

# Data Acquisition Systems

Data acquisition systems, as the name implies, are products and/or processes used to collect information to document or analyze some phenomenon. In the simplest form, a technician logging the temperature of an oven on a piece of paper is performing data acquisition. As technology has progressed, this type of process has been simplified and made more accurate, versatile, and reliable through electronic equipment. Equipment ranges from simple recorders to sophisticated computer systems. Data acquisition products serve as a focal point in a system, tying together a wide variety of products, such as sensors that indicate temperature, flow, level, or pressure.

**Recorders and Dataloggers** are products used with sensors to document information relating to a process. Recorders usually have a pen that deflects as a percentage of input span, while paper moves beneath it at a defined speed in relation to time. The recorder output is an easy-to-read, continuous trend line. Dataloggers typically print the actual value of the input with a time stamp. The advantages of the datalogger include less paper usage, higher resolution of the reading, and less chance of misinterpretation of the data. Hybrid recorders are instruments that have both trend recording and datalogging ability. Some of these units also include features such as math calculations and communication ability to transfer data to a host computer for further analysis.

**Computers**, which have become so prevalent throughout our lives, have become a major component in data acquisition. Depending on the skill level of the user and the products, the computer can take on several different roles. Two ways to classify computer-related data acquisition products are those that "plug-in" directly into the computer, and those that "stand alone" and interface to the computer through a communication port. In either situation, computer software is always required to instruct the computer on how to handle the data.

**Communication-Based** data acquisition products, those that interface with a computer through a communication port, can range from dataloggers to remote intelligent control systems. The most common communication interface for short distances is RS-232. RS-232 defines serial communication for one device to one computer communication port, with speeds up to 115 K baud (bits per second). Typically 7 or 8 bits (on/off signal) are transmitted to represent a character or digit. The ASCII code provides a standard definition allowing alphanumeric characters to be represented by a string of bits. Other serial communication interfaces include RS-422 and RS-485. Both provide the ability to communicate longer distances with multiple units on the line. Two common parallel communication interfaces are the Centronic and IEEE-488. Parallel interfaces communicate data at 8 or more bits at one time. The Centronic interface is the common parallel interface used to connect printers to a computer. The IEEE-488 interface (also sometimes known as GPIB or HPIB) provides a high speed parallel interface for up to 15 devices.

**Plug-In** computer data acquisition cards plug directly into the computer bus within the computer case. Advantages of using cards are speed (because they are connected directly to the bus) and cost (because the overhead of packaging and power is provided by the computer). Cards offered are primarily for IBM PC and compatible computers. Features provided by the cards can vary due to number and type of inputs (voltage,

thermocouple, on/off), outputs, speed and other functions provided. Each card installed in the computer is addressed at a unique Input/Output memory map location. The memory map in the computer provides the address locations the processor uses to gain access to the specific device as required by its program.

**Software** is a key aspect of any computer. Application software packages allow the user to perform sophisticated functions with minimal effort. For custom applications, users typically write their own software in standard computer languages, such as C++. The latest

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development in computer software is icon-driven software. Icons are picture representations on the computer screen identifying a specific function or device. OMEGA strives always to provide a complete data acquisition offering with the all the products you may need, including the latest developments in the industry.



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