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HART®

We make HART accessible

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HART technology

Optimize your process

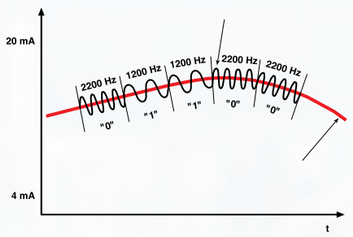
Standardized nearly 30 years ago, HART (Highway Addressable Remote Transducer) is the most broadly supported protocol in the world for the process industry. HART was originally developed as a way to make analog process measurement devices “smarter” by superimposing digital data on a 4…20mA signal loop.

The standard continues to develop

Today, more methods of connecting are regularly being introduced – including wireless and Ethernet. Backwards compatibility and manufacturer interoperability means you face no danger of getting locked into vendor-specific or regional solutions.

Your benefits

- Leverage intelligent device capabilities
  - Use unified tools for device configuration
  - Gain operational improvements by reducing troubleshooting time
- Increase system availability
  - Detect device or process connection problems in realtime
  - Avoid the high cost of unscheduled shutdowns
- Decrease maintenance costs
  - Use remote diagnostics to reduce field checks
  - Capture performance-trend data for predictive maintenance
- Improve regulatory compliance
  - Enable automated record keeping of compliance data
  - Take advantage of multivariable devices for more thorough reporting



1986

HART became an open standard.

1993

The HART Communication Foundation was formed to manage the standard

1999

The HART Server, an easy-to-use, OPC-compliant software application for accessing real-time process and diagnostic information, was released.

2001

HART 6 was released, including features to enable AMS (Asset Management System) integration.

2007

HART 7 was released, and included the WirelessHART standard.

2012

HART 7 was enhanced with additional functionality, including HART-IP.

HART devices

Unlock your data

The most basic use of HART allows users to configure their devices, setting the zero, span, and engineering units, calibrating the 4…20mA loop, and selecting the sensor type. Most HART devices are multivariable, meaning that they can provide multiple measurement values, although only the primary variable is represented by the 4…20mA signal.

Capabilities and benefits increase

Expanded use of HART-capable devices enables users to perform specialty operations, such as partial-stroke testing, data logging, and asset management using the information specific to each device type. These predictive maintenance operations help to increase plant availability and reduce operating costs.

You've already made the investment in HART. Now it's time to put that investment to work.

Level
The status of the sensor can be reported to aid in troubleshooting faulty measurements. A level transmitter may also support high and low alarm set points.

Temperature
In addition to the process temperature, ambient temperature can be reported along with cold junction temperatures. Further, the sensor breakage can be detected and reported to aid in troubleshooting.

Pressure
Differential pressure transmitters have variables for differential pressure, cell temperature, and static pressure that can be used for calculating flow. Sensor breakage and status can also be detected.

Flow
Coriolis mass-flow meters can report process media density. A DP-based mass-flow meter can report absolute pressure and temperature in addition to the main process measurement.

pH
In addition to the pH measurement, a HART pH device can provide temperature measurement, as well as other indicators of the sensor health and possible failure.

Valve positioner
The actual valve position feedback can be obtained from a digital positioner. Comparing this value to the target position can indicate a valve that is sticking.

Accessing device data

A Device Description (DD) is an electronic data file that describes specific features and functions of a particular device. The DD may include menus or graphic display features to be used by host applications, including handheld devices, in order to gain access to all parameters and data in the device.

Many HART devices also have a Device Type Manager (DTM) that allows the same access to data, although DTMs typically have a more graphical interface that is viewed in a Field Device Tool (FDT) container application, such as Pactware.

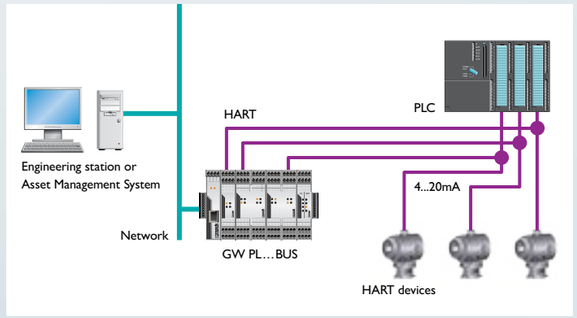
Ethernet HART multiplexer

The PL GW…-BUS modular gateway system provides a simple way to parameterize and monitor HART devices via HART-IP, Profinet, Modbus TCP, and FDT/DTM for easy integration into nearly any host system. It is a modern alternative for traditional RS485 HART multiplexers.

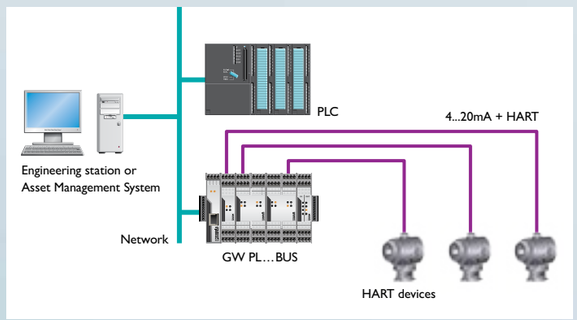
Suitable for any application

The multiplexer consists of a head station and a variety of HART expansion modules to suit any application need. A digital I/O expansion module enables alarm and status monitoring, as well as actuation of motors, pumps, blowers, and other equipment. Up to five expansion modules can be connected and powered by the head station. The modular design provides a scalable solution for modern distributed control systems and phased roll-outs.

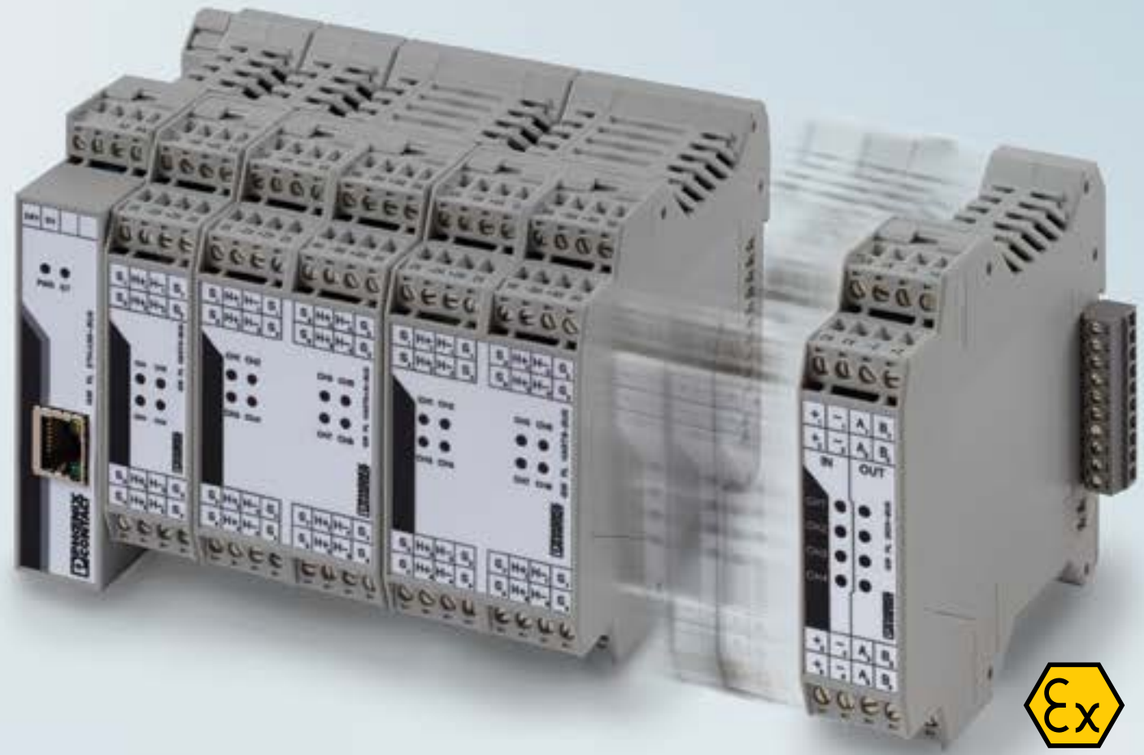
The multiplexer features a HART master on each channel for the fastest possible updates and execution times, optimizing partial-stroke testing, valve diagnostics, and batch data transfers.



The PL GW… -BUS gateway system can be added to an existing installation to access the HART data while leaving the analog control system fully operational.



The GW PL HART8+AI-BUS modules supply power to the HART field device, as well as access to its analog value, leaving available I/O capacity on the DCS for critical measurement points.



Type description	Ord. no.	Description
GW PL ETH/UNI-BUS	2702233	Ethernet HART multiplexer head station with HART-IP, FDT/DTM, Modbus TCP, and Profinet protocols. Connect up to five expansion modules.
GW PL ETH/BASIC-BUS	2702321	Ethernet HART multiplexer head station with HART-IP, FDT/DTM, and Modbus TCP protocols. Connect up to five expansion modules.
GW PL HART4-BUS	2702234	Four-channel HART expansion module for Ethernet HART multiplexer for use with existing HART loops.
GW PL HART8-BUS	2702235	Eight-channel HART expansion module for Ethernet HART multiplexer for use with existing HART loops.
GW PL HART8+AI-BUS	2702236	Eight-channel HART expansion module for Ethernet HART multiplexer with built-in loop current supplies and terminating resistors.
GW PL DIO4-BUS	2702237	Digital I/O expansion module for Ethernet HART multiplexer with four digital inputs (0…30 V DC) and four digital outputs (0….30 V DC, 1 A), addressable via Modbus TCP.

WirelessHART

RAD-WHG/WLAN-XD WirelessHART gateway

A DIN rail-mounted gateway that provides a simple way to access HART devices for configuration, calibration, and monitoring via HART-IP, Modbus TCP, or FDT/DTM.

In conjunction with the standard Ethernet interface, the gateway also features an integrated 802.11b/g transceiver for backhaul, mobile operator, or HMI connection.

RAD-WHA-1/2 NPT WirelessHART adapter

This rugged field-mount device is ideal for connecting up to four HART devices. The adapter may be loop or 24 V DC powered, and can be retrofitted to an existing installation while maintaining the analog control system, without reworking marshaling cabinets.

A WirelessHART network can be installed in a fraction of the time of a hard-wired system, resulting in lower installation costs thanks to:

- Cabling, conduit, and wiring tray costs
- Labor savings
- Reduction of permits

WirelessHART is also an ideal temporary installation for troubleshooting malfunctioning equipment.

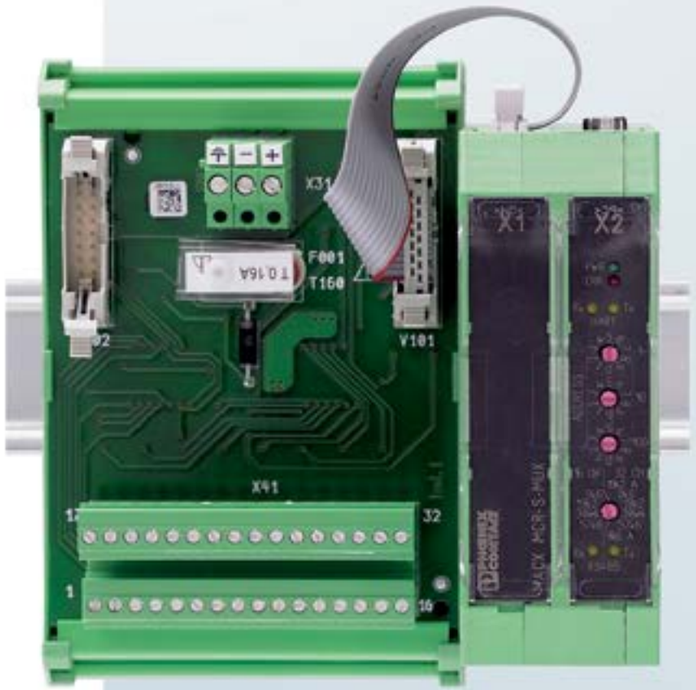
Type description	Ord. no.	Description
RAD-WHG/WLAN-XD	2900178	WirelessHART gateway with HART-IP, FDT/DTM, and Modbus TCP protocols. Supports up to 250 devices. Integrated WLAN for wireless Ethernet connection.
RAD-WHA-1/2NPT	2900100	WirelessHART adapter with 1/2"-NPT connection. Connect up to four HART devices. May be loop or 24 V DC powered. IP65 cast-aluminum housing with removable antenna.

HART multiplexer

The MACX MCR-S-MUX HART multiplexer enables communications between an engineering station or asset management system to HART field devices.

The multiplexer connects to a host system via RS485 and supports up to 32 HART devices.

The HART multiplexer connects to termination boards and termination carriers from Phoenix Contact.



Type description	Ord. no.	Description
MACX MCR-S-MUX	2865599	HART multiplexer for online configuration and diagnostics of up to 32 HART-compatible field devices
MACX MCR-S-MUX-TB	2308124	16-channel termination board for connection to MACX MCR-S-MUX, supports two-, three-, and four-wire HART devices

Signal conditioners

Phoenix Contact offers a complete range of analog signal conditioning for use in a variety of applications.

Repeater power supplies and output isolators are available specifically for use with HART-capable devices. They are designed to provide isolation and boost the voltage in the loop to compensate for long cable runs, while maintaining transparency to the HART communication.

Type description	Ord. no.	Description
MINI MCR-2-RPSS-I-I	2902014	Repeater power supply with three-way isolation, input signal 0(4)…20mA, output signal 0(4)…20mA. 6 mm wide, and -40° to 70°C operating temperature.
MACX MCR-SL-RPSSI-I	2865955	Repeater power supply with three-way isolation, input signal 0(4)…20mA, output signal 0(4)…20mA. SIL 2 according to IEC 61508
MACX MCR-SL-IDSI-I	2865971	Analog output isolator for 0(4)…20mA with three-way isolation. SIL 2 according to IEC 61508.
MACX MCR-EX-SL-RPSSI-I	2865340	Intrinsically safe Ex-i repeater power supply with three-way isolation, input signal 0(4)…20mA, output signal 0(4)…20mA. SIL 2 according to IEC 61508.
MACX MCR-EX-SL-IDSI-I	2865405	Intrinsically safe Ex-i analog output isolator for 0(4)…20mA with three-way isolation. SIL 2 according to IEC 61508.
MCR-FL-HT-TS-I-EX	2864545	Head-mounted HART temperature transducer for RTDs, thermocouples, resistance-type sensors, and voltage-type sensors.
MCR-FL-TS-LP-I-EX	2864587	DIN rail-mounted HART temperature transducer for RTDs, thermocouples, resistance-type sensors, and voltage-type sensors.

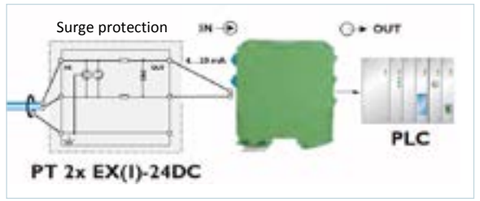
To view our entire range of signal conditioners, including a range of controller-specific termination carriers, visit:
www.phoenixcontact.com

Surge protection

Phoenix Contact offers a full range of surge protection products for power supply systems, measurement and control technology, data communications, and transceiver systems, including multiple surge protection options for HART interfaces.

Pluggable and fixed

Pluggable surge arrestors enable trouble-free replacement without rewiring or impacting loop impedance. Narrow footprint fixed versions maximize cabinet space. All versions protect the sensitive electronics from incoming high-energy surge voltages.



Type description	Ord. no.	Description
PT-IQ-1X2-EX-24DC-UT	2801512	Pluggable surge protection with integrated multi-stage status indicator on the module for one 2-wire floating Ex-i signal circuit. Includes base and protective plug element.
PT-IQ-2X2-EX-24DC-UT	2801513	Two-channel pluggable surge protection with integrated multi-stage status indicator on the module for two-wire floating Ex-i signal circuits. Includes base and protective plug element.
PT 2XEX(I)-24DC-ST (plug) PT 2XEX(I)-BE (base)	2838225 2839279	Two-channel pluggable surge protection for two 2-wire floating Ex-i signals.
PT 1X2-24AC-ST (plug) PT 1x2-BE (base)	2856058 2856113	Pluggable surge protection for two 2-wire floating signal circuits in non-Ex application.
TT-EX(I)- 24DC	2832124	Modular terminal block with three-stage surge protection for one floating Ex-i signal circuit, includes shield connection.
LIT 2X2-24	2804623	Two-channel surge protection, 6.2 mm wide, for two-wire floating Ex-i signal circuits.

Terminal blocks

Phoenix Contact has developed several terminal block configurations to aid in the wiring of control loops and minimize the amount of panel space required to terminate these signals. These terminal blocks incorporate a top-level fuse or disconnect function with a feed-through level and ground foot for shield connection.

Organize and simplify

This configuration perfectly organizes each wire of the signal loop into one terminal block, including a grounding location for each shield. A hinged fuse plug houses a 5 x 20-mm fuse for circuit protection and, when required, can also include a blown-fuse indication.

Type description	Ord. no.	Description
UT 4-PE/L/HESI (5x20)	3214320	Double-level fuse block with ground foot and pass-through level without indication.
UT 4-PE/L/HESILED 24 (5x20)	3214321	Double-level fuse block with 24 V blown-fuse indication, ground foot and pass-through level.
UT 4-PE/L/HEDI	3214324	Double-level terminal block with ground foot and pass-through level and hinge disconnect.
UT 4-PE/L/MT	3214364	Double-level terminal block with ground foot and pass-through level and knife disconnect.
UT 4-PE/L/N	3214361	Double-level terminal block with ground foot and pass-through level.
UT 4-PE/L/TG	3214365	Double-level terminal block with ground foot and pass-through level and plug zone.
UT 4-PE/L/HESI (5x20)	3214320	Double-level fuse block with ground foot and pass-through level without indication.

We make HART accessible

Phoenix Contact's portfolio of HART products connects you to your process in ways never before possible.

- Access diagnostic data from anywhere via HART-IP:
- Add new measurement points without the time and expense of wiring
- Connect your devices and provide convenient access for testing
- Protect your investment with surge protection and isolation

Phoenix Contact is your trusted partner for reliable HART communication.

For more information on our HART products, visit: **www.phoenixcontact.net**