HART COMMUNICATION FOUNDATION

The Impact of HART on Process Automation

The Compelling Case for the World's Most Used Digital Communications Protocol

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The impact of HART Communication on the process automation industry is immeasurable. No other field communication technology comes close—in size or scope of installation and overall effectiveness. HART is the industry's most cost-effective, easy-to-use and low-risk communication solution, and a key enabler for asset management and process improvement.

HART is best known for ease in digital process instrument calibration, but the modern HART device has many more capabilities that are increasingly useful to the end user. Most process automation suppliers now offer control system interfaces, remote I/O systems, and PC-based software applications that leverage the intelligence in HART-smart field devices to deliver continuous, real-time device diagnostics, multi-variable process information and much more.

Real-time HART integration into DCS architectures enables users to get the full benefit from intelligent devices - making HART Communication an important part of plant applications for control, safety, asset productivity and more. Continuous intelligent communication between the field device and control system allows problems with the device, its connection to the process, or inaccuracies in the 4-20mA control signal to be detected automatically within seconds—all of which enables proactive action to avoid process disruptions and unplanned shutdowns.

HART Communication Basics

HART Communication is a backward-compatible enhancement for 4-20mA instrumentation that enables remote, two-way digital communication with smart microprocessor-based field devices. HART devices support two simultaneous communication channels on the same wire—the 4-20mA "current loop" analog communication channel and the HART digital communication channel.

The 4-20mA analog communication channel is significant because it ensures compatibility with legacy systems and fast transport of control variable information to/from the process connection and controller.

Continuous, simultaneous and complementary real-time use of both communication channels provides a high level of control security and loop integrity far beyond what is achievable by using either channel alone.

The Smart Part of HART

All HART-enabled field devices, regardless of manufacture, contain 35-40 data items of rich information for improving plant operations and managing assets. The inherent intelligence of these devices allows them to perform internal diagnostic checks and communicate information regarding their status continuously.

Standard HART commands make it easy for systems to access the real-time data in HART devices with valuable device status information being part of every response packet from the device.

Integration with control systems allows both communication channels to be used for multi-variable process data and real-time detection to any problems impacting the device or the integrity of the 4-20mA current loop.

Detailed Device Diagnostics

In addition to standard indicators for device status and process variable quality, the HART Protocol

provides an efficient mechanism for control systems to access detailed device diagnostics. Up to 136 device-specific diagnostic parameters can be accessed with in a single HART command.

Control Loop Validation
Reliable, continuous communication is critical to making good control decisions. Quality, integrity, and accuracy of the 4-20mA current loop signal are also essential for good control. HART Communication enables control systems to continuously monitor and validate the integrity of the 4-20mA current loop. Real-time integration with control, safety and asset management systems delivers tremendous benefits as previously undetectable device or loop integrity problems are detected within seconds of occurrence.

Getting Connected
Today, most process automation system suppliers offer a variety of HART interface solutions to support integration with their control systems. Many have intelligent remote I/O subsystems and system interfaces for direct connection to HART devices. Most allow the HART data to be used in real-time for operator display, alarm and control functions. Third-party I/O systems and interface products are available to support integration with legacy control systems that might not be easily upgraded for HART Communication. Gateway interface solutions are also available for linking HART devices to systems based on network protocols such as Ethernet, Modbus, and Profibus.

Real-time HART integration with plant control, safety and asset management systems unlocks the value of connected devices and extends the capability of systems to detect any problems with the device, its connection to the process or interference with accurate communication between the device and system. The justification is two-fold; (1) cost reduction due to improved operations and increased efficiencies, and (2) cost avoidance as early warning to impending problems enables the high cost of process disruptions and unplanned shutdowns to be averted.

HART is the global standard for smart process instrumentation communication. With its huge installed base, ease of use, global acceptance, and the support of major process automation suppliers, HART Communication will continue to lead the world market well beyond the next decade—creating an ongoing demand for development of new HART-enabled products and advanced applications.