Ing. Antonio Gordillo / Marketing / 10 Agosto 2021

Welcome

Protocólo HART productos, aplicaciones

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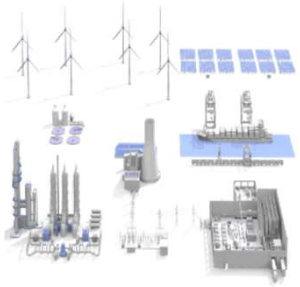
INSPIRING INNOVATIONS

Communication Interfaces – Overview 2021

Products



Application references

NearFi Technology
Designed by Phoenix Contact

PROFIBUS

TRUSTED WIRELESS

Technologies

PoE

HART

5G

"PAVE THE WAY FOR FUTURE BUSINESS"
by addressing relevant trends

SPE & APL

5G

TSN

OPC UA

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Fieldbus Communication 2

Serial Device Server / Gateways

Foundation fieldbus Power

Fieldbus Device Coupler Zone 2

Fieldbus Device Coupler Zone 2

Fieldbus Device Coupler Zone 1

Fieldbus Device Terminal box

Profibus DP/PA Converter

Profibus PA I/O Multiplexer

Ethernet HART Multiplexer

Fieldbus Communication 1

Ethernet Infrastructure

Ethernet Infrastructure

Ethernet Extender

Media Converter

Ethernet Isolator

Ethernet HART Multiplexer

Patch Panel

PoE Injector

Serial Device Server / Gateways

Data connectors

TIME SERVER

Fieldbus communication 2

Wireless

INSPIRING INNOVATIONS

Technologies

HART Technology

PoE Power over Ethernet

TRUSTED WIRELESS

Remote communication

PROFIBUS

5G

new

NearFi Technology
Designed by Phoenix Contact

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HART® TECHNOLOGY

Protocol, Technology, Products

in the beginning…

1950

1940s…1950s

Pneumatic signals were used with a range of 3…15 PSI

1970

1960s…1970s

Electronics began to replace pneumatics with a signal range of 10…50 mA

2021

1970s…today

Transistor technology advanced enough to reduce power consumption. A new signal range of 4…20 mA emerged.

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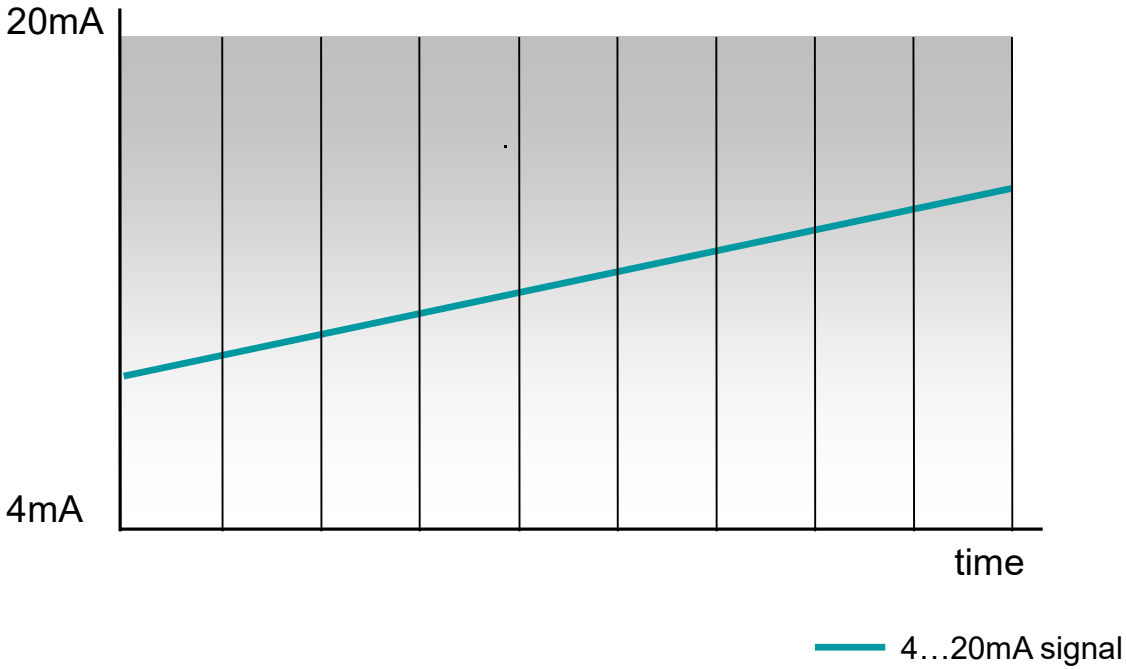
what is a 4…20mA signal?



- 4…20mA signal represents a physical measurement range
  - e.g., 0…100°F
- a signal less than 4mA or greater than 20mA indicates a problem

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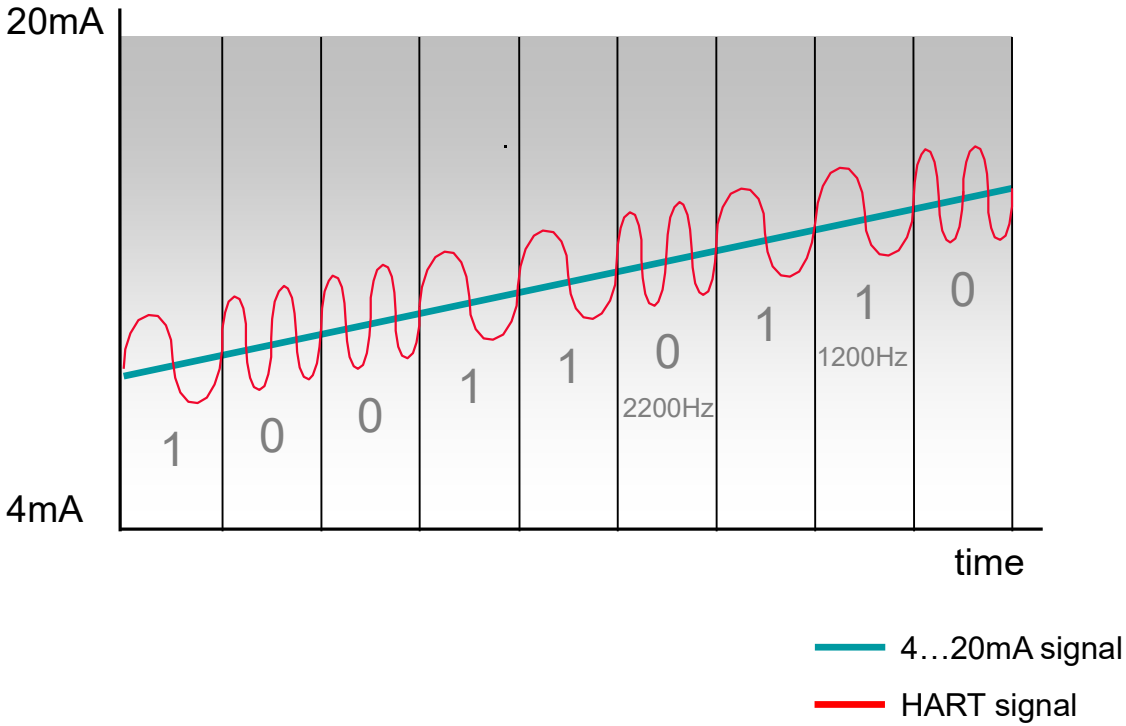
what is HART?

HART stands for Highway Addressable Remote Transducer



- HART is digital data superimposed onto a 4…20mA signal
- FSK modulation

  (frequency shift keying)
- 1200bps

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¿Qué es el Protocolo HART?

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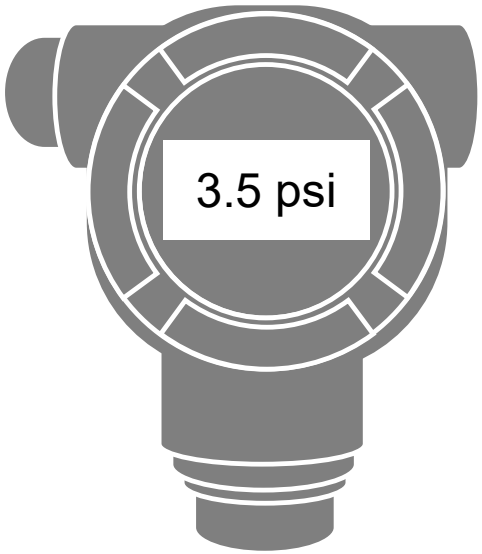
HART devices

most process measurement instruments are HART capable

pressure | temperature | level | flow | pH | valves | gas detectors



4…20mA — represents the process variable

4 process variables

device set up

calibration

device diagnostics

the HART protocol provides access to many additional features and capabilities

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HART commands

3 command sets

Universal

All devices must support

- Read manufacturer and device type
- Read primary variable (PV) and units
- Read or write 32-character message
- Write polling address

Common Practice

All devices should support

- Read selection of up to four dynamic variables
- Write device range values
- Calibrate (set zero, set span)

Device Specific

Unique to each device/manufacturer

- Read or write low-flow cut-off
- Start, stop, or clear totalizer
- Read or write density calibration factor
- Choose PV (mass, flow, or density)
- PID enable
- Write PID set point
- Valve characterization
- Valve set point

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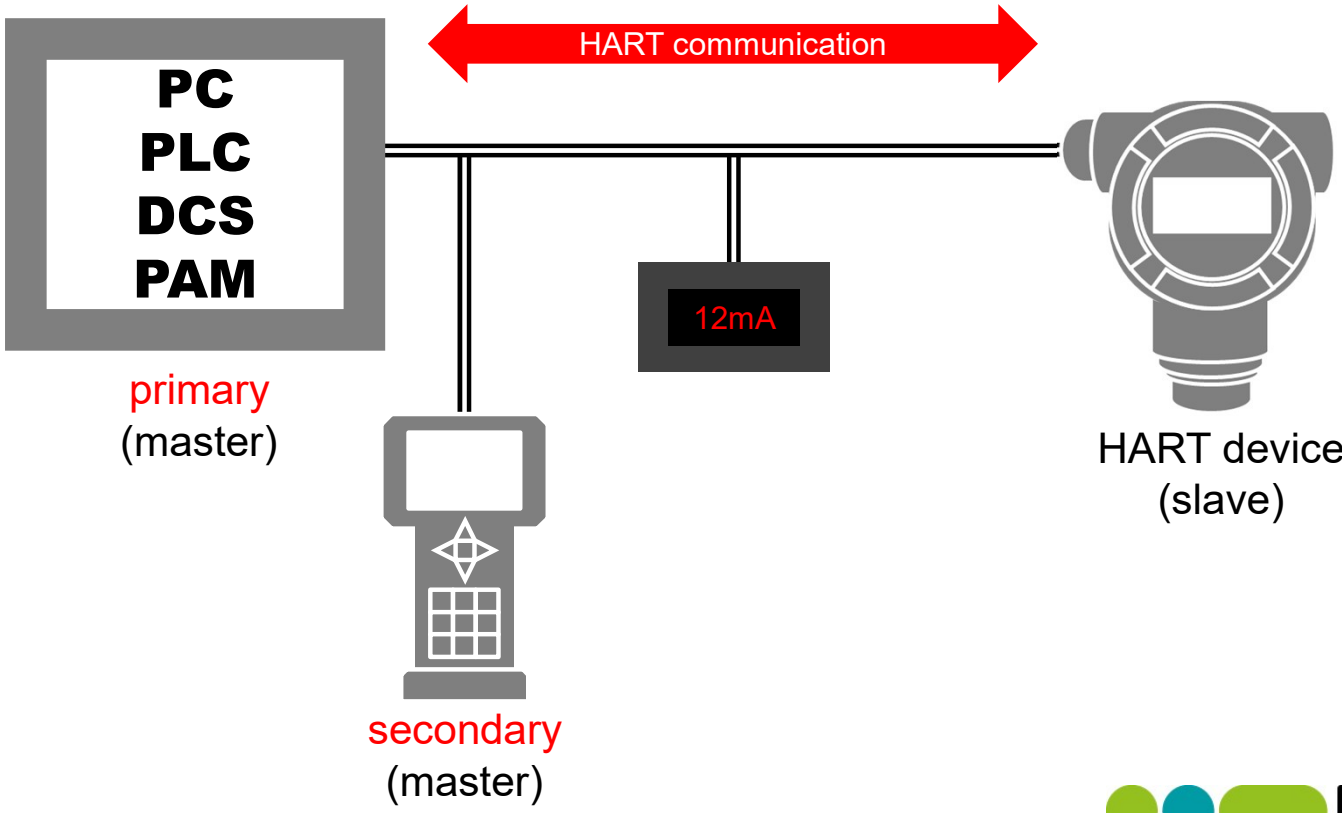
HART communication



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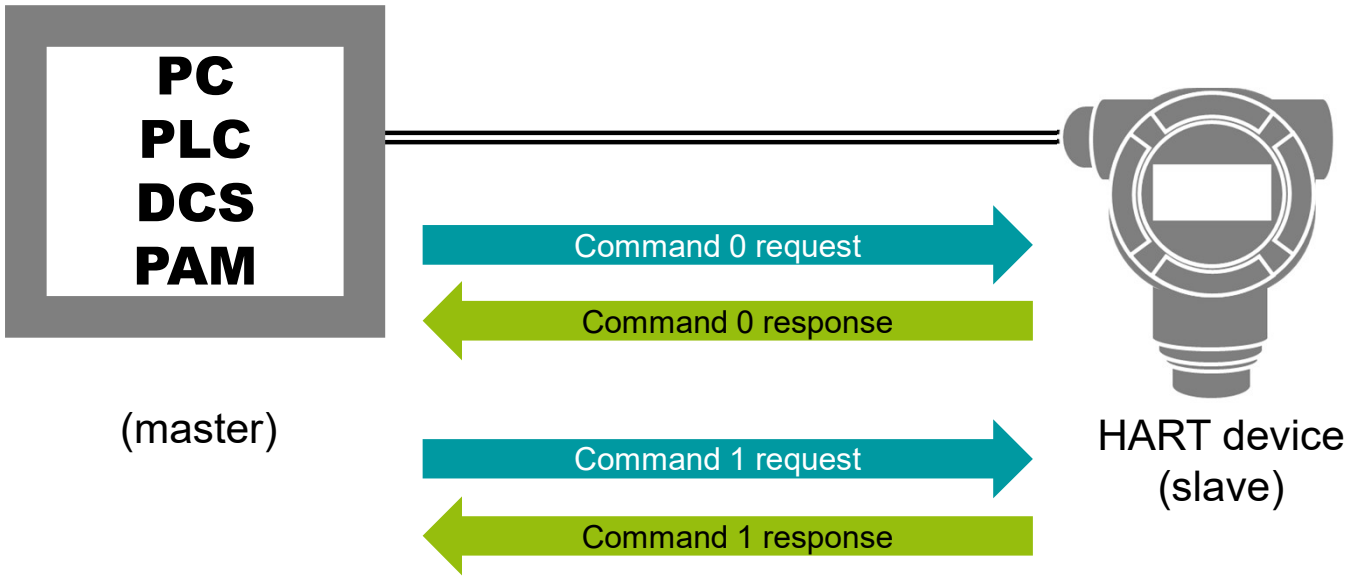
HART communication modes

poll and response



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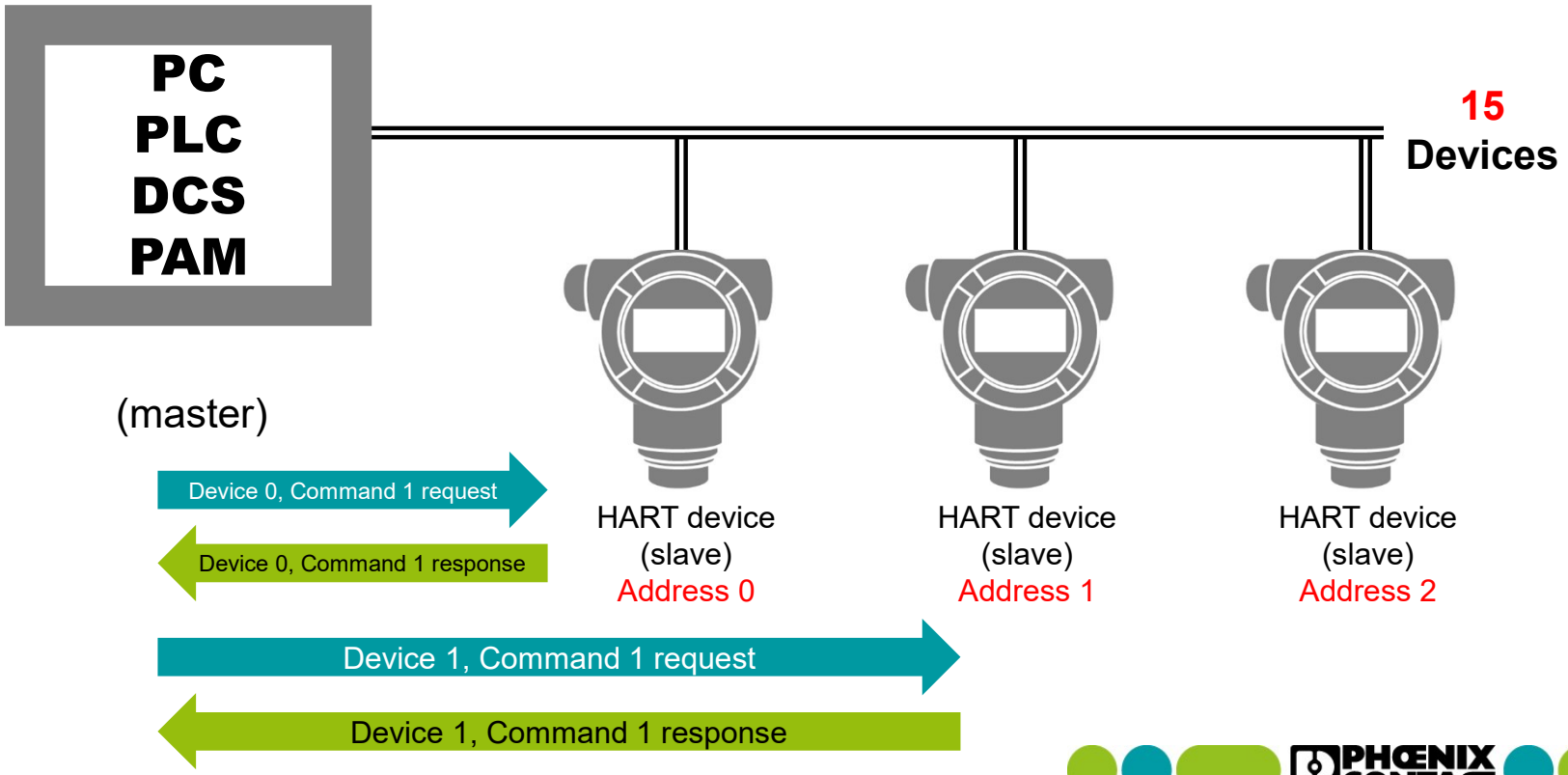
HART communication modes

multidrop



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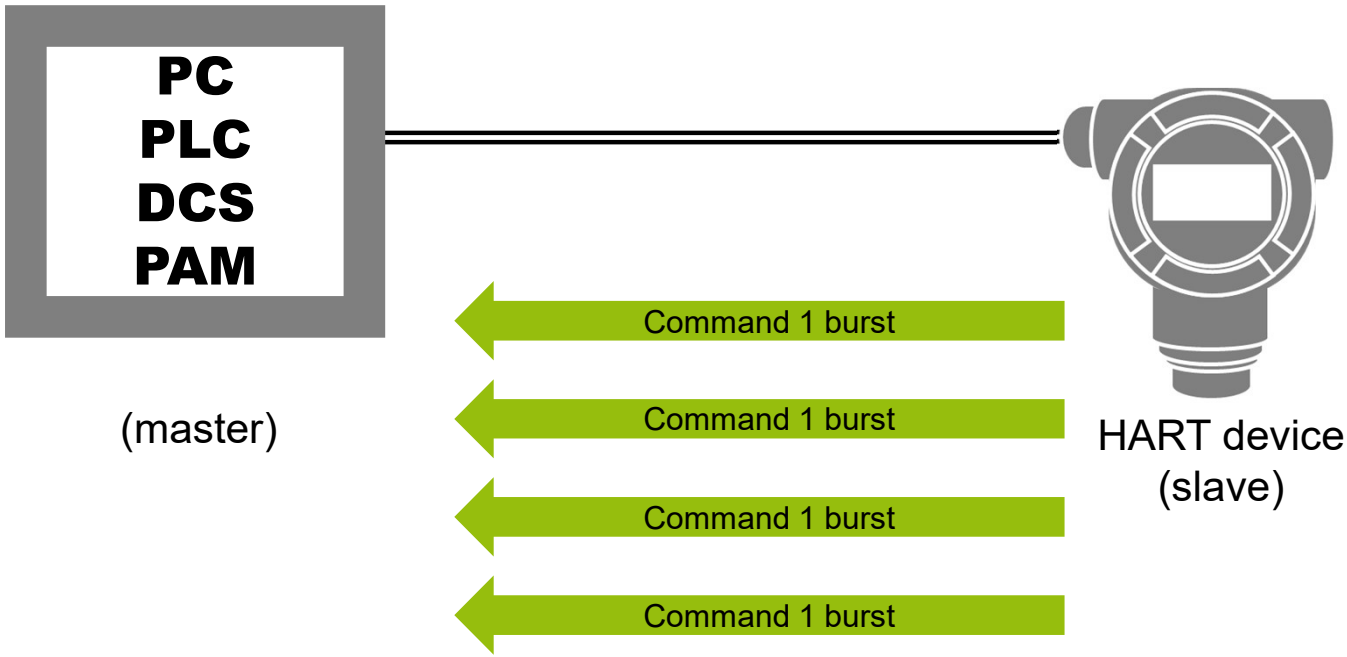
HART communication modes

burst



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Unlock your data

Level

- sensor status
- high and low alarm setpoints

Temperature

- ambient temperature
- cold junction temperature
- sensor breakage

Valve Positioner

- actual valve position feedback
- adjust for mechanical wear
- sensor status

Pressure

- cell temperature
- static pressure
- sensor status

Flow

- process media density
- absolute pressure and temperature
- totalized flow

pH

- temperature measurement
- sensor health

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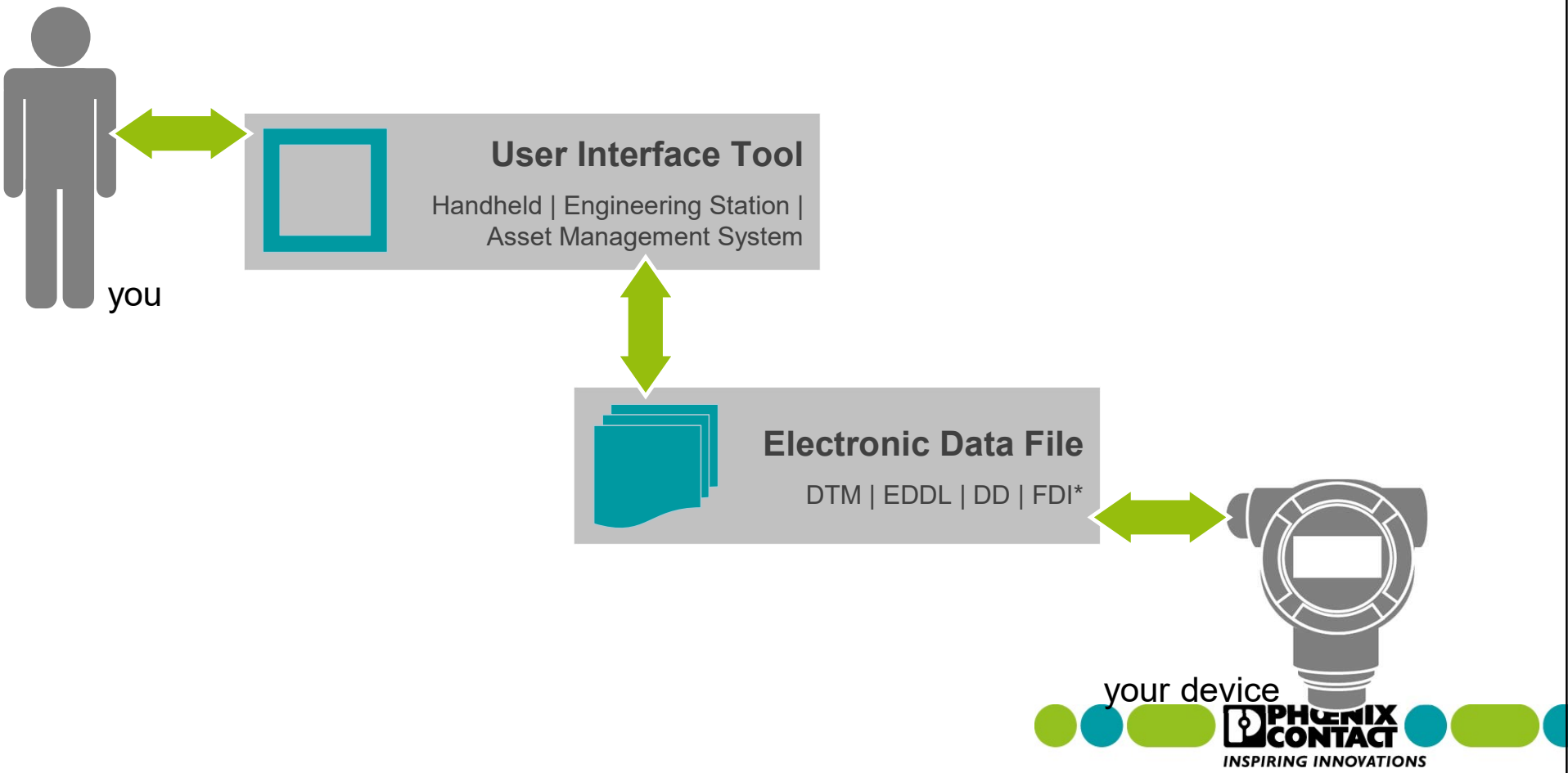
Accessing device data



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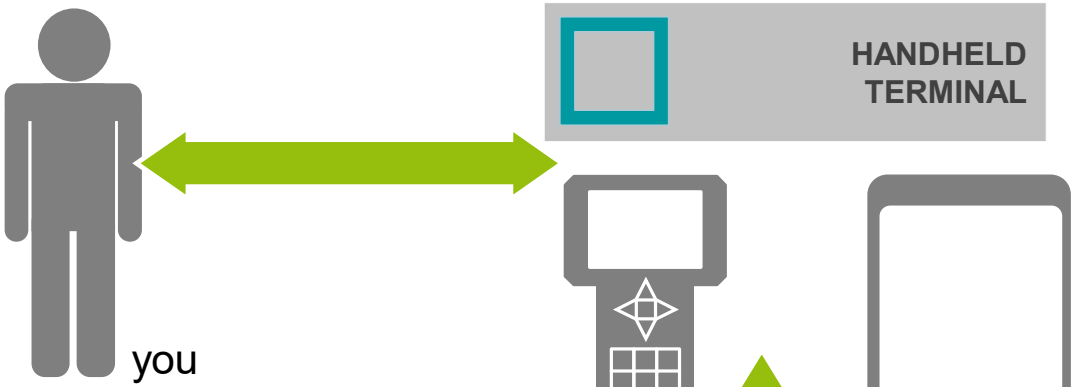

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Configure a HART Device Using a Handheld Programmer

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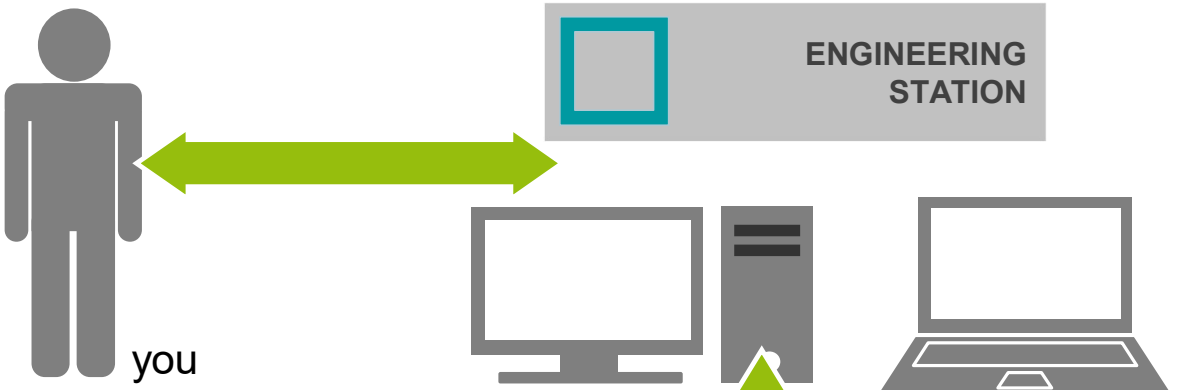
Accessing device data



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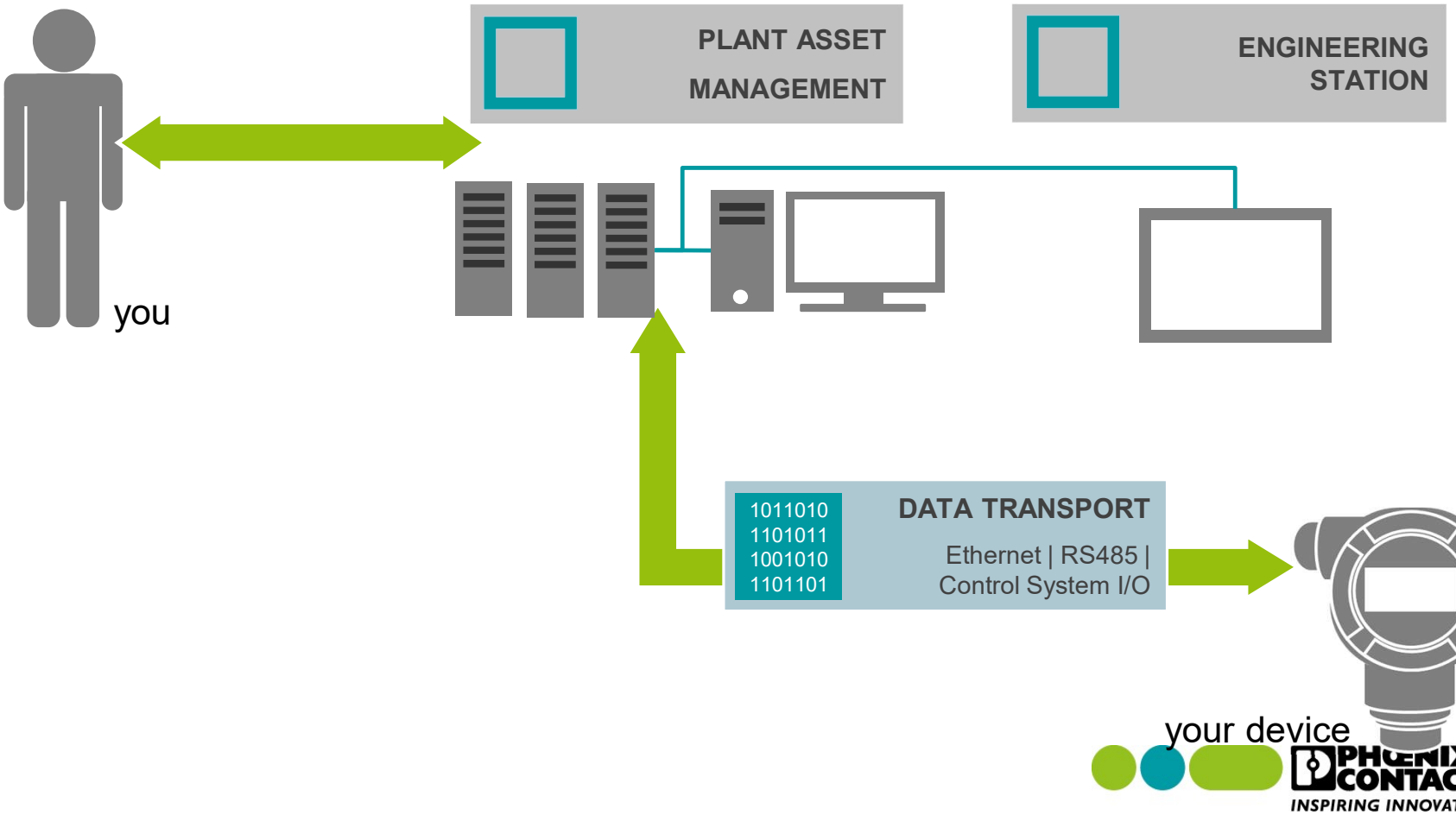
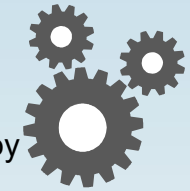
Accessing device data



HART technology can help you

- **Leverage intelligent device capabilities**
  - use unified tools for device configuration
  - gain operational improvements by reducing troubleshooting time



- **Decrease Maintenance costs**
  - use remote diagnostics to reduce field checks
  - capture performance trend data for predictive maintenance

- **Increase system availability**
  - detect device or process connection problems real time
  - avoid the high cost of unscheduled shutdowns

- **Improve regulatory compliance**
  - enable automated record keeping of compliance data
  - take advantage of multivariable devices for more thorough reporting

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Valve Maintenance

application

Valves account for

- Up to **90%** of safety failures
- **20…50%** of maintenance turnaround time

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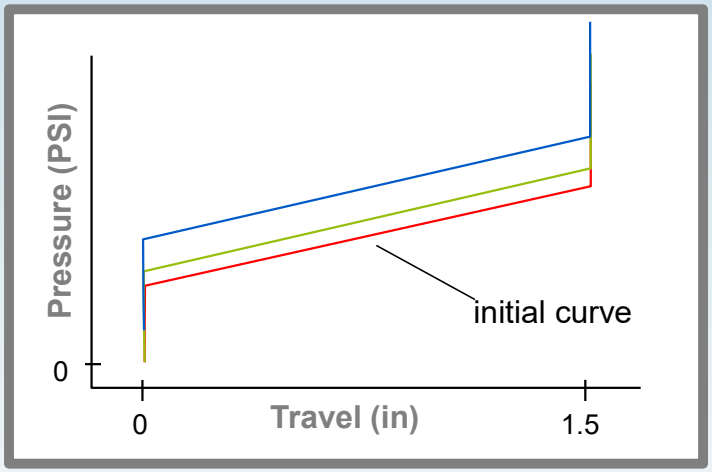
application

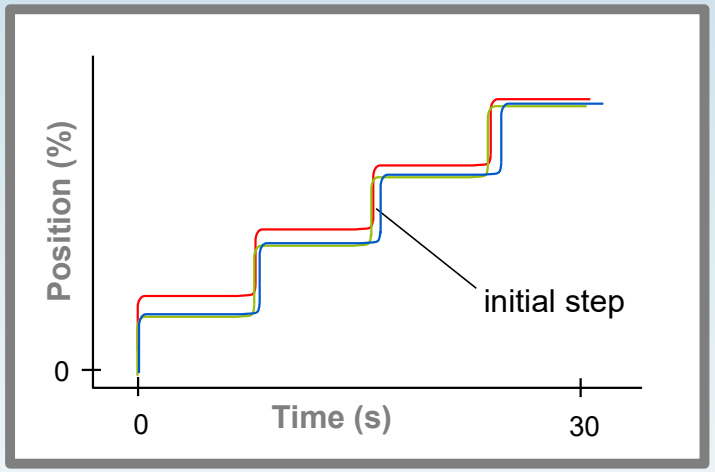
Valve Maintenance

HART data provides additional information

Actual valve position | Supply pressure | Actuator pressure | Stem friction

Valve Signatures





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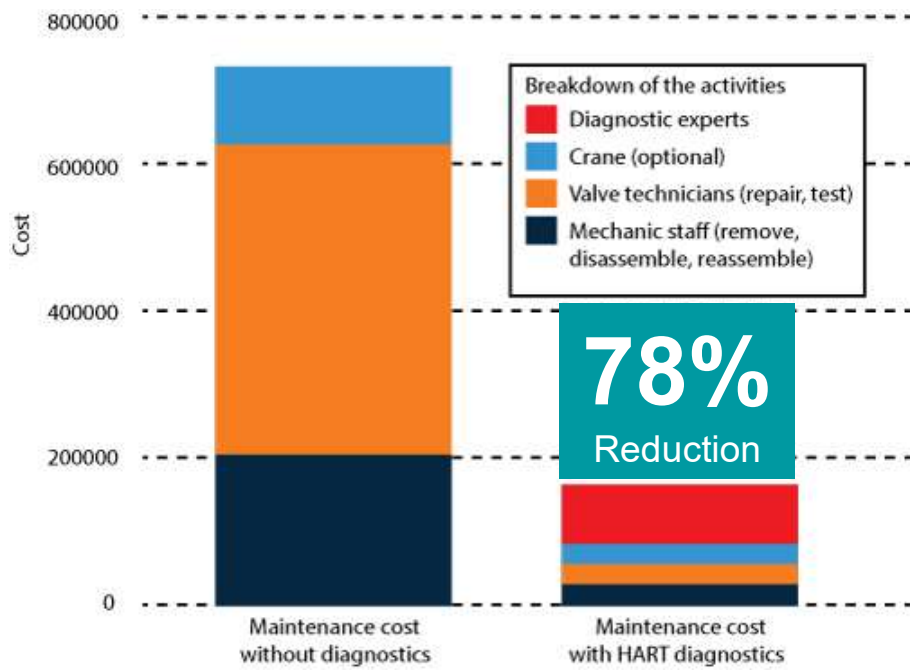
application

Valve Maintenance

HART enables transition to predictive maintenance

MOL Danube refinery valve maintenance costs



Source: FieldComm Group

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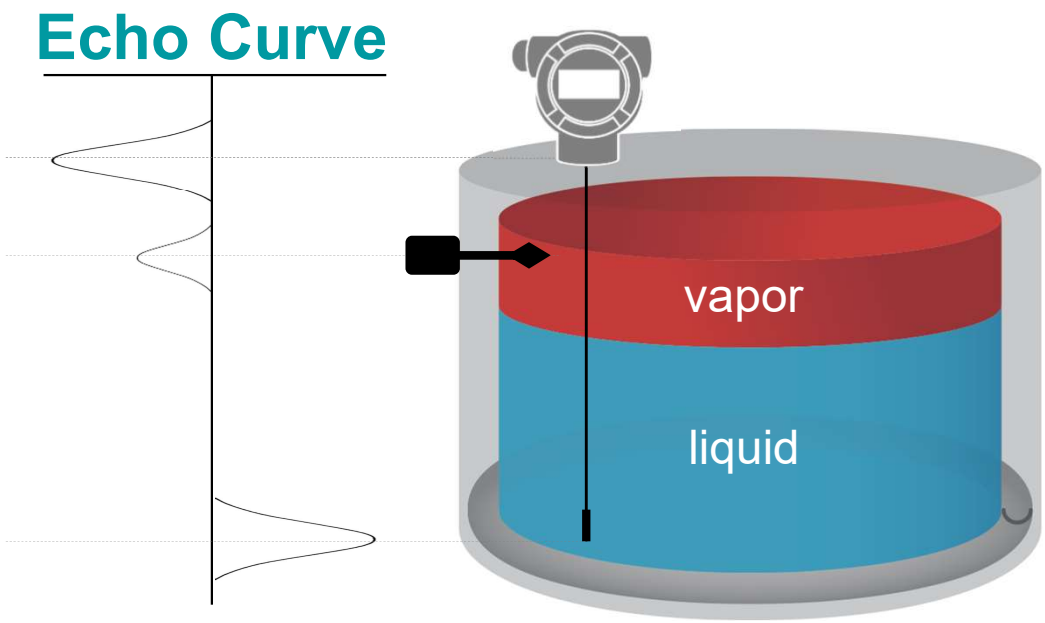
application

Guided Wave Radar Optimization

HART data provides additional information

Echo Curve | False Target Rejection Profile | Volume | Threshold Wizard



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Continuous Fault Monitoring

HART provides early warning of device failure

application

Universal Command 48

Bit 7—Device Malfunction

Bit 6—Configuration Changed

Bit 5—Cold Start

Bit 4—More Status Available

Bit 3—Primary Variable Analog Output Fixed

Bit 2—Primary Variable Analog Output Saturated

Bit 1—Non-Primary Variable Out of Limits

Bit 0—Primary Variable Out of Limits

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PACTware programming for the Ethernet HART Multiplexer

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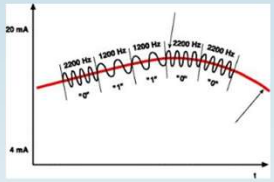
HART technology

the world's most broadly supported protocol for the process industry



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.

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HART installed base

There are nearly **40 MILLION** HART devices installed world wide.

Only about **10%** of those devices are actually connected to a HART capable control system.

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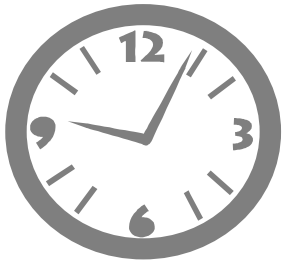
By utilizing HART data, operating expenditures can be reduced while increasing availability, saving you

MONEY.

Isn’t it about

TIME

to use the investment you already made in HART?



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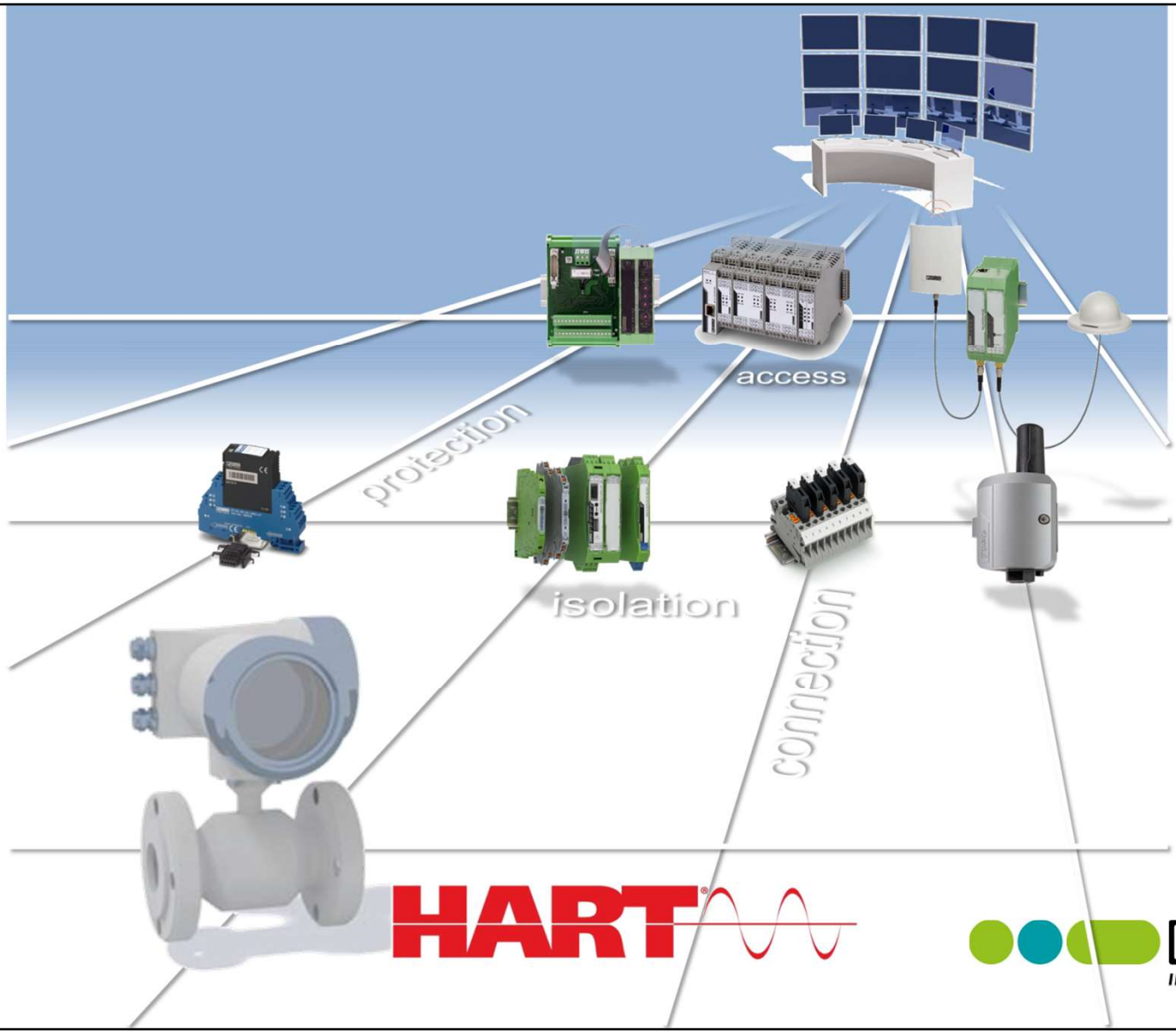

HART®

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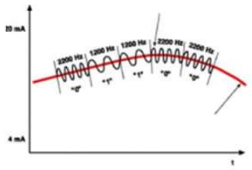
HART Products

HART®

Technology

HART Technology

the world's most broadly supported protocol for the process industry



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HART multiplexer

legacy HART access

access

RS485
32 HART devices
termination carrier
termination boards

HART

Multiplexer

HART multiplexer - MACX MCR-S-MUX - 2865599

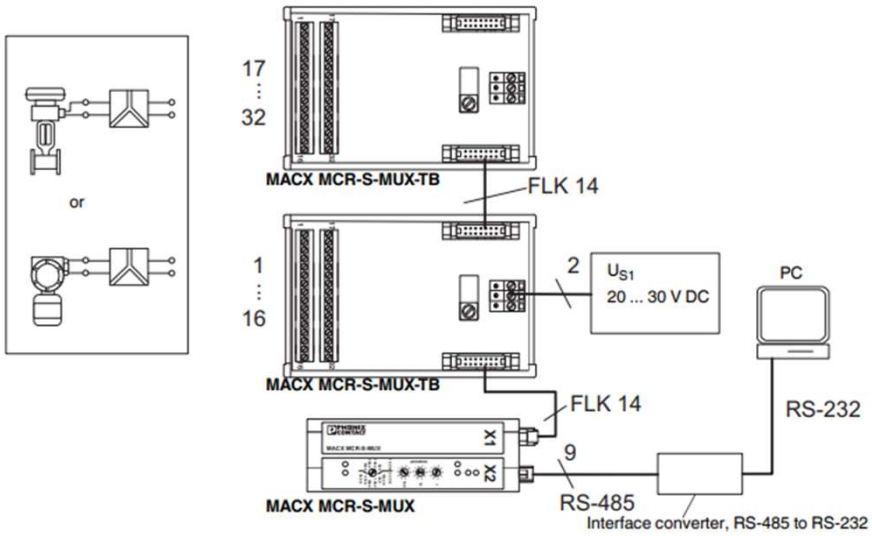
3D

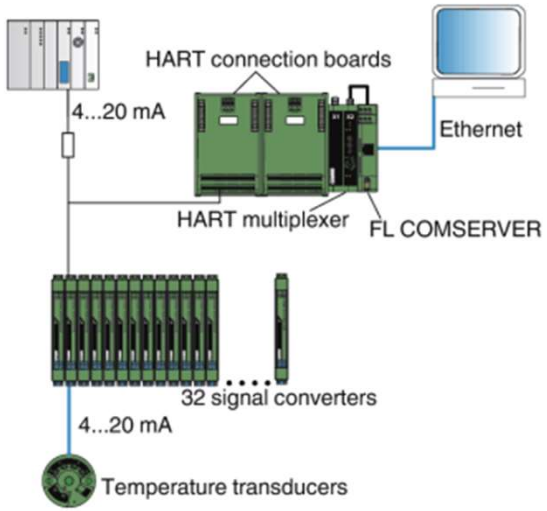
HART Multiplexer for online configuration and diagnostics of HART-compatible field devices, as well as for continuous documentation of process variables and states with a PC or management system for mounting on NS 35/7.5 or NS 32

Generate product PDF

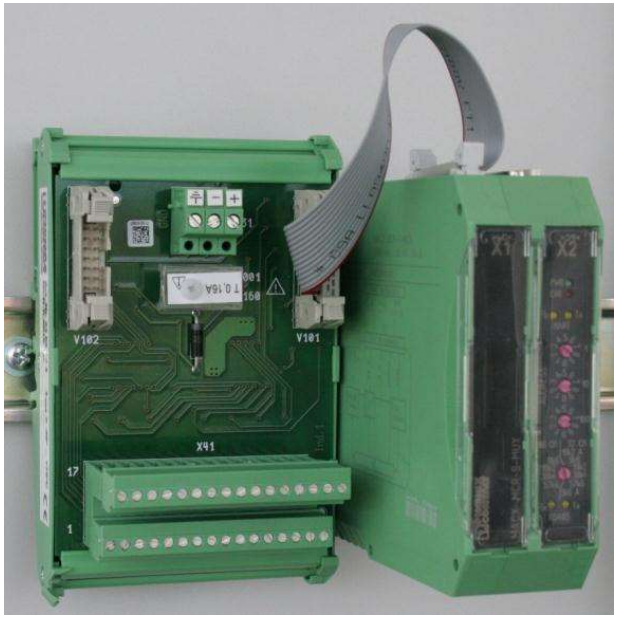
HART Multiplexer

Up to 32 HART devices





HART Multiplexing



- **HART Multiplexer**
  MACX MCR-S-MUX
  with
- **HART-Termination board**
  MACX MCR-S-MUX-TB

HART Multiplexer

MACX MCR-S-MUX

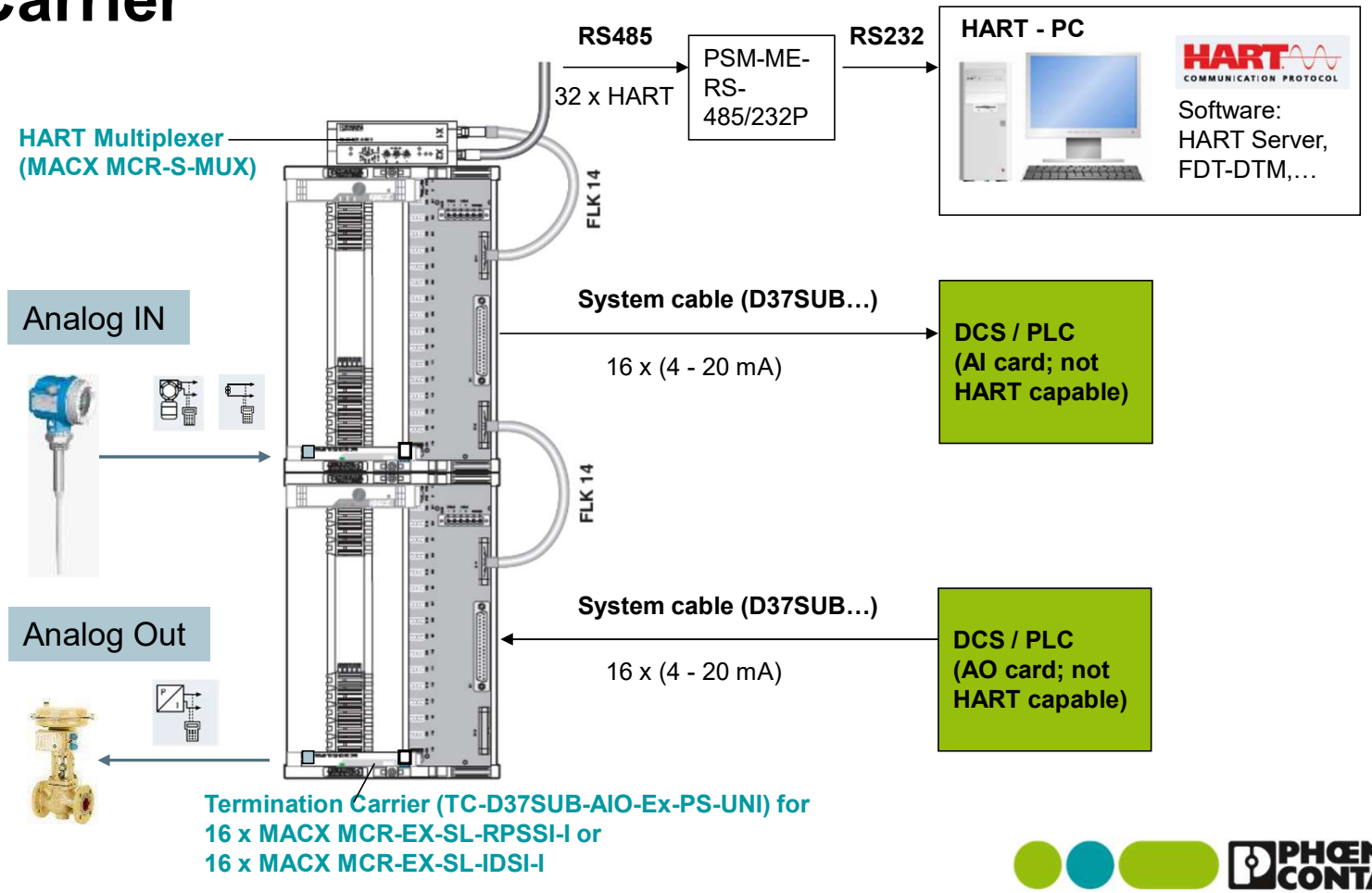
- Multiplexer for HART field devices
- 32 HART channels per multiplexer
- Up to 128 HART-multiplexer on one PC-interface
- Up to 4000 HART field devices
- Electrical isolation between power supply, RS 485 bus and HART channels

HART termination board

MACX MCR-S-MUX-TB

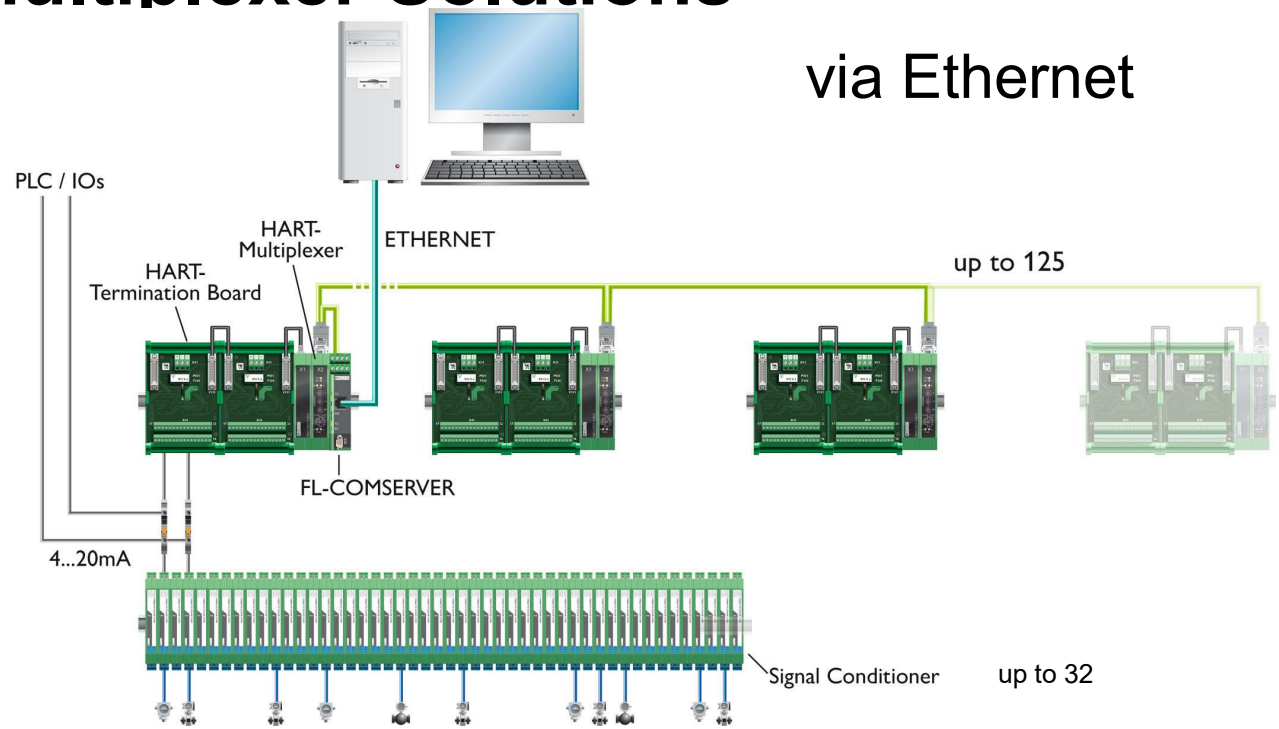
- Termination board for HART: from HART- field device to HART-Multiplexer
- For all modules with HART- transmission: MINI, MACX, PI
- 16 HART channels
- Expandable with a 2 second termination board -> 32 channel per multiplexer

HART Multiplexing with Termination Carrier

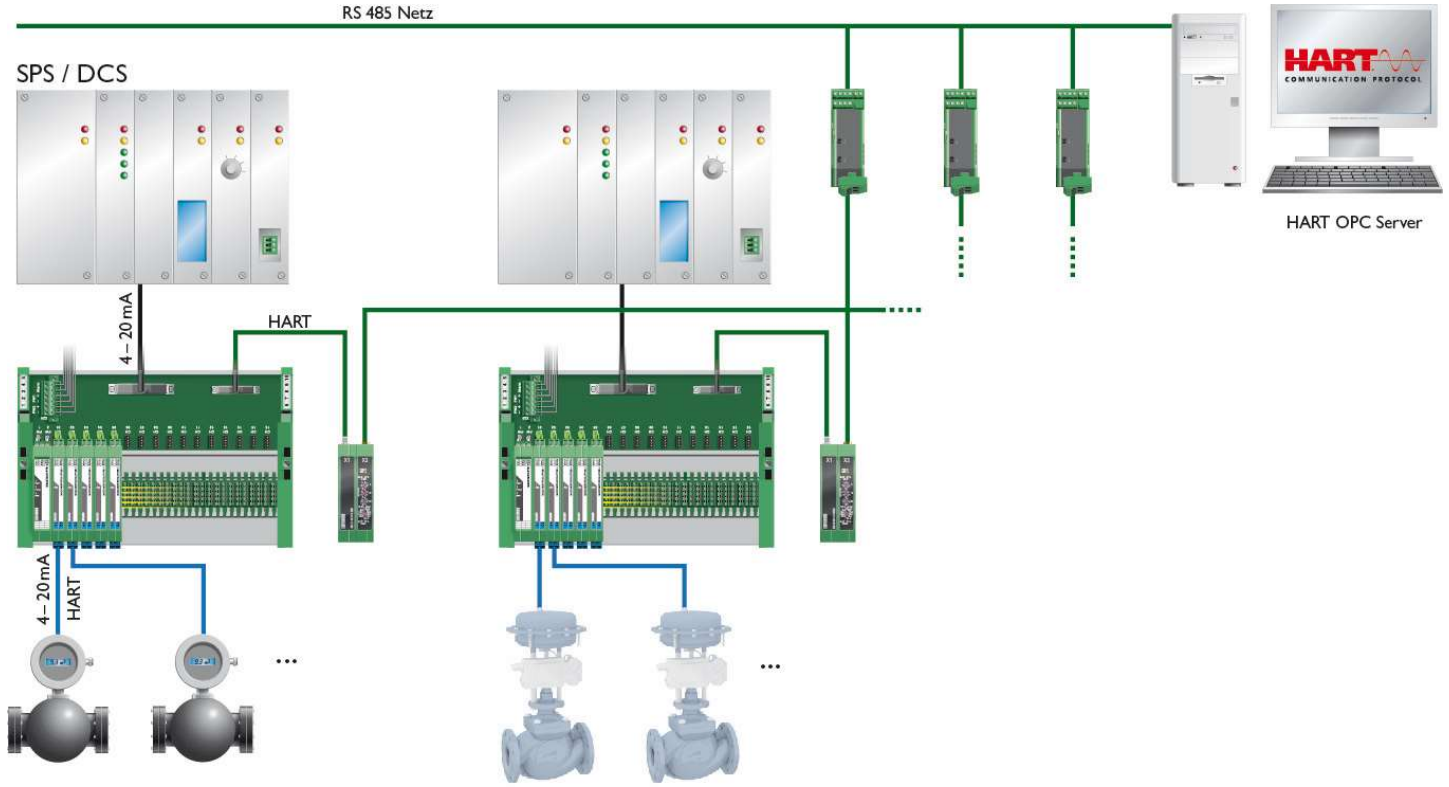


HART Multiplexer Solutions

via Ethernet



HART Multiplexer Solutions



Protocol Converter

A **Protocol converter** is a device used to convert the protocol of one device to the protocol suitable for the other device or tools to achieve the interoperability. This is sometimes referred to as a gateway, although a gateway typically has higher functionality.

Protocol Converter - MODBUS – DP/PA/FF

Converts Modbus RTU variables to modern digital Fieldbus signals

Set up and Parameterization via DD, EDD, GSD, & DTM from the Host/Asset Management System

Connect up to 4 legacy Modbus RTU devices to a fieldbus (maximum of 16 total registers per converter)

2-wire RS485 interface (1200…115.2kbps)

MODBUS RTU
to Profibus DP, Profibus PA or Fieldbus Foundation converter

Protocol Converter HART – DP/PA/FF

Set up and Parameterization via DD, EDD, GSD, & DTM from the Host/Asset Management System

Converts HART instrument data to modern digital Fieldbus signals

Connects up to 4 HART instruments to a Fieldbus (4 process variables maximum per converter)

2-wire HART loop signal connections using terminal blocks

Digital HART data to Profibus DP, Profibus PA or Fieldbus Foundation converter

Protocol Converter

	GW PL FF/MODBUS	GW PL PA/MODBUS	GW PL DP/MODBUS	GW PL FF/HART	GW PL PA/HART	GW PL DP/HART
Description	Modbus/RTU to FOUNDATION Fieldbus protocol converter	Protocol converter capable of connecting four Modbus/RTU devices to a PROFIBUS PA network	Modbus/RTU to PROFIBUS DP protocol converter	Protocol converter capable of connecting four HART (4-20 mA) devices to a Foundation Fieldbus network	Protocol converter capable of connecting four HART (4-20 mA) devices to a PROFIBUS PA network	Protocol converter capable of connecting four HART (4-20 mA) devices to a PROFIBUS DP network
Interface 1	Foundation Fieldbus	Profibus PA	Profibus DP	Foundation Fieldbus	Profibus PA	Profibus DP
Interface 1 connector	Combicon	Combicon	D-SUB 9, Combicon	Combicon	Combicon	D-SUB 9, Combicon
Interface 2	HART FSK	HART FSK	Modbus RTU	HART FSK	HART FSK	HART FSK
Interface 2	Combicon	Combicon	Combicon	Combicon	Combicon	Combicon
Order number	2316363	2316364	2316365	2316360	2316361	2316362

HART USB MODEM

USB modem for configuration and commissioning HART devices

The GW HART USB MODEM is suitable as a replacement for old RS232 HART modems or a cost effective alternative to expensive handheld devices.

Main Features

- Includes test utility to diagnose connection or configuration errors
- USB powered
- Unique form factor eliminates tangled cables
- Compatible with all major software packages

Ord. no 1003824 GW HART USB MODEM

Convertidor de protocolo de módem HART

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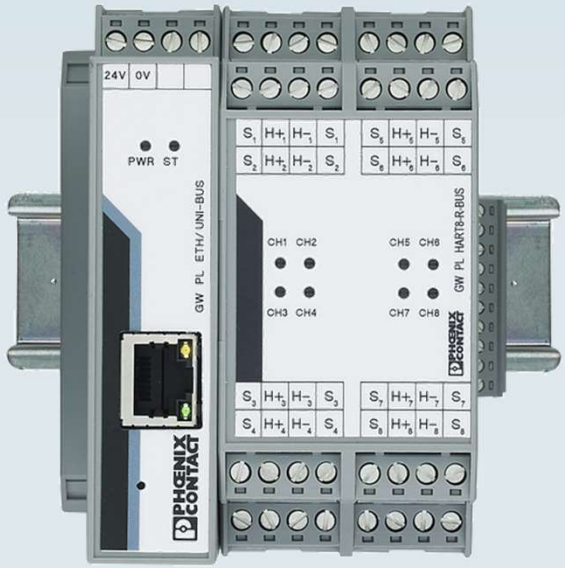
Modular Ethernet HART multiplexer



Converting HART protocol

The HART gateway converts the digital HART protocol into Ethernet protocols: HART-IP, Modbus TCP, PROFINET or UPC UA.

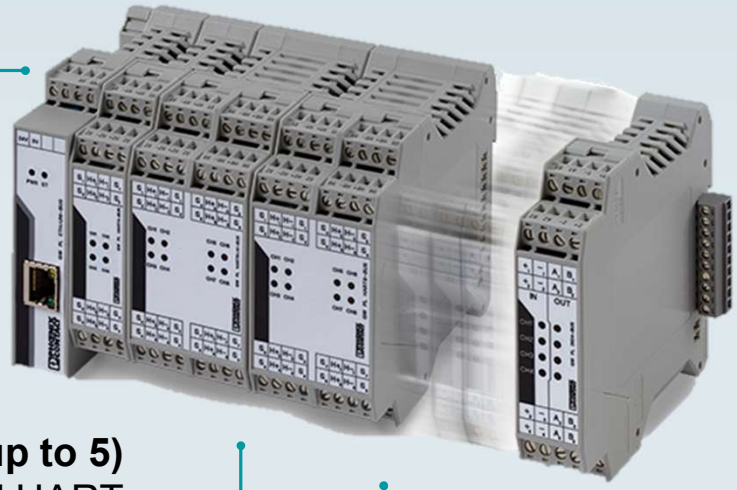
Easily parameterize and monitor HART field devices via Ethernet networks.

The modularity of the HART to Ehernet gateway, allows you to connect up to 40 HART devices.

Modular Ethernet HART multiplexer

Transmit critical HART process data over Ethernet (Modbus TCP, HART IP or Profinet)

1 HART master per channel ensures maximum update rate



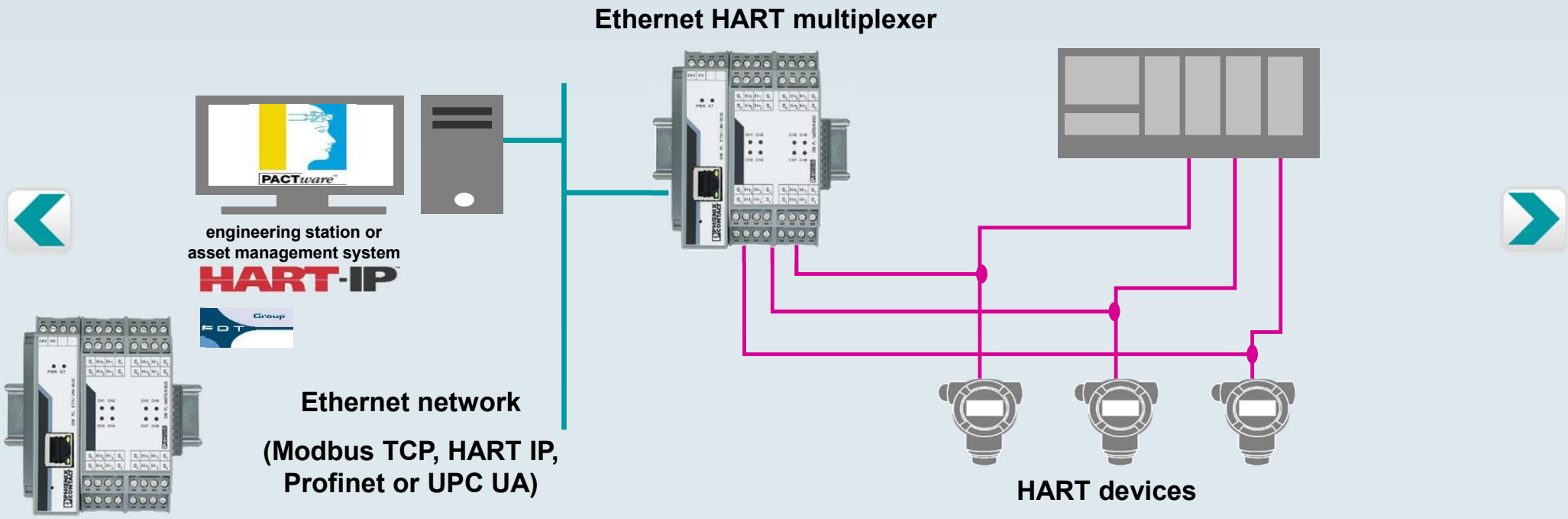
Enviromental
-40…70°C
ATEX, IECEx, UL Zone 2

Connect expansion modules (up to 5)
4 channel HART
8 channel HART
8 channel HART with loop supply
4 channel digital in/4 channel digital out

Access process data via
HART IP, Modbus TCP,
Profinet, FDT/DTM
configure with a web browser

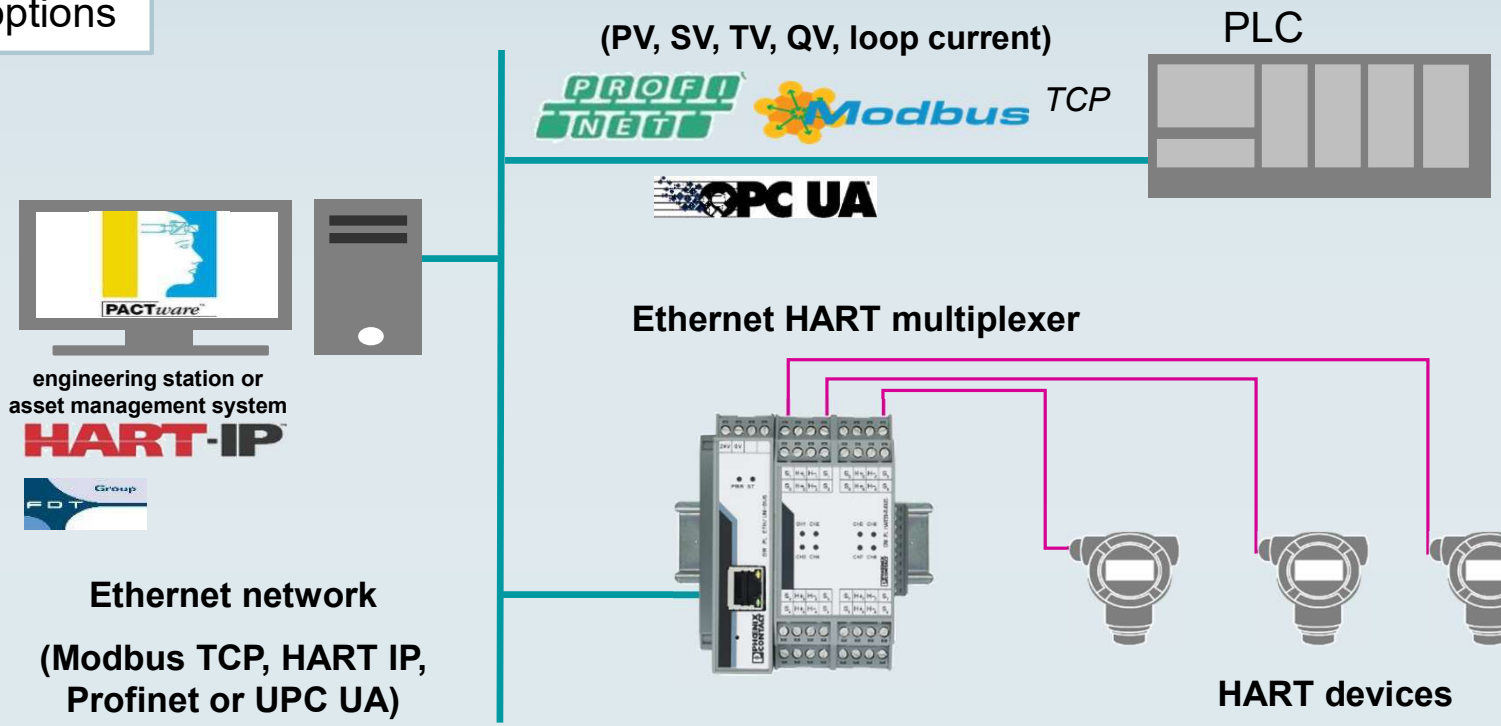
Modular Ethernet HART multiplexer

Installation options



Modular Ethernet HART multiplexer

Installation options



Get the most from your HART devices

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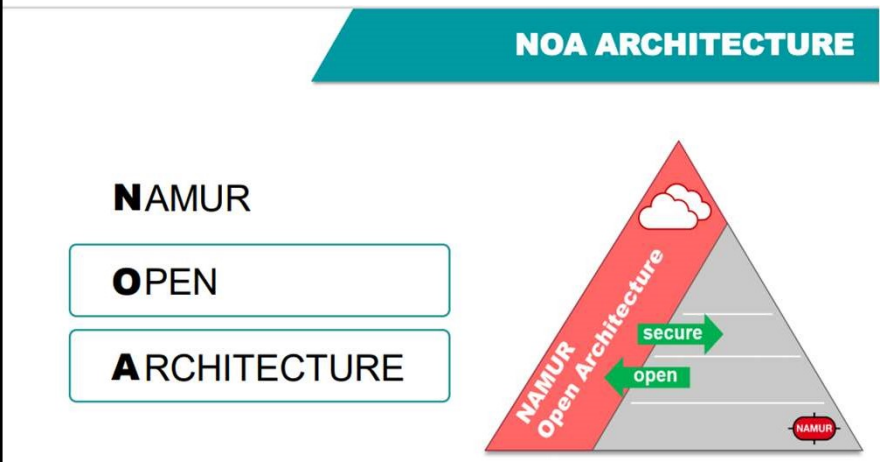
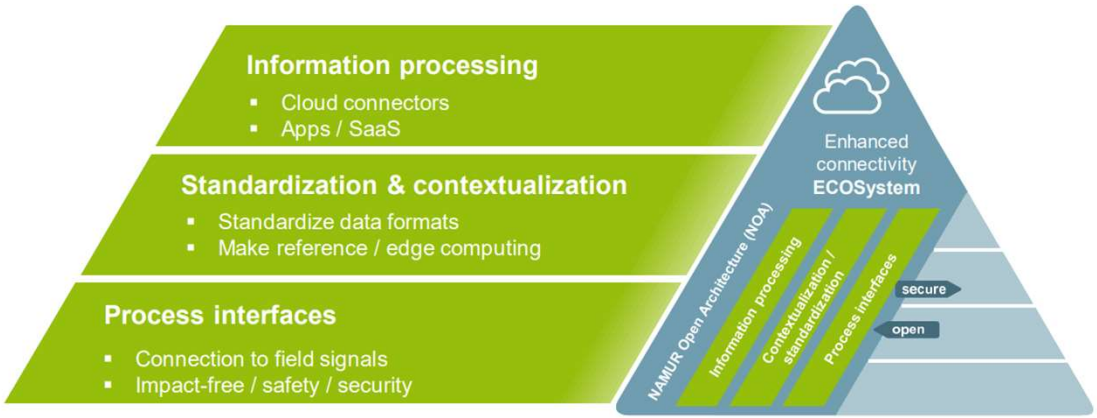
Modular Ethernet HART multiplexer

	Modular gateway Ethernet head station		Expansion modules					
Type	GW PL ETH/BASIC-BUS	GW PL ETH/UNI-BUS	GW PL HART4-BUS	GW PL HART8-BUS	GW PL HART8+AI-BUS	GW PL DIO4-BUS	GW PL HART4-R-BUS	GW PL HART8-R-BUS
Order number	2702321	2702233	2702234	2702235	2702236	2702237	2702879	2702880
Description	Head station with Modbus TCP, HART IP, FDT/DTM	Head station with Profinet, Modbus TCP, HART IP, FDT/DTM, OPC UA	4 channel HART module	8 channel HART module	8 channel HART module with analog loop supply	4 channel digital I/O	4 channel HART module with 250 Ohm input resistor	8 channel HART module with 250 Ohm input resistor

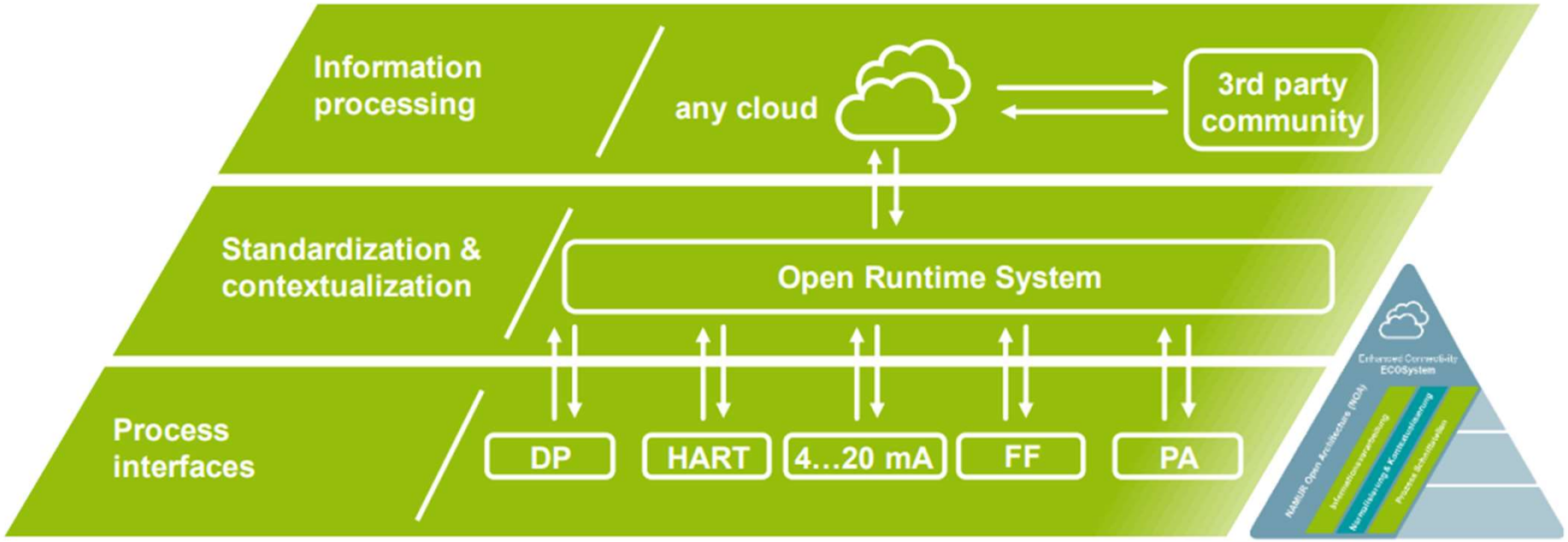
NOA

HART in Digital TWIN

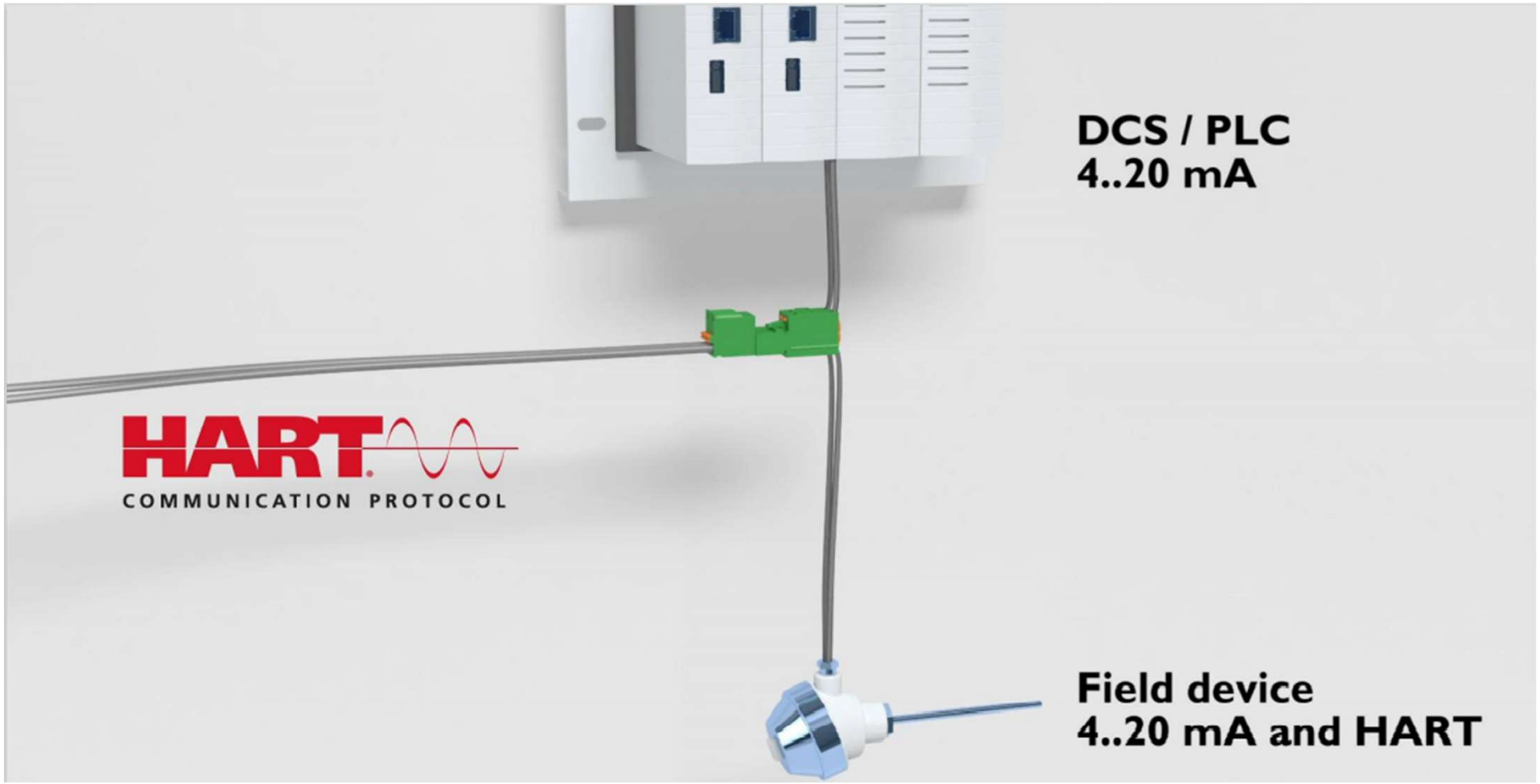




OPEN ARCHITECTURE
ENHANCED CONNECTIVITY ECOSYSTEM



PHOENIX CONTACT

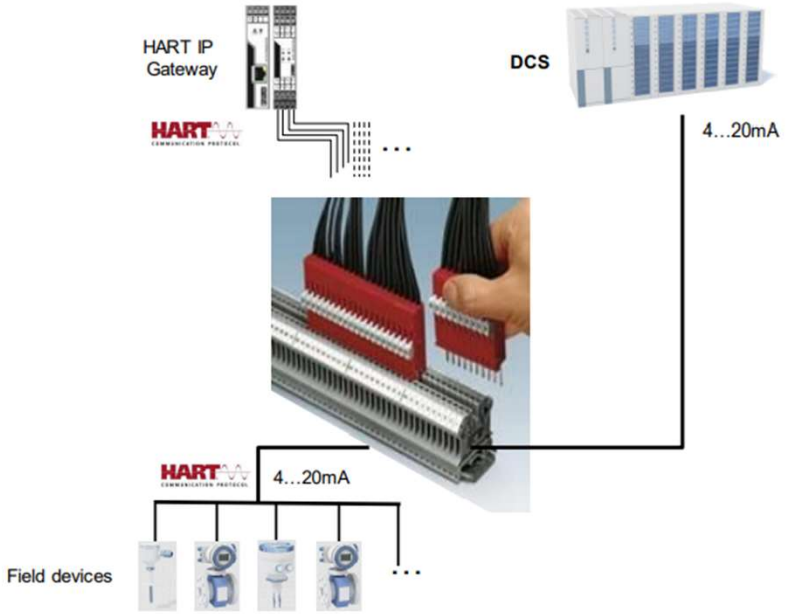

DCS / PLC
4..20 mA
HART
COMMUNICATION PROTOCOL
Field device
4..20 mA and HART

NOA in practice

Connections of 4 .. 20 mA signals incl. HART

Alternative terminals

PS-UK 2,5 B/Z-5 and
PS-UK 2,5 B/Z-6



HART CONNECTIVITY

Host Application
+
Description File
(DTM, EDD, FDI…)

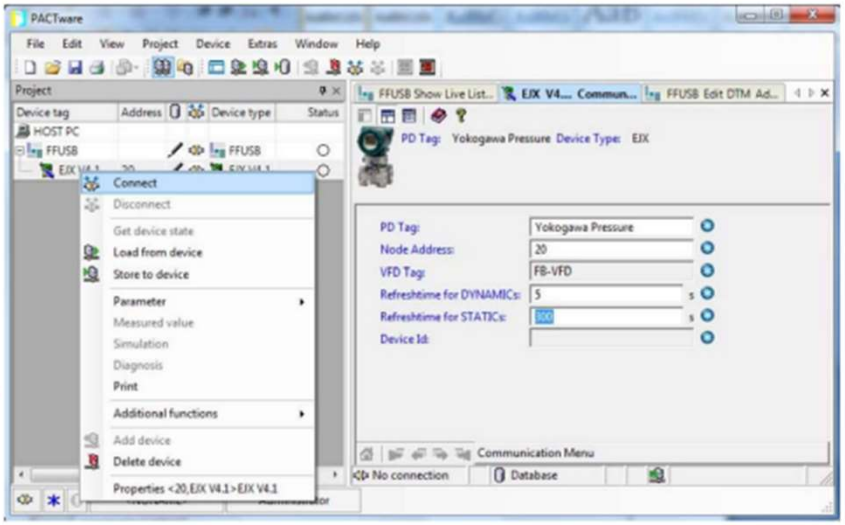
- Pactware
- AMS Devic Manager (Emerson)
- fdtCONTAINER application (M&M)
- DeviceCare (E&H)

Ethernet
Protocol: HART IP

HART-Ethernet-Gateway
GW PL ETH/UNI-BUS – 2702233

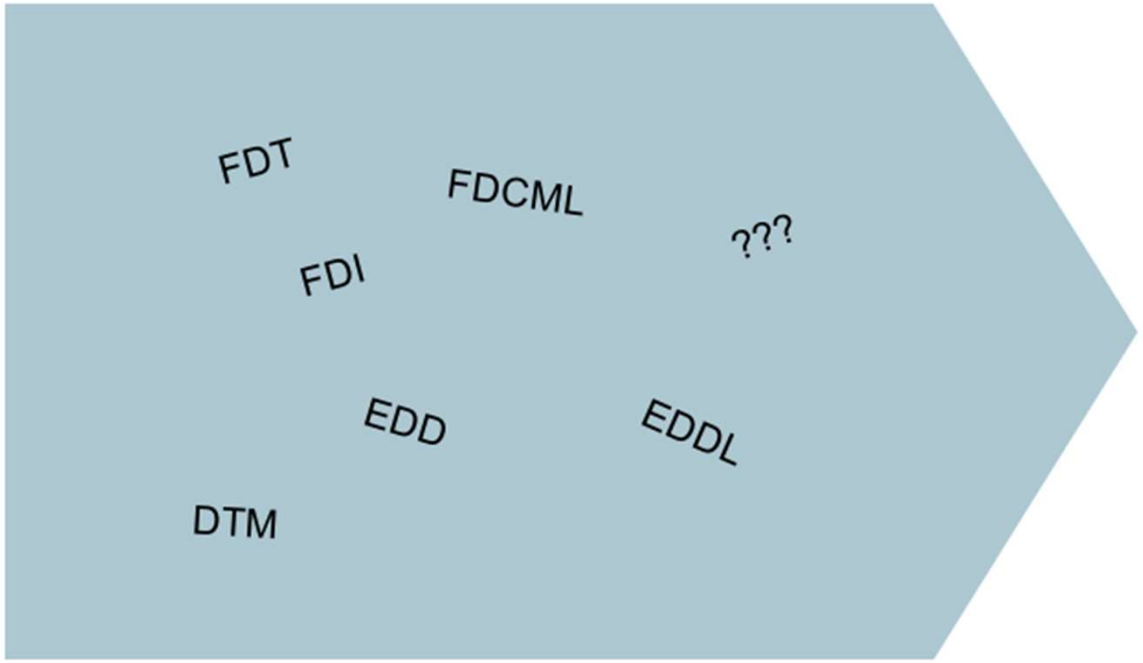
Up to 5 x 8 Input Modules
= 40 Sensor Connections

Sensor Setup/ Maintenance/ Diagnostic



NOA Data Formats

Once complicated, today simple



OPC UA PA-DIM

Information model dev -1-

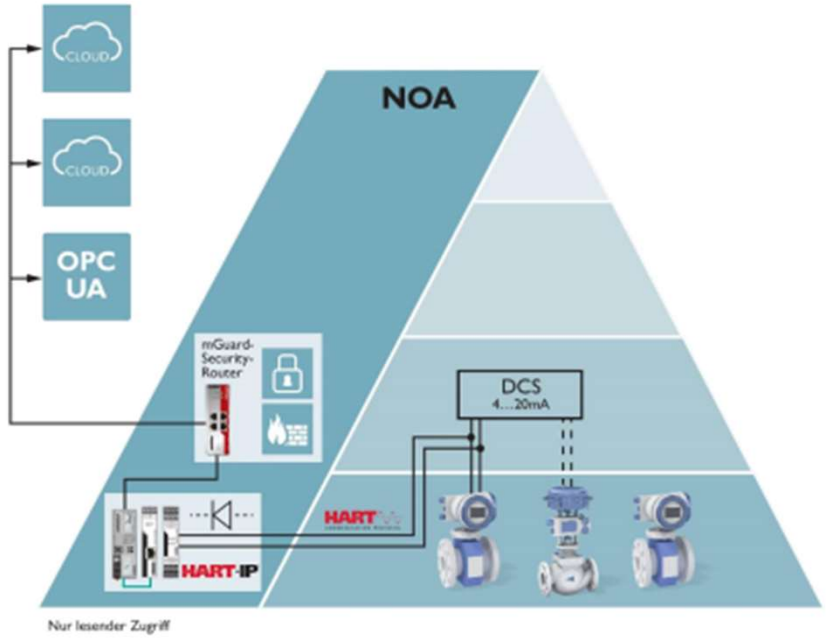
Element	
Device ID	Standard
Process Var.	Class
Services	Class
Parameters	Class
UI	Generic

PHOENIX CONTACT

NOA in practice

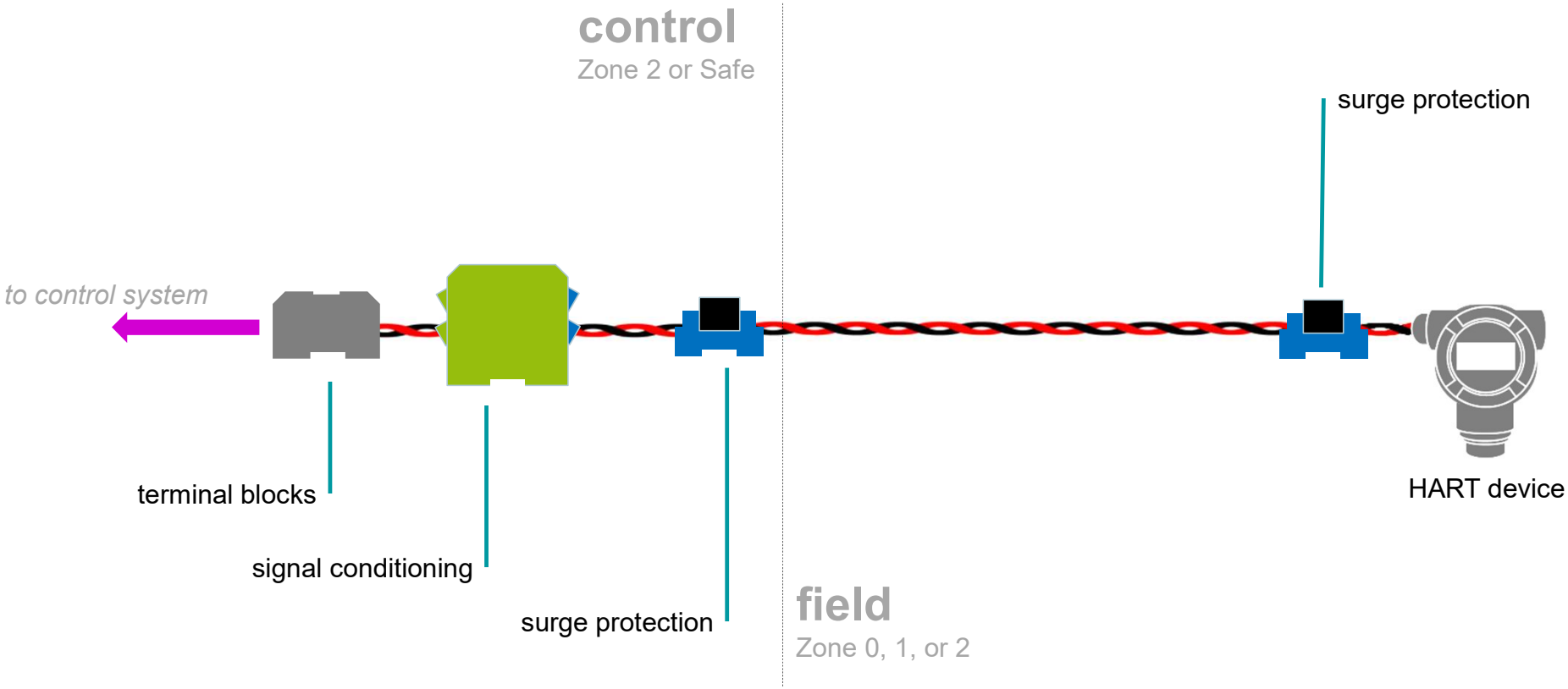
Connections of 4 .. 20 mA signals incl. HART

- ✓ Access via HART
- ✓ Reading data of ALL sensors
- ✓ Standardized format



Nur lesender Zugriff

Access | Isolation | Connection | Protection



Surge protection

options with HART compatibility

protect

multi-channel
4…20mA
intrinsically safe

Interface Analog

Signal conditioner, process indicators and field devices

MINI Analog Pro

Highly compact signal conditioners- with pluggable connection technology

MACX Analog

Signal conditioners with functional Safety additional intrinsically safe

Field Analog

Process indicator and field devices

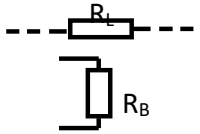
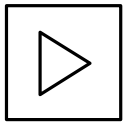
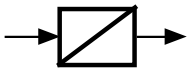
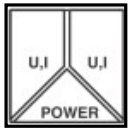
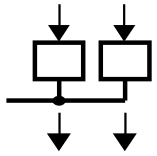
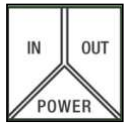
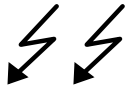
Basics

Additional information

References and sales promotions

MCR Basics and general Product Overview

Why are signal conditioners are used?

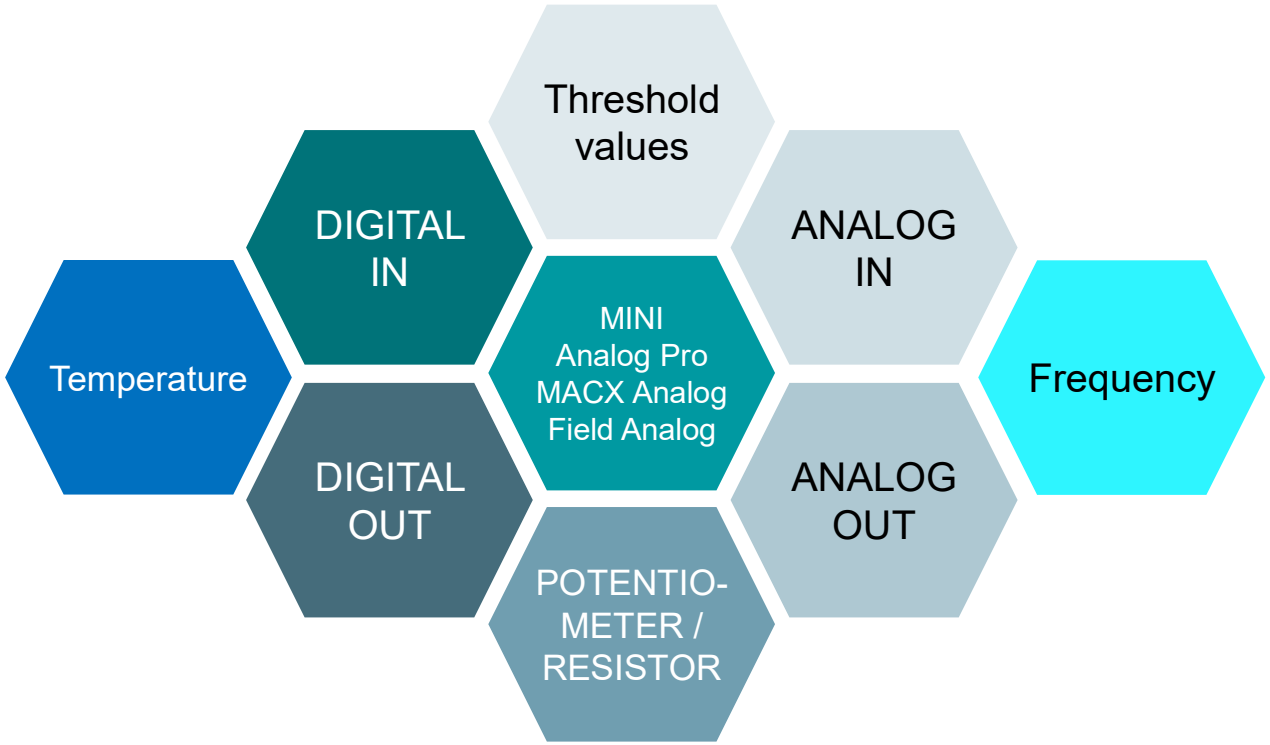
Problem	Solution
 Long transmission lines	 Signal amplifiying
 High loads	 Signal conversion
 Various analog signals	 Galvanic isolation
 Ground loops / Potentials differences	 Signal filtering

Why are signal conditioners are used?

Problem	Solution
 Operation of systems with safety-relevant functions	SIL 2 EN 61508 — Signal conditioners with SIL level according to EN 61508
 Reliability of a safety function required	PL EN ISO 13849 — Signal conditioners with performance level according to EN ISO 13849
 Ignition Dangerous environment	Ex — Ex i isolation amplifiers with international approvals

Interface basics

Product overview



Interface basics

Approvals

Our signal conditioners are available with the following certificates:

MINI Analog Pro

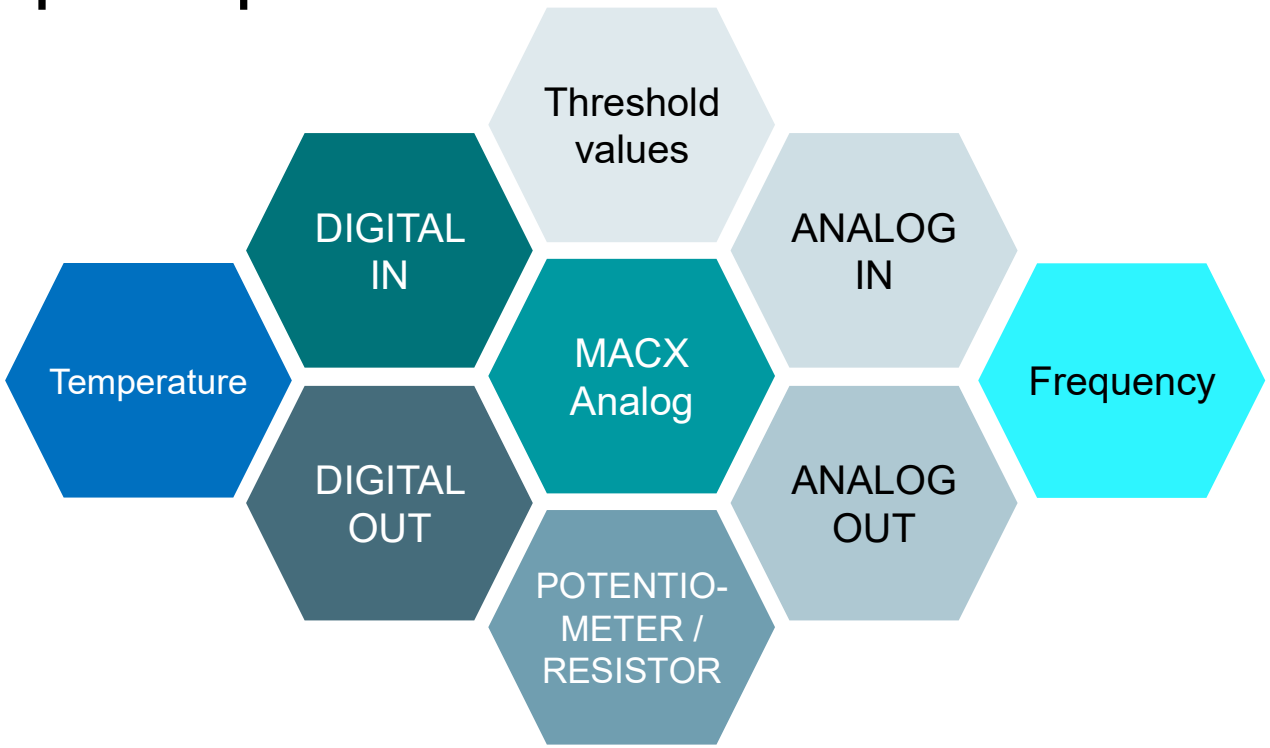
MACX Analog

Field Analog

MACX Analog

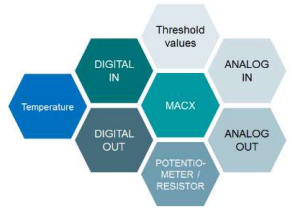
MACX Analog

Isolation amplifier with functional safety and explosion protection

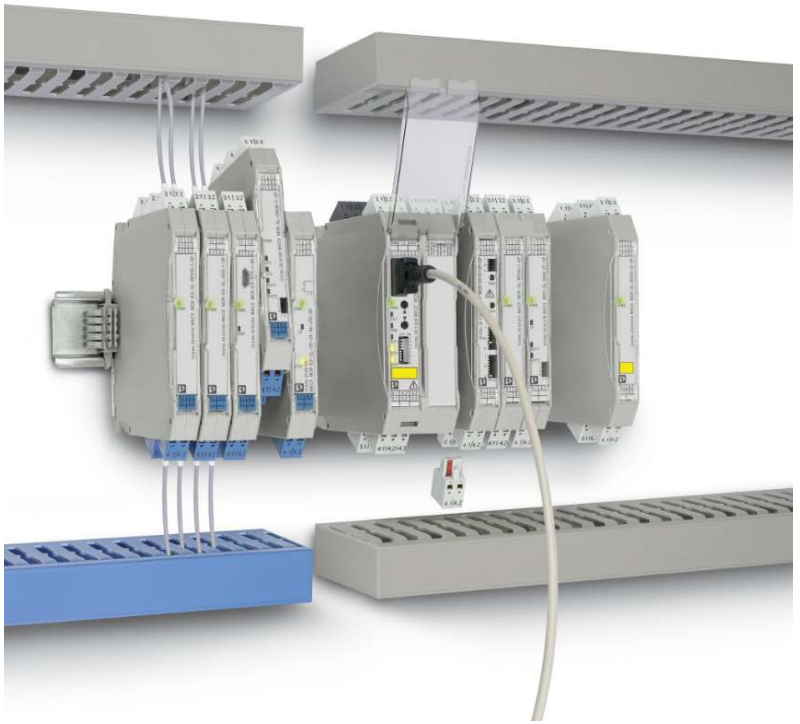


MACX Analog

Reliable and safe

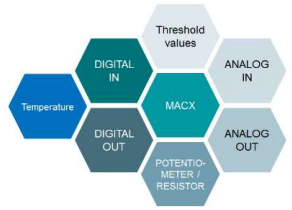


- ✓ MACX Analog isolation amplifiers offer you comprehensive solutions for the safe, trouble-free processing of analog and digital signals
- ✓ In addition to explosion protection for all zones and substance groups, MACX Analog includes functional safety according to SIL IEC / EN 61508 and PL EN ISO 13849
- ✓ That means highest security for your applications



MACX Analog

Reliable and safe



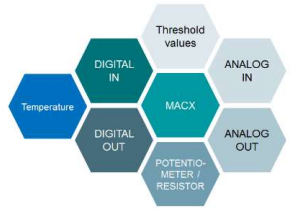
- ✓ Functionally safe in the process industry with SIL
  - ✓ Phoenix Contact implements the requirements of functional safety according to IEC / EN 61508
  - ✓ The product family has a Safety Integrity Level from SIL 2 up to SIL 3
- ✓ Functionally safe in machinery and plant engineering with PL
  - ✓ Selected MACX analog isolating amplifiers are additionally certified according to EN ISO 13849 and offer a performance level
  - ✓ starting with PL c up to PL d

SIL
IEC 61508

PL
EN ISO 13849

MACX Analog

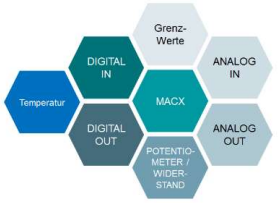
Maximum explosion protection



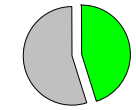
- ✓ All MACX Analog Isolation Amplifiers are suitable for Zone 2 installation
- ✓ In addition, the Ex i isolation amplifiers are ATEX and IECEx approved. This allows universal use in all Ex-zones as well as for all substance groups
  - ✓ [Ex ia] - for intrinsically safe (Ex i) circuits up to Zone 0 and Zone 20
  - ✓ IIC and IIIC approved for all substance groups
- ✓ Optimized Ex i parameters
  - ✓ (High compatibility coverage with intrinsically safe field devices)
- ✓ Further international EX approvals complete the portfolio

MACX Analog

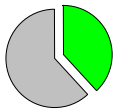
High space savings with full compatibility



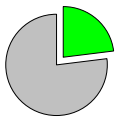
- ✓ Single-channel and dual-channel products with standard functions on a width of only 12.5 mm create space savings of up to 45%
- ✓ All device types have the same outer contour and handling



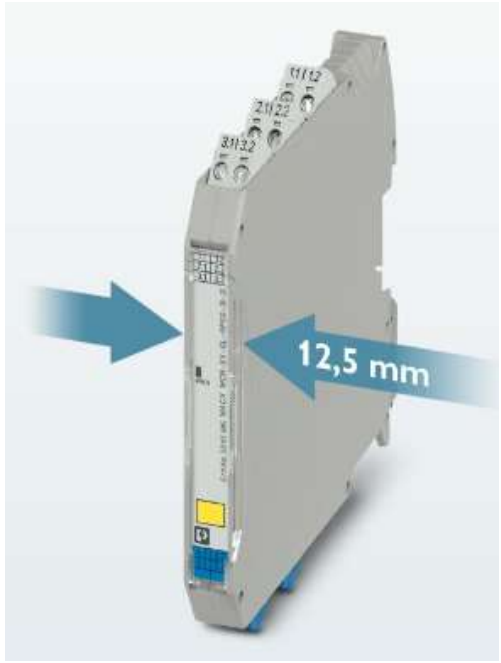
45% compared to housing width 22.5 mm



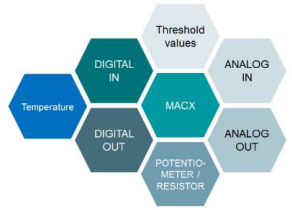
38% compared to housing width 20 mm



23% compared to housing width 16 mm

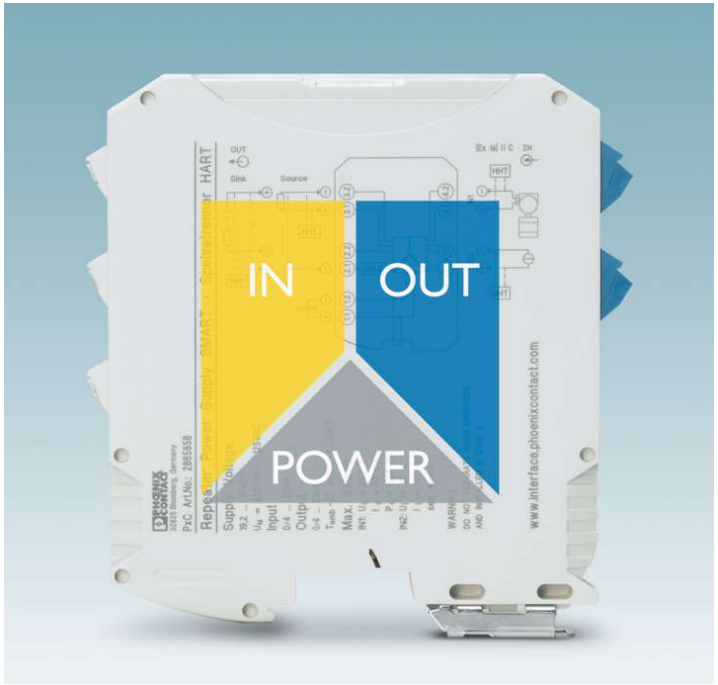


High signal quality and long life



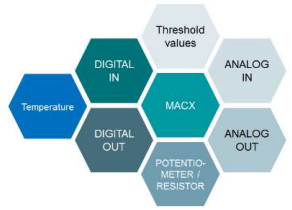
- ✓ The transformer concept with safe galvanic isolation guarantees precise, interference-free signal transmission

- ✓ Test voltage 2,5 kV (50 Hz / 1 min.)
  - ✓ Dangerous contact voltages up to 300 V (AC / DC) are permanently and safely separated according to EN 61010
  - ✓ Test voltage of 375V and Um 253V AC according to IEC / EN 60079-11

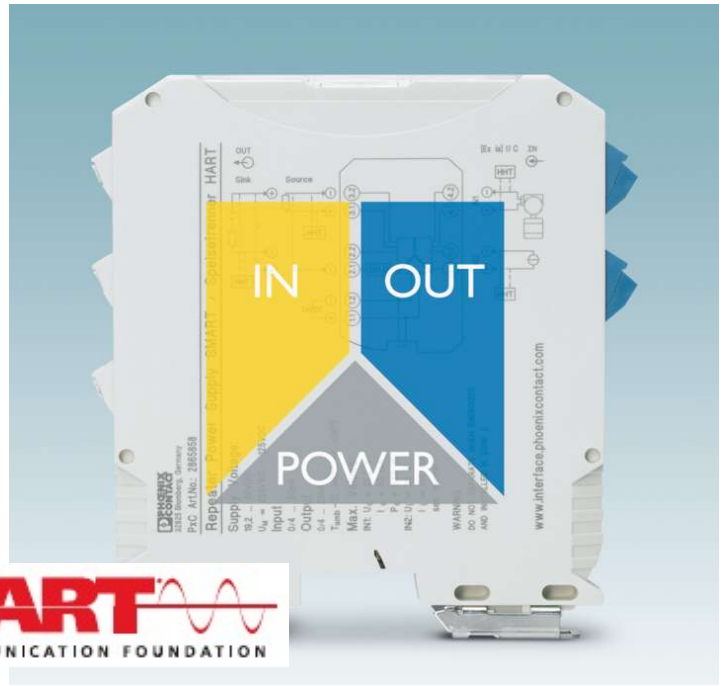


MACX Analog

High signal quality and long life



- ✓ Benefit from long service life and high operational safety over the full operating temperature range of -40 C ° to 70 C ° thanks to low power consumption and self-heating
- ✓ Electrolytic capacitor-free circuit technology (for all 24V DC variants)
- ✓ Precise transmission behavior and high accuracy
- ✓ Type test according to NE 95 for selected MACX isolating amplifiers (high requirements of the chemical industry are met)

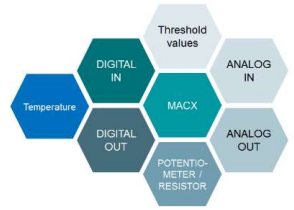


HART COMMUNICATION FOUNDATION

PHOENIX CONTACT

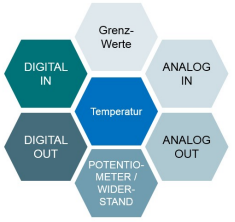
MACX Analog

Easy installation and commissioning

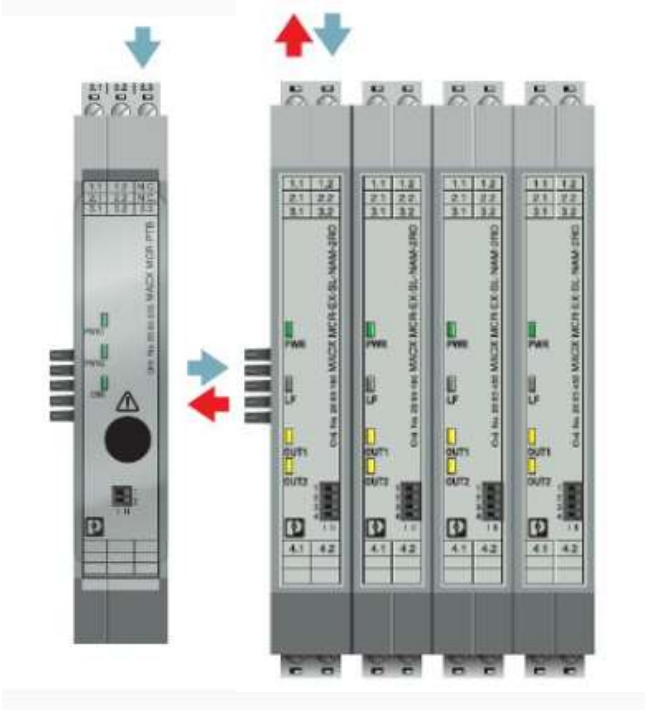


- ✓ Plug-in, coded terminals
  - ✓ Coded plugs prevent damage by permutation
  - ✓ Optionally with screw connection or with quick push-in connection technology
  - ✓ Push-in connectors have double connection options
- ✓ Worldwide use in all supply networks of variants with wide-range input
  - ✓ enables you to operate safely at any mains voltage from 19.2 V ... 240 V AC / DC

Power bridging - feed-in concept

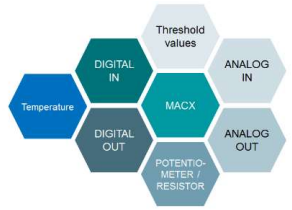


- ✓ **Direct feed**
  - ✓ Via any MACX MCR-EX-SL… device;
    - ✓ up to 400 mA (for approx. 10 devices)
- ✓ **With feed module**
  - ✓ MACX MCR-PTB
    - ✓ up to 3.75 A (for approx. 95 devices) and additional group error message
    - ✓ Possibility of a redundant, diode-decoupled supply
      - ✓ If a supply fails, the safe function is guaranteed

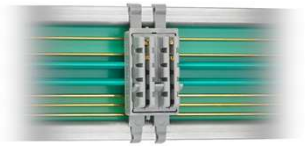


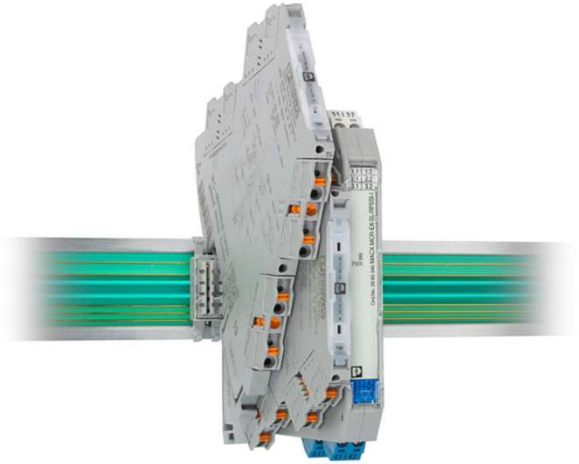
MACX Analog

Easy installation and commissioning



- ✓ Modular energy bridging system
  - ✓ Adapter for bridging systems from third-party manufacturers
  - ✓ The ME 6.2 TBUS-PR adapter enables MINI Analog Pro (6.2 mm) and MACX Analog (12.5 mm) modules to be adapted to the Power Rail System from Pepperl + Fuchs
  - ✓ Easy use of MINI Analog Pro and MACX Analog as an alternative to the Pepperl and Fuchs Power Rail feed system
  - ✓ Reliable availability of every signal adaptation through the use of different module manufacturers on the same infeed system

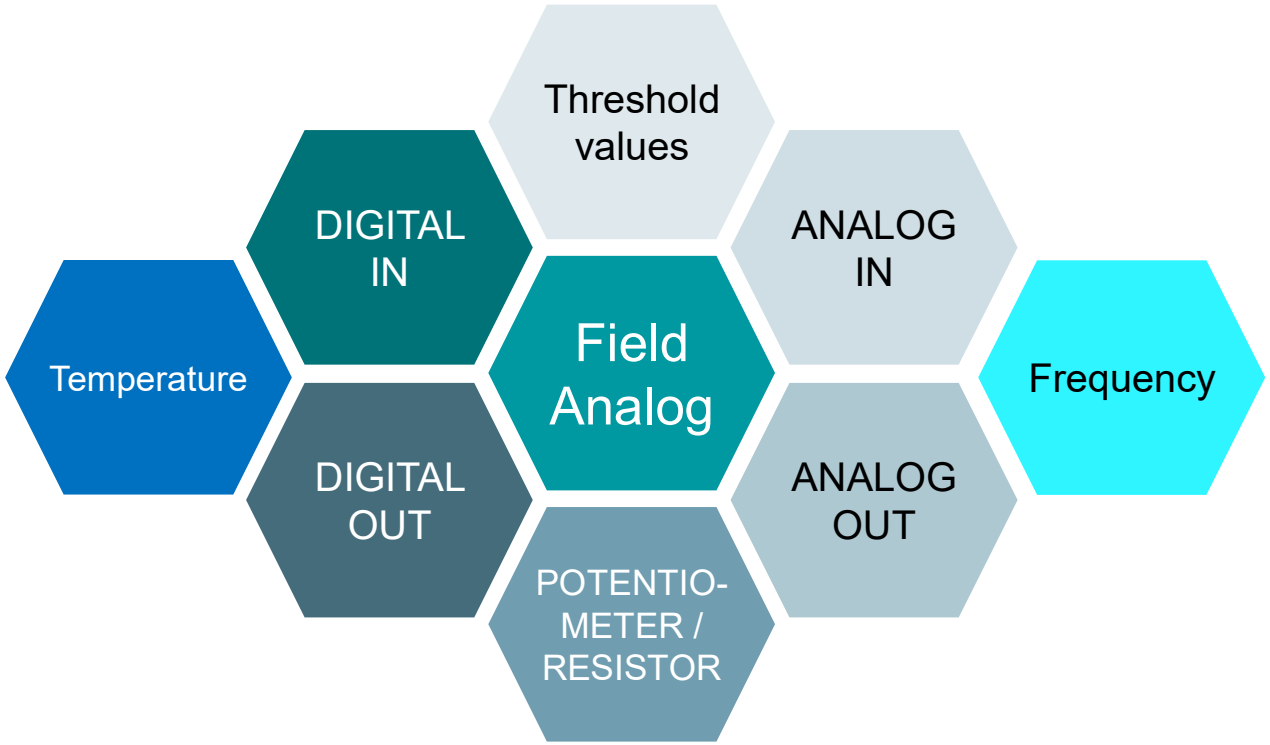




Field Analog

Field Analog

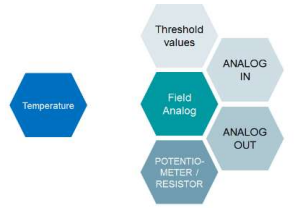
Process indicator and field devices



Field Analog

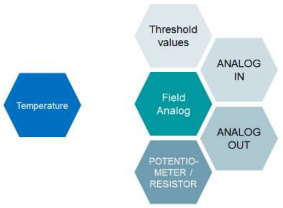
Monitor and measure in the field

- ✓ Process displays and field devices - capture, monitor and control signals close to the field
  - ✓ The field analog field displays allow you to monitor and display analog and temperature signals, as well as control digital and analog inputs and outputs
  - ✓ The field devices capture and convert the signals of resistance thermometers, thermocouples, resistance and voltage sensors directly on site
- ✓ Field Analog allows universal use in all Ex zones as well as for all substance groups



Field Analog

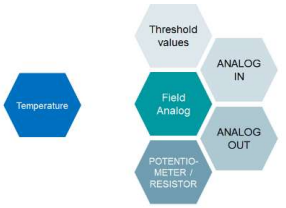
Reliable and safe



- ✓ Comprehensive certification package
  - ✓ Intrinsically safe and Zone 2 EX international approvals
- ✓ Field Analog provides functional safety
  - ✓ Field Analog temperature transmitters consistently meet the requirements for functional safety according to IEC / EN 61508 in a standardized development process
  - ✓ SIL 2 / SIL 3 (hardware / software) according to IEC / EN 61508
  - ✓ Loop-powered process indicators are SIL Non-reactive according to IEC / EN 61508

Field Analog

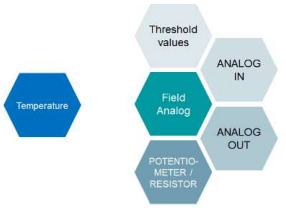
Monitor and measure in the field



- ✓ The FA MCR(-EX)-D-TUI-UI-2REL-UP Process Indicators of the Field Analog series enable you to monitoring and display of analog and temperature signals
  - ✓ RTDs
  - ✓ Thermocouple
  - ✓ resistance sensors
  - ✓ voltage sensors
- ✓ You can enter values locally, forward them to the PLC and evaluate them via the multifunctional display

Field Analog

Service-friendly



- ✓ Everything in view…
  - ✓ The current process values are clearly visible on the five-digit, backlit displays
  - ✓ At the same time, the bar graph gives you a quick overview
  - ✓ Alarm states can be detected quickly even from a distance by the color change
  - ✓ Using the loop-fed process indicator with HART communication, you can read out your HART parameters from the field without additional peripherals

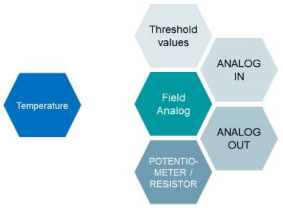
HART COMMUNICATION PROTOCOL

PHOENIX CONTACT

Field Analog

Temperature transmitter

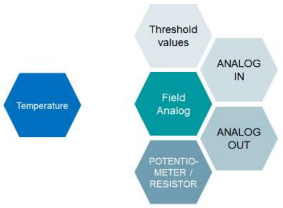
- ✓ Loop-powered temperature transducers for resistance thermometers, thermocouples, resistance, current and voltage sensors are available in 2 variants; each with 1 channel or dual sensor input.
  - ✓ For switch cabinet installation on DIN rail optionally with screw connection or with quick push-in connection technology
  - ✓ As a head transmitter for recording and converting signals directly in the field with screw connection technology



Field Analog

Service-friendly

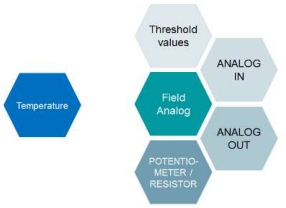
- ✓ Our loop-powered temperature converters provide you with two inputs for
  - ✓ RTD
  - ✓ Thermocouple
  - ✓ Resistance and voltage sensors with extensive mathematical monitoring functions of the input signals such. Acquisition of temperature deviations of two sensors with output of the warning via HART
  - ✓ High measurement availability through sensor monitoring functions and device error detection



HART COMMUNICATION PROTOCOL

Field Analog

Flexible configuration options



- ✓ Simply configure with free FDT / DTM software
- ✓ Process displays are alternatively parameterized via the front keyboard
- ✓ Temperature transducers can also be parameterized via HART

HART COMMUNICATION PROTOCOL

Accessories

Overview

Field Analog
Accessories for process displays and field devices

Termination Carrier
Cabling Solution Termination Carrier

MINI Analog Pro
Systemadapter

MINI Analog Pro MACX Analog
Supply components and error message modules

MACX Analog
HART Multiplexer

Skip the chapter

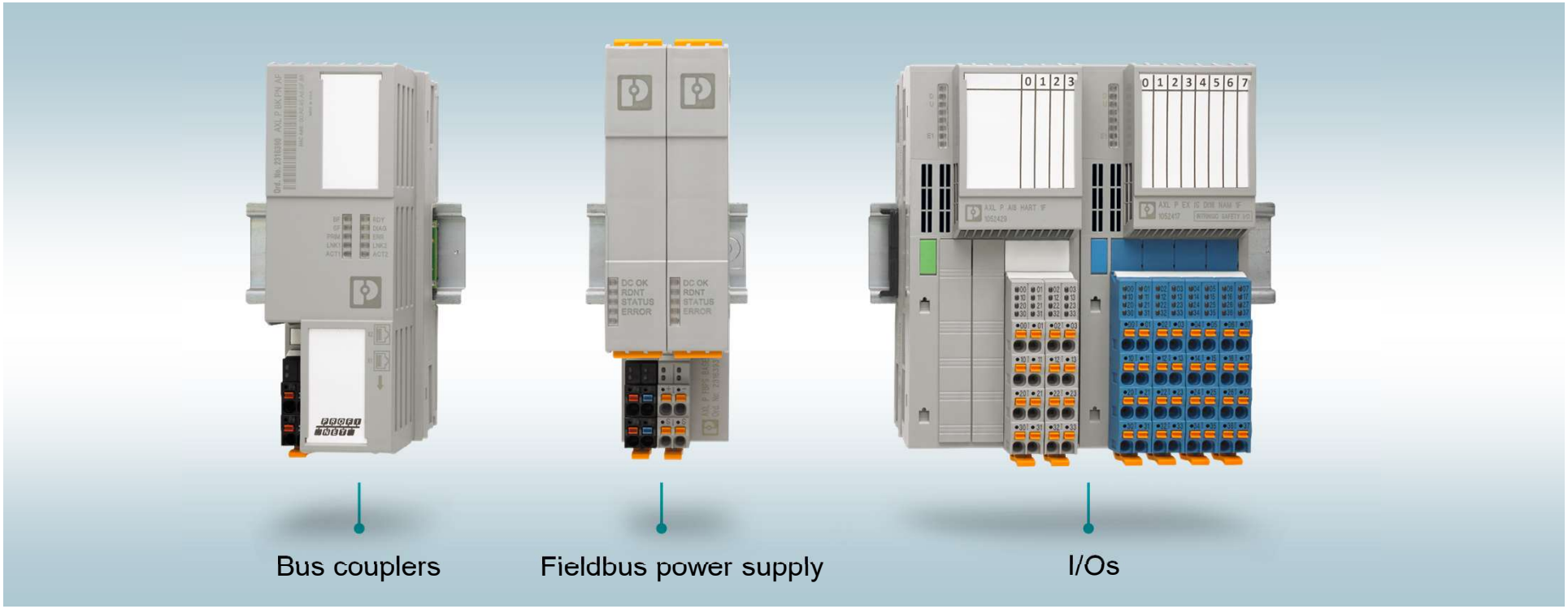
Accessories

Cabling Solution Termination Carrier

- ✓ The Termination Carrier combines large amounts of signal from the field with your automation system - Plug & Play with system cables
  - ✓ **Connect** the signals quickly and precisely
  - ✓ **Compact** - for high packing density
  - ✓ **Sturdy** - for high system availability
  - ✓ **Easy maintenance** - for simplified documentation and commissioning
  - ✓ **Flexible** - for optimal adaptation
- ✓ Available for MACX Analog and MINI Analog Pro

Axioline P

The high-availability I/O system

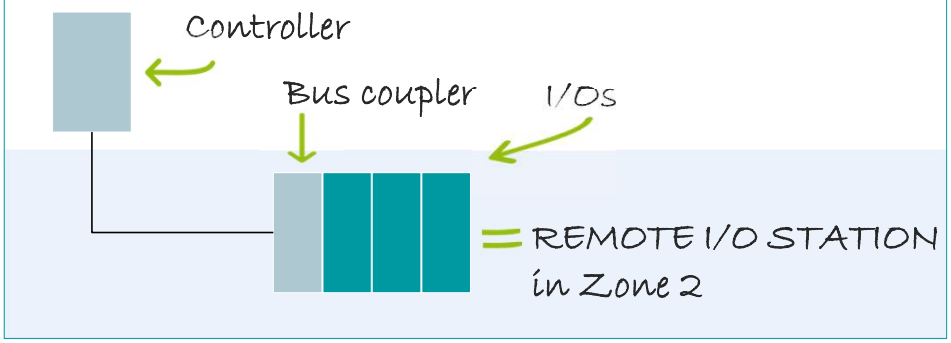


I/Os

Grey or Blue

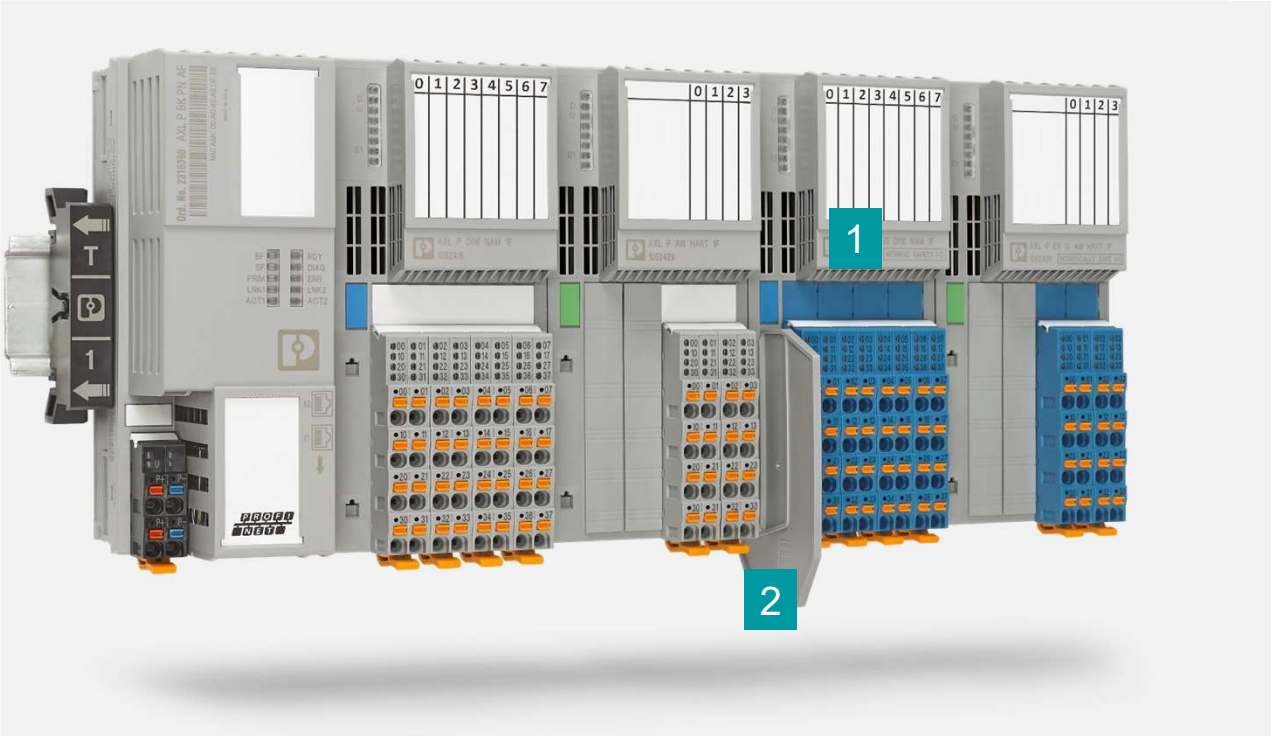
“Build up an I/O station by adding the required I/Os next to the bus coupler. Choose between intrinsically safe and non-intrinsically safe I/Os fitting to your application.”

Remote I/Os for Zone 2 installation



I/Os

Easy expansion of Ex-i modules



1 Expansion of Ex-i modules after last non Ex-i module

2 Partition plate necessary between

! No additional power supply module needed

I/Os

I/O details – DI16 NAM

DIGITAL INPUT FOR NAMUR SENSORS

- 16 channels
- For 2-wire NAMUR sensors acc. to EN 60947-5-6
- Also known as a supervised input, since Input Module can
  also detect short circuit, or open circuit in the loop.
- Intrinsic safe and non-I.S. versions

AXL P DI16 NAM 1F	**1052416**
AXL P EX IS DI16 NAM 1F	**1052417**

I/Os

I/O details - AI8 HART

ANALOG INPUT FOR HART SENSORS

- 8 channels
- 4…20 mA
- For 2-wire loop powered passive transmitters
  - our Input module powers the loop.
- HART Functionality can be deactivated on module
- Compliant to HART Standard Versions 5, 6, or 7
- Intrinsic safe and non-I.S. versions

AXL P AI8 HART 1F	**1052429**
AXL P EX IS AI8 HART 1F	**1052432**

I/Os

I/O details – AO4 HART

ANALOG OUTPUT FOR HART ACTUATORS

- 4 channels
- 0/4…20 mA
- HART Functionality can be de-activated on module
- Compliant to HART Standard Versions 5, 6, or 7
- Intrinsic safe and non-I.S. versions

AXL P AO4 HART 1F	**1087079**
AXL P EX IS AO4 HART 1F	**1087082**

Applications

Target markets

You will find Phoenix Contact isolation amplifiers, process displays and field devices in any industry that need to amplify, filter or convert signals

From the highly compact 6 mm isolation amplifier and functionally reliable isolation amplifier to signal isolators for intrinsically safe circuits in the Ex-i range

You can find them all over the world

Incorpore dispositivos HART en un controlador PROFINET con la herramienta GSDML

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Connecting the World of Process Automation

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DRIVING DIGITAL TRANSFORMATION IN PROCESS AUTOMATION

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FIELDCOMM GROUP

For over 30 years FieldComm Group has led the development of standards, tools, and product registration for smart instruments and systems for the process automation industry.

Our corporate mission is to:

- develop, manage, and promote global standards for integrating digital devices on-site, mobile and cloud-based systems;
- provide services for standards conformance and implementation of process automation devices and systems that enable and improve reliability and multi-vendor interoperability;
- lead the development of a unified information model of process automation field devices while building upon industry investment in the HART®, FOUNDATION™ Fieldbus and FDI standards.

LEARN MORE

FDI IDE 1.5 NOW AVAILABLE!

More support for HART-IP and PA-DIM.

FIND OUT MORE

INTEGRATION

FDI, PA-DIM, DeviceInfo

FIND OUT MORE

HART-IP

HART-IP brings the speed of Ethernet to the simple and easy to use HART protocol. Coupled with Ethernet-APL, HART-IP will transform instrumentation.

FIND OUT MORE

PLANT OF THE YEAR

2021 nominations are now open. Please enter your plant for this prestigious award.

ADDITIONAL DETAILS

HART BASICS

Self-paced eLearning Course

ENROLL FOR FREE

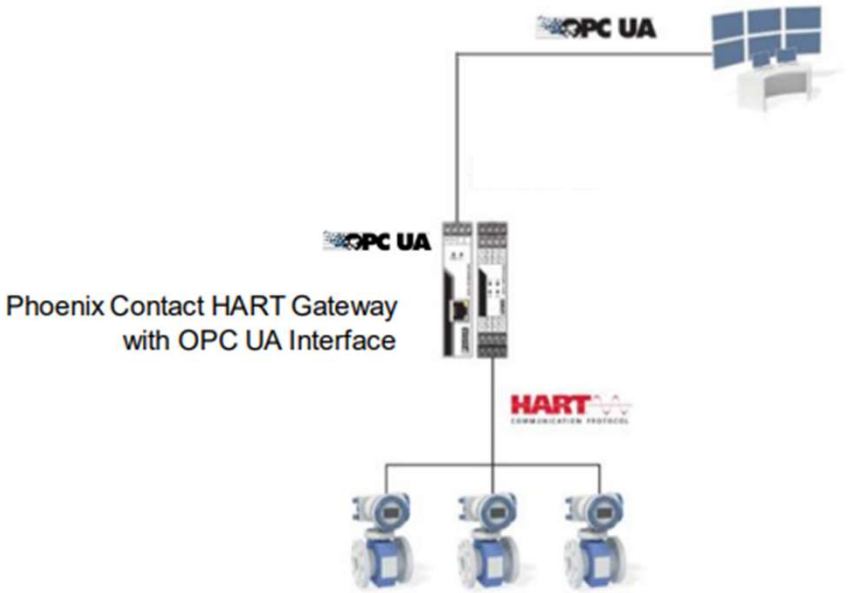
SUPPORT

FAQ's, knowledge base, training

FIND OUT MORE

NOA Data

From HART to OPC UA, the “small” solution

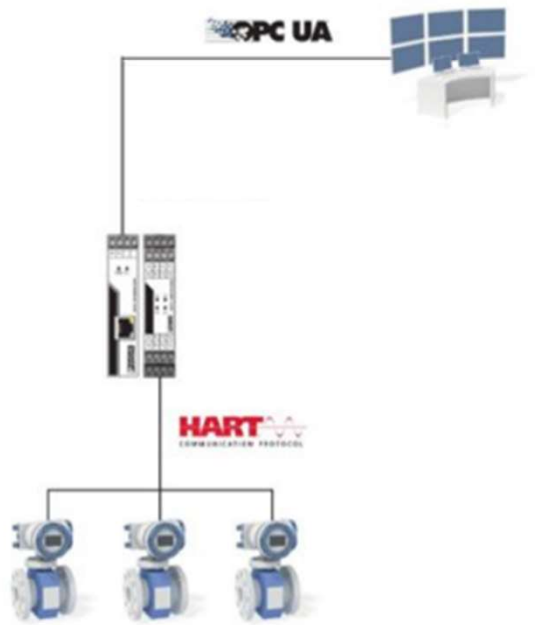


- ✓ Simple access to HART data
  - ✓ Via OPC UA
  - ✓ Via HART IP
  - ✓ Via Modbus TCP
- ✓ No configuration required
- ✓ Simple asset management

- No device-specific data

NOA Data

From HART to OPC UA, the “small” solution



Data Access View

#	Server	Node Id	Display Name	Value
1	OPC UA ...	NS0|Numeric|70079	Analog Channel Fixed (ro)	0
2	OPC UA ...	NS0|Numeric|70073	Analog Channel Saturated (ro)	29
3	OPC UA ...	NS0|Numeric|70067	Device Operation Mode (ro)	0
4	OPC UA ...	NS0|Numeric|70063	Device Specific Status (ro)	{0,0,0,0,0,64}
5	OPC UA ...	NS0|Numeric|70081	Device-Specific Status (ro)	{104,12,48,180,40,17,48,180,80,172}
6	OPC UA ...	NS0|Numeric|70065	Extended Device Status (ro)	0
7	OPC UA ...	NS0|Numeric|70069	Standardized Status 0 (ro)	5
8	OPC UA ...	NS0|Numeric|70071	Standardized Status 1 (ro)	0
9	OPC UA ...	NS0|Numeric|70075	Standardized Status 2 (ro)	0
10	OPC UA ...	NS0|Numeric|70077	Standardized Status 3 (ro)	0
11	OPC UA ...	NS0|Numeric|70149	Date Code (rw)	{1,1,0}
12	OPC UA ...	NS0|Numeric|70147	Descriptor (rw)	DESC
13	OPC UA ...	NS0|Numeric|70227	DeviceCode (ro)	196
14	OPC UA ...	NS0|Numeric|70229	DeviceName (ro)	unknown
15	OPC UA ...	NS0|Numeric|70231	DeviceRevision (ro)	2
16	OPC UA ...	NS0|Numeric|70117	Long Tag (rw)	
17	OPC UA ...	NS0|Numeric|70223	ManufacturerCode (ro)	69
18	OPC UA ...	NS0|Numeric|70225	ManufacturerName (ro)	Krohne
19	OPC UA ...	NS0|Numeric|70177	Message (rw)	HUHU
20	OPC UA ...	NS0|Numeric|70129	PVDamping (ro)	{63,128,0,0}
21	OPC UA ...	NS0|Numeric|70125	PVHighRange (ro)	5000
22	OPC UA ...	NS0|Numeric|70127	PVLowRange (ro)	0
23	OPC UA ...	NS0|Numeric|70139	PVLowerSensorLimit (ro)	-10
24	OPC UA ...	NS0|Numeric|70141	PVMinimumSpan (ro)	0.001
25	OPC UA ...	NS0|Numeric|70137	PVUpperSensorLimit (ro)	110
26	OPC UA ...	NS0|Numeric|70145	Tag (rw)	SENSOR
27	OPC UA ...	NS0|Numeric|70219	LoopCurrent (ro)	4.12838
28	OPC UA ...	NS0|Numeric|70189	PV (ro)	0.812871
29	OPC UA ...	NS0|Numeric|70221	PVPercentRange (ro)	Foxboro Eckardt
30	OPC UA ...	NS0|Numeric|70187	PVUnitString (ro)	percent
31	OPC UA ...	NS0|Numeric|70185	PVUnits (ro)	57
32	OPC UA ...	NS0|Numeric|70207	QV (ro)	23.2263
33	OPC UA ...	NS0|Numeric|70205	QVUnitString (ro)	Degrees Celsius
34	OPC UA ...	NS0|Numeric|70203	QVUnits (ro)	32
35	OPC UA ...	NS0|Numeric|70195	SV (ro)	23.35
36	OPC UA ...	NS0|Numeric|70193	SVUnitString (ro)	Degrees Celsius
37	OPC UA ...	NS0|Numeric|70191	SVUnits (ro)	32
38	OPC UA ...	NS0|Numeric|70201	TV (ro)	39.2874
39	OPC UA ...	NS0|Numeric|70199	TVUnitString (ro)	millibars
40	OPC UA ...	NS0|Numeric|70197	TVUnits (ro)	8

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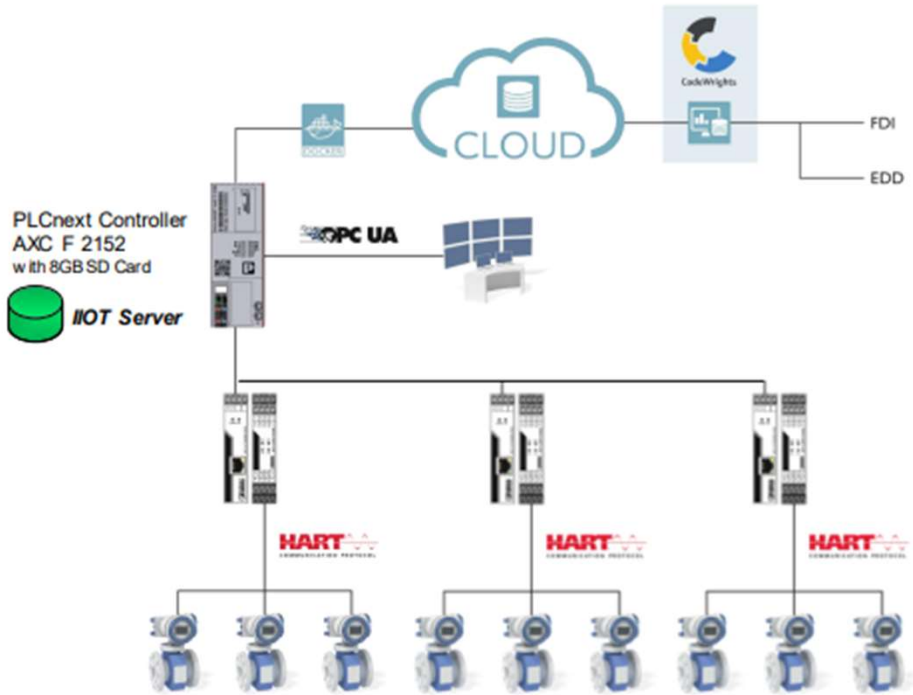
NOA Data

From HART to OPC UA, the “big” solution



- ✓ Simple access to HART data via OPC UA
- ✓ No configuration required
- ✓ Data in PA DIM format
- ✓ All device-specific data available
- ✓ Available for all devices from HART v5

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HART-IP™

HART AT THE SPEED OF ETHERNET

Ethernet networks have been pervasive in office environments for decades. But in process facilities, 2-wire 4-20mA wiring has been the norm. Slowly, Ethernet and IP networks are growing towards the process plant floor. To address this growth FieldComm Group developed an internet protocol (IP) enabled version of HART named HART-IP.

HART-IP allows host level systems and asset management applications to access and integrate measurement and device diagnostics information from HART-enabled field devices through existing IP networks be they Ethernet, packet-radio, satellite or 3G/4G based.

> **IF INSTRUMENT INFORMATION NEEDS TO BE MADE AVAILABLE TO AN IP NETWORK, IT CAN BE DONE WITH HART-IP**

HART-IP is a simple-to-use, high-level application technology that is independent of the underlying media. Thus HART-IP operates with redundant Ethernet media as well as mesh or ring topologies. Similarly, HART-IP can run over Power over Ethernet (PoE) for such infrastructure and devices. Speeds of 10 Mbit/s, 100 Mbit/s, and 1 Gbit/s etc. are supported.

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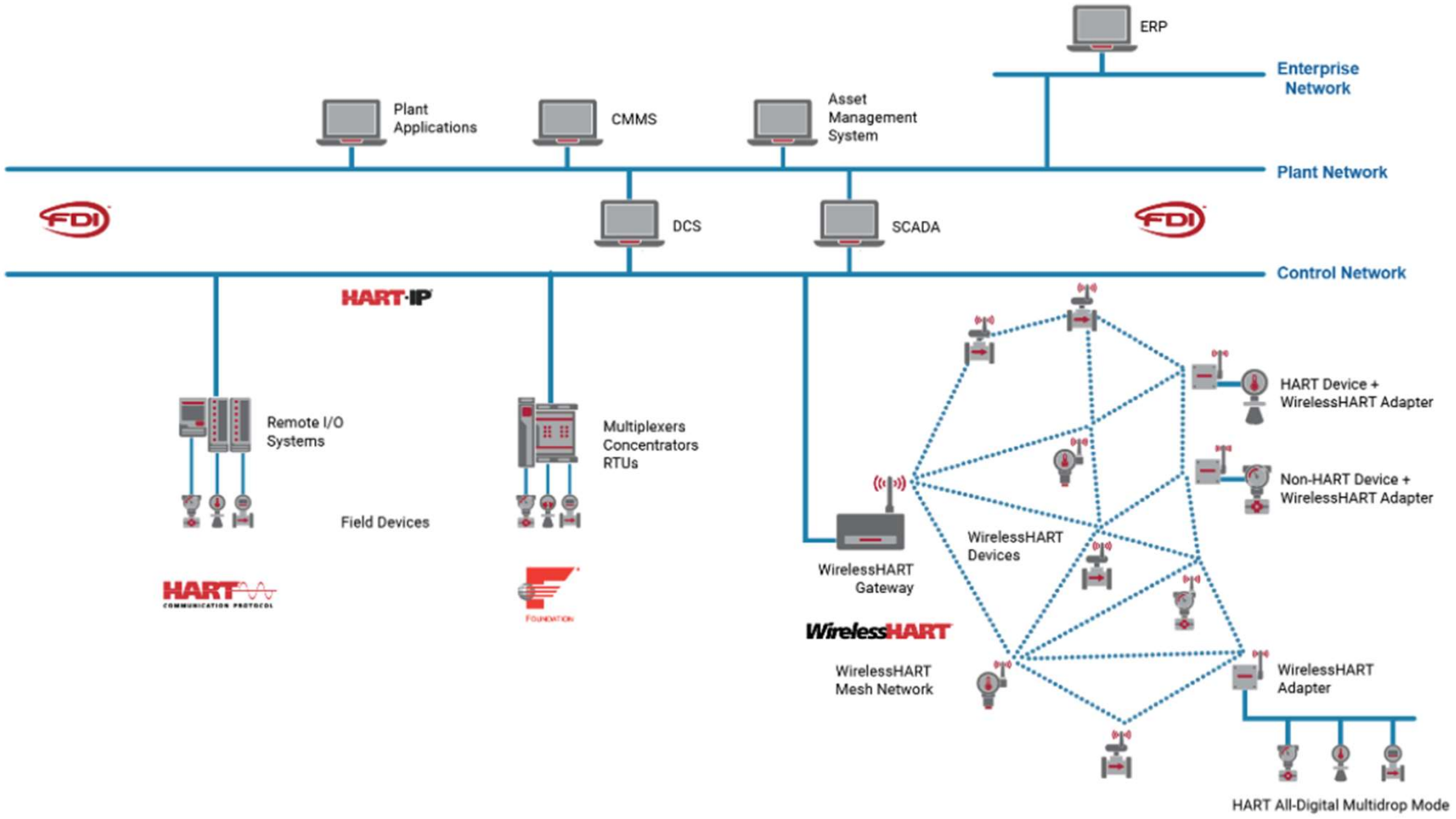
ERP
Enterprise Network
Plant Applications
CMMS
Asset Management System
Plant Network
DCS
SCADA
Control Network
HART-IP
Remote I/O Systems
Field Devices
Multiplexers
Concentrators
RTUs
WirelessHART Gateway
WirelessHART Devices
HART Device + WirelessHART Adapter
Non-HART Device + WirelessHART Adapter
WirelessHART Mesh Network
WirelessHART Adapter
HART All-Digital Multidrop Mode

HART-IP™

Because the application layer is the same for HART field devices as HART-IP, time consuming and error-prone data mapping, for example with MODBUS RTU is eliminated, making HART-IP the most simple to use and suitable backhaul network for WirelessHART gateways and wired HART multiplexers and remote I/O.

HART-IP offers a straightforward method to access large amounts of all the standard HART information available in a HART device coming from products that concentrate many measurement points into a single output. It allows the information from these devices to be integrated with TCP/IP networks easily, without the need to go through any translation processes and with no loss of information.

HART-IP Features and Benefits

Feature	Benefit
10 Mbit/s - 1Gbit/s support	Operates with existing infrastructure
HART Application Layer	Simple integration with existing control and asset management systems
Standard TCP/IP protocol	Shared bandwidth with existing applications. No requirement for customized Ethernet protocol

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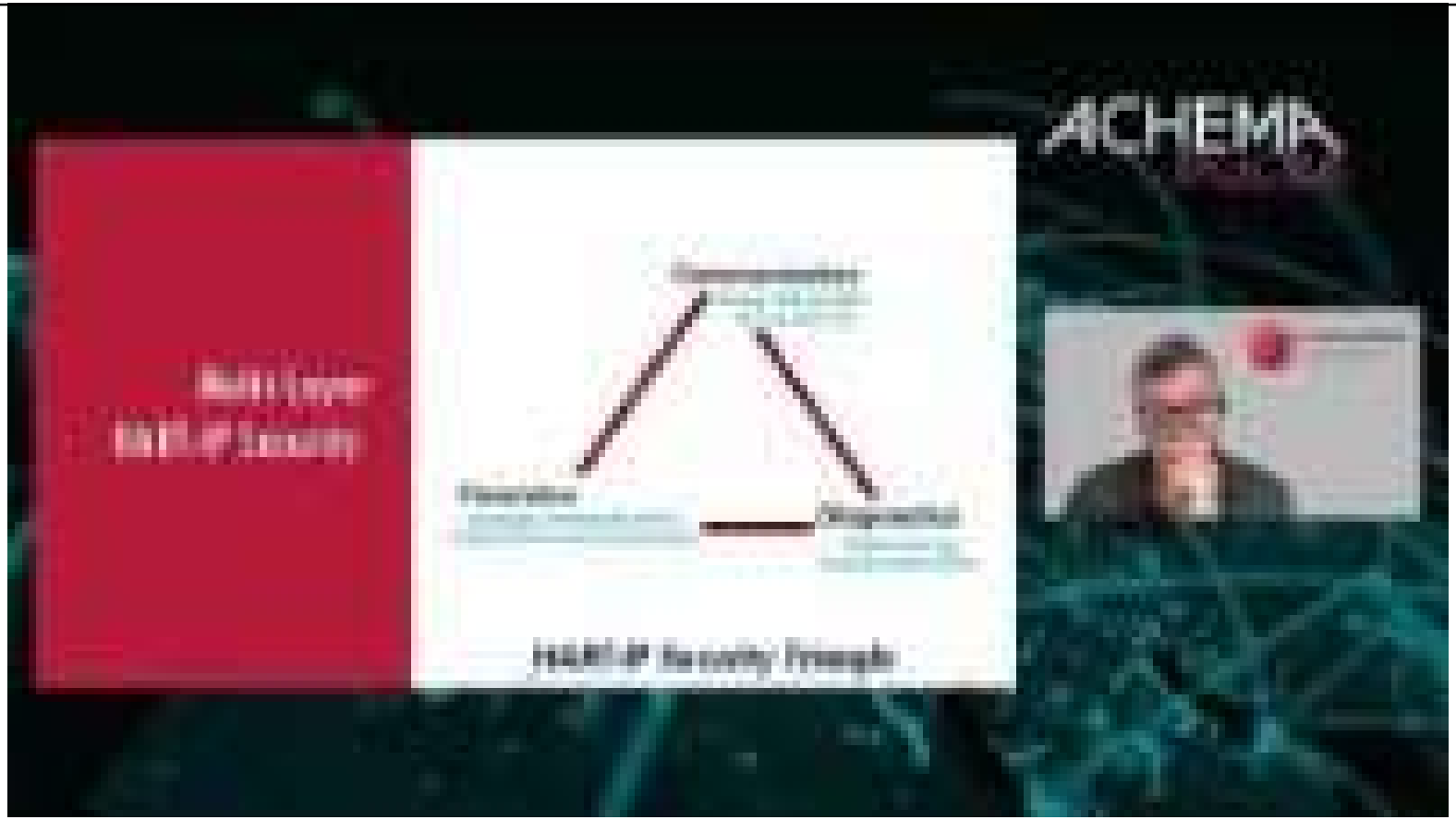
HART-IP and Ethernet-APL Explained

The video in this section was presented during the ACHEMA Pulse 2021 virtual event. It provides a brief history and overview of HART-IP technology, as well as a description of 2-wire Ethernet-APL technology. HART-IP and Ethernet-APL offer a great solution for obtaining the benefits of higher speed communication while maintaining all the software and work processes that are already familiar to end users.



HART-IP® - the Simple, Secure and Proven Solution for EthernetAPL

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Device servers and protocol converters

Goals of industry

- Monitor Equipment Health
- More Diagnostics
- Predictive Maintenance Strategy
- Asset Management
- Remote Calibration
- Lower Operating Costs
- Improve Process Efficiency
- Less Down Time
- Increase Personnel Safety
- Remote Configuration

Danke

HART Presentation

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