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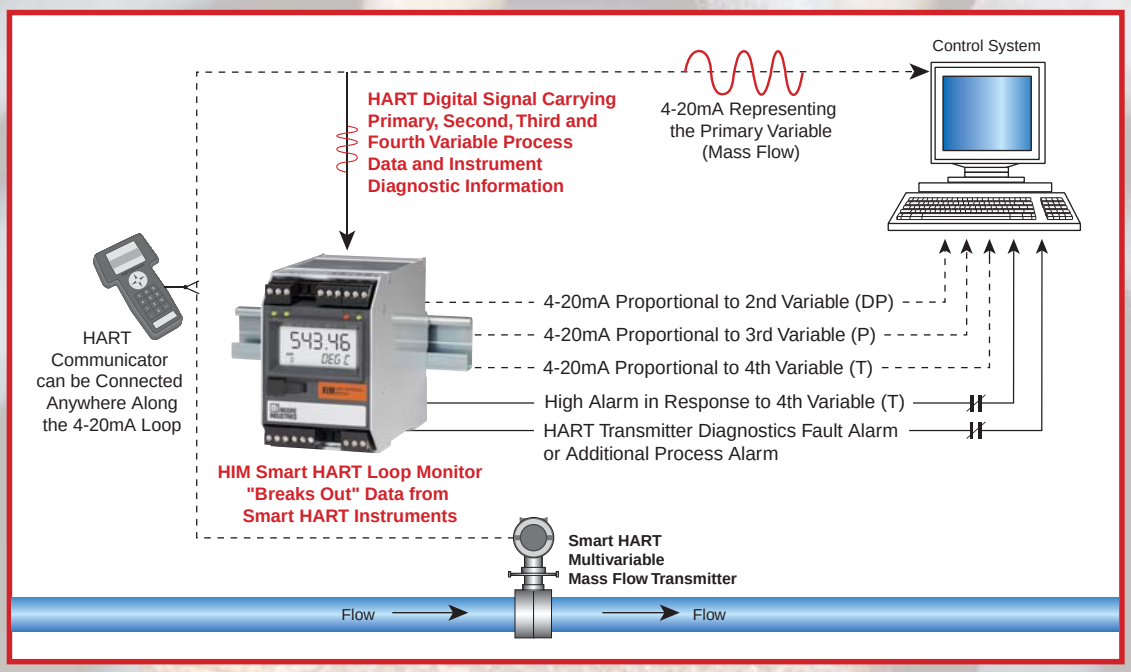


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Save time, increase profits and productivity with HART.

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# Get Connected! What Are You Waiting For?

By Ron Helson, Executive Director, HART Communication Foundation

HART Communication is working 24/7, but if you aren't "getting connected" to continuously access the valuable information from your HART devices, then you are not taking full advantage of all your HART assets: moving from scheduled to predictive maintenance, optimizing your processes and avoiding unscheduled shutdowns. So what are you waiting for?

Get connected to maximize the benefits of your intelligent measurement and control assets. Having your plant control, safety and asset management systems communicate full-time with your wired and wireless HART devices unlocks all their real-time diagnostics and intelligence. Getting automation systems continuously connected to your HART devices is an important step to a culture change that will impact how you manage measurement devices, maintenance policies, plant operations and, ultimately, your bottom line.

Here are compelling, real-world examples that demonstrate the benefits of getting connected:

At the MOL Danube Refinery in Hungary, using HART reduced operating and maintenance costs nearly $900,000 by providing actionable information on device and control valve health and preventing unscheduled shutdowns.

Using HART, Evonik Degussa Chemicals in Shanghai cut loop check time and costs by 25%. Daily troubleshooting of instruments is now mainly done from the safety and convenience of the control room.

At the largest nuclear power plant in North America, HART enabled the move from preventive maintenance toward true predictive maintenance: a more effective way to address valve and process problems.

At a Northstar Bluescope steel mill, a *Wireless*HART solution eliminated almost 100% of cable and conduit, reducing maintenance costs by $200,000 annually.

Users worldwide are sending a clear message to industry suppliers by purchasing and deploying HART-enabled products in overwhelming numbers each year. They choose HART Communication because it is a simple, reliable, secure, low-risk, feature-rich and cost-effective intelligent communication protocol that delivers significant value and rapid ROI. Suppliers are responding with cost-effective products, many of which are described in this supplement.

Even a relatively small investment to get connected provides actionable information that will improve operation and lower costs. Join other users who are gaining significant, high-value benefits for their companies when you get connected to the intelligent information in your HART devices. So what are you waiting for? ●

***This issue is our 11th HART Supplement in* Control *magazine. We thank you and everyone involved for continued interest and support of this valuable resource.***

*For more on HART® and WirelessHART® go to www.hartcomm.org or www.controlglobal.com.*

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# Getting Connected: Why and How

Save time, increase profits and productivity with HART.

More than 30 million HART-enabled devices have been installed in process plants around the world. In fact, according to a recent market study released by ARC Advisory Group, there were 32 million installed HART devices, growing to 35 million in 2011, and the report projects growth to continue to 37.3 million devices in 2012. Many, if not most, of the instrumentation and final control element vendors in the world provide HART connectivity with their field devices. The HART protocol has become the standard for fieldbus communication in the world.

More and more, companies are seeing the benefit of doing more than being temporarily connected to the instrument or valve with HART communicator or PC communicator software for commissioning or calibration. They have seen that using HART to its fullest capabilities is an area of optimization, lowered cost and increased profitability.

## WHY GET CONNECTED?

For the past 15 years, manufacturing theorists such as ARC Advisory Group have been talking about the benefits of implementing real-time decision making from the plant to the executive suite. Especially in the "high-cost" manufacturing countries, such as the United States, Canada and all of Western Europe, keeping plants open means showing increasing ROI to corporate planners. There are really few ways to do this. The two increasingly useful approaches are both about increasing productivity. The first is asset management. The second is advanced process optimization.

"Collaborative process automation and a continuous improvement plan utilizing performance feedback and the benefits associated with automation are the keys to automation's contribution to increasing manufacturing productivity, not the latest and the greatest technology," an ARC study reports.

Performance feedback is the key. Most plants have HART-enabled field instruments and final control elements. Simply connecting those instruments digitally to the control and computerized maintenance management systems (CMMS) provides much of the feedback that the ARC report is talking about.

Downtime is a key culprit. An ARC study done in 2007 reports that downtime still represents a significant percent of production lost. In oil refining, for example, downtime can be from 1% to 8%. In petrochemicals as a whole, downtime ranges from 2% to 5%, and in the food and pharmaceutical industries, downtime ranges from 1% to 10%.

It is easy to tie ROI into reducing downtime. So how do you reduce downtime? The answer has been clear for years: better and more predictive maintenance systems. But no maintenance system is any better than the sensors that feed information to it. If you are collecting information from those sensors about their sensor health and the processes they are monitoring by hand, the maintenance system is always behind. The quality of that hand-collected data taken off operator and technician clipboards is usually poor to unreadable, and says things like "didn't work—fixed it." State-of-the-art asset management systems need real-time data—real-time sensor readings and real-time diagnostics.

Evonik Degussa Specialty Chemicals Company in Shanghai, P. R. China, decided that HART technology would be used to connect field instru-

ments to the distributed control system (DCS) as well as to the asset management and safety systems. There are more than 2000 HART-enabled instruments connected to the central control system, while the remote HART connection simultaneously feeds data to the integrated asset management and safety instrumented systems.

"As a direct result of this implementation," says Luc Sterck, Project Manager Instrumentation for Evonik, "we cut loop check time and costs by 25 percent, and daily troubleshooting of instruments are now mainly done from the safety and convenience of the control room."

The plant's predictive maintenance program

## How to Get HART Connected

**Figure 1: All the ways you can use HART to make your plant run more profitably.**

| Connection Type | Product Type | Function | Suppliers* |
|---|---|---|---|
| HART Field Devices – all HART 5, 6 and 7 devices including IEC 62591 / *Wireless*HART | Measuring instruments, valve positioners, gateways, repeaters, adapters, etc. | Full range of intelligent process measurement and control devices for: pressure, temperature, level, flow, valve positioning (control), discrete, signal converters, diagnostics, alerts and more. | Emerson, E+H, MACTek, Moore Industries, Pepperl+ Fuchs, Phoenix Contact, Siemens, Yokogawa and Others |
| Temporary HART Connection – for device set-up, commissioning, configuration, diagnostics and maintenance troubleshooting | Handheld Communicator or Field Calibrator | Temporary connection to single HART device. Connect at device or anywhere on the wire. | E+H, Emerson, Fluke, Yokogawa & Others |
| | PC-based HART configuration software with HART interface (modem) - connection to device. | Temporary connection to single HART device. Connect at device or anywhere on the wire. | E+H, Emerson, ifak system, MACTek, ProComSol, Siemens, Yokogawa & Others |
| Permanent HART Connection – full-time access, use and integration of intelligent device information with control, safety and asset management systems. Includes Temporary Connection capabilities from above. | Loop Converter / Monitor – communicates full-time with a single HART device. Reads and converts HART digital signal from a device into select analog signals for use by non-HART capable control system. | Provides multiple 4-20mA signals and/or contact closures outputs representing process variables or diagnostic data from a HART device. May also provide alarms, Modbus RTU or digital display for process status or faults. | Emerson, Moore Industries, Pepperl+Fuchs, Yokogawa & Others |
| | Multiplexer – HART capable I/O system for communication with multiple HART devices. Provides remote access to HART device information for centralized asset and device management. | Provides path for PC-based asset management software to communicate with HART devices while 4-20mA signals continue to non-HART control system. Connect to PC via RS-485, OPC, Ethernet, etc. | E+H, ifax system, Pepperl+Fuchs & Others |
| | Remote or Distributed I/O – HART capable I/O system for communication with multiple HART devices. Provides remote access to HART device information for centralized asset and device management. | Concentrates, communicates and connects multiple HART devices and their information to control or asset management systems via digital communication link like Modbus, Ethernet, Profibus, etc. | E+H, Emerson, MACTek, Pepperl+Fuchs, Phoenix Contact, Siemens, Yokogawa & Others |
| | DCS/PLC with integrated HART-capability – full-time, fully integrated analog plus HART digital communication with connected devices. | HART data fully integrated into control system and operator display for real-time use of intelligent device information and diagnostic alerts. | Emerson, Phoenix Contact, Siemens, Yokogawa & Others |
| Permanent HART Connection - Application Specific – products used to facilitate full-time connection to HART information | Protocol Converters – used in applications where systems cannot directly accept HART data. | Converts HART signals to Ethernet, Profibus, Modbus or Foundation fieldbus systems | Emerson, ifak system, Siemens & Others |
| | *Wireless*HART Gateway – component of *Wireless*HART network that communicates to *Wireless*HART devices and to the control system. | Interface between *Wireless*HART field device network and control, asset management or monitoring system | Emerson, E+H, Pepperl+Fuchs, Phoenix Contact, Siemens & Others |
| | *Wireless*HART Adapter – component of *Wireless*HART network that provides a wireless communication connection to a wired HART device | The adapter attaches to a wired HART device (or anywhere on the wire) to provide wireless communication of PV, diagnostics and other HART information between the device and the *Wireless*HART Gateway interface | Emerson, E+H. MACTek, Pepperl+Fuchs, Phoenix Contact, Siemens & Others |

* Note: Companies listed are sponsors of this supplement. Check HART Product Catalog at hartcomm.org for a complete list.

**MACTek bullet**

Figure 2: This adapter can upgrade up to eight devices to be able to send wireless diagnostic and process data.

**Emerson's CHARM Input/Output Modules Have HART**

Figure 3: Each module contains HART I/O and HART digital data is extracted automatically.

is expected to reduce the total number of hours spent by maintenance teams. "We strongly believe," Sterck says, "that our plant's commitment to implement predictive device diagnostics on all HART instruments will bring comprehensive and pertinent operating information to key personnel and therefore assure better plant availability by predicting unexpected failures and avoiding associated downtimes."

The logic solvers of Evonik Degussa's plant use HART technology to connect with the sensors for loop check and safety instrumented function (SIF) interlock validation. Some of the logic solvers are used in complex online flammability calculations (SIL3).

## INTEROPERABILITY GETS YOU CONNECTED!

You don't need to radically revise your plant's instrumentation schemes. Operators and maintenance techs already have all the data they need—right in their HART devices. Each HART device is designed to be interoperable—it starts in the HART specification, using EDD in every device, and then it is tested and registered by the HART Communication Foundation.

Since 2007, there has been a new way to get connected with HART. In 2010, the IEC approved IEC62591-*Wireless*HART, the first international open standard for wireless field devices. As data gathering needs expand, both for asset management and plant optimization, new devices and new functions can be added to the control system without the major expense and downtime of pulling new wires. And *Wireless*HART is designed to be backward-compatible and interoperable with wired HART devices.

"Because IEC 62591-*Wireless*HART is completely backward-compatible with any registered installed HART devices, using adapters such as the MACTek Bullet can easily get the diagnostic and secondary process variable information from existing HART transmitters without the cost, expense and time associated with new wiring. And, since the Bullet can support up to eight devices in a HART multidrop application, it makes the case for the adapter even more cost-effective," says Thomas Holmes, CEO of MACTek Corporation.

There has been an explosion of devices and systems that you can use for connectivity with HART devices. Almost all the major DCS vendors have

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**Each HART device is designed to be interoperable—it starts in the HART specification, using EDD in every device, and then it is tested and registered by the HART Communication Foundation.**

now provided native HART digital data gateways directly into the control system. There are quite a few companies that make HART digital multiplexers that route the data to the control systems. Every tested and registered device is interoperable with any other, right out of the box.

As the chart in Figure 1 shows, there are numerous vendors for every type of HART device, including calibration and configuration devices. "Our company offers products for temporary use like our isHRT USB communication modem as well as solutions for permanent parameter acquisition, " says Tobias Thobaben of ifak system. "The modular isNetH@RT gateway provides parallel access to up to 40 HART lines, thus making it a real enabler for HART based asstet management solutions. Our free HART starter pack delivers real added value, allowing generic access to HART 5, 6, and 7 devices within FDT based applications," Thobaben continues, "and our isHRT USBeX intrinsically safe communication modem allows users to work on HART devices without shutdown or hot work permits."Thobaben's company is not alone in providing generic access. ProComSol has been a leader in providing PC-based software for commissioning, calibration and troubleshooting HART devices. CEO Jeffrey Dobos says, "our popular DevCom2000 Smart Device Communicator Software is now available for communicating with HART instrumentation from Mobile devices such as PDA's and Smartphones. Moreover, the name of the software has been updated from DevCom2000 PDA to DevCom2000 Mobile to reflect the manner in which mobile technology is changing the way people live and work. DevCom2000 Mobile uses the registered DD files from the HART Communication Foundation for complete access to all features of the instrument including Methods."

Like many mobile apps, DevCom2000 can be had on a try before you buy basis. "The enhancements in Rev 1.6 enable potential customers to try the DevCom2000 Mobile software for 10 days before deciding to purchase. They can experience the power of the DevCom2000 desktop version with the convenience of mobile technology," Dobos says.

Staying connected is simple. All HART devices are designed with both interoperability and interchangeability in mind. "Process industry users have very high expectations when it comes to interoperability," says Ron Helson, executive director of the HART Communication Foundation. "To them, interoperability is much more than devices sharing the same network infrastructure. Devices must integrate with the system in the same way without the need for multiple gateway types, special drivers and different system configuration methods. Similarly, devices should be commissioned, set up and calibrated the same way, and device diagnostics information should be consistent. HART, including *Wireless*HART technology, meets all these user requirements."

The standard HART command set and the vendor-specific commands return data values that are easily integrated into the control and asset management systems. In the control system, this additional digital data improves the ability for the operator to optimize the process. In the asset management system, the diagnostic data provides the information to predict maintenance requirements that techs and managers simply cannot get from clipboard-based rounds.

Getting connected is not rocket science. It will improve productivity, reduce maintenance and maintenance costs, and significantly reduce downtime. So what are you waiting for? ●

**And Now There's an App for That!**

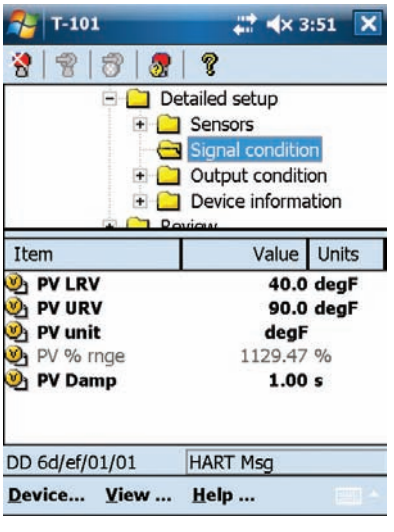


**Figure 4: HART meets mobility. Here's the first Windows Mobile app for HART commissioning from ProComSol.**

# RIDE THE WAVE

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Historically, industrial wireless communication has not been used in process automation applications; however, WirelessHART™ will change this trend. WirelessHART saves cabling costs and can be used in applications considered impossible using traditional installation methods. The technology is based on the proven HART protocol, so implementation and training is easy and straightforward. Even better, the wireless field devices integrate easily into the highly-available and stable mesh network generated by components from Pepperl+Fuchs.

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Do more with less. That's the mantra of many industries today in North America or anywhere else around the globe. Companies no longer have employees that aren't fully utilized—nobody has a couple of hours to grab a clipboard and some test equipment and go out in the plant to check the condition of field devices and final control elements.

Besides, plants require hot work permits, safety information, workarounds and other time-consumers, making it highly unproductive to grab that clipboard and go.

Companies around the world have begun formal programs to use the diagnostic data in their HART-smart instruments and control valve actuators and positioners by directly connecting them to the asset management systems in the maintenance department.

"HART technology has saved both time and money," says Todd Gordon of We Energies in Milwaukee, Wis. "We have also used the HART signal from digital valve controllers (DVCs) or positioners to provide valve position to our DCS control system with the use of a HART converter module."

Why was this important? "Actual position feedback was not available with the original plant equipment, and we couldn't tell if a valve was sticking without physically looking at it," Gordon says. "With this HART signal converted to 4-20 mA for an input to DCS, we then added a deviation alarm to tell the control operator when the DCS command signal deviated from the actual valve position more than 5% for more than five seconds. This HART feature alone saved the plant from tripping offline on several occasions. We have been able to adjust valve packing on valves when they were in service, which is a huge benefit. We have also prioritized maintenance work based on the friction calculations of the HART smart positioners. The dampers with the highest friction numbers were repaired first."

**Chart of HART Diagnostic Information**

| |
|---|
| Analog Loop Check |
| Broadcast messaging |
| Device Calibration |
| Device Configuration |
| Device Status |
| Multi-Variable Reads |
| PV with status |
| 32 Character Tag |
| All variables with status |
| Digital Loop Check |
| Enhanced Multi-variable support |
| Local Interface Lock |
| Manual ID of device by host |
| Peer to peer messages |
| Visual ID of Device |
| Time or Condition based Alerts |
| Report by Exception |
| Synchronized Sampling |
| Time stamp |
| Trends |
| Wireless Co-existence |
| Wireless diagnostics |
| Wireless mesh & star topologies |
| Wireless message routing |
| Wireless Security |

Figure 1: Get connected to all of this valuable diagnostic data that you already own.

Hiren Choksi, of Krishak Bharti Cooperative Limited in Gujarat, India, agrees. "Benefits are quite huge in terms of the monetary aspect, as well as it has helped by increasing the overall productivity of the plant. Let's say, in an ammonia plant, one unplanned breakdown shortens the life of reformer tubes by 7% due to thermal shocks. Using the HART protocol, faults and errors are able to be identified and rectified well in advance."

Tina Lockhart, director of engineering for Moore Industries International, says, "Every HART field device response contains information regarding the device's health. This information consists of device and variable status, such as device malfunction or primary variable out of limits. Having this data sent with every message provides the operator with confidence in the integrity of the process measurement and with immediate notification of a problem. From a maintenance perspective, a whole plant can be monitored from a single location, and fault diagnosis can often be performed remotely. Many instruments provide additional status information that can be used for predictive maintenance and replacement of equipment on an as-needed basis. This results in reduced maintenance trips, fewer process disruptions and high system availability."

Eddie Saab of Lakeside Process Controls in Ontario, Canada, talks about the use of HART diagnostics to correct serious problems at the Bruce Nuclear Power Station. "This is the largest nuclear power plant in North America," he says."Bruce Power had a history of feedwater heater operating problems. When a comprehensive root-cause analysis was initiated in 2001, it pointed to two main causes for the problems: an inverted loop in the saturated drains that allowed liquid to collect (which was corrected), and inadequate heater level control, which was solved using HART-enabled smart instrumentation."

Saab continues. "The Bruce Power/Lakeside process controls team decided to carry out what it called "smart utilization of smart equipment." Solenoids and junction boxes were integrated onto the valve assemblies. An interlock was tied in so that if power was lost to the solenoid, the positioner air supply was blocked, and the valve actuator used its spring to get the valve to the fail-safe position. The team used the HART signal inherent in the Fisher DVC6000 digital positioner to detect the solenoid trip. And, finally, the team set up the Fisher DVC6000 digital positioner on the valve to provide a direct signal for valve position and to enable on-line valve diagnostics."

## MOVING TO PREDICTIVE MAINTENANCE

"This approach uses two-way communication between the control room and the valve for on-line troubleshooting," Saab continues. "On-line troubleshooting is looking for advance signs of problems that could impact process performance. This allows the plant to move away from preventive maintenance, typical within the industry, and toward true predictive maintenance, a more effective way to address valve and process problems."

Kenneth Marse, of Galata Chemicals LLC in Taft, La., puts the value of HART for asset management simply. "The plant converted to contract instrumentation/electrical maintenance in 2007, and staffing was significantly reduced. Instrument reliability suffered, and calibration compliance declined. Using HART and the AMS system [from Emerson Process Management], the site has improved instrument reliability and has returned to full calibration compliance while maintaining a reduced staff."

AMS is just one of the asset management software packages that easily uses both HART process and diagnostic information. Nearly all of the major CMMS (computerized maintenance

**Moore's HART Health Monitor**

Figure 2: Online fault diagnosis made easy with HART

**"On-line diagnostics provided by the HART instruments does something more than preventive maintenance. [They] ensure the stable operation of the system and increase the precision of control."**

**— József Bartók, MOL Danube Refinery**

management software) and automation-vendor-based packages provide native support for HART devices.

We know, from talking to our customers," says Kaoru Sonoda of Yokogawa Electric Corporation, "just how much time and money can be saved with good predictive maintenance systems. With the widespread use of HART instruments, connecting existing and future HART devices into both the control system like our CENTUM and the asset management system like our PRM (Plant Resources Management) can be critical to realizing those benefits." Sonoda adds, "And the FieldMate Device Management Tool allows for easy device configuration and troubleshooting"

## INTEROPERABILITY AND BACKWARD COMPATIBILITY

We Energies' Todd Gordon notes, "Valley Power Plant has been using HART smart instrumentation since the late 1980s. The transmitter loop test function has been used for troubleshooting and insurance compliance testing of the boiler trip functions. HART smart valve positioners have been used since 1999, and they have provided valuable diagnostic capabilities that have allowed us to troubleshoot problems while the valves are in operation. It also helps to pinpoint problems before mechanics start taking valves apart. A leaking valve diaphragm that has been identified with diagnostics can be replaced without removing the valve, which saves time and money. We have found numerous problems before they affected plant operations."

Gordon adds, "Other power plants in our company have adopted HART technology over the years. The older Oak Creek Power Plant added an AMS on-line system when they installed wireless transmitters on their feedwater heaters for performance monitoring. Pleasant Prairie started using digital valve controllers in 2003, has an online AMS system and recently added some *Wireless*HART transmitters to their systems."

Gordon says HART interoperability is transparent. "Two new plants were built in the last few years by two different contractors (Washington Group & Bechtel)," he says, "and both plants came standard with on-line HART technology to communicate with the HART smart instrumentation in the plant."

## SAVE TIME AND MONEY ON CALIBRATION AND DIAGNOSTICS

Galata's Marse says, "Our plant is using AMS Intelligent Device Manager and HART to monitor diagnostic alerts and for calibration management to reduce maintenance time and maintain calibration compliance. The central system links real-time HART data and instrument documentation in a single system which provides a single source for the I/E technician."

Without the ability to enter calibration data directly into the asset management system, the data that is collected about the actual condition of the instruments other than the HART diagnostic data is suspect.

Jim Shields, product manager for calibrators for Fluke, points out, "Several surveys have shown that paper-and-pencil documentation

**Documenting Calibrators Speak HART and CMMS**

**Figure 3: Documenting Calibrators with HART connectivity make calibration rounds easy.**

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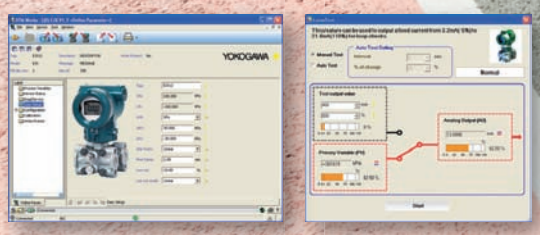

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produces and perpetuates errors. Further, as maintenance and operations departments have less and less time and fewer employees, much of the data collected on clipboards will just be filed and not used. In addition, entering this manually collected data into CMMS systems is also a manual operation, taking time, costing money and usually far down the list of things that must be done to keep the plant operating and producing revenue. That's why the new Fluke 754 Documenting Calibrator has HART connectivity. Both sets of data can be documented and uploaded directly to the CMMS."

Just how much money can you save using HART diagnostics? "On-line diagnostics provided by the HART instruments does something more than preventive maintenance," says József Bartók, automation engineer at MOL Danube Refinery in Hungary, adding that this "ensures the stable operation of the system and increases the precision of control." Beyond fixing what breaks or keeping the plant running, a reliable, stable operation contributes to bottom-line profitability.

On-line and off, HART has proved its mettle according to Bartók.

In one case, the head pressure control was slow on one unit leading to the assumption that a valve was stuck and in need of removal and repair. But technicians with on-line diagnostic tools used HART-supplied data to interrogate the valve and find current-to-pneumatic damage only in the intelligent positioner–not the whole valve.

**HART-supplied diagnostic data saved the MOL Danube Refinery at least two days of unscheduled downtime, or approximately €637,000 ($897,790 USD).**

Operators put the valve in manual, and the fix took a half hour of instrumentation work. This saved the plant at least two days of unscheduled downtime, or approximately €637,000 ($897,790 USD).

Savings, increased throughput, reduced downtime—spell it any way you want. You already have all the data you need to gain savings like MOL did—in your HART instruments.

**Emerson's AMS Snap-In Network Manager**

Figure 4: *Wireless*HART device networks can be designed easily with this visual network manager

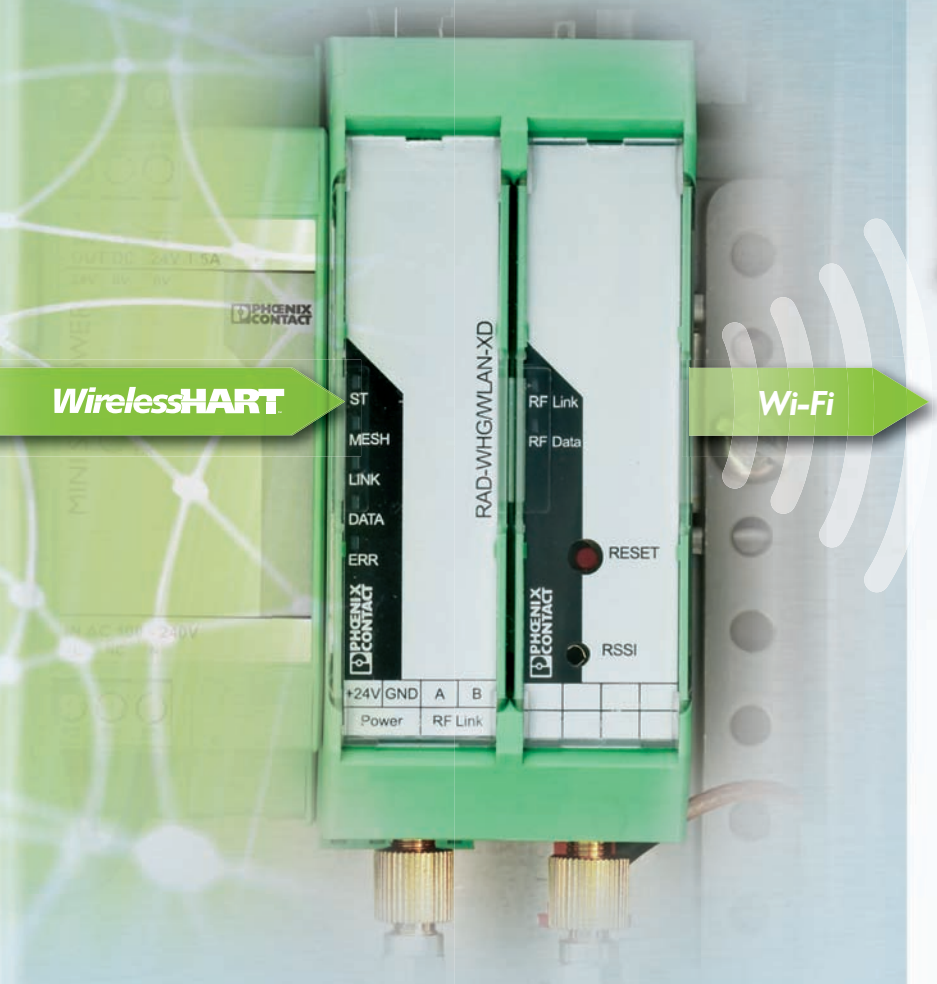
## WIRED OR WIRELESS—HART'S THE SAME

Engineers and operators who are familiar with how to connect HART to their control and asset management systems are finding IEC62591-*Wireless*HART a breeze to add to their systems. Each *Wireless*HART transmitter behaves exactly like its wired counterpart. This is thanks to the interoperability and interchangeability specifications designed into the HART and *Wireless*HART specification from the beginning. The biggest difference between the two is that there are no wires.

We Energies added an asset management system (Emerson's AMS Suite) and *Wireless*HART sensors, according to Gordon, "when they installed wireless transmitters on their feedwater heaters for performance monitoring." The AMS Suite has what is called a "snap-in" module that performs network management and device site selection for wireless instruments and final devices.

No matter what vendor's brand of HART or *Wireless*HART devices you use, you can be assured of a simple and easy way to improve your asset management—with tools you already have. So get connected with HART right now! ●

# Your gateway to HART® network flexibility




**Shown in actual size**
45 x 99 x 114.5 mm

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We're bringing our industrial wireless expertise to your HART sensor network. With its flexible installation options, web-based management, and **wired and wireless backhaul capabilities**, our new WirelessHART Gateway increases efficiency, saves time and gets your data where it needs to go.

**The WirelessHART Gateway:**

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- Programs with web-based management or HART handheld
- Uses standards-based communication with Modbus TCP and HART UDP protocols
- Mounts on a DIN rail or can be used in the field as an IP67 solution

Find out how to make the WirelessHART Gateway work for your network – call **1-800-322-3225** or visit **phoenixcontact.com/wirelessHART**

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INSPIRING INNOVATIONS

# UNLEASH YOUR ASSET!

## HART Ethernet Gateway: isNet Lite and isNet H@rt

New!

Free!

### The HART Starterpack

- new isH@RT Device DTM provides a generic access to the vendor-independent parameters of any HART field device
- supports all devices that were designed to conform to the specifications HART 5, 6 & 7
- based on the isEDDView DTM and the EDD interpreter DTM
- Starterpack includes isH@rt CommDTM & isH@RT Device DTM
- is now included with all the HART devices of ifak system GmbH
- no need to buy any more software

## More flexibility: Mobile HART devices

The isHRT USB is a replacement for the RS232 modems commonly used in process automation. It also includes an embedded HART master which satisfies the required timing constraints of the HART bus regardless of PC performance.

For the use in hazardous areas we offer an intrinsic safe, ATEX certified version: isHRT USBeX.
It is functionally equivalent to the standard type.

The H@rt BluePack supports wireless (Bluetooth) and wired (USB) access to a HART network and runs an embedded HART master stack. This guarantees compliance with the HART timing requirements regardless of the speed of the PC host application or the data transmission quality between the host and the Bluetooth device.
The interface can be powered via the USB connection or 3 replaceable AAA cells. It can be powered down by an on/off button. To increase the life span of the batteries the device switches to sleep mode if no Bluetooth communication takes place.

Visit **www.ifak-system.com/HART** for more information.

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# Get Connected with *Wireless*HART

The only international open standard for wireless sensor networks takes charge, so get connected now.

In August 2011, IDTechEx published a survey, "Wireless Sensor Networks 2011-2021." In it, the researchers claimed that wireless sensor networks will grow from $0.45 billion in 2011 to $2 billion by 2021. Most of that growth will be in smart homes, smart grid and other non-industrial applications.

Raghu Das, CEO of IDTechEx says, "In 2011, industrial wireless sensor networks account for approximately 6% of the total $0.45 billion. In 2021, they will account for approximately 28% of the estimated $2 billion market."

"In 2011 I'd estimate *Wireless*HART to be 60% of that market segment that is industrial only," Das continued. It is difficult to predict its use in the future—the choice of standards is a problem."

A recent survey by *Control* magazine indicates that the prediction may well be easier than Das thinks. According to the survey, published in the August issue, end users have stopped waiting for the standards to be hashed out and have begun selecting *Wireless*HART over other standards. Part of this is undoubtedly true because *Wireless*HART is now the only international open standard for wireless sensor networks: IEC62591-*Wireless*HART.

As a further insight, the *Control* study showed that 18% of respondents said they didn't need wireless networks—any variable they needed badly enough was worth running cable to. If you remember that HART Communication is both wired and wireless, this is an important advantage to end users and asset owners. You can continue to use your wired HART systems and when there is a need, a *Wireless*HART network will fit right in.

## INTEROPERABILITY MAKES *Wireless*HART WORK

A unique feature of *Wireless*HART is its integration with the wired HART specification. Just as all HART instruments—including *Wireless*HART—have been interoperable and backward-compatible. You already know how to commission and calibrate the wireless versions, because you already have HART smart devices in your plant. There is no run-up learning curve.

"From the E+H perspective we support all standardized communication protocols which of course includes *Wireless*HART"says Endress+Hauser (www.endress.com) wireless product manager Jason Knuteson. "Our customers are continuing to ask for robust and flexibility solutions for difficult process applications they experience, and *Wireless*HART is a great answer to their needs!"

What does interoperability really mean? It means that any HART device of any kind will work seamlessly with all other certified and registered HART devices. Further, for its basic functions at least, any certified and registered HART device can be interchanged with any other similar device. So every HART temperature transmitter is interchangeable, and so forth. For *Wireless*HART, it means that any *Wireless*HART gateway can be used with any manufacturer's devices, and all devices can be used with any gateway.

**The Growth of *Wireless*HART**

| Wireless Sensor Networks | 2011 | 2021 |
|---|---|---|
| All Wireless Networks | $450,000,000 | $2,000,000,000 |
| Industrial Sensor Networks | $27,000,000 | $560,000,000 |
| WirelessHART | $16,200,000 | $336,000,000 |

**Figure 1: Data from IDTechEx and Control predicts that *Wireless*Hart will grow exponentially over the next 10 years.**

**Network Manager and More!**

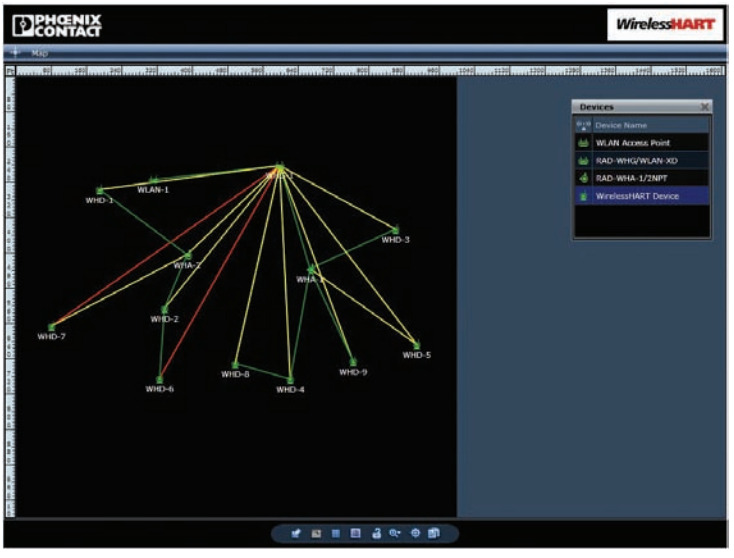


**Figure 2: Phoenix Contact's Network Manager also includes a Wireless Network Planner.**

## THE *Wireless*HART ECOSYSTEM

Proprietary wireless systems and even some so-called standard systems generally have only one vendor. This can be very worrisome for the operator when selecting a wireless network for the plant. Since 2007 when it was introduced, the number of vendors producing registered and certified *Wireless*HART devices (the HART "Ecosystem") has been climbing—now numbering around 20. These vendors include the manufacturers of at least 80% of all transmitters, control valves, and online analysis equipment, such as Siemens, Endress+Hauser, Moore Industries International, Emerson Rosemount and Emerson Fisher.

"Siemens is continuing to see a strong demand for our *Wireless*HART products and solutions," says Michael Cushing, product marketing manager for Siemens Industry, Inc. (www.sea.siemens.com) "and our SITRANS products are the cornerstone to our portfolio. Cost and efficiency is driving this demand, as *Wireless*HART users eliminate significant costs of cabling and installation, and realize the convenience of faster commissioning and easier maintenance. We also have the ability to interface *Wireless*HART with other Siemens process instruments through our SITRANS AW200 adapter. Customers will continue to have the need for easy access to information from plant applications and operations, and *Wireless*HART is well-suited to provide diagnostic information on measured process values."

What this means for you is that you have much less risk selecting *Wireless*HART for your wireless sensor network than in selecting any other system. It means that *Wireless*HART is "future proof." You can be certain that the HART Communication Foundation will maintain the full backward compatibility that has become its hallmark.

## SO WHO'S WAITING?

You may not be waiting at all. According to the wireless study published in *Control*'s August 2011 issue, 43% of respondents said they already had wireless field networks, while another 27% said they were planning to install them in the next 1-3 years. If that's the case, the next step is to learn how to design, configure, manage and operate IEC62591-*Wireless*HART sensor networks.

## SETTING UP *Wireless*HART

"The *Wireless*HART standard is built on proven industry standards," Executive Director Ron Helson says. "The radio uses the IEEE 802.15.4 standard and requires extremely low power, enabling the battery to last as long as 10 years in some applications. The radio operates in the same license-free 2.4 GHz band as Wi-Fi and many other wireless technologies. *Wireless*HART uses channel-hopping and channel black-listing to prevent interference and enable coexistence with other wireless networks, and a combination of star and mesh topology networking to ensure robustness in the presence of noise."

Helson continues, "*Wireless*HART uses the Electronic Device Description Language (EDDL) (IEC 61804-3) to simplify system integration as well as enabling setup, calibration and device diagnostics using graphical interface software applications."

*Wireless*HART was designed to operate reliably in a process plant environment that is full of structural steel, metal vessels and pipes using industry-accepted mesh topology. *Wireless*HART mesh networks are easily deployed without the

need for installing a wireless infrastructure of backbone routers in many plant areas and providing power for them.

What you need to get started is a scale drawing or photo of your plant. Several companies make wireless sensor network management equipment that allows you to overlay the physical location of the sensors on the scale drawing, and tell you whether you need repeaters, more sensors or more gateways. For an example of this, see the Emerson AMS snap-in component in Figure 4 of the previous article on page S-16.

## REAL WORLD, REAL ANSWERS FROM *Wireless*HART

BASF had a real problem. Technicians needed to measure the temperature in a rotating vacuum dryer full of catalyst. Because the dryer rotated, wired temperature sensors had been eliminated. They were stuck with manual sampling and lab testing. They needed something better and faster.

"We went in search of alternatives so that we could dispense with the time-consuming sampling process and free up the operators," say Ramon Kranendonk and Perry Stofberg pf BASF in De-Meern, the Netherlands. "On the Endress+Hauser stand at a trade fair, we saw a demonstration of a wireless system for measuring temperature. The system used standard transmitters and a module with an antenna was used to transmit the data signal to a host by means of *Wireless*HART. For us, this was obviously an excellent solution."

Kranendonk noted that another criterion was the straightforward integration into the system. Control is via Siemens PLCs and PROFIBUS. Their asset management software is FieldCare. The Fieldgate gateway has 24 VDC power, and two outputs: one Ethernet, and one Modbus. The Modbus signal is converted to PROFIBUS DP and fed to the PLC. The Ethernet signal is sent to the FieldCare server.

"BASF has a number of good applications for wireless communication, and we are putting them to good use," Kranendonk says.

This application shows another unique feature of IEC62591-*Wireless*HART. A wireless adapter can be retrofitted to an existing HART wired transmitter to turn it into a fully functional wireless transmitter. Like the rest of the HART ecosystem *Wireless*HART adapters are being made by several vendors, including Endress+Hauser, Emerson (www.emersonprocess.com) and Pepperl+Fuchs (www.pepperl-fuchs.com). MACTek (www.mactekcorp.com ) produces a "Bullet" *Wireless*HART adapter that permits up to eight wired HART transmitters to operate wirelessly. Some of these wireless adapters provide their own power supply or can be used to power the transmitter, and some get their power from the current loop connected to the wired HART transmitter.

"*Wireless*HART easily scales to support large applications with separate networks for each plant area aligning with DCS structures and division-of-work responsibilities that make it easy to manage and more secure," Helson says.

Northstar Bluescope Steel had a real problem. The steel mill has water-cooled electric arc furnaces, with water-cooled burners and cooling panels that keep the furnace walls from melting and deforming—and blowing out the panels. If that happens,

**Diagram of BASF's Wireless Connections**

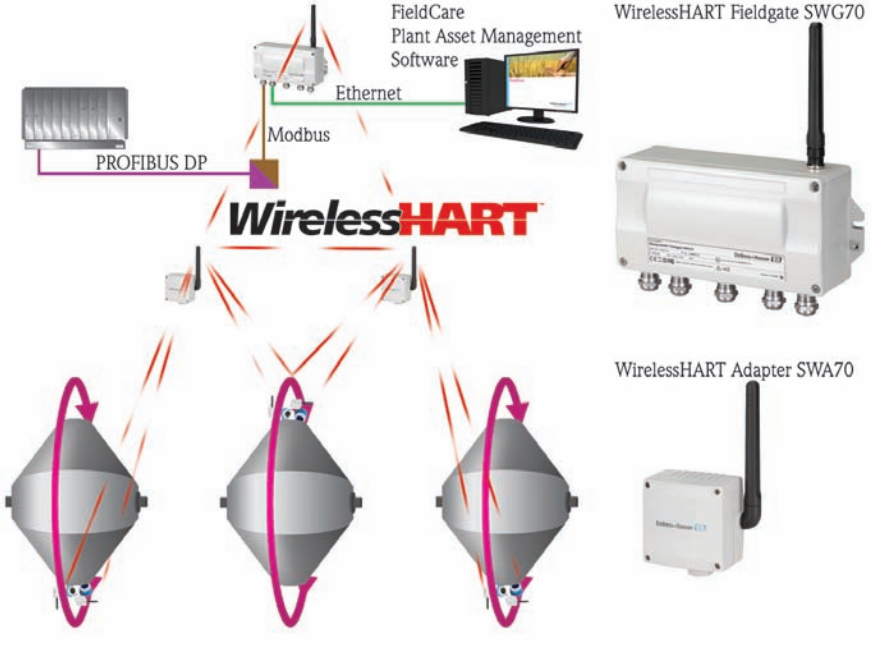


Figure 3: Because they rotate, wired sensors were just not practical

the furnace is seriously damaged, and just one blown-out panel costs upwards of $20,000 to repair. Then there is the lost production cost due to the unexpected downtime. That can be as much as an additional $200,000 per day or more.

"Between nine and 12 measurements per week would fail due to high temperatures or physical damage to sensors, cable or conduit," says Rob Kearney, maintenance supervisor of Northstar's mini-mill in Delta, Ohio. "And when a measurement point fails, the furnace must be shut down. The new wireless solution eliminated almost 100% of the cable and conduit—which reduced maintenance costs by $200,000 annually."

The self-organizing *Wireless*HART network collects the data used to control temperature on the furnaces. Emerson provided 32 Rosemount *Wireless*HART temperature transmitters, 28 for control and four for monitoring. The transmitters send their data to a *Wireless*HART gateway which interfaces with the mill's transformer-regulation and burner-control system.

"Safety has also been improved," Kearney says. "The furnace's cooling panels are operating consistently at a safe temperature, and there is less maintenance required around the hot furnace shell, where ambient temperatures can be +140 °F."

### IS HART FUTURE-PROOF?

The process industries, in fact, all manufacturing, are very conservative. Refineries and chemical process plants especially don't like trying new things, because a failure generally makes something go boom. Pharma and biopharma plants and other validated industries are similar in conservative application of new technologies.

But HART and its wireless capability, *Wireless*HART, aren't new. They are both based on the proven technology that has made HART the standard for process fieldbus. And going forward, you don't have to fear that suddenly the devices will become obsolete. Endress+Hauser is one of the world's two largest field instrument manufacturers. Here's what Jason Knuteson, E+H wireless product manager, has to say, "The long-term investment and commitment into the *Wireless*HART and other wireless communication is 100% from E+H. This is a decision made at the top levels within our organization! We are committed to the needs of our customers."

David Skelton, Phoenix Contact's (www.phoenixcontact.com) vice president Americas sums it up well. "Process engineers around the world are using *Wireless*HART as a way to easily obtain data from their existing HART or new *Wireless*HART instruments. With this gateway, Phoenix Contact has combined our competencies in wireless, networking and process technologies to develop a product that makes *Wireless*HART networks even more cost-effective and flexible." ●


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ProComSol, Ltd designs and manufactures both the hardware and software needed to perform complete HART device configuration and monitoring using your PC or Smartphone. DevCom2000 software uses the registered DDs from the HART Foundation, allowing full access to all device parameters, including Methods. The latest revision supports HART 7 and *Wireless*HART. Reliable, cost-effective USB modems and convenient, wireless Bluetooth modems provide the interface between HART instruments and configuration & monitoring software. Order these items using our secure website.

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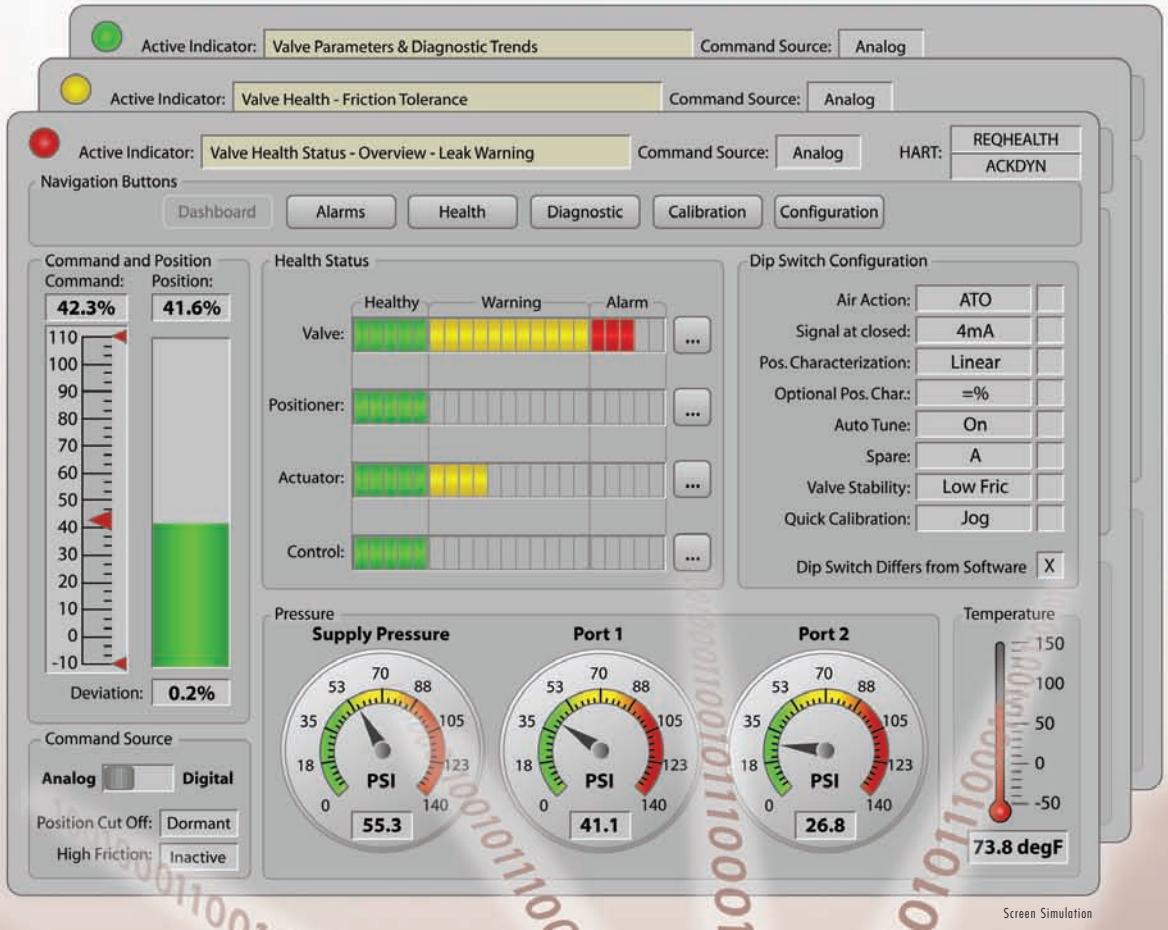


Screen Simulation

# Working all the time... so you don't have to.

HART Communication is working – 24/7 – to identify problems for corrective action to avoid a potential plant shutdown – and help you move from scheduled to predictive maintenance. For maximum benefit your plant control, safety and asset management systems should "get connected" to continuously communicate with HART-enabled devices and unlock their real-time diagnostics and intelligent capabilities.

## Wired and Wireless...GET CONNECTED!

SCAN WITH RED LASER

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