

## Quality Assurance Using High-Precision Vacuum Pumps

### **Delphin TopMessage Modular Measurement Data Acquisition System**

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**CAS DataLoggers** recently provided the data acquisition systems solution for a company providing vacuum solutions for a wide range of modern production and analysis processes as well as in research. The company's high-quality products found use in everyday devices such as TVs, light bulbs, and air-conditioning units, and also high technology processes including CD/DVD manufacture and medical instruments. Their core competence was the development of systems for vacuum generation and processing gas extraction, placing high levels of quality and precision not only on their own products but also on the technical equipment used for vacuum production and development. At the testing department, the lab team had set up a large test bench where the company inspected its vacuum systems as early as the development stage. Complex testing procedures delivered important data to project engineers including electrical values, vacuum performance, volume flow rates, etc. which enabled them to determine the limit values of their products. These trials then established the parameters that would be used at the final inspection. Development was never at a standstill at the company, with the latest trends moving towards dry compressing fore pumps. In response, management began planning to increase production of these pumps, realizing that this required the best quality assurance procedures, which in turn required cutting-edge data acquisition systems capable of extremely sophisticated measurements and featuring powerful yet user-friendly data acquisition and evaluation software.



The company installed a **Delphin TopMessage Data Acquisition and Control System** in its final vacuum pump inspection department where all systems were precision-tested following their assembly. The TopMessage device was used to acquire and record data provided by the pumps.

The TopMessage device processed any signal quickly and reliably from just a few thermocouples right up to thousands of measurement points. Universal inputs enabled any unit of measurement to be acquired (e.g. temperature, pressure flow, vibration etc.) often entirely removing the need for costly measurement transducers. Data then underwent direct scaling and linearization. Offering universal inputs and outputs with extended functions and software channels, the TopMessage handled 30 analog inputs or 48 digital inputs and could connect up to 10 slave devices for extended functionality, making it ideal for both small and large applications requiring the processing of thousands of channels. This modular and scalable system featured high accuracy with up to 24-bit resolution and 2 slots for analog

or digital input or output cards as well as a CANbus for expansion modules. Housed within an industrial grade enclosure, the TopMessage also featured signal conditioning within the device, an Ethernet interface, and screw terminal connections.

Master and slave devices each accommodated two I/O modules. The customer was presented with a range of I/O modules to select the best one for their application, with different modules available for any number of channels and sensor types. A network interface enabled the TopMessage device to be integrated into a TCP/IP network or to be directly connected to a PC workstation or laptop/netbook computer. Online measurement data could be transmitted, saved and processed, and the data could be stored simultaneously within the TopMessage device itself on its local memory.

To observe what was running when, the company's vacuum pumps were equipped with a guard which provided constant monitoring of the entire system, giving users early warning of any possible pump malfunctioning. The guard had a serial interface which was connected to the TopMessage device at the test bench, which in turn recorded and reported all important data. The output was then archived for internal use. These reports allowed the company to document their equipment's condition at the date of supply, which was useful for future customer queries.

Additionally, the TopMessage system was upgraded to include ProfiSignal Basic universal software for data acquisition, test automation and data acquisition applications. This software's wide areas of application ranged from simple data storage and visualization to a complete automation solution offering reporting. ProfiSignal Basic was easy to configure by PC, and plant engineers found the representation of the channels to be clear and intuitive with a Windows Explorer-style operation. The software was also used to set control parameters enabling automated test procedures to be performed. Management quickly switched from the older MHouse software to ProfiSignal because it offered so many major benefits: this one software package covered all project requirements. The laboratory head explained the situation at the test bench: "Here we can use ProfiSignal to select a start-time for test profiling to begin. This has been set at night so that by the morning we will have a pump ready to be inspected at operational temperature."

All the functions provided by ProfiSignal were utilized in this application, while the TopMessage hardware performed the important control tasks, as the device functioned without the need for any PC support. Operation, visualization and parameter settings were all performed with ProfiSignal running on a PC. Setup was easy: the software enabled developers to generate systems for tasks which previously could only be met by setting up complex control systems. ProfiSignal was neatly structured according to projects, applications and analysis diagrams, and a structure diagram could be generated with just a few mouse clicks for the vacuum pump test procedures. ProfiSignal had simplified the lab's test procedures,

with each task within a test procedure represented by blocks which acted as containers for program code. Clicking the container allowed access to the code, enabling intuitive programming. The parameter diagrams proved to be just as helpful, enabling a simple method of entering pump test parameters and generating parameter diagrams. Time-consuming tasks such as correcting program bugs or syntax errors became a thing of the past thanks to ProfiSignal's intuitive operation and simple configuration.

The company was entirely satisfied with their new measurement data acquisition system and eventually came to use more than 20 of Delphin's TopMessage units. The TopMessage made for an easy install, and 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, lab engineers found that the TopMessage system was very reliable and highly accurate, and operators were easily able to work with the ProfiSignal Basic software for automation and reporting. Users were offered a tool which helped to warn of imminent malfunctions and to detect long-term changes taking place, thereby enabling maintenance procedures based on the actual condition of the machine.

The company's laboratory head explained, "ProfiSignal can be easily set up and running without any need for specific training, in contrast to the majority of other complex products available on the market. But Delphin's software and hardware is still capable of meeting both our simple and complex measuring requirements. Using the Delphin device has enabled us to considerably shorten lead times from initial planning through to the start-up of our testing procedures."

Check out the Delphin TopMessage product page at [http://www.dataloggerinc.com/products/TopMessage\\_Data\\_Acquisition\\_and\\_Control\\_System/133/](http://www.dataloggerinc.com/products/TopMessage_Data_Acquisition_and_Control_System/133/).

The entire CAS inventory of data acquisition systems can be found at [http://www.dataloggerinc.com/categories/Data\\_Acquisition\\_Systems/26/](http://www.dataloggerinc.com/categories/Data_Acquisition_Systems/26/).

For further information on the Delphin TopMessage data acquisition system, other solutions from Delphin Technology, 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](http://www.DataLoggerInc.com).

#### Contact Information:

CAS DataLoggers, Inc.  
12628 Chillicothe Road  
Chesterland, Ohio 44026  
(440) 729-2570

# CAS DATALOGGERS

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(800) 956-4437

[sales@dataloggerinc.com](mailto:sales@dataloggerinc.com)

<http://www.dataloggerinc.com>