WHY SIZE AND PERFORMANCE MATTER:

A REVIEW OF ELECTRONIC INSTRUMENTS FOR PROCESS INDUSTRY APPLICATIONS

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A larger than ever choice of electronic instruments is available today to meet the wide spectrum of process industry applications. Whether these are at the individual instrumentation level, or are Fieldbus connected plant wide systems, the challenge is to achieve enhanced productivity and profitability.

The essential purpose of all electronic instrumentation is to process information and communicate this in a clear format to human operators. This information can be in the form of an analogue or digital data signal input, and the processing may be simply conversion into a numeric readout. However, the optimum choice of digital instrumentation, for particular process applications, is more challenging today. New factors include the growing adoption of different data communication standards and industrial automation requirements - Whilst complying with quality control, environmental impact and management information requirements.

To understand some of the electronic instrumentation choices better, let us consider examples from three key areas in more detail: individual instruments, localised systems and for the entire plant process.

Instrumentation applications

Still the most common instrument application in the process industry is the conversion of an analogue signal from a process sensor, e.g. a 4...20mA loop, into a numeric value scaled in process units such as temperature, weight, flow, pressure, speed, etc. Such requirements were met previously by traditional electromechanical pointer instruments. In many applications the electronic instrument is required to do more. In particular, to provide outputs from MIN/MAX alarm limits to regulate the process. Another common requirement is the provision of an RS-232 serial data output to interface with a local or remote printer, PC or SCADA system.

Meters, controllers & printers for instrumentation

Local system applications

Localised systems generally have a programmable logic controller or industrial computer system at their heart. These can monitor multiple analogue and digital data inputs, then process the signal information according to their built-in programme and trigger multiple outputs to control the system. But they still need to provide operator information and receive manual input instructions. This is an application area for modern process instruments. While many such units still use standard RS-232, RS-422 or RS-485 serial interfaces, versions are now generally required for use with newer data bus formats. This growing list includes Profibus (Process Field Bus), InterBus, CANopen, ARCNET, AS Interface and Ethernet. Due to their distinct characteristics and features, different process industry sectors, such as automotive manufacturing, have standardised on different bus standards. A typical range of electronic instrumentation offers each of these interfaces, and in a choice of sizes with LED, LCD or VFD display. The display formats are available in alphanumeric, graphic or numeric displays, generally housed in industrial rugged panel mounting enclosures. Graphic versions are the most versatile enabling multi-line alphanumeric or graphic information such as simulated bargraph or pictorial icons to be displayed. Some versions also incorporate keys to enable operator input and intervention.

Graphic & numeric displays for data bus applications

Entire plant applications

Typical whole plant applications tend to be built around several interconnected, but distributed, localised systems - using networked programmable logic controllers and industrial computers. In addition to providing operator information and operator input at localised points, such systems often need large format displays to communicate essential information to all operators. For example, in large production plants or warehousing environments it has been found that boldly displaying 'target' and 'actual' production rates and other performance statistics that everyone can see, greatly improves productivity and overall profitability. Such displays can be configured to receive their data over standard serial or field bus networks. In practice, and depending on the size of the plant, one or several large format displays will be mounted on walls, or hung from chains so that they can be viewed by all concerned operators. Double-sided and four-sided configurations are also available, as are versions for outdoor use. Units for use outside need to be weatherproof to IP 65 standards, include a heater to ensure operation at sub-zero temperatures, and incorporate automatic brightness control.

The display format can be numeric, dot-matrix alphanumeric or indeed a customised combination. A typical series of large format displays offers different digit sizes to cover the required viewing distances. For example, 60mm high digits are viewable up to 25m away, but 250mm high digits can be read even at a distance of 100m. In addition to specifying the required number of digits, such units can be supplied with suitable text and caption lettering. LED dot-matrix displays can be single or multicoloured in panel sizes up to a massive 3 x 2 metres. The applications are almost endless, but typical examples include; animated plant schematics, variable data and statistics (e.g. in tabular, bargraph or pie chart formats) and alphanumeric text in a range of fonts and colours.

Large numeric & dot-matrix alphanumeric displays

Little or large?

Clearly both size and performance do matter. The final choice of display size and format depends on many factors, and a typical process industry application is likely to use several different versions to suit the particular requirement of different areas. However size and display format are not the only considerations. Instrument performance will also need to meet the specifications for new plants and the upgrading of existing ones. These are likely to focus on using one of the growing list of newer data bus standards - Profibus, InterBus, CANopen, ARCNET, AS Interface or Ethernet. In the end, as they say, it is 'horses for courses' and the final choices are yours.

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