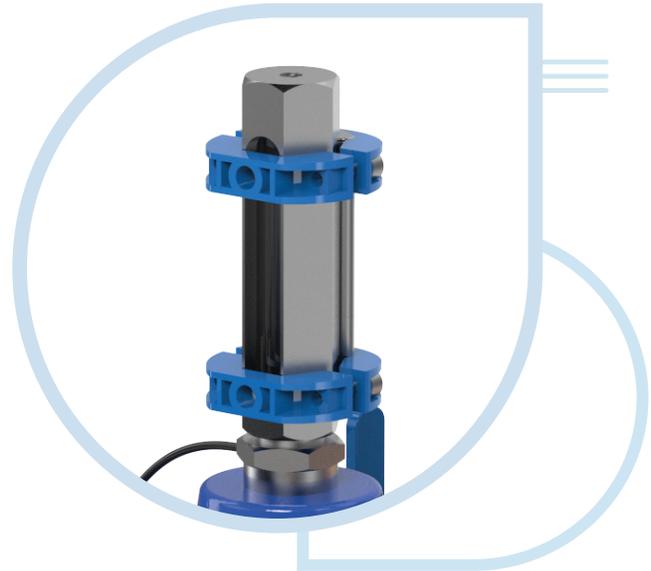
Security:

The Cla-Val **Link2Valves™** complete environment has been pen tested against vulnerability.

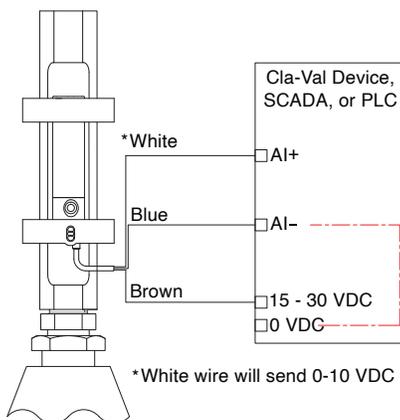
- Accounts protected against brute force attacks.
- 2-factor authentication access possibility
- HTTPS connection with verified certificates
- TLS 1.1 cryptography (or more recent)
- Secured communicating devices interface with no direct access possible.
- Physically and logically secured servers

PRODUCT FEATURES

- The Cla-Val Model e-Lift-35 Valve Position Transmitter is an accurate monitor of the valve position. Through an industry standard 0-10 VDC output signals, the e-Lift-35 delivers the accuracy required for computer-guided control valve systems (SCADA).



WIRING



NOTE: Ensure internal or external bridge/jumper is present

See Model X101D for details and dimensions

SPECIFICATIONS

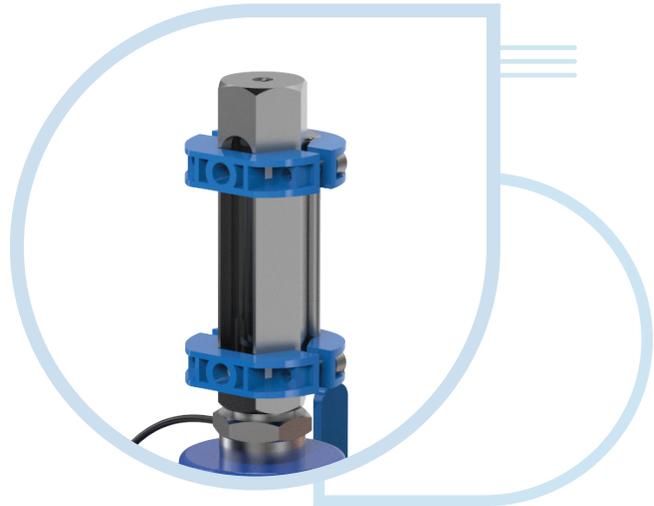
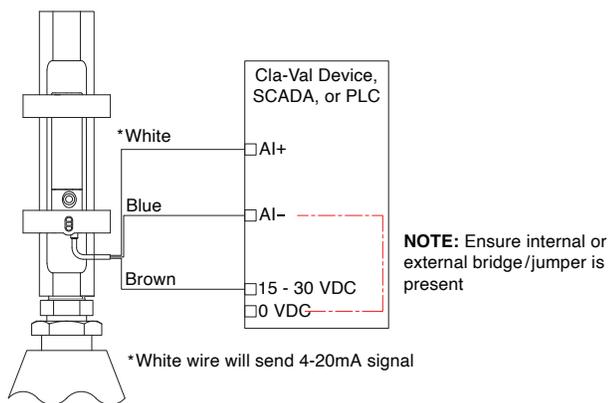
- Fits Valve Sizes:** 1-1/2" to 16"
- Enclosure:** IP-68 Water Resistant up to 6.6 ft (2m) for 1 Month
- Temperature Range:**
 - Ambient Temperature: -13°F to 185°F (-25C to 85C)
 - Fluid Temperature: 32°F to 185°F (0C to 85C)
- Electrical Conn.:**
 - Cable Length: 6.6 Feet (2m)
 - Power Supply Voltage 15-30 VDC
 - Output Signal 0-10 VDC
- Parameters:**
 - Pressure Rating: 360 psi max
 - Accuracy: $\pm 100 \mu\text{m}$
- Standard Materials:**
 - Site Tube: Pyrex
 - Site Tube Housing: 316 Stainless Steel

PRODUCT FEATURES

- The Cla-Val Model X117H Valve Position Transmitter is an accurate monitor of the valve position. Through an industry standard 4-20mA output signals, the X117H delivers the accuracy required for computer-guided control valve systems (SCADA).

WIRING DIAGRAM

See Model X101D for details and dimensions



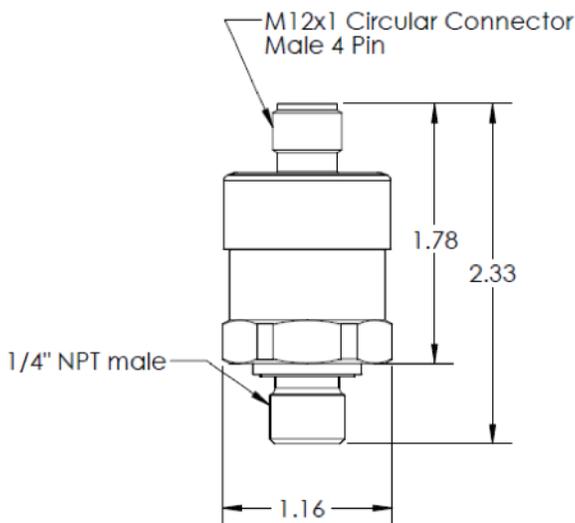
SPECIFICATIONS

- Fits Valve Sizes:**
1-1/4" to 48"
- Enclosure:**
IP-68 Water Resistant up to 6.6 ft (2m) for 1 Month
- Temperature Range:**
Ambient Temperature: -13°F to 180°F (-25C to 85C)
Fluid Temperature: 32°F to 185°F (0C to 85C)
- Electrical Conn.:**
Ambient Temperature: -13°F to 185°F (-25C to 85C)
Fluid Temperature: 32°F to 185°F (0C to 85C)
- Parameters:**
Pressure Rating: 400 psi max
Accuracy: $\pm 100 \mu\text{m}$
- Standard Materials:**
Site Tube: Pyrex

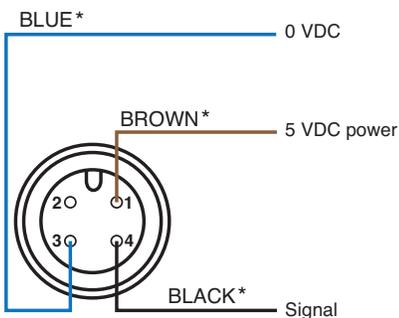
PRODUCT FEATURES

- The Cla-Val Model X141-PTV Option consists of a gauge pressure transmitter installed with isolation valves mounted on the main valve inlet and/or outlet. It transmits the pressure via a 0.5 - 4.5 VDC ratiometric signal.

DIMENSIONS



WIRING



* Wire Color only applicable when using Gray Cla-Val Cable.



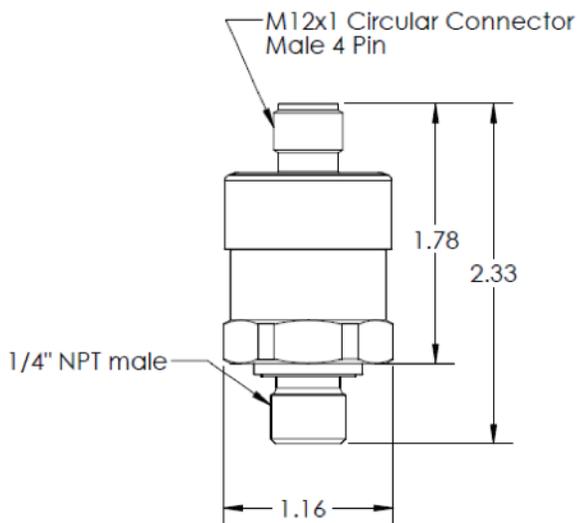
SPECIFICATIONS

- Enclosure:** IP-67
- Process Connection:** 1/4" NPT Male Threaded
- Electrical Connection:** 2 Wire 0.5 - 4.5 VDC Ratiometric
Supply Voltage 5 VDC
Cable Length: 6.5 Feet (2m)
- Parameters:** Pressure Ranges : 0-290 psi
Accuracy $\pm 0.25\%$ of Span
(per IEC 61298-2)
Pressure Overload 2X Max Scale
- Temperature:** Ambient Temperature:
-40°F to 176°F (-40C to 80C)
Fluid Temperature:
32°F to 176°F (0C to 80C)
- Wetted Material:** 316 Stainless Steel

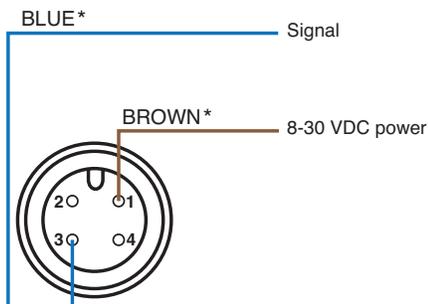
PRODUCT FEATURES

The Cla-Val Model X141-PT Option consists of a gauge pressure transmitter installed with isolation valves mounted on the main valve inlet and/or outlet. It transmits the pressure via a 4-20mA signal.

DIMENSIONS



WIRING



* Wire Color only applicable when using Gray Cla-Val Cable.



SPECIFICATIONS

- Enclosure:** IP-67
- Process Connection:** 1/4" NPT Male Threaded
- Electrical Connection:** 2 Wire 4-20mA
Supply Voltage 8-30 VDC
Cable Length: 33 Feet (10m)
- Parameters:** Pressure Ranges : 0-290 psi
Accuracy $\pm 0.5\%$ of Span (per IEC 61298-2)
Pressure Overload 2X Max Scale
- Temperature:** Ambient Temperature: -40°F to 176°F (-40C to 80C)
Fluid Temperature: 32°F to 176°F (0C to 80C)
- Wetted Material:** 316 Stainless Steel



Global Locations



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