How to save costs with simple, effective data management

Water and wastewater utilities must monitor numerous aspects of their systems on a continuous basis. Various instruments are used to measure these processes, producing volumes of data every day.

To provide information for operations and meet regulatory requirements, this data must be quickly accessed, recorded, and stored. Often, the data may also be used for automated control of the system. Data loggers and data managers are cost effective ways to transmit and store data and provide system control.

Endress+Hauser is a leading supplier of products and services for process measurement and automation. Water Online spoke with three of Endress+Hauser's experts to find out how data loggers and managers can save costs while providing effective data management. Alan Vance, Industry Manager – Environmental; Keith Riley, National Product Manager, Pressure and Temperature; and Tim Schrock, Americas Area Manager for Temperature, Recorders and Components answered questions about this important topic.

How do data loggers and data managers work?

Generally speaking, these devices will take an input signal (analog, pulse, or digital) from one or multiple instruments. Based upon customer-defined intervals, this information is then stored for later retrieval and review and/or displayed "live" via the localized human-machine interface (HMI) screen. The data to be reviewed can be transmitted electronically via an integral web server or using external storage devices such as an SD card or flash drive. For example, a 4-20mA output signal representing water flow or tank level would be the input to the data logger/manager.

How are these devices typically used in the water and wastewater industry?

A very common application is to add a simple battery-powered data logger to remote areas that do not have power available. For example, a municipality may want to monitor lake level in a remote area using a level transmitter (battery or solar). It would then use a simple data logger to record the level data over a period of time and have that data available to review and store.

What is the difference between a data logger and a data manager?

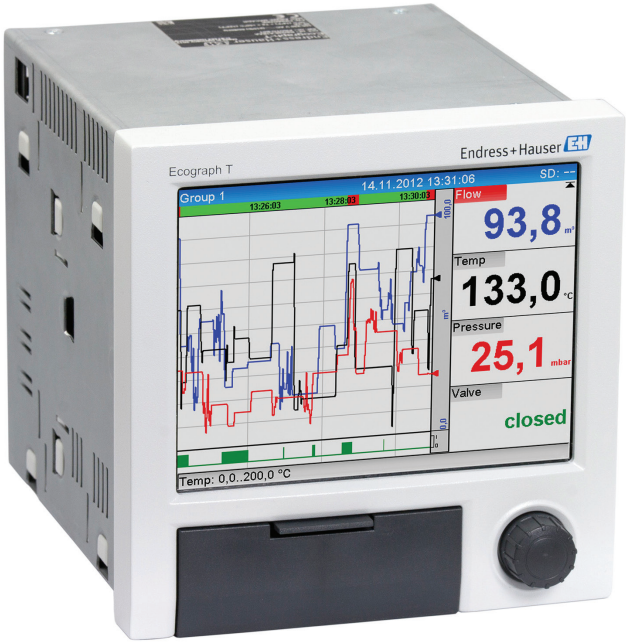
Data loggers are very simple devices that store (log) "x" number of measured values (time-stamped) from either an analog or digital input. The devices may be either battery-powered or hard-wired. Typically, data loggers are used in stand-alone or remote-type applications.

Data managers provide a higher level of functionality. Just like data loggers, data managers store data, but also: display and trend the data; perform math functions such as totalization; and allow easy integration into a municipalities control system. Data manager math channels can perform more complex calculations such as pump control, differential pressure (dP) flow, open-channel flow, or energy management. Control strategies are realized using various outputs options such as analog, digital, or relay.

How are these devices able to integrate with a variety of existing sensors and equipment?

Specification of up to five individual channels, each with four individual inputs, allows data managers to integrate with a variety of instrument output signals: voltage, RTD [resistance] thermocouple, pulse, 4-20mA analog, and Highway Addressable Remote Transducer (HART) protocol.

In the case of HART-capable instruments, the communication can be from the instrument to the data manager and from the data manager to the instrument. Consequently, it is possible to diagnose issues and change individual instrument settings through the data manager using published instrument device type managers (DTMs) or drivers.



Ecograph T RSG35 - Universal Graphic Data Manager

How do operations personnel access current and historical information from the data managers?

The information captured by the data manager can be relayed to separate control systems or historians in a variety of manners.

1. SD card or flash drive [historical]
2. Download directly from the data manager via integrated web server [historical]
3. Stream live data using a variety of communication protocols
   a. Modbus
   b. Profinet
   c. Profibus DP
   d. EtherNet/IP
   e. Integrated web server

How do these devices ensure security of the water and wastewater data?

All the data managers will come equipped with a feature called "User Administration." With this feature, only authorized personnel will be able to make changes or access data from the device via a username and password. The accompanying software needed to extract the data, Field Data Manager, will also come with this feature. This will ensure that only authorized personnel will be able to extract the historical data from the device.

Are data loggers and data managers capable of being used outdoors or in corrosive or hazardous atmospheres, such as lift stations or chemical handling rooms?

Yes, there are a variety of enclosures available that will satisfy nearly every installation scenario.

1. Panel mount for integration into a control panel
2. Field mount—a standalone housing constructed of thermoplastic polycarbonate and chrome-nickel stainless steel offering IP65/NEMA 4 ingress protection
3. Desktop—a more portable option using a combination of sheet steel and aluminum as well as an integral handle for ease of handling

Are data managers capable of performing both systems monitoring as well as systems control?

As previously described, data managers are much more than data collection devices. Endress+Hauser's Ecograph T RSG35 and Memograph M RSG45 data managers can perform semi-complex calculations based upon individual or a combination of inputs. The results of this information can in turn be used to initiate actions via relay or analog output functionality.

This includes, but is not limited to, TeleAlarm functions available via email or SMS messages using either the integral web server or a separate GSM [GPRS] modem, which is similar to a mobile phone.

How do data managers compare to programmable logic controllers?

Programmable logic controllers (PLCs) continuously receive information from connected sensors and make decisions based upon a custom program before sending an output. PLCs are typically associated with "control." Data managers, as discussed earlier, will store, trend, display, and output data, along with performing simple control strategies as well.

Both data managers and PLCs provide excellent customer value in the correct circumstances. PLCs certainly have a higher level of calculation and control capability than do data managers. However, this level of service is not always necessary. For those instances where more localized and/or limited control is required, a data manager could be a much more cost-effective option.

RSG45 data managers differ from PLCs in that they can also function as a gateway device. Data managers can gather multiple signals from a variety of instruments and transmit this live data via the desired protocol: Profinet, Profibus DP, or EtherNet/IP.

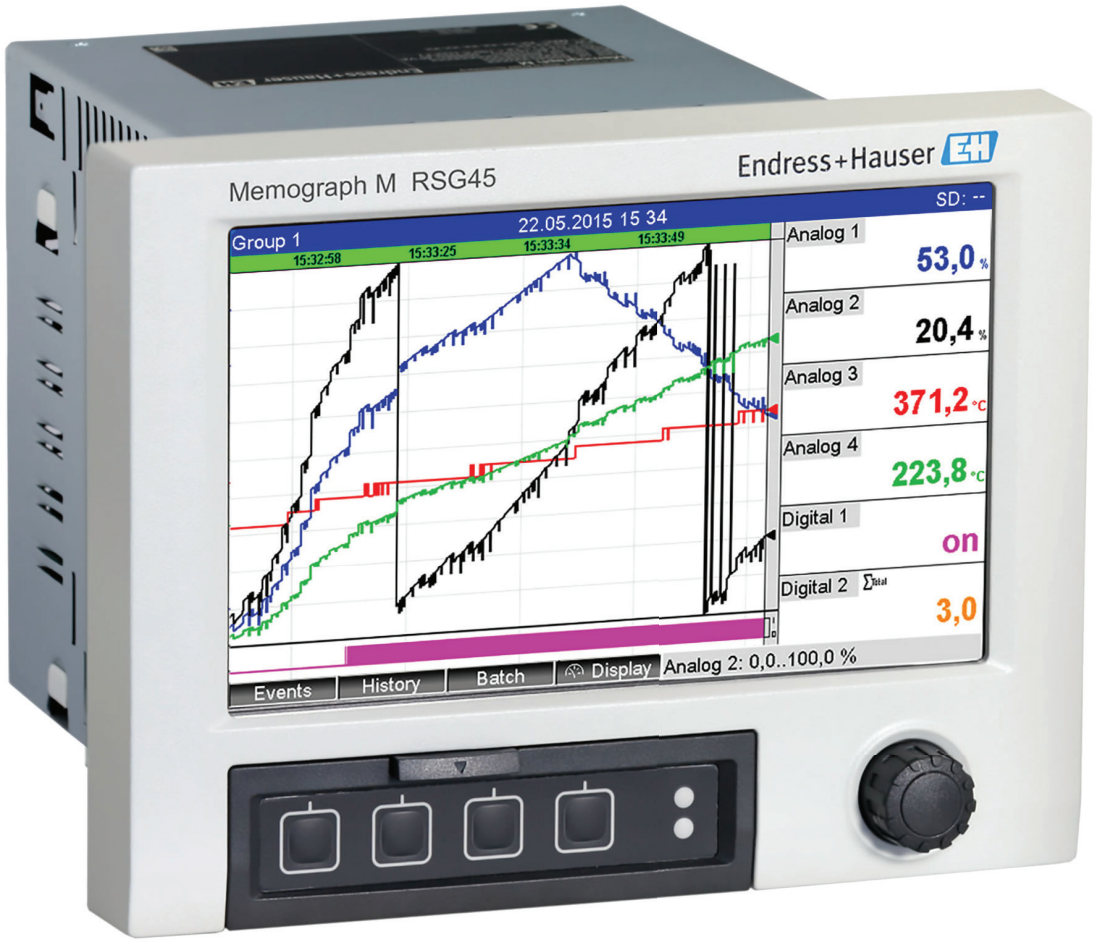
In the case of EtherNet/IP, it will allow a utility to update its control system without the need to update tens or hundreds of individual instruments. A properly configured and equipped data manager will bring legacy instruments into an EtherNet/IP control system environment.

How can the use of data loggers and data managers save utilities time and/or money?

For the remote applications described above, features like the TeleAlarm will be able to alert operators of possible issues in real time. This will allow operators to act immediately as opposed to waiting for the next trip to the location, which could be very costly depending on the issue.

Taken a step farther, the embedded web server and HART functionality of the RSG45 data manager will allow a utility's technicians to diagnose and troubleshoot HART-capable instrument issues remotely. This can save time and money by:

1. Eliminating the need to send a technician to a remote site to simply troubleshoot, not necessarily fix, an issue
2. Ensure that if a technician does need to travel to the remote site, they have the necessary components/tools needed to quickly and efficiently resolve the problem



Memograph M RSG45 - Advanced Data Manager

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