# Communication Interfaces - Overview

Products

Technologies

PoE

Everything
for industrial networks

# Communication Interfaces - Our product portfolio

Fieldbus Communication

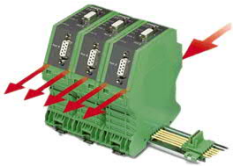
Ethernet Infrastructure

Wireless

Remote Communication

# Fieldbus Communication 1

Converter
Isolator



Repeater
Segment
Coupler

Fast
connectors
(SUBCON)

Fiber optic
converter

Modular hub

Extender
Serial/Profibus

Protocol
converter

Radioline
Multipoint-
Multiplexer

Terminator
resistor

Fieldbus
Communication 2

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fieldbus Communication 2

Serial Device Server

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

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# Ethernet Infrastructure

Ethernet Extender

Media Converter

Ethernet Isolator

Ethernet HART Multiplexer

Patch Panel

PoE Injector

Serial Device Server

Data connectors

Fieldbus communication 2

Wireless

# Wireless

Radioline

Wireless Multiplexer

Wireless HART

Radioline Outdoor solution

WLAN

Bluetooth EPA

Ethernet Infrastructure

Remote communication

INSPIRING INNOVATIONS

# Remote communication

TC Mobile I/O

TC MGuard

DSL Router

TC Router

TC Cloud Client

mGuard Secure Cloud

Wireless

Technologies

# Technologies

HART Technology

PoE Power over Ethernet

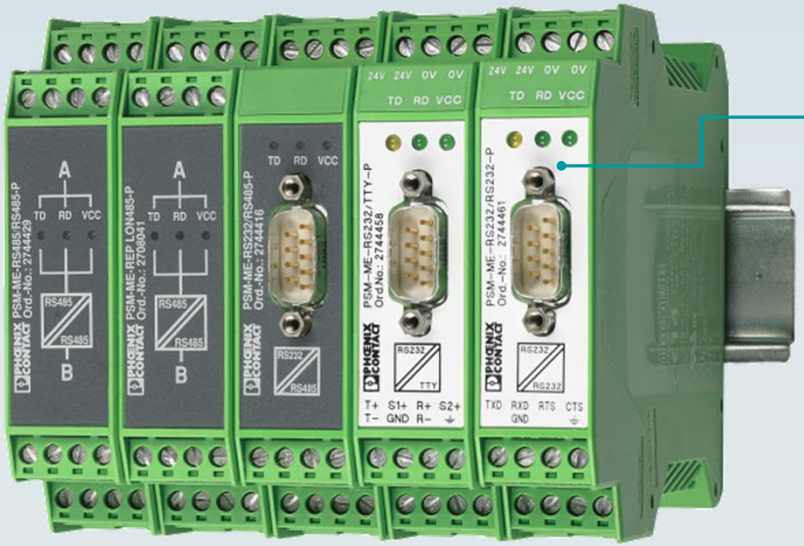
TRUSTED WIRELESS

Remote communication

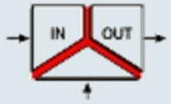
PROFIBUS

# Converter and isolator

**Integrated power supply unit**
The device can be supplied directly with 24 V AC/DC



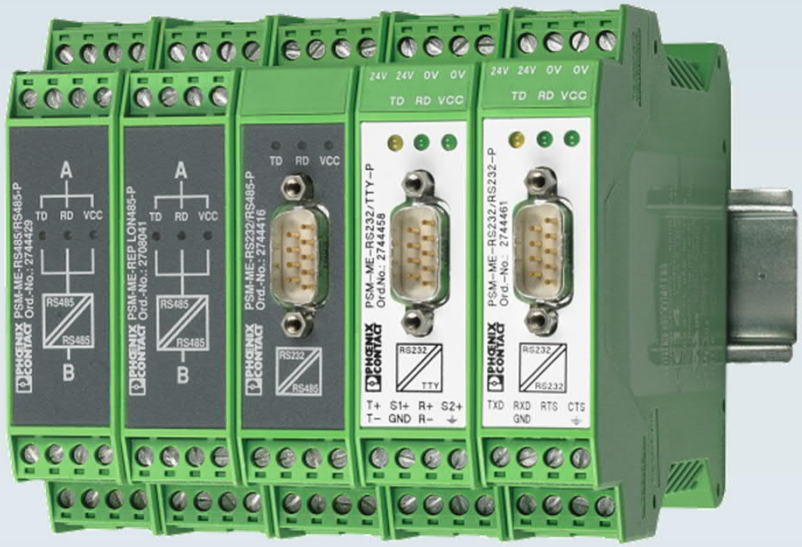
**Interference-free and robust**
High-grade 2 kV electrical isolation between the power supply and the data interfaces

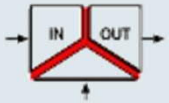


3-way-isolation

**Improve performance**
Thanks to integrated signal amplification, you can achieve a significant improvement in the transmission speed and range of your network.

# Converter and isolator






3-way-isolation

- Isolator for RS-232
- Repeater RS 485
- Repeater LON
- Converter for RS-232 to
  - RS-422
  - RS-485 2-wire
  - RS-485 4-wire
- Converter for RS-232 to TTY
- Device-specific approvals:

  DNV, UL HazLoc, ATEX, operation at altitudes of up to 5,000 m, railway applications acc. EN 50121-4



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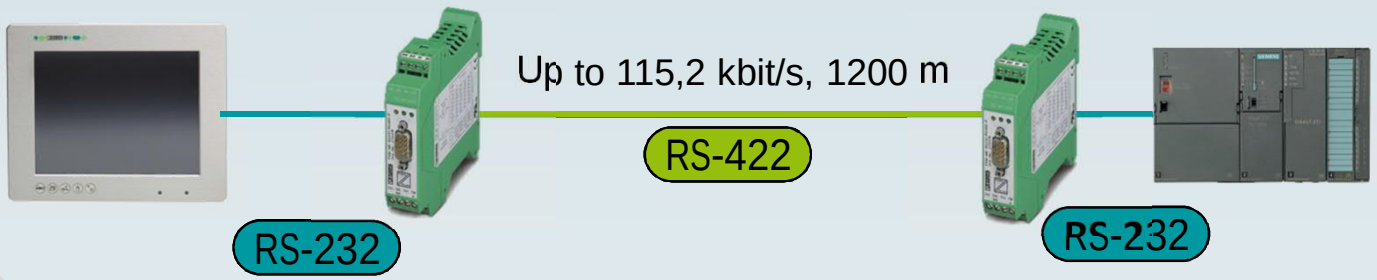
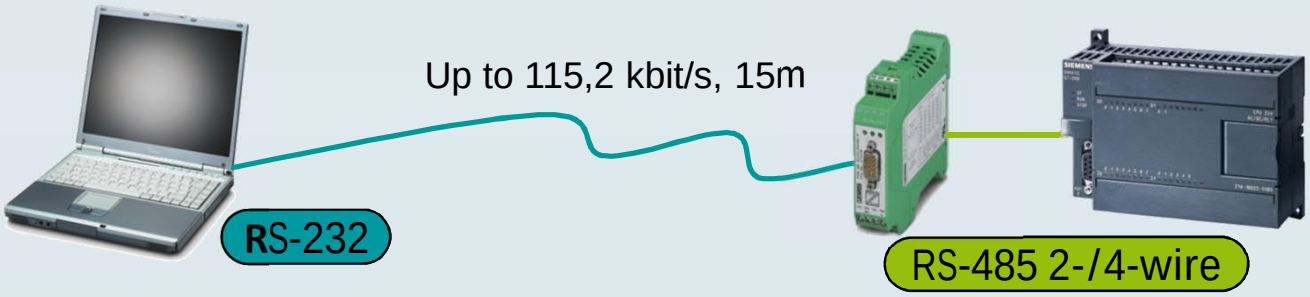
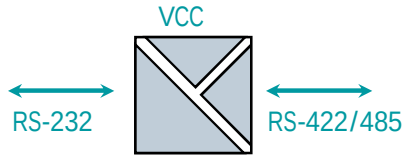
# Converter and isolator




- Interference-free point-to-point connection
- Increase distances of RS-232 from 15 m up to 1200m by converting to RS-422



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# Converter and isolator

| | PSM-ME-RS232/RS232-P | PSM-ME-RS232/TTY-P | PSM-ME-RS232/RS485-P | PSM-ME-RS485/RS485-P | SM-ME-REP LON485-P |
|---|---|---|---|---|---|
| Type | RS-232 isolator | RS-232 on TTY converter | RS-232 on RS-485/RS-422 converter | RS-485 on RS-485 repeater | LON repeater |
| Interface 1 | RS-232 | RS-232 | RS-232 | RS-485 | RS-485 |
| Interface 2 | RS-232 | TTY | RS-485 / RS-422 | RS-485 | RS-485 |
| Range (max.) | 15 m | 1000 m | 1200 m | 1200 m | 1200 m |
| Data rate (max.) | 115,2 kbps | 19,2 kbps | 115,2 kbps | 1500 kbps | 2000 kbps |
| Order number | 2744461 | 2744458 | 2744416 | 2744429 | 2708041 |

| ME-SAS (Accessorie) |
|---|
| Shield connection clip for printed circuit terminal block |
| 2863899 |

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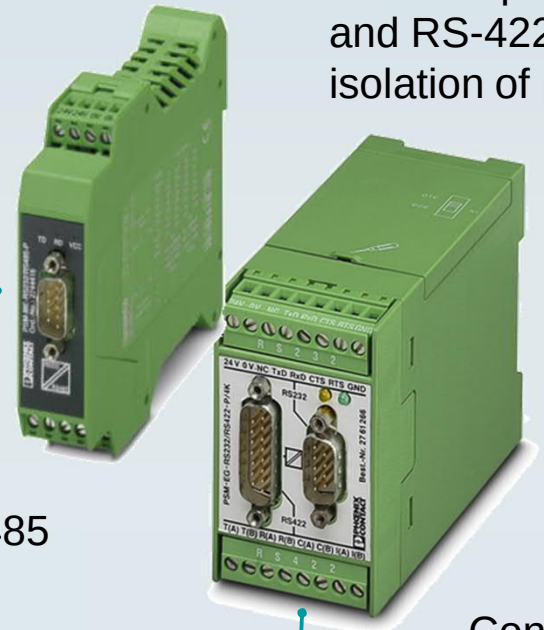
INSPIRING INNOVATIONS

# Interface converter

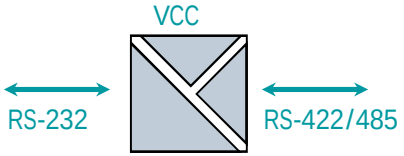
High-quality 3-way isolation between power supply, RS-232, and RS-422 for safe electrical isolation of potentials with 2.5 kV



Converter
RS-232 (V.24) to RS-485

Converter
RS-232 (V.24) to RS-422 (V.11)

- Converting the RS-232 point-to-point interface into the bus-capable RS-485 standard makes it possible to networks up to 32 devices via 2- or 4- wire cable.
- Increase range or remote transmission up to 1200 m
- Point-to-point connection between two RS-232 interfaces vis RS-422



3-way-isolation

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# Interface converter

| | PSM-ME-RS232/RS485-P | PSM-EG-RS232/RS422-P/4K | ME-SAS (Accessorie) |
|---|---|---|---|
| Description | Interface converter, for converting RS-232 (V.24) to RS-422 (V.11) and RS-485, with electrical isolation<br>2 channels | Interface converter, for converting RS-232 (V.24) to RS-422 (V.11), with electrical isolation,<br>4 channels, | Shield connection clip for printed circuit terminal block |
| Interface 1 | V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1<br>D-SUB 9 plug | V.24 (RS-232) interface in acc. with ITU-T V.28, EIA/TIA-232, DIN 66259-1<br>Screw connection | |
| Transmission lenght (Interface 1) | 15 m (shielded twisted pair) | 15 m (twisted pair) | |
| Interface 2 | RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1<br>Screw connection | RS-422 interface in acc. with ITU-T V.11, EIA/TIA-422, DIN 66348-1<br>D-SUB-15 male connector | |
| Transmission lenght (Interface 2) | 1200 m (shielded twisted pair) | 1200 m (twisted pair) | |
| Order number | 2744416 | 2761266 | 2863899 |

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# Termination resistor

PROFIBUS connection D(A), D(B)

Status LEDs

Slide switch for termination resistor

24 V DC voltage supply

D-SUB, programming interface

- PROFIBUS or other RS-485 networks can be actively terminated at the bus end using the PSI-TERMINATOR-PB-TBUS device
- Active Line termination
- Redundant power supply: 24 VDC
- Diagnostic LED’s for power and data activity
- T-Bus functionality for power supply

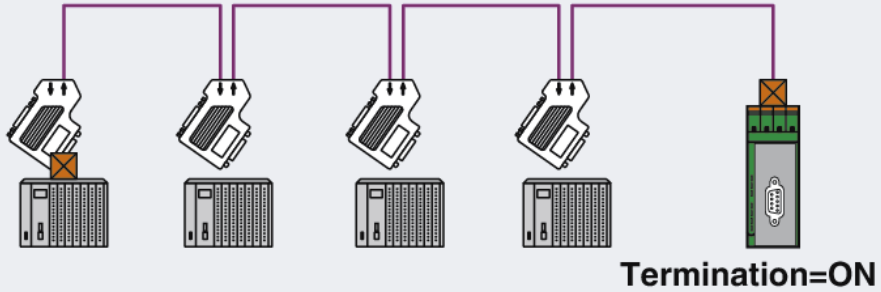


PHOENIX CONTACT INSPIRING INNOVATIONS

# Termination resistor

## Application examples:

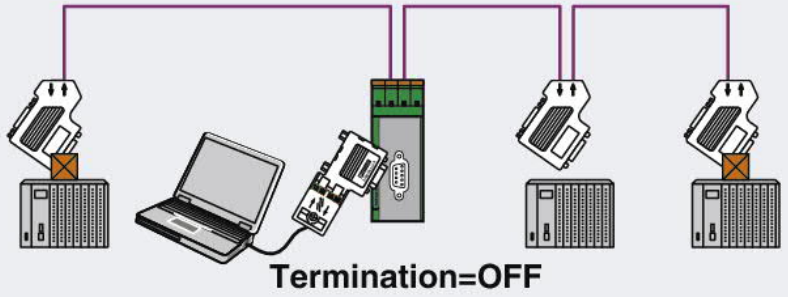
**Termination operation**




☒ = Active bus termination resistor

The terminator is suitable for ensuring bus termination when changing Profibus slave devices. In this application, the terminator is installed after the last bus device in the cabel. The bus cable is permanently terminated when the termination resistor at the device is switched on.

**Programming access**




☒ = Active bus termination resistor

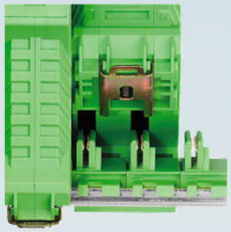
The terminator can be integrated into the bus system as a fixed programming interface. Termination is deactivated in this mode of operation. Passive and active programming devices are supported.

# Termination resistor

| | PSI-TERMINATOR-PB-TBUS | ME 22,5 TBUS 1,5/ 5-ST-3,81 G (Accessory) |
|---|---|---|
| Description | Active termination resistor for PROFIBUS and RS-485 bus systems, redundant power supply, routing of the supply voltage via DIN rail connector, electrical isolation, switchable termination, integrated programming interface | DIN rail connector for routing the power supply voltage |
| Interface | PROFIBUS acc. to IEC 61158, RS-485 2-conductor | |
| Termination resistor | 390 Ohm / 220 Ohm / 390 Ohm (can be connected) | |
| Serial transmission speed | up to 12 Mbps | |
| Order number | 2702636 | 2707437 |

# The modular hub

Simply snap the devices onto the DIN rail and go!



**Smooth installation**
The DIN rail connector instantly provides data and the supply voltage to each device associated with the station

**Combine**
The Fiber optic converter can be combined with copper repeater, SHDSL devices in whichever way you choose

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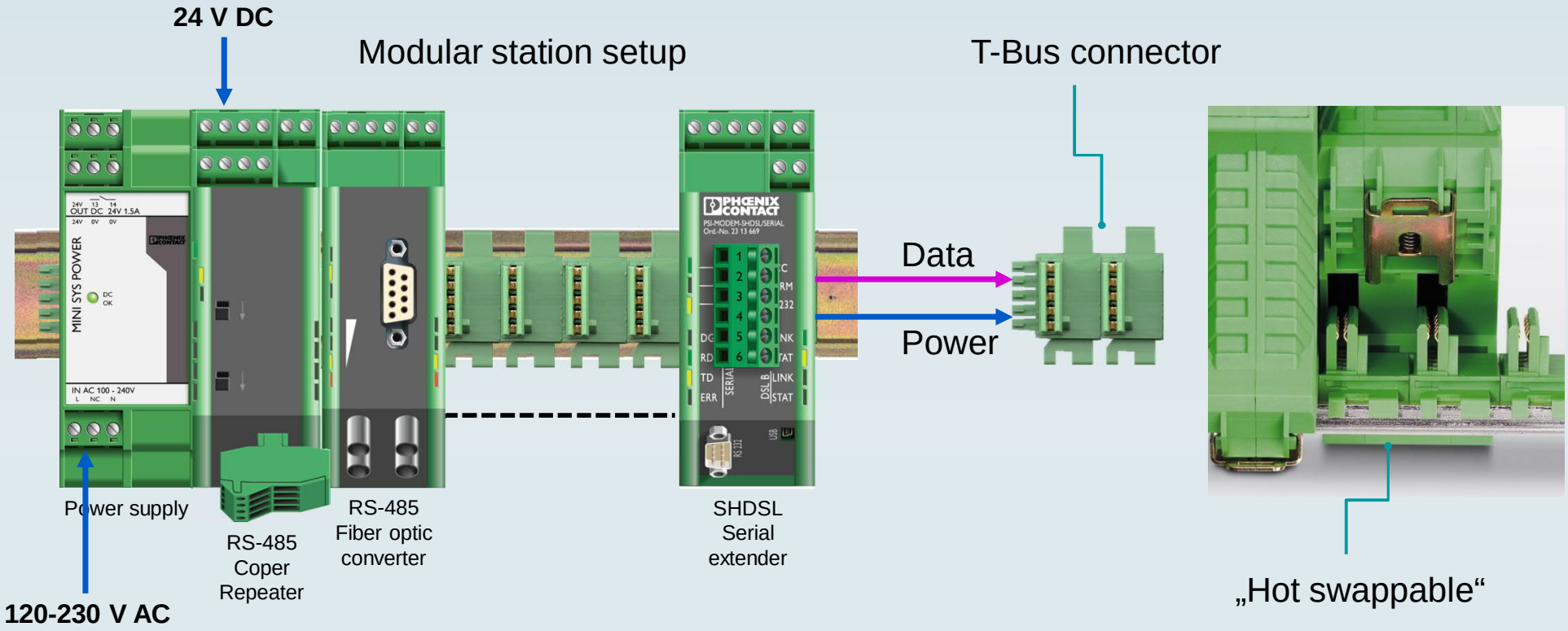
# The modular hub

**Combine copper, fiber and SHDSL however you choose**

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# Repeater – Copper transmission

Extend your network over a wide area regardeless of the data rate

Extend and distribute channels as required

Modular station with T-Bus connector

The number of devices in a network can be extended by segmenting with repeaters

Different topologies

**Features Repeater:**

- Bit-Oversampling
- Bit-Retiming
- Start-delimiter detection for PROFIBUS
- Potential segmentation



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# Repeater – Copper transmission

- Transmission speed: <=12 Mbps
- Electrical isolation between all ports
- Operation altitudes of up to 5000m and rail application in line with EN 50121-4
- Wide temperature range: -20°C…+60°C
- Approvals: ATEX, cULus Listed 508, Class1, Zone 2 and Class 1, Div2

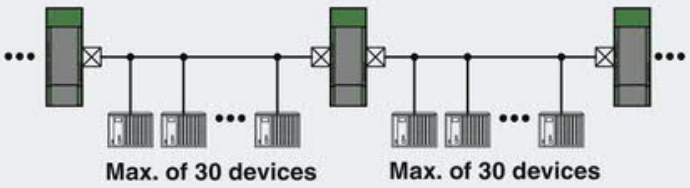


INSPIRING INNOVATIONS

# Repeater – Copper transmission

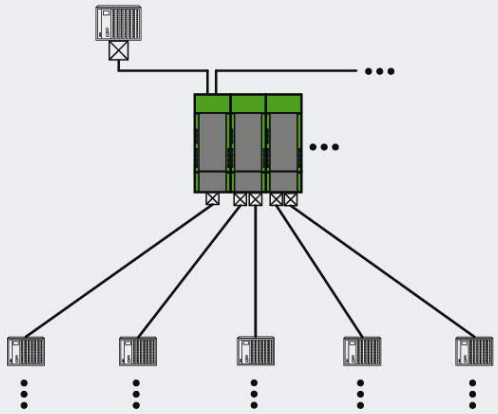
## Topologies

Linear structure



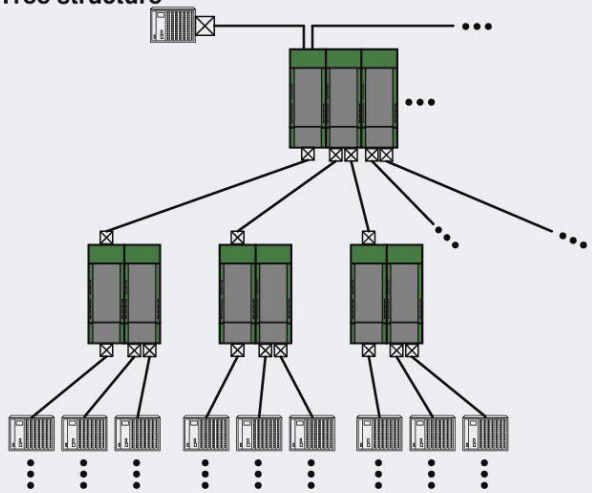

☒= Switch on bus terminating resistor

Star structure



☒= Switch on bus termination resistor

Tree structure

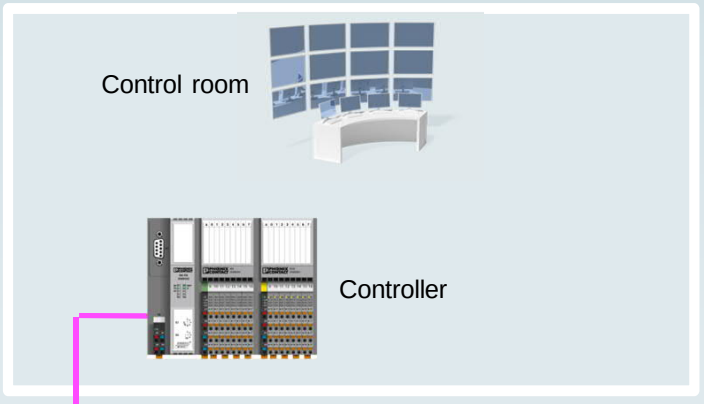


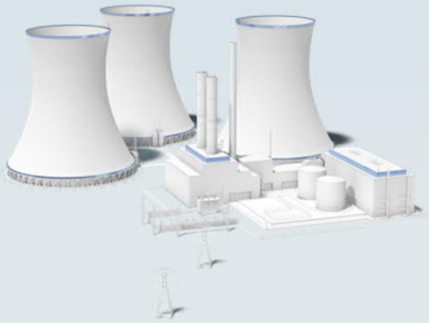
☒= Switch on bus terminating resistor

**Bus segmentation with repeater makes it possible to multiply the permission coverage of the network and to extend the number of devices.**

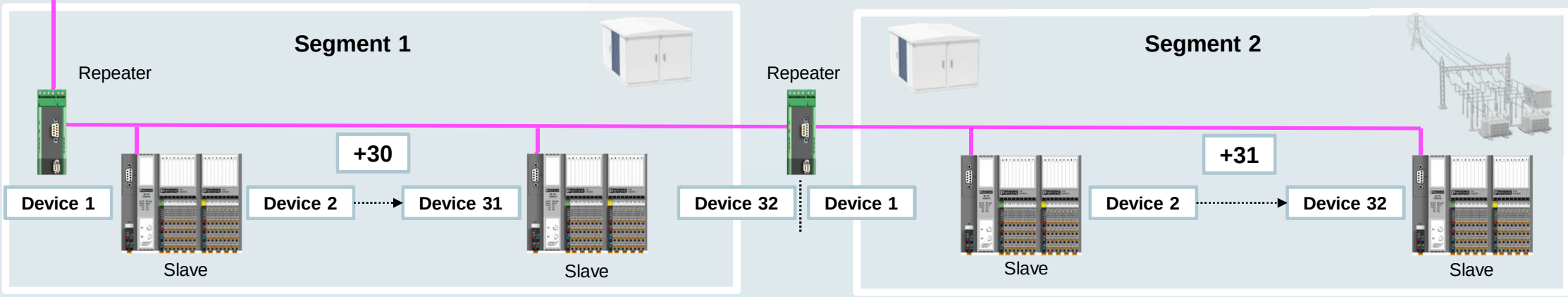
**Mixes / network structures, star and tree structures can be created using repeaters.**

# Repeater – Copper transmission



- Max 32 devices in one segment
- Each repeater port counts as one device, but has no node address



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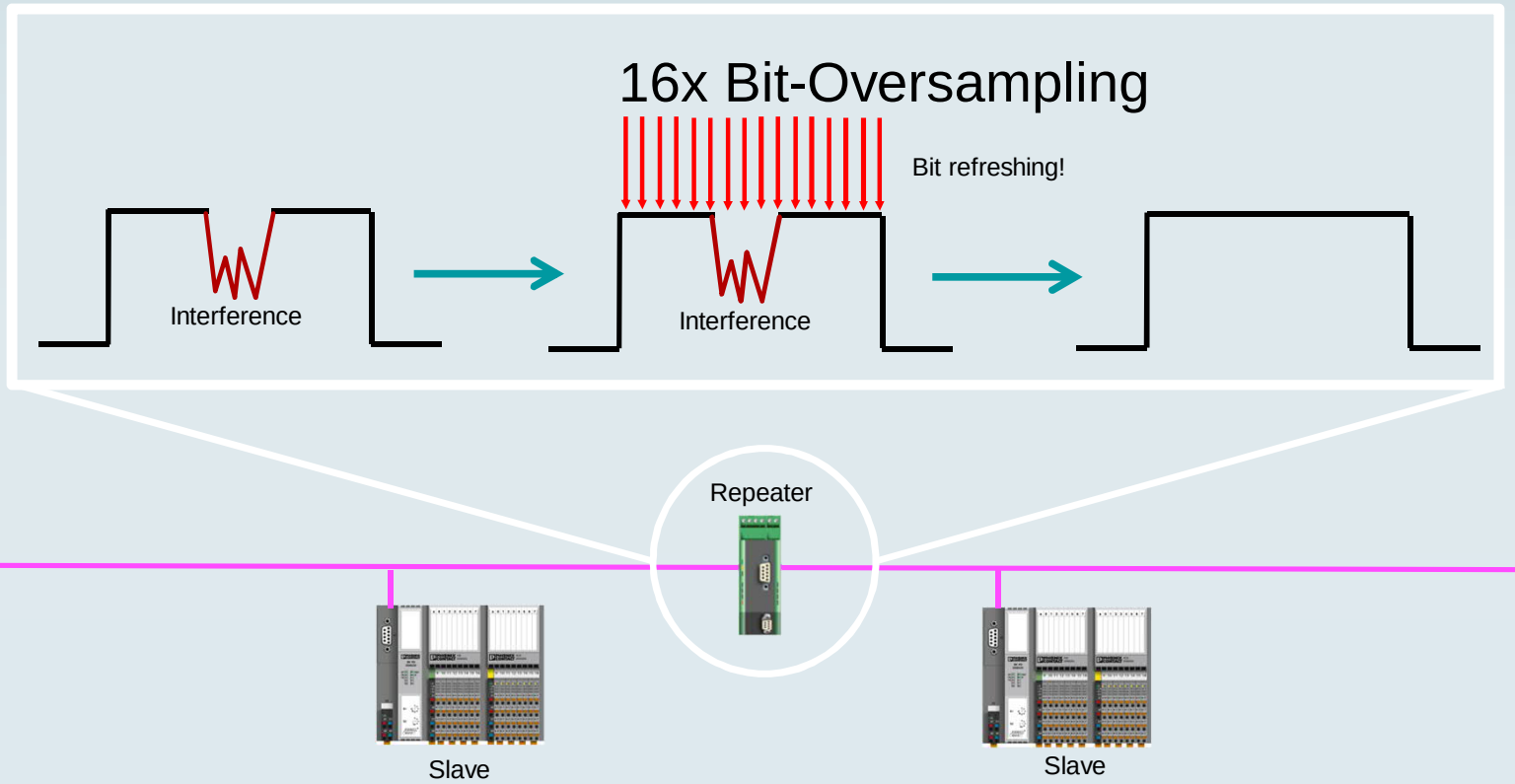
# Repeater – Bit-Oversampling



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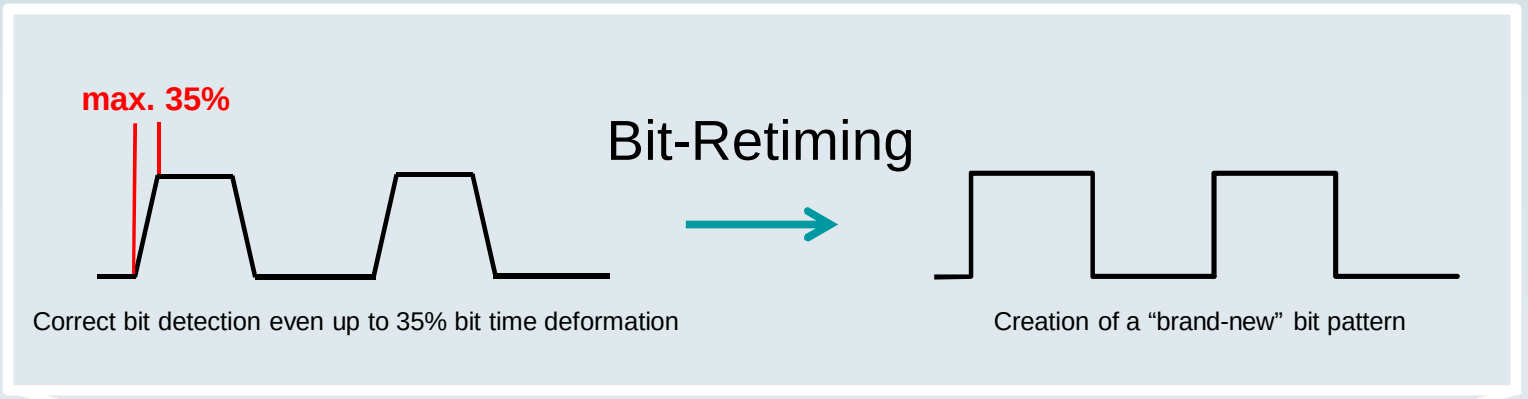
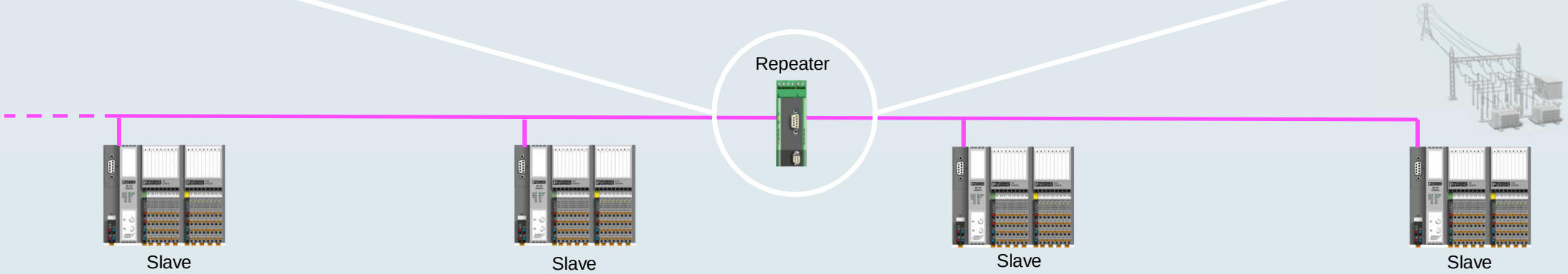
# Repeater – Bit-Retiming



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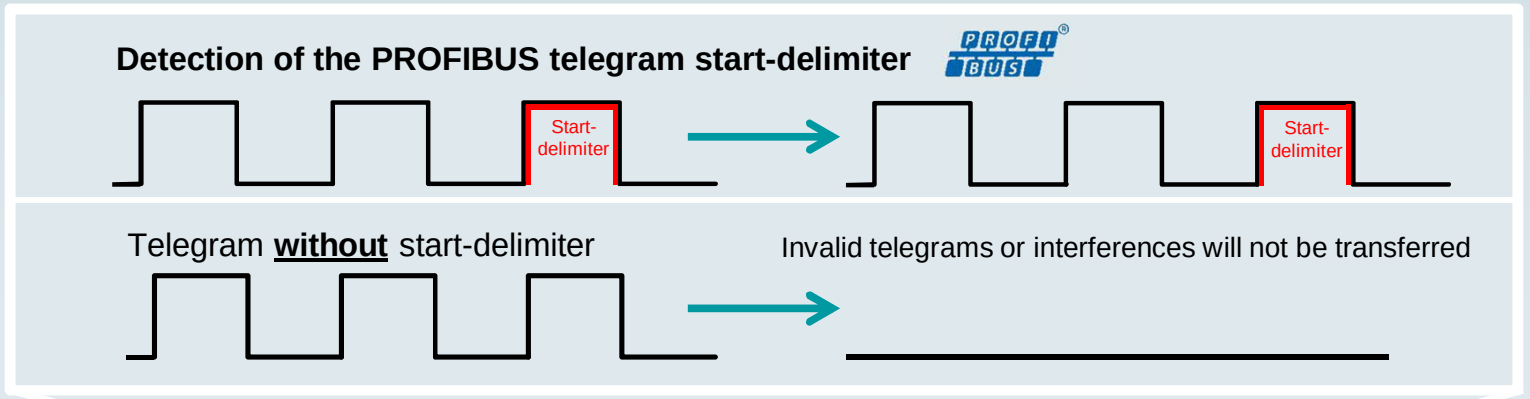
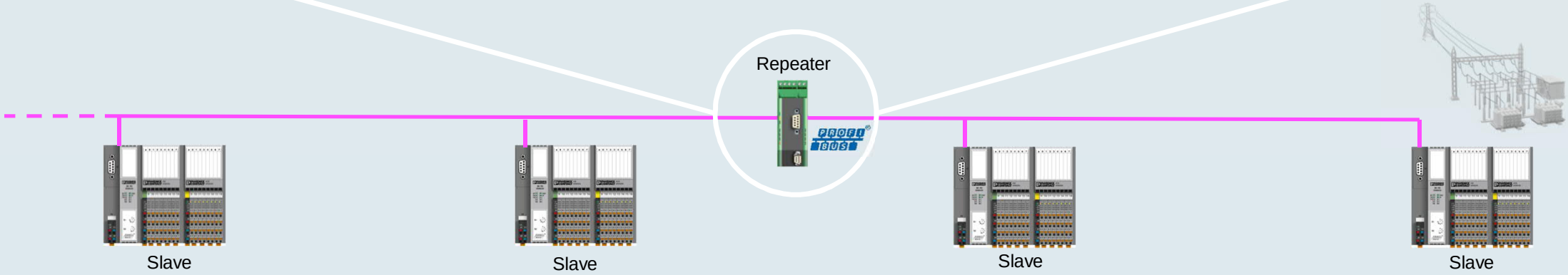
# Repeater – Start-Delimiter Detection



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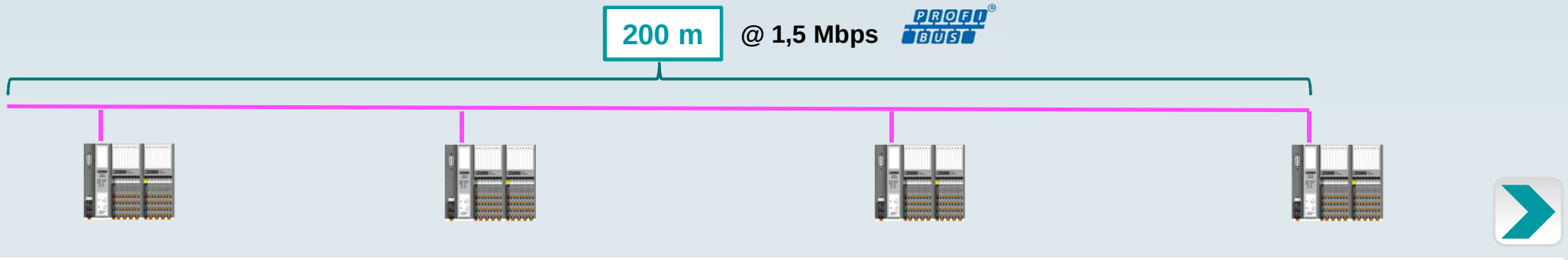
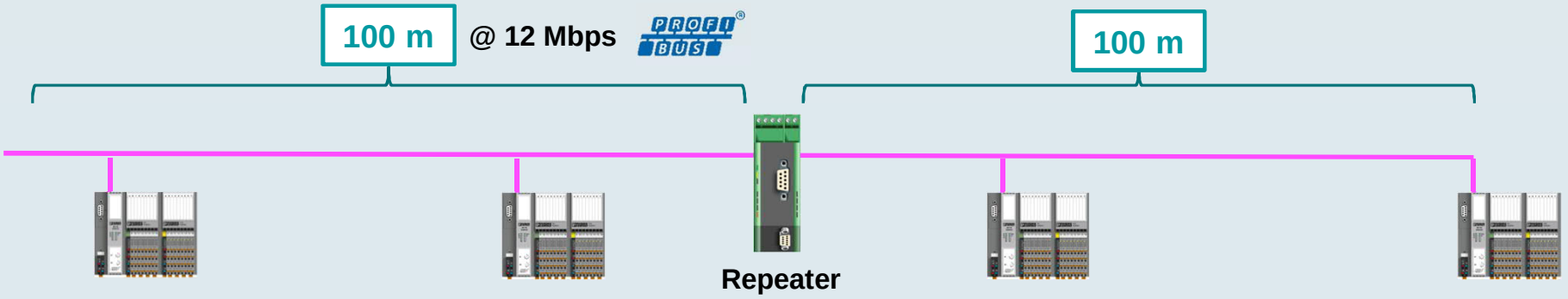
# Repeater – Distance vs. Segment length

The maximum segment length depends on the transmission speed!



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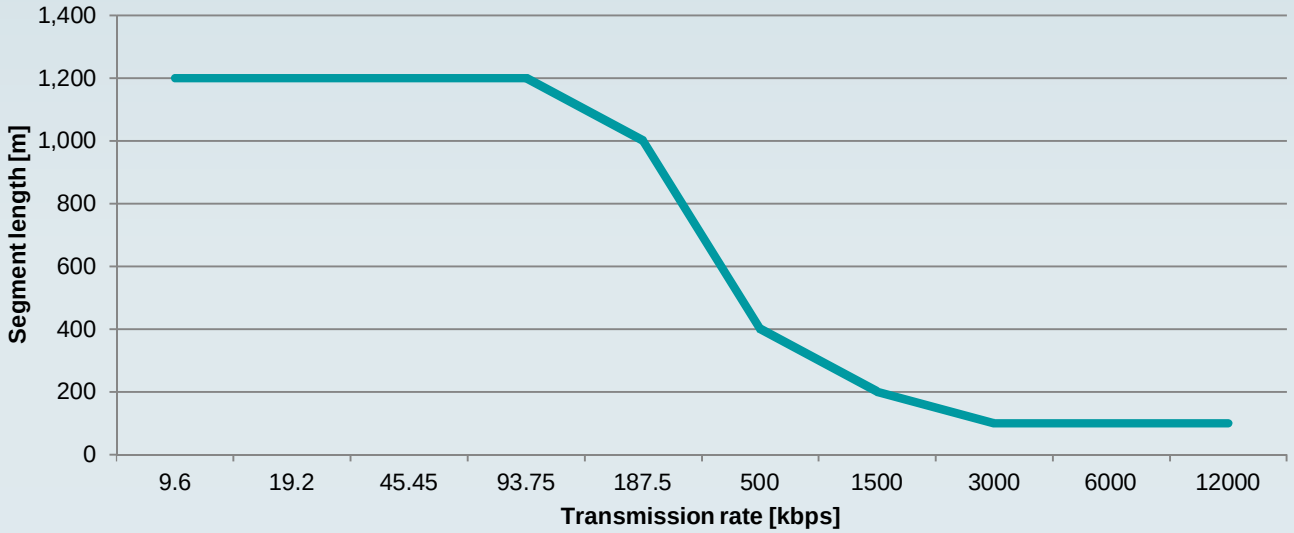
# Transmission rate vs. Segment length

## The max. transmisson rate depends on the segment length

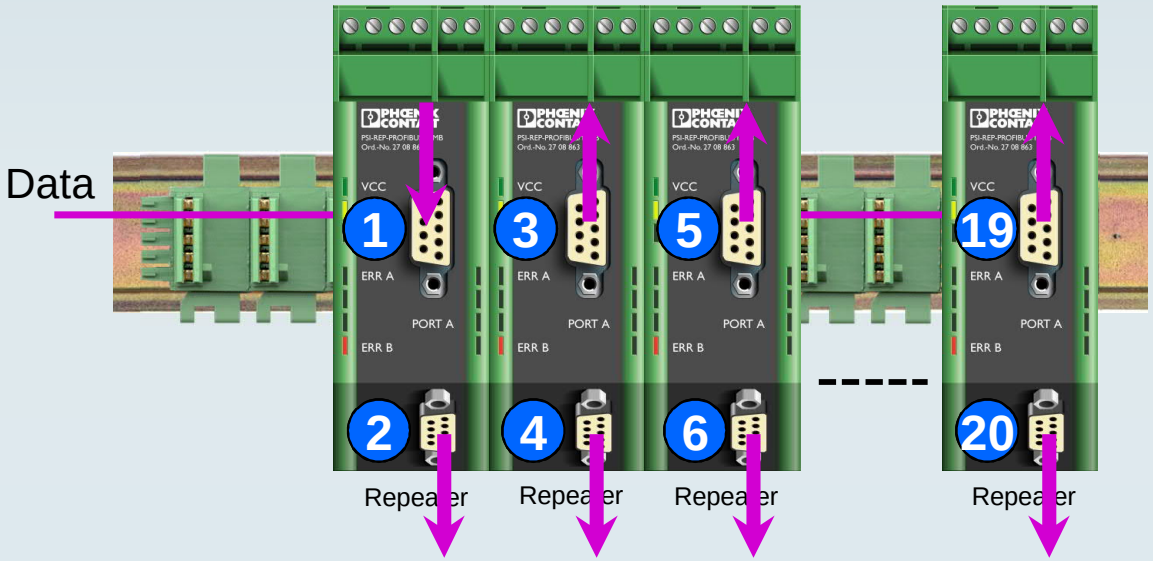



| Transmission rate [kbps] | 9.6 | 19.2 | 45.45 | 93.75 | 187.5 | 500 | 1,500 | 3,000 | 6,000 | 12,000 |
|---|---|---|---|---|---|---|---|---|---|---|
| Segment length [m] | 1,200 | 1,200 | 1,200 | 1,200 | 1,000 | 400 | 200 | 100 | 100 | 100 |

# Repeater – Modular station

Data

Ports




Extend and distribute channels as required

Up to 10 repeater can be connected via the T-Bus



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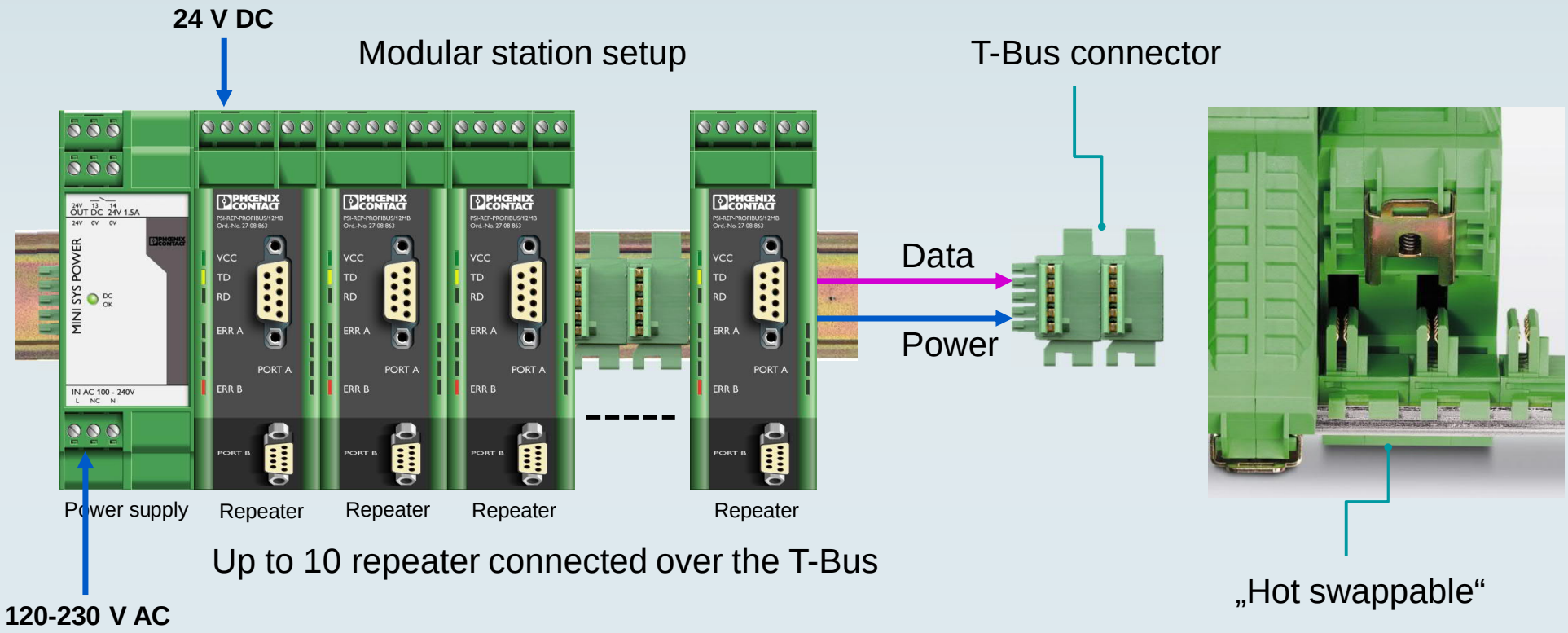
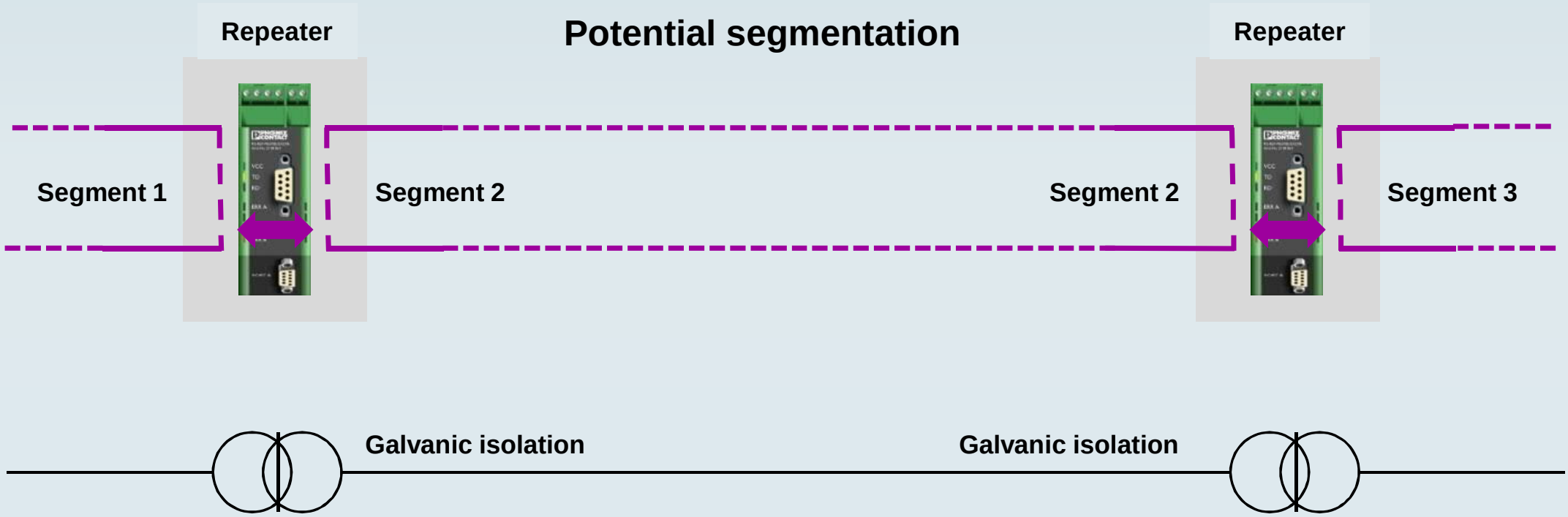
# Repeater – Modular station



# Repeater – Potential segmentation



# Repeater – Copper transmission

| | PSI-REP-DNET CAN | PSI-REP-PROFIBUS/12MB | PSI-REP-RS485W2 |
|---|---|---|---|
| Device type | CANopen/Device Net repeater | PROFIBUS repeater | RS-485 repeater |
| Data rate | 1000 kbps | up to 12Mbps | 500 kbps |
| Copper range | 1000 m | 1200 m | 1200 m |
| Interfaces | 2 x copper | 2 x copper | 2 x copper |
| Order number | 2313423 | 2708863 | 2313096 |

# Fiber optic converter

- Permanent monitoring of the fiber optic signal quality (***Worldwide unique***)
- Long transmission distances up to 45 km
- Topologies: Point-to-Point, Star, Line, Ring
- Modular station

Resistant against electromagnetic interferences (EMI)



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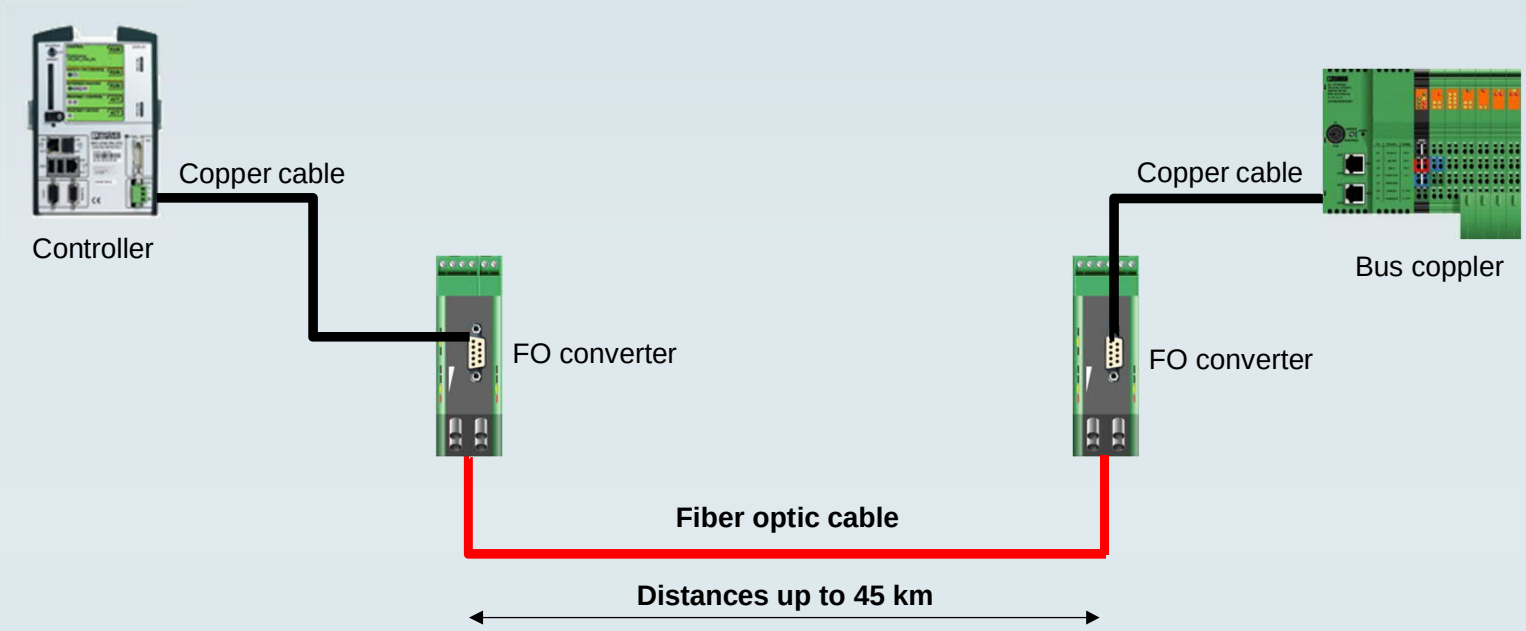
# Fiber optic converter - Distance



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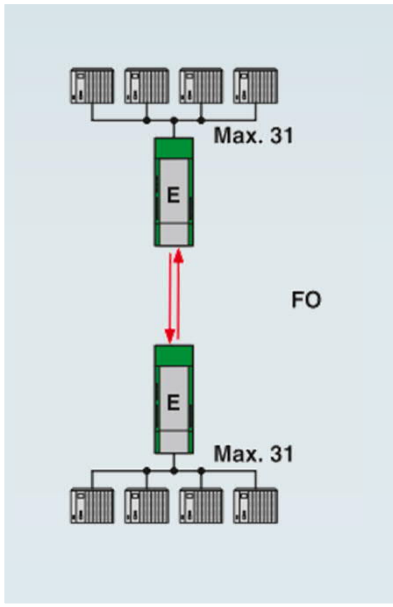
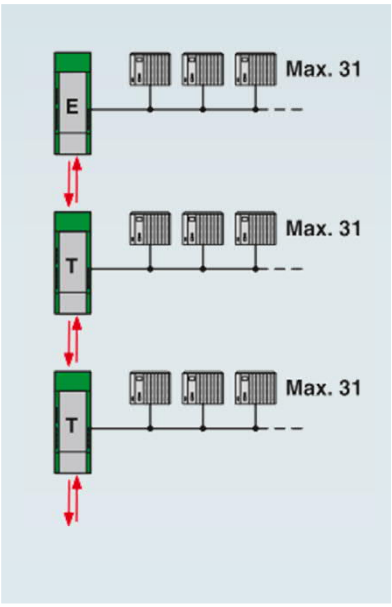
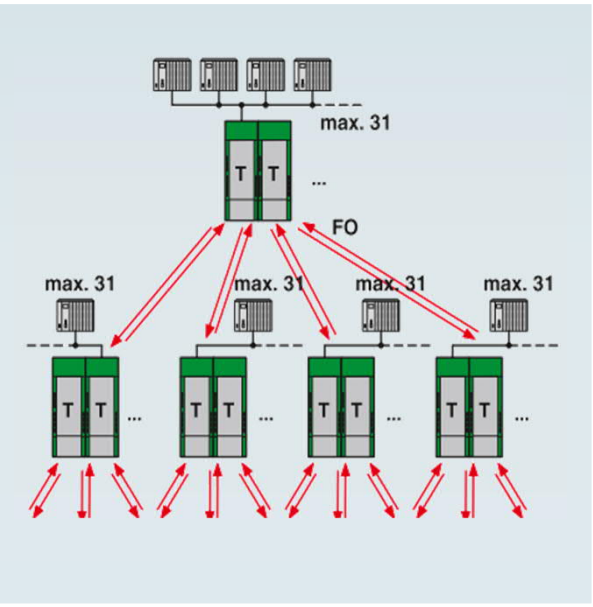
# Fiber optic converter - Topologies



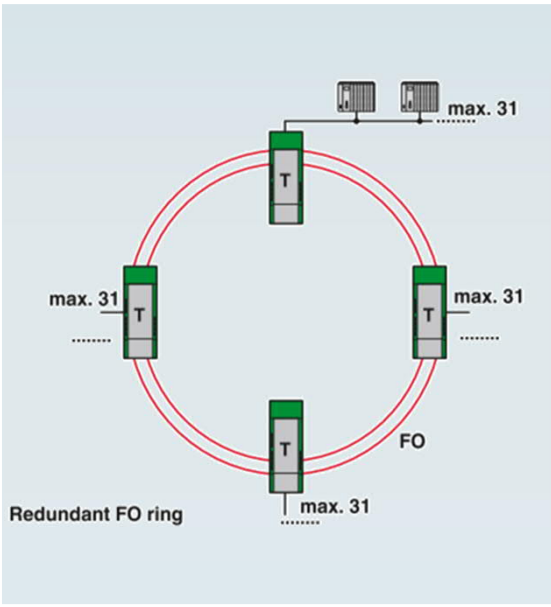

Point-to-Point connection




Linear structure

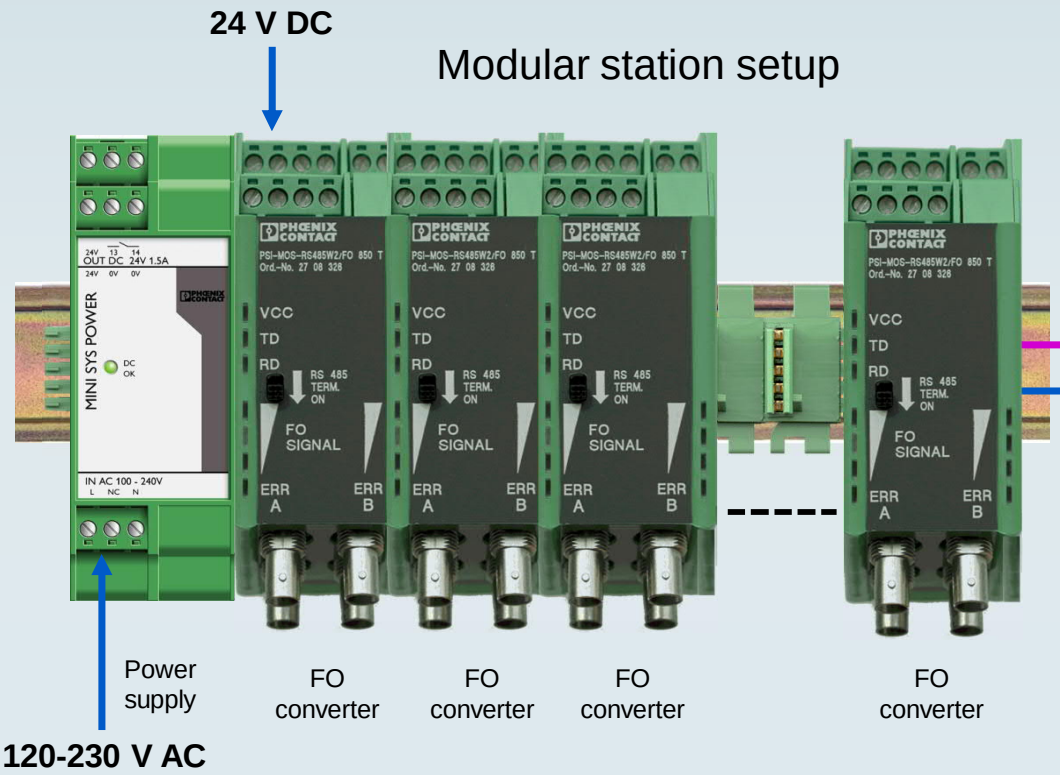


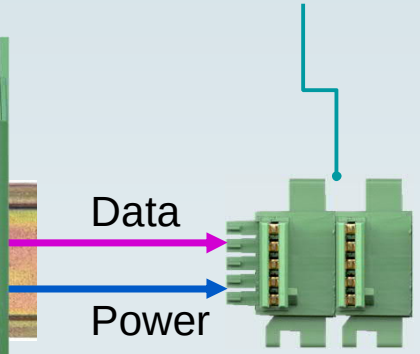

Star & Tree structure

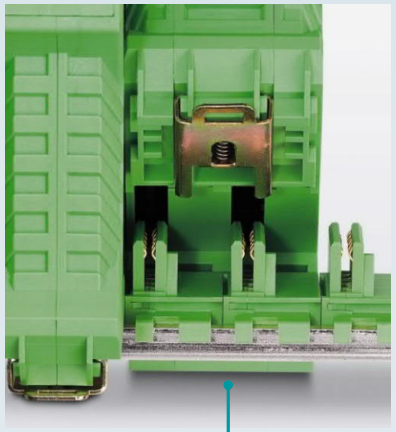



Redundant ring

# Fiber optic converter – Modular station



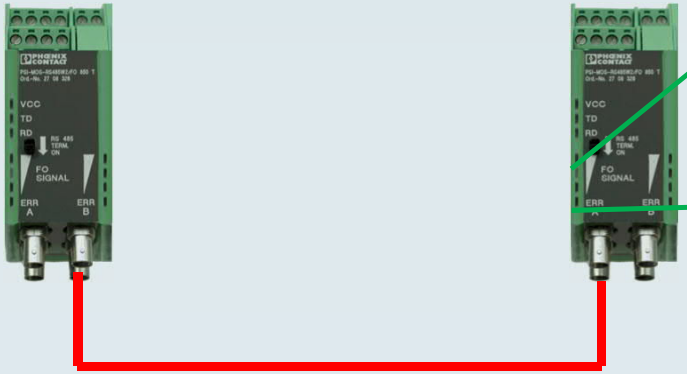




Up to 10 converter connected over the T-Bus

# Fiber optic converter – Modular station

Diagnosis without PLC possible!




Fiber optic cable

**LED indication of the FO interface**:

| LED | | Receive signal |
|---|---|---|
| FO signal | Green | Received power is very good |
| | Green | Received power is good |
| | Yellow | Received power is critical (system reserve) |
| ERR | Red | Received power is insufficient, broken fiber |

# Fiber optic converter

DeviceNet
CANopen

| | PSI-MOS-DNET CAN/FO 660/BM | PSI-MOS-DNET CAN/FO 660/EM | PSI-MOS-DNET CAN/FO 850/BM | PSI-MOS-DNET CAN/FO 850/EM | PSI-MOS-DNET/FO 850 E | PSI-MOS-DNET/FO 850 T |
|---|---|---|---|---|---|---|
| Device type | FO converter 660 nm | FO converter 660 nm | FO converter 850 nm | FO converter 850 nm | FO converter 850 nm | FO converter 850 nm |
| Data rate | 800 kbps | 800 kbps | 800 kbps | 800 kbps | 1000 kbps | 1000 kbps |
| Polymer fiber range | 100 m | 100 m | - | - | - | - |
| HCS fiber range | 800 m | 800 m | 2800 m | 2800 m | 1800 m | 1800 m |
| Glass MM range | - | - | 4800 m | 4800 m | 4600 m | 4600 m |
| Glass SM range | - | - | - | - | - | - |
| Copper range | 1000 m | 1000 m | 1000 m | 1000 m | 1000 m | 1000 m |
| Interfaces | 1x FO, 1x copper | 1x FO, 1x copper | 1x FO, 1x copper | 1x FO, 1x copper | 1x FO, 1x copper | 2x FO, 1x copper |
| Order number | 2708054 | 2708067 | 2708083 | 2708096 | 2313999 | 2313986 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fiber optic converter

| | PSI-MOS-PROFIB/FO 660 E | PSI-MOS-PROFIB/FO 660 T | PSI-MOS-PROFIB/FO 850 E | PSI-MOS-PROFIB/FO 850 T | PSI-MOS-PROFIB/FO 1300 E | PSI-MOS-PROFIB/FO 1300 T |
|---|---|---|---|---|---|---|
| Device type | FO converter 660 nm | FO converter 660 nm | FO converter 850 nm | FO converter 850 nm | FO converter 1300 nm | FO converter 1300 nm |
| Data rate | up to 12 Mbps | up to 12 Mbps | up to 12 Mbps | up to 12 Mbps | up to 12 Mbps | up to 12 Mbps |
| Polymer fiber range | 70 m | 70 m | - | - | - | - |
| HCS fiber range | 400 m | 400m | 800 m | 800 m | - | - |
| Glass MM range | - | - | 2600 m | 2600 m | 25 km | 25 km |
| Glass SM range | - | - | - | - | 45 km | 45 km |
| Copper range | 1200 m | 1200 m | 1200 m | 1200 m | 1200 m | 1200 m |
| Interfaces | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper | 2x FO, 1x copper |
| Order number | 2708290 | 2708287 | 2708274 | 2708261 | 2708559 | 2708892 |

INSPIRING INNOVATIONS

# Fiber optic converter

## RS-232

| | PSI-MOS-RS232/FO 660 E | PSI-MOS-RS232/FO 660 T | PSI-MOS-RS232/FO 850 E | PSI-MOS-RS232/FO 850 T | PSI-MOS-RS232/FO 1300 E |
|---|---|---|---|---|---|
| Device type | FO converter 660 nm | FO converter 660 nm | FO converter 850 nm | FO converter 850 nm | FO converter 1300 nm |
| Data rate | 115,2 kbps | 115,2 kbps | 115,2 kbps | 115,2 kbps | 115,2 kbps |
| Polymer fiber range | 100 m | 100 m | - | - | - |
| HCS fiber range | 800 m | 800 m | 2800 m | 2800 m | - |
| Glass MM range | - | - | 4200 m | 4200 m | 27 km |
| Glass SM range | - | - | - | - | 45 km |
| Copper range | 15 m | 15 m | 15 m | 15 m | 15 m |
| Interfaces | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper |
| Order number | 2708368 | 2708410 | 2708371 | 2708423 | 2708588 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fiber optic converter

## RS-422

| | PSI-MOS-RS422/FO 660 E | PSI-MOS-RS422/FO 660 T | PSI-MOS-RS422/FO 850 E | PSI-MOS-RS422/FO 850 T | PSI-MOS-RS422/FO 1300 E |
|---|---|---|---|---|---|
| Device type | FO converter 660 nm | FO converter 660 nm | FO converter 850 nm | FO converter 850 nm | FO converter 1300 nm |
| Data rate | 2 Mbps | 2 Mbps | 2 Mbps | 2 Mbps | 2 Mbps |
| Polymer fiber range | 100 m | 100 m | - | - | - |
| HCS fiber range | 800 m | 800 m | 2800 m | 2800 m | - |
| Glass MM range | - | - | 4200 m | 4200 m | 27 km |
| Glass SM range | - | - | - | - | 45 km |
| Copper range | 1000 m | 1000 m | 1000 m | 1000 m | 1000 m |
| Interfaces | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper |
| Order number | 2708342 | 2708384 | 2708355 | 2708397 | 2708575 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fiber optic converter

## RS-485

| | PSI-MOS-S485W2/FO 660 E | PSI-MOS-RS485W2/FO 660 T | PSI-MOS-RS485W2/FO 850 E | PSI-MOS-RS485W2/FO 850 T | PSI-MOS-RS485W2/FO 1300 E |
|---|---|---|---|---|---|
| Device type | FO converter 660 nm | FO converter 660 nm | FO converter 850 nm | FO converter 850 nm | FO converter 1300 nm |
| Data rate | 500 kbps | 500 kbps | 500 kbps | 500 kbps | 500 kbps |
| Polymer fiber range | 100 m | 100 m | - | - | - |
| HCS fiber range | 800 m | 800 m | 2800 m | 2800 m | - |
| Glass MM range | - | - | 4200 m | 4200 m | 25 km |
| Glass SM range | - | - | - | - | 45 km |
| Copper range | 1200 m | 1200 m | 1200 m | 1200 m | 1200 m |
| Interfaces | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper | 2x FO, 1x copper | 1x FO, 1x copper |
| Order number | 2708313 | 2708300 | 2708339 | 2708326 | 2708562 |

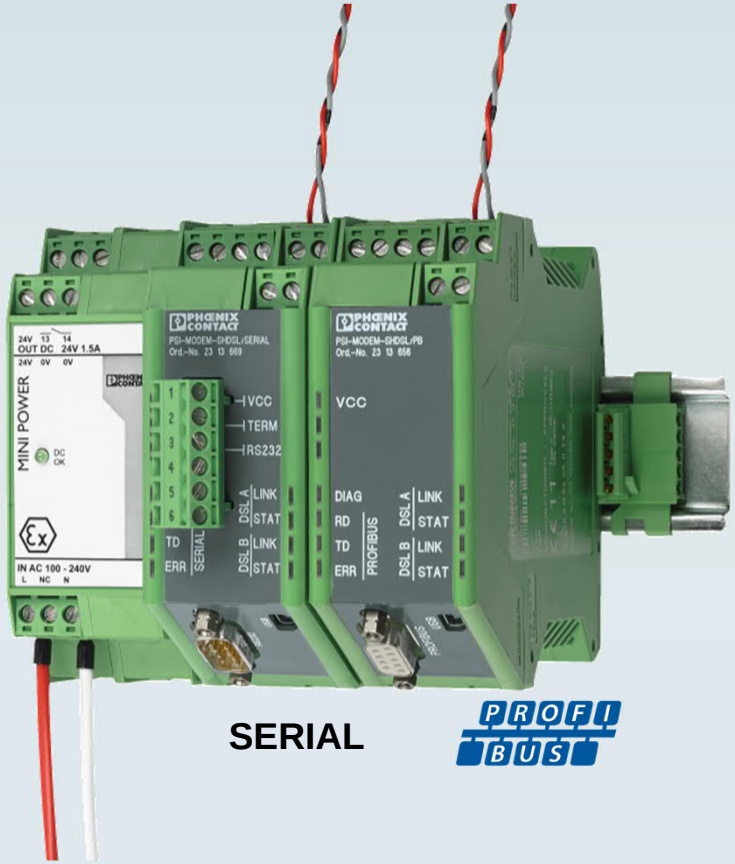
# Fiber optic converter

## Accessories

| | MINI-PS-100-240AC/24DC/1.5/EX | MINI-SYS-PS-100-240AC/24DC/1.5 | ME 17,5 TBUS 1,5/ 5-ST-3,81 GN | ME 17,5 TBUS 1,5/PP000-3,81 BK |
|---|---|---|---|---|
| Device type | System power supply | System power supply | DIN rail connector | DIN rail connector |
| Description | For providing the supply voltage via the foot element (Din rail connector)<br><br>In ex areas | For providing the supply voltage via the foot element (Din rail connector) | For bridging the **supply voltage and for data communication** | For bridging **only** the **supply voltage** |
| Output voltage | 24 V DC | 24 V DC | - | - |
| Output current | 1,5 A | 1,5 A | - | - |
| Order number | 2866653 | 2866983 | 2709561 | 2890014 |

INSPIRING INNOVATIONS

# Extender – Serial & PROFIBUS




**SERIAL**

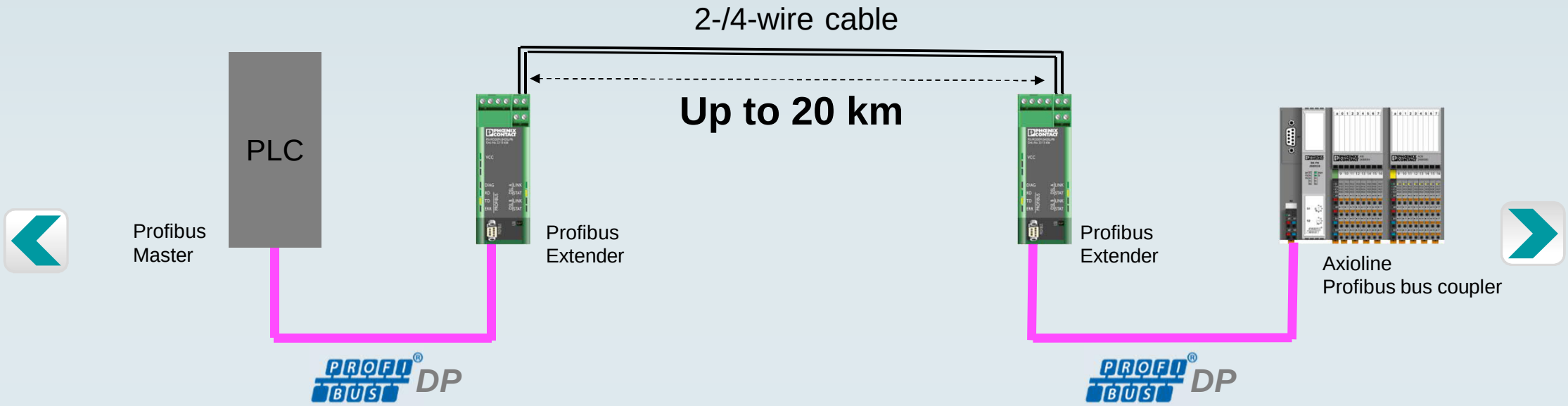
- PROFIBUS and Serial extender for copper-based transmission up to 20 km
- Robust SHDSL modulation method
- Does not required a special cable
- Any 2- or 4-wire cable can be used
- Point-to-Point, line and star structures

# Extender - PROFIBUS

- PROFIBUS bus segments on existing on-site lines
- Distances up to 20 km possible with lower data rates and with good cable quality
- Line structure up to 30 SHDSL devices
- PROFIBUS
  - Linear structure: up to 500 kbps
  - Point-to-Point: up to 1,5 Mbps
- Diagnostic via USB port or LEDs
- Configuration software

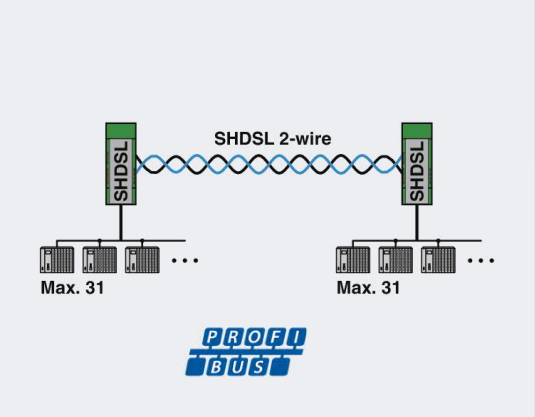
# Extender – PROFIBUS

**Example:**

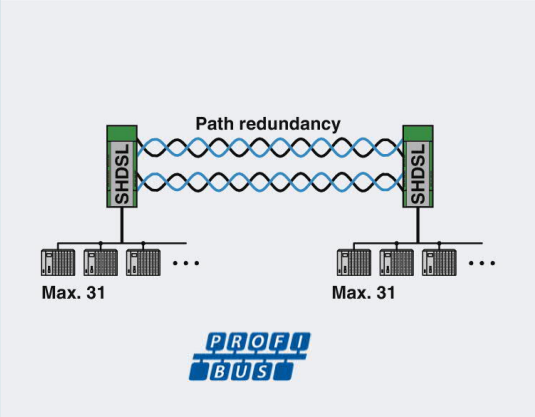


# Extender – PROFIBUS

**Topologies:**

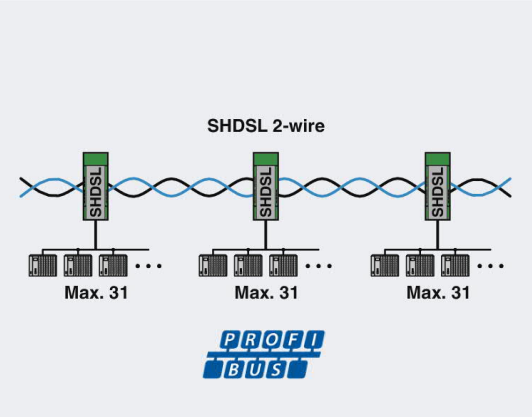



Point-to-Point
2-wire




Point-to-Point
4-wire

PROFIBUS data rate for point-to-point
is up to 1,5 Mbps




Line
2-wire

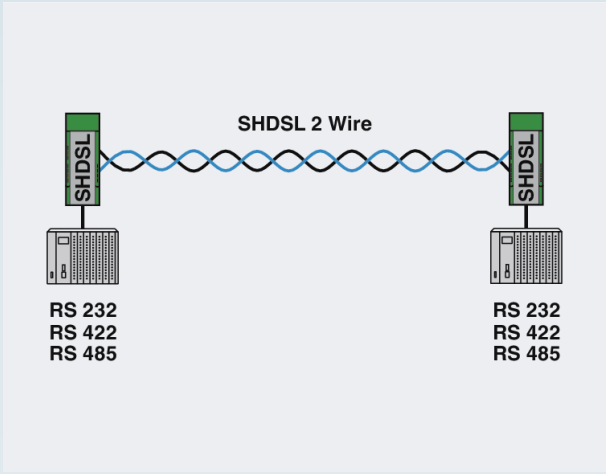
PROFIBUS data rate for linear
structure is up to 500 kbps

# Extender - Serial

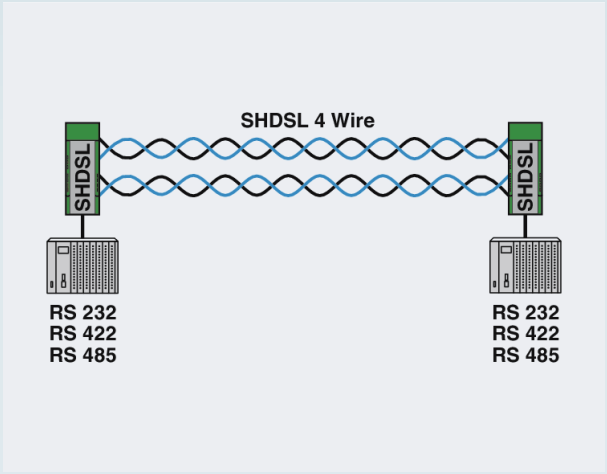
- Distances up to 20 km
- Transparent protocol
- Point-to-Point and line structures
- RS-232, up to 230,4 kbps
- RS-422, up to 2000 kbps
- RS-485 W2, up to 2000 kbps
- Diagnostic via USB port or LEDs
- Configuration software

# Extender – Serial

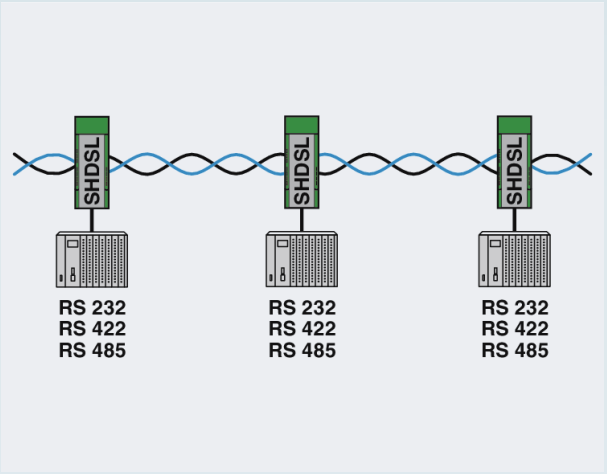
**Topologies:**




Point-to-Point
2-wire

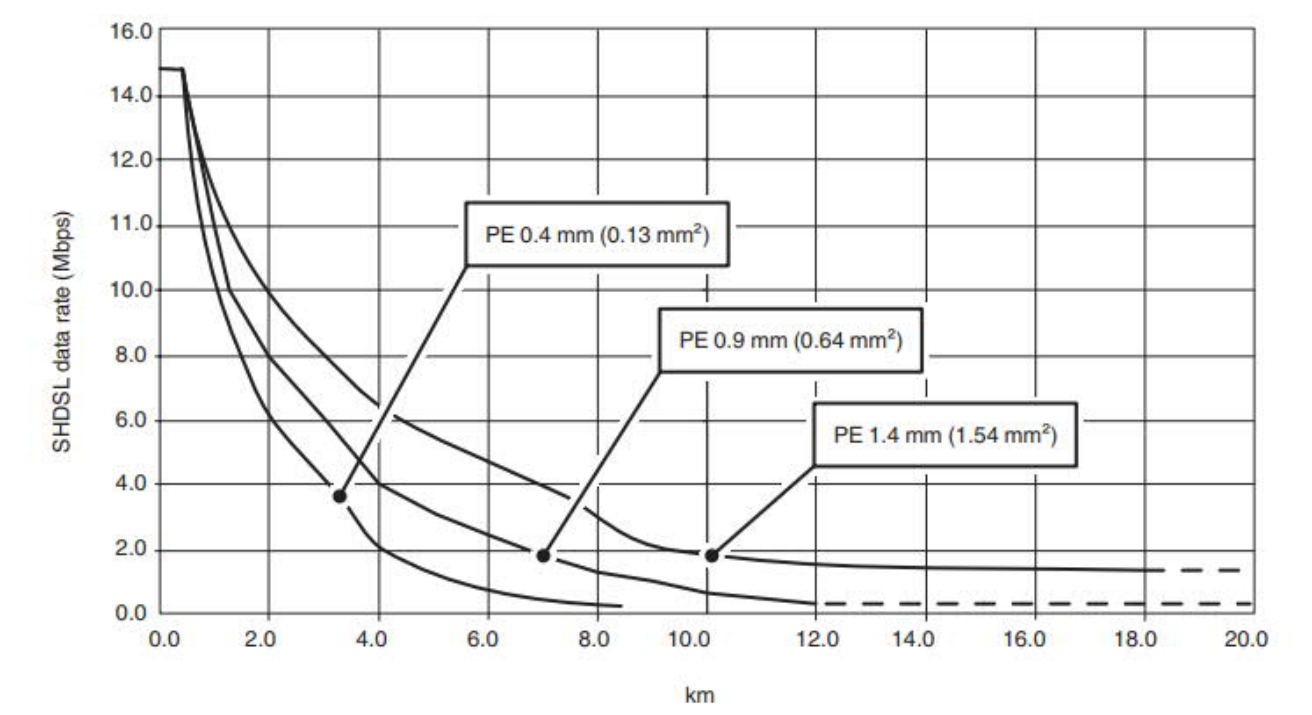



Point-to-Point
4-wire




Line
2-wire

# Extender – Serial and PROFIBUS




Dependency of the maximum SHDSL data rate (Mbps) on the distance for a 2-wire connection

# Extender – Serial & PROFIBUS

| | PSI-MODEM-SHDSL/SERIAL | PSI-MODEM-SHDSL/PB | DT-TELE-SHDSL (Accessory) |
|---|---|---|---|
| Function | Industrial SHDSL extender for serial RS-232/422/485 interfaces | Industrial SHDSL extender for PROFIBUS | Surge protection for two SHDSL telecommunications interfaces |
| Topologies | Point-to-point, Line structure | Point-to-point, Line structure | - |
| Interfaces | RS-232 (D-SUB 9 plug), RS-422 (Screw connector), RS-485 (Screw connector) | PROFIBUS D-SUB 9 female connector | RJ 45 an plug-in screw termnal block |
| Transmission lenght (SHDSL Interface) | 20 km | 20 km | - |
| Serial transmission speed | Up to 2000 kbps | Up to 1,5 Mbps | - |
| Order number | 2313669 | 2313656 | 2801593 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB fast connectors

**Reliable Plug and Play connectors**
M12 connection technology for PROFIBUS and CANopen – preventing installation errors

**The classic, flexible choice**
Screw or spring connection, for bus systems or as a universal version

**Specifically for PROFIBUS**
It only takes a minute: user-friendly cable connection via screw or IDC terminal block technology

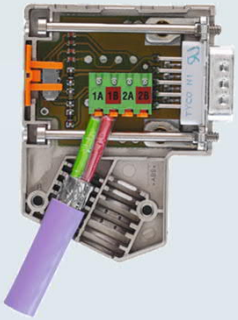
Maximum flexibility thanks to various cable outlets of 35°, 90° and 180°



PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB fast connectors

Maximum flexibility thanks to various cable outlets of 35°, 90° and 180°



**Universal plugs**
Versions with 9, 15 or 25 contacts for all commonly used interfaces

**Specifically for PROFIBUS**

**Specifically for CANopen**

**M12 plugs**
Direct assembly of M12 cables
Secure and easy detachable connections

**Stripping tool** for PROFIBUS cable

**Termination resistor** included

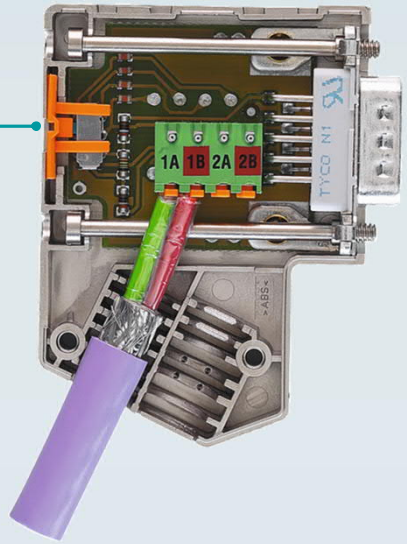
# Universal plugs

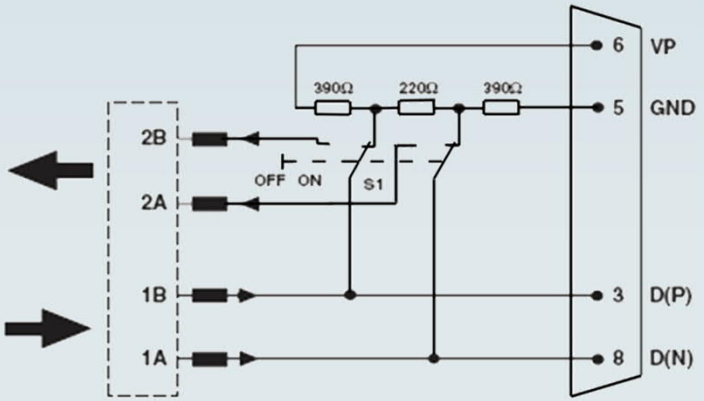
- Easy mounting, thanks to user-friendly connection methods
- High electromagnetic resistance, thanks to metalized housing
- Flexible cable entry at 35-degrees, thanks to reversible PCB's
- Comprehensive product range: versions with different numbers of positions and angles for cable entry
- Versions with 9, 15 or 25 contacts for all commonly used interfaces, such as RS-232/RS-422/RS-485, TTY and many more.

# D-SUB connectors – Termination resistor

Slide switch to active the termination resistor

**Termination resistor inside**



**ON**

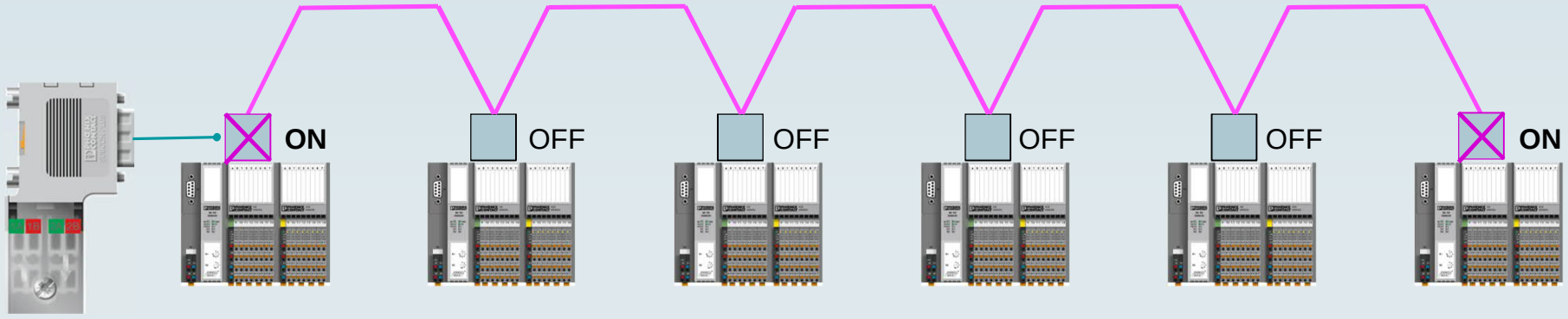
OFF

CLICK HERE



PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB connectors – Termination resistor



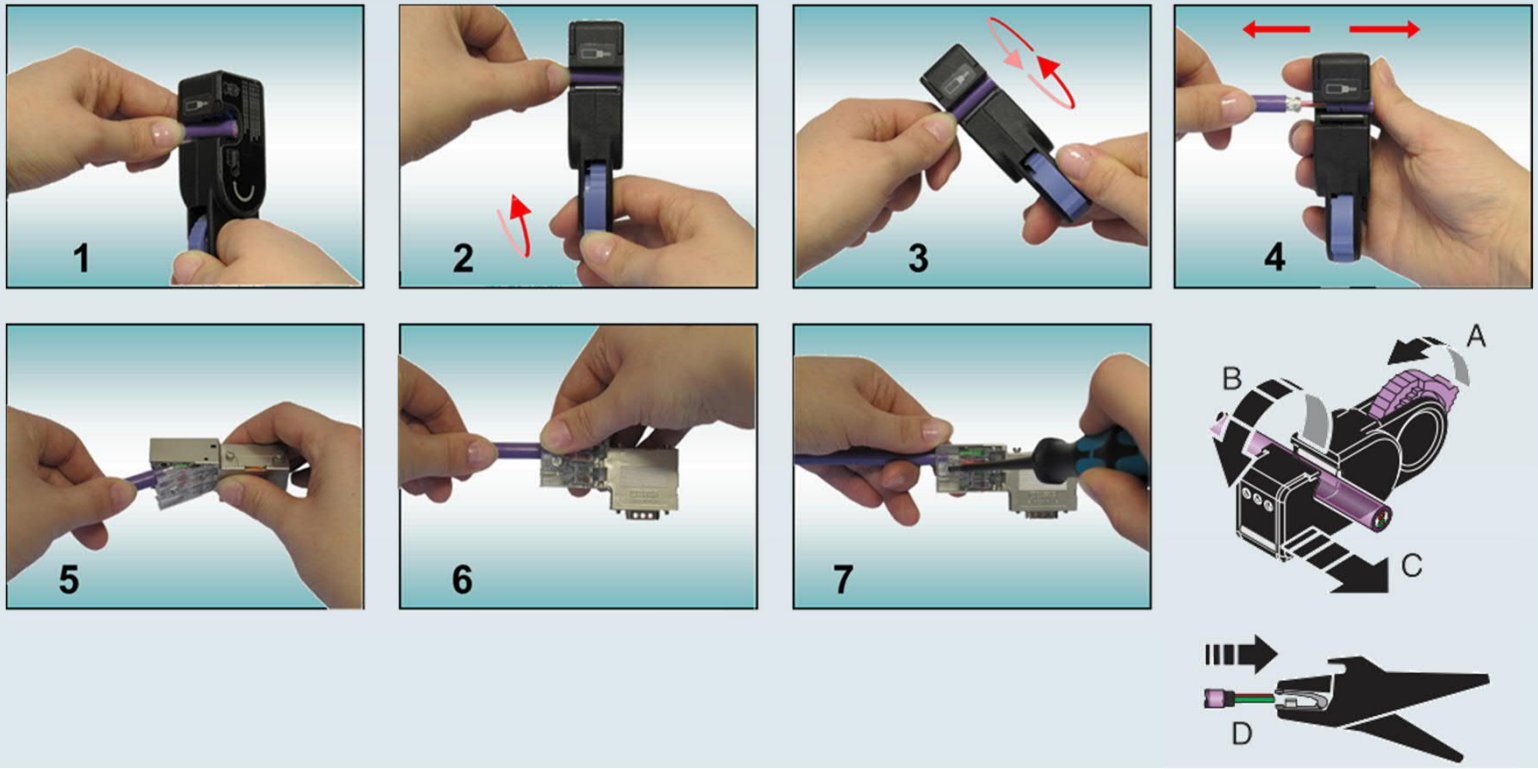

**D-Sub connector**

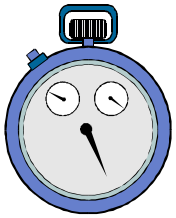
Use the side switch on the D-SUB connector, to activate the termination resistor at the start and end point of a bus system!



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Stripping tool



The easiest on side termination in **< 1 min.**

Quick stripping tool
PSM-STRIP-FC/PROFIB
Order number: 2744623



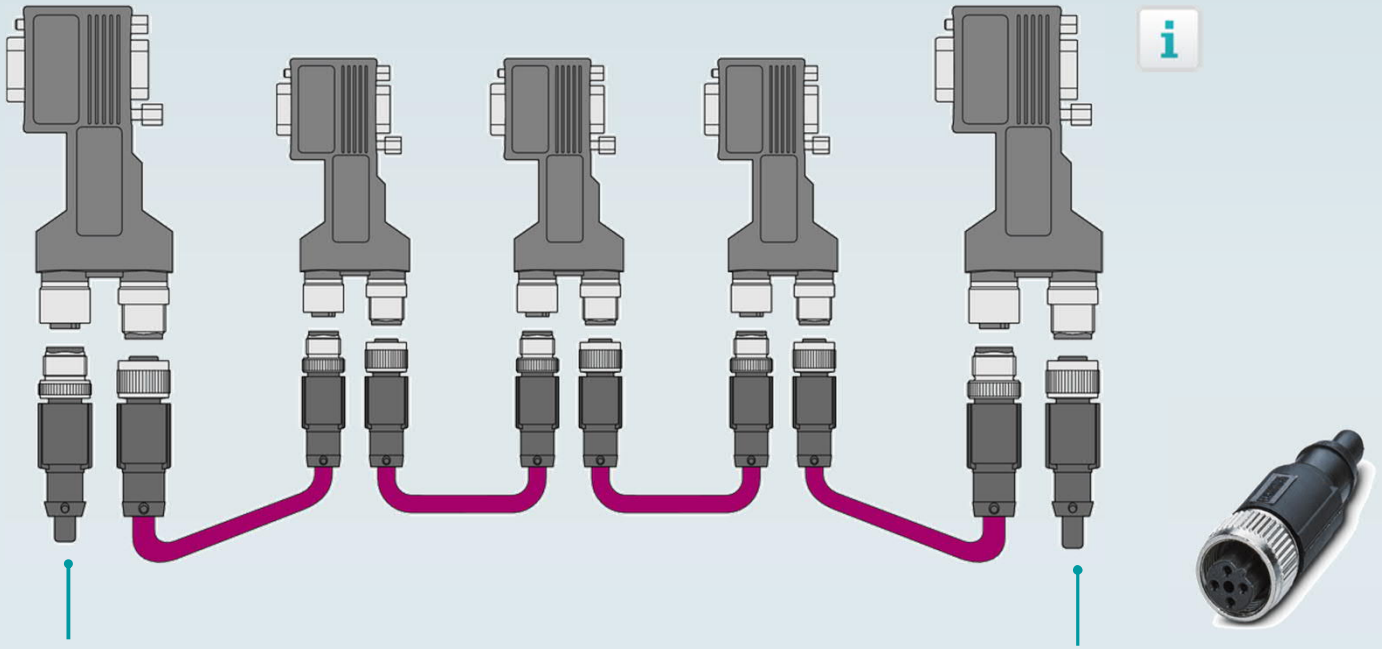
INSPIRING INNOVATIONS

# D-SUB fast connectors M12

- **Direct assembly of M12 cables**
  Secure and easy detachable connections
- **Variants for every requirement**
  Different angles of M12 orientation for every application
- **Fault-free Installation**
  by using 100% pre-tested components
- **Full moulded housing**
  resistance against harmful environment
- **M12 SPEEDCON interlock system**
  M12 locking with just a half-turn
- **Complete product range**
  with 14 types for PROFIBUS and CANopen

PROFIBUS CANopen

# D-SUB plug with M12 SPEEDCON – Termination resistor



M12 Termination resistor

M12 Termination resistor

# D-SUB fast connectors M12

| | SUBCON-PLUS-PROFIB/90X/M12<br>SUBCON-PLUS-CAN/90X/M12 | SUBCON-PLUS-PROFIB/90X/PG/M12<br>SUBCON-PLUS-CAN/90X/PG/M12 | SUBCON-PLUS-PROFIB/90/M12<br>SUBCON-PLUS-CAN/90/M12 | SUBCON-PLUS-PROFIB/90/PG/M12<br>SUBCON-PLUS-CAN/90/PG/M12 | SUBCON-PLUS-PROFIB/35/M12<br>SUBCON-PLUS-CAN/35/M12 | SUBCON-PLUS-PROFIB/35/PG/M12<br>SUBCON-PLUS-CAN/35/PG/M12 | SUBCON-PLUS-PROFIB/AX/M12<br>SUBCON-PLUS-CAN/AX/M12 |
|---|---|---|---|---|---|---|---|
| Description | Long version for Siemens S7 controller | | Compact connector for universal operation | | Universal version with angular M12 connector | | For limited space requirements |
| Cable inlet | 90° | 90° | 90° | 90° | 35° | 35° | 180° |
| Version | Long | Long with PG | Compact | Compact with PG | Universal | Universal with PG | Axial |
| Order number PROFIBUS | 2902729 | 2902728 | 2902318 | 2902317 | 2902320 | 2902319 | 2902321 |
| Order number CANopen | 2902731 | 2902730 | 2902323 | 2902322 | 2902325 | 2902324 | 2902326 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB fast connectors M12 Accessories

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Termination resistor M12** | **Termination resistor M12** | **Bus system cable 0,3 m** | **Bus system cable 1 m** | **Bus system cable 2 m** | **Bus system cable 5 m** | **Bus system cable Free input** |
| Type | SAC-5P-M12MS PB TR | SAC-5P-M12FS PB TR | SAC-2P-MSB/0,3-910/FSB SCO | SAC-2P-MSB/1,0-910/FSB SCO | SAC-2P-MSB/2,0-910 SCO | SAC-2P-MSB/5,0-910/FSB SCO | SAC-2P-MSB-FSB SCO/910/... |
| Description | PROFIBUS M12 | PROFIBUS M12, female connector | Bus system cable, Profibus (12 Mbps) | Bus system cable, Profibus (12 Mbps) | Bus system cable, Profibus (12 Mbps) | Bus system cable, Profibus (12 Mbps) | Bus system cable, Profibus (12 Mbps) |
| Cable lenght | - | - | 0,3 m | 1 m | 2 m | 5 m | 0,2 ….40 m |
| Order number | 1507803 | 1403911 | 1518106 | 1518122 | 1518025 | 1518148 | 1538092 |

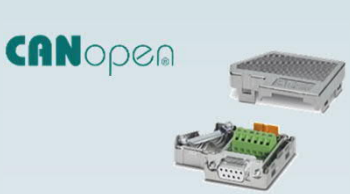
PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB fast connectors

| | SUBCON-PLUS-PROFIB/90/IDC | SUBCON-PLUS-PROFIB/90/SC | SUBCON-PLUS-PROFIB/SC2 | SUBCON-PLUS-PROFIB/AX/SC | SUBCON-PLUS-PROFIB/PG | SUBCON-PLUS-PROFIB/AX |
|---|---|---|---|---|---|---|
| Description | IDC terminal block connection | Screw connection teminal blocks | Screw connection teminal blocks | Screw connection teminal blocks | Spring connection terminal blocks | Spring connection terminal blocks |
| Cable inlet | 90° | 90° | 35° | 180° (axial) | 35° | 180° (axial) |
| Order number | 2313672 | 2313698 | 2708232 | 2744380 | 2744403 | 2744377 |
| | | | | | | |
| Order number with Programming Interface | 2313685 | 2313708 | 2708245 | - | 2744348 | - |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB fast connectors



| | SUBCON-PLUS-CAN | SUBCON-PLUS-CAN/SC2 | SUBCON-PLUS-CAN/AX |
|---|---|---|---|
| Description | Screw connection terminal blocks, CAN, CANopen®, SafetyBUS p up to 1 Mbps | Screw connection terminal blocks, CAN, CANopen®, SafetyBUS p up to 1 Mbps | Screw connection terminal blocks, CAN, CANopen®, SafetyBUS p up to 1 Mbps |
| Cable inlet | 35° Cable diameter 6…10 mm | 35° Cable diameter 7,6…8,4 mm | 180° (axial) |
| Order number | 2744694 | 2708999 | 2306566 |
| | | | |
| Order number with Programming Interface | - | 2708119 | - |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# D-SUB fast connectors - Universal

| | SUBCON 9/M-SH | SUBCON 15/M-SH | SUBCON 15 HD/M-SH | SUBCON 25/M-SH | SUBCON 37/M-SH | SUBCON 9/F-SH | SUBCON 15/F-SH | SUBCON 15 HD/F-SH | SUBCON 25/F-SH | SUBCON 37/F-SH |
|---|---|---|---|---|---|---|---|---|---|---|
| Housing | With one cable entry | | | | | | | | | |
| Pin assignment | All contacts (pin / socket) to terminal block | | | | | | | | | |
| D-SUB/ No. of pos. | 9-pos. pin | 15-pos. pin | 15-pos- pin HD | 25-pos.pin | 37-pos. pin | 9-pos. socket | 15-pos. socket | 15-pos. socket HD | 25-pos. socket | 37-pos. socket |
| Order number | 2761509 | 2761606 | 5604602 | 2761622 | 2300973 | 2761499 | 2761596 | 5604603 | 2761619 | 2300986 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

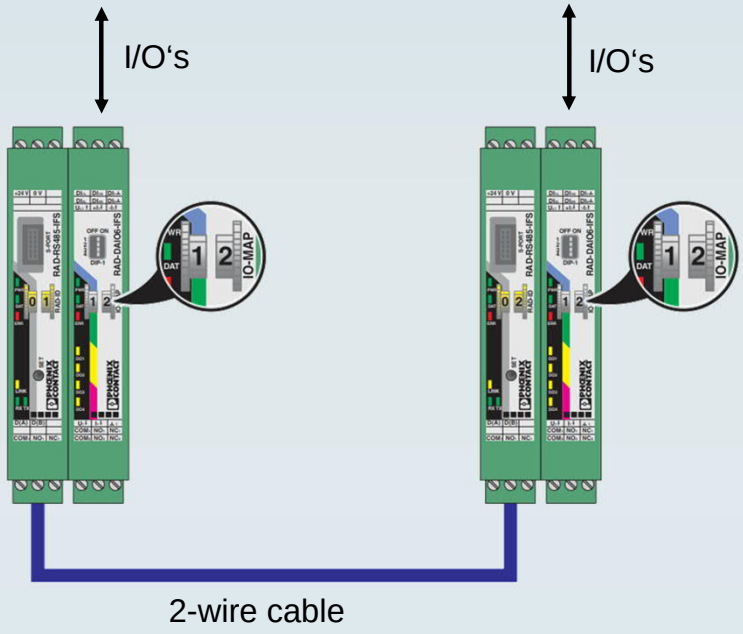
# D-SUB fast connectors - Universal

| | SUBCON-PLUS 9/M | SUBCON-PLUS M1 | SUBCON-PLUS M2 | SUBCON-PLUS 9/F | SUBCON-PLUS F1 | SUBCON-PLUS F2 | SUBCON-PLUS F3 | SUBCON-PLUS F4 | SUBCON-PLUS F5 | SUBCON-PLUS-M/AX 9 | SUBCON-PLUS-F/AX 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Housing | With two cable entries | | | | | | | | | 180° (axial) | 180° (axial) |
| Pin assignment | Full assignment to one terminal block | 1,2,3,5,6,8 to two terminal blocks | 2,3,4,5,7,9 to two terminal blocks | Full assignment to one terminal block | 1,2,3,5,6,8 to two terminal blocks | 2,3,4,5,7,9 to two terminal blocks | 2,3,6,7,8,9 to two terminal blocks | 2,3,4,5,6,7 to two terminal blocks | 1,1,2,3,6,7 to two terminal blocks | Full assignemnet to one terminal block | |
| D-SUB/ No. of pos. | 9.pos. pin | | | 9.pos. socket | | | | | | 9. Pos pin | 9.pos. socket |
| Order number | 2744018 | 2761826 | 2761839 | 2744241 | 2744267 | 2799490 | 2761871 | 2744089 | 2744102 | 2904467 | 2311797 |

INSPIRING INNOVATIONS

# Radioline Multipoint Multiplexer

**I/O-Mapping via 2-wire-cables**




- Multipoint multiplexer (I/O to I/O)
- Multipoint multiplexer and Wireless
- Modbus RTU slave (I/O to serial)
- Modbus RTU slave and Wireless



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Radioline Multipoint Multiplexer

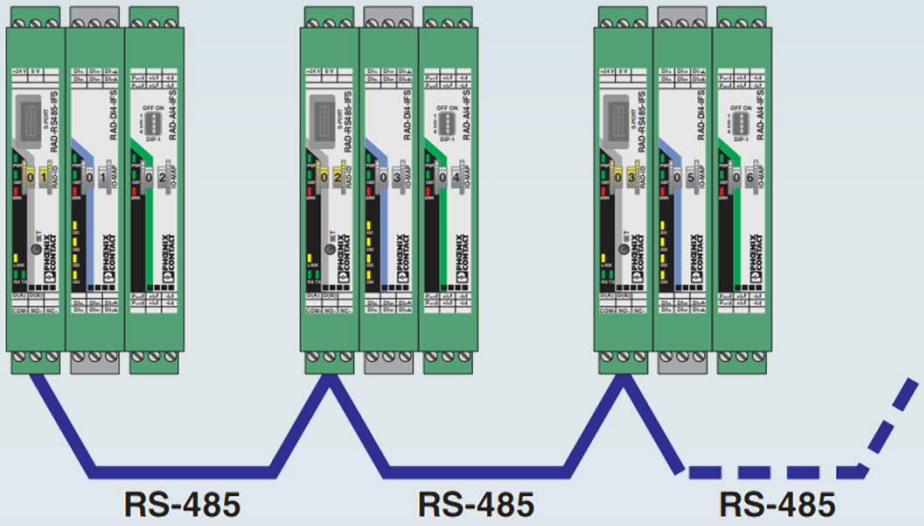
**I/O-Mapping via 2-wire-cables**

**Multipoint-Multiplexer**
Distribution of I/O signals via existing 2-wire-cables

**Stand-Alone as Modbus-Slave**
Operation on any Modbus/RTU-Master

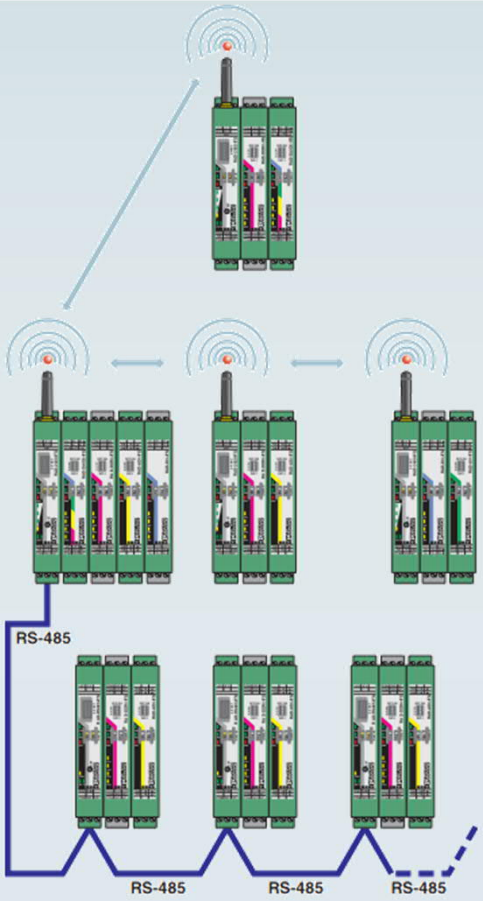
**Intermedia communication**
Wireless and wired modules form a combined system.

# Radioline Multipoint Multiplexer I/O to I/O




- Multipoint multiplexer – easy I/O distribution between multiple stations
- Up to 99 stations via RS-485
- Addressing using yellow thumbweel
- Easy I/O mapping using white thumbwheel on the extention modules
- Fast startup via Plug and Play

# Radioline Multipoint Multiplexer and Wireless

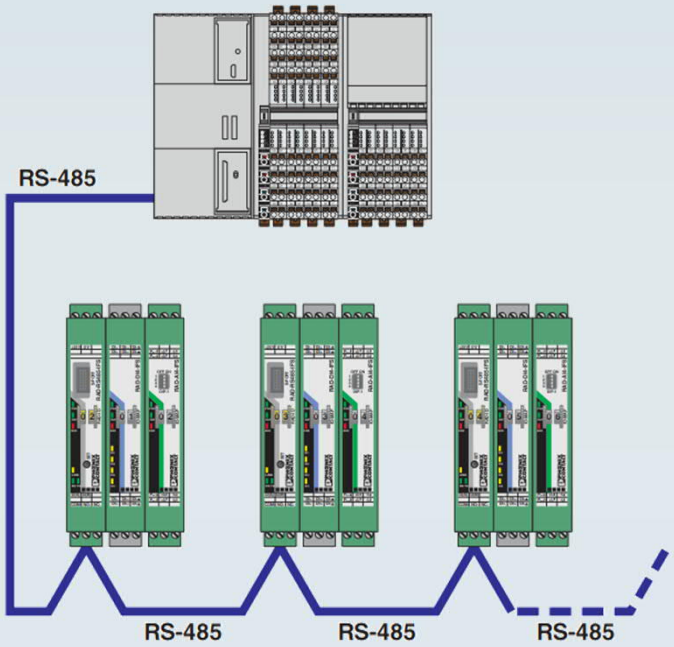



- Cross-media distribution of I/O signals
- Up to 250 stations in total:
  - 98 RS-485 stations and
  - 152 wireless stations
- Easy I/O mapping using white thumbwheel on the extention modules
- Fast startup via Plug and Play



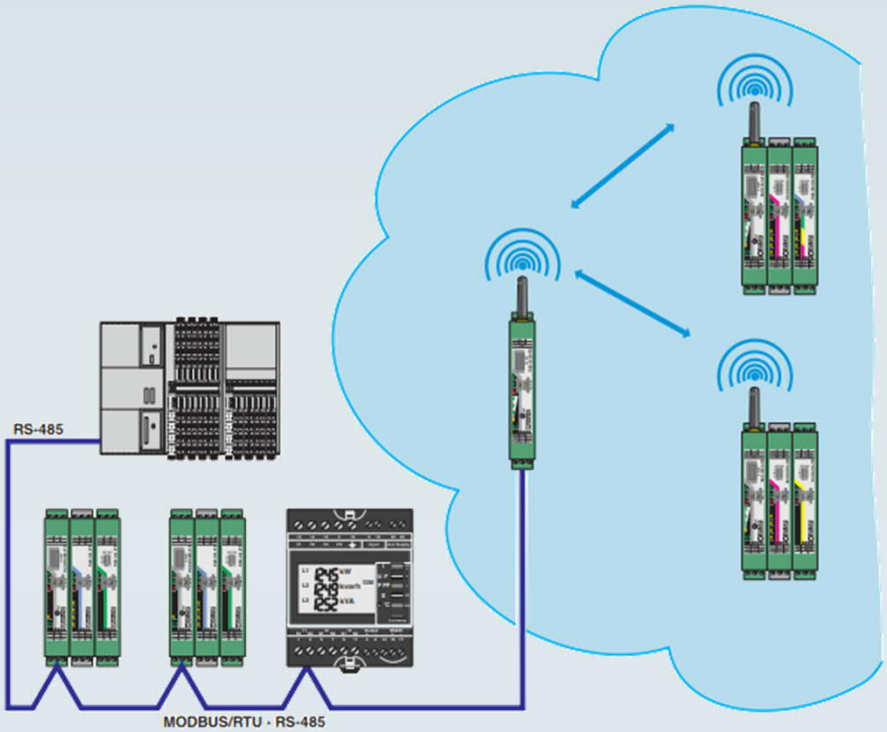
PHOENIX CONTACT
INSPIRING INNOVATIONS

# Radioline Modbus RTU slave (I/O to serial)




- Operation as a bus coupler for Modbus RTU with Radioline extendsion modules
- As a Modbus slave to any master
- Up to 98 stations per Modbus newtork
- Integration in existing Modbus newtorks
- Fast startup via Plug and Play
- Default setting of the RS-485 interface: 19.2/8/E/1

# Radioline Modbus RTU slave (I/O to serial)



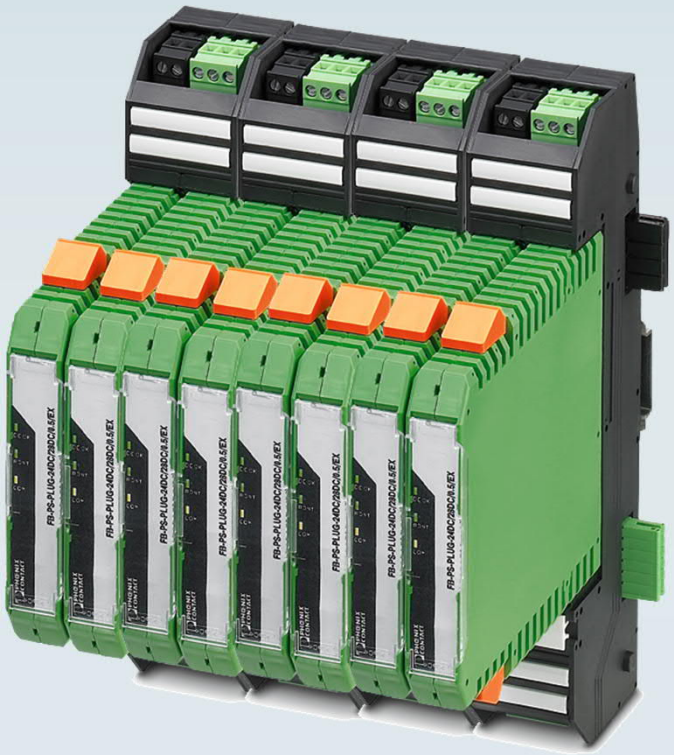

- Radioline wireless system and RS-485 stations at a Modbus master (I/O to serial)
- Support for all Radioline wireless systems (2,4 GHz, 868 MHz, 900 MHz)
- Up to 98 RS-485 stations and up to 250 wireless stations
- The wireles network acts like a single Modbus RTU slave
- All devices in the RS-485 network are standard Modbus RTU slaves
- Integration in existing Modbus networks

# Radioline Multipoint Multiplexer – Extension modules

| | Communication module | Digital In 4 channel | Digital Out 4 channel | Digital In 8 channel | Digital Out 8 channel | Analog In 4 channel | Analog Out 4 channel | Analog / digital | PT 100 4 channel |
|---|---|---|---|---|---|---|---|---|---|
| Type | RAD-RS485-IFS | RAD-DI4-IFS (Input) | RAD-DOR4-IFS (Output) | RAD-DI8-IFS (Input) | RAD-DO8-IFS (Output) | RAD-AI4-IFS (Input) | RAD-AO4-IFS (Output) | RAD-DAIO6-IFS (Input / output) | RAD-PT100-4-IFS |
| Description | RS-485 multipoint multiplexer, can be extended with I/O modules | 4 digital wide range inputs 0…250V AC/DC | 4 digital relay outputs 24 V DC / 250 V AC / 5 A | 8 digital inputs 0…30,5 V DC | 8 digital transistor outputs 30,5 V DC / 200 mA | 4 analog input 0/4…20 mA | 4 analog outputs Alternatively 0/4…20 mA or 0…10 V DC | 1 analog input/output 0/4…20 mA 2 digital wide range inputs/outputs 0…250 V AC/DC | 4 Pt100 inputs Temperature measuring range: -50°C…+250°C |
| Order number | 2702184 | 2901535 | 2901536 | 2901539 | 2902811 | 2901537 | 2901538 | 2901533 | 2904035 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

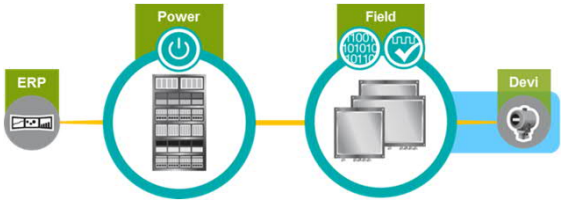
# FOUNDATION Fieldbus Power



ACB TECHNOLOGY

**ISA G3 Harsh Severity Level tested**

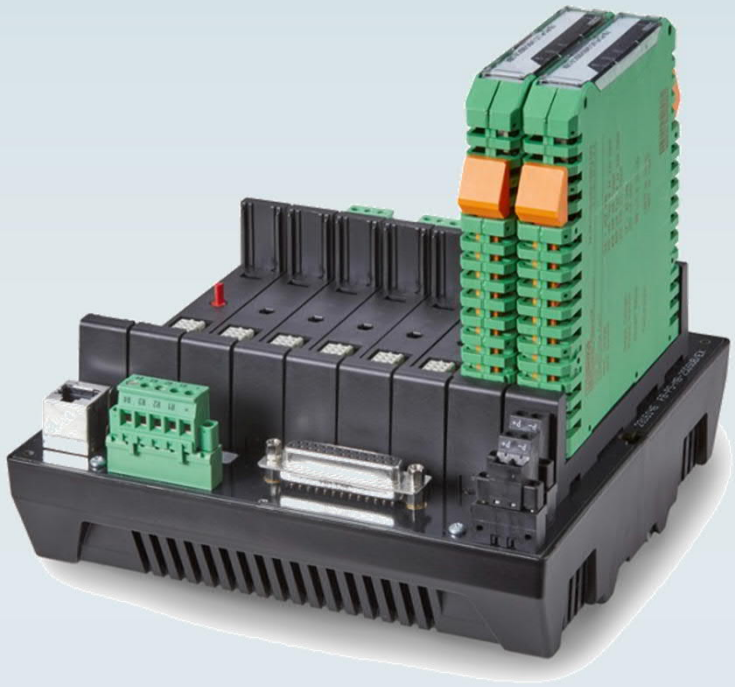
- Utilizes Key Features of QUINT line with the reliability of Fieldbus
- Modular base eliminates unused capacity
- Integrated diagnostic relay in each plug
- Bulk power distribution and common error messaging between bases
- ACB Technology maximizes the service life of the power supplies
- 500 mA @ 28 VDC




Product overview

PHOENIX CONTACT
INSPIRING INNOVATIONS

# FOUNDATION Fieldbus Power



ISA G3 Harsh Severity Level tested

- Class 1 Division 2, Zone 2 Installation
- -40C….+70C operating temperature range
- 180mm x 77mm x 180mm
- Integrated Relay diagnostics
- Host Connection options
  - D-SUB 25 socket connector
  - Invensys® D-SUB 25 cable
  - Two Yokogawa AKB336 20-pin cables
  - Four terminal block connections (no approvals)

# FOUNDATION Fieldbus Power

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **FB-PS-PLUG-24DC/28DC/0.5/EX** | **FB-PS-BASE/EX** | **FB-PS-MB-25DSUB/EX** | **FB-PS-MB-Y/EX** | **FB-PS-MB-I/EX** | **D-FB-PS** | **ZEC 1,5/ 4-LPV-5,0 C2,4 BK** |
| Description | Power supply plug for fieldbus system in hazardous locations | Base for fieldbus power supply plugs. | Universal four-channel, redundant fieldbus power supply base with D-SUB 25 host connector.<br><br>**Universal four channel redundant fieldbus power supply base with Host Terminal blocks available (2316155)** | Yokogawa four-channel, redundant fieldbus power supply base with host connectors for two AKB336 Yokogawa 20-pin cables. | Invensys four-channel, redundant, fieldbus power supply base with host connector for Invensys D-SUB 25 cable. | End cover for FB-PS-BASE/EX base. Use in power and indicator bus at each end base. | PCB connector, nominal current: 10 A, rated voltage (III/2): 320 V, number of positions: 4, pitch: 5 mm, color: black, contact surface: Tin, mounting: Direct plug-in method |
| | Provides 500 mA @ 28 V DC to couplers along the trunk. | Provides redundancy when 2 plugs are installed. Redundancy is maintained across multiple bases via internal power buses. Additional internal bus provides remote indication. | | | | | |
| Order number | 2316132 | 2316145 | 2316146 | 2316148 | 2316149 | 2316226 | 1793260 |

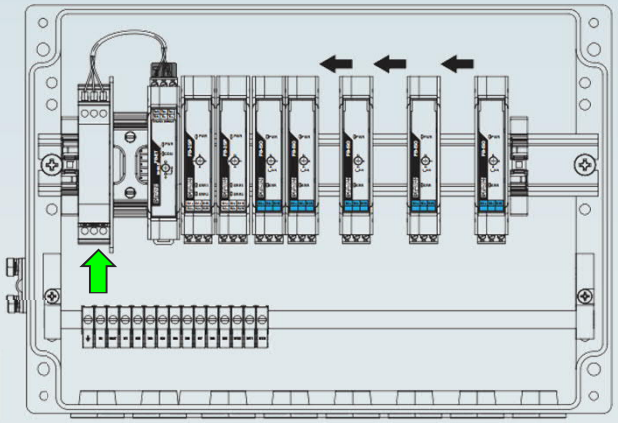
PHOENIX CONTACT
INSPIRING INNOVATIONS

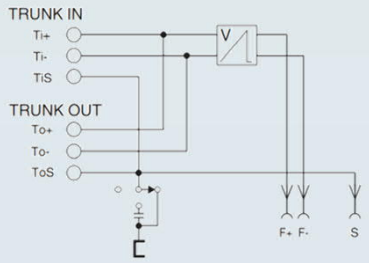
# Fieldbus Device Couplers

**Modular field device coupler for Zone 2**

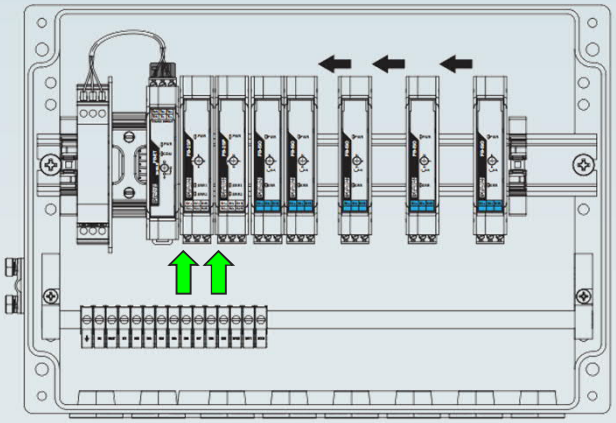
- For PROFIBUS PA and Foundation Fieldbus
- Three main devices:
  - Trunk line module
  - Coupling module
  - Diagnostic module
- For Zone 2 installations, with connection of Zone 0, 1 and 2 instruments in the same housing
- Integration in the control level is carried out via standard H1 (FF) communication and device management using DD, EDDL and DTM.

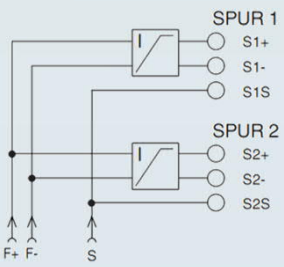
# Fieldbus Device Couplers



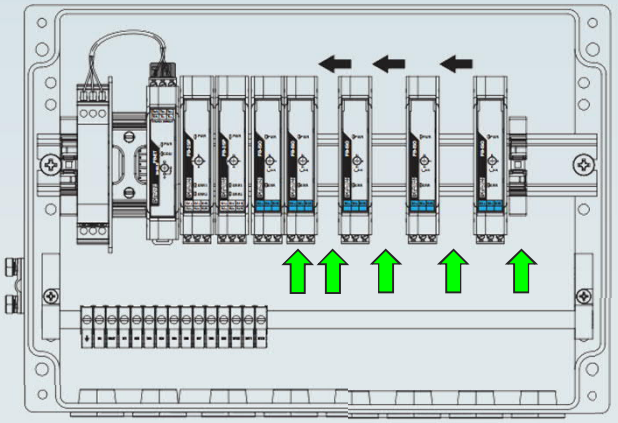


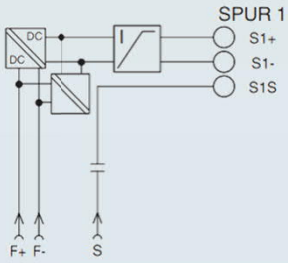

**FB-ET/E**






**FB-2SP/E**






**FB-ISO**



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fieldbus Device Couplers

| | FB-ET/E | FB-2SP/E | FB-2SP/24DC | FB-ISO | FB-DIAG/FF/LI | FB-DIAG/FF/NC |
|---|---|---|---|---|---|---|
| Description | Trunk module for Foundation Fieldbus and PROFIBUS PA modular device couplers with terminator | Device coupler for Foundation Fieldbus and PROFIBUS PA with terminal connections for 2 spurs connected to fieldbus end devices | Foundation Fieldbus isolator for Zone 2 installation using the intrinsically safe [ic] protection method. | Device coupler for Foundation Fieldbus and PROFIBUS PA. Provides intrinsically safe FISCO connection to a single end device. | Field diagnostics module, legacy installation, includes pluggable side connector.<br><br>For Foundation Fieldbus | Field diagnostic module, includes TBUS connector.<br><br>For Foundation Fieldbus |
| | Redundancy (High Reliability) | | ATEX ic Zone 2 | Ex ia, Zone 0 | | |
| Order number | 2316050 | 2316052 | 2316352 | 2316064 | 2316284 | 2316297 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fieldbus Device Couplers

| | FB-MODULAR-PP | FIELDBUS TERMINATOR |
|---|---|---|
| Description | Partition plate used between two fieldbus modular device couplers and provides the required 50 mm spacing between an **intrinsically safe** electrical connection and a **non-intrinsically safe** electrical connection. | The fieldbus terminator plug is pre-installed in the trunk out connection of device couplers.<br>It is required to be installed at the end of each fieldbus segment to realize impedance matching of the network. |
| Order number | 2316061 | 2316034 |

**Example of non-intrinsically safe and intrinsically safe signal connections on same t-bus back plane**

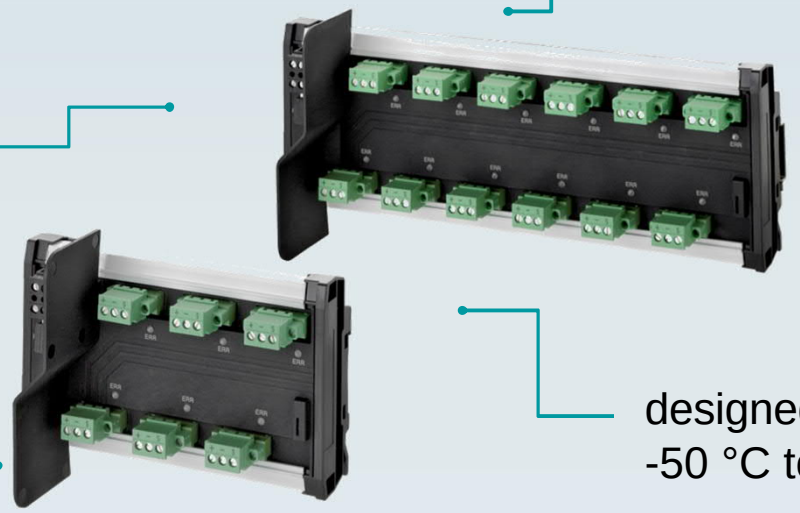
PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fieldbus Device Couplers

**Field device coupler for Zone 2 / Division 2**

Field device couplers for **PROFIBUS PA** and **FOUNDATION Fieldbus** with **6 and 12 channels**

**Save space**
highly compact and connection takes place on one side from below



Terminator preinstalled

designed for ambient temperatures of -50 °C to +90 °C.

ISA G3 Harsh Severity Level tested

# Fieldbus Device Couplers

## Zone 1 Installation

2g Vibration
15g shock

IP 30 Trunk cover

1 kilogram

NAMUR NE 21
FF-846
ISA G3 tested

1500 V AC Isolation
between Trunk and Spur

-40º ... 80º Celsius
operating temperature

35mA maximum current draw per spur



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fieldbus Device Couplers

| | FB-6SP | FB-12SP | FB-8SP ISO | FB-12SP ISO |
|---|---|---|---|---|
| Interface 1 | Foundation Fieldbus and PROFIBUS PA Segment | | | |
| No. of ports | 6 | 12 | 8 | 12 |
| Located in | Zone 2 | Zone 2 | Zone 1 | Zone 1 |
| Order number | 2316307 | 2316310 | 2316311 | 2316312 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Fieldbus Device Couplers – Terminal box

## Enclosure Solution for Zone 2 / Division 2

Grounding Lug

316 Stainless Steel

Removable Hinges

Pad lock capable

6 and 12 channel

Available with Terminal blocks or Surge base for Trunk Connection

Single piece gasket – IP66

ATEX, IEC Ex , Class 1 Div 2 System

# Fieldbus Device Couplers – Terminal box

| | FB1-S1-6SP-T-0-10-00-0-0 | FB1-S1-6SP-S-0-10-00-0-0 | FB2-S1-12SP-T-0-16-00-0-0 | FB2-S1-12SP-S-0-16-00-0-0 |
|---|---|---|---|---|
| Description | FF/PA - 6-spur block junction box | FF/PA - 6-spur block junction box | FF/PA - 12-spur block junction box | FF/PA - 12-spur block junction box |
| Connect up to | 6<br>field devices | 6<br>field devices | 12<br>field devices | 12<br>field devices |
| Surge protection | No | **Trunk cable (+, -, S) is connected to a Plugtrab surge base (PT 4+F-BE)** | No | **Trunk cable (+, -, S) is connected to a Plugtrab surge base (PT 4+F-BE)** |
| Features | Terminator preinstalled<br>Provides current limiting short-circuit protection per spur | Terminator preinstalled<br>Provides current limiting short-circuit protection per spur | Terminator preinstalled<br>Provides current limiting short-circuit protection per spur | Terminator preinstalled<br>Provides current limiting short-circuit protection per spur |
| Order number | 2316420 | 2316446 | 2316417 | 2316433 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

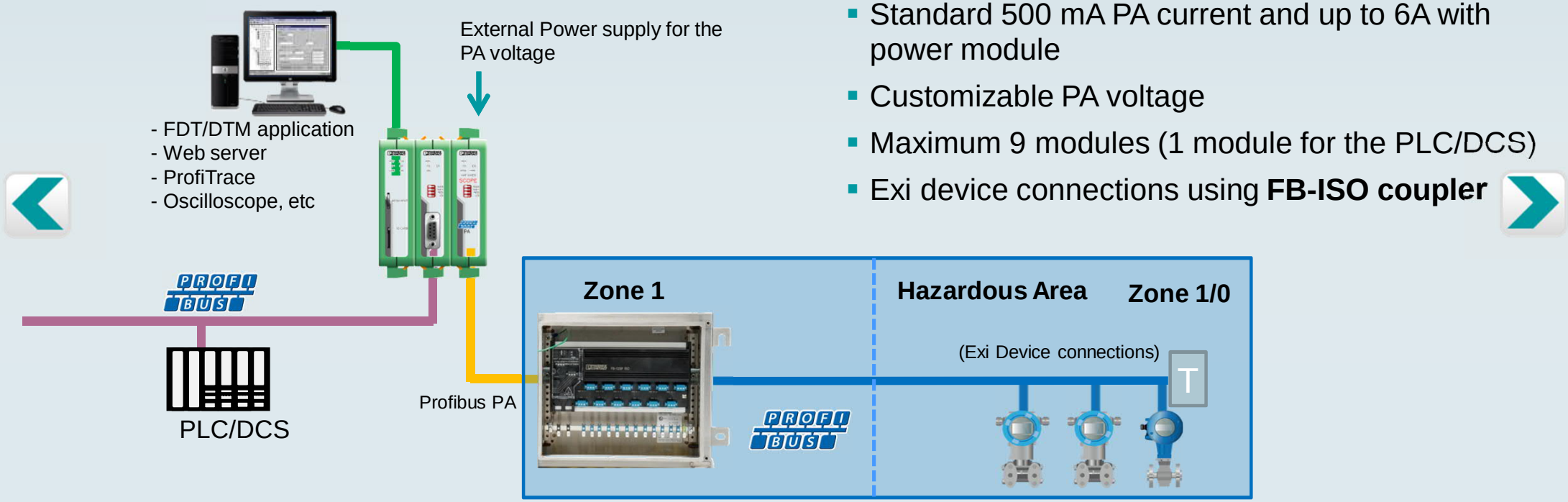
# PROFIBUS DP/PA Converter

- One communication interface module can drive up to ten individual PROFIBUS DP or PROFIBUS PA modules
- Powerful, embedded web server for configuration and
  access to network diagnostics
- PROFIBUS PA link can auto-detect any baud rate up to 12 Mbps transparently
- Built-in ProfiTrace® OE for monitoring network status
- System is completely hot swappable
- Manage and configure PROFIBUS field devices using FDT/DTM
- Redundancy installation



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Profibus PA Exi Connection Solution

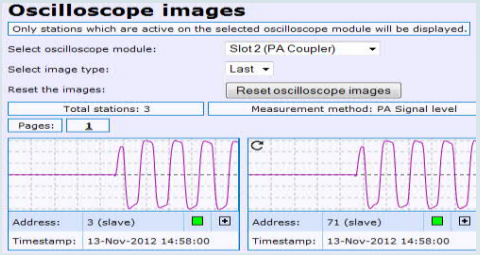



- 9.6 kbps .. **12 Mbps** on the PROFIBUS DP side
- Integrated PA termination
- Standard 500 mA PA current and up to 6A with power module
- Customizable PA voltage
- Maximum 9 modules (1 module for the PLC/DCS)
- Exi device connections using **FB-ISO coupler**

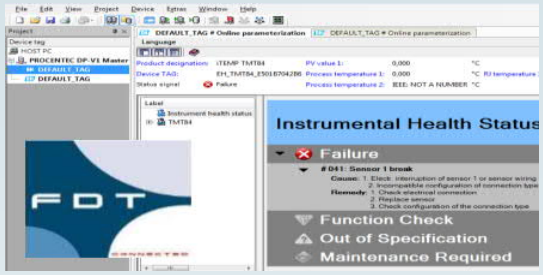


PHOENIX CONTACT
INSPIRING INNOVATIONS

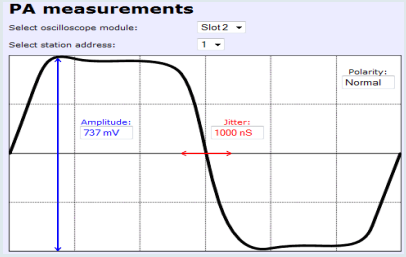
# PROFIBUS DP/PA Converter – Web-Based Management




**Telegram Anaylsis**



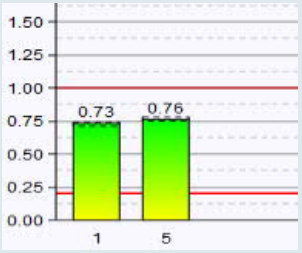

**FDT / DTM**



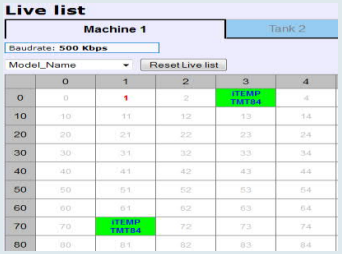

**Signal Analysis**

| Channel 1 | |
|---|---|
| Network: | 1 (Machine 1) |
| Baudrate: | 500 Kbps |
| Station count active on channel: | 2 |
| Link function: | Off |
| Setting: | Dipswitch |
| DC voltage: | 23.59 V |
| DC plus: | 12.16 V |
| DC min: | -11.43 V |
| DC noise: | 23 mV |
| DC unbalance: | -7 % |
| Current consumption: | 0.029 A |

**DC Analysis**




**Bar Graphs**




**Profi Trace**



PHOENIX CONTACT
INSPIRING INNOVATIONS

# PROFIBUS DP/PA Converter

| | FB-HSB-DP/PA | FB-HSP-PLUG/24DC/6A |
|---|---|---|
| Description | **PROFIBUS DP to PROFIBUS PA coupler** | **PROFIBUS power module 6A** |
| | Auto detect any baud rate up to 12 Mbps transparently | The PROFIBUS power module adds additional power to the backplane of a PROFIBUS network when the headstation is no longer capable of supporting all of the DP or PA modules. Power modules can be used to create power redundancy on the backplane. |
| | Manage and configure PROFIBUS field devices using FDT/DTM | Adds additional power to the PROFIBUS backplane<br><br>Backplane power redundancy |
| Order number | 2316370 | 2316383 |

INSPIRING INNOVATIONS

# PROFIBUS DP/PA Converter

| | | | | |
|---|---|---|---|---|
| | **FB-HSC** | **FB-DP-RPTR** | **FB-DP-RPTR/SC** | **FB-PA/SC** |
| Description | **Head station for monitoring up to four PROFIBUS networks** | **PROFIBUS DP interface/repeater module** | **PROFIBUS DP repeater expansion module for the PROFIBUS DP/PA coupler system** | **PROFIBUS PA interface module with oscilloscope** |
| | One communication interface module can drive up to ten individual PROFIBUS DP or PROFIBUS PA modules | Automatic detection of baud rate up to 12 Mbps<br><br>Integrated switchable terminator | Oscilloscope and bar graph functionality<br><br>Automatic detection of baud rate up to 12 Mbps | |
| | Manage and configure PROFIBUS field devices using FDT/DTM | Supported protocols: DP-V0, V1, V2, FDL, MPI, FMS and Profisafe<br>No bus addressing of device required | Supported protocols: DP-V0, V1, V2, FDL, MPI, FMS and Profisafe<br>No bus addressing of device required | |
| Order number | 2316371 | 2316373 | 2316374 | 2316375 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Profibus PA I/O Multiplexer

Collecting I/O data from PROFIBUS PA fieldbus systems

Easy integration into host system with an EDD-, GSD-, or DTM-data file

No software needed thanks to a pre-configured head station

Five application-specific head stations allow simple implementation in the field

UL listed

Suitable for ATEX zone 2, IECEx CoC



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Profibus PA I/O Multiplexer

Five head stations enable different combinations of I/O modules to exist on a Profibus PA networks.

The table shows the maximum possible I/O modules per head station.

| | | | Maximum I/O extension modules per head station | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | FB-DI4/NAMUR-IFS 2316275 | RAD-DAIO6-IFS 2901533 | RAD-DI4-IFS 2901535 | RAD-DOR4-IFS 2901536 | RAD-DI8-IFS 2901539 | RAD-AI4-IFS 2901537 | RAD-AO4-IFS 2901538 | PT100-4-IFS 2904035 | |
| **Ord. No.** | **Head station** | **Station Profile** | **NAMUR digital Input** | **Digital/ analog In-/output** | **Digital Input** | **Digital Output** | **Digital Input** | **Analog Input** | **Analog Output** | **PT 100** | |
| 2316270 | FB-MUX/HS/DIO-NAM/PA | Valve Coupler solution to open and close, monitor, the position of a valve | **3** | **-** | **-** | **2** | **-** | **-** | **-** | **-** | |
| 1005331 | FB-MUX/HS/AI/PA | Temperature and / or Analog In | **-** | **-** | **-** | **-** | **-** | **(5)*** | **-** | **(5)*** | Up to 5 AI or PT100 |
| 1005330 | FB-MUX/HS/AIOTEMP/PA | Analog I/Os & Temperature | **-** | **-** | **-** | **-** | **-** | **(3)*** | **2** | **(3)*** | 3 AI or 3 PT00 |
| 1005329 | FB-MUX/HS/DAIO/PA | Combo Digital & Analog I/Os | **-** | **3** | **-** | **-** | **-** | **-** | **-** | **-** | |
| 1005332 | FB-MUX/HS/DI24/PA | High Density Digital Inputs or NAMUR digital inputs | **(6)*** | **-** | **-** | **-** | **(3)*** | **-** | **-** | **-** | |

*see also Headstation description on the next slide!

# Profibus PA I/O Multiplexer – Head stations

| | | | | | |
|---|---|---|---|---|---|
| | **FB-MUX/HS/AI/PA** | **FB-MUX/HS/AI/PA** | **FB-MUX/HS/AIOTEMP/PA** | **FB-MUX/HS/DAIO/PA** | **FB-MUX/HS/DI24/PA** |
| Description | Can be used with up to five 4-channel analog input modules (RAD-AI4-IFS), five 4-channel PT100 temperature sensing modules (PT100-4-IFS), or any combination of modules for a maximum of 20 channels.<br><br>This configuration can be used as an analog input and temperature control solution. | Can be used with up to five 4-channel analog input modules (RAD-AI4-IFS), five 4-channel PT100 temperature sensing modules (PT100-4-IFS), or any combination of modules for a maximum of 20 channels.<br><br>This configuration can be used as an analog input and temperature control solution. | Can be used with up to three 4-channel analog input modules (RAD-AI4-IFS) or three 4-channel PT100 temperature sensing modules (RAD-PT100-4-IFS), and two 4-channel analog output modules (RAD-AO4-IFS).<br><br>This configuration can be used as an analog input/output and temperature control solution. | Can be used with up to three, 6-channel Digital-Analog-Input-Output modules (RAD-DAIO6-IFS).<br><br>This configuration can be used as a combination digital and analog I/O solution. | Can be used with up to six 4-channel digital input modules (RAD-DI4-IFS), six 4-channel NAMUR digital input modules (FB-DI4/NAMUR-IFS), three 8-channel digital input modules (RAD-DI8-IFS), or any combination of modules for maximum of 24 total channels.<br><br>This configuration can be used as a high-density digital input solution. |
| Order number | 2316270 | 1005331 | 1005330 | 1005329 | 1005332 |

# Profibus PA I/O Multiplexer – Extension modules

| | NAMUR digital In 4 channel | Digital In 4 channel | Digital Out 4 channel | Digital In 8 channel | Analog In 4 channel | Analog Out 4 channel | Analog / digital | PT 100 4 channel |
|---|---|---|---|---|---|---|---|---|
| Type | FB-DI4/NAM-IFS (Input) | RAD-DI4-IFS (Input) | RAD-DOR4-IFS (Output) | RAD-DI8-IFS (Input) | RAD-AI4-IFS (Input) | RAD-AO4-IFS (Output) | RAD-DAIO6-IFS (Input / output) | RAD-PT100-4-IFS |
| Description | 4 digital NAMUR inputs<br><br>EN 60947-5-6 | 4 digital wide range inputs 0…250V AC/DC | 4 digital relay outputs 24 V DC / 250 V AC / 5 A | 8 digital inputs 0…30,5 V DC | 4 analog input 0/4…20 mA | 4 analog outputs Alternatively 0/4…20 mA or 0…10 V DC | 1 analog input/output 0/4…20 mA 2 digital wide range inputs/outputs 0…250 V AC/DC | 4 Pt100 inputs Temperature measuring range: - 50°C…+250°C |
| Order number | 2316275 | 2901535 | 2901536 | 2901539 | 2901537 | 2901538 | 2901533 | 2904035 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# 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

PROFIBUS DP  PROFIBUS PA  Fieldbus Foundation

# 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 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Ethernet Extender

- SHSDL technology
- Ranges of up to 20 kilometers
- Existing two-wire cables can be used
- Data rates of up to 30 Mbps
- Easy installation via Plug and Play
- Automatic topology and data rate detection
- Point-to-point, line and ring structures
- System extension during operation



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Ethernet Extender

Managed Ethernet Extender

Unmanaged Ethernet Extender

Status / diagnosis display

new

VLAN (virtually/logically separate IP networks)

Firmware v5.xx or later

Replaceable surge protection

Remote diagnostics of all devices and paths

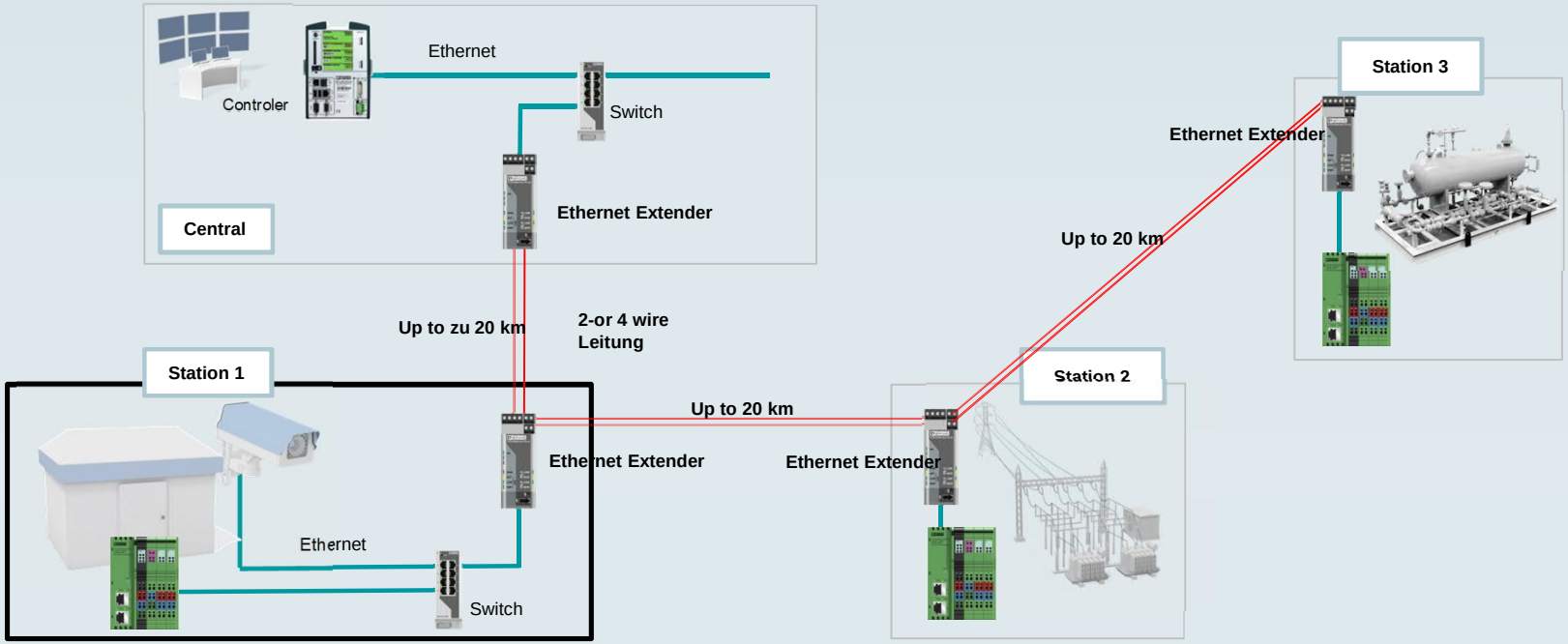
Line, Star and Ring topologies are possible



PHOENIX CONTACT
INSPIRING INNOVATIONS

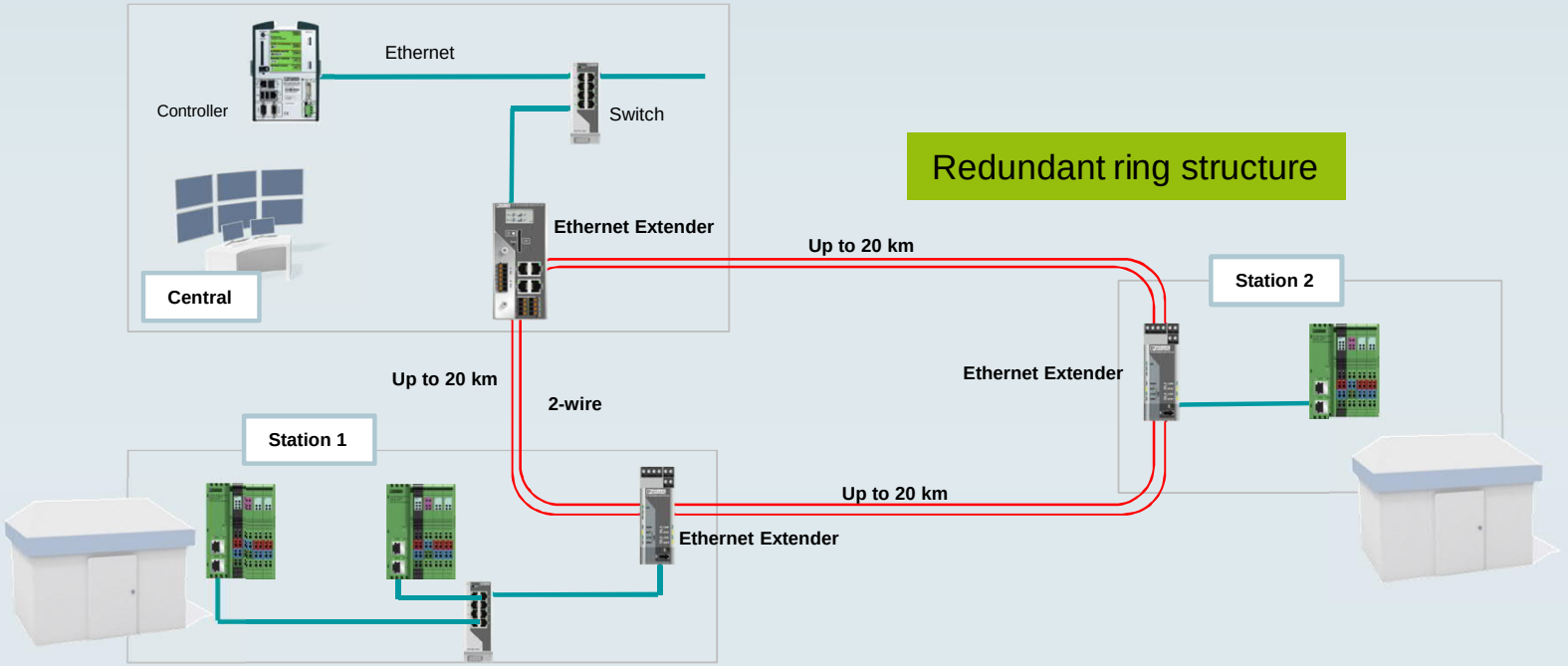
# Ethernet Extender

## Point-to-Point and Line network structure

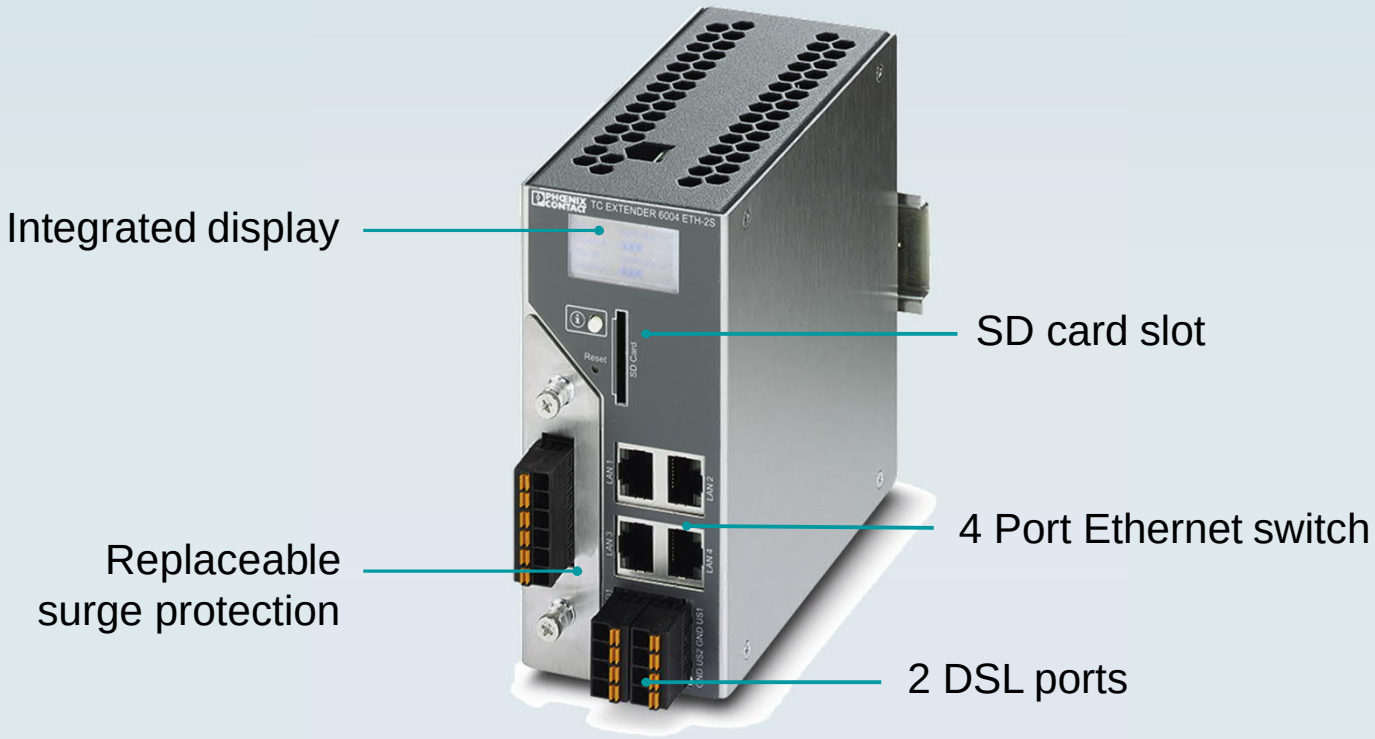


# Ethernet Extender

## Ring network structure



# Managed Ethernet extender



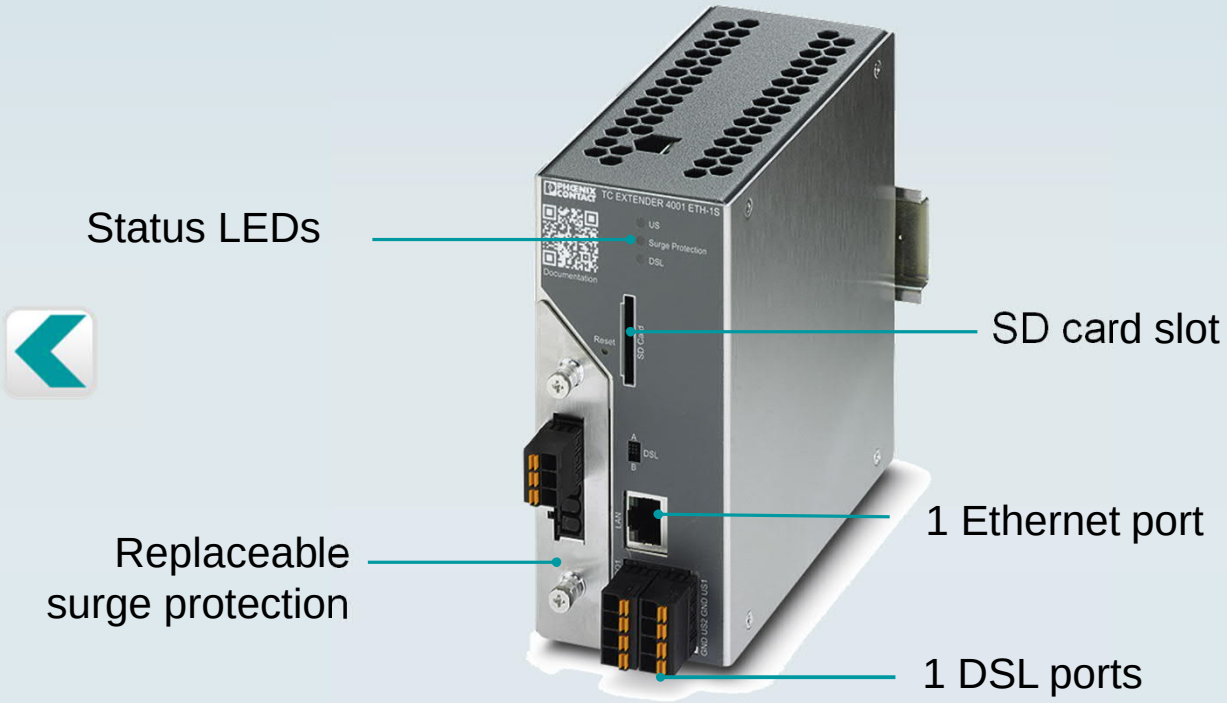

**TC EXTENDER 6004 ETH-2S**

- 2 DSL ports
- Integrated surge protection
- Topology: Point-to-Point, line, redundant ring
- Unique at the market: Plug-&-Play at ring application



PHOENIX CONTACT INSPIRING INNOVATIONS

# Managed Ethernet extender




**TC EXTENDER 4001 ETH-1S**

- 1 DSL ports
- Topology: Point-to-Point
- Integrated surge protection



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Unmanaged Ethernet extender

2 DSL ports

Status LEDs

DSL Status/Link LEDs

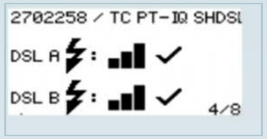
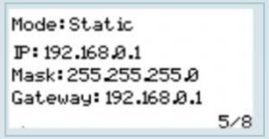
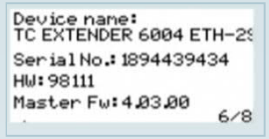
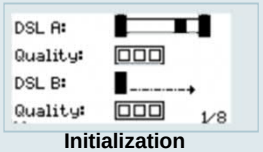
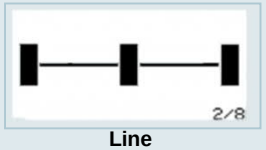
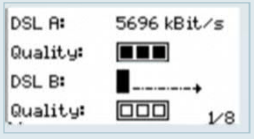
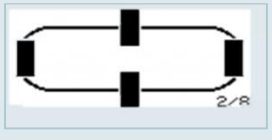
**TC EXTENDER 2001 ETH-2S**

- 2 DSL ports
- 1 Ethernet port
- Topology: Point-to-Point, line, redundant ring
- Unique at the market: Plug-&-Play at ring application



PHOENIX CONTACT INSPIRING INNOVATIONS

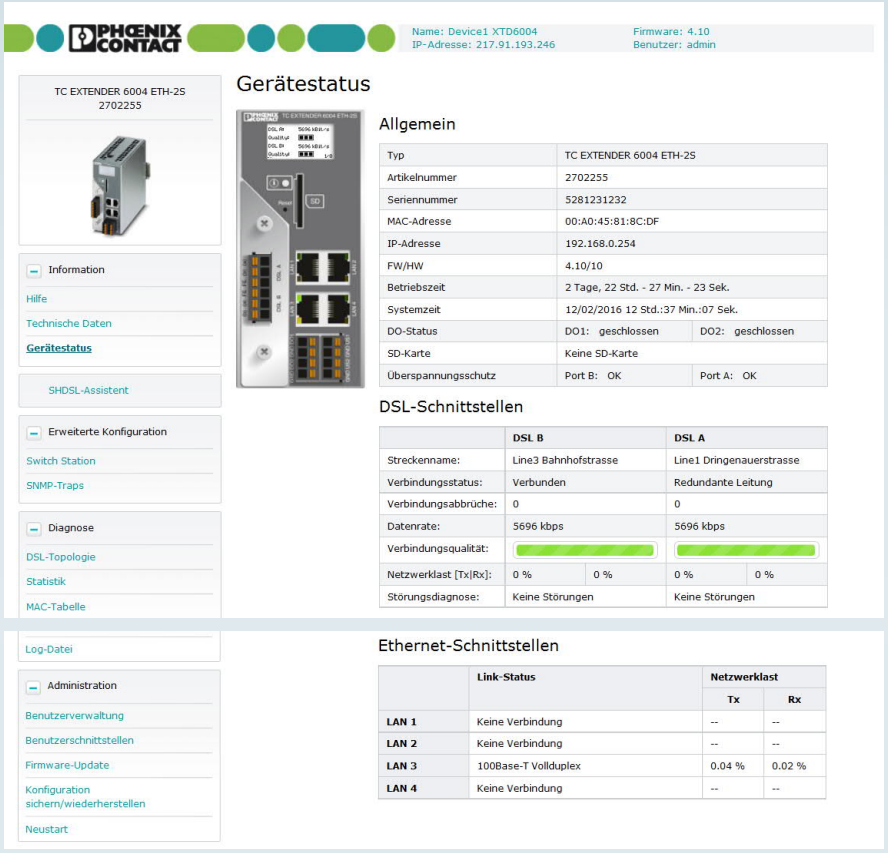
# Status- / diagnosis display

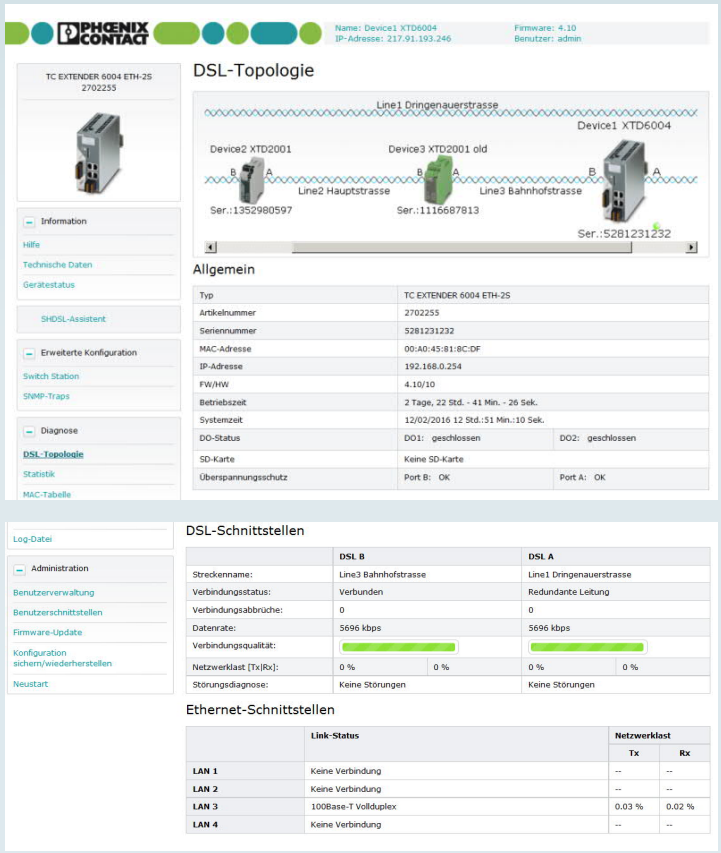
| SHDSL-connection | System topology | - Power supply<br>- Outputs DO | Surge protection | Ethernet parameter | Device information | Link documentation | optional |
|---|---|---|---|---|---|---|---|
| | | |  |  |  | | |
| No remote device | No remote device | - Both power supplies<br>⇒ OK<br><br>- Both outputs<br>⇒ low | Protection module OK<br>⇒ OK | | | | Individually configurable via web server |
| | | | | | | | |
| Remote device found | Point-to-Point | | | | | | |
|  |  | | | | | | |
| Initialization | Line | | | | | | |
|  |  | | | | | | |
| Current data rate | Redundant Ring | | | | | | |
| | | | | | | | |
| Current data rates | | | | | | | |



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Remote diagnosis via IP (Web based management)




**Live test link to an Ethernet Extender in Bad Pyrmont**:

http://217.91.193.246:1000

Login:
User Name: user
Password: user



INSPIRING INNOVATIONS

# Integrated surge protection

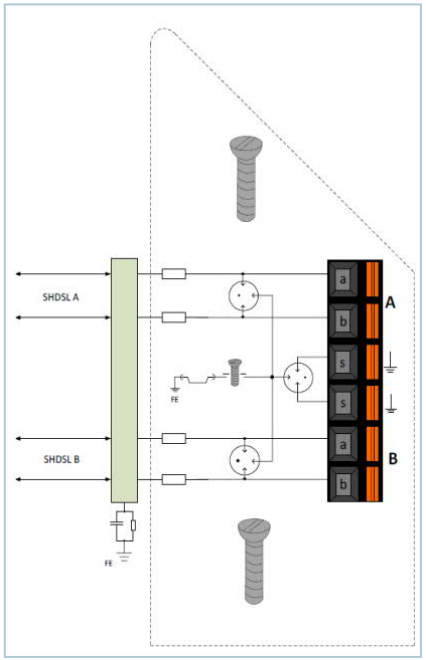
## Alarm via SNMP

(Simple Network Management Protocol ):

| Status | Action |
|---|---|
| Protective module ok | ------- |
| Performance limit reached | DSL port is at performance limit, replacement of protective module is recommended |
| Module overloaded | DSL port is overloaded, replacement required, Replace protective module |

Surge protection

Circuit diagram






PHOENIX CONTACT
INSPIRING INNOVATIONS

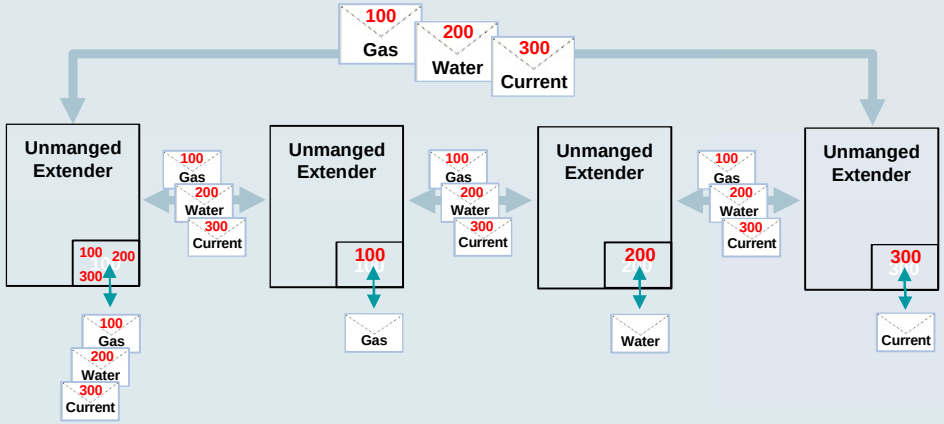
# VLAN – Unmanaged extender

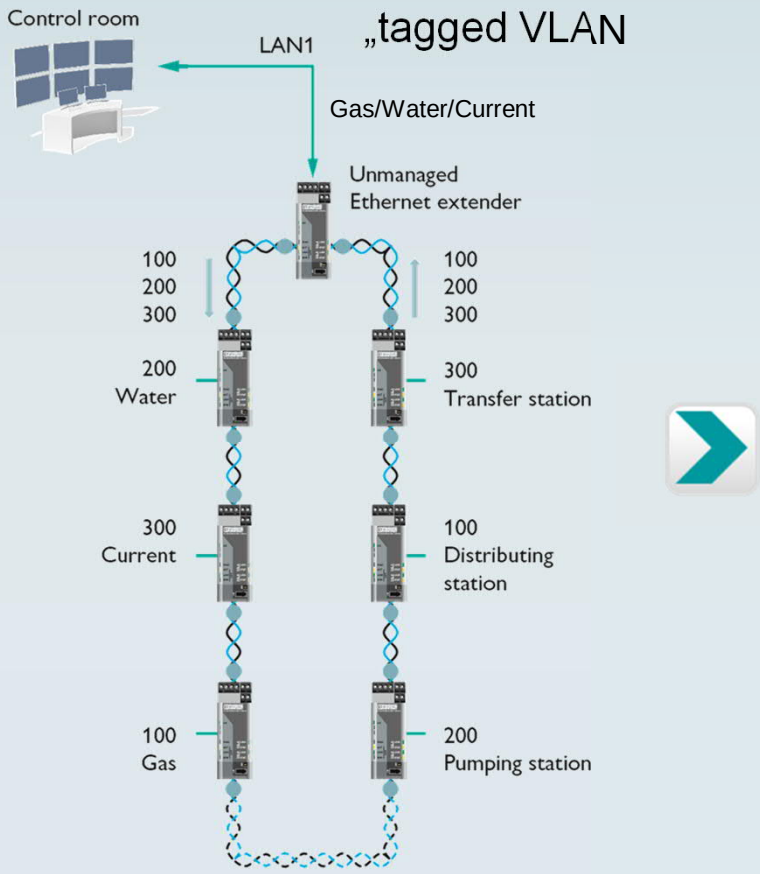
new

Using VLAN to virtually separate critical IP networks and make them secure

In firmware version v5.xx and later, VLAN (virtual local area network) can be used to virtually isolate critical IP networks.

**Communication with a combination of „tagged and untagged VLAN“**





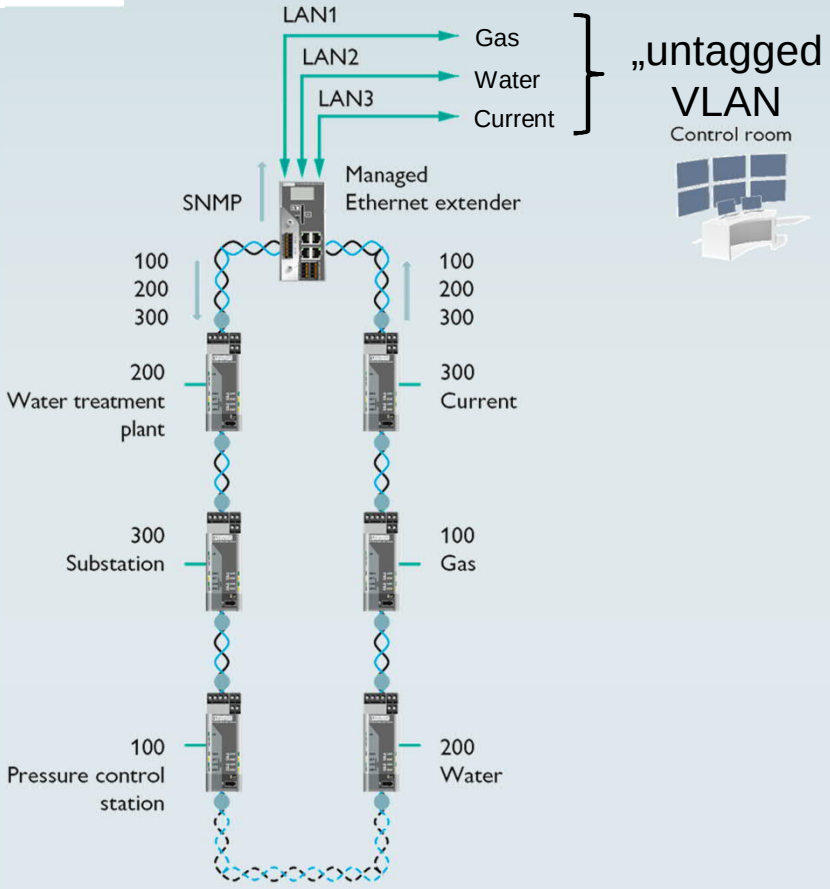

INSPIRING INNOVATIONS

# VLAN – Managed and unmanged extender

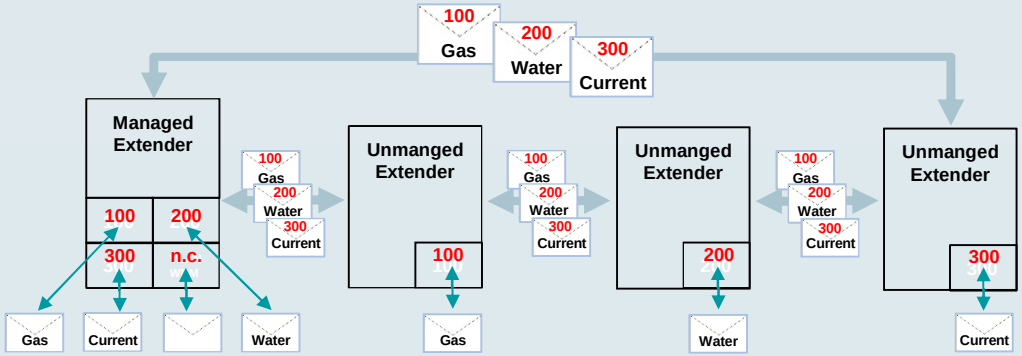
new

Using VLAN to virtually separate critical IP networks and make them secure

In firmware version v5.xx and later, VLAN (virtual local area network) can be used to virtually isolate critical IP networks.




**Communication with „untagged VLAN“**



# Extension of complex IT networks

| | TC EXTENDER 2001 ETH-2S | TC EXTENDER 4001 ETH-1S | TC EXTENDER 6004 ETH-2S | TC EXTENDER PT-IQ-1S | TC EXTENDER PT-IQ-2S |
|---|---|---|---|---|---|
| Function | Unmanaged Ethernet-Extender | Managed Ethernet-Extender | Managed Ethernet-Extender | Replaceable surge protection module<br><br>Only for Ethernet extender 4001 ETH-1S (2702253) | Replaceable surge protection module<br><br>Only for Ethernet extender 6004 ETH-2S (2702255) |
| Topologies | Ring,<br>Line,<br>Point-to-point | Point-to-point | Ring,<br>Line,<br>Point-to-point | | |
| Replaceable surge protection | No | Yes | Yes | | |
| Diagnostic indicators | LEDs | LEDs | Display | | |
| Ports | 2x SHDSL, 1x Ethernet | 1x SHDSL, 1x Ethernet | 2x SHDSL, 4x Ethernet | | |
| Order number | 2702409 | 2702253 | 2702255 | 2702257 | 2702258 |

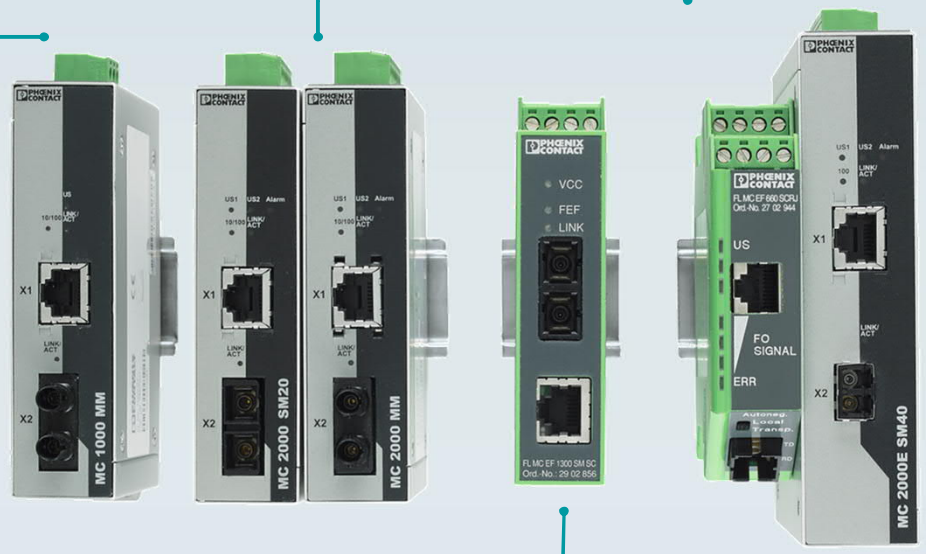
PHOENIX CONTACT
INSPIRING INNOVATIONS

# Ethernet Media Converter

Maximum interference immunity,

very short delays (latency)

Link-fault-pass-through function: constant connection monitoring




Maximum transmission distances with an extremely high data rate up to 40 km

approved for zone 2



PHOENIX CONTACT INSPIRING INNOVATIONS

# Ethernet Media Converter

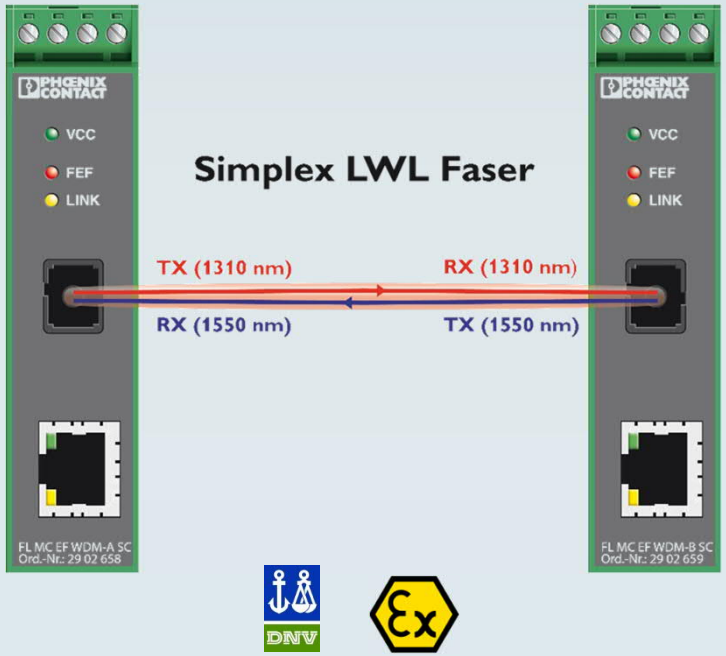
**For standard application**
Class 1000 media converter
They offer an easy and inexpensive entry-level solution for converting to FO technology

**For realtime protocols**
Class 2000 media converter
Time cricial Ethernet protocols such as Powerlink, EtherCAT or Sercos. Thanks to the switch-over to pass through operation, they enable very short delays (latency)

**With special approvals**
ATEX and DNV shipbuilding approval for e.g. process industry, machine building and wind power, through to shipbuilding.

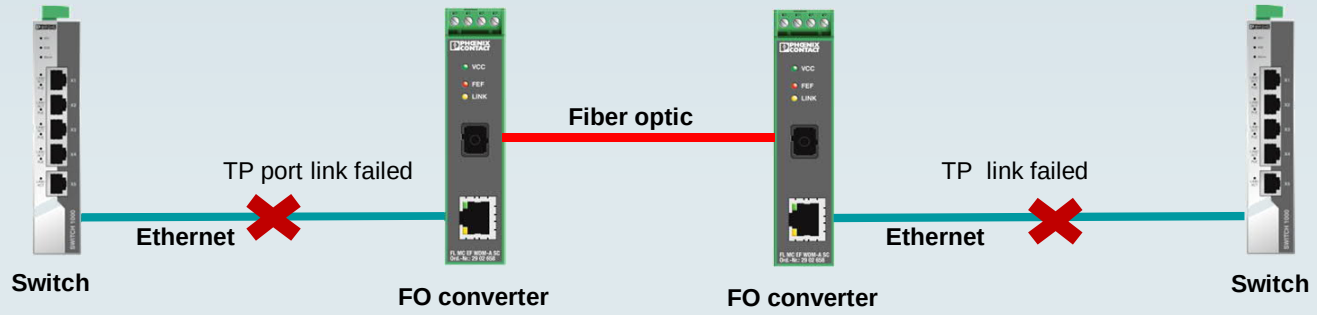
**For special application**
Provide perfect solution, even for special applications such as rotating applications, PROFINET networks or use in the energy industry.

# Ethernet Media Converter WDM




- Full duplex transmission via a single optical fiber
- 10/100Base-T(X) auto negotiation
- Link fault pass through (LFP)
- Fare End Fault signaling (FEF)
- SC simplex connection
- Redundant power supply possible
- Operation mode and speed can be set manually

# Link Fault Pass Through (LFP)




The LFP function provides permanent connection monitoring

- The link on the fiber optic connection switches off, if the connection is lost on the copper side of the FO converter
- The FO converter on the other side registers the aborted link via the fiber optic path and likewise interrupts the connection for the twisted pair segment

# Ethernet Media Converter

| | FL MC 1000 SC | FL MC 1000 ST | FL MC 2000T SC | FL MC 2000T ST | FL MC 2000T SM20 SC | FL MC 2000T SM40 SC |
|---|---|---|---|---|---|---|
| Transmission | Multimode fiberglass | | | | Singlemode fiberglass | |
| Connection method | SC duplex | B-FOC (ST*) | SC duplex | B-FOC (ST*) | SC duplex | |
| Temperature range | 0°C…+60°C | | -40°C…+75°C | | | |
| Range | Up to 9.6 km | | | | Up to 20 km | Up to 40 km |
| Light wavelength | 1310 nm | | | | | |
| Special features | Auto negotiation and MDI (x) | | Store-and-forward or pass through mode can be selected via DIP switch with a short latency time of 835 ns. They can therefore be used for realtime Ethernet protocols | | | |
| Order number | 2891320 | 2891321 | 2891315 | 2891316 | 2891317 | 2891318 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Ethernet Media Converter

| | FL MC EF 1300 MM SC | FL MC EF 1300 MM ST | FL MC EF 1300 SM SC | FL MC 2000E | FL MC 2000E SM40 LC |
|---|---|---|---|---|---|
| Transmission | Multimode fiberglass | | Singlemode fiberglass | Multimode fiberglass | Singlemode fiberglass |
| Connection method | SC duplex | B-FOC (ST*) | SC duplex | LC duplex | |
| Temperature range | -40°C…+65°C | | | -40°C…+75°C | |
| Range | Up to 10 km | | Up to 36 km | Up to 9.6 km | Up to 40 km |
| Light wavelength | 1310 nm | | | | |
| Special features | LFPT and FEF diganostic functions, auto negotiation and auto MDI (x), backplane bus for redundant or alternative power supply | | | Accordance to IEC 61850/IEEE1613<br>4 kV insulation voltage, high EMC protection | |
| Order number | 2902853 | 2902854 | 2902856 | 2891056 | 2891156 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Ethernet Media Converter

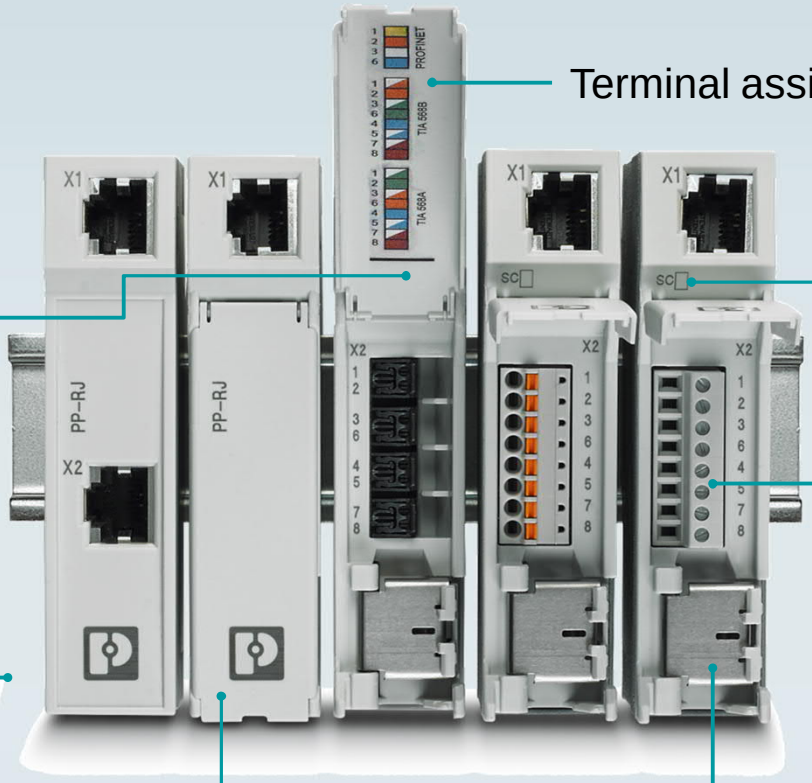
| | FL MC EF WDM-SET SC | FL MC EF WDM-A SC | FL MC EF WDM-B SC | FL MC ETH/FO 660 T | FL MC EF 660 SCRJ |
|---|---|---|---|---|---|
| Transmission | Multimode and single mode glass fiber | | | Polymer fiber PCF | |
| Connection method | SC simplex | | | SC-RJ | |
| Temperature range | -40°C…+65°C | | | -20 °C ... 55 °C | |
| Range | Up to 38 km | | | Up to 100 m | |
| Light wavelength | 1310/1550 nm | | | 660 nm | |
| Special features | Converters A and B | Converter A | Converter B | T-coupler with two FO connections and two RJ45 sockets | Single-port media converter |
| Order number | 2902660 | 2902658 | 2902659 | 2313164 | 2702944 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Patch panels

- Patch panels serve as an interface module between the field and control cabinet cabling
- Large selection of different connection technologies
- Protective functions for high system availability
- Concealed wiring space, thanks to front cover
- 10 / 100 / 1000 Mbps

# Patch panels




Terminal assignment for Ethernet

Length for cable stripping

Shield current detection

Different connection technologies

- Screw
- Push-In
- IDC
- RJ45

Integrated surge protection

Covered cable installation

Cable shield contact spring
(shield contacting with strain relief)



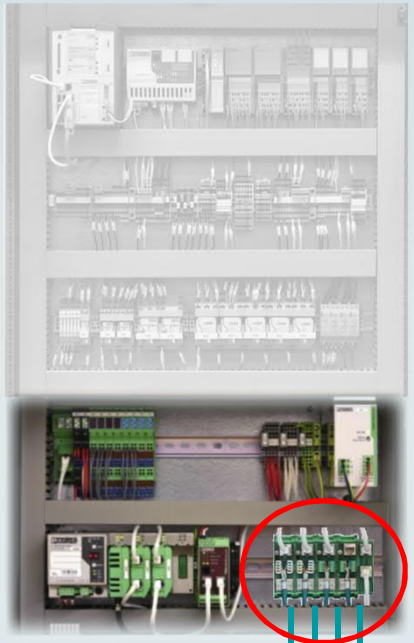
INSPIRING INNOVATIONS

# Patch Panel Application

## Typical applications

Machine building –
switching cabinet pre-assembly

- Pre-assembly with patch cable
- Field cable installation on site



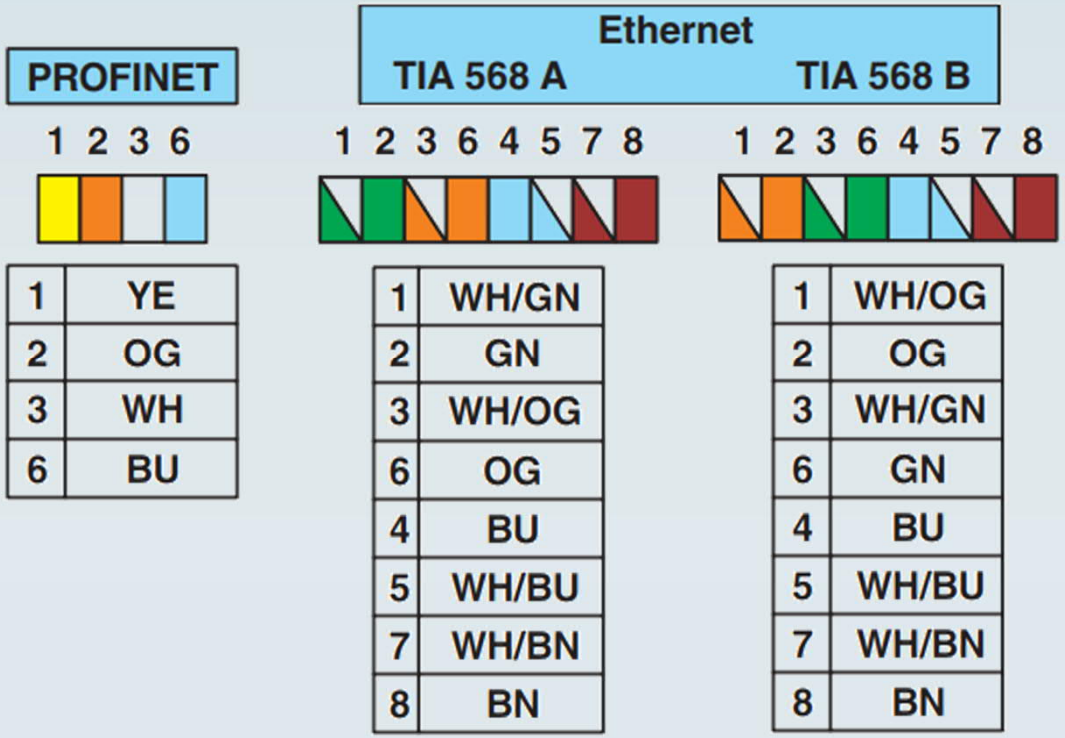
Patch Panel

Ethernet cable



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Terminal assignment




| | |
|---|---|
| 1 | YE |
| 2 | OG |
| 3 | WH |
| 6 | BU |

| | |
|---|---|
| 1 | WH/GN |
| 2 | GN |
| 3 | WH/OG |
| 6 | OG |
| 4 | BU |
| 5 | WH/BU |
| 7 | WH/BN |
| 8 | BN |

| | |
|---|---|
| 1 | WH/OG |
| 2 | OG |
| 3 | WH/GN |
| 6 | GN |
| 4 | BU |
| 5 | WH/BU |
| 7 | WH/BN |
| 8 | BN |

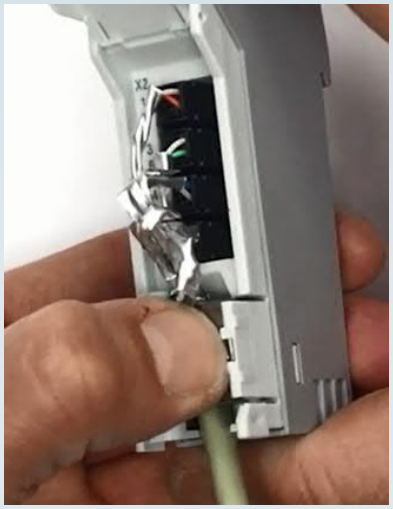
Terminal assignment for Ethernet (IEC 80.3u: TIA 568 A, TIA 568 B) and Profinet

**Key:**

| | |
|---|---|
| OG | Orange |
| WH | White |
| GN | Green |
| YE | Yellow |
| BU | Blue |
| BN | Brown |

# Cable shield connection

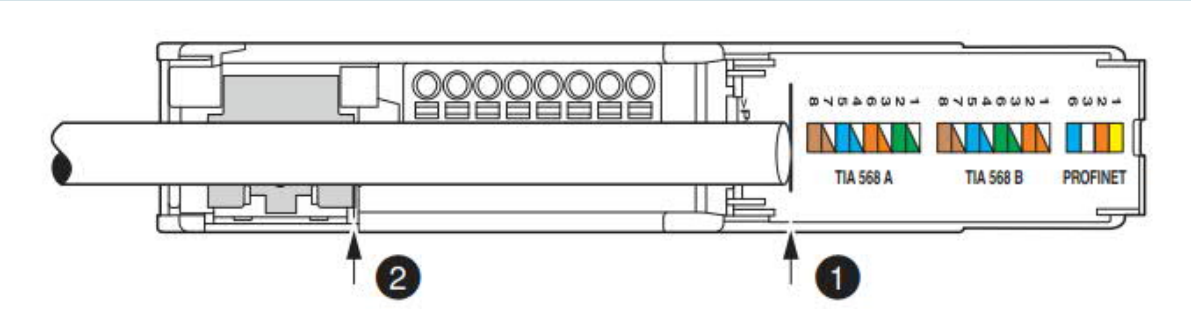
Laying the cable jacket and shielding underneath the shielding clamp



Closing the shield clamp with one finger

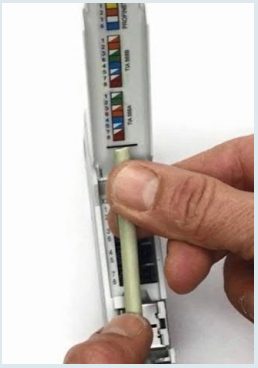
Closing the cover ensures a clean installation

# Crimping length



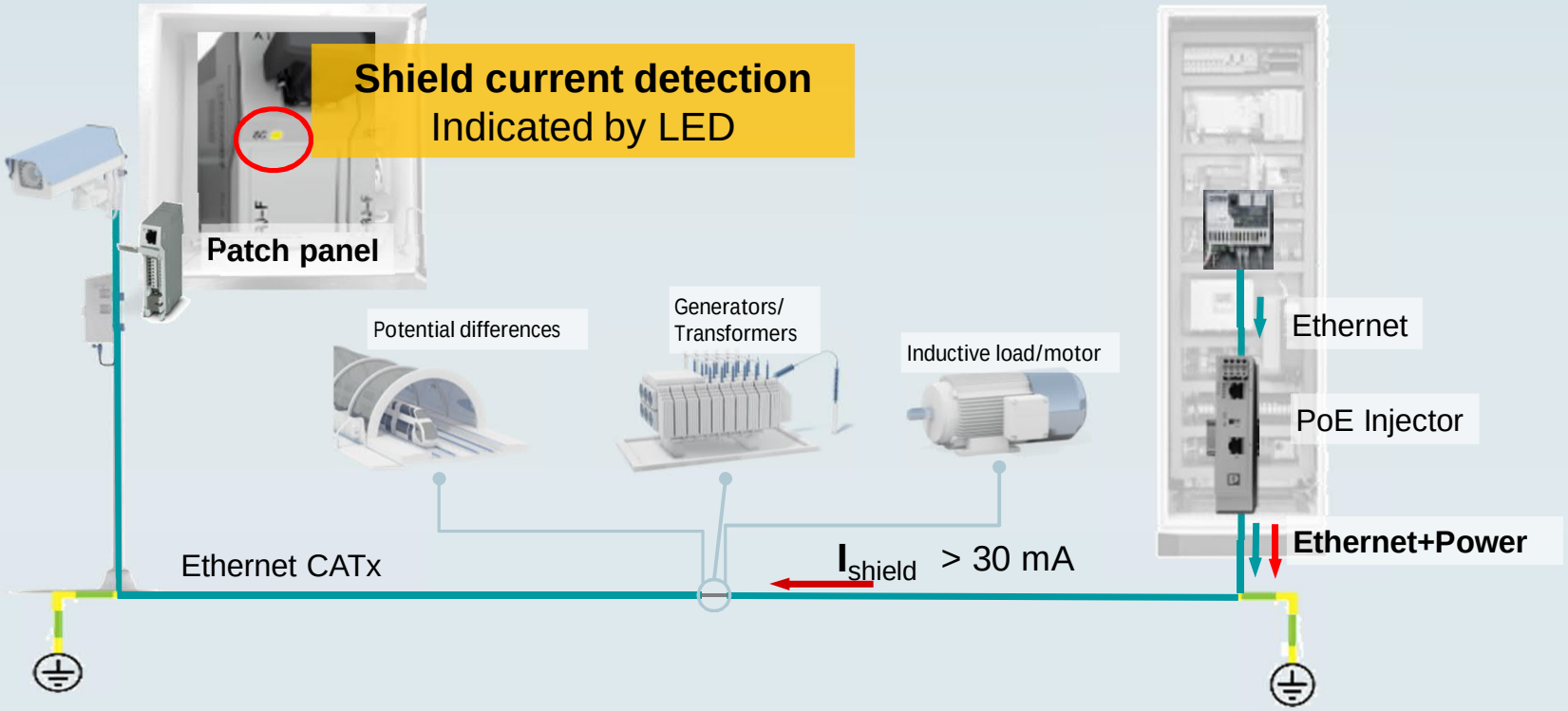

The edge off the shield contact spring indicates the correct length for stripping (5,5 cm)

Place the cable end on the marking line



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Shield current detection




- If there are different potential references within an installation, equalization currents can flow via the cable shielding.
- LED (SC) lights up in the event of cable shield currents greater than +30 mA and less than -30 mA

# Patch panels

| | PP-RJ-RJ | PP-RJ-SC | PP-RJ-SCC | PP-RJ-IDC | PP-RJ-RJ-F | PP-RJ-SC-F | PP-RJ-SCC-F | PP-RJ-IDC-F |
|---|---|---|---|---|---|---|---|---|
| Function | Standard patch-panel | Standard patch-panel | Standard patch-panel | Standard patch-panel | Functional patch-panel | Functional patch-panel | Functional patch-panel | Functional patch-panel |
| Cable connection | RJ45/ RJ45 | RJ45/ Screw | RJ45/ Push-In | RJ45/ IDC | RJ45/ RJ45 | RJ45/ Screw | RJ45/ Push-In | RJ45/ IDC |
| **Surge protection** | No | No | No | No | **Yes** | **Yes** | **Yes** | **Yes** |
| **Shield current detection** | No | No | No | No | **Yes** | **Yes** | **Yes** | **Yes** |
| Order number | 2703015 | 2703016 | 2703018 | 2703019 | 2703020 | 2703021 | 2703022 | 2703023 |

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INSPIRING INNOVATIONS

# Patch panels

| | FL CAT5 TERMINAL BOX | FL-PP-RJ45-SC | FL-PP-RJ45-SCC | FL-PP-RJ45-LSA |
|---|---|---|---|---|
| Connection type | RJ45/Screw | RJ45/Screw | spring-cage connection | LSA-connection |
| Description | 4-pole, 10/100 MBit/s | 8-pole, 10/100/1000 MBit/s | | |
| Shielding | Directly on the DIN-rail | directly on the DIN rail or optionally via RC combination | | |
| Shield connection | Bracket clamp with screws | | | |
| Order number | 2744610 | 2901643 | 2901642 | 2901645 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Patch panels

| | FL-PP-RJ45/RJ45 | FL-PP-RJ45/ RJ45-B | FL-PP-RJ45-SCC/ SC041 | FL-PP-RJ45-SCC/ SC045 |
|---|---|---|---|---|
| Connection type | RJ45/Screw | RJ45/Screw | spring-cage connection | LSA-connection |
| Description | 8-pole, 10/100/1000 MBit/s | Extended temperature range -40 °C ... 85 °C, narrow width | Cable sharing module with cable outlet to the front | Cable sharing module with cable outlet upwards |
| Shielding | Directly on the DIN rail or optionally via RC combination | Continuous shield | Directly on the DIN rail or optionally via RC combination | |
| Shield connection | Via RJ45 port | | Bracket clamp with screws | |
| Order number | 2901646 | 2904933 | 2903532 | 2904577 |

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INSPIRING INNOVATIONS

# Power over Ethernet Injectors

Surge protection and shield current monitoring on the field cable side

Different performance standards and electrical isolation

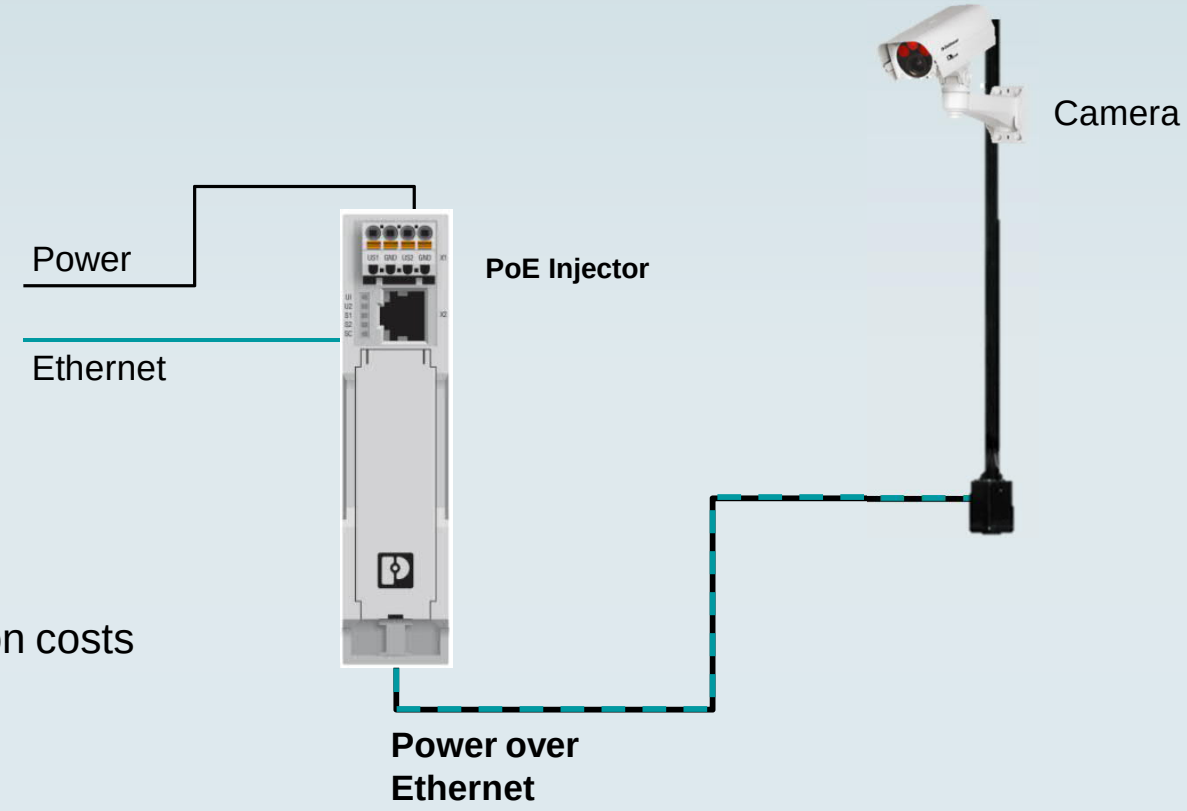
Multiple connection technologies and covered wiring space

Tool-free shield connection



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Power over Ethernet Injectors



# Different performance standards

Different performance standards and electrical isolation

- IEEE 802.3 at, up to 15 W
- IEEE 802.3 af,  up to 30 W
- IEEE 802.3 bt, up to 60 W

- supply voltage and Power over Ethernet port are electrically isolated in certain Injector´s

# Surge protection and shield current monitoring

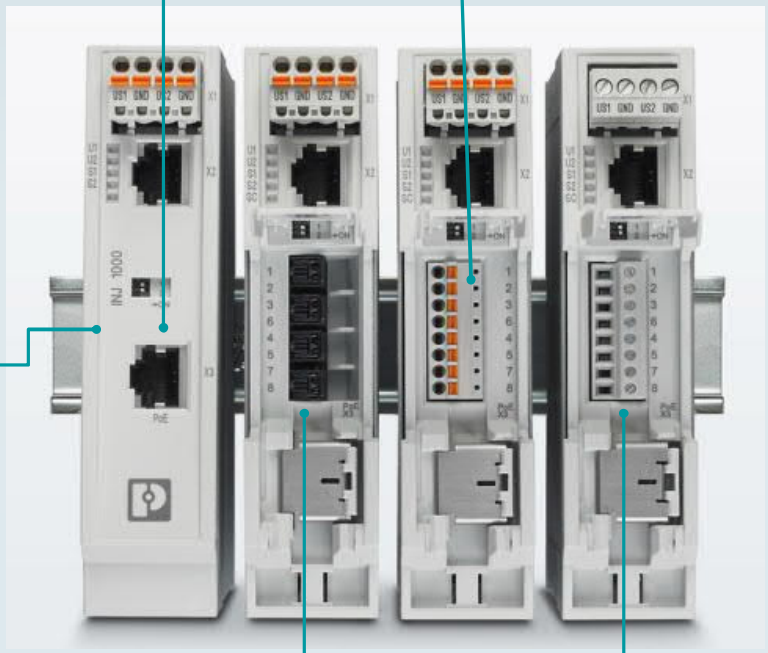
Surge protection and shield current monitoring on the field cable side

- integrated surge protection protects devices and application against sudden high voltages in the data cables
- An LED indicates differences in potential or other shield currents caused by the effects of EMC



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Multiple connection technologies



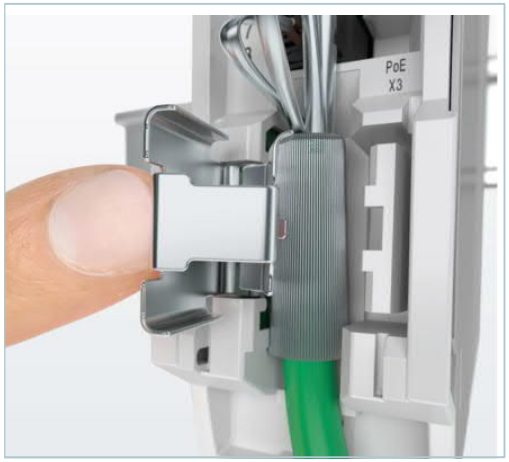

- IDC, Push-in, screw, and RJ45 connections.
- Covered cable wiring space

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Tool-free shield connection

Tool-free shield connection

- Quick and easy connection of the cable shielding without tools
- strain relief is assured
- Simply lay the cable in the shaft provided and close the shroud



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INSPIRING INNOVATIONS

# Power over Ethernet Injectors

| | INJ 1000<br>INJ 1010 | INJ 1000-T<br>INJ 1010-T | INJ 1100-T<br>INJ 1110-T | INJ 2102-T<br>INJ 2112-T | INJ 2103-T<br>INJ 2113-T | INJ 2101-T<br>INJ 2111-T | FL PSE 2TX |
|---|---|---|---|---|---|---|---|
| Connection technology | RJ45 / RJ45 | RJ45 / RJ45 | RJ45 / RJ45 | RJ45 / IDC | RJ45 / Push-In | RJ45 / Screw | 2 x RJ45/RJ45 |
| Temperatur range | 0°C … +60°C | -40 °C … +75 °C | | | | | 0°C … +55°C |
| Galvanic isolation | No | | | Yes | | | |
| Overvoltage protection, shield current diagnosis | No | | | Yes | | | No |
| Order number<br>PoE af*/at, 15*/30W | 2703005 | 2703006 | 2703009 | 2703012 | 1004065 | 2703011 | *2891013 |
| Order number<br>PoE bt, 60W | 2703007 | 2703008 | 2703010 | 2703014 | 1004066 | 2703013 | - |

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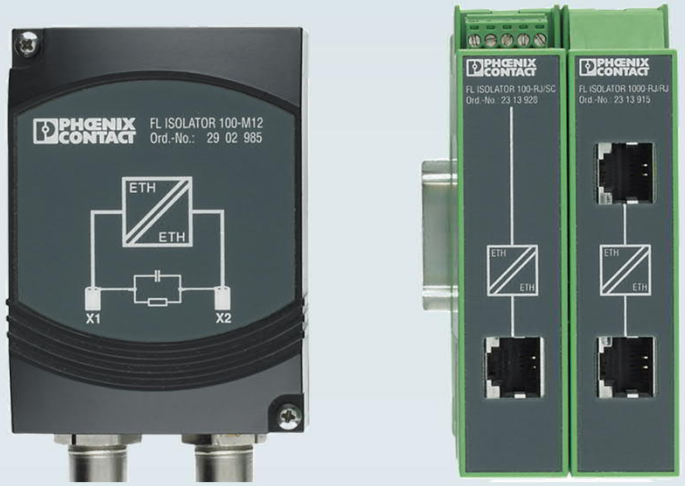
INSPIRING INNOVATIONS

# Ethernet Network Isolator




- Protection against aggressive environmental influences, particularly harsh industrial environments, thanks to coated PCB
- Dielectric strength of up to 4 kV
- No power supply required
- Approval for railway applications (rolling stock) according to EN 50155 and EN 50121

# Ethernet Network Isolator

Without power supply

4000 V AC electrical isolation

Approval for
- EN 50121 (track)
  EN 50155 (rolling stock)

Wall or DIN rail mounting
Optional with DIN Rail mounting kit

Vibration-resistant M12 connection

SPEEDCON LOCKING



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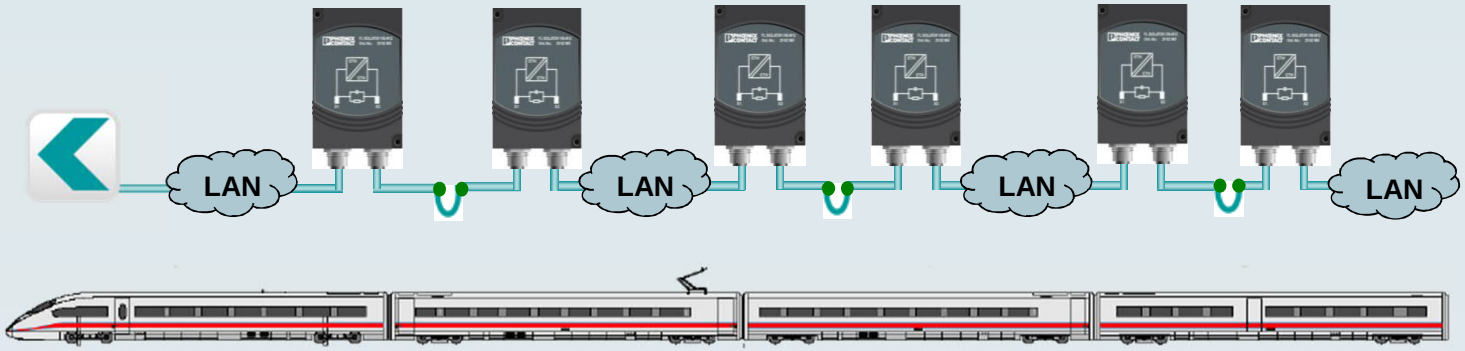
# Ethernet Network Isolator

Railway application




- Avoids high potential equalizing currents between individual sections of the train up to 4 kV
- Approval for EN 50121 (track)
- Approval for EN 50155 (rolling stock)

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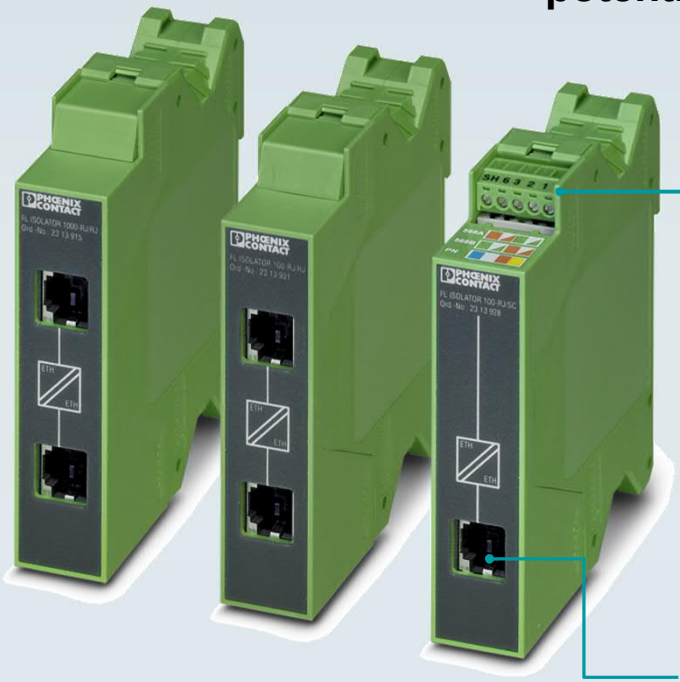
# Ethernet Network Isolator

**Reliable protection in case of potential differences**

4,000 VAC galvanic isolation

Passive device

10/100/**1000** MBit/s



Screw terminal

RJ-45 connector

10/100 MBit/s

# Ethernet Network Isolator

| | FL Isolator 1000-RJ/RJ | FL Isolator 100-RJ/RJ | FL Isolator 100-RJ/SC | FL Isolator 100-M12 | FL EPA RMS |
|---|---|---|---|---|---|
| EN 50155–rolling stock<br>EN 50121- wayside | Yes | Yes | Yes | Yes | Set for mounting devices with EPA design on a DIN rail for FL Isolator 100-M12 |
| Port 1 | RJ-45 | RJ-45 | RJ-45 | M12 D-coded | |
| Port 2 | RJ-45 | RJ-45 | Screw | M12 D-coded | |
| Baudrate im Mbps | 10 / 100 / 1000 | 10 / 100 | 10 / 100 | 10 / 100 | |
| Galvanic isolation up to | 4000 V | 4000 V | 4000 V | 4000 V | |
| Mounting on | DIN Rail | DIN Rail | DIN Rail | Wall | |
| Order number | 2313915 | 2313931 | 2313928 | 2902985 | 2701133 |

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INSPIRING INNOVATIONS

# Device server

A **DEVICE SERVER**

(also referred to a serial server or terminal server) enables you to connect devices with an RS-232, RS-422 or RS-485 serial interface to a local area network (LAN).

# Device server

256-bit AES encryption for secure transfer of sensitive data

User authentication to prevent unauthorized access

Simple configuration and built-in diagnostics

Compact, DIN rail mount form factor

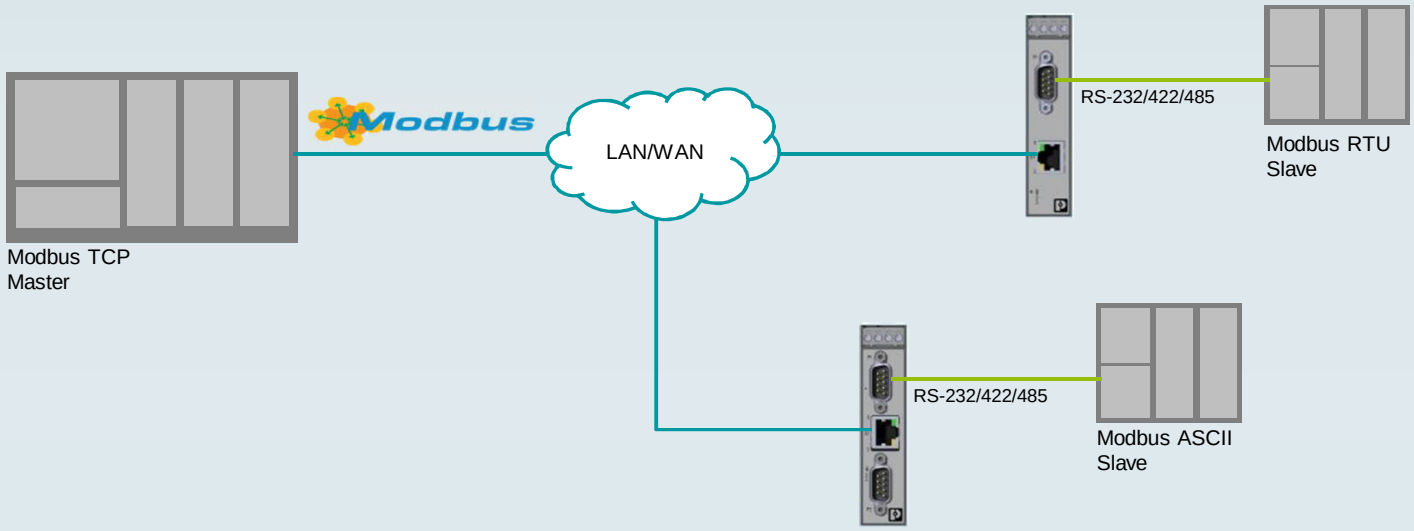
Windows COM port driver for seamless integration

## Application example:

- Modbus RTU/ASCII to Modbus TCP
- Serial Tunneling (point to point)
- Serial Tunneling (multiplexing)
- Multiple devices with the same Device ID
- Private Modbus Networks
- Virtual COM Port
- ASCII to Ethernet/IP
- ASCII to Modbus RTU

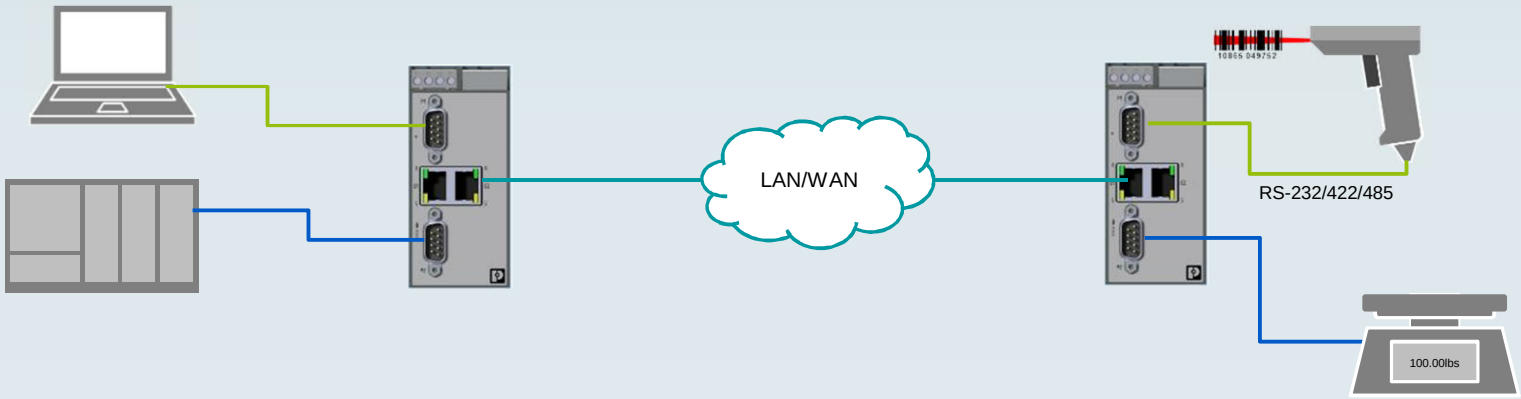
# Device servers - Application example

## Modbus RTU/ASCII to Modbus TCP



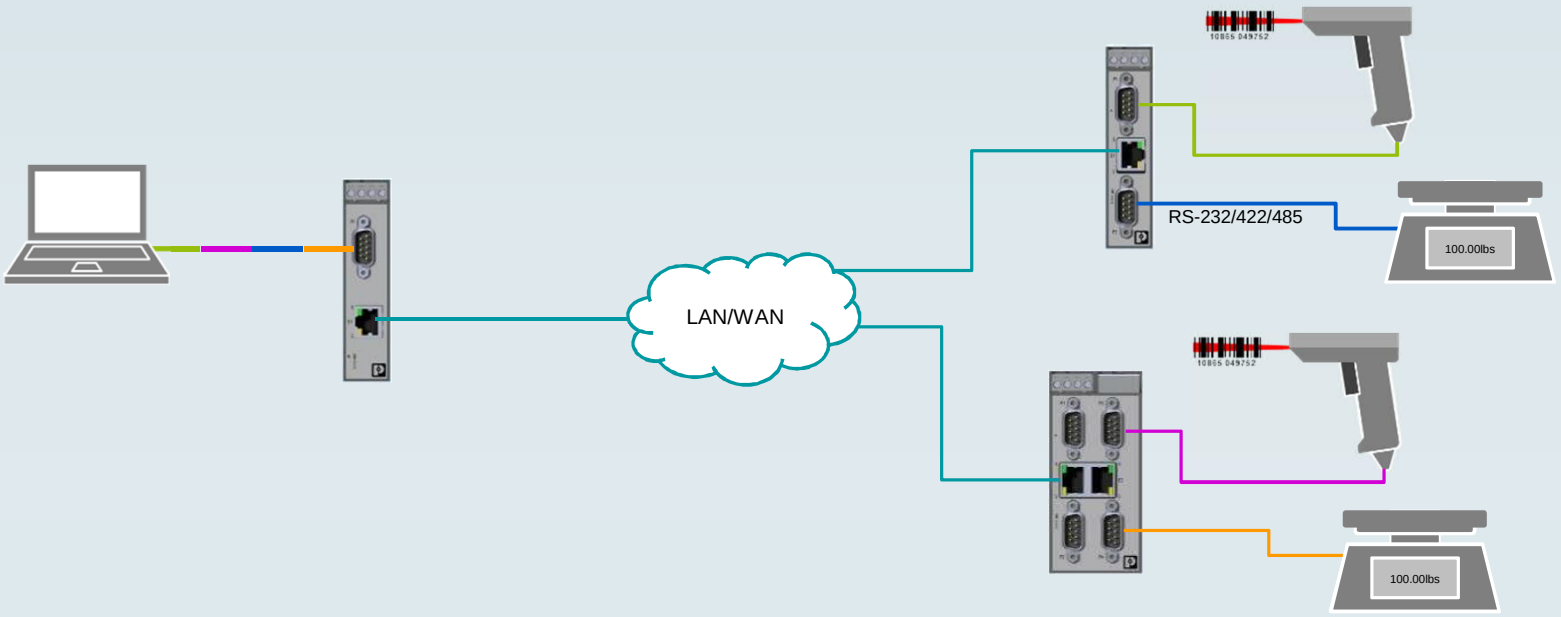
# Device servers - Application example

Serial Tunneling (point to point)



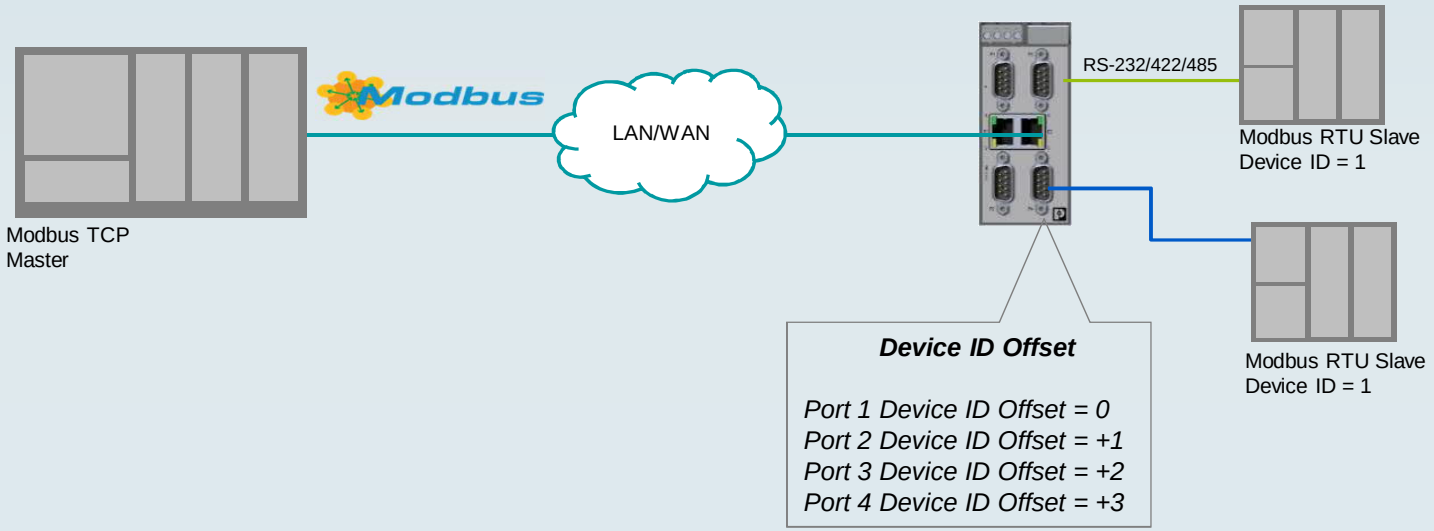
# Device servers - Application example

## Serial Tunneling (multiplexing)



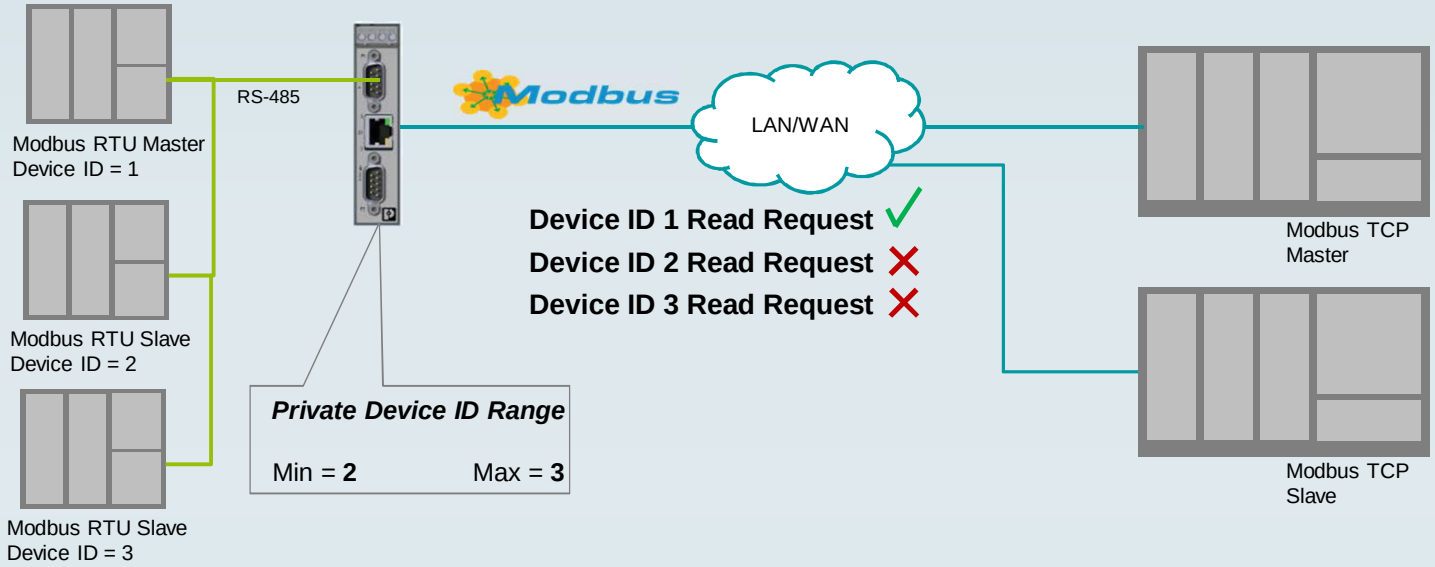
# Device servers - Application example

## Multiple devices with the same Device ID



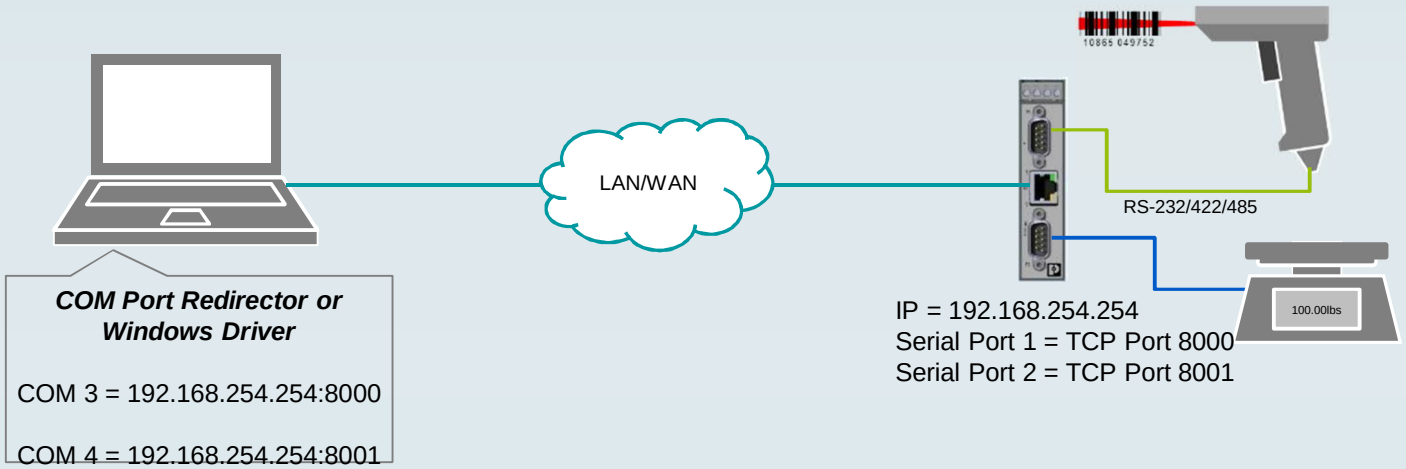
# Device servers - Application example

## Private Modbus Networks



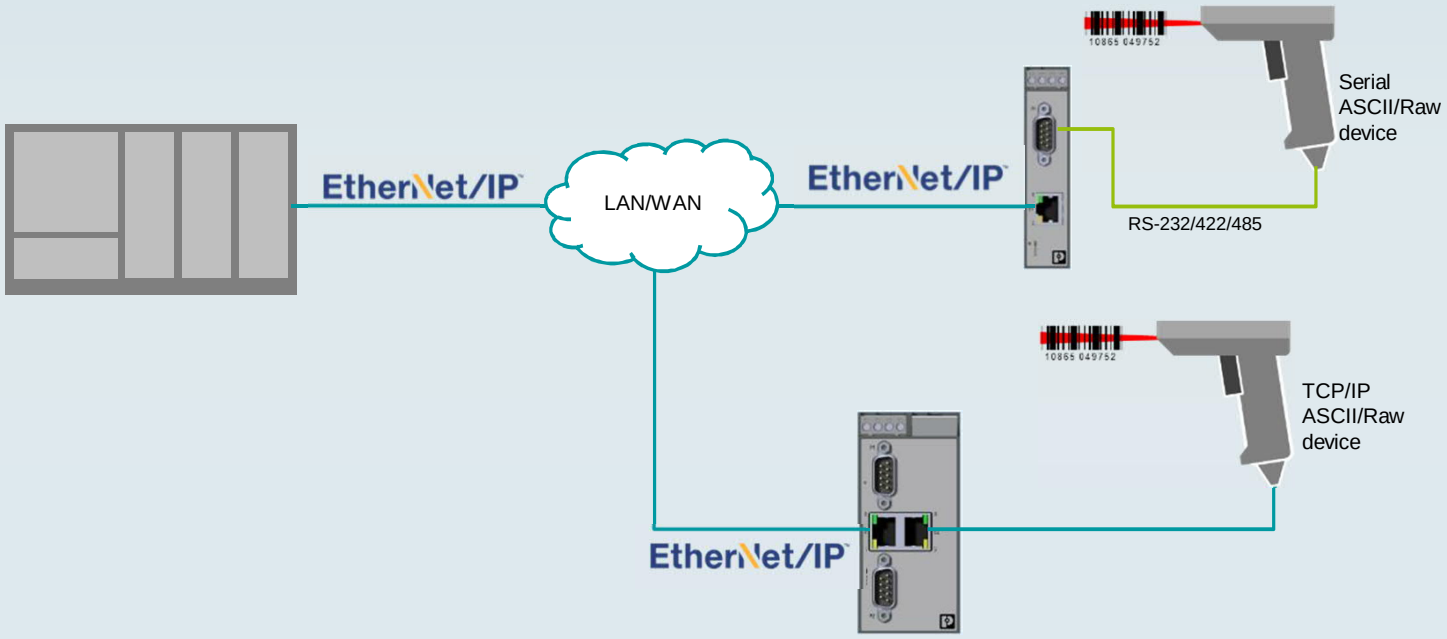
# Device servers - Application example

## Virtual COM Port



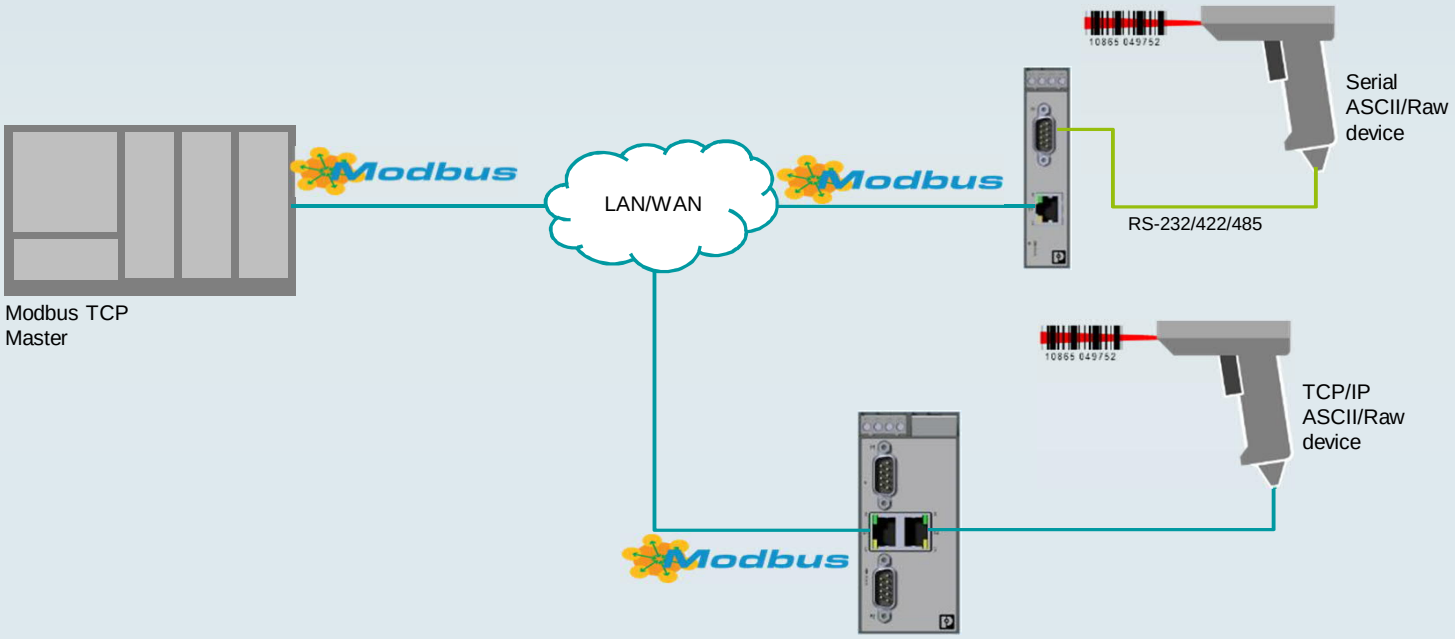
# Device servers - Application example

## ASCII to Ethernet/IP



# Device servers - Application example

## ASCII to Modbus TCP



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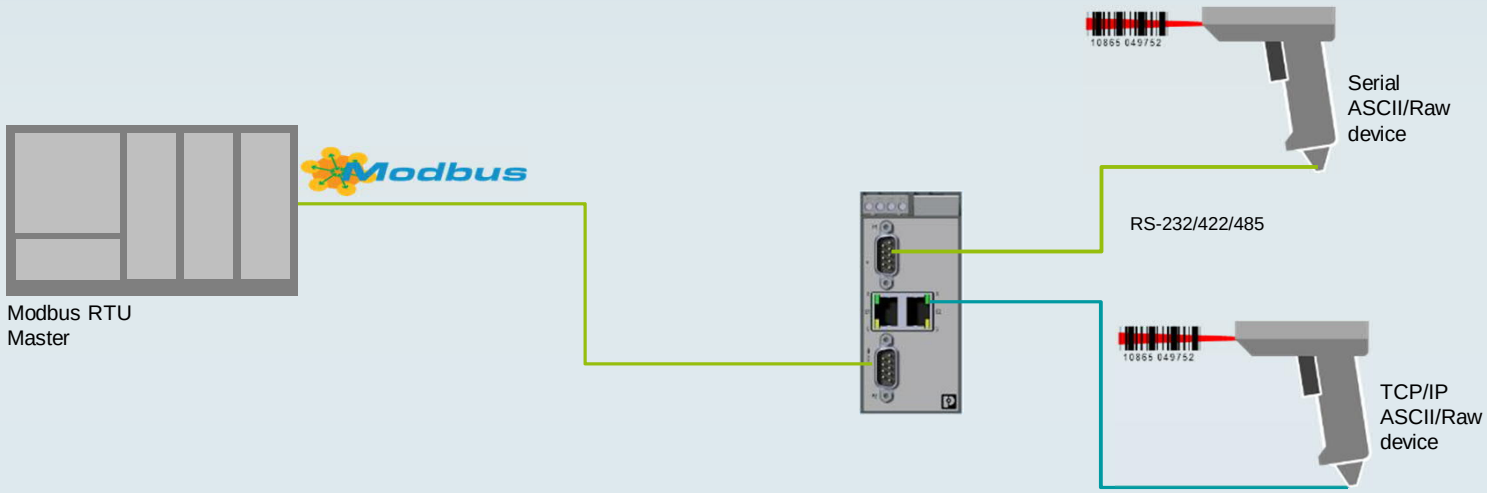
INSPIRING INNOVATIONS

# Device servers - Application example

## ASCII to Modbus RTU



# Serial Device Server

| | FL COMSERVER BASIC | FL COMSERVER BASIC-T | GW DEVICE SERVER 1E/1DB9 | GW DEVICE SERVER 1E/2DB9 | GW DEVICE SERVER 2E/2DB9 | GW DEVICE SERVER 2E/4DB9 |
|---|---|---|---|---|---|---|
| Protocol | **Protocol transparent** | | | | | |
| Ethernet interface | 1x RJ45 | | 1x RJ45 | | 2x RJ45 | |
| Serial interface (RS-232/422/485) | 1x D-SUB 9 | | 1x D-SUB 9 | 2x D-SUB 9 | | 4x D-SUB 9 |
| Special features | ATEX. UL (Class I, Division 2) | | ATEX, IECEx, UL (Class I, Division 2) | | | |
| Order no. | 2313478 | 2904681 | 2702758 | 2702760 | 2702761 | 2702763 |

INSPIRING INNOVATIONS

# Gateways

| | FL COMSERVER UNI | FL COMSERVER UNI-T | GW MODBUS TCP/RTU 1E/1DB9 | GW MODBUS TCP/RTU 1E/2DB9 | GW MODBUS TCP/RTU 2E/2DB9 | GW MODBUS TCP/RTU 2E/4DB9 | GW MODBUS TCP/ASCII 1E/1DB9 | GW MODBUS TCP/ASCII 1E/2DB9 | GW MODBUS TCP/ASCII 2E/2DB9 | GW MODBUS TCP/ASCII 2E/4DB9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Protocol | **Modbus/RTU to Modbus/TCP** | | | | | | **RAW, ASCII to Modbus/TCP** | | | |
| Ethernet interface | 1x RJ45 | | 1x RJ45 | | 2x RJ45 | | 1x RJ45 | | 2x RJ45 | |
| Serial interface (RS-232/422/485) | 1x D-SUB 9 | | 1x D-SUB 9 | 2x D-SUB 9 | | 4x D-SUB 9 | 1x D-SUB 9 | 1x D-SUB 9 | | 4x D-SUB 9 |
| Special features | ATEX, UL (Class I, Divisson 2) | | ATEX, IECEx, UL (Class I, Division 2) | | | | | | | |
| Order no. | 2313452 | 2904817 | 2702764 | 2702765 | 2702766 | 2702767 | 2702768 | 2702769 | 2702770 | 2702771 |

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INSPIRING INNOVATIONS

# Gateways

| | GW PN/ASCII 1E/1DB9 | GW PN/ASCII 1E/2DB9 | GW PN/ASCII 2E/2DB9 | GW PN/ASCII 2E/4DB9 | GW EIP/ASCII 1E/1DB9 | GW EIP/ASCII 1E/2DB9 | GW EIP/ASCI 2E/2DB9 | GW EIP/ASCII 2E/4DB9 |
|---|---|---|---|---|---|---|---|---|
| Protocol | **RAW, ASCII to PROFINET** | | | | **RAW, ASCII to EtherNet/IP** | | | |
| Ethernet interface | 1x RJ45 | | 2x RJ45 | | 1x RJ45 | | 2x RJ45 | |
| Serial interface (RS-232/422/485) | 1x D-SUB 9 | 2x D-SUB 9 | 2x D-SUB 9 | 4x D-SUB 9 | 1x D-SUB 9 | 2x D-SUB 9 | 2x D-SUB 9 | 4x D-SUB 9 |
| Special features | ATEX, IECEx, UL (Class I, Division 2) | | | | | | | |
| Order no. | 1021080 | 1021058 | 1021056 | 1020882 | 2702772 | 2702773 | 2702774 | 2702776 |

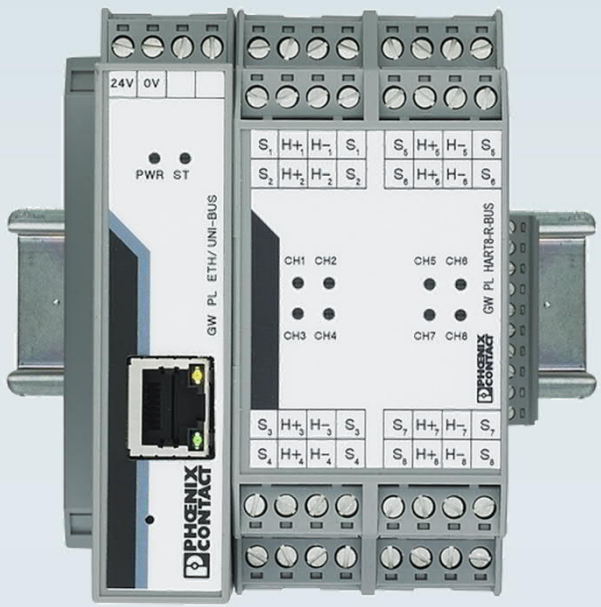
PHOENIX CONTACT
INSPIRING INNOVATIONS

# Gateways

new

| | GW PN/ASCII 1E/1DB9 | GW PN/ASCII 1E/2DB9 | GW PN/ASCII 2E/2DB9 | GW PN/ASCII 2E/4DB9 |
|---|---|---|---|---|
| Protocol | **Modbus to Ethernet/IP** | | | |
| Ethernet interface | 1x RJ45 | | 2x RJ45 | |
| Serial interface (RS-232/422/485) | 1x D-SUB 9 | 2x D-SUB 9 | 2x D-SUB 9 | 4x D-SUB 9 |
| Special features | ATEX, IECEx, UL (Class I, Division 2) | | | |
| Order no. | 1062540 | 1062423 | 1062380 | 1062388 |

# Modular Ethernet HART multiplexer




## Converting HART protocol

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

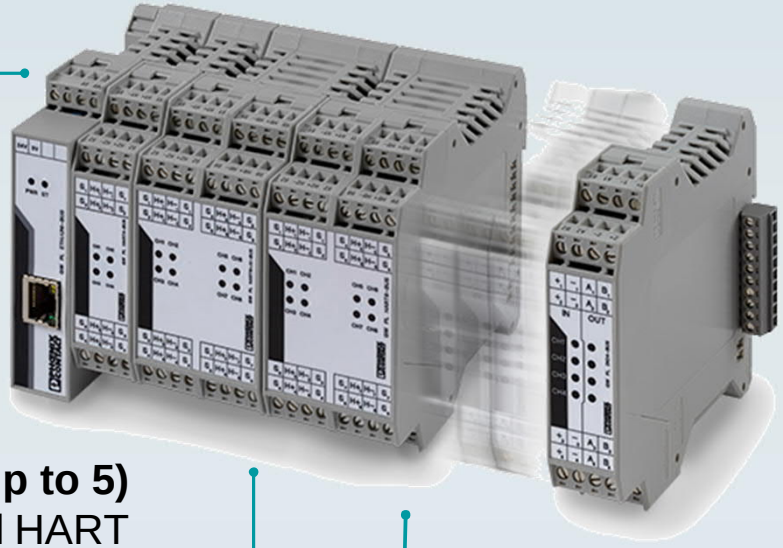
Easily parameterize and monitor HART field devices via Ethernet networks.

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



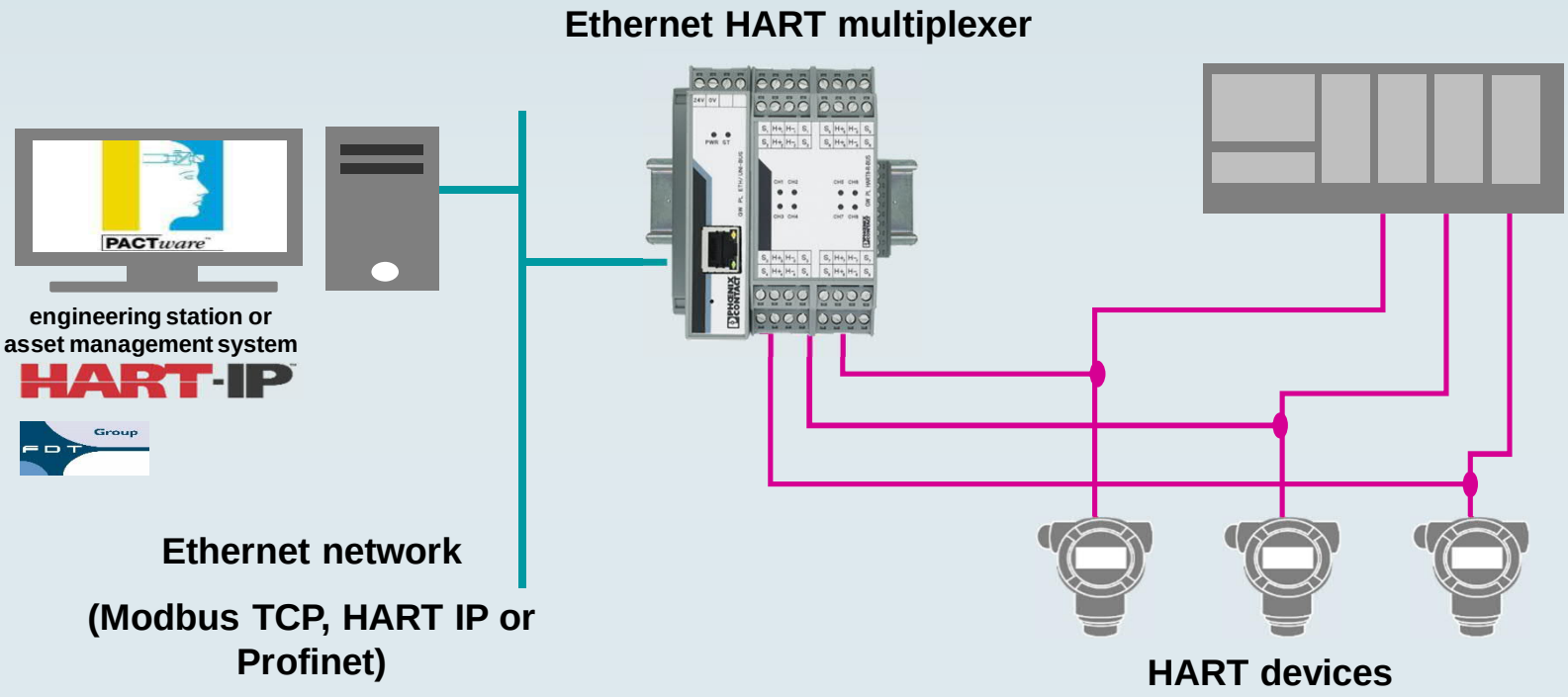
**Enviromental**
-40…70°C
ATEX, IECEx, UL Zone 2

**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

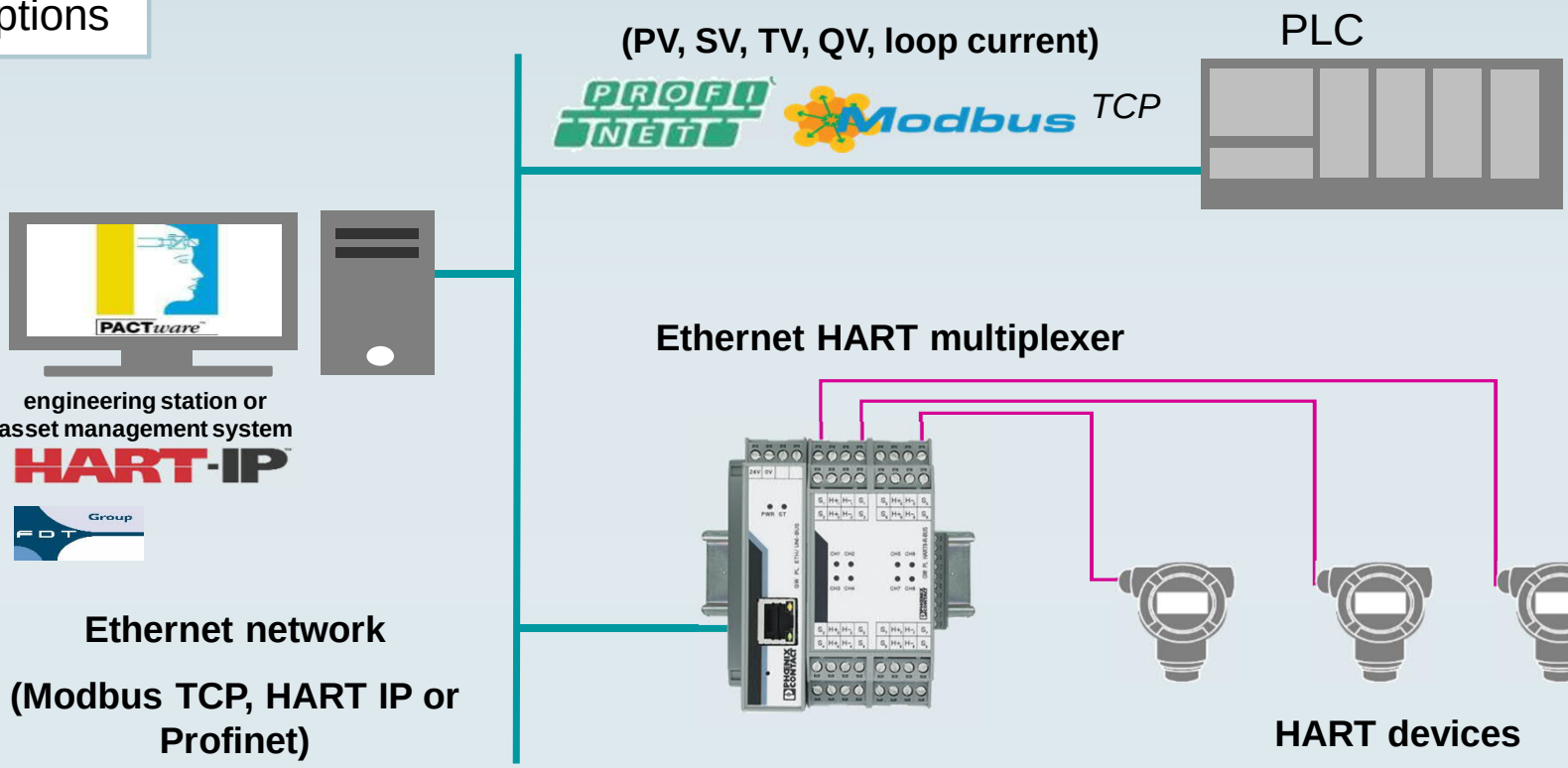





PHOENIX CONTACT
INSPIRING INNOVATIONS

# Modular Ethernet HART multiplexer

## Installation options






PHOENIX CONTACT
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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 HART8-BUS | GW PL HART4-BUS | GW PL HART8+AI-BUS | GW PL DIO4-BUS |
| Order number | 2702321 | 2702233 | 2702235 | 2702234 | 2702236 | 2702237 |
| Description | Head station with Modbus TCP, HART IP, FDT/DTM | Head station with Profinet, Modbus TCP, HART IP, FDT/DTM | 8 channel HART module | 4 channel HART module | 8 channel HART module with analog loop supply | 4 channel digital I/O |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Radioline

TRUSTED WIRELESS

**Easy startup**

- Without programming
- Adjustable via thumbwheel
- I/O mapping

**Universal applications**

- I/O-to-I/O cable replacement
- Serial cable replacement RS-232/485
- I/O integration in Modbus RTU PLCs
- RS-485 extension possible

**Worldwide use**

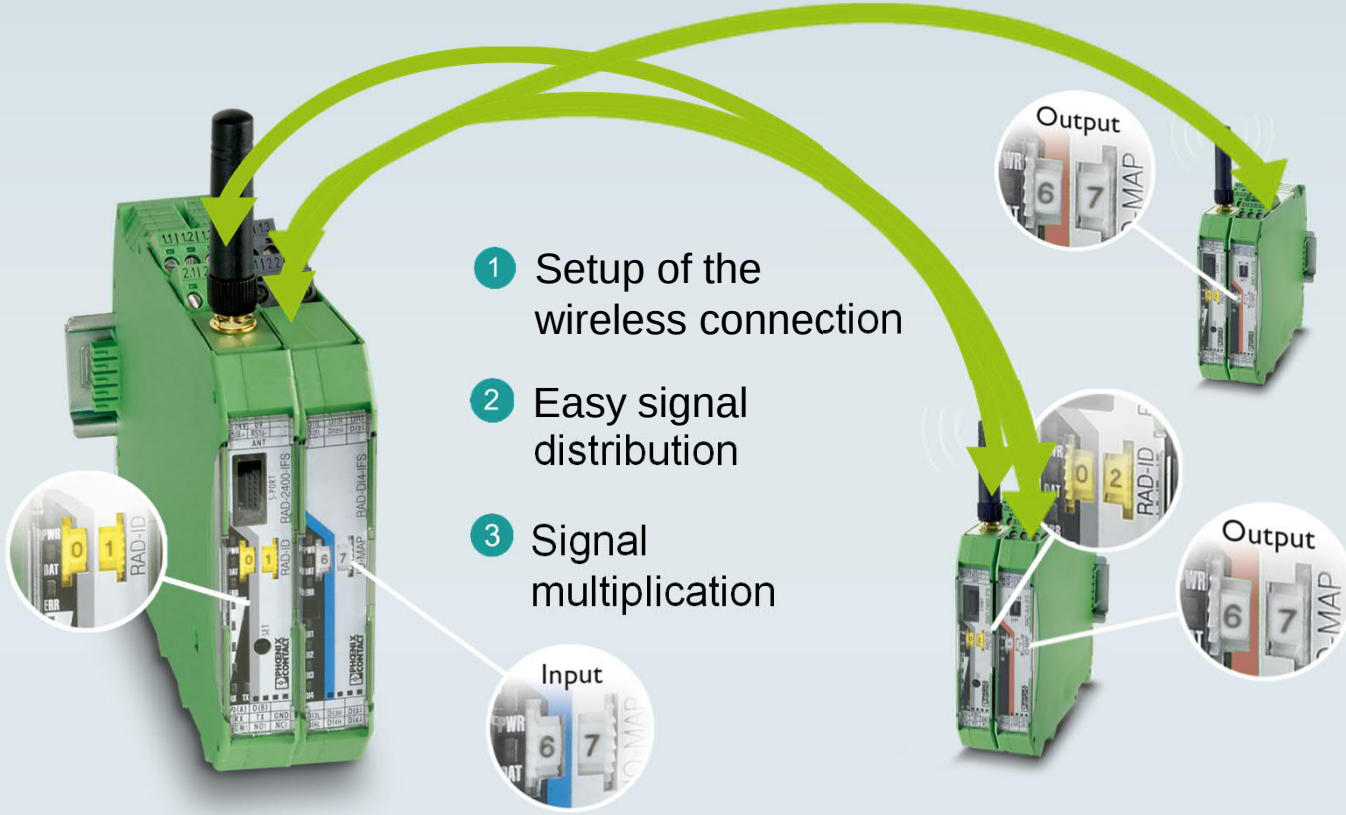
- 2,4 GHz, 868 MHz, 900 MHz and wired head stations
- Adjustable baud rates
- Ranges up to 5, 20 or 32 km

**Flexibly expandable**

- Up to 250 Stations in a network
- Up to 32 I/O modules per station
- Various digital and analog extension modules
- Hot-Swapping
- Galvanic channel-to-channel isolation

# Radioline

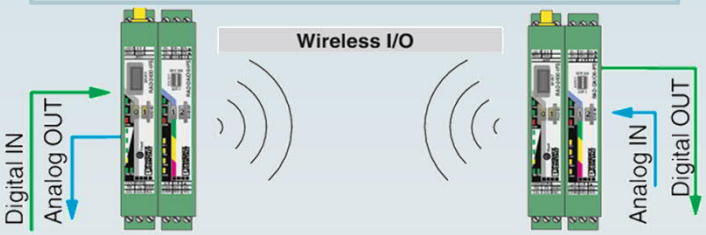
TRUSTED WIRELESS




1. Setup of the wireless connection
2. Easy signal distribution
3. Signal multiplication

# Radioline - One System for different applications

## Option 1

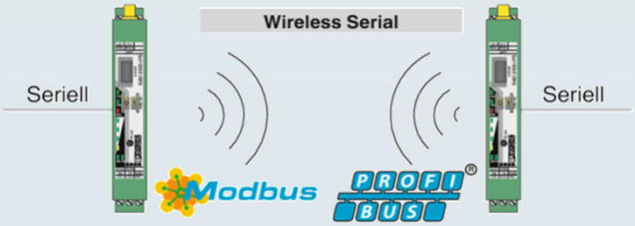



I/O to I/O

## Option 2

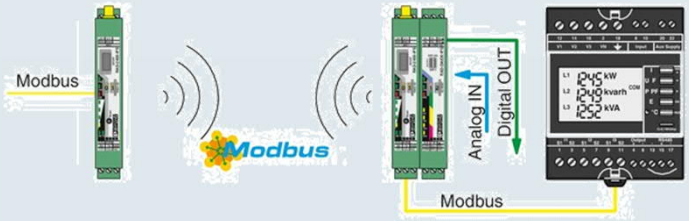
I/O to Modbus RTU

## Option 3




Serial to Serial (RS 232/485)

## Option 4




I/O and Modbus parallel



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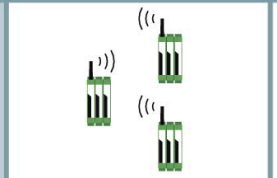
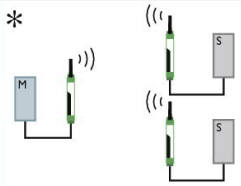
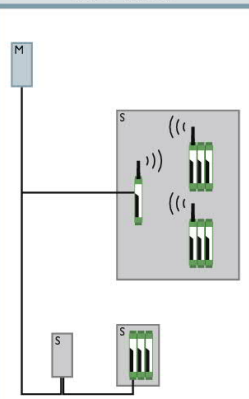
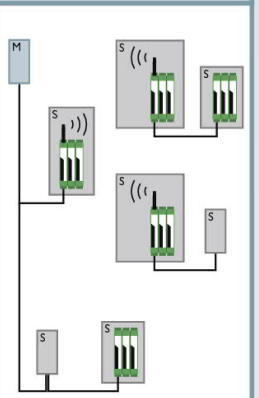
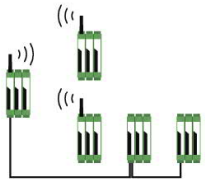
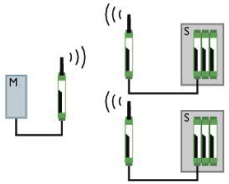
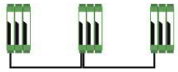
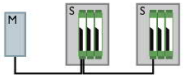
INSPIRING INNOVATIONS

# Radioline System – Application overview

| Application overview for the Radioline system | I/O to I/O | Serial to Serial | I/O to Serial | |
|---|---|---|---|---|
| | I/O data mode | Serial data mode | PLC/Modbus RTU mode | PLC/Modbus RTU **Dual** mode |
| Communication between wireless stations |  |  |  |  |
| Combined communication between wireless- and RS-485 stations |  |  | | |
| Communication between RS-485 stations |  | |  | |

Explanation

- M — Modbus Master
- S — Modbus Slave
- Radioline wireless module
- Radioline wireless station with I/Os
- Radioline RS-485 station with I/Os
- * In addition to Modbus, more serial protocols are supported



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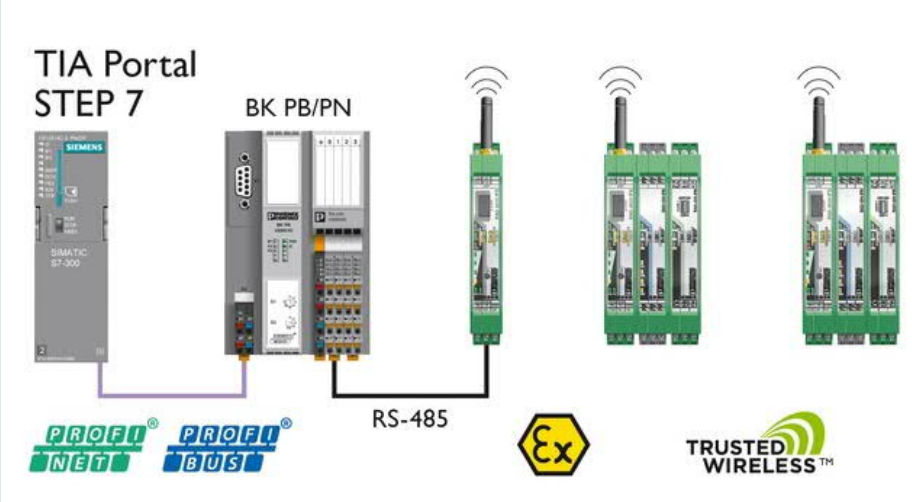
INSPIRING INNOVATIONS

# Radioline function blocks for PCWORX / STEP 7 / TIA Portal




- Monitoring and control of remote stations without cable access
- Simple reading of process data, status and diagnostic parameters of the individual radio stations
- Flexibility, simple installation and cost savings compared to wired installations
- Reduced development times
- License free and cost free function blocks

## Supported hardware and software

- Siemens: S7-3xx, S7-12xx, S7-15xx PLCs, STEP 7, TIA Portal
- Phoenix Contact: Inline + Axioline PLCs, PCWORX

# Radioline

| International Ex approval | 868 MHz | 900 MHz America | 900 MHz Australia | 2,4 GHz worldwide | 2,4 GHz Japan | RS485 Interface |
|---|---|---|---|---|---|---|
| Type | RAD.868-IFS | RAD-900-IFS | RAD-900-IFS-AU | RAD-2400-FS | RAD-2400-IFS-JP | RAD-RS485-IFS |
| Can be use in | Europe | North and South America and Canada | Australia | Worldwide | Japan | Worldwide (No radio) |
| Range up to | **20 km** | **32 km** | **32 km** | **5 km** | **5 km** | **cable** |
| Supply voltage | 19,2 …30,5 V DC | 10,8 …30,5 V DC | 10,8 …30,5 V DC | 19,2 …30,5 V DC | 19,2 …30,5 V DC | 19,2 …30,5 V DC |
| Temperature range | -40°C…+70°C | | | | | |
| Order number | 2904909 | 2901540 | 2702878 | 2901541 | 2702863 | 2702184 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Radioline

new

| | Outdoor box for use in America | Outdoor box for worldwide use (configurable) |
|---|---|---|
| Type | RAD-900-DAIO6 | RAD-RUGGED-BOX-CONF |
| Integrated | 900 MHz radio, 6 integrated IO channels (2 x digital IN and OUT, 1 x analog IN and OUT), power supply | Fully pre-wired box with integrated power supply, over-voltage protection, selectable radio module and up to three selectable IO extension modules |
| Degree of protection | **NEMA 4X (IP 66)** | **IP 66** |
| Range up to | **32 km** | **Depends on selected radio** |
| Supply voltage | 10,8 …30,5 V DC, 100 … 240 V AC | 100 … 240 V AC |
| Temperature range | -40°C…+70°C | -25°C…+55°C |
| Order number | 2702877 | 1091638 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Radioline – Extension modules

| International Ex approval | Digital In 4 channel | Digital Out 4 channel | Digital In 8 channel | Digital Out 8 channel | Analog In 4 channel | Analog Out 4 channel | Analog / digital | PT 100 4 channel |
|---|---|---|---|---|---|---|---|---|
| Type | RAD-DI4-IFS (Input) | RAD-DOR4-IFS (Output) | RAD-DI8-IFS (Input) | RAD-DO8-IFS (Output) | RAD-AI4-IFS (Input) | RAD-AO4-IFS (Output) | RAD-DAIO6-IFS (Input / output) | RAD-PT100-4-IFS |
| Description | 4 digital wide range inputs 0…250V AC/DC | 4 digital relay outputs 24 V DC / 250 V AC / 5 A | 8 digital inputs 0…30,5 V DC | 8 digital transistor outputs 30,5 V DC / 200 mA | 4 analog input 0/4…20 mA | 4 analog outputs Alternatively 0/4…20 mA or 0…10 V DC | 1 analog input/output 0/4…20 mA 2 digital wide range inputs/outputs 0…250 V AC/DC | 4 Pt100 inputs Temperature measuring range: -50°C…+250°C |
| Order number | 2901535 | 2901536 | 2901539 | 2902811 | 2901537 | 2901538 | 2901533 | 2904035 |

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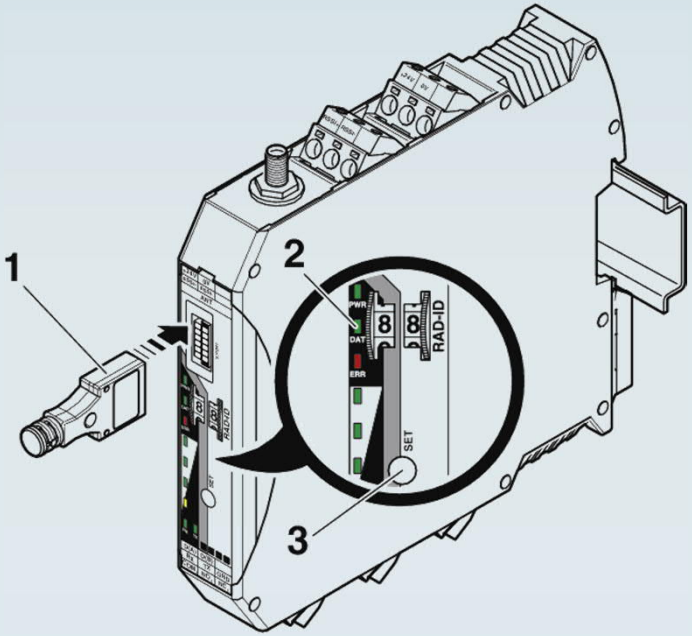
INSPIRING INNOVATIONS

# Radioline – accessories

| | RAD-CONF-RF3 | RAD-CONF-RF5 | RAD-CONF-RF7 | RAD-CONF-RF1 | RAD-CONF-RF1 | RAD-MEMORY | RAD-CABLE-USB |
|---|---|---|---|---|---|---|---|
| Frequency | **2,4 GHz** | **2,4 GHz** | **2,4 GH** | **868 MHz** | **900 MHz** | For all Radioline front modules | For all Radioline front modules |
| Description | Configuration stick for the 2,4 GHz wireless module unique network ID, RF band 3 | Configuration stick for the 2,4 GHz wireless module unique network ID, RF band 5 | Configuration stick for the 2,4 GHz wireless module unique network ID, RF band 7 | Configuration stick for the 868 MHz wireless module unique network ID, RF band 1 | Configuration stick for for the 900 MHz wireless module, unique network ID, RF band 1 | Memory stick for saving custom configuration data | Data cable for communication between the PC and Radioline devices |
| Features | For easy and secure network addressing with unique network ID | | | | | Freely configurable | for diagnostics and configuration, 2m cable |
| Order No.: | 2902814 | 2902815 | 2902816 | 2702197 | 2702122 | 2902828 | 2903447 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Radioline – Configuration sticks




1. CONFIGSTICK RAD-CONF-RF….
2. Status LEDs
3. SET button

Using a CONFIGSTICK, you can configure a **unique and secure** network. This enables the parallel operation of multiple networks (using different RF bands).

**Reading in the device configuration using the CONFSTICK**

- Insert the CONFSTICK into the S-PORT of the wireless module.
- Press and hold down the SET button on the wireless module for 1 second.
- Parameter read in is started
- Read-in has been completed when the DAT LED lights up once. The new parameters are activated.
- Remove the CONFIGSTICK from the wireless module.

# Wireless Accessories

**Cable and adapter**
- Cable length 0,5 … 15 m
- Frequency range 0 … 6 GHz

**Surge protection**
- 2,4 GHz & 5 GHz
- 868 MHz & 900 MHz

**Antenna barrier (Ex-i)**
- Use of standard antennas in areas (Zone 0,1,2)
- Installation as enclosure lead-through in Zone 2
- Frequency range 0,7 … 6 GHz
- Protection class IP65

**Omnidirectional antenna**
- For short and medium distances
- Numerous devices in different directions
- Versatile applications

**Directional antenna**
- Bridging large distances
- Point-to-point connections
- Stationary or linear applications
- Decoupling due to directivity in the case of multiple point-to-point paths

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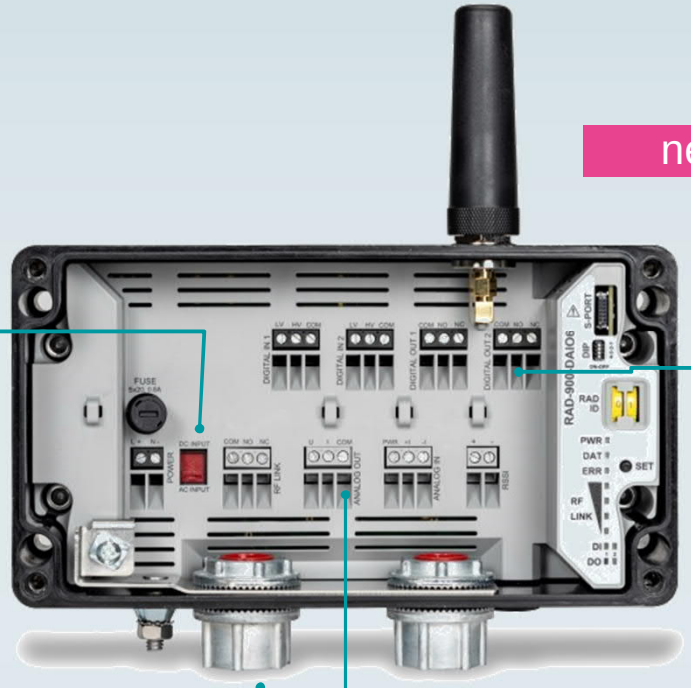
INSPIRING INNOVATIONS

# Radioline – RAD-900-DAIO6

new



Fused AC/DC Power selection

Six built-in I/O points 2DI, 2DO, 1AI,1AO

Dual half-inch NPT fittings for power and data isolation

Seperated terminals and wire-tie loops for cable management

- Compact NEMA4X housing
- Compatible with existing RAD-900-IFS installations
- Class I Division 2
- Up to 1000 ft out of the box
- Software-free installation for I/O-to-I/O applications
- **Only for North and South America and Canada**



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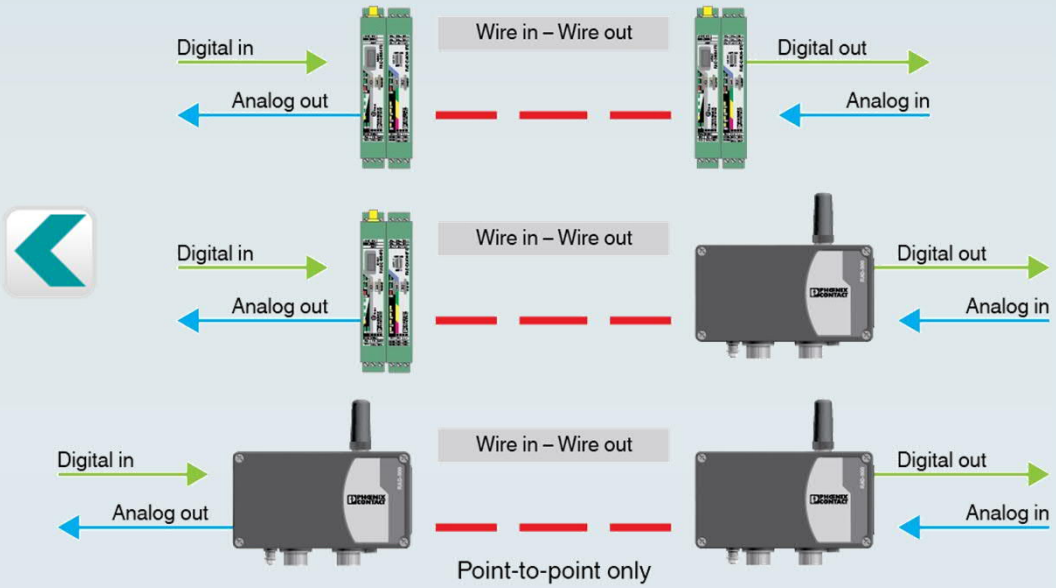
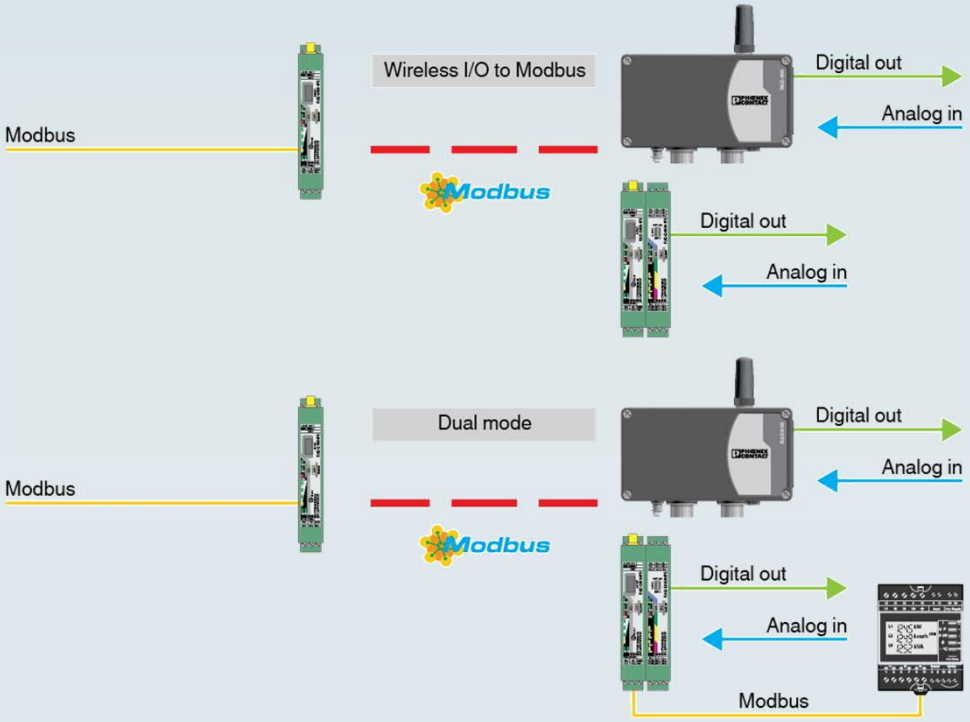
# Radioline – RAD-900-DAIO6

## Modes of operation



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INSPIRING INNOVATIONS

# Radioline – RAD-RUGGED-BOX-CONF

## Outdoor box solution (configurable)

- Fully pre-wired control box with integrated 230V power supply, over-voltage protection, selectable radio module and up to three selectable IO extension modules
- Quick and easy connection of power supply and IO signals
- Outdoor use thanks to robust UV-resistant and impact-resistant IP-66 housing

new

**For worldwide use**

868 MHz | 900 MHz | 2,4 GHz

# Radioline – RAD-RUGGED-BOX-CONF

new

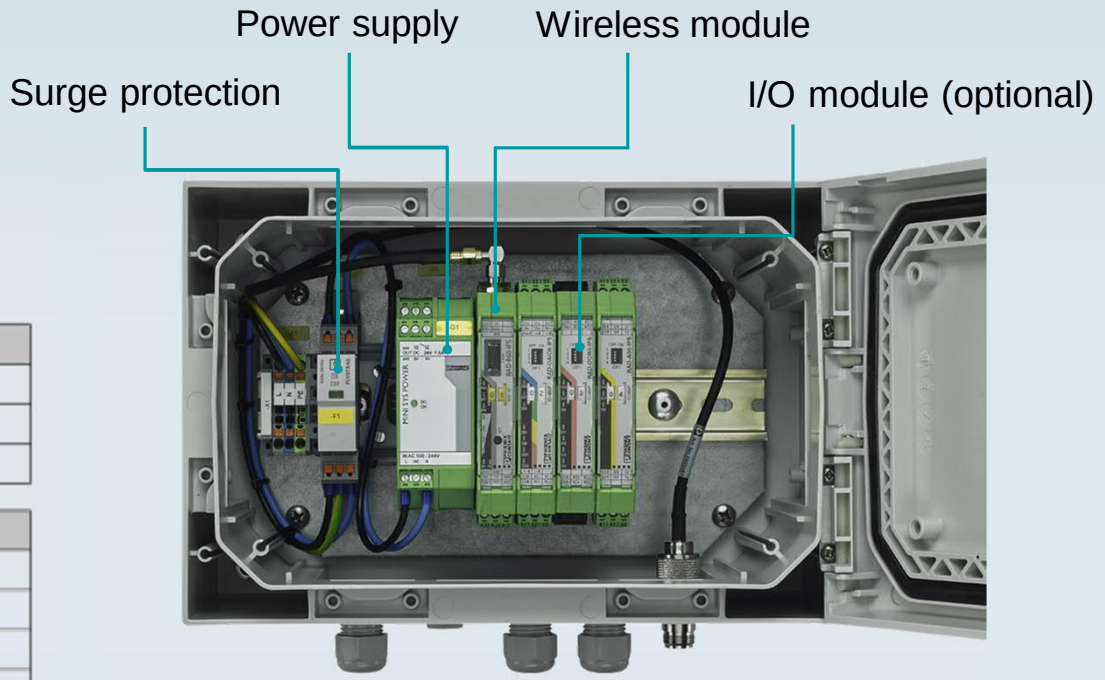
## Order key

Example:

| Order No. | Wireless module | I/O module (optional) | | |
|---|---|---|---|---|
| | | 1 | 2 | 3 |
| 1091638 | 2400 | DI4 | AI4 | DO8 |

| Wireless module (1 unit) | Area of application | Order key |
|---|---|---|
| 2.4 GHz | Worldwide | 2400 |
| 868 MHz | Europe | 868 |
| 900 MHz | America | 900 |

| Type of I/O extension module (optional, up to 3 units) | Order key |
|---|---|
| 2 digital inputs/outputs and 1 analog input/output | DAIO6 |
| 4 digital inputs | DI4 |
| 8 digital inputs | DI8 |
| 4 analog current inputs | AI4 |
| 4 Pt 100 inputs | PT100 |
| 4 digital relay outputs | DO4 |
| 8 digital transistor outputs | DO8 |
| 4 analog current or voltage outputs | AO4 |




**For worldwide use**

868 MHz | 900 MHz | 2,4 GHz



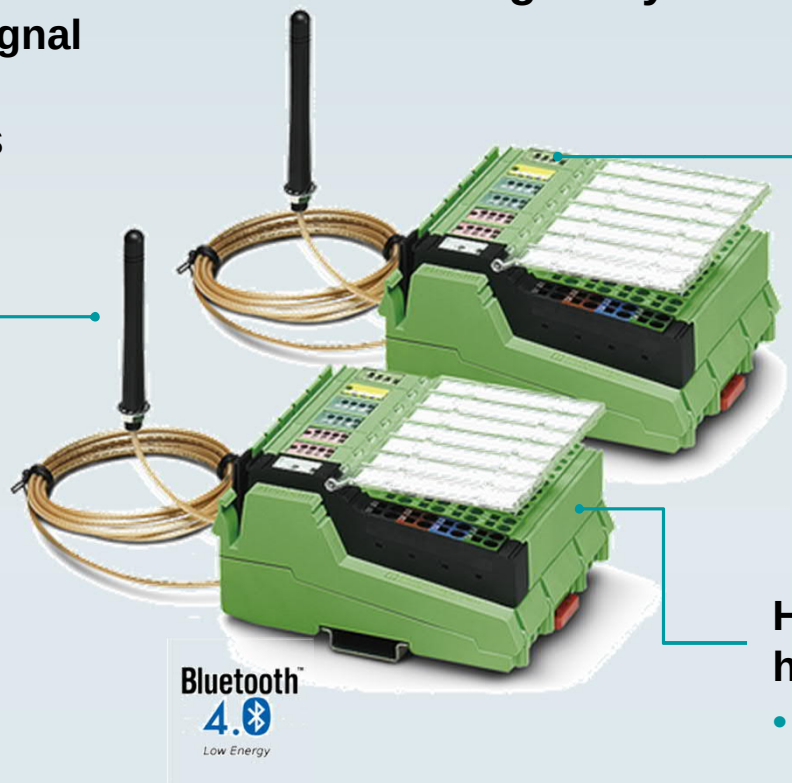
PHOENIX CONTACT
INSPIRING INNOVATIONS

# Wireless Multiplexer

**Plug&Play - startup without configuration**

**Suitable for time-critical signal transmission**

- Transmission time < 10 ms




**Diagnose**

- Radio link diagnostics via LED bargraph

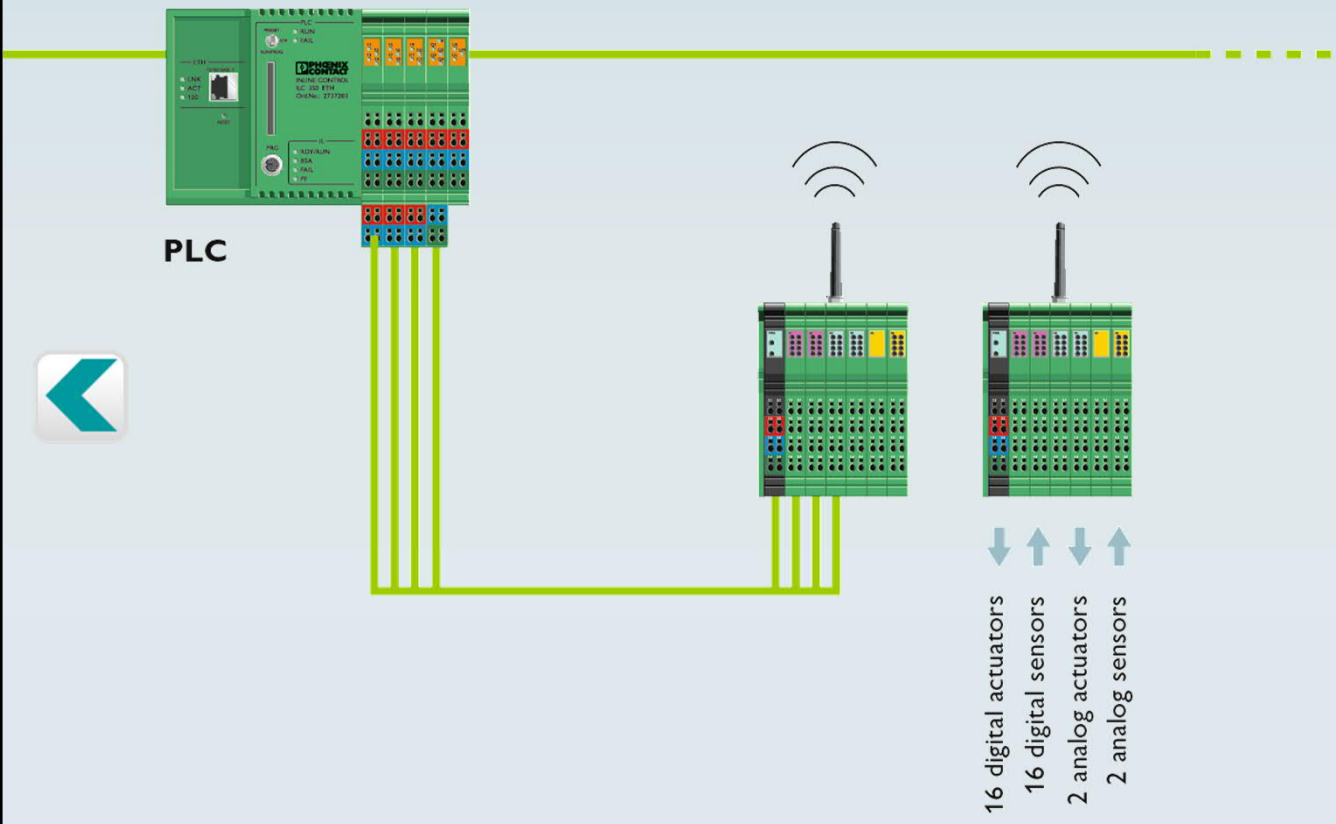
**Distances**

- 50 m – 100 m indoors
- 200 m – 400 m outdoors

**High number of channels in a compact housing**

- Analog / digital

# Wireless Multiplexer




- Point-to-point communication
- 16 digital inputs/outputs
- 2 analog inputs/outputs
  0-20 mA, 0-10 V
- Transmission time
  ≥ 10 ms
- Bluetooth 4.0 technology



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INSPIRING INNOVATIONS

# Wireless Multiplexer

| | ILB BT ADIO MUX-OMNI | ILB BT ADIO MUX |
|---|---|---|
| Description | Wireless set including omnidirectional antennas with 1,5 m cable | Wireless set without antennas |
| Transmission power | 20 dBm / 100 mW | |
| Number of I/O channels | 16 DI/DO + 2 AI/AO (0-20 mA / 0-10 V) Not expandable | |
| Temperature range | -25°C … 60°C | |
| Network structure | Point-to-Point | |
| Order number | 2884208 | 2702875 |

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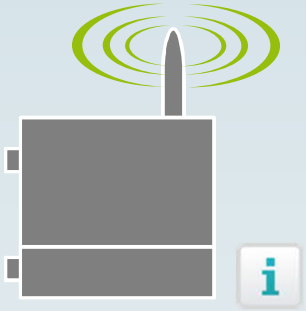
INSPIRING INNOVATIONS

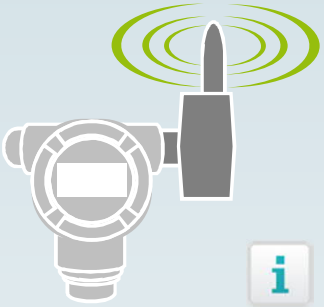
# Wireless HART



## WirelessHART gateway

manages the WirelessHART network

connects to the control system



## WirelessHART adapter

retrofit wired instruments to WirelessHART

may be loop, line, or battery powered

## WirelessHART device

add new measurement or control devices without any wires

may be line or battery powered

WirelessHART

global RF band

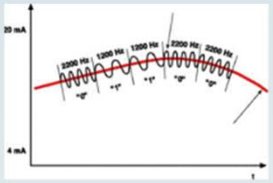
security

mesh networking

time synchronized

# 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.

# Wireless HART Gateway

**Integrated WLAN**
Redundant connection as backup for ethernet cable

Mobile access for programming and diagnostic

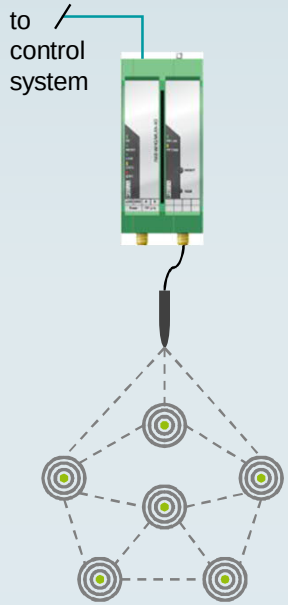
**Ethernet-Port**
For easy programming and diagnostics with integrated web server

**Environmental**
-40…70°C
ATEX, IECEx, CSA Zone 2

**Access process data via**
HART IP, Modbus TCP,
FDT/DTM
(supports up to 250 field devices)
configure with a web browser

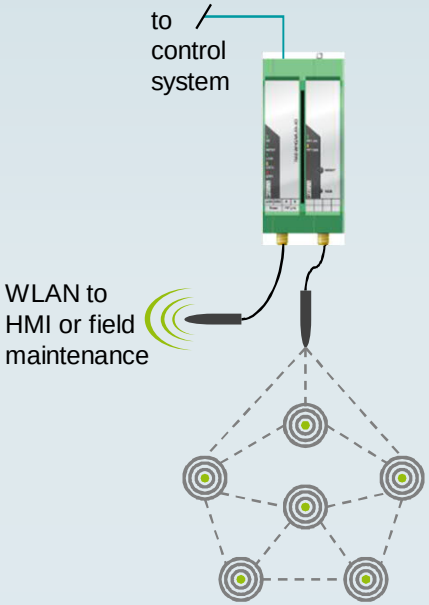
**Process data access**
HART IP, Modbus TCP, FDT/DTM
(supports up to 250 field devices)

# Wireless HART Gateway - Installation options




**WLAN disabled**

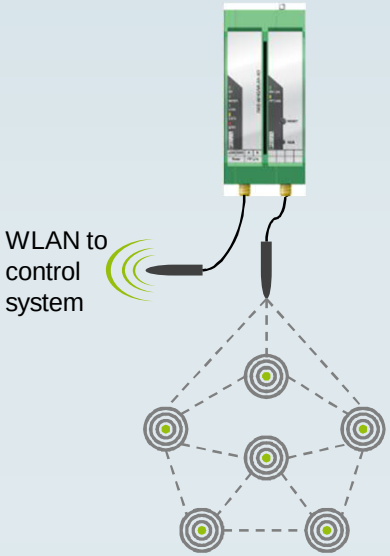
Ethernet connection to control system




**WLAN maintenance port**

Ethernet connection to control system

WLAN connection to HMI, maintenance PC or tablet




**WLAN backhaul**

WLAN connection to control system

# Wireless HART Adapter

**Removable outdoor antenna**
Can optionally be replaced for increased performance by antennas with more gain

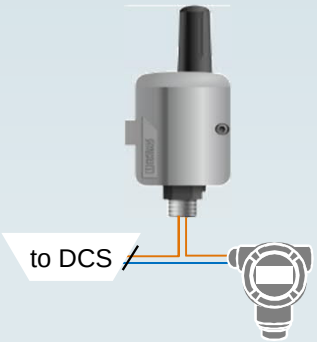
**Environmental**
-40…70°C
ATEX, IECEx, CSA Zone 2

**Mechanical**
rugged cast aluminum housing
1/2NPT or M20 fitting

**Sensor connection**
Connection of up to 4 HART devices
Direct supply of one HART- device (loop-powered)

# Wireless HART Adapter - Installation options

## retrofit existing installations

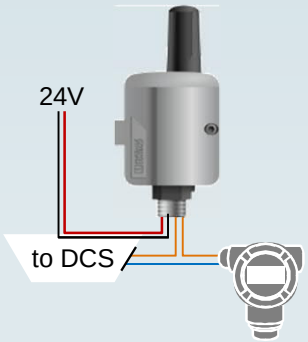



### loop powered

retrofit an existing device

the loop stays intact

WHA is loop powered



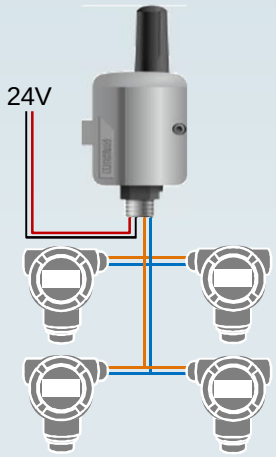

### line powered

retrofit an existing device

the loop stays intact

WHA is 24V powered

## add new measurement points

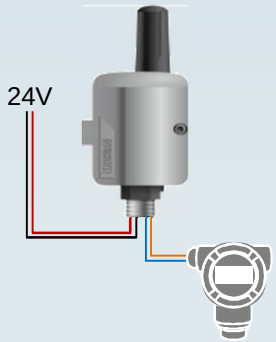



### multidrop

connect up to 4 HART devices

WHA is 24V powered

WHA supplies loop power for the HART devices




### 4…20mA

WHA is 24V powered

WHA supplies loop power for a 4…20mA device

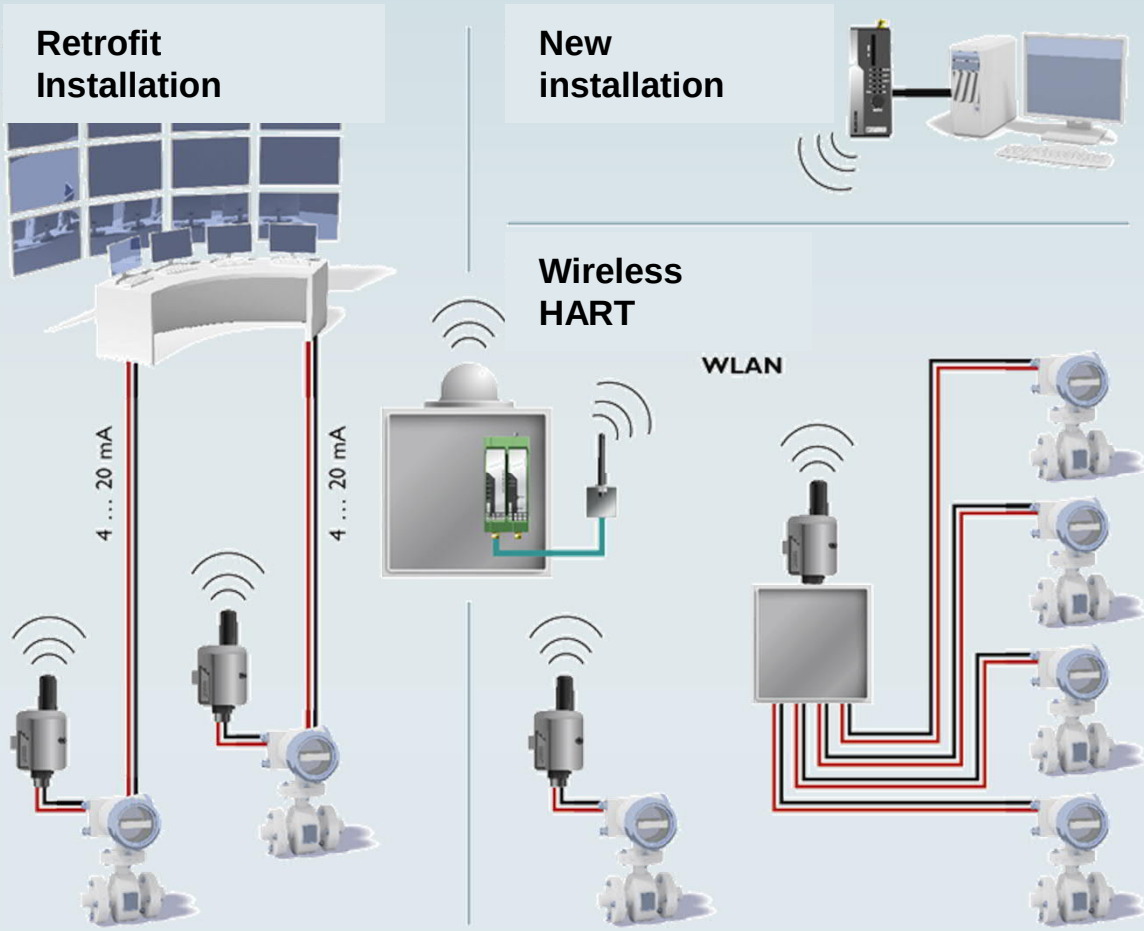
WHA reports 4…20mA loop value as PV

# Wireless HART

**Wireless HART can:**

**New installation**
- Accelerate system extension
- Reduce start time
- Lower investment costs

**Retrofit installation**
- Meet new directives
- Increase efficiency
- Lower maintenance costs



# 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

# Wireless HART

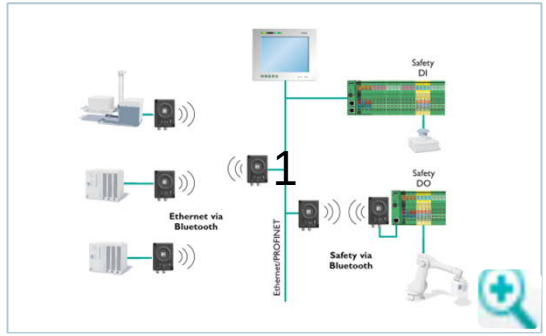
| | RAD-WHG/WLAN-XD | RAD-WHA-1/2NPT | GW HART USB MODEM (Accessoire) |
|---|---|---|---|
| Description | Gateway between WirelessHART field devices and 802.11b/g | Adapter that can be used to interface HART field devices into a WirelessHART network. | USB modem for configuration and commissioning HART devices<br><br>The GW HART USB MODEM is suitable as a replacement for old RS232 HART modems or a cost effective alternative to expensive handheld devices. |
| Wireless Interface | 2,4 GHz…2,4835 GHz | | |
| Interface | Supports 250 Wireless HART devices | Up to 4 HART devices can be connected to one adapter | |
| Antenna connection | RSMA (female) (without antenna) | N (female) (Removable antenna) | |
| Degree of protection | IP20 | IP65 | |
| Order number | 2900178 | 2900100 | 1003824 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial Bluetooth

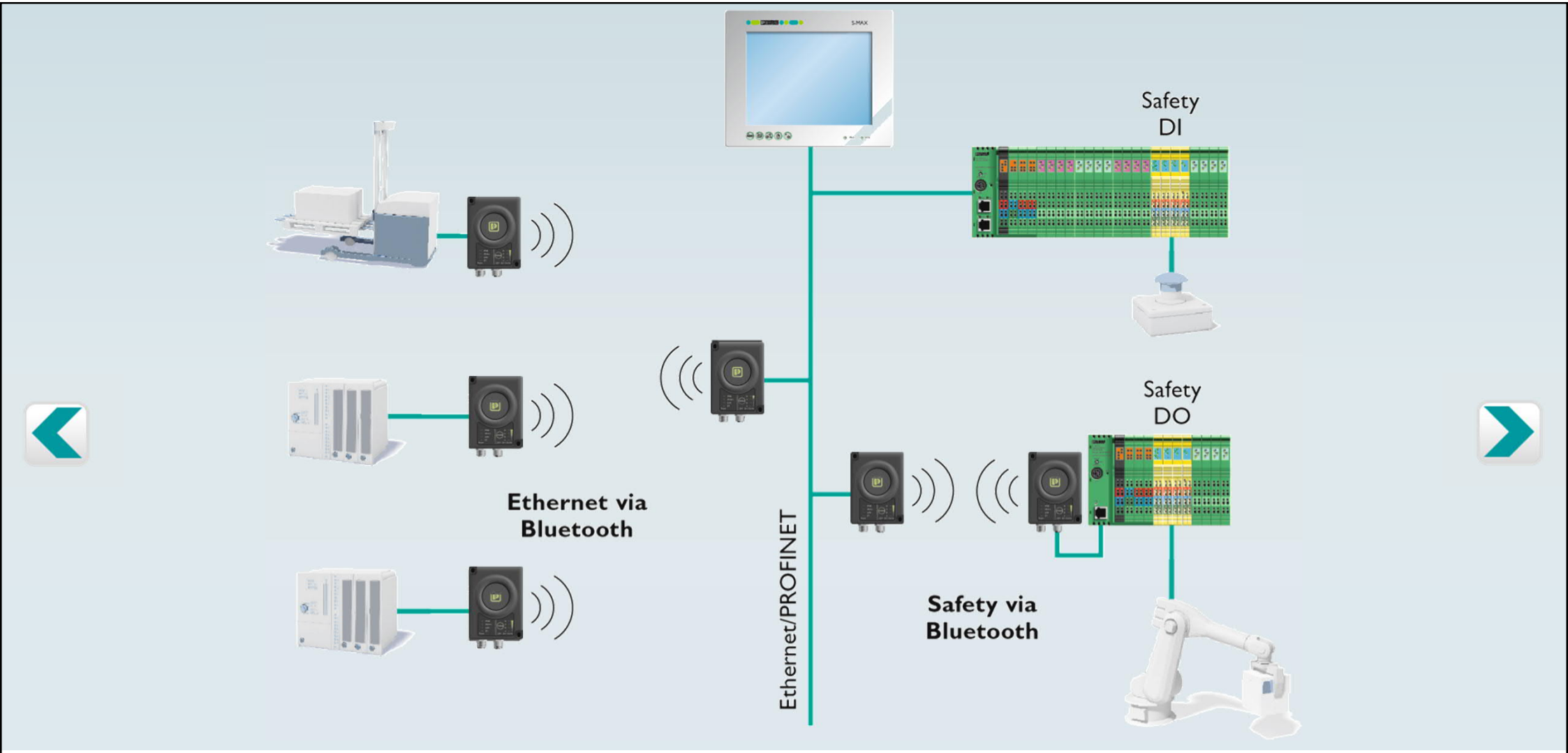
Various application areas

- Point-to-point connection (Cranes, traveling bridge collectors, robots)
- Multipoint connection (I/O components, scanners, PCs)






PHOENIX CONTACT
INSPIRING INNOVATIONS






PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial Bluetooth

Interference-free parallel operation with WLAN networks

- Adaptive frequency hopping (AFH)
- Low emission mode (LEM)
- Black channel list (BCL)



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial Bluetooth

| | | | |
|---|---|---|---|
| | **FL EPA 2 (BT Mode)** | **FL EPA 2 RSMA (BT Mode)** | **FL BT EPA 2** |
| Function | Bluetooth Ethernet Client Adapter | Bluetooth Access Point | Bluetooth Ethernet Client Adapter |
| Antenna | Internal panel antenna | Omnidirectional antenna supplied as standard | Internal panel antenna |
| Frequency band | 2,4 GHz | 2,4 GHz | 2,4 GHz |
| Connection type | M12 connection | M12 connection | M12 connection |
| Degree of protection | IP65 | IP65 | IP65 |
| Temperature range | -40 °C … 65 °C | -40 °C … 65 °C | -40 °C … 65 °C |
| Order number | 1005955 | 1005957 | 1005869 |

# Industrial WLAN

Reliable communication thanks to MIMO technology

All-in-one-solution

Compatible with standards IEEE 802.11 a/b/g/n

Quick and easy startup

Optimized for operation in PROFINET and EtherNet/IP networks

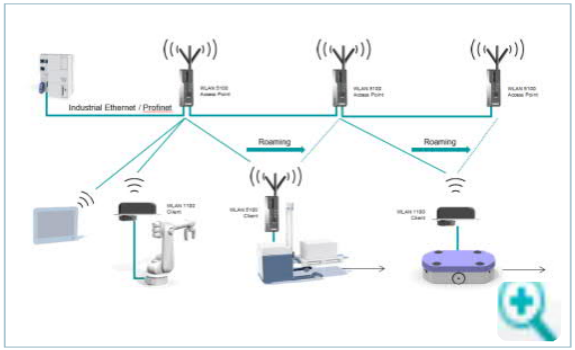


PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

Reliable communication thanks to MIMO technology

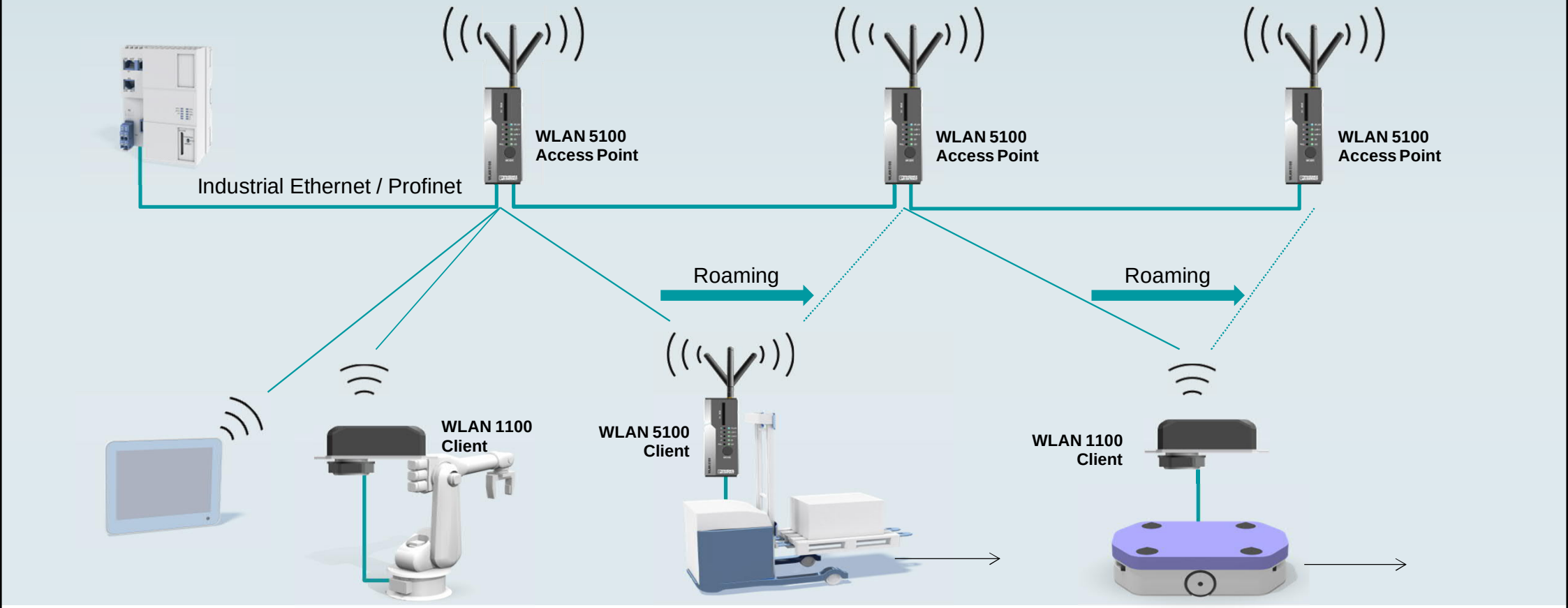
- Interruption-free roaming






INSPIRING INNOVATIONS

# Industrial WLAN



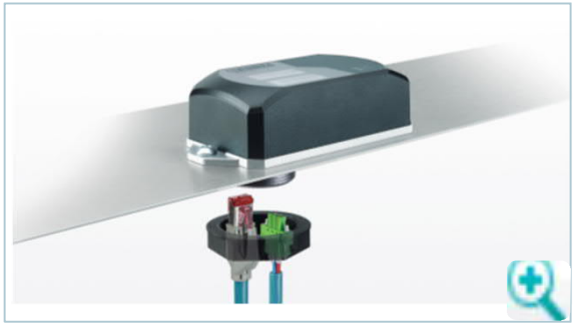



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

All-in-one-solution

- Integraded antennas and wireless module on one single device
- Single-hole mounting directly on machines, mobile vehicles or control cabinets
- Shockproof according to IK08



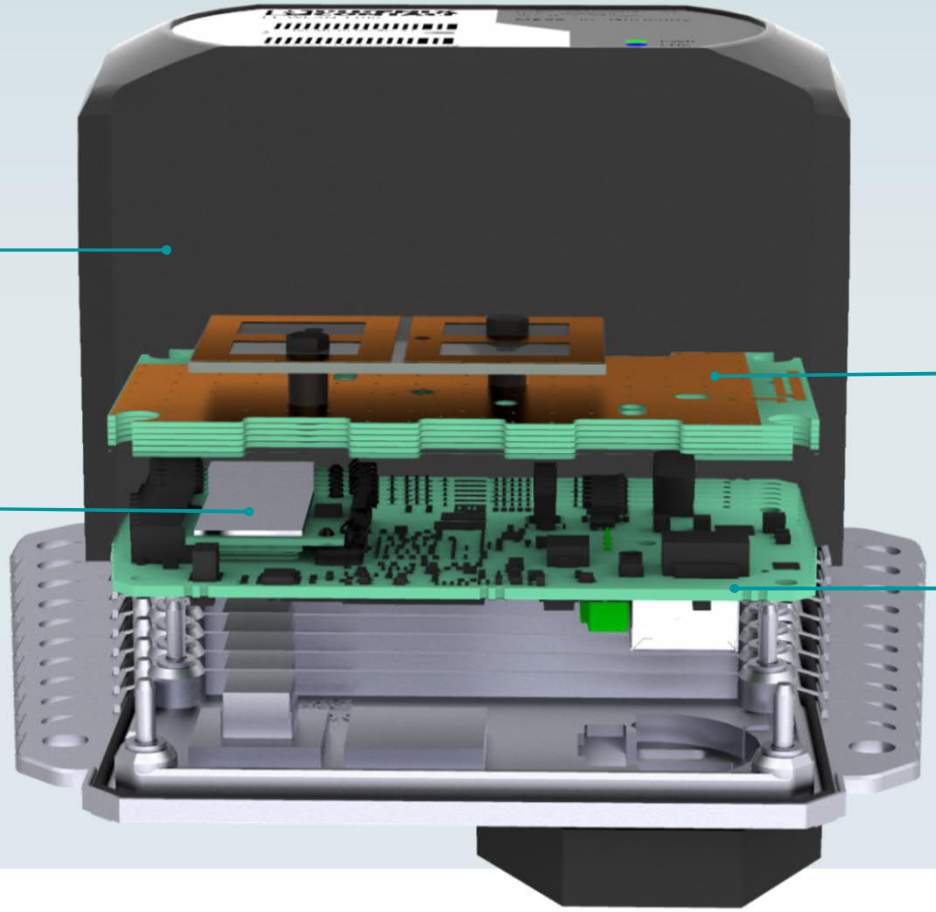


PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

**Extremely robust housing**,
shockproof in accordance
with IK08, 7 Joule at -50°C
Protection Class IP 54

**Powerful WLAN Board**
802.11a/b/g/n
Dual band, 2,4 & 5 GHz



**Special antennas**
For fast and reliable
communication

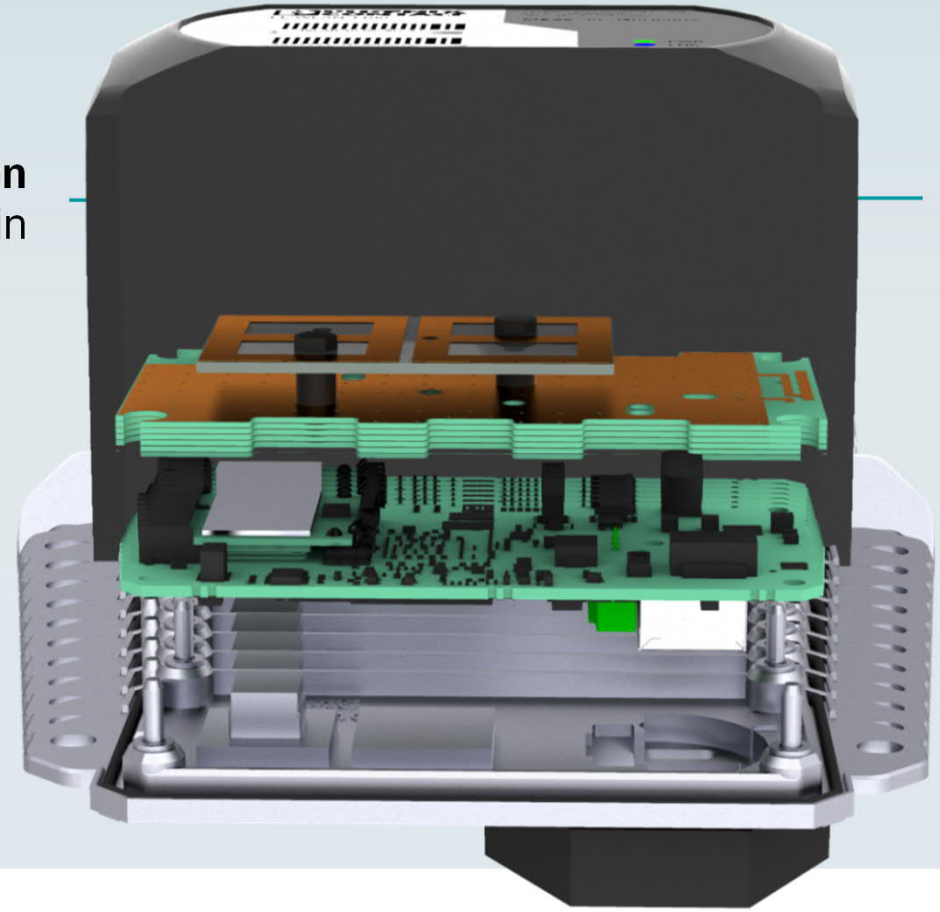
**Powerful Access Point**
Linux operating system



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

**Power connection**
Push-in



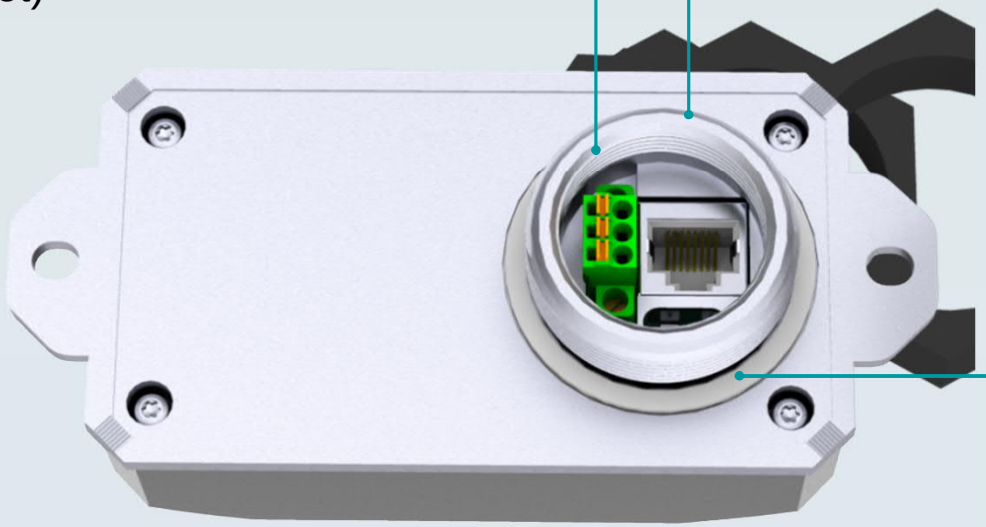
**Ethernet connection**
Standard RJ45



PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

**M32 inside thread**
For optional IP67-connection adapter
(if not mounted on cabinet)



**M40 external thread**
for mounting

**Seal**
up to IP67

# Industrial WLAN

**Fast and easy connection**
thanks to single-hole mounting

Product overview

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

**Fast and easy connection**
thanks to single-hole mounting

**Quick fastening**

Product overview

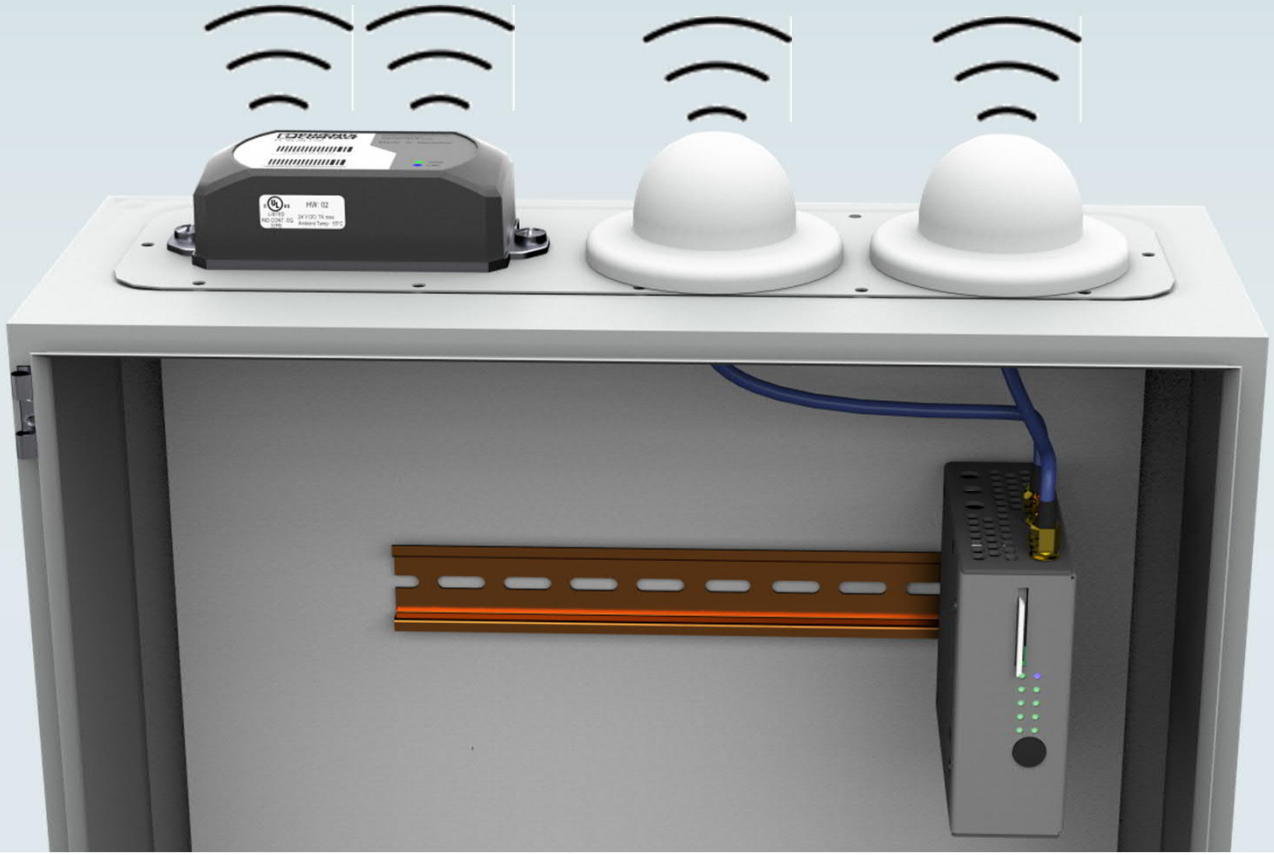
PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

Product overview

INSPIRING INNOVATIONS

# Industrial WLAN



Product overview

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

Quick and
easy startup

- Cluster Management

# Industrial WLAN

| | FL WLAN 1100 (Europe) | FL WLAN 1101 (USA, Canada) | FL WLAN 2100 (Europe) | FL WLAN 2101 (USA, Canada) |
|---|---|---|---|---|
| Function | Wireless access point and client | | Wireless access point and client | |
| Antenna | 2 x integrated Antennas with MIMO technology | | 2 x integrated Antennas with MIMO technology | |
| Wireless standard | IEEE 802.11 a/b/g/n | | IEEE 802.11 a/b/g/n | |
| Frequency band | 2,4 and 5 GHz | | 2,4 and 5 GHz | |
| Connection type | RJ45 | | RJ45 | |
| Degree of protection | IP54 above, IP20 below | | IP66/68 above, IP20 below | |
| Temperature range | 0 °C ... 60 °C | | -40 °C … 60 °C | |
| Order number | 2702534 | 2702538 | 2702535 | 2702540 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial WLAN

| | FL WLAN 5110 (Europe) | FL WLAN 5111 (USA, Canada) |
|---|---|---|
| Function | Wireless access point an client | |
| Antenna | 2 x external Antennas (not included in scope of supply) with MIMO technology | |
| Wireless standard | IEEE 802.11 a/b/g/n | |
| Frequency band | 2,4 and 5 GHz | |
| Connection type | RJ45 | |
| Degree of protection | IP20 | |
| Temperature range | -40 °C … 60 °C | |
| Order number | 1043193 | 1043201 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial Bluetooth and WLAN

| | FL EPA 2 (WLAN Mode) | FL EPA 2 RSMA (WLAN Mode) |
|---|---|---|
| Function | Combined Ethernet wireless module with Bluetooth and WLAN | Combined Ethernet wireless module with Bluetooth and WLAN |
| Antenna | Internal antenna | Omnidirectional antenna supplied as standard |
| Frequency band | 2,4 and 5 GHz | 2,4 and 5 GHz |
| Connection type | M12 connection | M12 connection |
| Degree of protection | IP65 | IP65 |
| Temperature range | -40 °C … 65 °C | -40 °C … 65 °C |
| Order number | 1005955 | 1005957 |

# Remote communication

Remote maintance via public telephone network

Remote maintance via the Internet and mobile network

Remote control via the mobile network

Remote control via in-house cables

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Remote maintenance via public telephone network

Configuration via web-based management

Can be used worldwide

Switchover between DSL router (default) and DSL modem

Up to three VPN tunnels simultaneously

Firewall

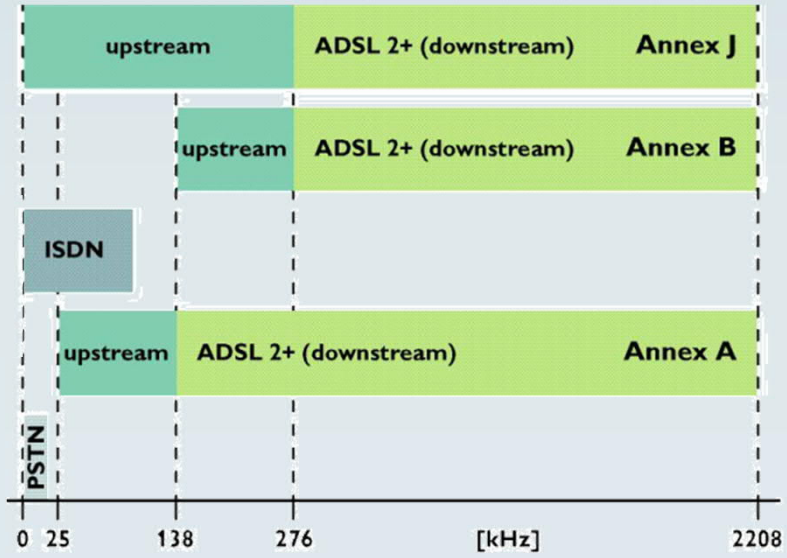
IPsec and OpenVPN

Connect remote stations via ADSL (Asymmetric Digital Subscriber Line)



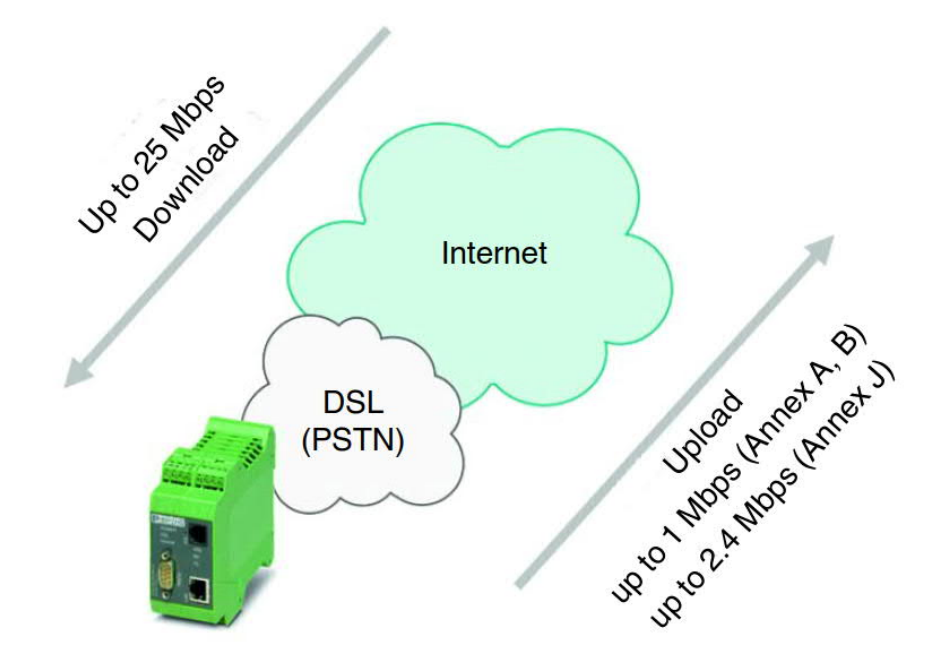
PHOENIX CONTACT INSPIRING INNOVATIONS

# Remote maintenance via public telephone network




- The DSL router is set to Annex B by default
- Switch the Annex bewteen A, B and J via a browser access
  - **Annex A:** DSL operation parallel to analog telephony (PSTN/Public Switched Telephone Network)
  - **Annex B:** DSL operation parallel to gigital telephony (ISDN/Integrated Services Digigital Network)
  - **Annex J:** IP-based connection (German only)

# Maximum DSL transmission speed

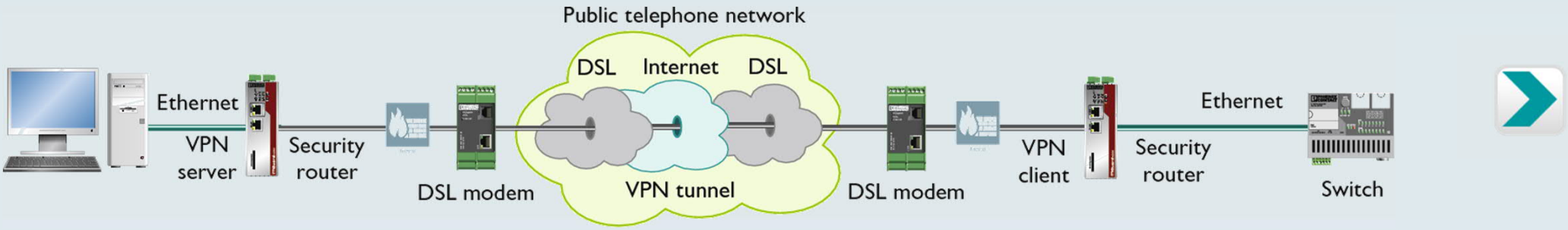



| Country | Annex A, B, J |
|---|---|
| Austria | Mixed, primarily Annex A |
| Belgium | Mixed, primarily Annex A |
| Denmark | Primarily Annex A |
| France | Primarily Annex A |
| Germany | Annex B, Annex J |
| Great Britain | Annex A |
| Iceland | Annex A |
| Italy | Primarily Annex A |
| Netherlands | Mixed, primarily Annex A |
| North America | Annex A |
| Norway | Primarily Annex B |
| Spain | Primarily Annex A |
| Sweden | Primarily Annex A |
| Switzerland | Annex B |

# Remote maintenance via public telephone network

## Modem - Application example:

The DSL modem handles the signal conditioning between the public DSL and the local network
The router and firewall functions are handled by a downstream router, e.g. FL MGUARD

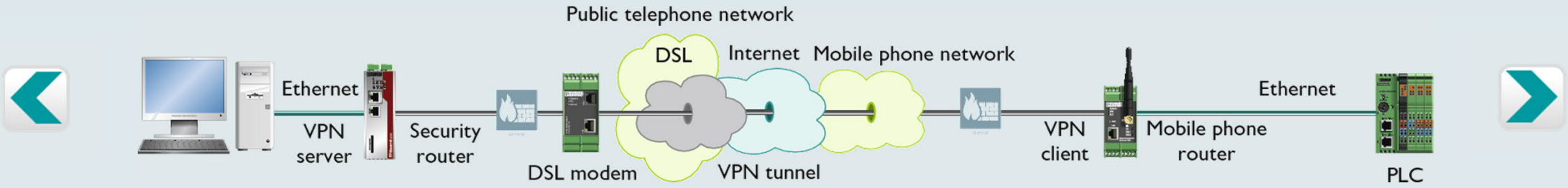



Use as a DSL modem, a downstream router handles the VPN router and firewall functions

# Remote maintenance via public telephone network

## Modem - Application example:

The DSL modem handles the signal conditioning between the public DSL and the local network
The router and firewall functions are handled by a downstream router, e.g. FL MGUARD

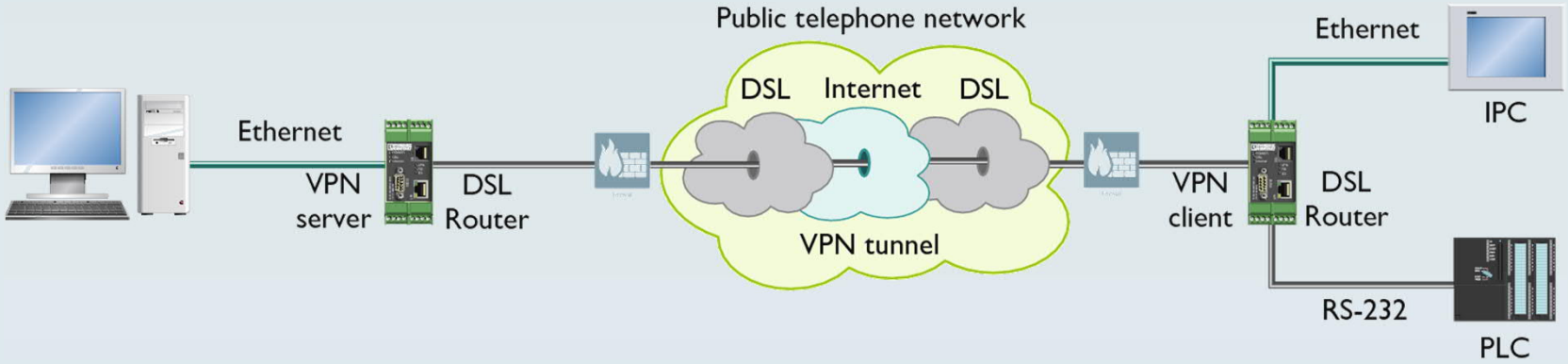



Use as a DSL modem in combination with a mobile router

# Remote maintenance via public telephone network

## Router - Application example:

The The broadband router handles not only the signal conditioning from DSL to LAN but also the router, VPN and NAT functions




Use as a DSL modem, the device handle the VPN router and firewall functions

# Remote maintenance via public telephone network

| | TC DSL ROUTER X400 A/B | TC DSL ROUTER X500 A/B |
|---|---|---|
| Description | Industrial ADSL broadband router/modem with integrated firewall and NAT function. The device supports the standards Annex A, B, and J (ALL-IP connections of Deutsche Telekom). | Industrial ADSL broadband router/modem with RS-232, integrated firewall, NAT and VPN support (IPsec, OpenVPN). The device supports the standards Annex A, B, and J (ALL-IP connections of Deutsche Telekom). |
| Function | Modem | Router |
| VPN Tunnel | No | Yes |
| Firewall | No | Yes |
| Transmission medium | ADSL, Annex A/B/J | ADSL, Annex A/B/J |
| Special feature | - | Serial device server |
| Order number | 2902709 | 2902710 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC Mobile I/O

new

2G and 4G

TC Mobile I/O APP

**Smallest remote control or alerting station**
4 relay outputs
4 digital & 2 analog inputs

USB port
Configuration via web browser

**Alerting at power failure**
Sends SMS message

**Communication over the mobile network**

- Alerting via SMS and E-Mail
- or constant communication with the ODP protocol

**Application example**

- Switching relay via APP
- Device to Device communication



PHOENIX CONTACT INSPIRING INNOVATIONS

# TC Mobile I/O X200 App

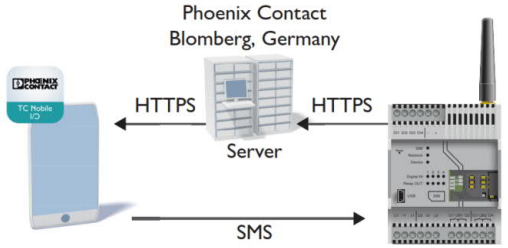
Get the APP on

Google play or Apple Store

iOS

Android

- User-friendly visualization
- Switch outputs on touch
- No SMS typing
- Query the device status automatically or manual
- Full cost control
- Easy to use






PHOENIX CONTACT
INSPIRING INNOVATIONS

# X200: Switching relays remotely via APP

Smartphone

APP

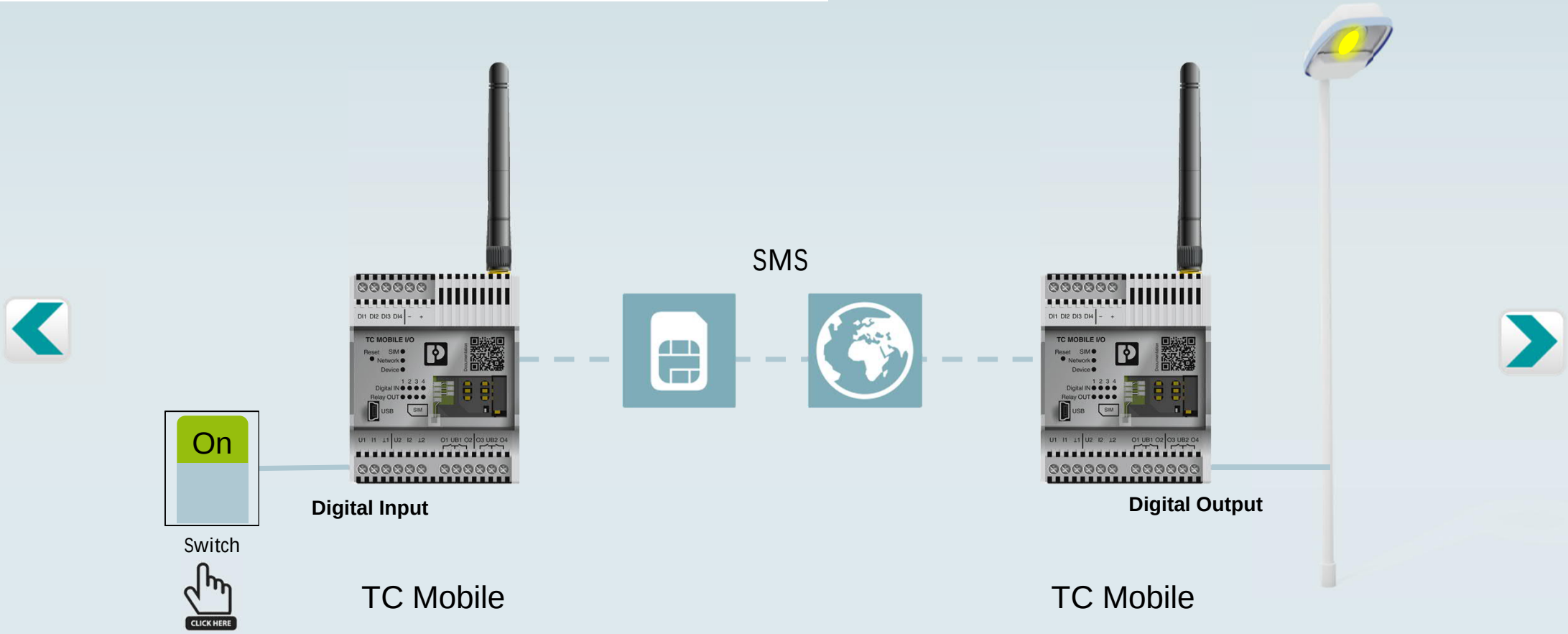
TC Mobile

4 relay outputs
4 digital & 2 analog inputs

Product overview

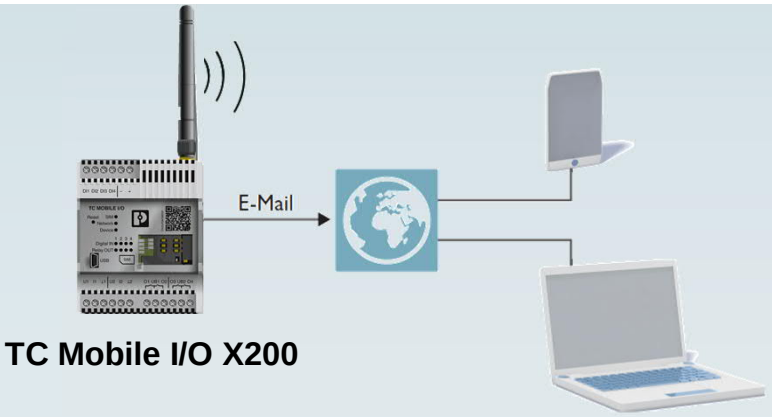
PHOENIX CONTACT
INSPIRING INNOVATIONS

# X200: Switching relays remotely



# X200: Sending e-mails / SMS

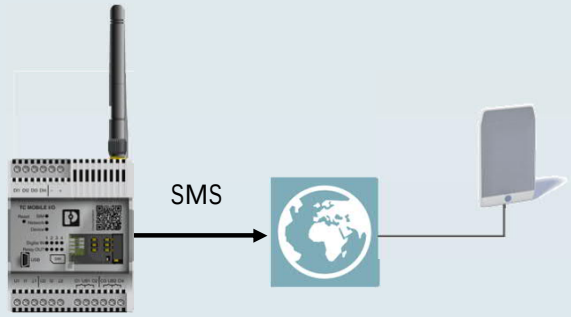
E-mail




**TC Mobile I/O X200**

- The device can send alarms and cyclical messages by e-mail.
- Also the entire log book can be send as an e-mail.
- E-Mail communication can take place without encryption or with SSL encryption.

SMS

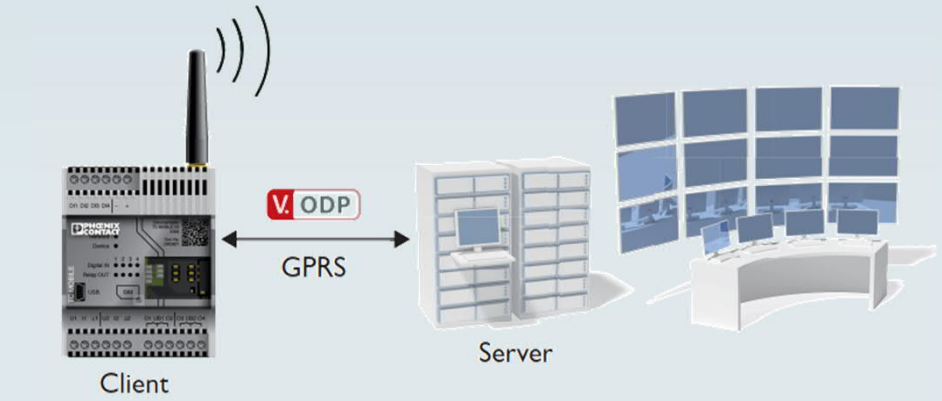



**TC Mobile I/O X200**

- The device can send an SMS even without an Internet connection
- Send SMS to individual devices or to device groups
- Switch the integrated relays via SMS messages

- **In the event of a power failure, one last SMS can still be sent to a selected device!**

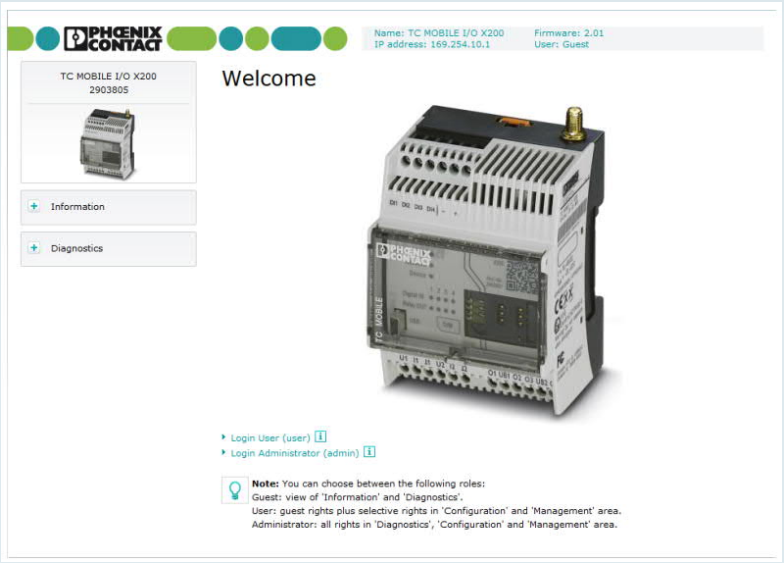
# X300: Communication with ODP server



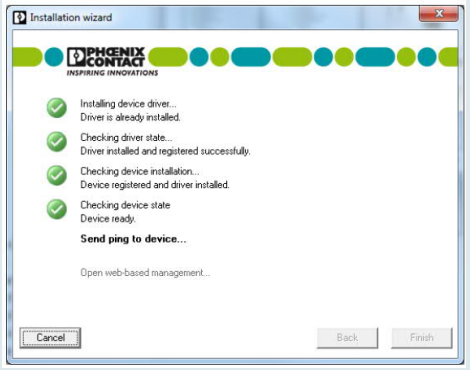

**TC Mobile I/O X300**

- The device communicates via the ODP protocol (Open Data Port)
- The TC Mobile I/O X300 is an ODP client
- ODP is a solution for remote transmission of data in order to adequately monitor systems transmit the data immediately or with a delay via the GPRS mobile communication service
- The ODP protocol stands for scalable and low data communication. It can therefore reduce the costs of mobile data communication
- Configuration via web browser

# Web browser

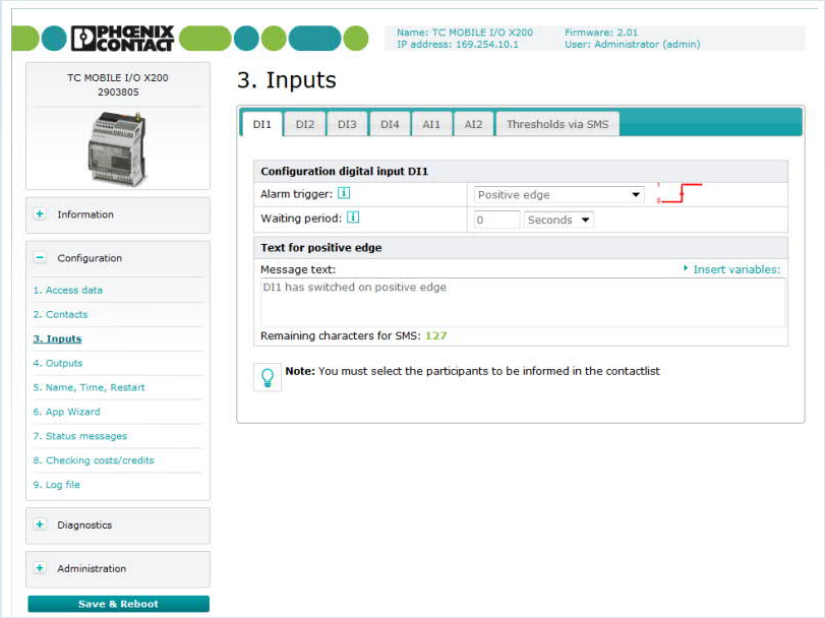



- Connect the devices via USB cable
- An installation wizard will support you during initial startup of the device.
- No additional software is required



# Web browser – Digital Input

4 digital inputs

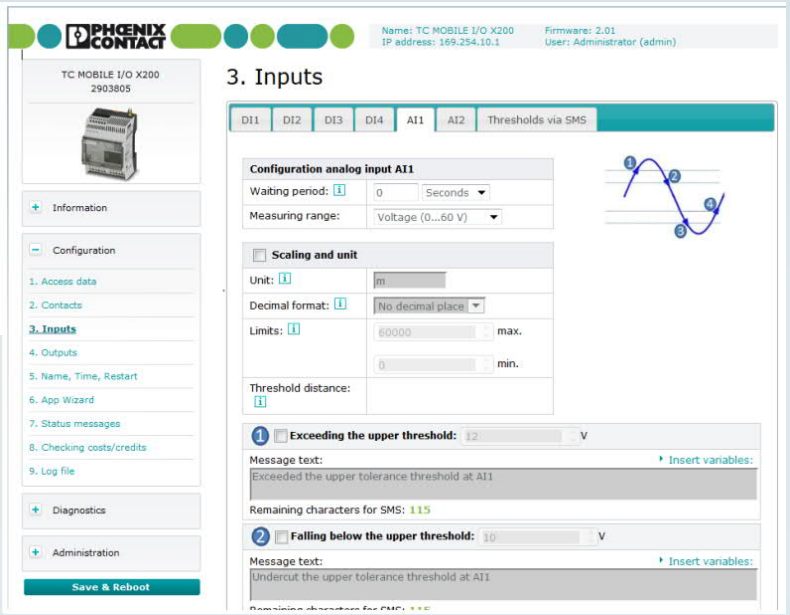



## Digital Inputs

- 4 digital input channels
- The alarm can be triggered in three ways:
  - For positive edge
  - For negative edge
  - For positive and negative edge
- The alarm can be triggered immediately or after a waiting period of 1 … 999 s/min/h
- Save different message texts for each edge

# Web browser – Analog Input

**2 analog inputs**




**Scalable analog inputs (DC device only)**

- 2 analog input channels
- The alarm can send up to four messages per analog input
  - Exceeding the upper tolerence
  - Falling below the upper tolerance
  - Exceeding the lower tolerance
  - Falling below the lower tolerance
- Input signal
  - 0 … 20 mA or 4 … 20 mA
  - 0 …. 60 V DC

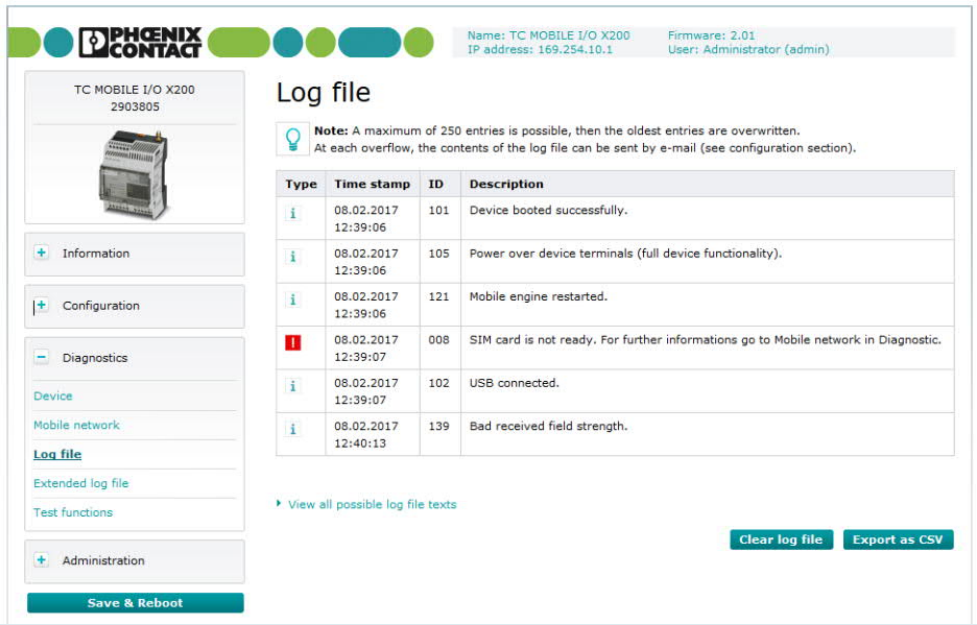
# Web browser – Relay Output

**4 relay outputs**

**Relay Outputs**

- 4 relay outputs
- Open or close the relays via telephone call or SMS
- One command can also switch several relays at the same time
- For security reason, incoming e-mails are not supported
- If a relay has been closed, it can be opened again automatically after a freely selectable waiting period (1 … 999 s/min/h)
- Send a confirmation SMS to the recipient after a relay is opened or closed

# Web browser – Log book




## Log book

- Important information about the device is recorded
- The device can send the contend of the log book automatically via e-mail
  - At overflow
  - At regular intervals, e.g. once a week
  - After an incoming SMS
- The content of the log book are not saved in the event of power failure

# TC Mobile I/O

new

| | X200 DC | X200 AC | X300 DC | X300 AC | X200-4G | X200-4G AC |
|---|---|---|---|---|---|---|
| | **SMS, E-Mail, App** | **SMS, E-Mail, App** | **ODP client** | **ODP client** | **SMS, E-Mail, App** | **SMS, E-Mail, App** |
| Mobile radio Interface | **2G** | **2G** | **2G** | **2G** | **LTE 4G** | **LTE 4G** |
| Digital relay inputs | 4 | 4 | 4 | 4 | 4 | 4 |
| Digital relay outputs | 4 | 4 | 4 | 4 | 4 | 4 |
| Analog inputs (0/4…20 mA) (0 … 60V DC) | 2 | - | 2 | - | 2 | - |
| Temperature range | -25°C .. +70°C | -25°C .. +70°C | -25°C .. +70°C | -25°C .. +70°C | -25°C .. +70°C | -25°C .. +70°C |
| Supply voltage | 10 V DC … 60 V DC | **93 V AC…250 V AC** | 10 V DC … 60 V DC | **93 V AC…250 V AC** | 10 V DC … 60 V DC | **93 V AC…250 V AC** |
| Order number | 2903805 | 2903806 | 2903807 | 2903808 | 1038567 | 1038568 |

# TC Router

Integrated logbook

Configuration via web-based management or microSD card

Two local Ethernet connections

**4G mobile router**
Fallback to 3G (UMTS/HSPA) and 2G (GPRS/EDGE)

**3G mobile router**
Fallback to 2G (GPRS/EDGE)

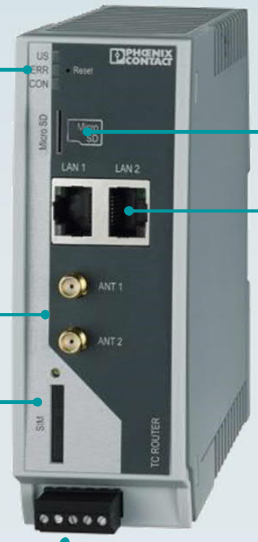
- Mobile high speed data links up to 150 Mbit/s via 4G LTE networks
- Mobile data links up to 21 Mbit/s via 3G networks
- IPsec and OpenVPN
- Up to three VPN tunnels simultaneously
- VPN remote start via call or SMS
- Stateful inspection firewall for dynamic filtering



PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC Router

**Status LEDs**
for instant diagnostic




Micro SD Slot
to load configuration

**MIMO antennas**
for best signal
reception

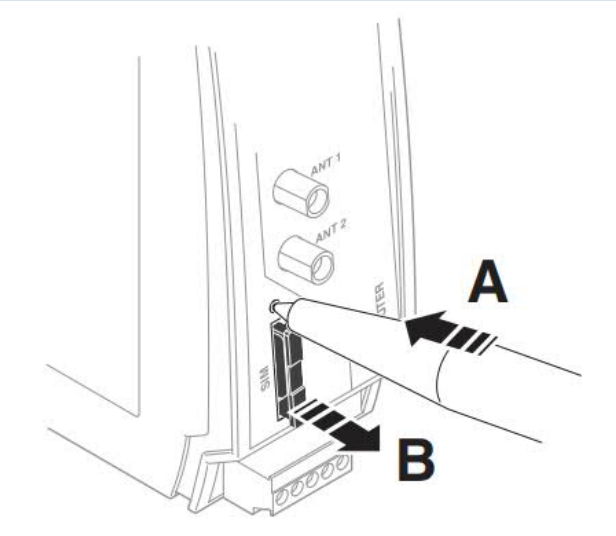
Two local Ethernet
connections

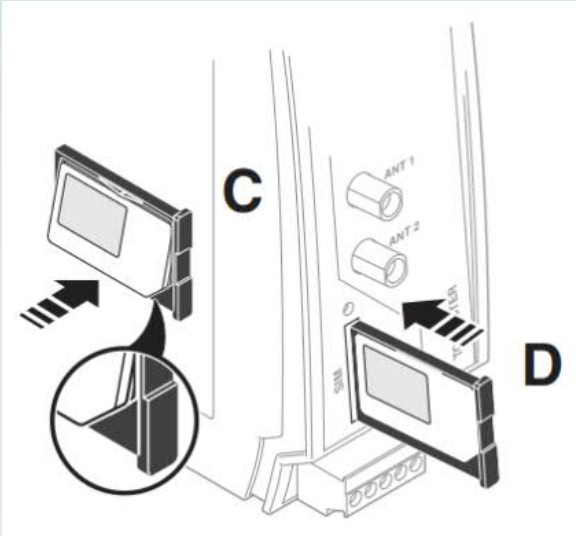
**SIM slot** for rugged
industrial mini SIM card

Switching inputs and outputs

**Energy Saving Mode**
Deactivation of the communication interfaces for max. energy saving

# SIM card




Remove the SIM card holder, inside the SIM card

**SIM slot** for rugged industrial mini SIM card

# Switching inputs and outputs

Two configurable **switching inputs** for following functions:

- SMS can be sent, even to multiple recipients
- E-Mail can be sent, even to multiple recipients
- Controlling an Output at a remote station via SMS
- Restart the router
- Start or stop a mobile data connection
- Switching the Ipsec or OpenVPN connection
- Automatically loading a configuration from a microSD card
- Activating energy-saving mode

One configurable **switching output**, activated by

- Activation by the input at a remote station
- SMS
- Web-based management
- Incoming call
- Connection abort
- Status of the mobile network connection, mobile data link and VPN connection

Switching inputs and outputs



PHOENIX CONTACT
INSPIRING INNOVATIONS

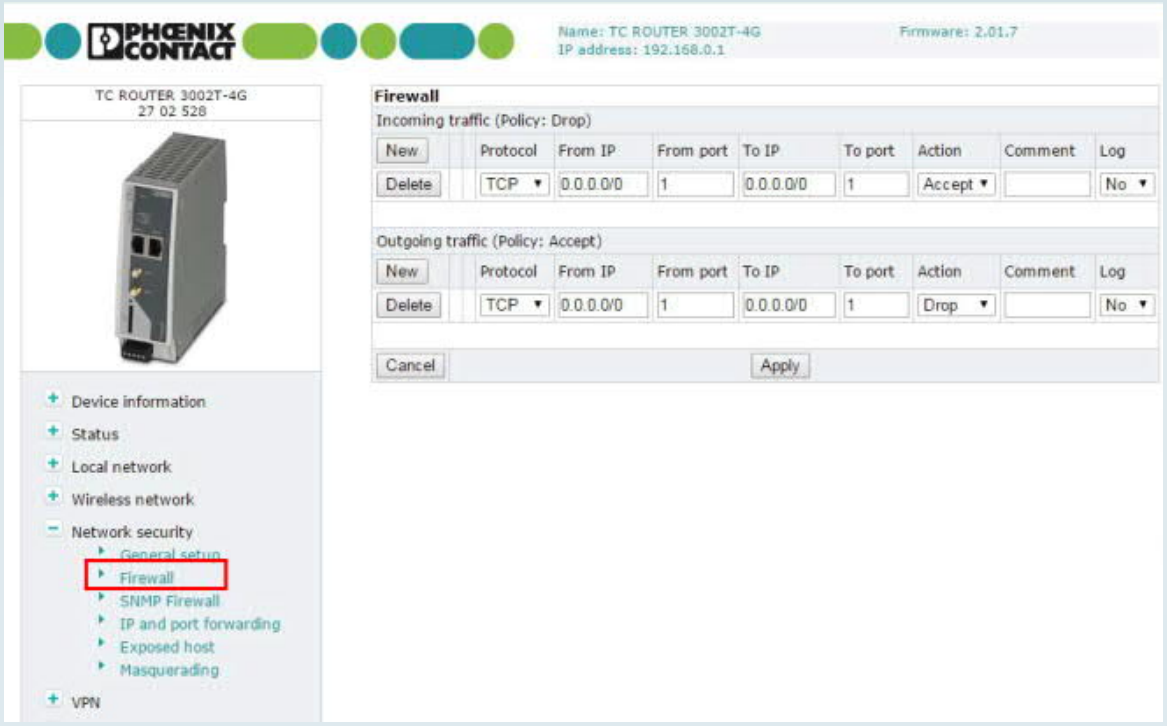
# Configuration via web-based management

The router is configured via web-based management

- Device information
- Status
- Local network
- Wireless network
- Network security
- VPN
- I/O
- System

INSPIRING INNOVATIONS

# Firewall




- The device includes a stateful inspection firewall
- The device supports a maximum of 32 rules for incoming data traffic and 32 rules for outgoing data traffic
- SNMP firewall to restrict SNMP access
- IP and port forwarding
- Exposed host (server setup)
- Masquerading

# VPN

**Requirements for a VPN connection**

- The IP addresses of the VPN partners are known and can be accessed
- The device supports up to three Ipsec connections and up to two OpenVPN connections.

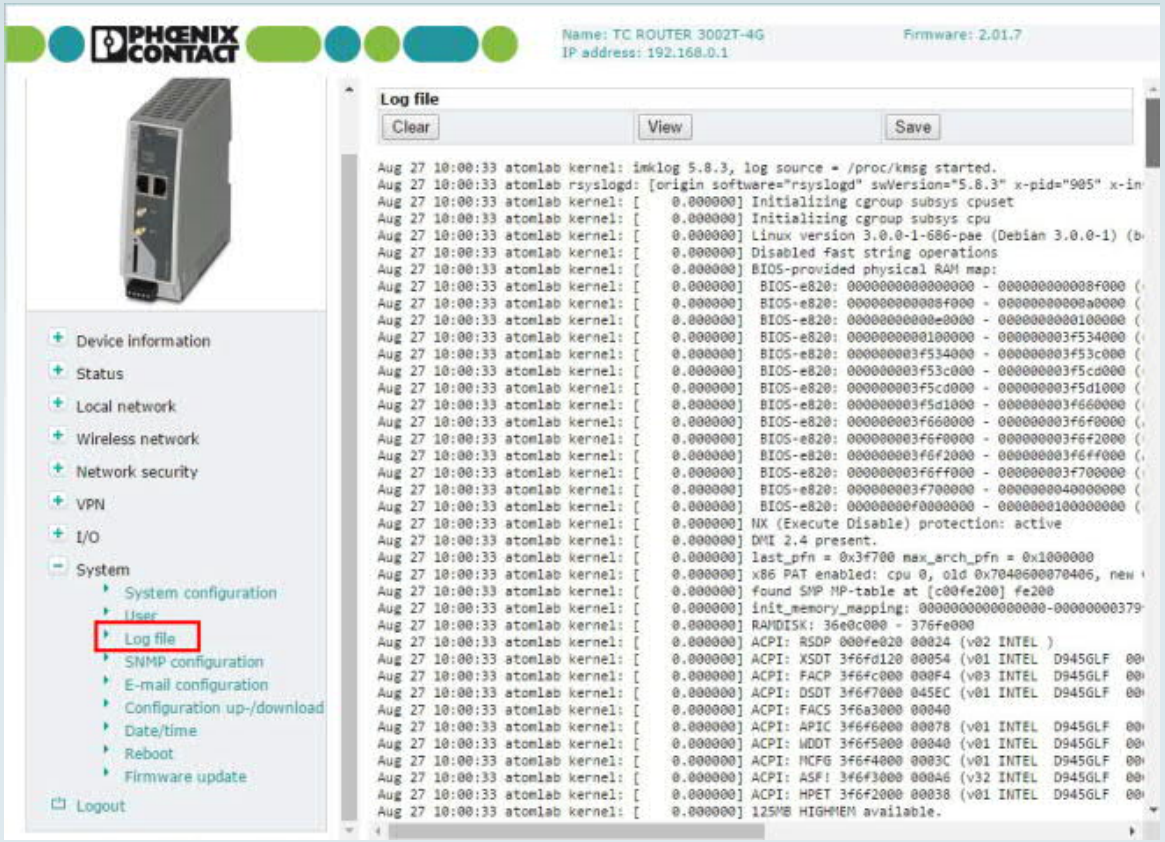
In order to successfully establish an **IPsec connection,** the VPN partner must support IPsec with the following configuration:

- Authentication via X.509 certificate or pre-shared secret key (PSK)
- Diffie-Hellman group 2 or 5
- 3DES or AES encryption
- MD5 or SHA-1 hash algorithms
- Tunnel mode
- Quick mode
- Main mode
- SA lifetime (one second to 24 hours)

The following functions are supported for **OpenVPN** connections:

- OpenVPN client
- TUN device
- Authentication via X.509 certificate or pre shared secret key (PSK)
- Static key
- TCP and UDP transmission protocol
- Keep Alive

# Log file




- The router log file can be used to diagnose various events operating states
- The log file is a form of circulating storage where the oldest entries are overwritten first (FIFO)



PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC Router

| | TC ROUTER 3002T-4G | TC ROUTER 3002T-3G | TC ROUTER 2002T-4G | TC ROUTER 2002T-3G | TC ANT MOBILE WALL 5M |
|---|---|---|---|---|---|
| Function | Industrial 4G router European version | Industrial 3G router European version | Industrial 4G router European version | Industrial 3G router European version | Multiband mobile phone antenna with mounting bracket for outdoor installation,<br><br>5m antenna cable (SMA) |
| Mobile radio Interface | 4G | 3G | 4G | 3G | |
| Transmission speed | 150 Mbit/s LTE Downlink | 21 Mbit/s HSPA Downlink | 150 Mbit/s LTE Downlink | 21 Mbit/s HSPA Downlink | |
| Switching inputs and outputs | 2 digital Inputs,<br>1 digital output | 2 digital Inputs,<br>1 digital output | 2 digital Inputs,<br>1 digital output | 2 digital Inputs,<br>1 digital output | |
| General | Firewall, NAT,<br>**IPsec, OpenVPN**<br>SMS and e-mail transmission | Firewall, NAT**,**<br>**IPsec**, **OpenVPN**<br>SMS and e-mail transmission | Firewall, NAT<br>SMS and e-mail transmission | Firewall, NAT<br>SMS and e-mail transmission | |
| Order number | 2702528 | 2702529 | 2702530 | 2702531 | 2702273 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC Router

verizon

AT&T

| | TC ROUTER 3002T-4G VZN | TC ROUTER 3002T-4G ATT | TC ANT MOBILE WALL 5M |
|---|---|---|---|
| Function | Industrial 4G router<br>**USA**<br>For communication in **Verizon** Wireless mobile network | Industrial 4G router<br>**USA**<br>For communication in **AT&T** Wireless mobile network | Multiband mobile phone antenna with mounting bracket for outdoor installation,<br><br>5m antenna cable (SMA) |
| Mobile radio Interface | 4G | 4G | |
| Transmission speed | 150 Mbit/s LTE Downlink | 150 Mbit/s LTE Downlink | |
| Switching inputs and outputs | 2 digital Inputs,<br>1 digital output | 2 digital Inputs,<br>1 digital output | |
| General | Firewall, NAT,<br>**IPsec, OpenVPN**<br>SMS and e-mail transmission | Firewall, NAT**,**<br>**IPsec**, **OpenVPN**<br>SMS and e-mail transmission | |
| Order number | 2702532 | 2702533 | 2702273 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC CLOUD CLIENT

Cost-effective entry into cloud-based remote maintenance

Intuitive operation of web interface

Simple startup due to configuration assistants in the mGuard secure cloud

Flexible communication with the cloud via operator or 4G LTE networks



PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC CLOUD CLIENT 1002-TX/TX

**Status LEDs** for instant diagnosis

**2 Ethernet ports**

**Micro SD Slot** to load configuration

Connector for power and digital input and output

- Connecting machines to **mGuard Secure Cloud** (Cloud only) via **operator network**
- LAN link into machine network and to the cloud via operator network
- Load configuration via MicroSD card
- VPN start by key switch
- Temperature range 0 … +60°C

# TC CLOUD CLIENT 1002-4G …

**Status LEDs**
for instant diagnosis

**Micro SD Slot**
to load configuration

**2 Ethernet ports**

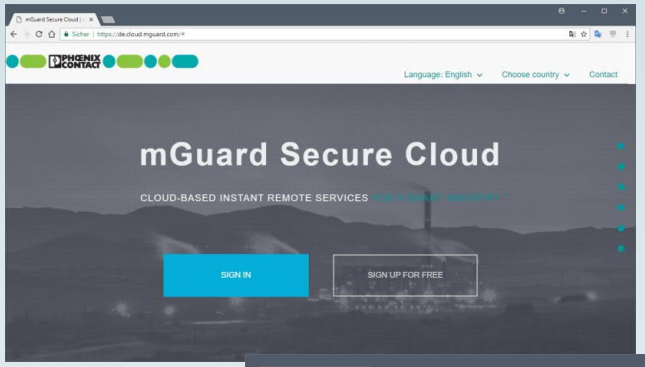
**MIMO antennas**
for best signal reception

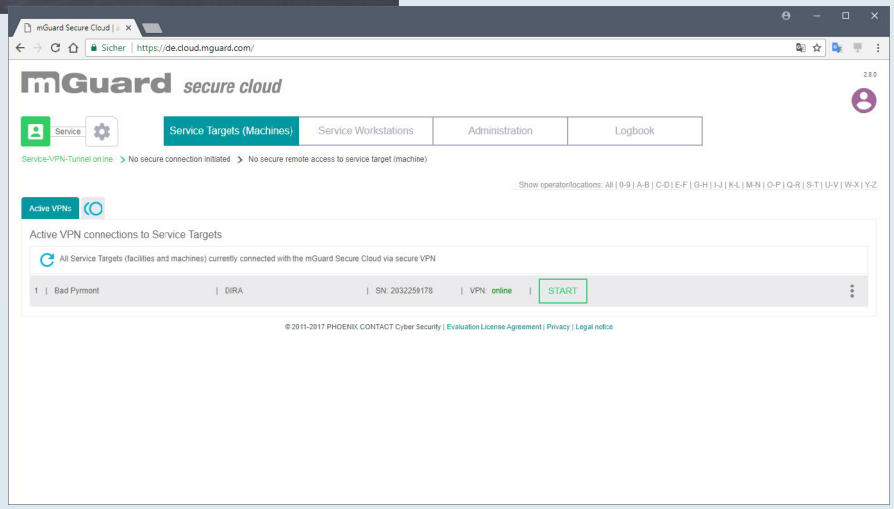
**SIM slot** for rugged industrial mini SIM card

Connector for power and digital input and output

- Connecting machines to mGuard Secure Cloud (Cloud only) via **4G cellular network** (EU, US)
- LAN link into machine network
  Cellular link to the cloud
- Load configuration via MicroSD card
- VPN start by key switch
- Temperature range 0 … +60°C

# mGuard Secure Cloud



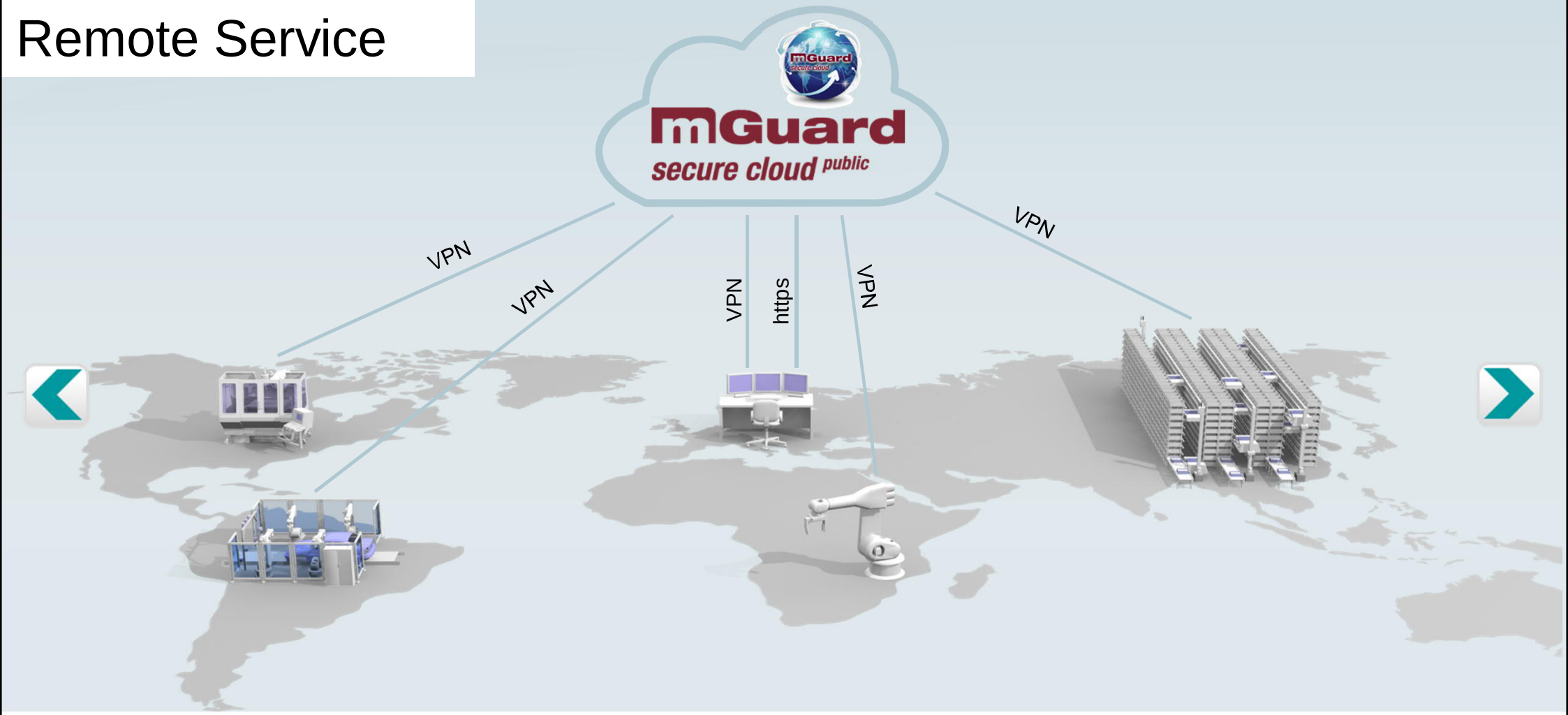




Phoenix's mGuard Secure Cloud offers operators and machine builders a highly secure, web-based method for instant remote services to any machine and production plant within a client's network.

The mGuard Secure Cloud is a professionally hosted, turnkey remote-services ecosystem for both the machine builder and the plant operator

https://de.cloud.mguard.com/

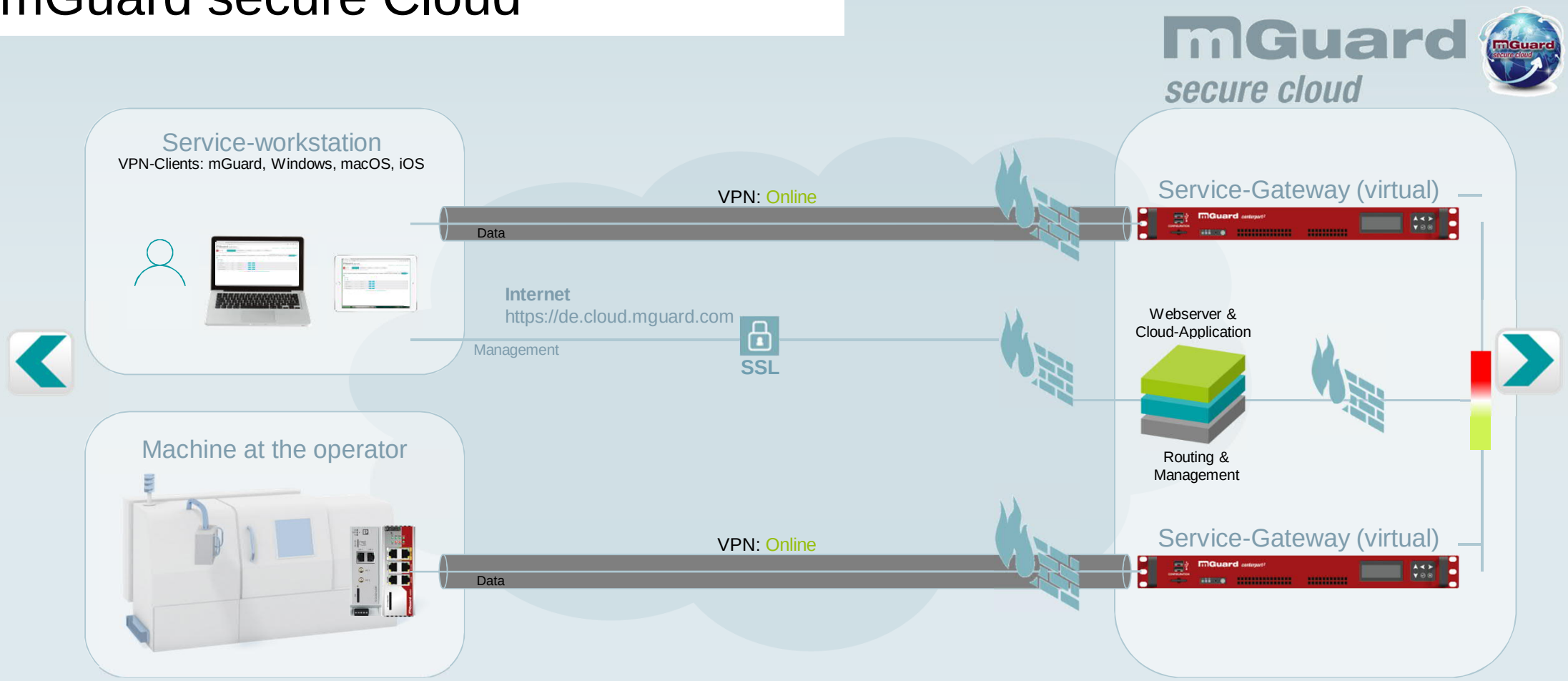
# Remote Service






PHOENIX CONTACT
INSPIRING INNOVATIONS

# mGuard secure Cloud



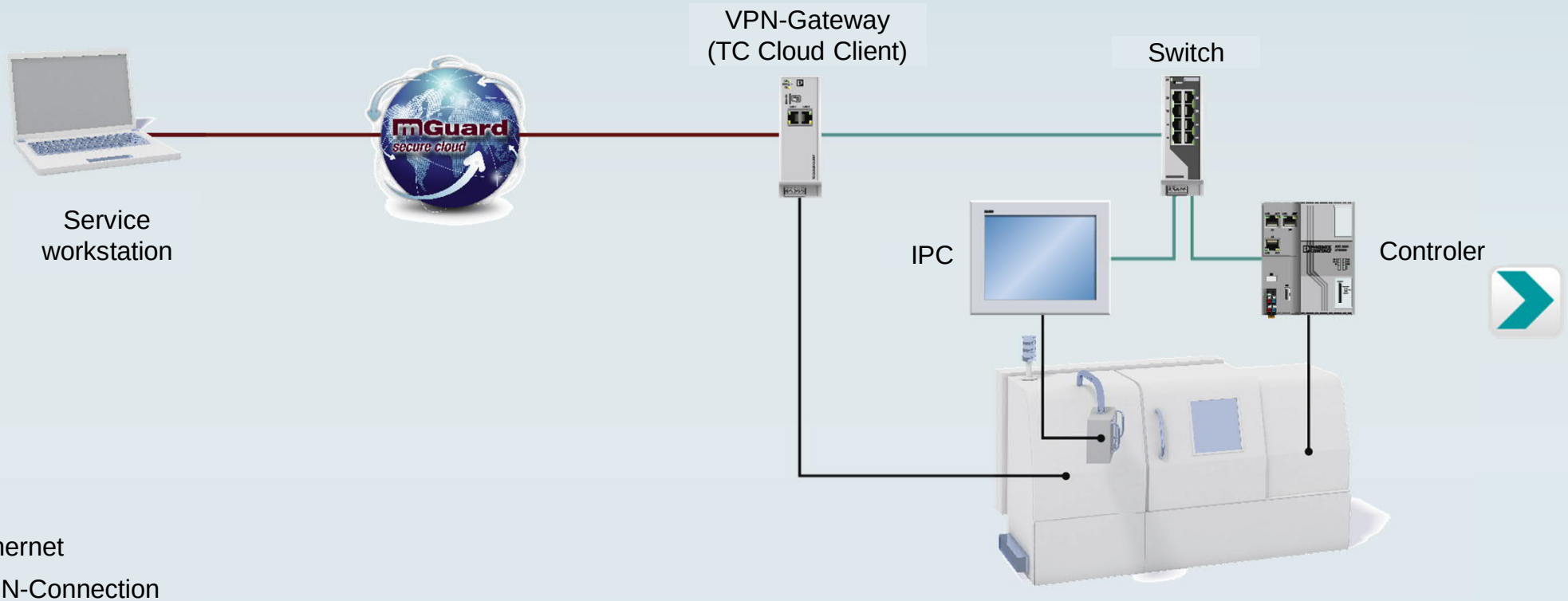



PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC Cloud Client

PHOENIX CONTACT
INSPIRING INNOVATIONS

# TC Cloud Client



# TC Cloud Client

verizon

AT&T

| | TC CLOUD CLIENT 1002-4G | TC CLOUD CLIENT 1002-TX/TX | TC CLOUD CLIENT 1002-4G VZW | TC CLOUD CLIENT 1002-4G ATT |
|---|---|---|---|---|
| Transmission medium | 4G LTE | Operator‘s network | 4G LTE Verizon, US | 4G LTE AT&T, US |
| Description | Industrial VPN gateway for mGuard Secure Cloud, Cloud communication via 4G LTE, European version | Industrial VPN gateway for mGuard Secure Cloud, cloud communication via operator network, | Industrial VPN gateway for mGuard Secure Cloud, cloud communication via 4G LTE, Verizon (US) | Industrial VPN gateway for mGuard Secure Cloud, cloud communication via 4G LTE, AT&T (US) |
| Special features | **Device configuration in mGuard secure cloud, simplified Web-Interface** | | | |
| Firewall | No | No | No | No |
| VPN Tunnel | 1 VPN tunnel to the mGuard Secure cloud | | | |
| Order number | 2702886 | 2702885 | 2702887 | 2702888 |

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Industrial security

Protects your system against unauthorized access by people or malware with the mGuard security product range. Use industrial router/firewall solution and industrial-level virus protection to secure your automation network.

The VPN-compatible devices also enable intensive data to be transmitted in encrypted form, providing secure maintenance of machine over public networks.

# Mobile router for worldwide network access

Routing with NAT (Network Address Translation) and 1:1-NAT

Packet prioritization by means of Quality of Service (QoS)

3G and LTE(4G)

Maximum security level with stateful inspection firewall and deep packet inspection

Easy and secure remote maintenance, thanks to VPN connection and IPsec protocol

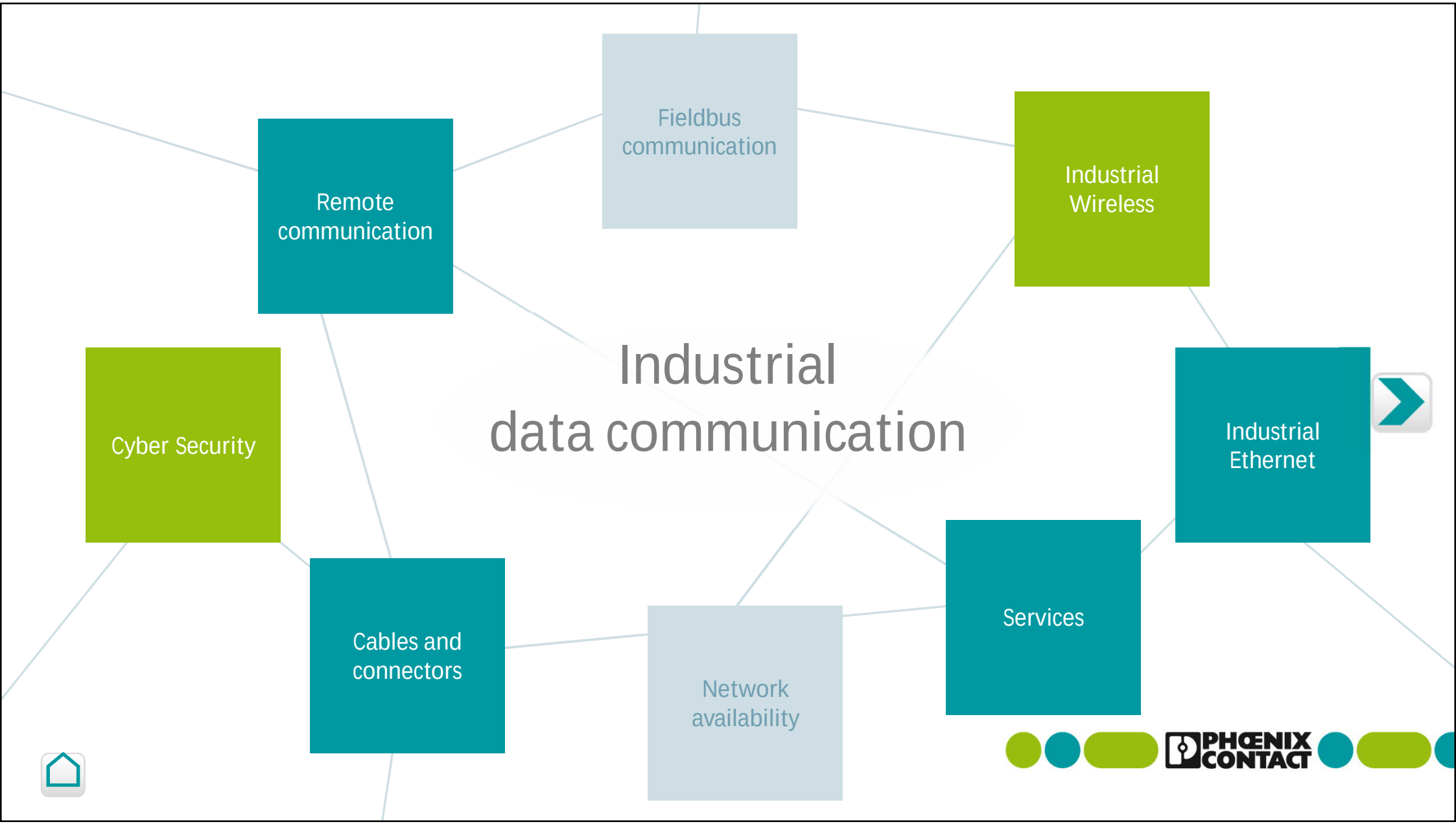


INSPIRING INNOVATIONS

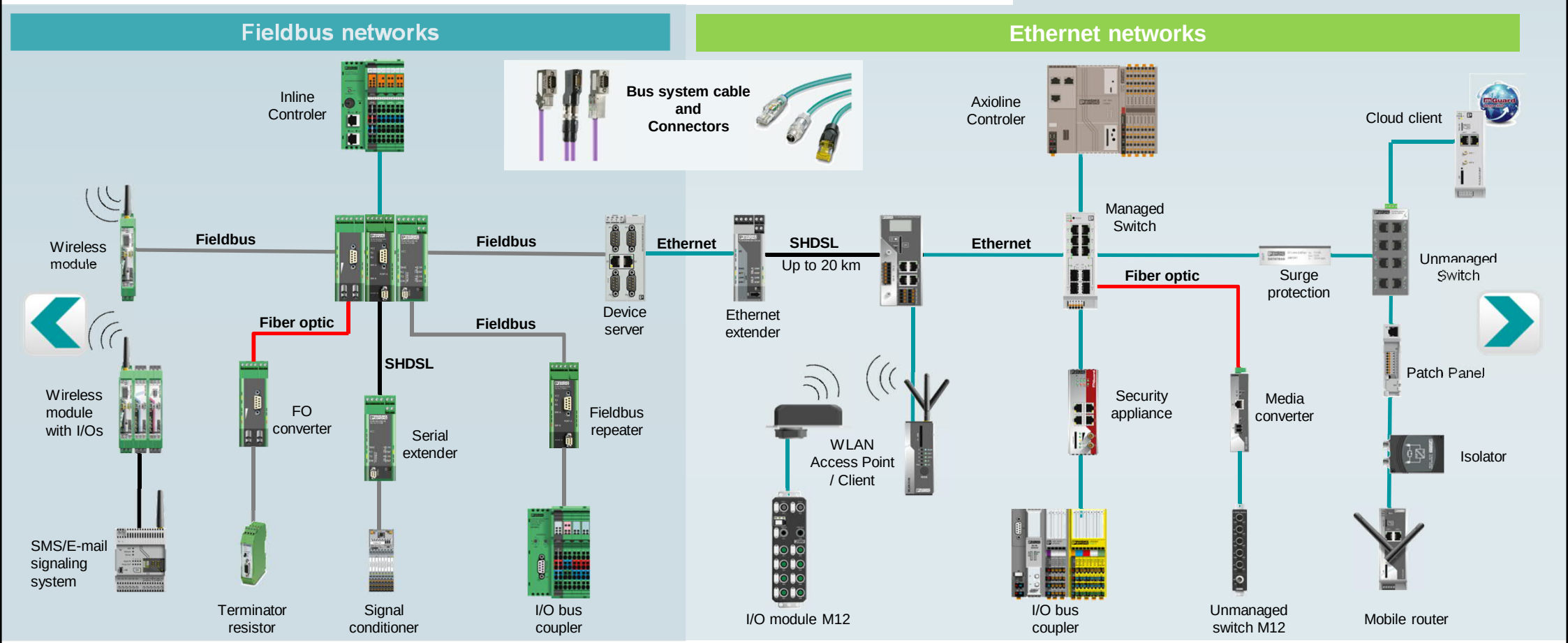
# TC mGuard

| | TC MGUARD RS4000 3G VPN | TC MGUARD RS2000 3G VPN | TC MGUARD RS4000 4G VPN | TC MGUARD RS2000 4G VPN |
|---|---|---|---|---|
| VPN tunnel optionally expandable | Up to 10 parallel (Up to 250 with additional license) | 2 parallel | Up to 10 parallel (Up to 250 with additional license) | 2 parallel |
| Firewall | Intelligent firewall | 2-click firewall | Intelligent firewall | 2-click firewall |
| Integrated switch | 4-Port managed | 4-Port managed | 4-Port managed | 4-Port managed |
| Special features | WAN, GPS reciever, 2 SIM card slots, NAT/1:1 NAT | GPS reciever, 2 SIM card slots, NAT/1:1 NAT | WAN, GPS reciever, 2 SIM card slots, NAT/1:1 NAT | GPS reciever, 2 SIM card slots, NAT/1:1 NAT |
| Mobile interface | 3G | 3G | 4G | 4G |
| Order number | 2903440 | 2903441 | 2903586 | 2903588 |

PHOENIX CONTACT
INSPIRING INNOVATIONS


Fieldbus communication
Remote communication
Industrial Wireless
Industrial data communication
Cyber Security
Industrial Ethernet
Cables and connectors
Network availability
Services
PHOENIX CONTACT

# Everything for industrial networks



Fieldbus communication

# Industrial data communication

# Everything for industrial networks

## Fieldbus communication

Fieldbus extenders and repeaters

Multiplexer

Fiber-optic transmission

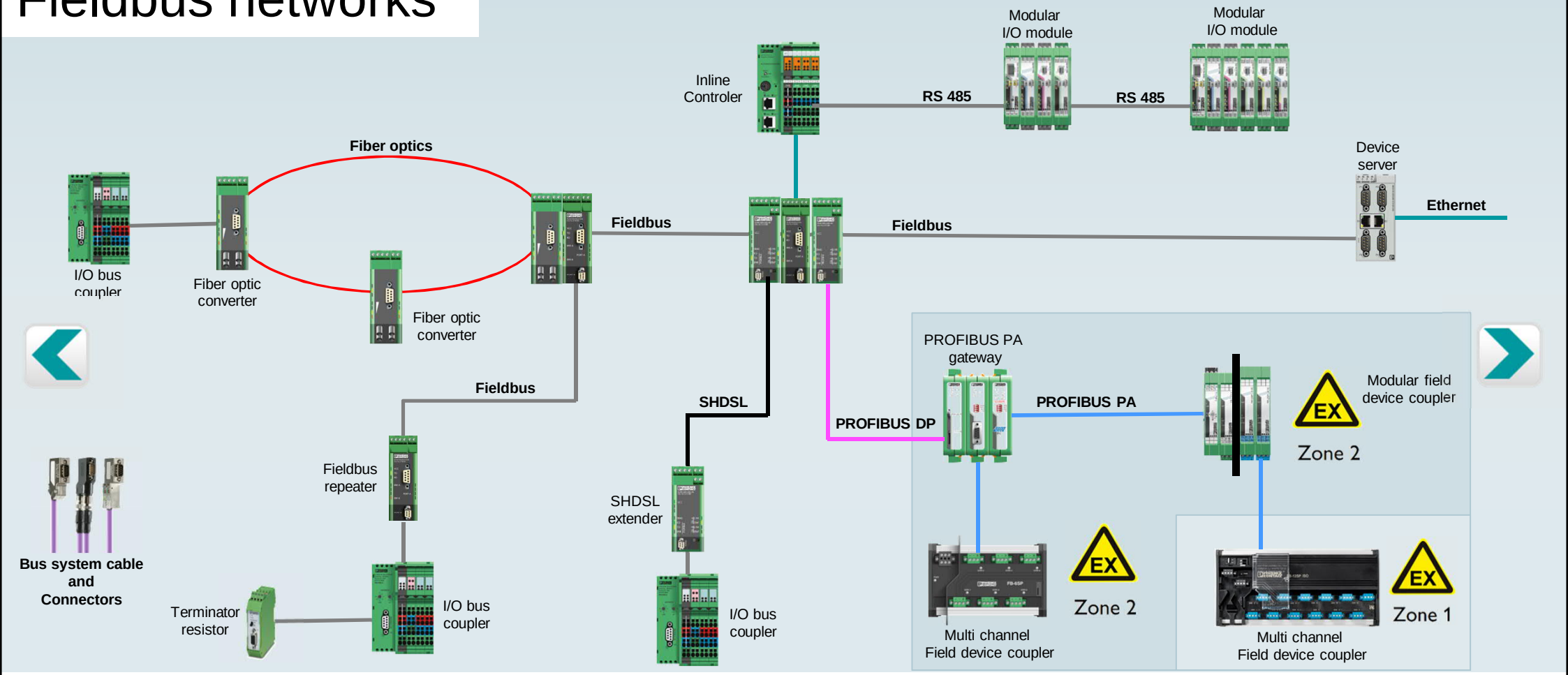
FF / Profibus PA

Converter and isolator

D-SUB connectors

Terminator

# Fieldbus networks



Fieldbus communication

# Industrial data communication

Industrial Ethernet

# Everything for industrial networks

PROFINET
Modbus TCP
EtherNet/IP
EtherCAT
CC-Link IE Field
sercos the automation bus

Media converter

Switches

PoE

management software

Router

## Industrial Ethernet

Extender

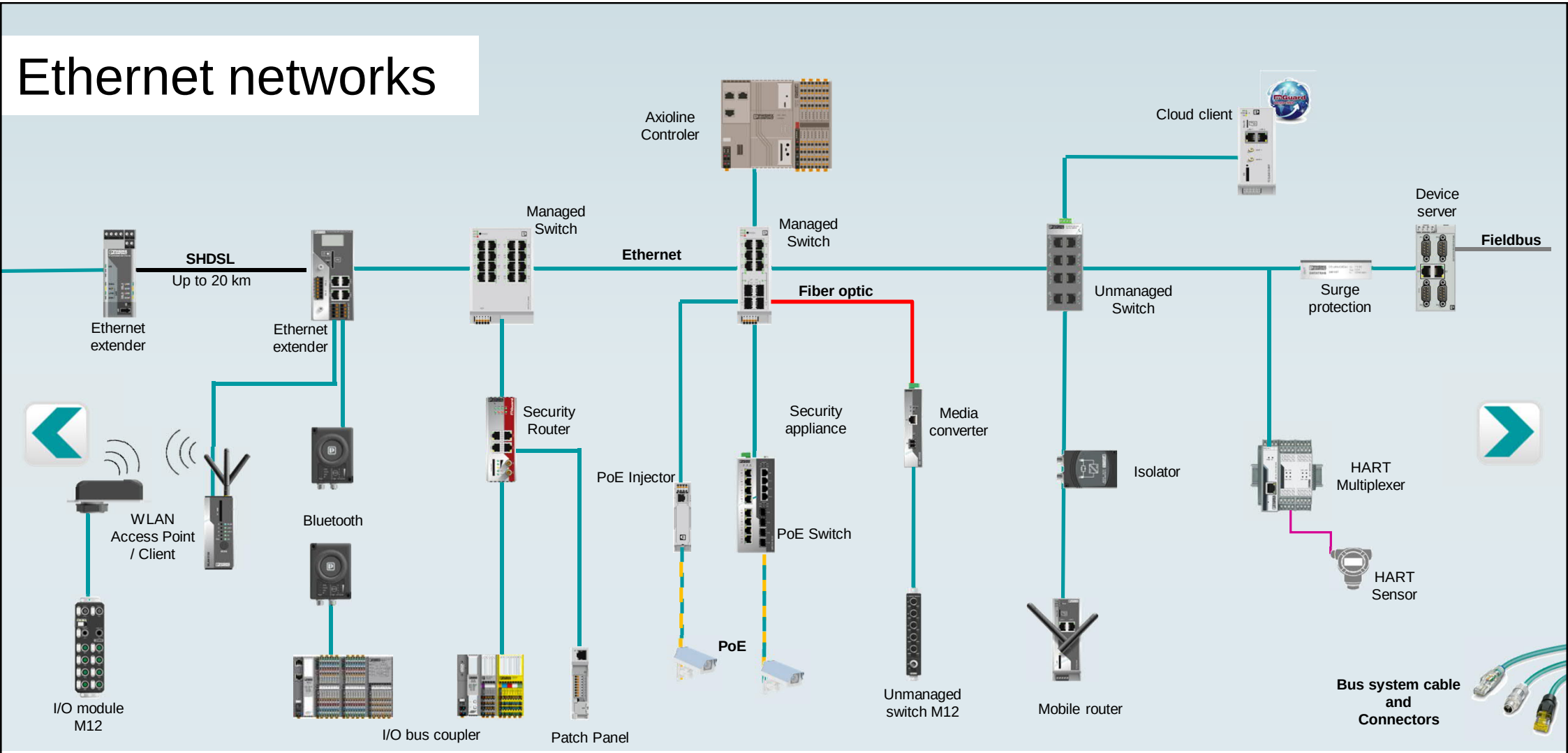
Hubs

Serial device server, gateways and proxies

HART multiplexer

PHOENIX CONTACT

# Ethernet networks



Fieldbus communication

Industrial Wireless

# Industrial data communication

Industrial Ethernet

# Everything for industrial networks

Wireless
Serial

## Industrial Wireless

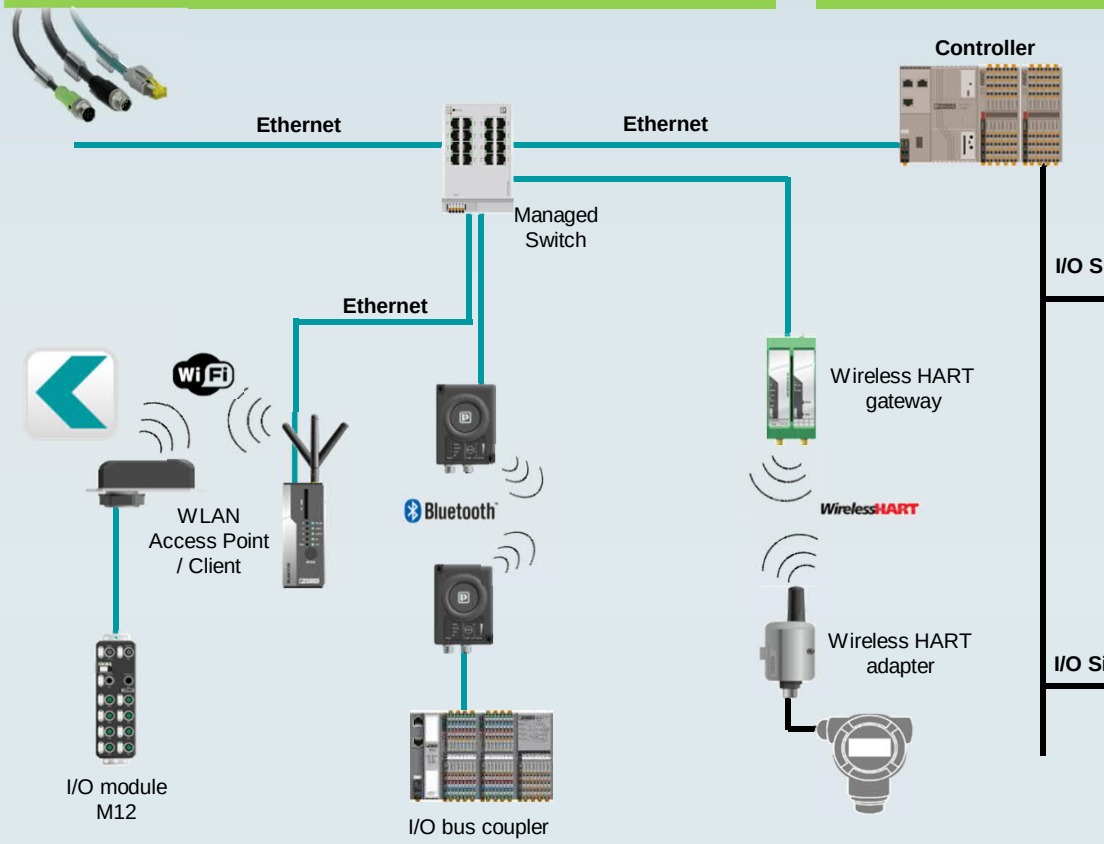
Wireless
I/O

Wireless
Ethernet

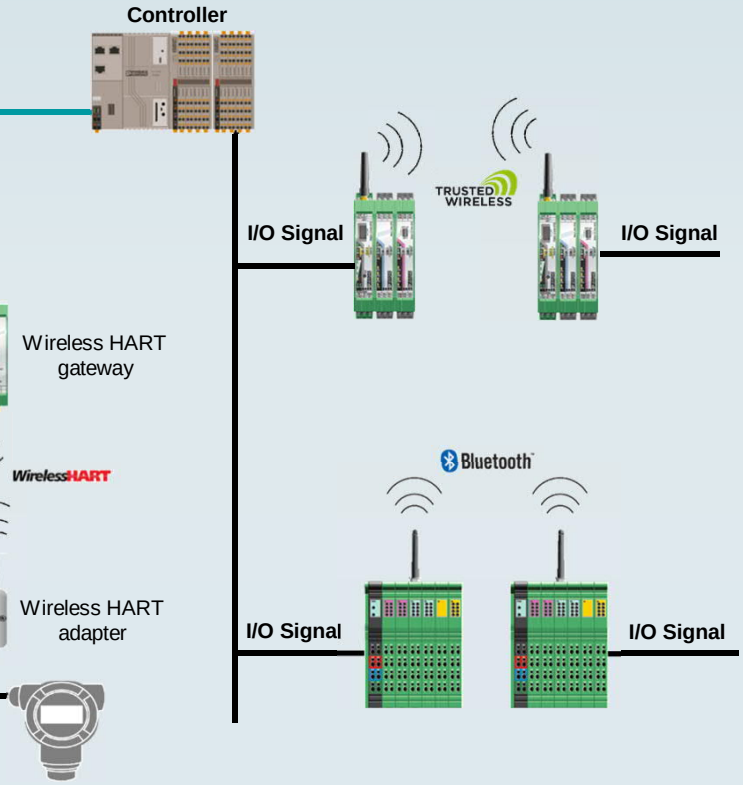
PHOENIX CONTACT

# Industrial Wireless

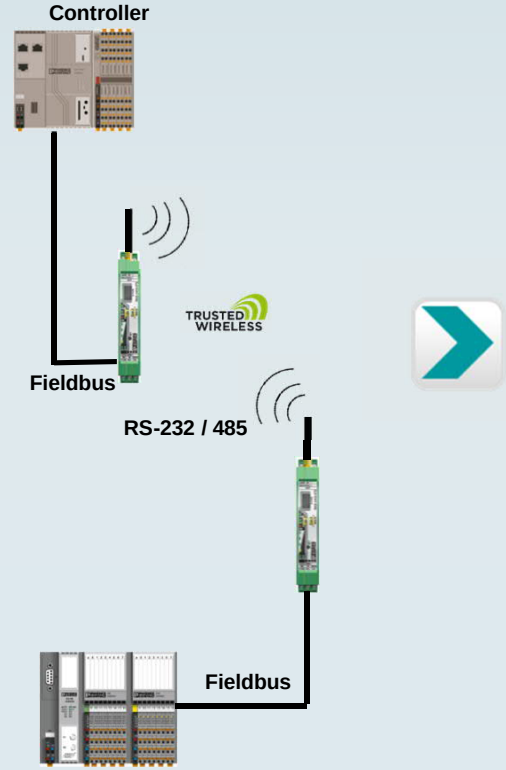
## Wireless Ethernet

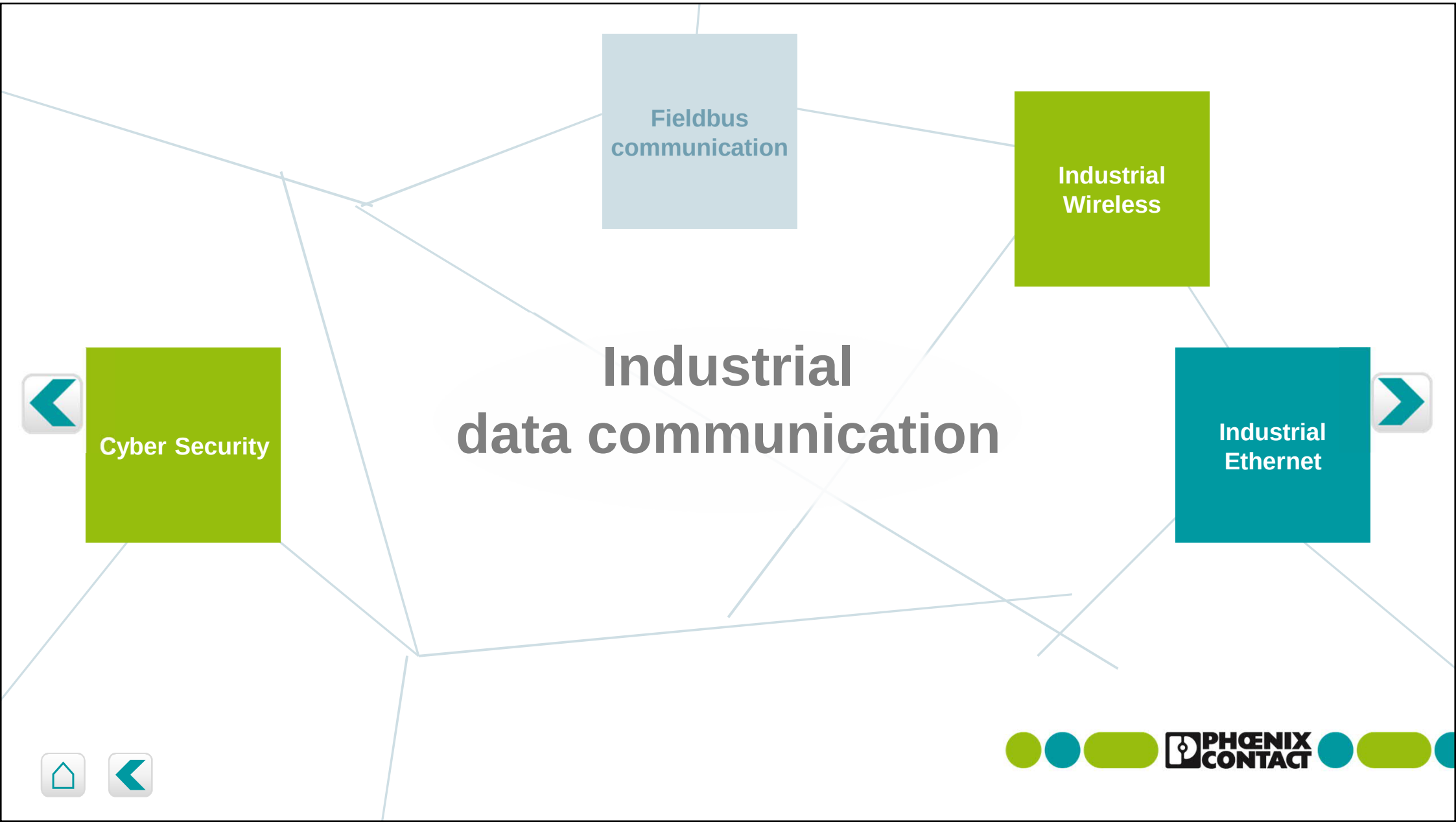



## Wireless I/O




## Wireless Serial




Fieldbus communication
Industrial Wireless
Industrial data communication
Cyber Security
Industrial Ethernet

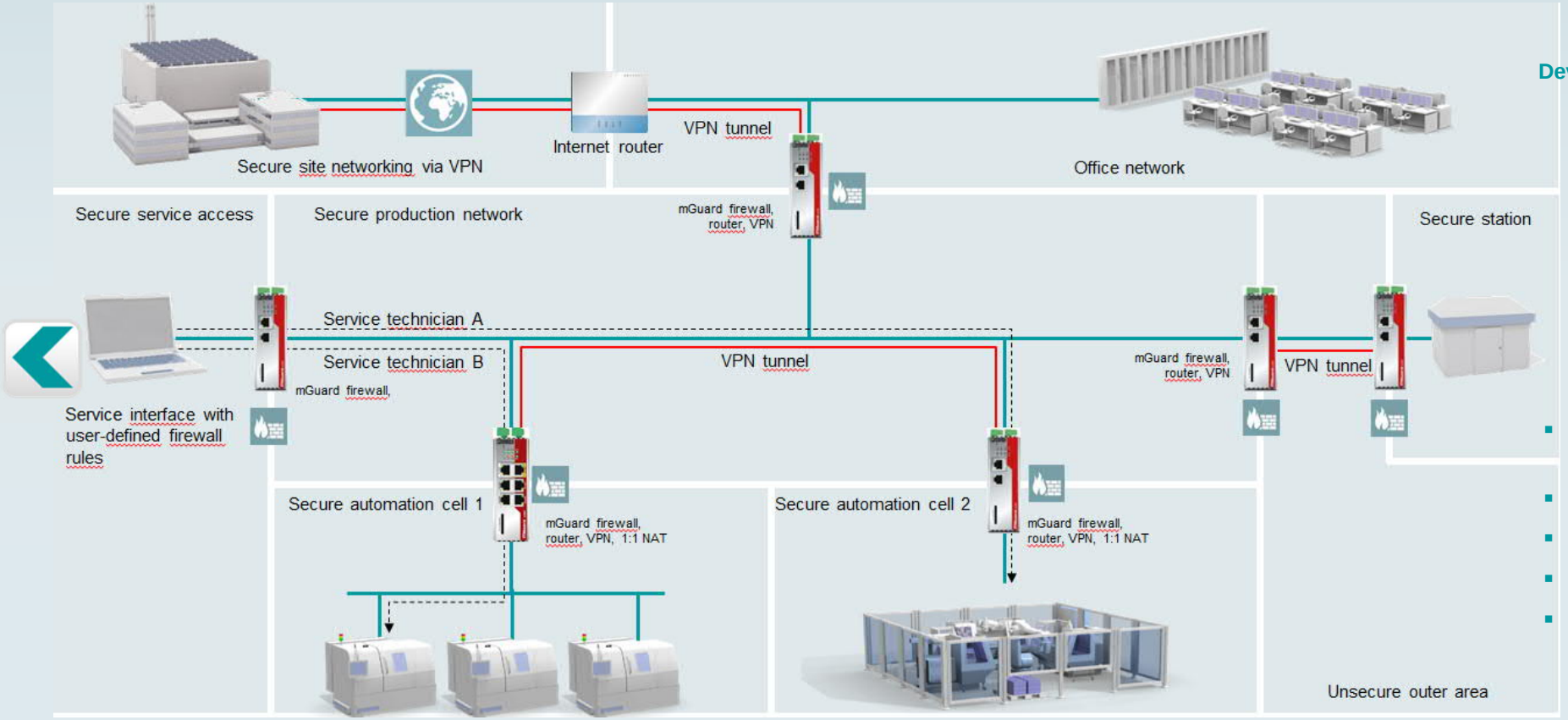
# Everything for industrial networks

Device managemend software

## Cyber Security

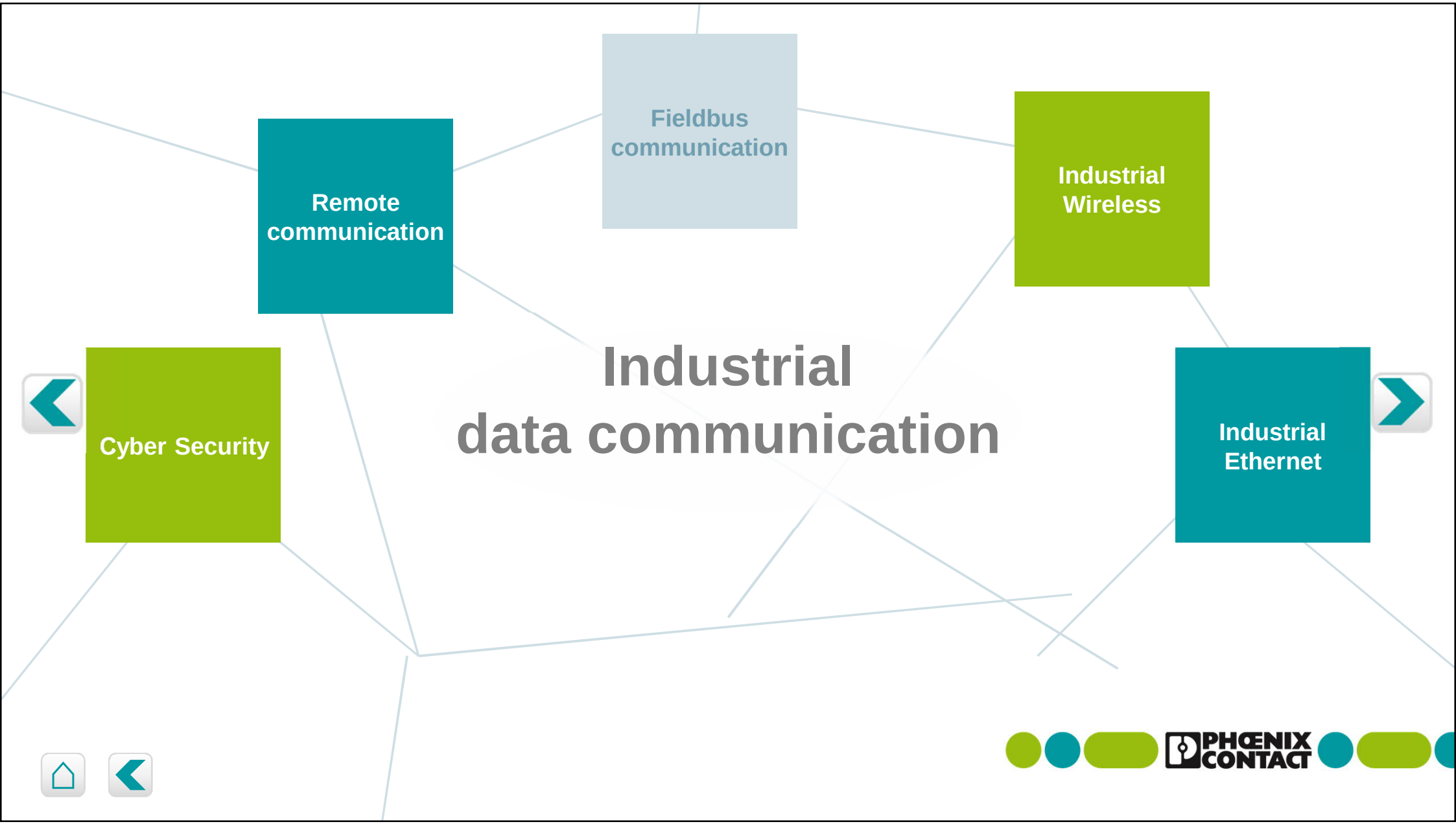
Security-Router and Firewalls

# Cyber Security




**Device managemend software**

- Network detection for unknown IP adresses
- IP assignment
- Device availability check
- Multiple Firmware Update
- Comfortable up- and download handling for configuration files


Fieldbus communication
Remote communication
Industrial Wireless
Industrial data communication
Cyber Security
Industrial Ethernet

# Everything for industrial networks

Alarm generation

## Remote communication

Remote maintenance

Remote control

PHOENIX CONTACT

# Mobile communication products in every application

Networking of a variety of machines

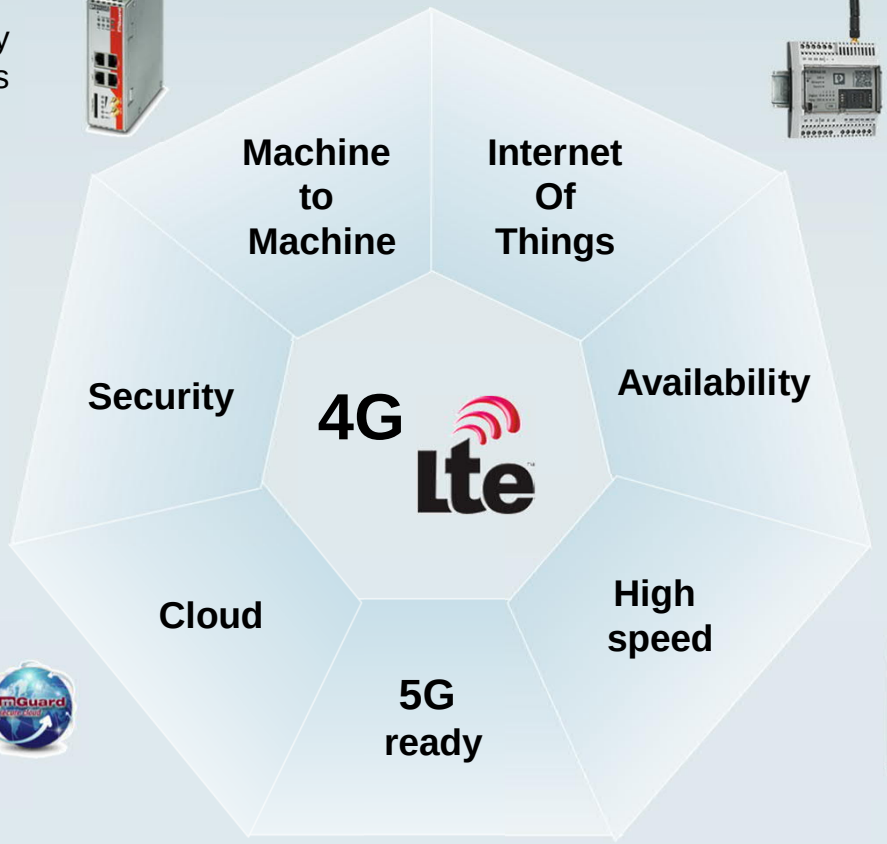
Transmission of simple sensor signals via the mobile network

Fullfill highest IT requirements

Router for world wide applications

Direct communication into the cloud

High data rates for infrastructure applications



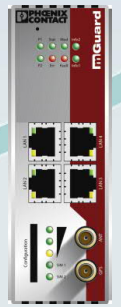
# Mobile networks product in every application

**TC MOBILE I/O**

**Alarming and Monitoring** for infrastructure applications

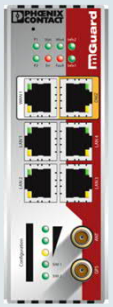
**TC ROUTER 4G**

**Universal cellular router** for infrastructure applications



**TC MGUARD RS2000**

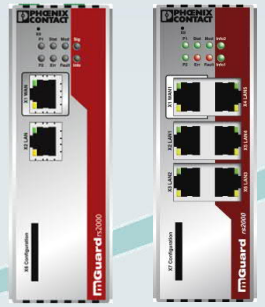
**Remote communication** for infrastructure applications with redundant provider

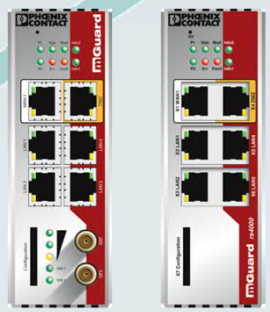


**TC MGUARD RS4000**

**Remote communication** for infrastructure applications with fallback WAN to mobile network

# Mobile networks product in every application





+

**TC CLOUD CLIENT**

**Remote service** only

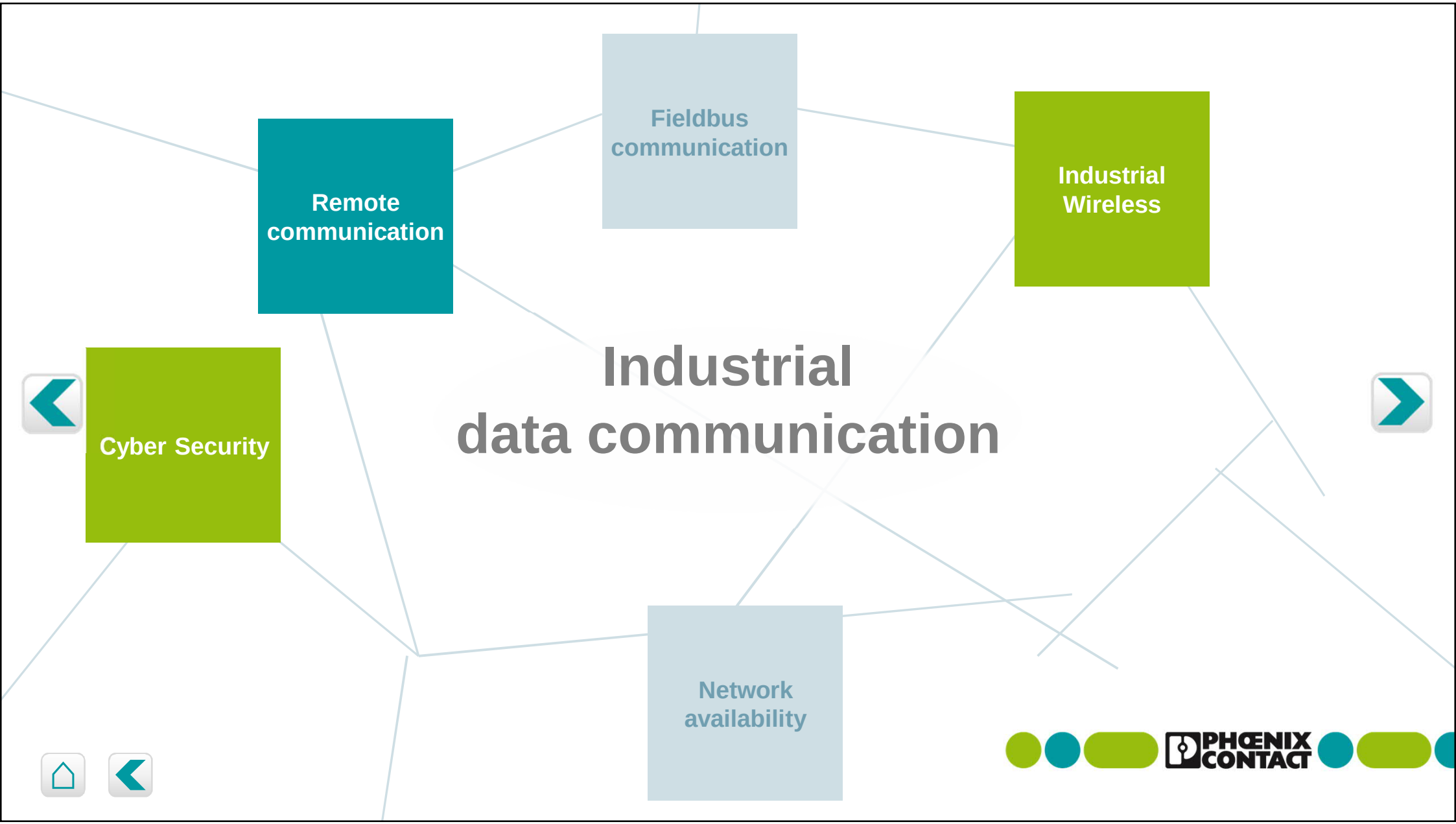
**MGUARD RS2000**

**Remote service** and **integration** of machines into factory network

**MGUARD RS4000**

**Remote service** (optional via cellular) and integration of machines in **complex factory networks**

**MGUARD Secure Cloud**


Fieldbus communication
Remote communication
Industrial Wireless
Industrial data communication
Cyber Security
Network availability

# Everything for industrial networks

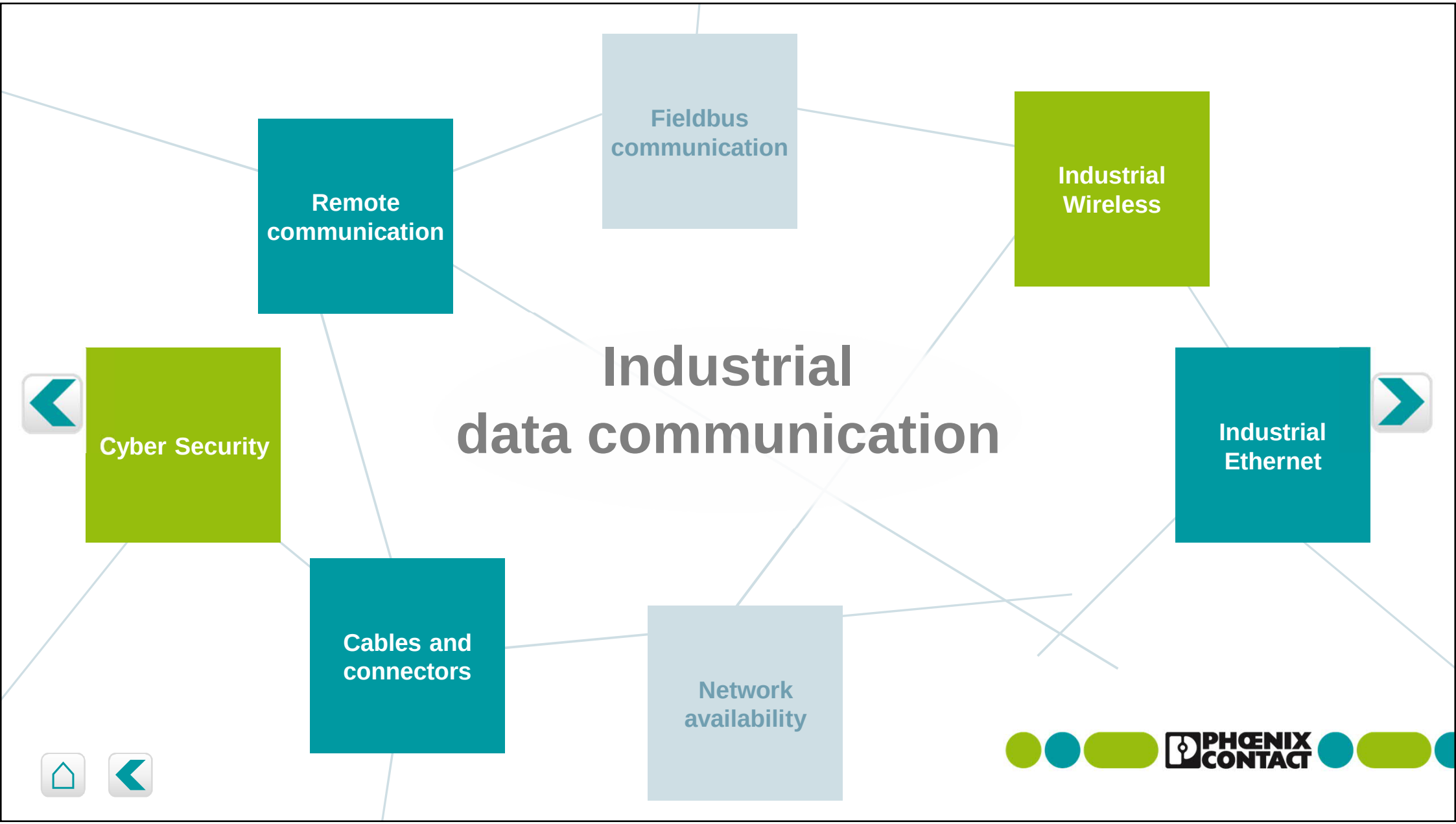
Isolator

## Network availability

Overvoltage Protection

Patch panel

Redundance


Fieldbus communication
Remote communication
Industrial Wireless
Industrial data communication
Cyber Security
Industrial Ethernet
Cables and connectors
Network availability

# Everything for industrial networks

## Data connectors and cable

Pre-Assembled data connectors for copper cables

Copper based data connectors

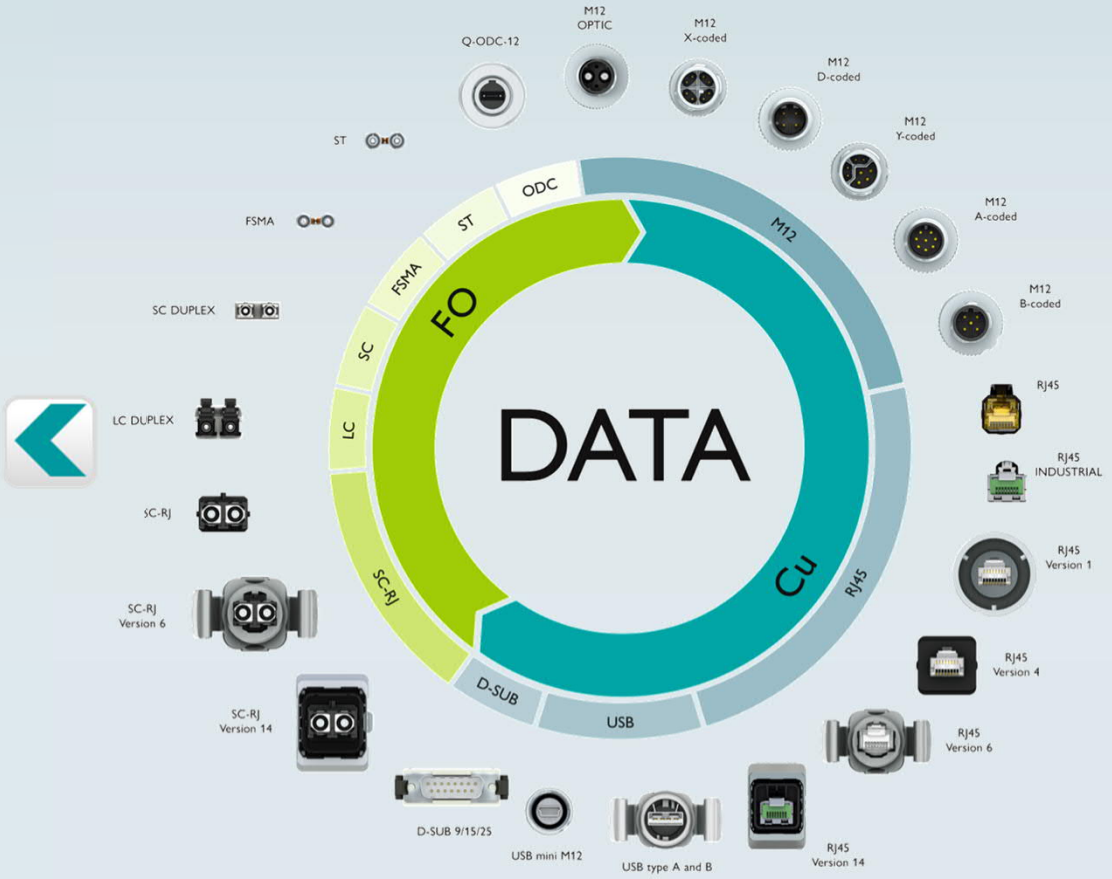
Pre-Assembled data connectors for glass fiber

Fiber optic-based data connectors

Heavy-duty connectors

PHOENIX CONTACT

# Data connectors for copper and fiber-optic cabling

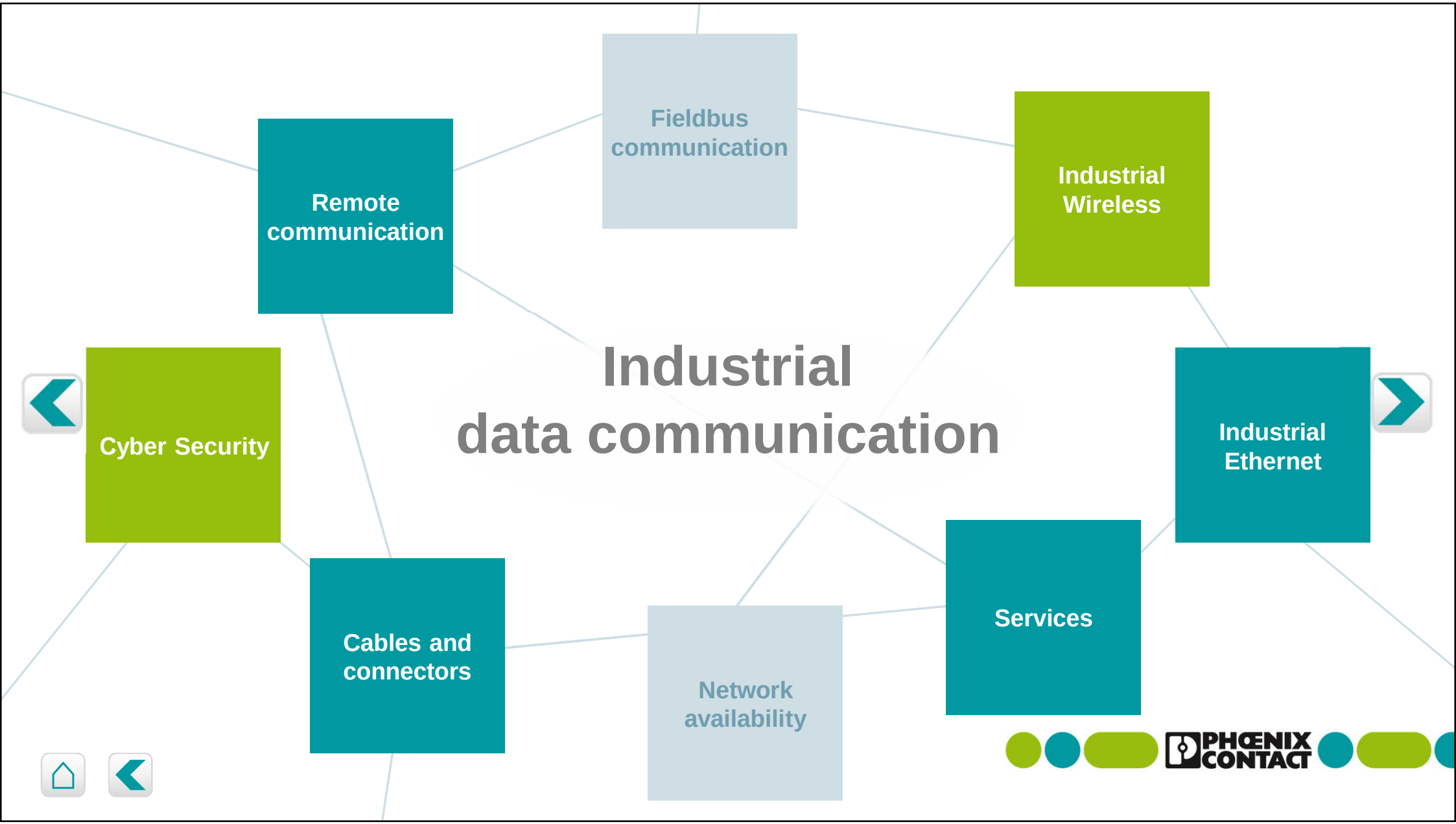



## Solution for copper cabling

- Transmission rates up to 10 Gbps
- Protection class IP20 and IP69k
- Spring, pierce and IDC insulation displacement connection
- 360 shielding concept
- For all common networks and fieldbusses

## Solution for fiber-optic cabling

- Transmission rates up to 40 Gbps
- Protection class IP20 and IP65/67 and IP68
- For POF,PCF and GOF
- For all common fiber-optic interfaces


Fieldbus communication
Remote communication
Industrial Wireless
Industrial data communication
Cyber Security
Industrial Ethernet
Cables and connectors
Network availability
Services
PHOENIX CONTACT

# Everything for industrial networks

Training and workshops

Maintenance and support

## Services

Planning and consulting

Configuration and startup

PHOENIX CONTACT

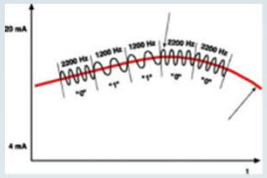
# HART Technology

HART®

Technology

# 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**

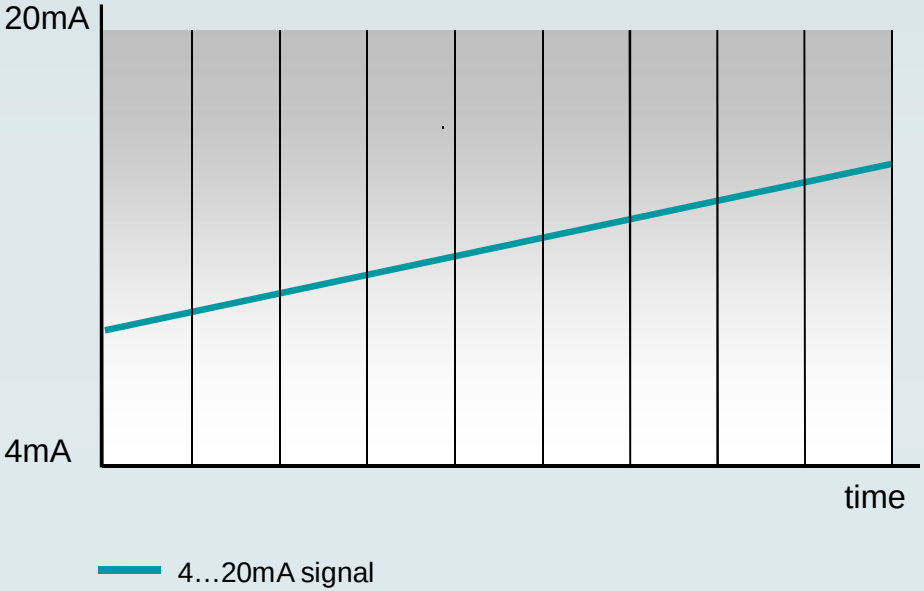
HART 7 was released, and included the WirelessHART standard.

**2012**

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

# HART Technology

## What is a 4…20mA signal?

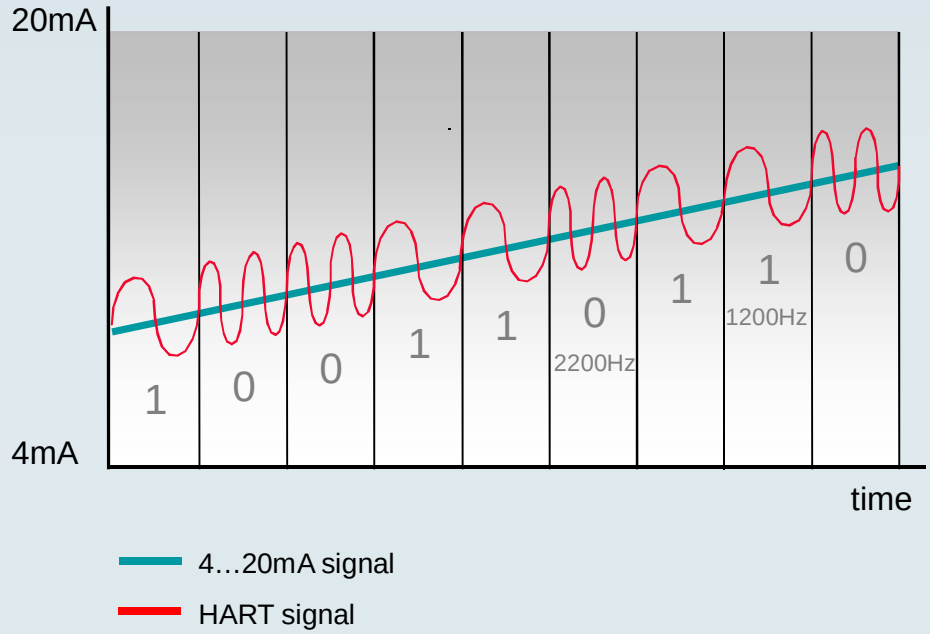



- 4…20mA signal represents a physical measurement range
  - e.g., 0…100°F
- a signal less than 4mA or greater than 20mA indicates a problem

# HART Technology

## What is HART?

HART stands for **H**ighway **A**ddressable **R**emote **T**ransducer



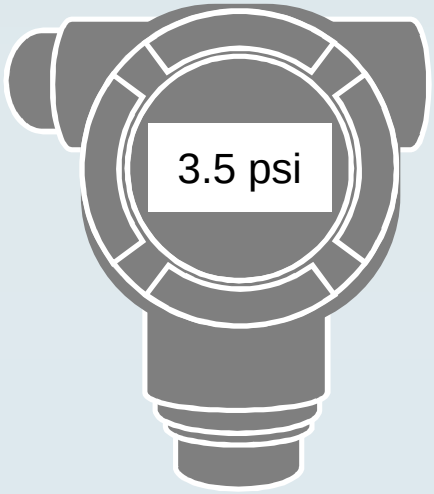

- HART is digital data superimposed onto a 4…20mA signal
- FSK modulation

  (frequency shift keying)
- 1200bps

# 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

# HART commands

## 3 commands 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

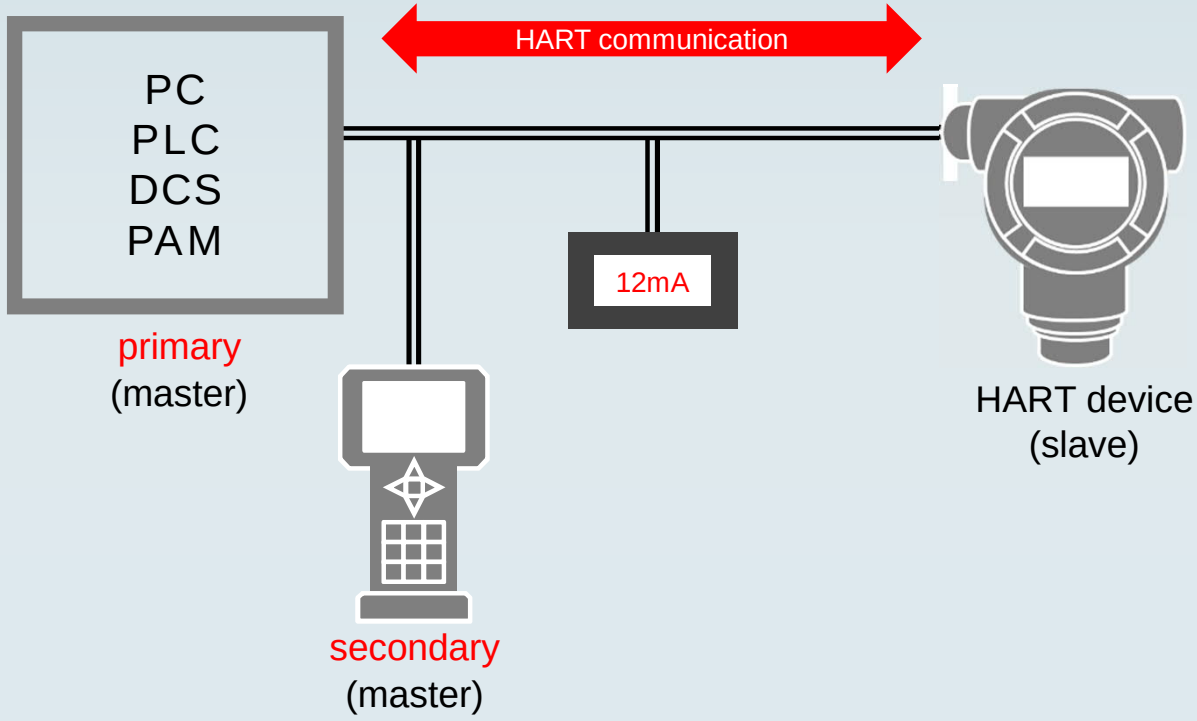
### Common Practice
**All devices should support**

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

### Device Specific
**Unique to each device/manufacturer**

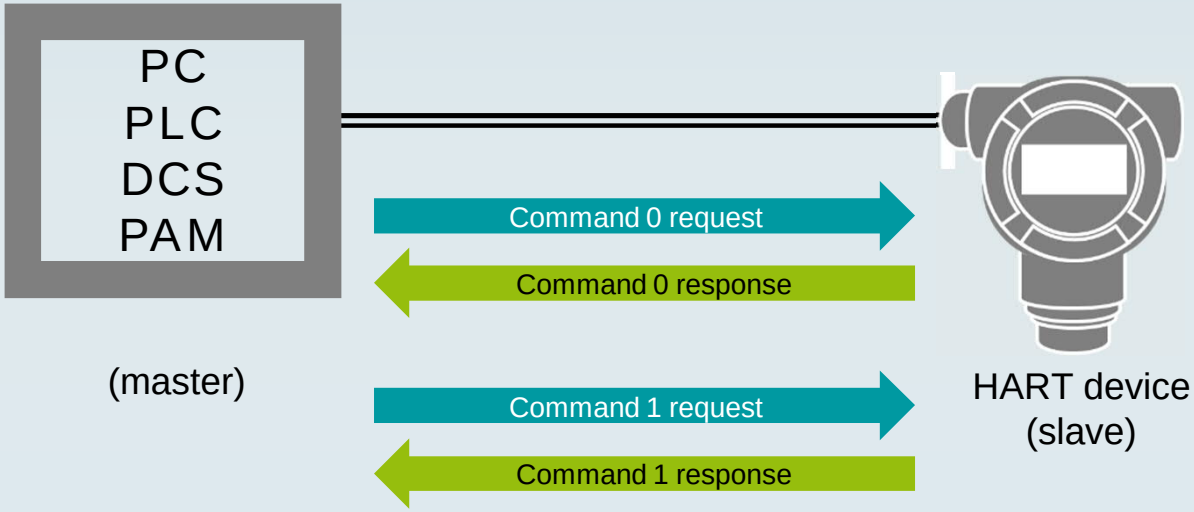
- Read or write low-flow cut-off
- Start, stop, or clear totalizer
- Read or write density calibration factor
- Choose PV (mass, flow, or density)
- PID enable
- Write PID set point
- Valve characterization
- Valve set point

# HART communication



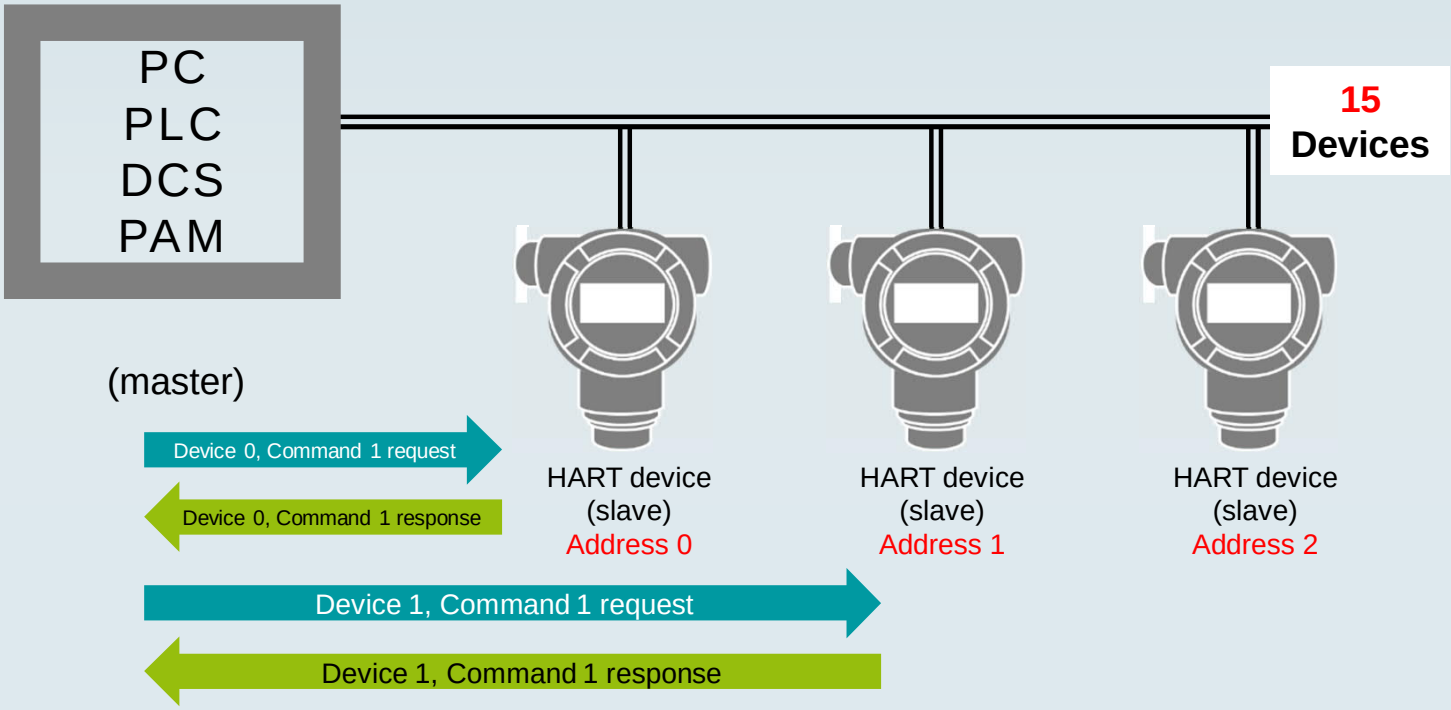
# HART communication modes

## Poll and response



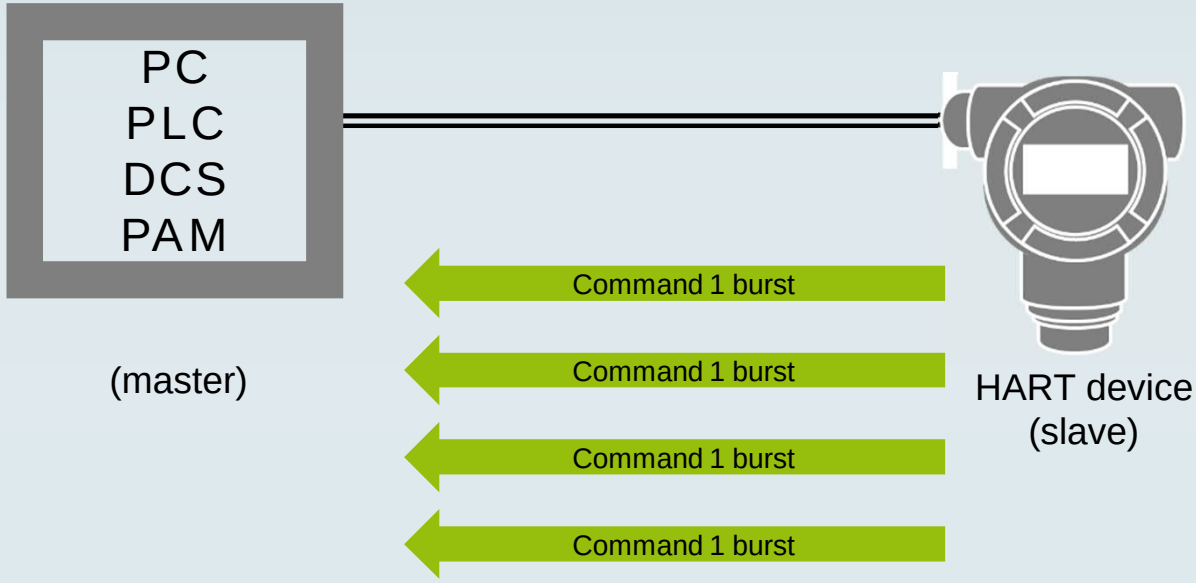
# HART communication modes

## Multidrop



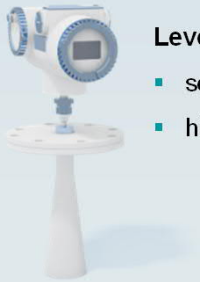
# HART communication modes

**Burst**



# HART communication

## 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

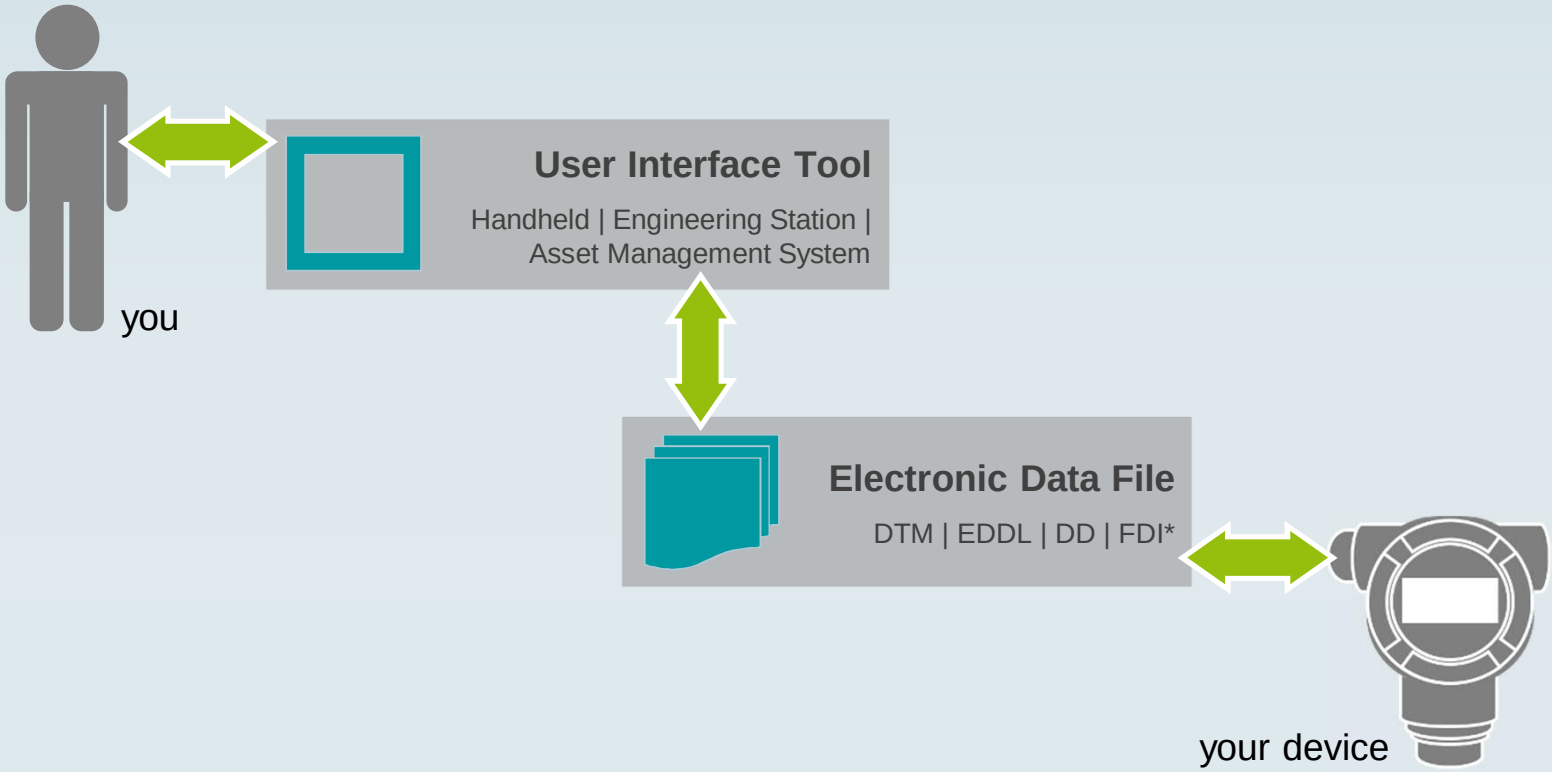
**Flow**

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

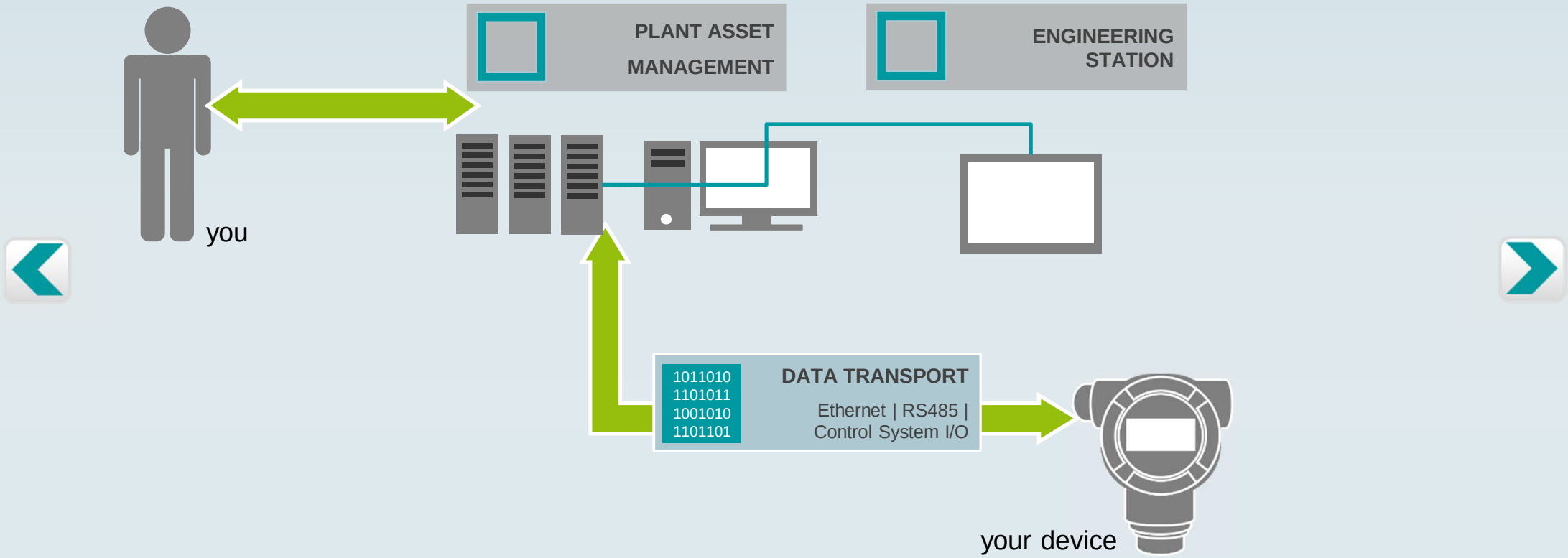
**pH**

- temperature measurement
- sensor health

# Accessing device data



# Accessing device data



# HART technology can help you

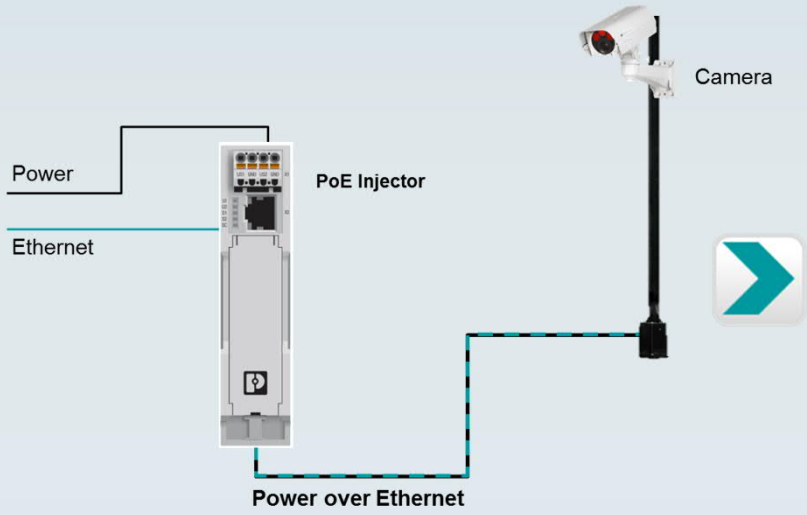
- **Leverage intelligent device capabilities**
  - use unified tools for device configuration
  - gain operational improvements by reducing troubleshooting time

- **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

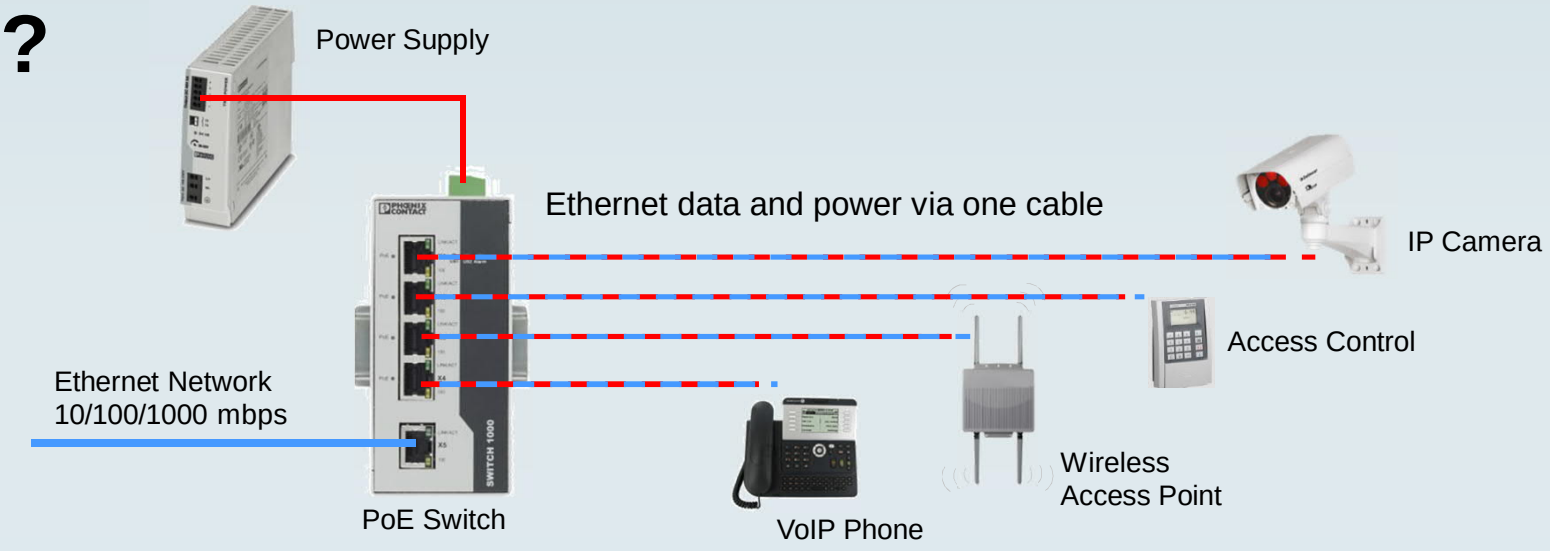
- **Improve regulatory compliance**
  - enable automated record keeping of compliance data
  - take advantage of multivariable devices for more thorough reporting

# Power over Ethernet (PoE)



# Power over Ethernet (PoE)

## PoE ?




Power Sourcing Equipment
- **PSE** -

Powered Device
- **PD** -

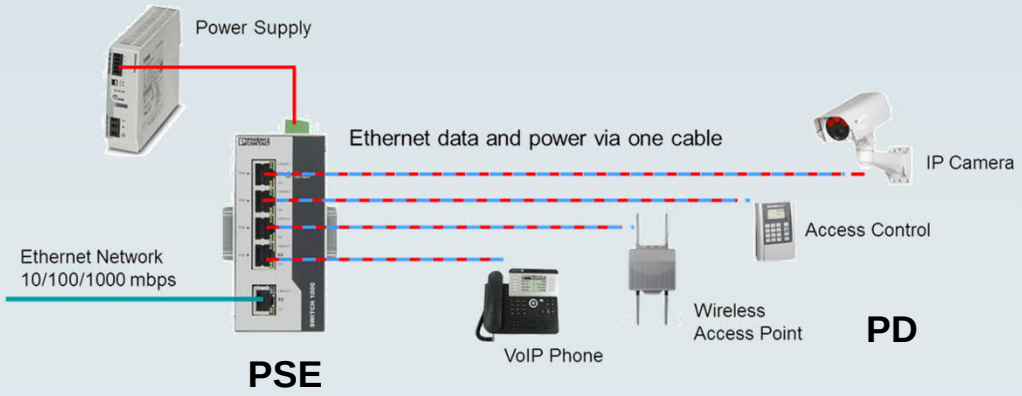
# Power over Ethernet (PoE)

## IEEE Standard for PoE

| Type | Standards | Maximum Current | Energized Pairs | Power trans-mitted by PSE | Power available at PD |
|---|---|---|---|---|---|
| PoE | IEEE 802.3af – 2003 Type 1 | 350 mA | 2 | 15,4 W | 12,95 W |
| PoE+ | IEEE 802.3at – 2009 Type 2 | 600 mA | 2 | 30 W | 25,5 W |
| PoE++ / 4PPoE | IEEE 802.3bt - 2018? Type 3 | 600 mA | 4 | 60 W | 51 W |
| PoE++ / 4PPoE | IEEE 802.3bt - 2018? Type 4 | 960 mA | 4 | 100 W | 71 W |

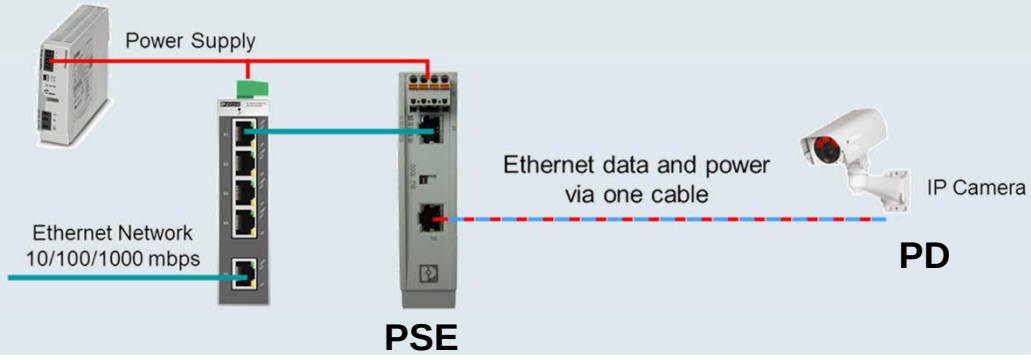
# Power over Ethernet (PoE)

## Endspan and Midspan




Power Sourcing Equipment (PSE)

„**Endspan**“ type

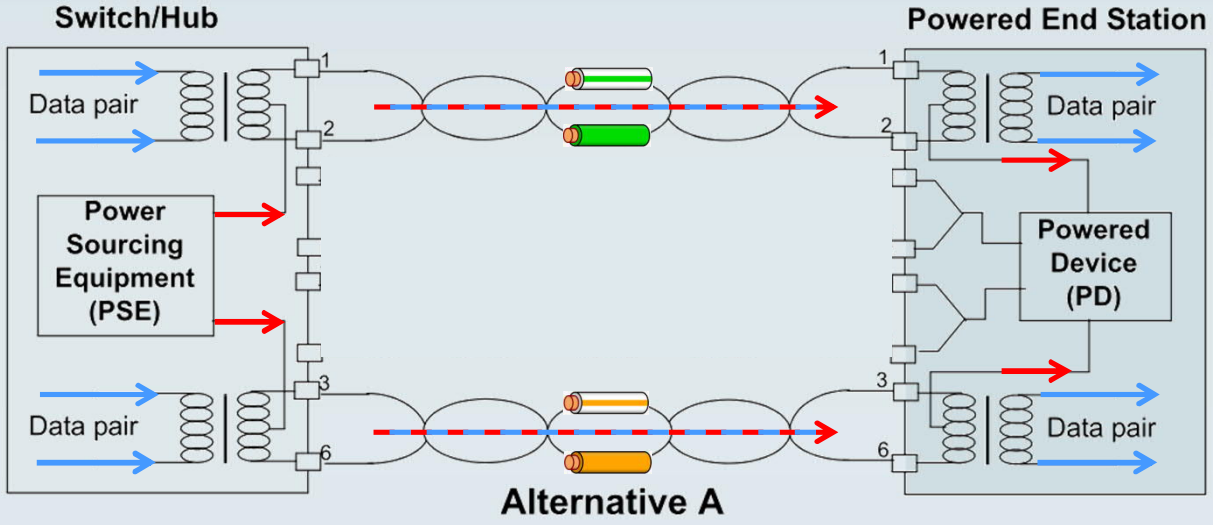



Power Sourcing Equipment (PSE)

„**Midspan**“ type

# Power over Ethernet (PoE)

## PoE af/at Mode A



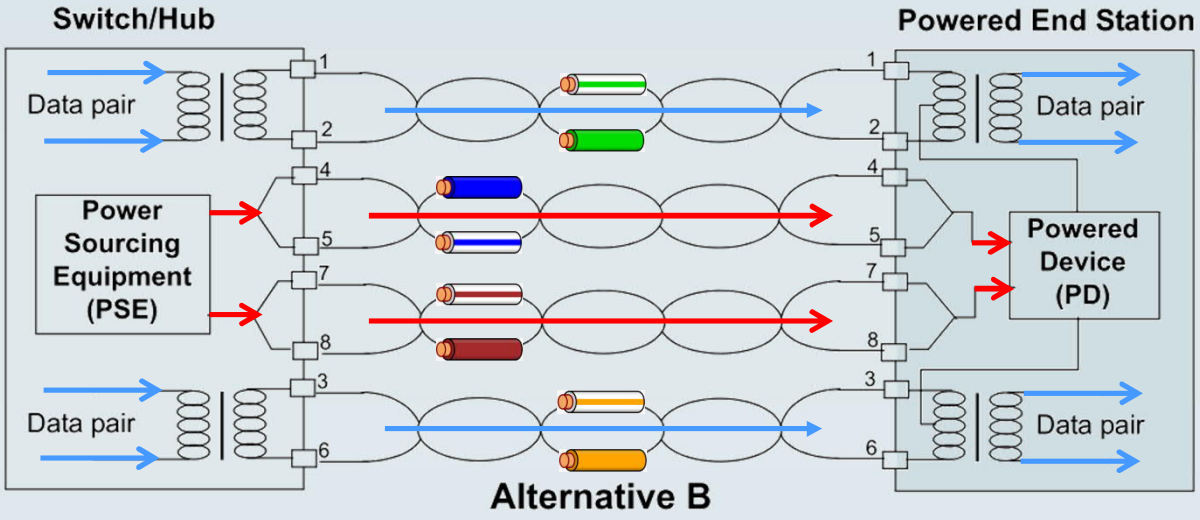

**10BASE-T/100BASE-TX** Endpoint PSE location overview

**Mode A**
Power is modulated on the data pairs

- **Phantom power**
- **2-pair mode**

# Power over Ethernet (PoE)

## PoE af/at Mode B

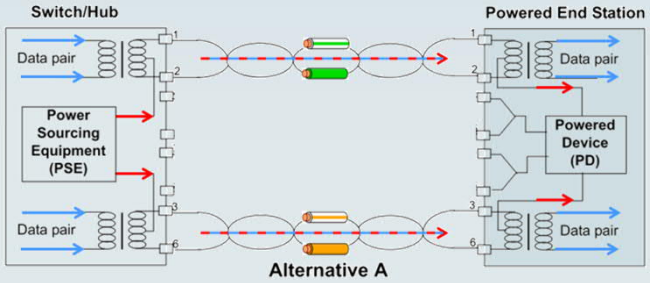


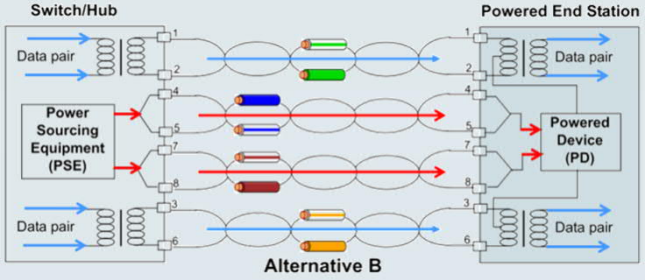

**10BASE-T/100BASE-TX** Endpoint PSE location overview

**Mode B**
Power is delivered on the spare pairs
**2-pair mode**
→ Only with 4-pair Cat cable
→ No Gigabit

# Power over Ethernet (PoE)

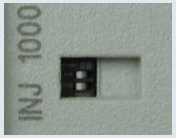
## PoE af/at  Mode A or B




- The PD must be able for both mode → A and B
- The PSE can implement mode A or B or both
- The PSE decides whether power mode A or B

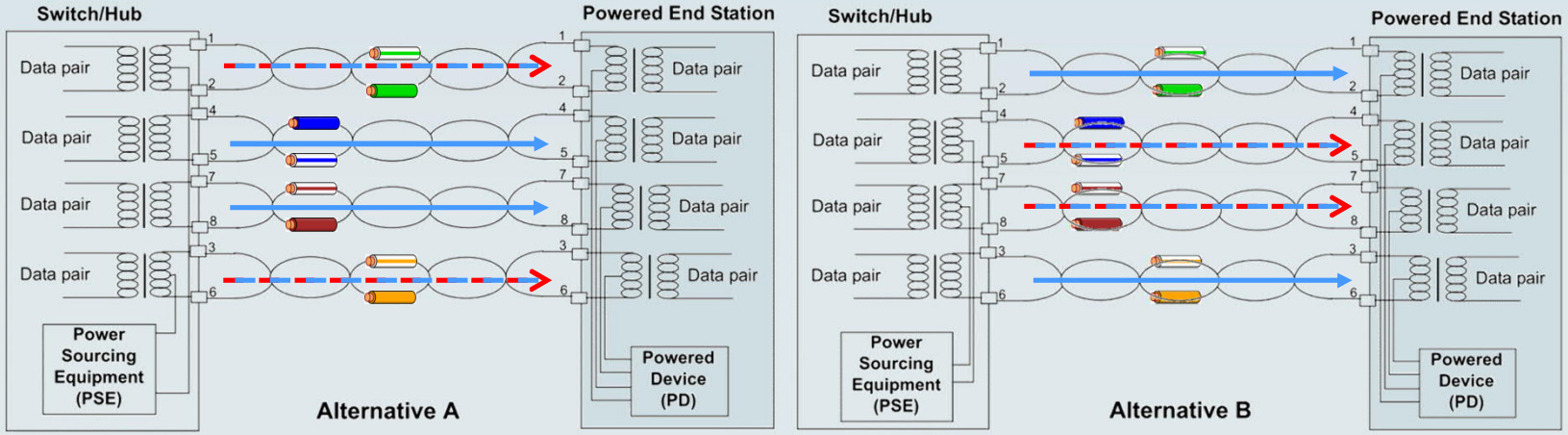
- PSE devices available with fixed A or B mode
  → B mode only for 10/100 mbps and 4 pair cable
- PSE devices with both modes and
  selection by Dip switch




| DIP 1 | Function |
|---|---|
| OFF | 2 pair mode A |
| ON | 2 pair mode B |

# Power over Ethernet (PoE)

## PoE af/at Gigabit

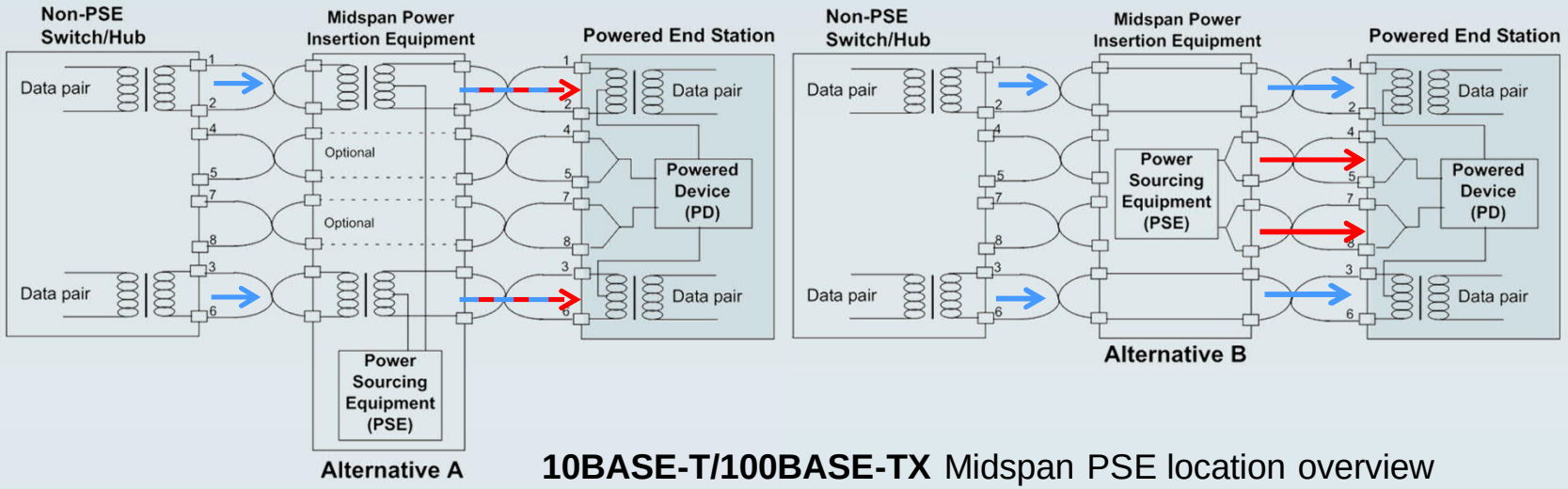



**Mode A + B**
Power is modulated on the data pairs → **2-pair mode**

**1000BASE-T** Endpoint PSE location overview

# Power over Ethernet (PoE)

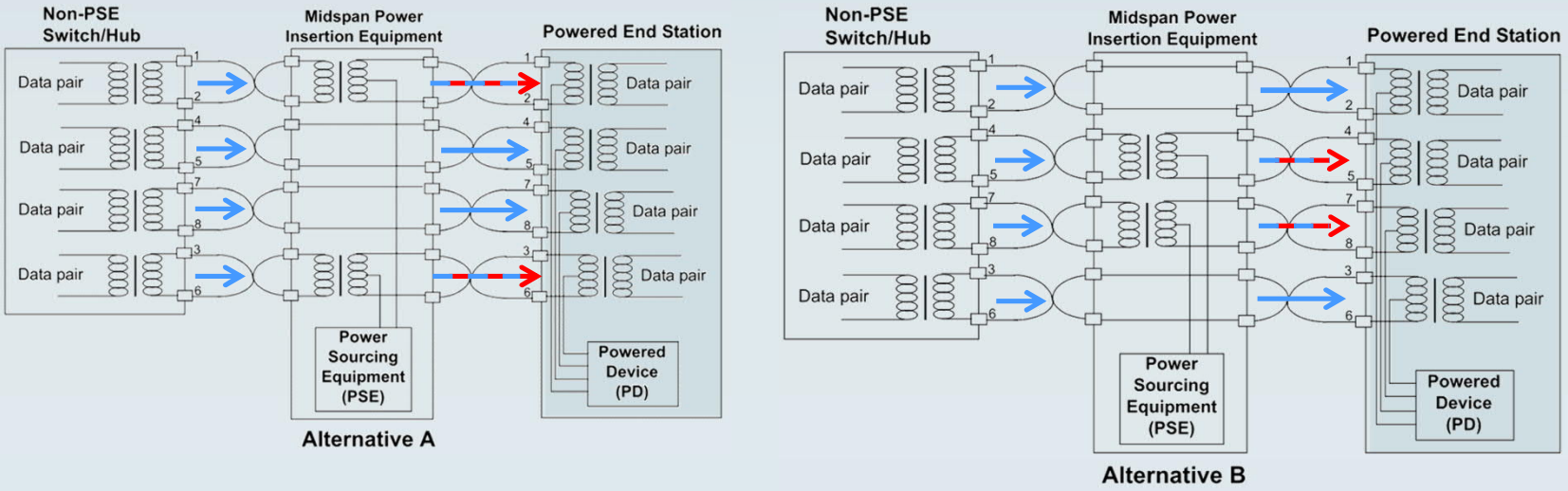
## PoE af/at Midspan




**10BASE-T/100BASE-TX** Midspan PSE location overview

# Power over Ethernet (PoE)

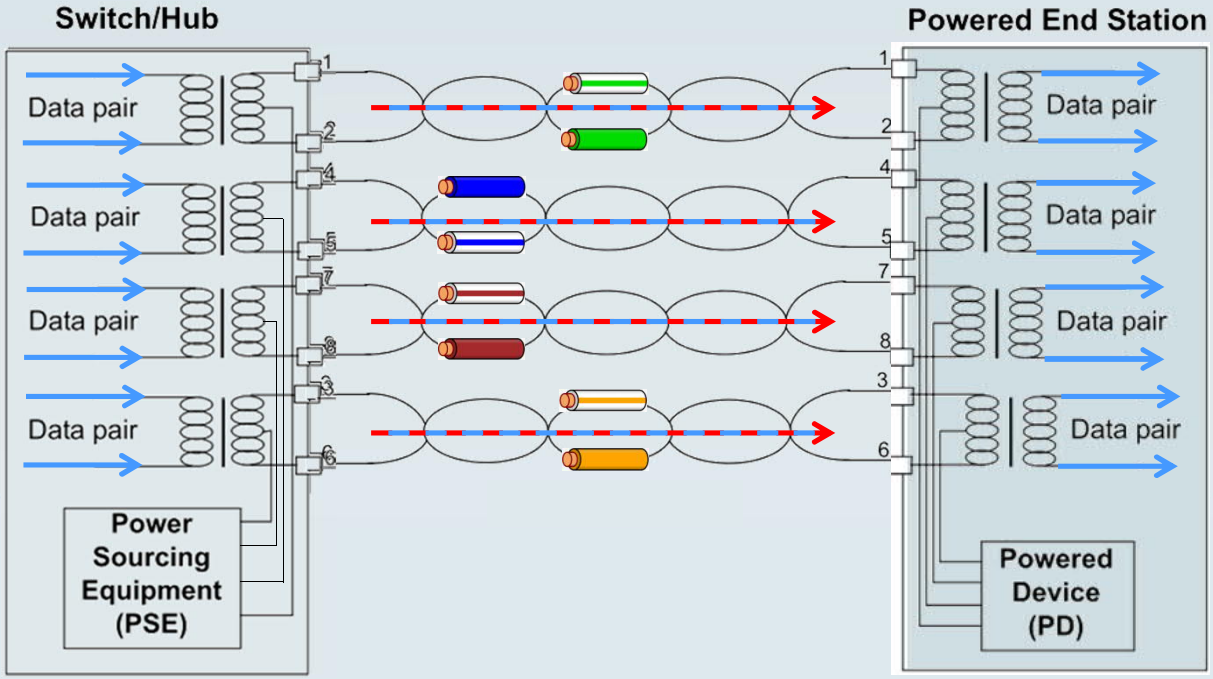
## PoE af/at  Midspan Gigabit




**1000BASE-T** Midspan PSE location overview

# Power over Ethernet (PoE)

## PoE bt - 4 pair mode

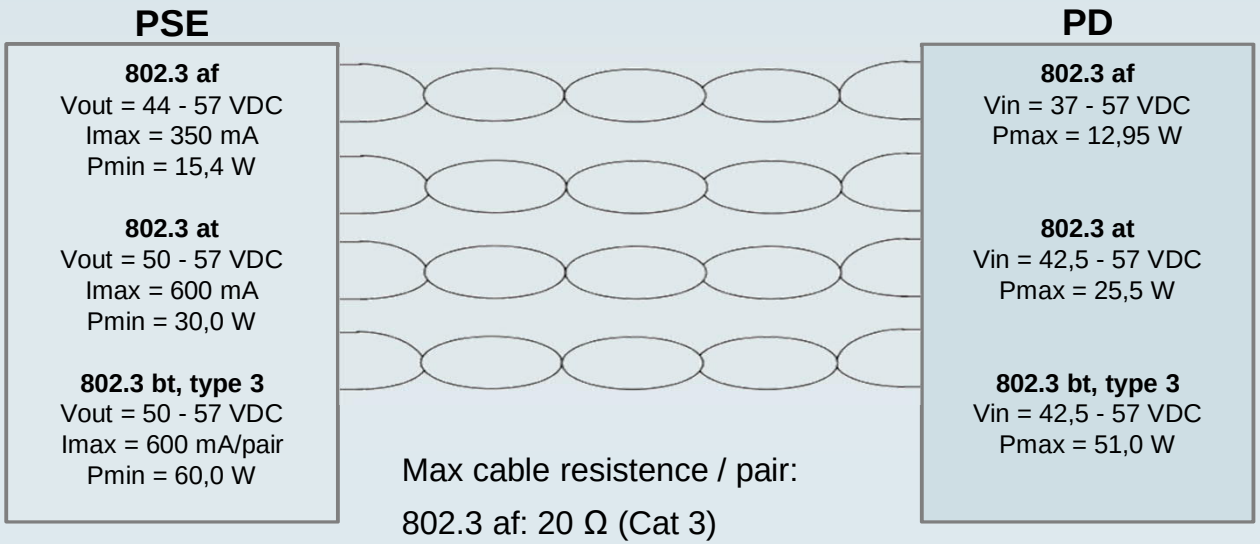



10/100/1000BASE-T/10GBASE-T **4-pair** Endpoint PSE location overview

**4-pair mode**
Power is modulated on all data pairs

# Power over Ethernet (PoE)

## Parameter




Max cable resistence / pair:

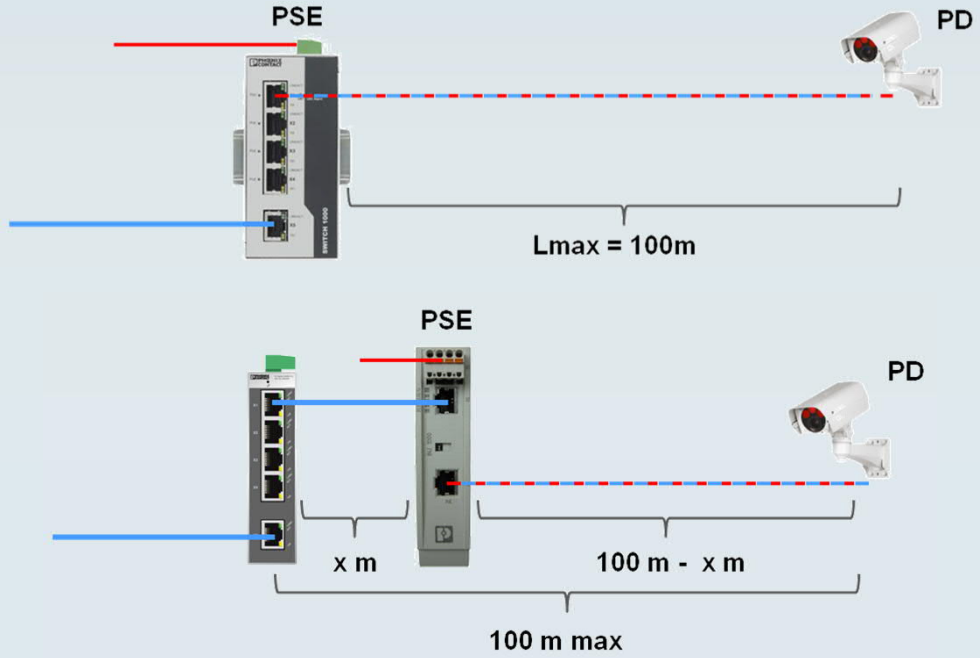
802.3 af: 20 Ω (Cat 3)
802.3 at: 12,5 Ω (Cat 5)
802.3 bt: 12,5 Ω

# Physical Layer Classification

| Standard | Class | Type | Classification Current | Max. Power by PSE | Max. Power at PD |
|---|---|---|---|---|---|
| IEEE 802.3 af | 0 | default | 0 - 4 mA | 15,4 W | 0,44 - 12,95 W |
| IEEE 802.3 af | 1 | optional | 9 – 12 mA | 4,0 W | 0,44 – 3,84 W |
| IEEE 802.3 af | 2 | optional | 17 – 20 mA | 7,0 W | 3,84 – 6,49 W |
| IEEE 802.3 af | 3 | optional | 26 – 30 mA | 15,4 W | 6,49 – 12,95 W |
| IEEE 802.3 at | 4 | optional | 36 – 44 mA | 30,0 W | 12,95 – 25,50 W |

# Power over Ethernet (PoE)

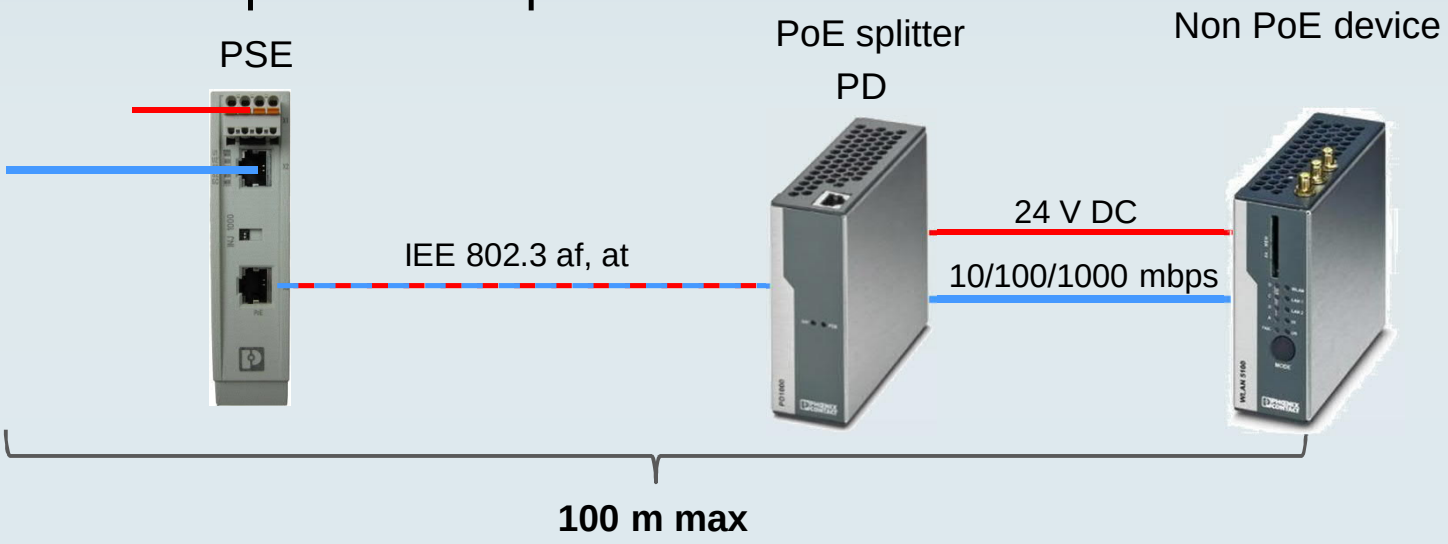
## Maximum distance



# Power over Ethernet (PoE)

## PoE splitter

- For seperation of power and data



# Trusted Wireless 2.0

TRUSTED WIRELESS

**Global RF Technology**

2.4 GHz, 900 MHz, 868 MHz license-free ISM- Band

Increase distance by adjustable data rates

Optimal adaption to the respective application

**Secure data communication**

Proprietary, „not-open“ Technology

Encryption: 128-Bit AES

Authentication / Integrity check: Unique encryption key for each message verifies the validity of the transmitter

**Flexible network structures**

Automatic network formation

Self-organizing and self-healing

Point-to-Point, Star, Mesh- and Line structures

**Robust data communication**

Coexistence mechanism: FHSS, WLAN-Blacklist, adjustable RF bands

Unique NET-ID via CONF-Stick

Multiple transmissions

PHOENIX CONTACT
INSPIRING INNOVATIONS

# Trusted Wireless 2.0

**Areas of application for Trusted Wireless 2.0**

Trusted Wireless is a wireless technology which has been developed especially for the industrial use!

- Rugged communication thanks to FHSS
- Automatic and manual coexistence mechanismus
- Secure communication thanks to 128 bit AES encryption and authentication
- Long range thanks to high reciever sensitivitiy and variable sata transmission rates
- Flexible networks with automatic connection management
- Distributed network maintenance makes things easier and faster
- Extensive diagnostic properties
- Adaptable to the desired application

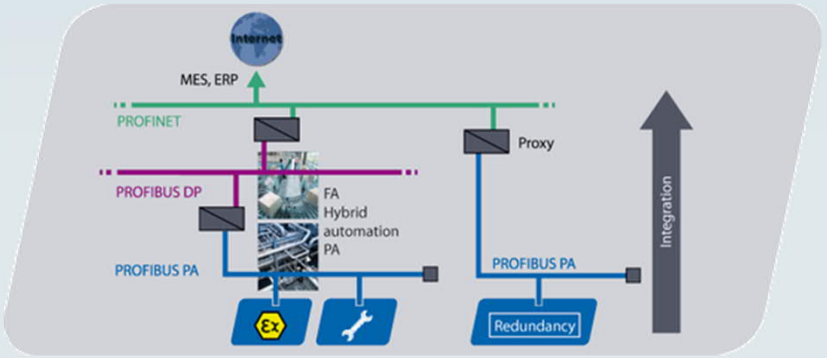
# Wireless technologies

| | Bluetooth | Wi Fi | TRUSTED WIRELESS | WirelessHART |
|---|---|---|---|---|
| **Technologies** | **Bluetooth** | **WLAN (Wireless Local Area Network)** | **Trusted Wireless 2.0** | **Wireless HART** |
| Network structure | Star structure - 1 Master up to 7 Slaves | Access point can handle endless clients | Mesh network – 1 Master up to 249 Slaves | Full-Mesh network – 1 Master up to 249 Slaves |
| Standard | IEEE 802.15.1 | IEEE 802.11 | Proprietary by Phoenix Contact | IEEE 802.15.4<br>HART 7 |
| Application | fast, small networks | Fast, high data volume, Ethernet | Low/medium data rate, large networks, best for infrastructure application | HART signal, Process industry, short distances |
| Frequency | 2,4 GHz | 2,4 GHz, 5 GHz, | 868 MHz, 900 MHz, 2,4 GHz | 2,4 GHz |
| Latency time (typical) | >10 ms (IO)<br>> 50ms (Serial) | >16 ms (depending on the data rate / Distance) | 0,1 – > 2 s, depending on the OTA data rate / network structure | > 3 s up to serveral minutes |
| Distance (free line of sight) | Typ. <= 150 m | Typ. <= 150 m | <= 5 km (2,4 GHz)<br><= 20 km (868 MHz)<br><= 32 km (900 MHz) | Typ. <= 250 m |

# PROFIBUS

**PRO**cess **Fi**eld **BUS**

PROFIBUS connects controllers or control systems with a number of field devices (sensors and actuators) via a single cable.




Source: Profibus.com

PROFIBUS • PROFINET

# PROFIBUS

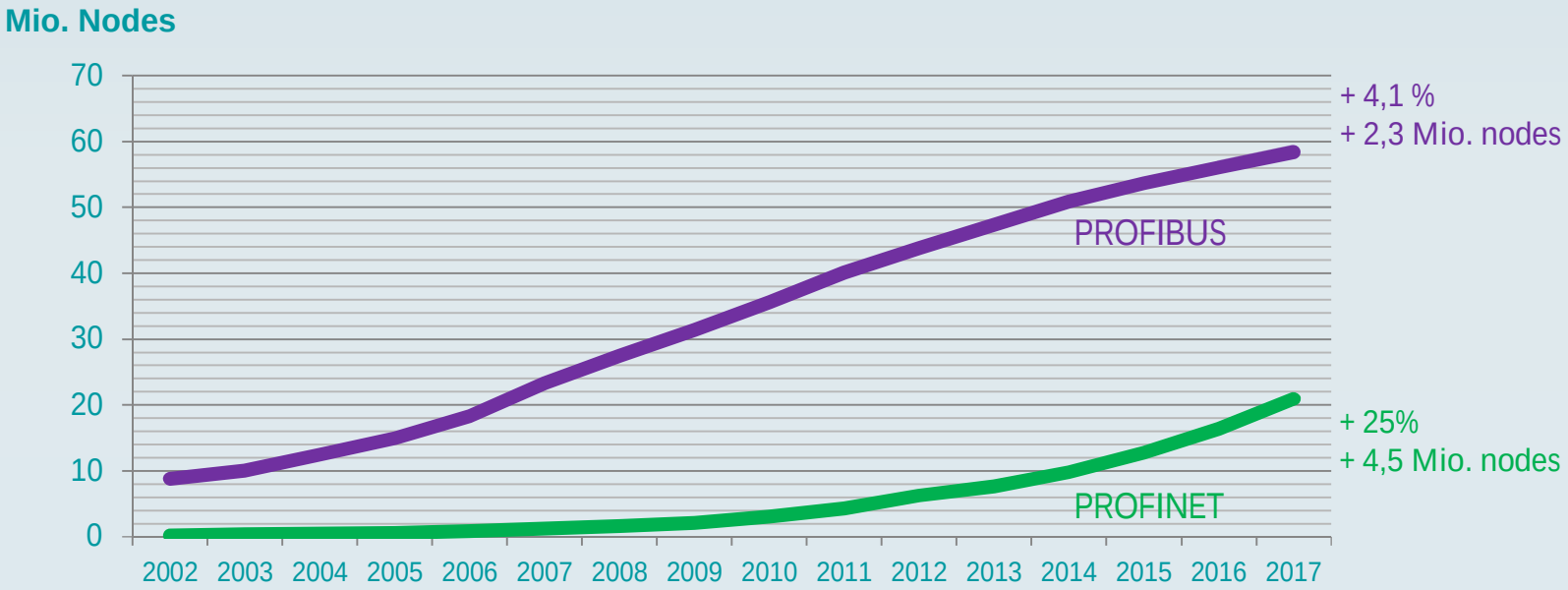
## PROFIBUS DP and PROFIBUS PA

- **PROFIBUS DP** (**D**ecentralized **P**eriphery) is mainly used for high speed input/output devices and to link intelligent devices such as drives. It can use different physical layers such as RS-485, wireless or fiber optics.

- **PROFIBUS PA** (**P**rocess **A**utomation) refers to the following features:
  - Bus powered by using the Manchester encorded Bus Powered (MBP) physical layer according to IEC 61158-2
  - Intrinsically safe design
  - Configuration over the bus
  - Device profile

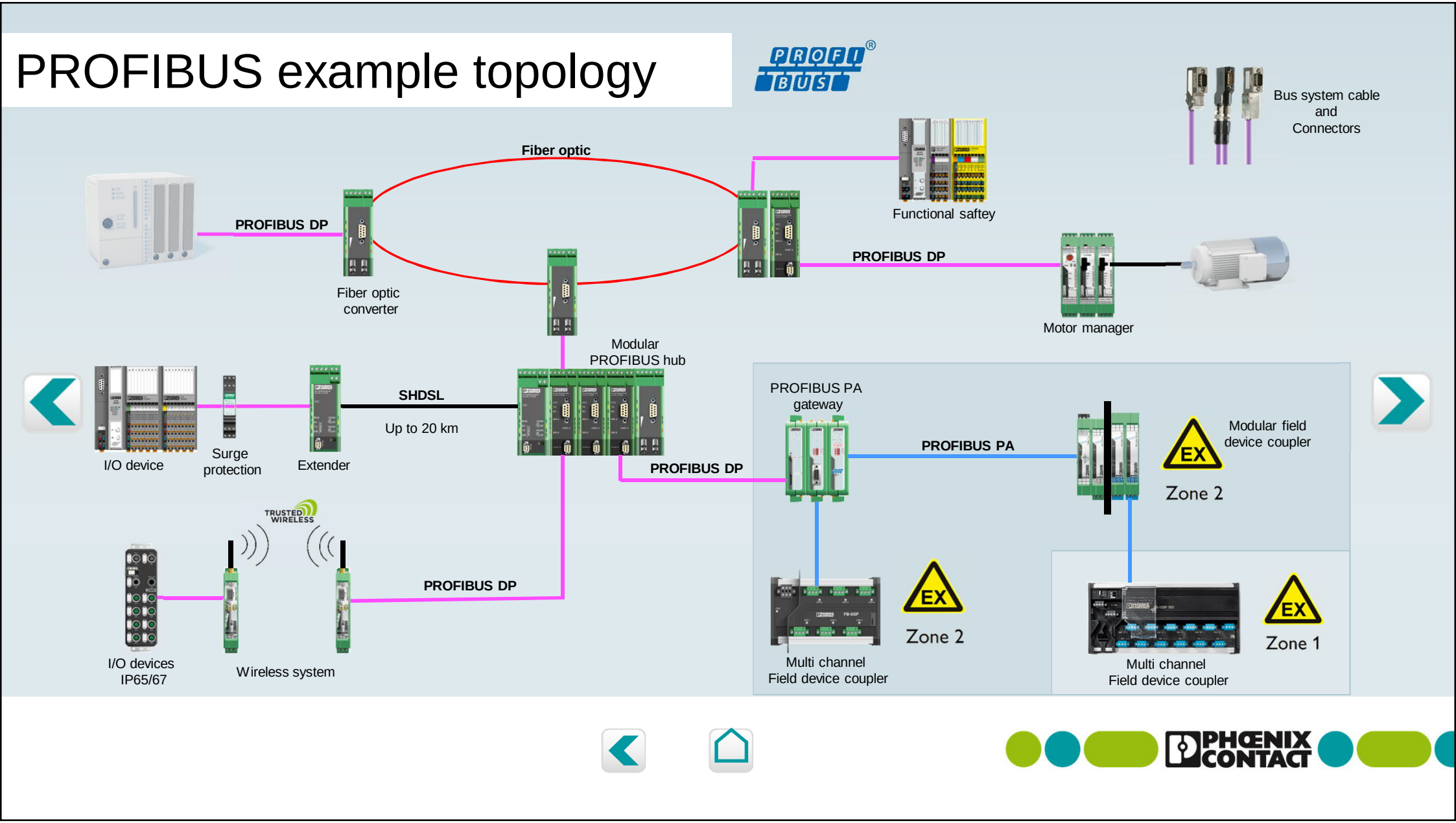
# PROFIBUS

## Number of PROFIBUS devices worldwide (2002 – 2017)




INSPIRING INNOVATIONS

# PROFIBUS example topology



# PROFIBUS

## PROFIBUS benefit for….

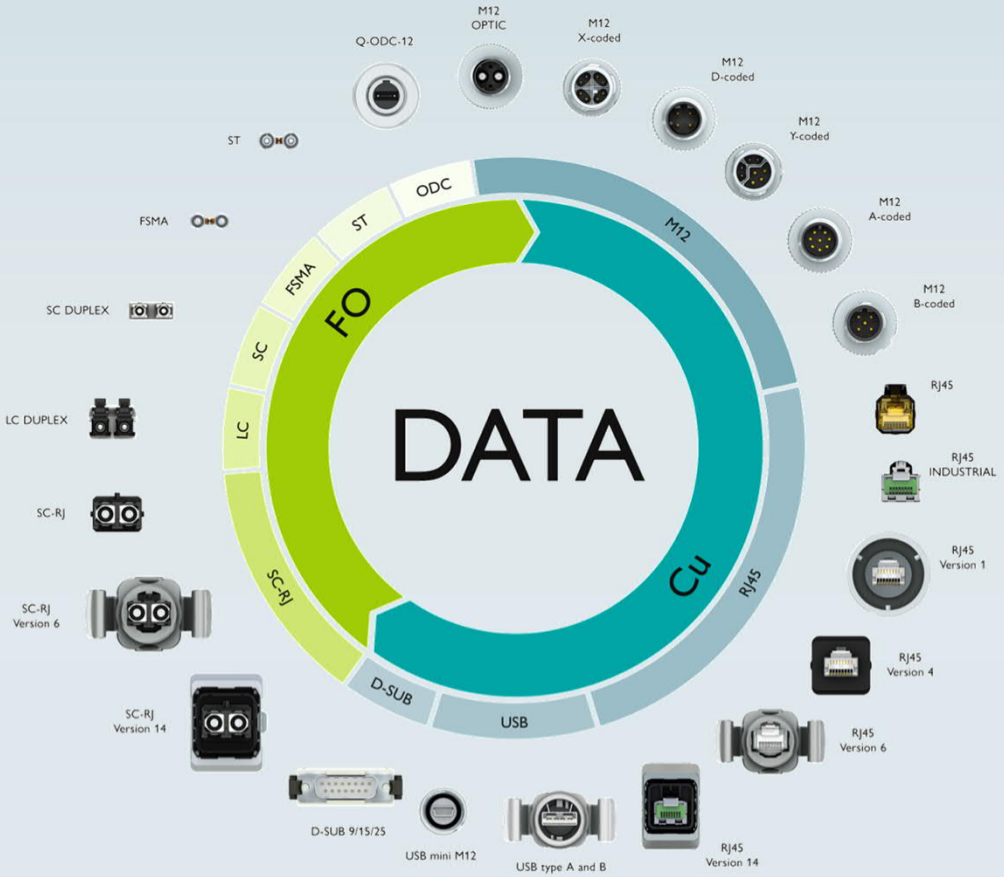
### Engineering Staff
- Less wiring, less hardware
- Faster engineering
- Huge vendor choice
- Easier commisioning
- Simpler documentation

### Operation Staff
- Transparency down to the sensor
- Better maintenance conditions
- Improves Asset Management
- Shorter plant downtime
- More flexible production

### Plant Managers
- Lower costs
- Faster and more flexible production
- Better production quality
- Safer plants
- Increased ROI

### Plants
- Advanced technology
- Easy migration
- Easier revamps
- Less expensive upgrades
- Longer Plant Lifetime

# Data connectors for copper and fiber-optic cabling




## Solution for copper cabling

- Transmission rates up to 10 Gbps
- Protection class IP20 and IP69k
- Spring, pierce and IDC insulation displacement connection
- 360 shielding concept
- For all common networks and fieldbusses

## Solution for fiber-optic cabling

- Transmission rates up to 40 Gbps
- Protection class IP20 and IP65/67 and IP68
- For POF,PCF and GOF
- For all common fiber-optic interfaces