

Testing Dishwasher Performance Using Modular Data Acquisition

Delphin TopMessage Customizable Real-Time Systems

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CAS DataLoggers recently supplied the data acquisition solution for a customer operating a test laboratory to gauge the performance of residential dishwashers. The lab contained over 40 test bays for testing several different dishwasher models. Specialized equipment in these bays monitored water consumption and water temperatures of the dishwashers during the different washing cycles. Temperature measurement was conducted with type K thermocouples and the water consumption was measured using flow sensors with pulse signal outputs. Test leads searched for a high-speed data acquisition system capable of interfacing with these sensors with highly accurate measurements, fast signal processing capability, and intuitive, simple configurability and operation. The customer planned on integrating additional test bays requiring more inputs in future, and therefore required a modular system so that they could upgrade the system easily with more input and output channels when the need arose.



The customer developed an integrated application using **Delphin TopMessage data acquisition and control systems**, installed in a control cabinet in the test laboratory, in combination with ProfiSignal Basic software. The TopMessages' compact designs ensured an easy fit into the cabinet, with the entire measurement systems consisting of 1 TopMessage acting as a master device and 3 TopMessages acting as slave extensions. The customer was offered a range of specific modules, deciding on 4 ADVT modules enabling Type K thermocouple measurement and 4 DIOT modules allowing pulse/flow rate measurement to determine the water consumption. The thermocouples and flow sensors were connected directly to the devices without the need for any intermediate converters.

The Delphin system architecture consisted of a PC running ProfiSignal connected via LAN with the master TopMessage which connected with the 3 slave TopMessages via CAN-bus. 40 flow sensors with a pulse output of 0-1000 Hz were connected via DIOT modules to one of the slaves, and 40 type K thermocouples measuring the water temperature via ADVT modules were connected to another slave.

The stand-alone TopMessage devices formed a modular and scalable system with high accuracy and up to 24-bit resolution with true differential inputs as well as 2 slots for analog or digital input or output cards and a CANbus for expansion modules. Housed within industrial-grade enclosures, the

TopMessages also featured signal conditioning, an Ethernet interface to connect to a PC for data analysis, and screw terminals for secure connections.

Test engineers found the Delphin ProfiSignal process visualization and monitoring software easy to use, so much so that the customer was able to develop the whole application themselves. The powerful software channels configured inside the TopMessage calculated the flow rate and overall water consumption directly on board level. The data storage was triggered for every bay individually through command buttons inside the application, and the data of every test cycle was recorded onto the 1GB TopMessage internal memory with a capacity of 128 million data records. Additionally, the data of every test cycle was archived automatically to a database with the ProfiSignal application by using the built-in recorder function. The application was organized in 7 bays, and every bay could be operated individually by using the corresponding start/stop buttons. With the overall control screen, the operator saw the status of each bay along with the current water consumption. Using additional navigation buttons, the engineers were able to open a trend diagram to see the consumption, flow rate and temperature--all displayed in an online trend.

The customer realized several advantages after installing the Delphin TopMessage data acquisition systems in their test lab. Initially the customer was offered a range of I/O modules to select the best ones for their application, with different modules available for any number of channels and sensor types. The TopMessages made for an easy install, so much so that the first test run was performed soon after installation. Likewise, the configuration of all the temperature sensors was equally hassle-free since no additional converter and signal conditioning unit was required. Another major benefit was the TopMessage's modular design which enabled future expansion of the testing program with additional inputs and outputs. All in all, plant engineers found that the TopMessage data acquisition system was both dependable and highly accurate, and operators relied on the user-friendly ProfiSignal Basic software for a complete automation and reporting solution. ProfiSignal also set up convenient online mimics to monitor temperatures in each bay, as well as on/off status, with an operation similar to Windows Explorer. Additionally, a network interface enabled the TopMessage systems to be integrated into a TCP network or to be directly connected to a PC workstation or laptop/netbook computer.

For more information on the Delphin TopMessage data acquisition and control system, other sophisticated data acquisition devices, 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.

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