PROCESSING

Selecting a process analyzer that will ... do the job

By Pete Anson, senior product manager, Emerson Process Management, Rosemount Analytical

As the operator or technician, your primary role is to ensure smooth and efficient plant operation. Your primary headache, however, is process interruptions and inefficiencies that may prove disastrous. To avert these problems, you rely heavily on your instrumentation and control room to identify potential problems before they occur. Without this critical information provided by the wide array of measurement devices, you are blind to live process conditions.

So, even with the presence of Murphy, who wreaks havoc on your plant regularly, you get by. Your plant has installed a range of specific devices that provide adequate on-line measurements of these critical processes. But what happens when you are looking at plant expansion, or your vintage 1990 instrument is on its last leg, or your existing instrumentation no longer adequately serves the plants current process measurement needs?

It's time to go hunting.

What type of instrument is best and what features do you need? How do you really shake down potential instruments before you buy? How to qualify (and disqualify) vendors? These are the questions that we will answer in this 5-step primer to selecting industrial measurement instruments.

Step 1: What type of instrument to consider?

This first-cut decision may already be obvious based on your power infrastructure, the installation environment, and any network connectivity requirements. Narrow the field based on your available power source – AC or DC.

Four-wire instruments are for AC-powered installations but may also be offered in a DC-powered configuration. You might like the features or capabilities of a specific AC-powered instrument, but wish to power it over DC. Look for instruments that can be ordered in an AC- or DC-powered configuration.

Two-wire instruments are DC-loop powered and only require connection to positive and negative leads for operation. If you are installing equipment in safety zones that require two-wire devices, make sure to specify electronic instruments that are agency-approved for hazardous area installation (such as explosion-proof or non-incendiary). Not all devices are approved as Intrinsically Safe (for Class I, Division 1 areas) or Non-Incendive (for Class I, Division 2 areas), which may be a hard-and-fast requirement for liability protection.

Some DC loop-powered instruments are available with network communication capabilities, typically HART® (Highway Addressable Remote Transducer originated by Rosemount) or FOUNDATION™ Fieldbus. Specify the appropriate network protocol if your plant has standardized on digital communications for critical measurement devices.

HART digital communications is also commonly used for networking of 4-wire devices. Check the specifications of the instruments you are considering for HART as a built-in feature or an ordering option. At this point, you have narrowed the field considerably to a handful of devices from a few recognized vendors.

Step 2: What features will do the job and make my life easier?

Making a list of your measurement or analytical requirements is an easy way to identify the instruments that will do the job for you. Review your feature list against product data sheets from instrument vendors to identify potential devices. Your basic features list should include:

1. Type of measurement. For example, pH or conductivity for liquid analytical measurements; CO_2 for gas analytical measurements; temperature and pressure for process measurements.
2. Range of measurement. Match your process conditions to the measurement capabilities (range and accuracy) of the electronic instrument.
3. Type of instrument enclosure. Specify a NEMA water-proof enclosure for basic protection of your two-wire or four-wire instrument. Specify explosion-proof enclosures for harsh environments or areas of installation where this safety rating is required.

Qualification Check List

- ☐ Tested the instrument and sensor in a live plant process or the lab
- ☐ Verified the vendor's technical support and customer support
- ☐ Surveyed at least two vendors and their products
- ☐ Confirmed the accessibility of local and factory contacts
- ☐ Checked the vendor's warranty and service policy
- ☐ Obtained a referral to an existing customer with the preferred vendor
- ☐ Received a quotation for the prospective instrument and/or sensors.

4. Surface mount, panel mount and pipe mount enclosures. Most vendors offer enclosure configurations and adaptor kits to support all three mounting methods.

5. Local instrument access. Keypad access or IR (infrared) hand-held remotes are available to allow calibration and configuration in situ.

6. 4-20mA analog outputs. You'll need the 4-20mA outputs to transmit live readings to the control room for real-time process evaluation, data logging and reporting.

7. Alarm relays. Specify relays if you need to trigger process alarms or annunciators in the control room for errant process conditions.

8. Diagnostics. This provides critical troubleshooting information on the condition of the instrument, sensor, overall loop, and the process.

9. Digital communications. HART and FOUNDATION Fieldbus provide centralized host access to on-line status, configuration settings and diagnostics for all networked instruments.

10. Agency approvals. Safety approvals from FM (U.S.) or CSA (Canada) may be required if instruments are to be operated in areas designated as hazardous.

11. Dual measurement. For certain applications and for instrument cost savings, some vendors provide dual or multiple sensor inputs to the same instrument.

12. Calibration standards. Embedded commercial standards and buffer tables make calibration easier. Confirm preferred standards and calibration methods in the instrument.

13. Integral timer for controller and PID operations. Chemical feed and other processes may require an internal timer with PID (Proportional, Integral, Derivative) logic functions to control pumps or valves.

14. Compatibility to other vendor's sensors. This requires test verification in most cases to ensure compatibility and adequate measurements.

15. Comprehensive installation and operation manuals. Make sure that the vendor provides sufficient technical documentation for your application and use.

Step 3: What about the vendor behind the product? How do I qualify them?

Taking a good look at the vendor can be a revealing indication of your future satisfaction (or frustration). Check the vendor's web site for easily accessible product and support information. What is the overall scope of their product line offering and how extensive is their line of sensors?

Consider the opinions of trusted outside sources. What do other plant operators say about a vendor's product accuracy, reliability and longevity? How do the vendor's products stack up in annual product reviews? What is the word on the street about a vendor? Trust your own good judgment. Based on your survey, is the vendor in business for the long haul or are they showing signs of diminished attention and weakness in the industries they serve? Has the vendor released new products that demonstrate its commitment to your industry or are their instruments lagging in technology or product line depth?

Here are some criteria that you might consider in your vendor screening process:

- Range of process sensors to serve all applications
- Ready access to customer support
- Technical resources available for special applications and troubleshooting
- Timeliness of vendor response to request for quotes and information
- Accessibility of sales people or field personnel for local support
- Industry reputation
- Overall value of product quality and service
- Industry experience
- Ability to offer customized solutions
- Warranty and replacement policy
- Time and attention during the qualification stage
- Technology and innovation in the product line
- Free equipment evaluations

Step 4: How do I shake down the instrument before purchase?

Crucial to your acceptance of an instrument is a live test in the plant process or a run-time lab test that closely simulates the actual process. To support your evaluation, here are some criteria that you might consider during a test:

1. Ease of installation
2. Ease of configuration and set-up
3. Ease of calibration
4. User friendly display screens and prompts
5. Reliability and accuracy of readings
6. Ease of maintenance and repair
7. Ease of access to measurement status and diagnostics

Step 5: How do I make the final cut decision that I can live with?

Now you are down to the brass tacks of a decision. You have built your required feature list, identified a short list of instruments, and evaluated potential vendors and their instruments.

Having done your homework, the decision should be easy. But, the proof is in the continuous, reliable operation of the instrument and loop in your plant. Before allocating capital to purchase these instruments or place your purchase order with the vendor, make sure that you have checked all the appropriate boxes on the checklist above.

The name of the game is taking the risk and uncertainty out of the decision. Follow these common-sense guidelines outlined here and you will make the best possible choice with a vendor that you can count on. Happy hunting.

For more information, contact Rosemount Analytical at www.emersonprocess.com/raihome.

EMERSON.
Process Management