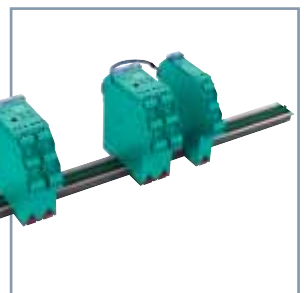
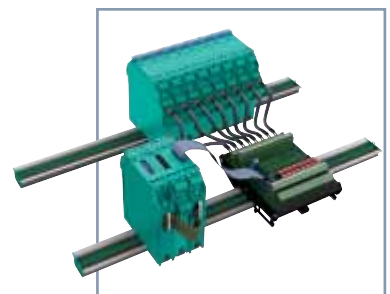
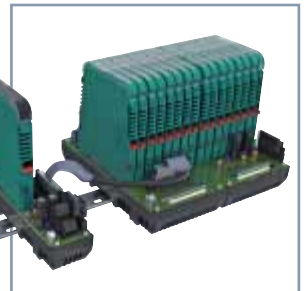




# BRIDGING COMMUNICATION WITH HART® INTERFACE SOLUTIONS





## WHAT IS HART?

**HART Communication is a bi-directional industrial field communication protocol used to communicate between intelligent field instruments and host systems.**

HART is the global standard for SMART process instrumentation. The majority of SMART field devices installed in plants worldwide are HART-enabled. These HART-enabled devices are the largest of all globally installed communication protocols and number more than 20 million. HART technology is easy to use and very reliable.

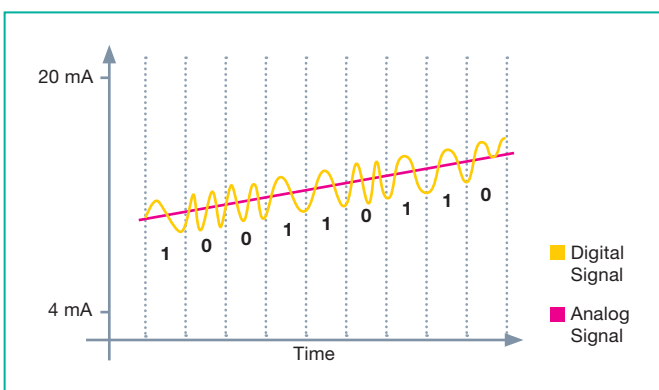
A host system can be a Distributed Control System, PLC, Asset Management System, Safety System or a handheld device.

HART is a master-slave field communications protocol developed in the late 1980s to facilitate communication with SMART field devices. HART stands for Highway Addressable Remote Transducer. The HART protocol makes use of the Bell 202 Frequency Shift Keying (FSK) standard to superimpose digital communication signals at a low level on top of the 4-20 mA control signal. This enables two-way field communication to take place and makes it possible for additional information beyond the normal process variable to be communicated to/from a SMART field instrument.

## YOUR BENEFITS

- Device configuration or re-configuration
- Device diagnostics or troubleshooting
- Reading the values of additional measurements provided by the device
- Device health and status

The HART protocol communicates at 1200 bps without interrupting the 4-20 mA signal and allows a host application (master) to get up to three digital updates per second from a field device. As the digital FSK signal is phase continuous, there is no interference with the 4-20 mA signal. Because HART is a master/slave protocol, field (slave) device speaks only when spoken to by a master. The HART protocol can be used in various modes for communicating information to/from smart field instruments and central control or monitoring systems. HART provides up to two masters (primary and secondary). This allows secondary masters such as handheld communicators to be used without interfering with communications to/from the primary master, i.e., control/monitoring system. There is also an optional “burst” communication mode where a single slave device can continuously broadcast a standard HART reply message. Higher update rates are possible with this optional digital communication mode and use is normally restricted to point-to-point topologies.



## HART MULTIPLEXER

**HART Interface Solutions from Pepperl+Fuchs consist of two HART Multiplexer Systems for multiple signal loops and a HART Loop Converter for single loop applications.**

The Multiplexer is used to connect HART field devices to Asset Management Systems like AMS™ Suite: Intelligent Device Manager from Emerson Process Management. At the heart of HART Interface Solution (HIS), the HART Multiplexer acts like a gateway device, routing communications between the maintenance workstation PC and the HART field devices. It interrogates each HART device, retrieves device information, and stores it in an internal database. This information is made available by the AMS Device Manager or PACTware. The HART Multiplexer also acts as a message coordinator for communication between the maintenance workstation PC and the HART devices.

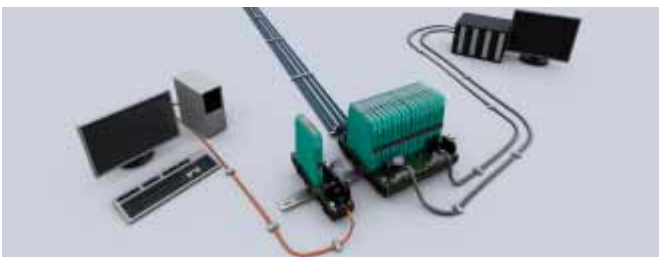
Our HART Multiplexers provide two essential benefits: small size and low cost per point. The small footprint is especially

important for retrofit installations where cabinet space is costly and often unavailable. For new installations, we offer a wide range of termination panels that can be used instead of the DCS I/O panels and onto which the multiplexer can be mounted directly.

Customized Termination Panels replace proprietary DCS, PLC and ESD panels or are ideal for new and upgrade installations where a HIS panel replaces the standard Field Termination Panel normally supplied by the DCS system vendor.

External Termination Panels are used in conjunction with proprietary DCS termination panels. These solutions are ideal for retrofit installations. For use with requirements for functional safety, there are assessments for loop views up to SIL3.

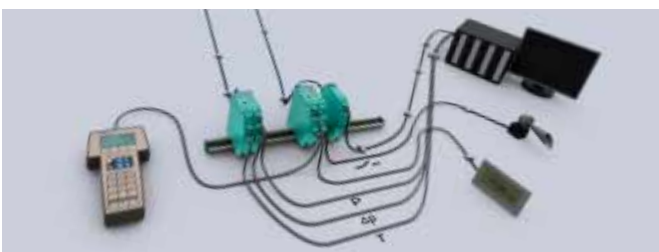
## SYSTEM OVERVIEW



**H-SYSTEM HART MUX** Each H-System HART Multiplexer (HID MUX 2700) provides communication to 32 HART devices. A network is built by multidropping multiplexers; up to 31 multiplexers are connected to support a single network with a maximum of 992 field instruments per communication port on your PC workstation.

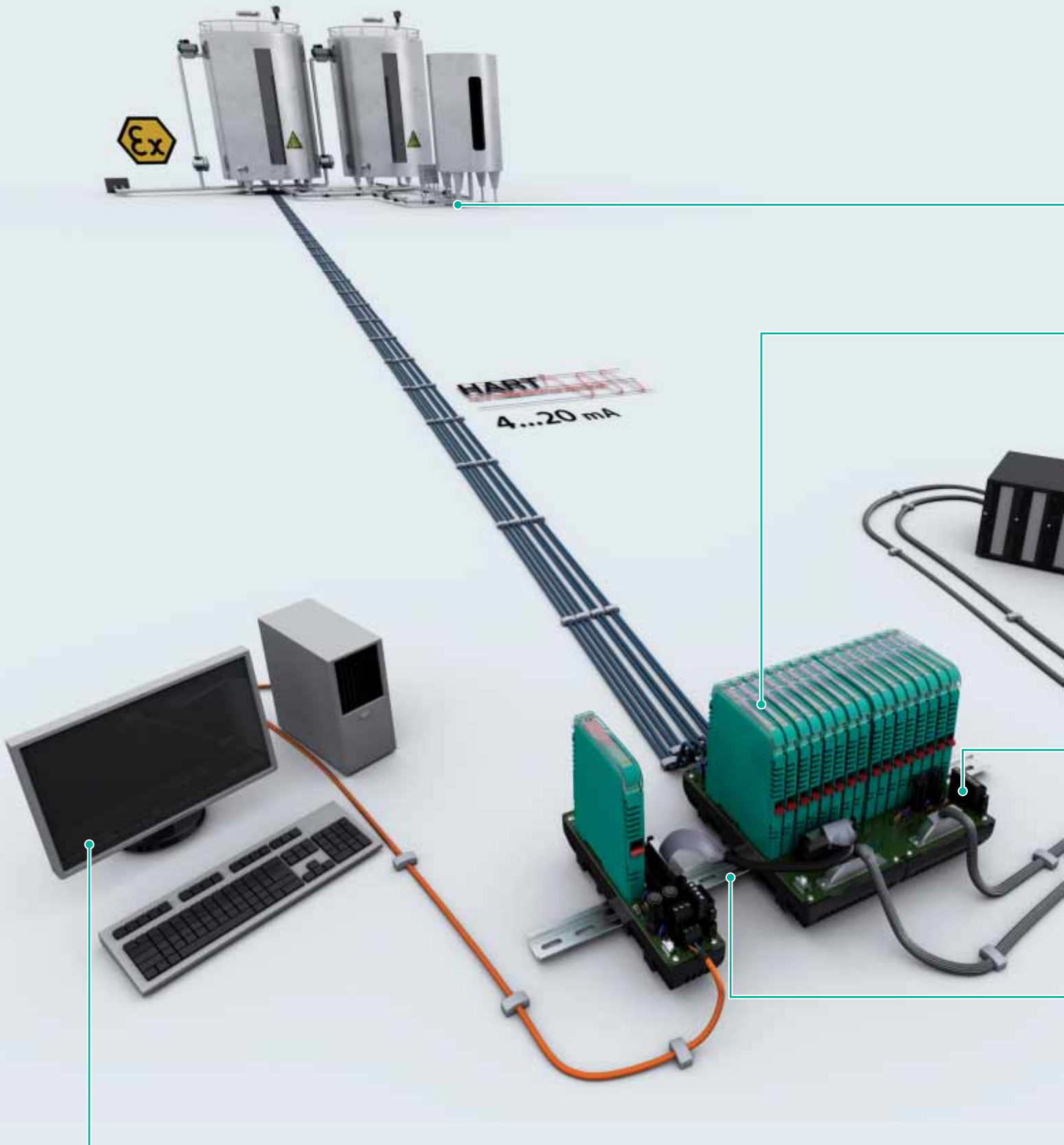


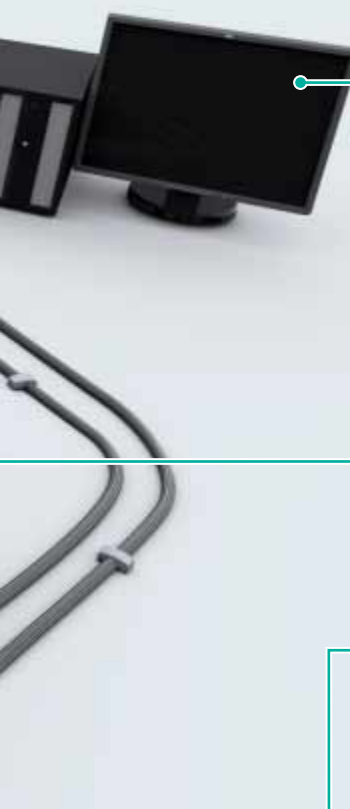
**K-SYSTEM HART MUX** The K-System HART Multiplexer works as a master/slave system and when fully occupied can drive up to 256 HART field devices. Up to 15 additional slaves can be connected to the master, each of which can support another 16 channels. This allows up to 7936 field devices to be addressed through one RS485 interface.



**K-SYSTEM HART LOOP CONVERTER** The HART Loop Converter (HLC) is a single loop solution. Each HLC is able to power and communicate with one HART-field device. It sets the field device into burst mode and converts up to 4 HART-variables into analog output signals. Trip values can be realized by optional output relays.

# THE HART INTERFACE SOLUTION IN H-SYSTEM TERMINATION BOARD





## IDEAL TERMINATION BOARD SOLUTIONS WITH H-SYSTEM

The interface technology of the H-System offers the ideal termination board solution. Customize your termination board to your own I/O-Specification with system connectors. The installation can easily be expanded with Fault Indication Boards, HART Communication Boards and additional termination boards assembled with the complete range of isolated barriers. The HART control loop is fed to the HART communication board with a ribbon cable.

### TRANSPARENCY INTO THE FIELD

Smart transmitters and valve controllers use the analog 4 ... 20 mA signal. Service and maintenance cost savings are realized in digital HART protocol communication.

### TERMINATION BOARD TECHNOLOGY WITH H-SYSTEM

H-System isolated barriers protect the hazardous area and feed the transmitters and valves. H-System barriers are snapped on termination boards and are transparent for HART communication.

### UNINTERRUPTED SIGNAL PROCESSING

HART signals do not interrupt the 4 ... 20 mA signals from the transmitters or valves to the PLC/DCS.

### FUNCTIONAL SAFETY

With the capacitive coupling the HART Signals will not harm the 4 ... 20 mA information – up to SIL3.

### COST SAVINGS WITH SYSTEM CONNECTORS

The analog 4 ... 20 mA signals are transmitted to the DCS/PLS via system cables. This avoids errors and reduces costs compared to single wirings.

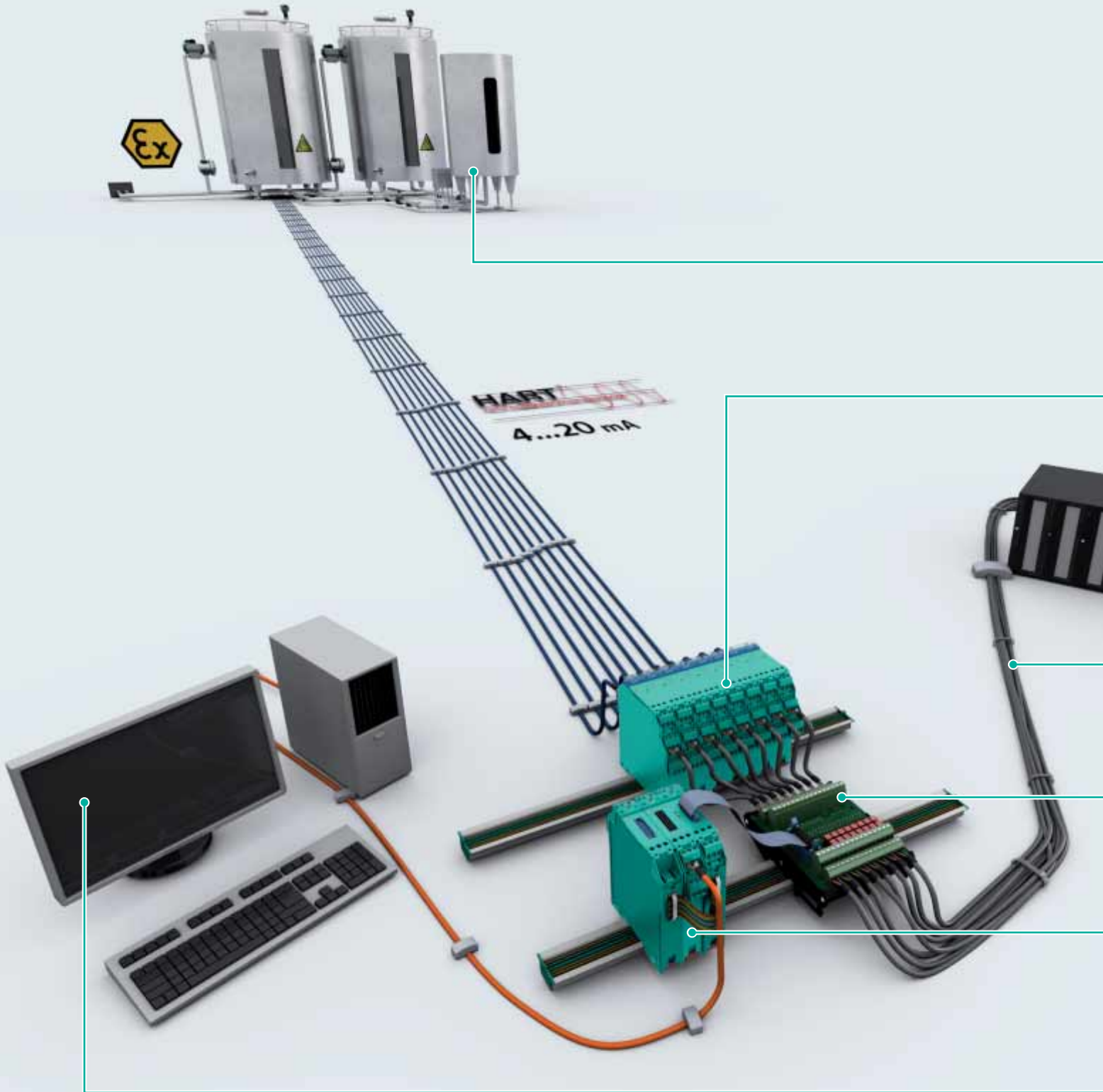
### FAST CONNECTING TO THE PROCESS

The HART Multiplexer HID MUX2700 is mounted on the HART Communication Board. The connection to the Termination Boards is accomplished with flat cable connectors. Each H-System HART Multiplexer can address up to 32 channels.

### EASY COMMUNICATION WITH THE FIELD DEVICE

Software tools like AMS from Emerson, PDM from Siemens, Fieldcare from Endress+Hauser, or PACTware enable an easy configuration of the HART Multiplexer and the field devices of all loops.

# THE HART INTERFACE SOLUTION WITH THE DIN-RAIL MOUNTAB





## K-SYSTEM – HIGH GRANULARITY IN DIN-RAIL TECHNOLOGY

The flexible, demand-oriented possibilities of installation – from a single module to a system solution for building a large-scale plant – characterize the K-System. Our extensive line of isolators contains over 150 different models, each containing industry-leading features and benefits. The K-System devices easily snap on to a 35 mm rail. An insert (Power Rail) is available that supplies power on gold-plated contact rails. Power and a collective error message are transferred to the K-System modules over the Power Rail. It couldn't be easier!

The HART control loop is fed to the HART Multiplexer with a ribbon cable.

### TRANSPARENCY INTO THE FIELD

Smart transmitters and valve controllers use the analog 4 ... 20 mA signal. Service and maintenance cost-savings are realized in digital HART protocol communication.

### ISOLATED BARRIERS IN K-SYSTEM

K-System isolated barriers protect the hazardous area and feed the transmitters and valves. K-System barriers are transparent for HART communication.

### FUNCTIONAL SAFETY

With the capacitive coupling the HART Signals will not harm the 4 ... 20 mA information - up to SIL3.

### UNINTERRUPTED SIGNAL PROCESSING

HART signals do not interrupt the 4 ... 20 mA signals from the transmitters or valves to the PLC/DCS.

### EASY FEED-IN OF HART SIGNALS

The HART-Termination Board couples the HART signals into the loops. The galvanic isolation remains unaffected.

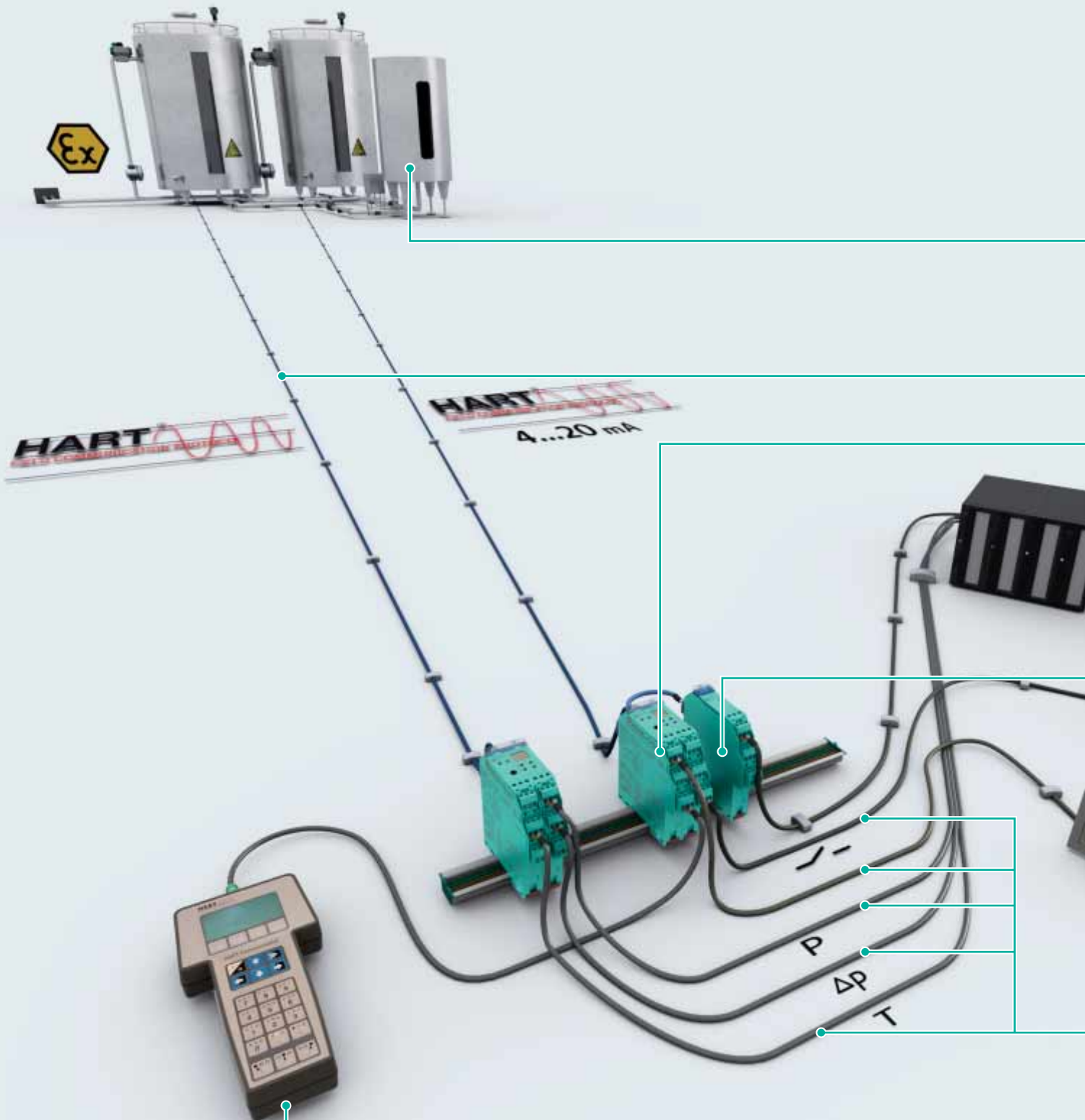
### HART MULTIPLEXER – THE WINDOW TO THE PROCESS

The HART Multiplexer is a Master-Slave-System. The Master can be combined with 15 additional Slaves. With 31 Masters, up to 7936 field devices can be used with each RS485 Interface.

### EASY COMMUNICATION WITH THE FIELD DEVICE

Software tools like AMS from Emerson, PDM from Siemens, Fieldcare from Endress+ Hauser or PACTware from Pepperl+Fuchs enable an easy configuration of the HART Multiplexer and the field devices of all loops.

# THE SINGLE LOOP HART INTERFACE SOLUTION WITH K-SYSTEM





## HART LOOP CONVERTER – SIGNAL EXPANDER IN THE K-SYSTEM

The one channel HART Loop Converter KFD2-HLC-EX1.D opens up the full potential of new and installed multivariable HART devices like Mass Flow, temperature and pressure transmitters, or valve positioners. As a member of the K-System family, the KFD2-HLC-EX1.D has all the advantages of that system like Power Rail connection, galvanic isolation, or LED indication. The HLC provides three isolated analog signals proportional to a multivariable transmitter's primary, second, third, or fourth variables. The HLC shows these process variables from the smart device with no additional process penetrations or wiring.

### USE THE FULL POTENTIAL OF HART DEVICES

The HART Loop Converter (HLC) opens the full potential of new and installed multivariable HART transmitters and valve applications.

### INTRINSIC SAFETY INTO THE FIELD

The supply of the HART field devices is available directly with the HLC without the need of additional isolated or zener barriers.

### ADVANTAGES OF ESTABLISHED INSTRUMENTATION

With the passive input the HLC can be connected to existing loops without influencing the safety parameters. The HLC enables trusted HART transmitters and valves to remain in place, and allows you to take advantage of the additional information they offer.

### UNINTERRUPTED SIGNAL PROCESSING

The existing analog loop won't be interrupted when accessing with the HLC.

### CONVERTS DIGITAL TO ANALOG

The HLC converts up to 4 variables from the HART signal into analog signals and trip values.

### FUNCTIONAL SAFETY

With the capacitive coupling the HART Signals will not harm the 4 ... 20 mA information – up to SIL3.







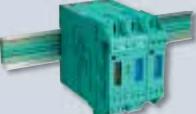

### MORE SIGNALS WITH THE HLC




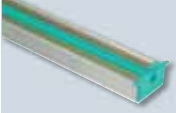




Installed transparency across the 4 ... 20 mA can be expanded with continuous readout information of the multiple HART variables. This information can be used for additional alarms or displays.

### HART COMMUNICATION TO FIELD DEVICE

With a HART communicator or other HART software tool, the connected field device can easily be parameterized from the safe side of the HLC.

# SYSTEM OVERVIEW

H-SYSTEM		Multi Loop (Multiplexer) Solution		Fault Bus	SIL	Zone 2	
Isolated Barriers	Transmitter Power Supplies and Current Drivers						
	The H-System Interface modules are isolated barriers that transfer signals from the hazardous area to the safe side. Transmitter power supplies feed your field transmitter and transfer the 4 ... 20 mA signal current to the safe side of the DCS. Current drivers transfer the signal current in the opposite direction. The barriers are transparent for the HART Signal.					■	■
Termination Boards	8- and 16-position Termination Boards						
	The interface modules (isolated barriers) are snapped onto the termination boards. Different connection options are available - from screw terminals to customized system cables. The HART signals are transferred to the HART Multiplexer with flat ribbon cable.					■	■
HART Multiplexer	HID MUX 2700						
	The H-System HART Multiplexer HID MUX 2700 provides the communication for up to 32 HART devices. The inputs are galvanically isolated and are used in loops up to SIL 3. The HART Multiplexer HID Mux 2700 is snapped on the HART Communication Board.					■	■
HART Communication Board	HIATB01-HART-2x16						
	The HART Communication Board is used with the H-System HART Multiplexer HID MUX 2700. With the redundant power supply and RS485 terminals you get maximum availability for your application.					■	■
Integrated HART Multiplexer	HPSM/32/MM-01						
	The integrated HART Multiplexer HPSM/32/MM-01 consists of a termination board and an integrated HART Multiplexer HID MUX 2700. This termination board is wired into the signal loop on the safe side and can communicate with up to 32 HART devices.						■
K-SYSTEM		Multi Loop (Multiplexer) Solution		Power Rail	SIL	Zone 2	
Isolated Barriers	Transmitter Power Supplies and Current Drivers						
	The Interface modules of the DIN-Rail mounted K-System are isolated barriers that transfer signals from the hazardous area to the safe side. Transmitter power supplies feed your field transmitter and transfer the 4 ... 20 mA signal current to the safe side of the DCS. Current drivers transfer the signal current in the opposite direction. All barriers are transparent for the HART Signal.					■	■
HART Multiplexer	HART Multiplex Master and Slave						
	The HART Multiplexer works as a master/slave system and when fully occupied can drive up to 256 analogue HART transmitters or HART control devices. The slave unit built into the Master KFD2-HMM-16 runs the 16 channels. Up to 15 additional KFD0-HMS-16 slave units can be connected to the master, each of which can support another 16 channels.					■	■
HART Termination Boards							
	These flexible termination boards with HART pick-off connectors have 16 terminal blocks to connect up to 16 HART loops. Optional versions with built-in 250 ohm HART resistors are available.						■

K-SYSTEM	Single Loop Solution	INPUT		OUTPUT		SUPPLY		STANDARDS	
		HART Com- munication	Transmitter Supply	4 ... 20 mA	Relay	24 V DC	Power Rail	Ex	Non-Ex
HART Loop Converter	KFD2-HLC-EX1.D								
	<ul style="list-style-type: none"> <li>- 1 channel</li> <li>- Input HART communication with transmitter supply</li> <li>- 3 analog outputs 4 mA ... 20 mA</li> <li>- Setup via pushbuttons/display</li> </ul>	■	■	■		■	■	■	
HART Loop Converter	KFD2-HLC-EX1.D.2W								
	<ul style="list-style-type: none"> <li>- 1 channel</li> <li>- Input HART communication with transmitter supply</li> <li>- 3 analog outputs 4 mA ... 20 mA</li> <li>- 2 output relays</li> <li>- Setup via pushbuttons/display</li> </ul>	■	■	■	■	■	■	■	
HART Loop Converter	KFD2-HLC-EX1.D.4S								
	<ul style="list-style-type: none"> <li>- 1 channel</li> <li>- Input HART communication with transmitter supply</li> <li>- 3 analog outputs 4 mA ... 20 mA</li> <li>- 4 output relays</li> <li>- Setup via pushbuttons/display</li> </ul>	■	■	■	■	■	■	■	
<b>K-SYSTEM</b>	<b>Accessories</b>								
Mounting	Power Rail								
	The Power Rail snaps directly onto a standard DIN-Rail and contains two conductors that deliver power to the modules. The Power Rail virtually eliminates lead breakage and short circuit due to reduced wiring. The Power Rail also provides an easy expansion. In addition to the supply delivery, the Power Rail also transmits a collective error message from the individual isolated barrier.								
Power	Power Supplies and Power Feed Module								
	With a 500 mA and 4 A Power supply you will find the ideal solution for powering your HART Interface Solution. The Power Supplies are short circuit protected and with the integrated gold connection terminals, easily snap onto the Power Rail so that no additional wiring is necessary. The Power Feed Module KFD2-EB2 supplies the Power Rail at a maximum current of 4 A. A contact for the collective error message is included. Redundant power feeds are available to increase the reliability of your system								
Wiring	HART Filter K-22μ								
	The new K-22μ is the optimal solution to filter the HART-Signals from 4 ... 20 mA signals. Even fast PLC-cards will no longer be able to detect the HART ripple. The K-22 μ can be mounted easily into the safe side terminals. Due to its construction with flat pins, it can be mounted together with the signal wires.								
Asset Management	Software								
	Pepperl+Fuchs HART Multiplexer works with PACTware and other major Plant Asset Management software packages. PACTware is a universal configuration tool for all P+F intelligent process automation products. These Windows-based packages are easy to use with simple interfaces for configuring and monitoring control devices. They are all compatible with the open HART protocol.								
Asset Management	USB HART Modem								
	The USB HART Modem is fully HART compliant for communication with any HART instrument and error-free slave testing. It draws the power from USB port and needs no external power supply. The Modem is USB 1.1 compliant. An integral 6-foot USB connector cable and connector cable terminates in two test clips that are polarity insensitive so you may attach either one of the test clips to positive or negative poles. The galvanic isolation allows you to connect the unit across the current sense resistor or the field device.								

# PROCESS AUTOMATION – PROTECTING YOUR PROCESS



For over a half century, Pepperl+Fuchs has been continually providing new concepts for the world of process automation. Our company sets standards in quality and innovative technology. We develop, produce and distribute electronic interface modules, Human-Machine Interfaces and hazardous location protection equipment on a global scale, meeting the most demanding needs of industry. Resulting from our world-wide presence and our high flexibility in production and customer service, we are able to individually offer complete solutions – wherever and whenever you need us. We are the recognized experts in our technologies – Pepperl+Fuchs has earned a strong reputation by supplying the world's largest process industry companies with the broadest line of proven components for a diverse range of applications.

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