Application Note

# PRV Monitoring with Ru-32

## Features

- Wireless Communication
- Battery powered
- Submersible enclosure
- Computation of flow
- Convenient installation
- Telog Enterprise
- Telogers for Windows
- Ru-32 Recording Telemetry Unit
- PT-3R Pressure Sensors
- PRV inlet/outlet pressure
- PRV differential pressure
- PRV valve position sensor
- Computed flow

### 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 wear and lose their calibration settings. Early detection of the valve's improper operation will ensure system pressures are maintained throughout the system under all flow conditions.

### Solution

Telog Instruments offers a high performance RTU to monitor PRVs, providing historic performance data, real-time alarms and computation of flow through the valve.

Key features of the Telog PRV monitoring application include:

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

Telog's PRV monitoring solution includes a submersible Ru-32 RTU with two pressure sensor/transmitters. The pressure sensors provide ¼ NPT fittings for convenient attachment to the PRV's inlet and outlet pressure ports.

Since the Ru-32 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.

Once the data is received by the host application—Telogers for Windows or Telog Enterprise—it is stored in a database for web site viewing, system reports or sharing with other software applications such as modeling, SCADA etc.

## PRV Monitoring

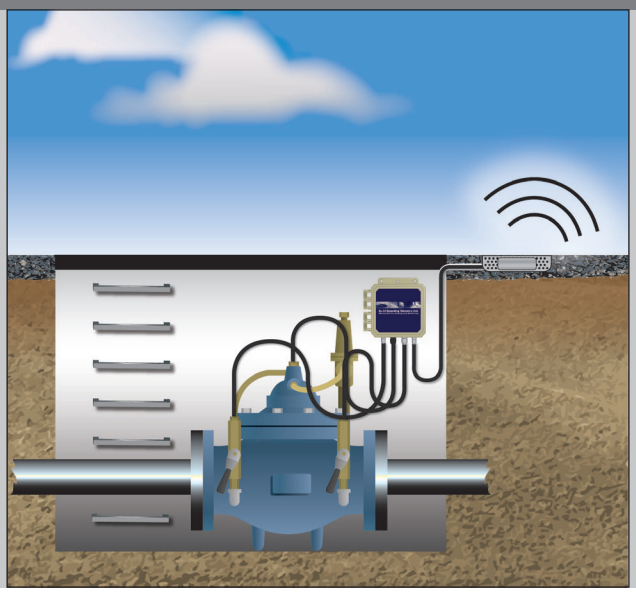

Figure 1

## PRV Monitoring System

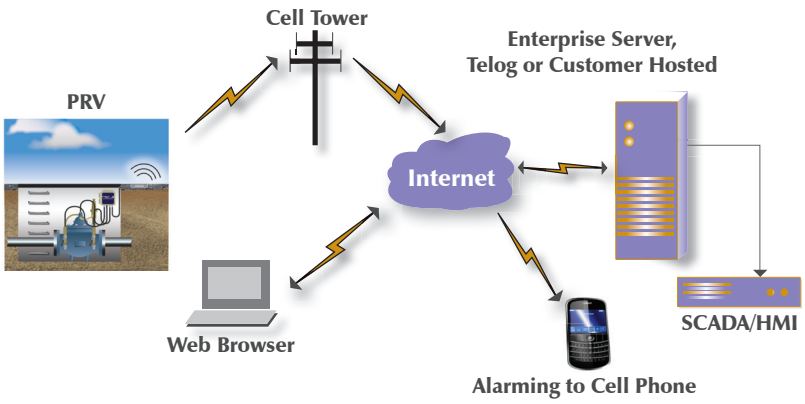


Figure 2

### Battery Operation

The Telog Ru-32 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. 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 Ru-32 is powered from a user replaceable single 'D cell lithium battery. The battery will typically power the Ru-32 for up to 4 years when sampling the sensors every 5 seconds and generating data calls to its host computer on average twice per day

### Underground Installation

The Telog Ru-32 RTU is rated NEMA 6 (IP-67) and can operate submerged underwater. All material that comes into contact with the environment is either plastic or 316 stainless steel, permitting many years of trouble-free service in harsh environments.

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 Ru-32 can also compute flow through the valve when using a "valve position sensor", e.g. the Cla-Val x117dLP. Knowing the valve position which provide a % open measurement and the valve flow characteristics (provided by the valve manufacturer) and the differential pressure across the valve (computed from input and output pressure sensors) the Telog RTU and host software Enterprise can compute flow through the valve.

The Telog RTU can compute differential pressure across the valve from the two pressure sensors (inlet and outlet), measure the valve open position, and then compute flow through the PRV using the valve manufacturer's algorithm and calibration data. Since the computation is performed in the RTU, interval flow totals at user-defined intervals may also be performed in the RTU.

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.

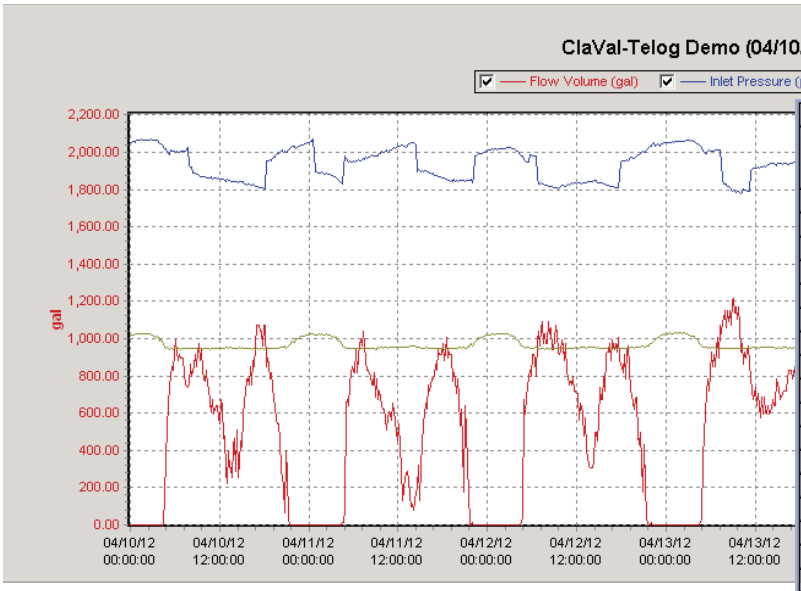


**Figure 3**

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.