Application Note

Monitoring Cla-Val PRVs

with Cla-Val X144 FlowMeter

Features	Products	Measurements
• Wireless communication • Battery powered • Submersible enclosure • Computation of flow • Convenient installation	• Telog Enterprise • Telogers for Windows • Ru-33 Recording Telemetry Unit • PT-485 Pressure Sensors • Cla-Val X144 e-FlowMeter	• PRV inlet/outlet pressure • PRV differential pressure • Interval flow • Flow totals

Application

Pressure reducing valves (PRVs) are used throughout water distribution systems to reduce pipeline pressure to a predetermined set point. This decreases water loss and prevents pipe breaks.

Over time, PRVs like any mechanical device, will need to have routine maintenance performed. Monitoring the operation of the valve will help ensure that the valve is working properly, thus ensuring the integrity and optimum performance of the water distribution system.

Solution

Telog Instruments offers a high performance RTU, along with the Cla-Val X144 e-FlowMeter, to monitor Cla-Val PRVs, providing historic performance data, real-time alarms and recording of flow through the valve.

Key features of the Telog RTU/Cla-Val X144 e-FlowMeter monitoring application include:

- Wireless data retrieval via cellular networks
- Battery powered RTU operation
- Submersible RTU enclosure
- Submersible Cla-Val X144 e-FlowMeter
- Inlet, outlet and differential pressure monitoring
- PRV flow computation and totals
- Real-time alarms and historic trend data
- Easy installation

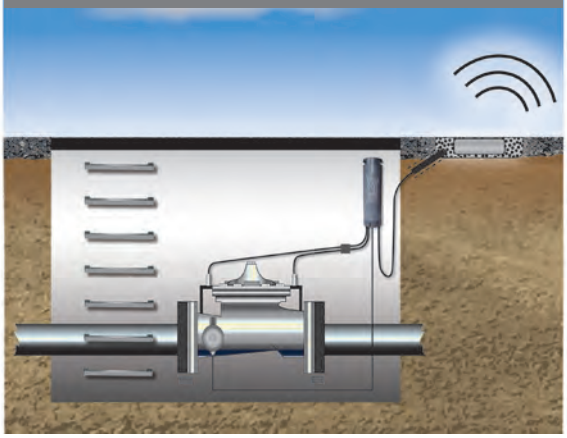
Telog's PRV monitoring solutions include a submersible Ru-33 RTU with two pressure sensor/transmitters and a submersible Cla-Val X144 e-FlowMeter. The pressure sensors provide ¼" NPT fittings for convenient attachment to the PRV's inlet and outlet pressure ports. The Cla-Val X144 e-FlowMeter mounts on either inlet tapping of the PRV. The meter is available in sizes 2" to 24".

Since the Ru-33 is a data recorder, it can sample pressure frequently (e.g. every 5 seconds), compute and store interval statistics (e.g. minimum, average and maximum pressure) at user defined intervals (e.g. every 5 minutes, hourly, etc.) and push this data up to the user's host application infrequently (e.g. once per hour, daily, etc.).

The RTU can also initiate calls to the host server immediately in response to high/low pressure alarm events and/or high/low flow events.

The Cla-Val X144 e-FlowMeter uses the vortex shedding method to measure flow. The meter is inserted into the inlet tapping of the PRV and the measurement cylinder is oriented parallel to the direction of flow. The flow enters the measurement cylinder where it encounters a bluff body, generating vortices, which in turn, deflect off a piezoelectric sensor. The sensor counts the vortices and communicates the data to the meter's integral circuit board where it is converted into a digital pulse that occurs at a rate proportional to the rate of flow.

PRV Monitoring



PRV Monitoring System

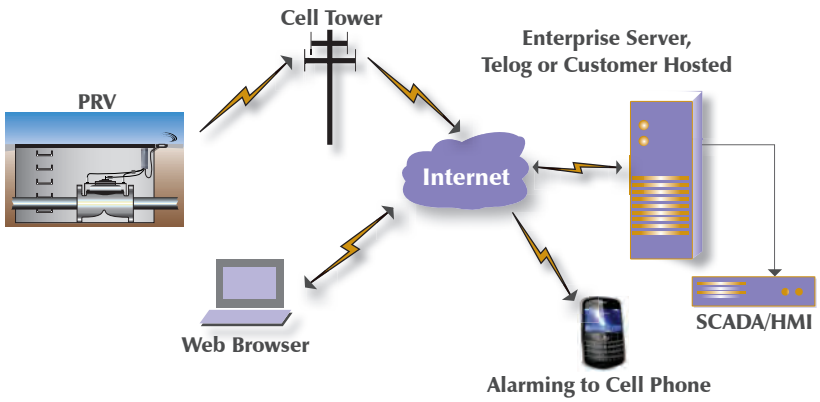


Figure 2

Battery Operation

The Telog Ru-33 runs on user-replaceable batteries and consumes very little power, permitting operation for extended time periods with no maintenance. Power use is kept at a minimum by pulse-exciting the pressure transducers for very short periods whenever a measurement is made. Power to the Cla-Val X144 e-FlowMeter is also supplied by the Telog Ru-33. Data calls are initiated infrequently by the RTU, so the cellular radio shuts down between calls, greatly reducing energy consumed for communications.

By contrast, SCADA system RTUs are typically configured to receive incoming queries for data, so they must power their radios or communications modems continuously. The energy consumption of the Telog RTU typically consumes two orders of magnitude less energy than SCADA system RTUs.

The standard Ru-33 is powered by a single 6-volt lantern battery. Telog also offers an extended body enclosure that will accommodate a custom alkaline battery pack, which will increase battery life by a factor of 4 to 5.

Underground Installation

The Telog Ru-33 RTU, pressure sensors, and connecting cables are rated NEMA 6 (IP-67) and can operate submerged underwater. The Cla-Val X144 e-FlowMeter is rated IP 68 submersible.

Telog also offers a variety of cellular antennas, including a burial antenna that may be installed in the street below the asphalt. This results in a completely underground, battery powered wireless system that is easy and inexpensive to install and maintain.

Flow Computation

The Telog RTU frequently samples pressure and flow from the sensors then computes and stores statistical data at user defined intervals (e.g. 5 minute min/max/average pressures and flow totals), then pushes these data up to the host server on schedule or exceedance alarm conditions.

This flow computation approach is much more accurate than performing the computation in a SCADA host application from infrequently sampled data (every few minutes, for example). Flow is computed and stored as interval data in the RTU, so alarm calls can be generated on high/low flow as well as pressure conditions.

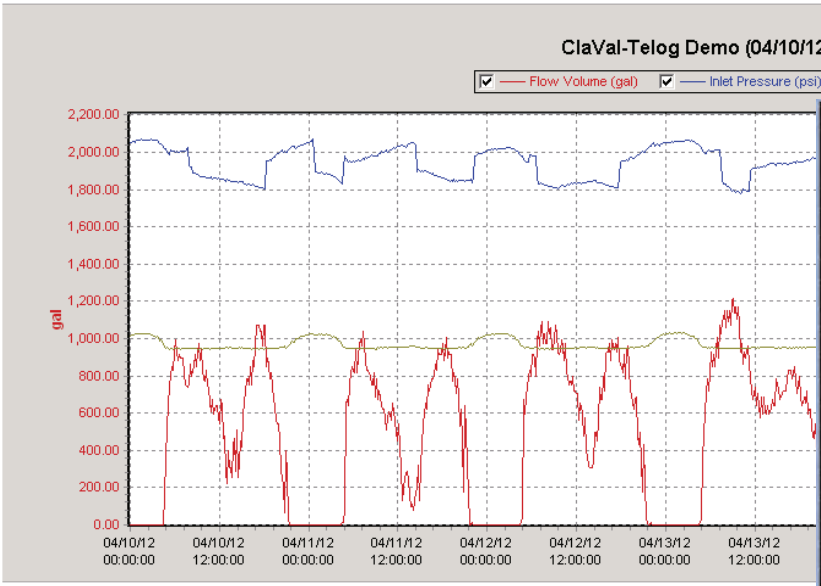


Figure 3

Figure 3 is a graph of PRV flow, inlet, and outlet pressures.

	A	B	C	D
1	Time	Flow Volume (gal)	Inlet Pressure (psi)	Outlet Pressure (psi)
988	04/16/12 20:20:00	752.000	141.465	68.927
989	04/16/12 20:30:00	704.000	141.185	68.860
990	04/16/12 20:40:00	592.000	142.044	69.013
991	04/16/12 20:50:00	512.000	142.568	69.138
992	04/16/12 21:00:00	640.000	141.818	69.128
993	04/16/12 21:10:00	528.000	142.257	68.942
994	04/16/12 21:20:00	272.000	143.336	69.168
995	04/16/12 21:30:00	64.000	144.153	69.443
996	04/16/12 21:40:00	16.000	144.774	69.745
997	04/16/12 21:50:00	0.000	145.323	70.248
998	04/16/12 22:00:00	16.000	145.469	70.083
999	04/16/12 22:10:00	0.000	145.591	70.132
1000	04/16/12 22:20:00	0.000	145.329	71.227
1001	04/16/12 22:30:00	0.000	145.908	71.821
1002	04/16/12 22:40:00	0.000	146.249	72.733
1003	04/16/12 22:50:00	0.000	146.615	72.910
1004	04/16/12 23:00:00	0.000	146.743	72.907
1005	04/16/12 23:10:00	0.000	147.157	73.054
1006	04/16/12 23:20:00	0.000	146.505	73.542
1007	04/16/12 23:30:00	0.000	145.780	73.828
1008	04/16/12 23:40:00	0.000	145.902	73.807
1009	04/16/12 23:50:00	0.000	146.072	73.929
1010	**Minimum**	**0.000**	**129.556**	**68.326**
1011	**Average**		**141.807**	**70.333**
1012	**Maximum**	**2176.000**	**158.329**	**75.161**
1013	**Total**	**585968.000**		

Figure 4

The tabular graph shown in Figure 4 provides interval data in tabular form.