

Lift Station Monitoring

Features	Products	Measurements
<ul style="list-style-type: none"> Record & alarm key parameters Accurate pump run time and duty cycle Flow computation w/no flow meters Economic, reliable cellular comm. Typically 1/3 cost of SCADA installation 	<ul style="list-style-type: none"> Telog RS-3xxx Series Telog PT-3V Pressure Transmitter 	<ul style="list-style-type: none"> Power Pump Runtime Level Line Pressure Temperature & Vibration PLC Interface

Application

Lift stations are remote pumping facilities that move wastewater from lower to higher elevation. Monitoring lift stations is important to collection system operators to:

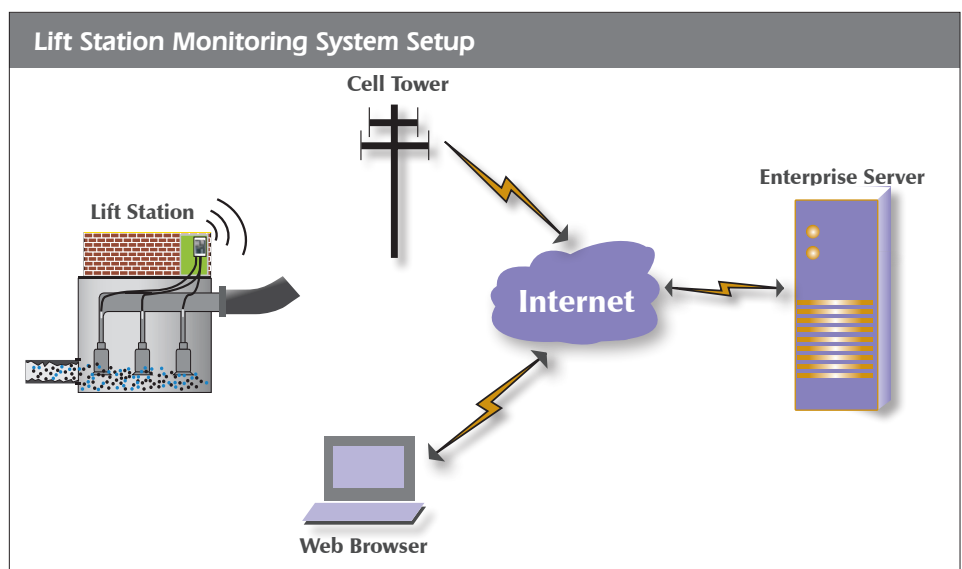
- Obtain real-time alarms on:
 - Pump failures
 - Wet well overflow
 - Station tamper or vandalism
 - AC power failure
 - Generator power failure
 - Pump temperature and/or vibration exceedance
- Ensure pumps are functioning properly and sized correctly
- Optimize energy efficiency
- Track station flows

Solution

A comprehensive lift station monitoring system provides information to Operations, Maintenance, Collections and Modeling groups within a utility. This includes:

- Real-time alarming
- Time-stamp event data
- Trend data
- Station flow history
- Pump cycle data
- Pumping rate history
- Pump energy efficiency history
- Site diagnostics

Telog offers an economical remote monitoring system for lift stations. The Telog system collects information on station operation and provides a combination of real-time alarms and historic data pump activity, pump performance, station flows and station alarms. Information is shared with interested parties via:



- Web server access
- Email and/or SMS message alarms
- Daily, weekly, monthly reports
- Data sharing with third party applications (modeling, SCADA, etc.)

Data is automatically collected from lift stations using Telog RTUs then transferred to a central Telogers Enterprise server via a choice of communication technologies including packet switched cellular, landline telephone, radio or Ethernet. Data may be transmitted on a user defined schedule and/or immediately on detection of a station alarm.

Information is stored for archival use in the Enterprise SQL database to share with other applications (e.g. SCADA, modeling, billing) and made available to users in report format or graphical presentations on a web site.

RS-3314 Monitoring Lift Station



Event + Trend Data

A key parameter of interest at lift stations is pump run time; how often the pumps cycle; the duration of each cycle and their cumulative run times.

Telog RTUs record the time stamp of each pump on/off event to one second resolution. This information permits computing cycle and cumulative run times accurately.

This event recording approach is superior to the SCADA RTU pump monitoring methodology which typically polls the pump on/off at intervals of once per minute or even less frequently providing at best one minute cycle time resolution.

Monitoring pump operation to one second resolution allows the Telog RTUs to generate alarms when pump cycle times vary from nominal. It further allows the Telogers Enterprise application to compute, report and alert on statistical parameters such as comparative cycle run time against historic operation and vs. other pumps at the same station.

For example, tracking the daily cumulative run time between two identical pumps at the same station permits generating operating alerts when the run-time ratio of the two pumps begins to diverge.

Measurements

Telog RTUs monitor three types of inputs or measurements:

- Analog signals - wet well level, temperature, vibration, etc.
- Digital alarm inputs - level exceeded, generator fail, etc.
- Digital pulse inputs - rain gauge tip, flow meter frequency, etc.

If the station is configured with sensors (wet well level, flow, pump on/off contracts, etc.) the Telog RTU can pick up these signals for recording and alarming. Telog also offers sensors for the following measurements:

- **Wet well level** - Telog offers both ultrasonic and pressure level sensors for installation in wet wells.
- **Pump on/off** - A snap-on CT (split-core current transformer) that can be clipped over one leg of the pump power leads to detect the pump on/off status or an uncommitted relay contact from the pump controller can be directly connected to the RTU digital input.
- **Pump power** - A snap-on CT that produces an analog signal proportional to pump current. Single phase current may be scaled up to total pump power assuming the motor is balanced and line

voltage is relatively stable. Alternatively, Telog can provide a three phase voltage/current monitor transducer with three CTs.

- **Line pressure** - A pressure sensor with 1/4 NPT SS fitting for installation on force mains.
- **Temperature & vibration** - Sensors to monitor and trend pump temperature and/or vibration for early failure detection.
- **Rain gauge** - Tipping bucket rain gauge (six or eight inch bucket).
- **PLC interface** - Collect measurement and alarm data from PLCs installed at the station, e.g. via MODBUS protocol.

Station Flow Algorithm

For lift stations that employ fixed speed pumps and have well defined wet well geometry, the Telogers Enterprise application can compute the pumping rate of each pump and the flow through the station.

The Enterprise flow algorithm examines the history of each pump cycle then statistically determines the pumping rate of each pump daily. This pump rate along with the pump run time is used to compute station flows.

Enterprise stores the station flows as historic trend data which can be rolled up in flow reports for example as hourly, daily, monthly flows, etc. Enterprise also tracks the daily pump rate of each pump which can be an early warning indicator of needed maintenance.

Date	Pump 1					Pump 2						
	Rate (gpm)	Count	Avg On Time (mins)	Max On Time (mins)	Total Run Time (hours)	Duty Cycle	Rate (gpm)	Count	Avg On Time (mins)	Max On Time (mins)	Total Run Time (hours)	Duty Cycle
03/19/2008	122.79	92	5.52	35.40	8.47	35.3%	126.30	93	4.23	12.05	6.57	27.4%
03/20/2008	124.22	116	3.43	5.12	6.64	27.7%	126.82	115	3.22	4.40	6.20	25.8%
03/21/2008	124.57	98	3.47	13.28	5.68	23.7%	129.04	98	2.97	6.93	4.87	20.3%
03/22/2008	123.96	92	3.18	8.58	4.89	20.4%	128.74	92	2.78	5.88	4.27	17.8%
03/23/2008	123.59	90	3.50	8.58	5.26	21.9%	127.35	91	3.05	5.05	4.65	19.4%
03/24/2008	122.87	79	2.27	3.93	2.99	12.5%	126.21	81	2.17	2.47	2.93	12.2%
03/25/2008	121.20	80	2.67	4.97								
03/26/2008	121.72	91	2.93	4.67								
03/27/2008	120.54	70	2.15	2.42								
03/28/2008	120.05	91	2.55	3.87								
03/29/2008	119.95	85	2.92	6.75								
03/30/2008	119.54	85	2.88	7.20								
03/31/2008	119.88	89	5.02	90.58								
04/01/2008	119.17	104	3.27	9.23								
04/02/2008	121.06	95	2.75	4.73								
04/03/2008	121.66	89	2.67	4.52								
04/04/2008	122.61	89	2.87	5.43								
04/05/2008	122.16	94	2.90	5.65								
04/06/2008	121.05	85	2.27	2.63								
04/07/2008	121.48	84	2.60	4.15								
04/08/2008	121.91	81	2.52	3.93								
04/09/2008	120.74	79	2.58	4.10								
04/10/2008	119.89	77	2.52	3.78								
04/11/2008	119.23	83	2.97	11.22								
04/12/2008	119.23	139	3.07	24.57								
04/13/2008	117.80	152	3.67	7.00								
04/14/2008	116.26	146	2.92	4.63								
04/15/2008	114.08	72	2.08	2.68								
04/16/2008	113.18	2	0.28	0.52								
04/17/2008	113.86	1	0.58	0.58								
04/21/2008	118.45	9	0.82	2.95								
04/23/2008	119.01	35	2.12	4.12								
04/24/2008	119.29	65	2.80	10.45								
04/25/2008	119.57	68	2.67	8.95								
04/26/2008	119.85	79	2.87	6.28								

Pump Station Report

