CAS DATALOGGERS

Guide to Saving Time with Intelligent Data Logging

How to Simplify Data Analysis and Find Answers Quicker

When trying to define intelligent data logging, it's useful to compare it with traditional data logging. In the past, data loggers or recorders would typically be configured to sample a set number of channels at a fixed rate and store the recorded values in memory. The data could then be downloaded to a PC afterward and analyzed to identify trends, anomalies, and other events. The analysis was often very time-consuming, requiring the user to weed through thousands or millions of data points to find a region of interest to study. Consider for example a data logger that measures 2 inputs once a second; within one day this would fill more than 86,000 rows in a Microsoft Excel spreadsheet. Now imagine several months' worth of data or a higher speed logger that samples at 100 to 1000 Hz. This amount of data can simply overwhelm the user and analysis becomes a task of finding a needle in a haystack.

With advances in technology and computing power, modern data loggers such as the dataTaker DT80 or Delphin Expert Logger 100 can dramatically reduce the amount of time and effort required to extract critical information. These "intelligent" data loggers incorporate several features that allow them to go well beyond the functionality of a traditional data logger to help zero in on what the user is looking for. The key is separating the raw data from the information it contains, which is what the user is after.

Intelligent Data Logging Functions

One intelligent data logging feature is having multiple, flexible sampling schedules that allows the measurement and recording of data to be tailored to each specific application. In many instances, there are some parameters of interest that may change slowly, such as the temperature of a large furnace or the level in a tank. Other parameters may change much more rapidly, such as the pressure or flow rate in a fluid line. By allowing multiple sample rates, intelligent data loggers can be configured to match the sample interval to how fast the data changes, eliminating redundant data. In the example above, it may take several minutes for the level in a large storage tank to change by an inch or two while the flow rate into or out of the tank may change

dramatically over a few seconds. Sampling both at the same rate generates a large amount of data for the level that is redundant.

Other sampling techniques include adjustable or adaptive sampling schedules that allow the data logger to change the sample rate or the number of inputs to be measured based on an external event or the value of a measured parameter. This allows the data logger to only record data when it's meaningful. Often, it's not the individual data points that are important, but rather the overall behavior over some period.

Simple statistical techniques can be used to reduce the mountain of data down to a few salient point values that convey the same information. Intelligent data loggers can measure hundreds of data points of a specified period and then report information such as the minimum and maximum values, the average and standard deviation of the measured points, and even the date and time of minimum or maximum values. Some loggers even include the ability to bin data into histograms to provide a clear picture of the distribution of measured value over some period. Imagine if you were monitoring the temperature of a storage freezer every five minutes and you wanted to look at a months' worth of data—would it be better to sort through 8,600 data points or a simple report of minimum, maximum and average for each day consisting of 90 points; almost 100x less!

Today's intelligent loggers also incorporate the ability to perform calculations on the measured values. This can be as simple as calculating and recording the difference between two measured values. For example, the temperature of fluid coming into and flowing out of a heat exchanger or integrating the output of a flow rate sensor to compute total flow volume. Combining this with flexible scheduling capabilities enables an intelligent data logger to capture instantaneous flow rate plus flow volume totalized on an hourly, daily, week and/or monthly basis. Of course, this could be done in a spreadsheet, but wouldn't it be much easier to download a file once a month that already had all the data summarized in form ready for presentation or archiving?

Finally, a very powerful feature of intelligent data loggers is flexible alarm programming. While many data loggers allow simple alarms based on whether a value is above or below a preset limit, intelligent data loggers provide greatly expanded capabilities including alarms that are based on the value of multiple inputs, rate of change of an input, calculated values, time of day or a combination of all of these. These alarms can do much more than simply throw up a flag—they can enable or disable other measurements, turn one or more outputs on or off, send an email or text, or change the operating mode of the logger.

By using the capabilities of a modern intelligent data logger, it is possible to minimize the amount of raw data that must be manually analyzed and to maximize actionable data that contains the essential information that the user was after when they installed the logger. Alarms can be configured to provide immediate notification of out of limit conditions while minimizing the number of false trips.

Internet-Enabled Data Logging

Additionally, the latest generation of intelligent data loggers offers internet connectivity to enable a whole new class of applications. These devices can publish real-time or historical data via built-in web servers as well as send email and SMS messages. In the past, if engineers wanted to publish data collected by the device, it had to be taken back to a computer and processed there, but modern data loggers incorporate an internal web server. Using a standard web browser on a PC or smartphone allows a user to retrieve the current measured values, status, alarm, and error information. For example, imagine a data logger connected to a weather station that not only records meteorological data but also publishes a web page showing the current conditions all on its own.

By combining an intelligent data logger with a cellular modem, it's possible to build a system that can transmit alarm messages that not only communicate the nature of the alarm but actual measured values. An example from the popular dataTaker family is the DT80M intelligent logger, which features a built-in 3G modem to handle remote data logging applications where conventional access to the logger is difficult and for mobile applications in vehicles.

This allows the user receiving the message to determine both the nature and the severity of the condition and decide if urgent action is needed or if it's a minor issue that can be dealt with in due course.

More Than Just Recording

Modern environmental data loggers can do much more than simply sample and record measurements at a single fixed rate as did previous generations of these devices. Enhanced processing power combined with predefined math, statistical and alarm functions and flexible programming interfaces, allow them to process measured data locally, reduce the volume of data being stored, and generate actionable information. Intelligent data loggers can also make complex conditional decisions based on

incoming data, execute simple control functions, and generate alarm and email messages based on user-defined criteria. The latest generation of products even includes web servers making the data available to a much wider audience via standard tools. By using these capabilities, users can dramatically improve productivity by reducing the time and effort required to get the information they need to do their job efficiently.

For further information on intelligent data loggers, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Applications Specialist at **(800) 956-4437** or visit the website at www.DataLoggerInc.com.