Oferta de Comunicación Serial

Profibus DP, Modbus RTU/ASCII y Gateways

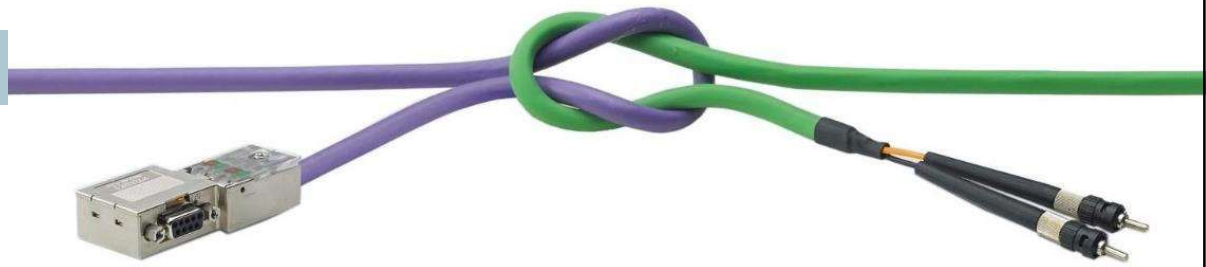
Antonio Gordillo / 8 Junio 2021 / Marketing Automatización

PHOENIX CONTACT
INSPIRING INNOVATIONS

Fieldbus Technology

Agenda

- Different Fieldbuses
- Interbus, CAN,
- Modbus RTU/ASCII
- PROFIBUS DP
- Physical basics of RS-485
- Termination of bus lines
- Active Termination
- SUBCON D-Sub connectors
- Repeater
- Device Servers
- Gateways



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Summary

RS-232	RS-422	RS-485
▪ asymmetrical voltage interference ▪ 3 data lines (TxD, RxD, GND) ▪ point-to-point ▪ full duplex ▪ max. data rate 115.2 kbit/s ▪ max. distance 15 m	▪ balanced differential voltage ▪ twisted pair cable (4 wire) ▪ full duplex ▪ point-to-point ▪ line termination 120 Ohm ▪ max. datarate:10 Mbit/s ▪ max. distance: 1200 m	▪ balanced differential voltage ▪ twisted pair cable (2 or 4 wire) ▪ half duplex (2 wire) ▪ full duplex (4 wire) ▪ multipoint ▪ line termination 180 Ohm ▪ max. datarate:10 Mbit/s ▪ max. distance: 1200 m ▪ Tri-State
+ Common − Low speed, low distance, low EMI	+ higher data rate, longer distance, high EMI	+ higher data rate, longer distance, high EMI

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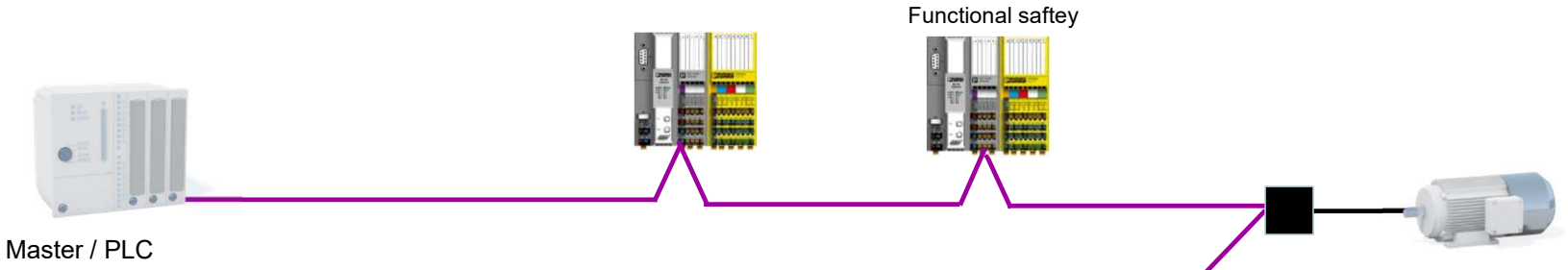
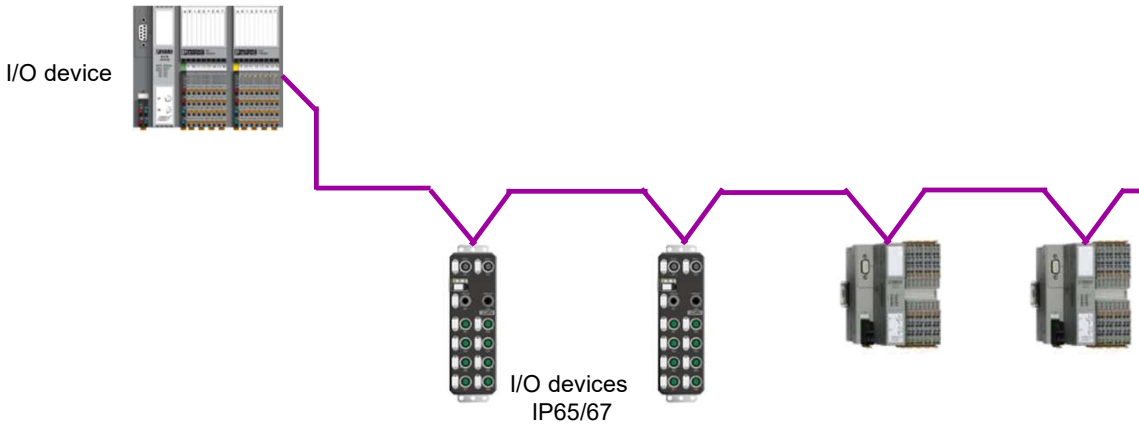


Fieldbus

Link between controllers or control systems to several decentralized field devices (sensors and actuators) via a single cable.



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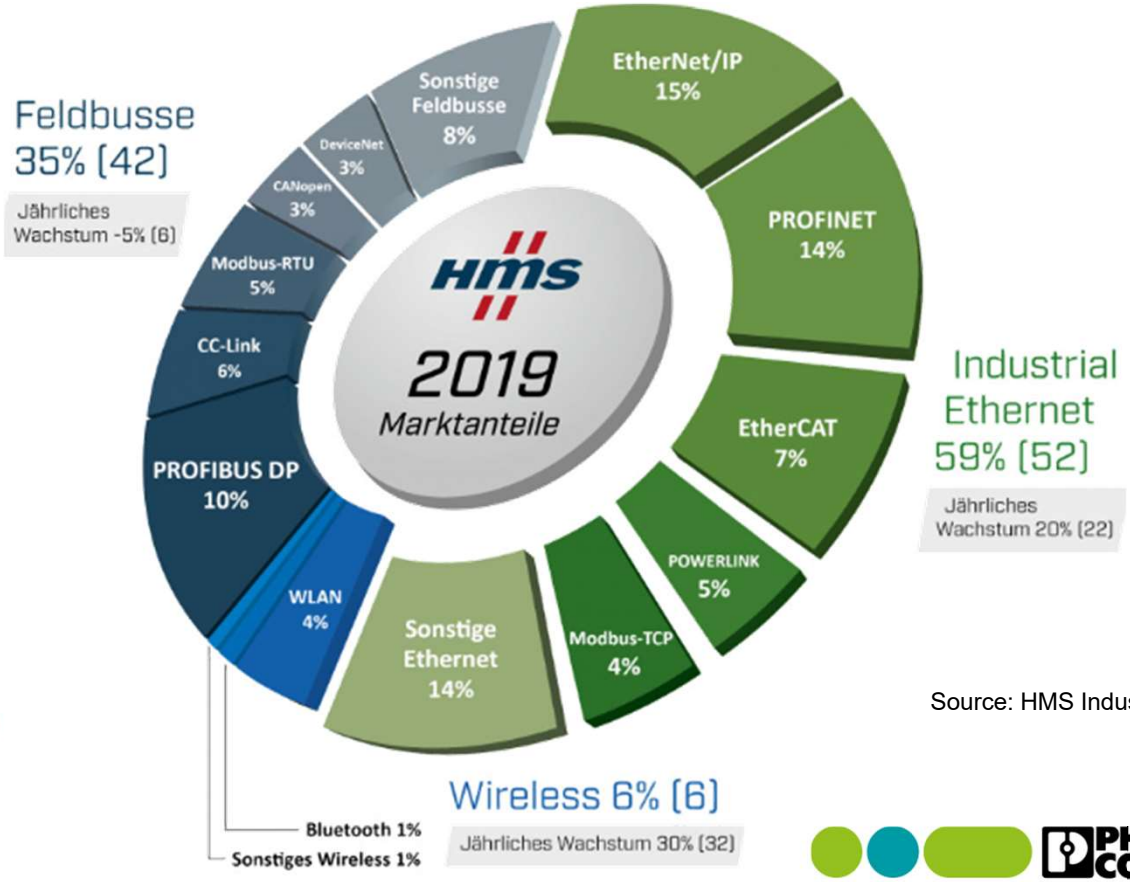
Common Fieldbuses



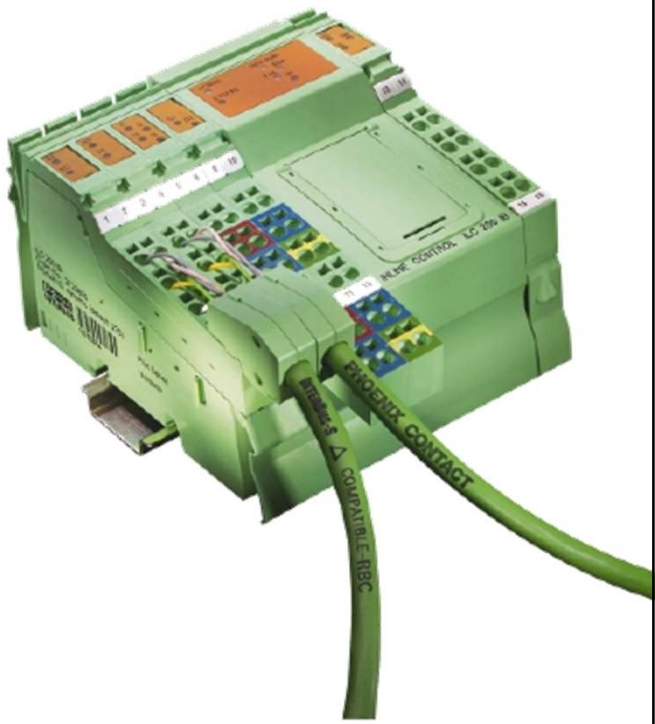
Source: HMS Industrial Networks

Fieldbus Technology

Interbus

Features

- Single-master system with active slaves
- Max. 512 devices
- 500 kBit/s or 2 MBit/s
- Logical Ring structure
- standardized according **IEC 61158-x**



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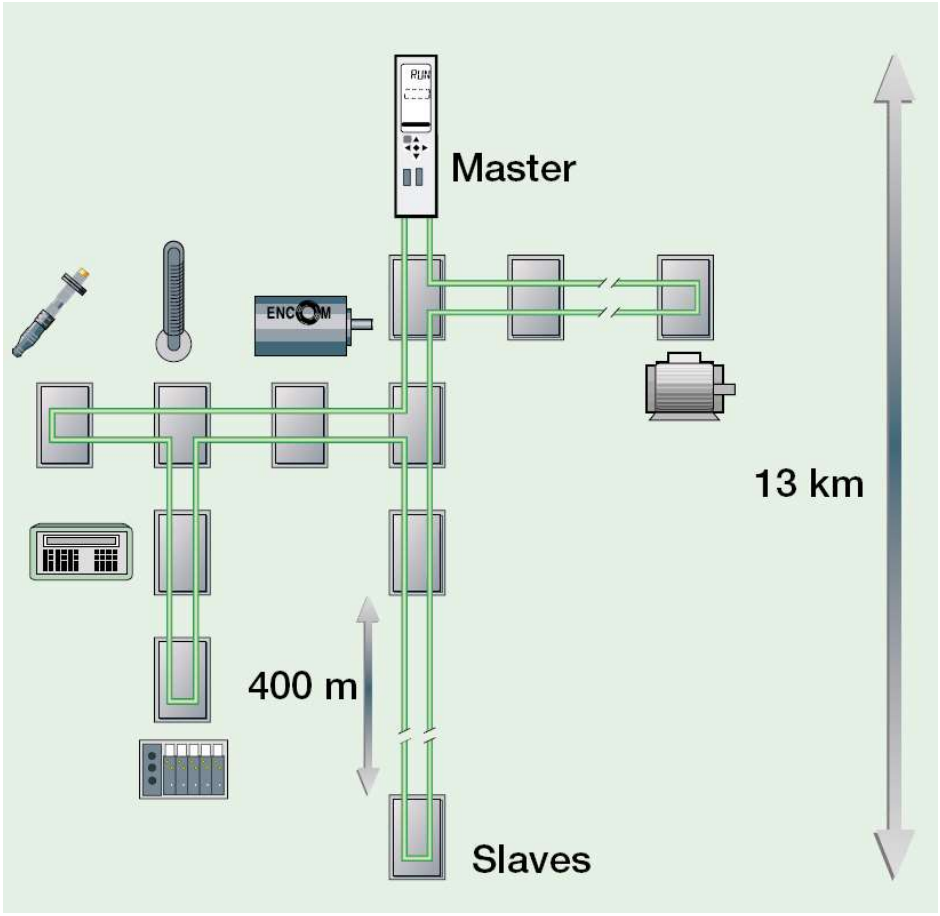
Interbus



Technology

- RS422 4-wire
- Full duplex
- Point-to-point connection
- Max. 400 m between remote bus devices
- 13 km total length

Fieldbus Technology

Interbus Solution CI

PSI-MOS
Fiber Optic Converter

RS-422

SUBCON connector

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Fieldbus Technology

CAN

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Fieldbus Technology

CAN

Bases on **Controller Area Network (CAN)**

- **balanced** differential voltage interface
- **3 wires** (CAN_HIGH, CAN_LOW, GND)
- 120 Ω active line termination
- **CSMA/CA** access control with a non-destructive **bus arbitration**

  Carrier **S**ense **M**ultiple **A**ccess with **C**ollision **A**voidment

  (priority, signal run time)

Fieldbus Technology

DeviceNet

Features DeviceNet

- Speed 125 kBit/s,
  250 kBit/s and 500 kBit/s
- Up to **64** Devices
- Maximum Network Expansion
  500 m (at 125 kBit/s)

Speed	Distance
500 kBit/s	100 m
250 kBit/s	250 m
125 kBit/s	500 m

standardized according
IEC 61158

Rockwell Automation

Allen-Bradley

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CANopen

DeviceNet

CANopen

Features CANopen

- Up to 30 Devices
- Speed up to 1 MBit/s
- Maximum Network Expansion
  1000 m (at 50 kBit/s)

Speed	Distance
800 kBit/s	50 m
500 kBit/s	100 m
250 kBit/s	250 m
125 kBit/s	500 m
50 kBit/s	1000 m

Fieldbus Technology

CAN Solution CI

CANopen

REPEATER

PSI-MOS
Fiber Optic Converter

SUBCON connector

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Modbus.org

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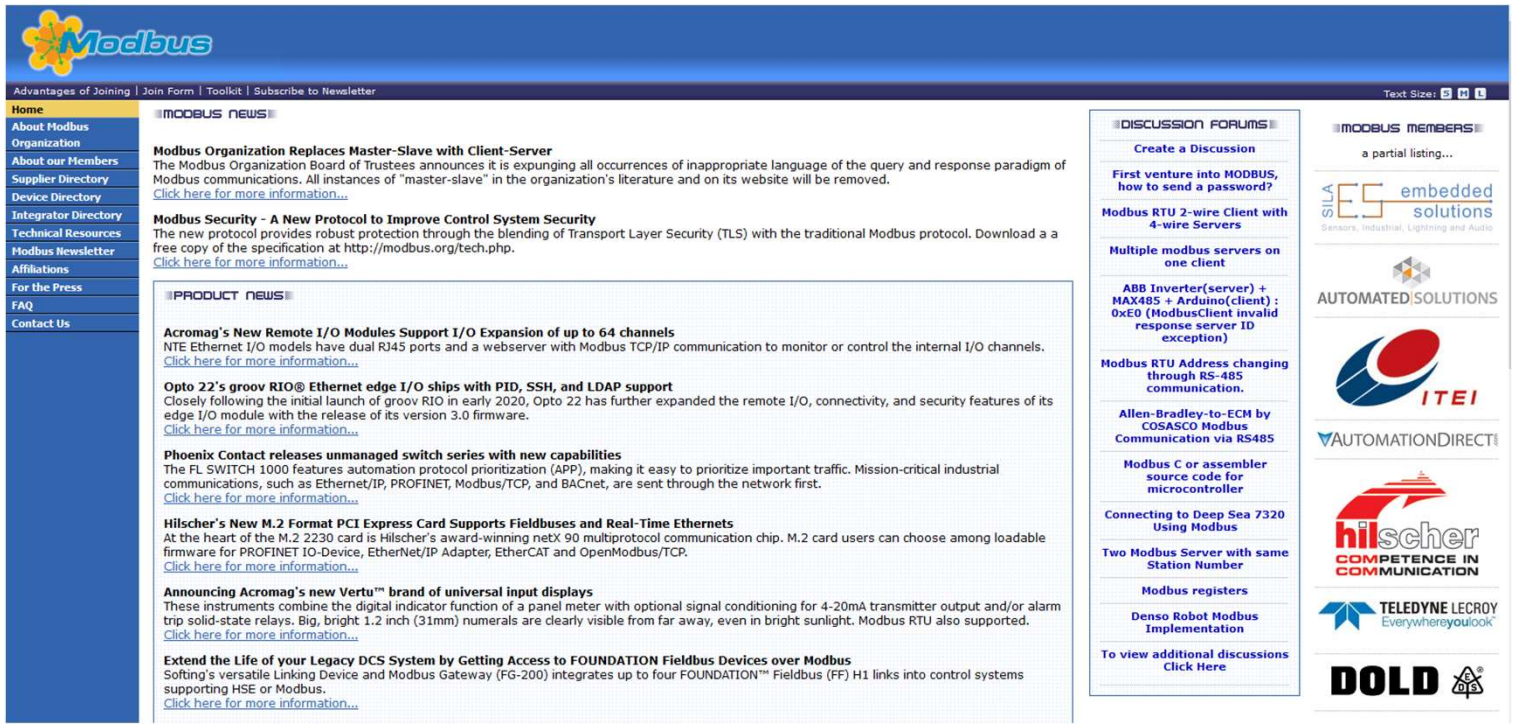

Modbus

Most important variants:

- **Modbus RTU** and
- **Modbus ASCII** for serial connections

- **Modbus/TCP** for connections over TCP/IP

Modbus

- **Modbus RTU**
  - 11 bits (1 start 8 data 1 parity 1 stop)
- **Modbus ASCII**
  - 10 bits (1 start 7 data 1 parity 1 stop)
- **Features**
  - One Master and up to 247 Slaves
  - Asynchronous serial transmission over a variety of media:
    - RS-485 2/4 –wire
    - Fiber
    - Radio
  - Speed 9.6kBit/s, 19.2kbps and higher (500 kbps)

Fieldbus Technology

Modbus Solution CI

Modular Repeater Series

Stand Alone RS-485 Repeater

PSI-TERMINATOR

PSI-MOS Fiber Optic Converter

Wireless - Radioline

Device Server (TCP)

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Portfolio Products

Modbus RTU/ASCII

- Bus Modules
- Connectors
- Converters and repeaters
- Energy Measuring device and energy meters
- Fieldbus Gateways
- Isolators
- Modular controllers
- Patch fields
- Signal conditioners with Modbus connection
- Software PLC
- Surge Protection
- Wireless
- Extender Serial

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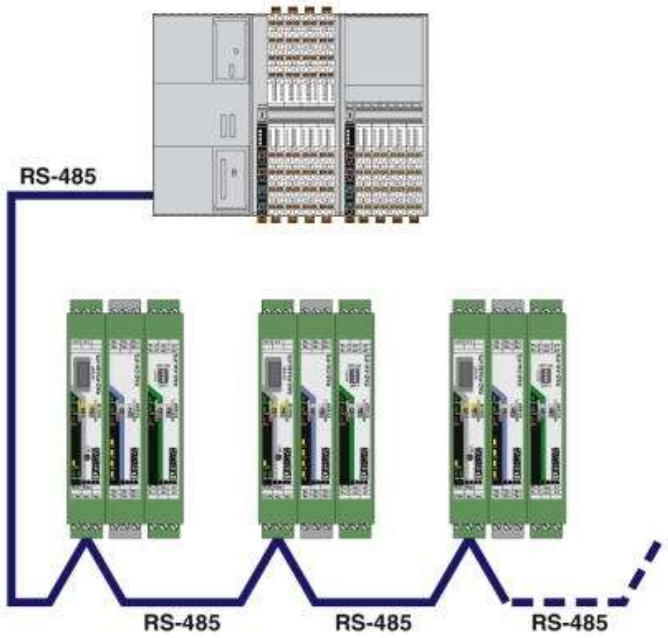
Bus Modules

RAD-RS485-IFS

Modbus



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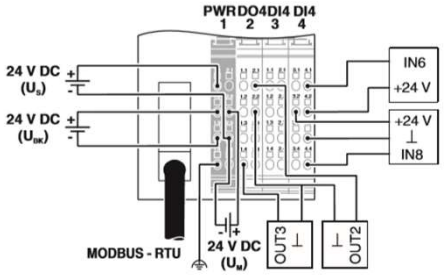
Bus Modules

IL MOD BK DI8 DO4-PAC

8 Connection example

Figure 4 Connection example



12 Modbus function codes

The Modbus protocol functions determine whether data is to be read or written and what type of data is involved.

The following function codes are supported:

Function code	Function	Description
FC1	Read coils	Read digital outputs
FC2	Read input discretes	Read digital inputs
FC3	Read holding registers	Read a multiple register (e.g., read back analog output)
FC4	Read input registers	Read words from inputs
FC5	Write coil	Write a digital output
FC6	Write single registers	Write an output register (e.g., analog output)
FC15	Write multiple coils	Write multiple digital outputs
FC16	Write multiple registers	Write multiple output registers
		FW 1.07 or later

Connectors

SUBCON-PLUS 9/M

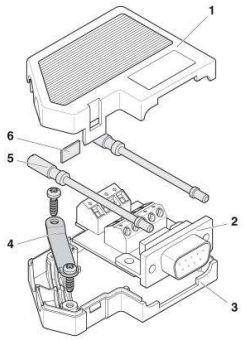
SUBCON-PLUS 9/F

SUBCON-PLUS-F/AX 9

SUBCON-PLUS-M/AX 9

SUBCON-PLUS M1

SUBCON-PLUS F1



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Energy Measuring and Energy meters

EEM-EM357

EEM-EM355

EEM-MA770-R

EEM-MA771-R

EEM-MA370-R

EEM-MA371-R

Fieldbus Gateways and Device Servers

Interface converters - GW MODBUS TCP/RTU 1E/1DB9 - 2702764

3D

The GW MODBUS TCP/RTU... gateway converts serial based Modbus RTU (or ASCII) to Modbus TCP. Supports serial master or slave devices. Includes one RJ45 port and one D-SUB 9 port.

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In-stock article

Interface converters - GW MODBUS TCP/RTU 2E/4DB9 - 2702767

3D

The GW MODBUS TCP/RTU... gateway converts serial based Modbus RTU (or ASCII) to Modbus TCP. Supports serial master or slave devices. Includes two RJ45 ports and four D-SUB 9 ports.

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In-stock article

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Fieldbus Gateways and Device Servers

Protocol converter - GW PL FF/MODBUS - 2316363

Modbus/RTU to FOUNDATION Fieldbus protocol converter

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3D

Delivery time on request

Protocol converter - GW PL PA/MODBUS - 2316364

Modbus/RTU to PROFIBUS PA protocol converter

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3D

Delivery time on request

INSPIRING INNOVATIONS

Fieldbus Gateways and Device Servers

Protocol converter - GW PL DP/MODBUS - 2316365

3D

Modbus/RTU to PROFIBUS DP protocol converter

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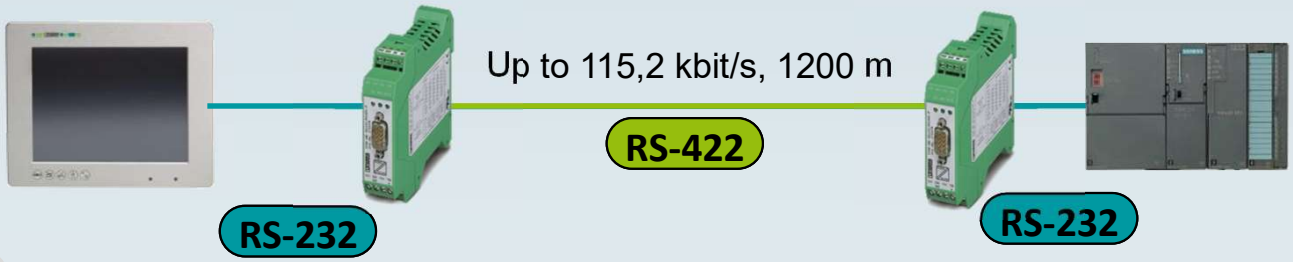
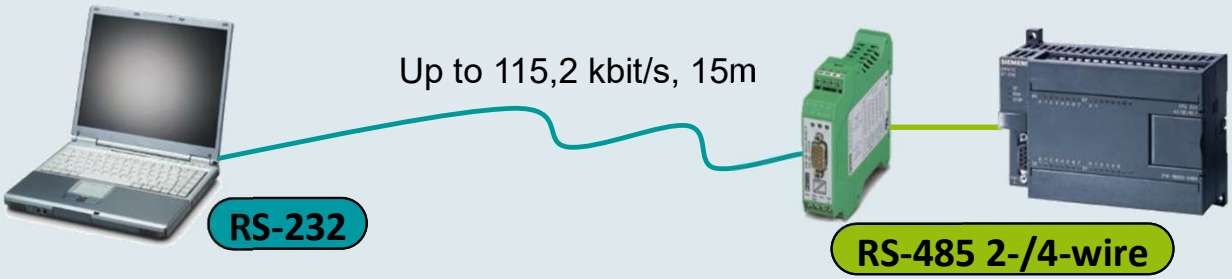
Delivery time on request

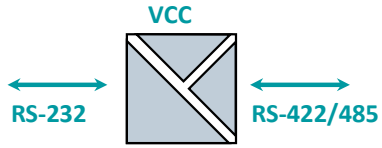
INSPIRING INNOVATIONS

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



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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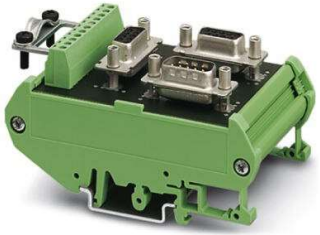
Patch Fields

PSM PTK



PSM PTK - 4

Modular Controllers

IB IL RS 232-PAC

IB IL RS 485/422-PRO-PAC

AXL F RS UNI 1H

For serial data transmisión

ILC 100

AXC 1000

AXC 3000

AXC F 1152
AXC F 2152
AXC F 3152

Wireless

Wireless module - RAD-2400-IFS - 2901541

Radioline - 2.4 GHz wireless transceiver with RS-232/RS-485 interface, can be extended with I/O modules, RSMA (female) antenna connection, point-to-point, star, and mesh networks up to 250 stations, range of up to 5 km (with a clear line of sight), for worldwide use

3D

Generate product PDF

Wireless module - RAD-900-IFS - 2901540

Radioline - 900 MHz wireless transceiver with RS-232/485 interface, can be extended with I/O modules, RSMA (female) antenna connection, point-to-point, star, and mesh networks up to 250 stations, range of up to 32 km (line of sight), use in North America

3D

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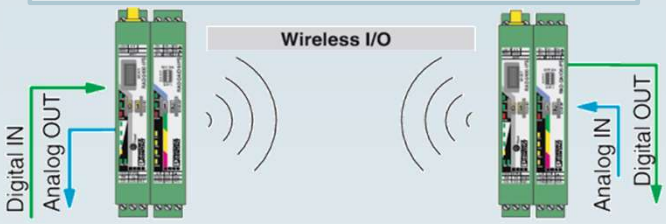
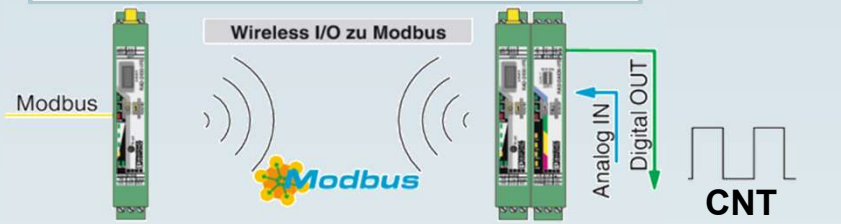
Radioline - One System for different applications

Option 1



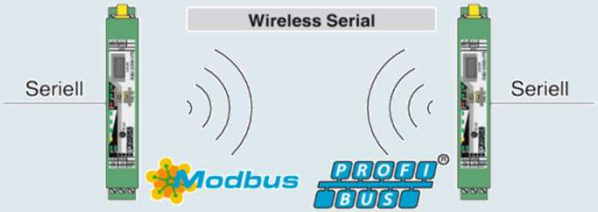
I/O to I/O

Option 2



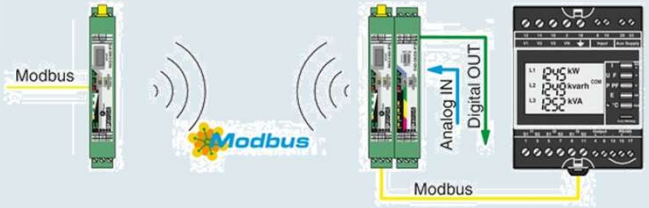
I/O to Modbus RTU

Option 3



Serial to Serial (RS 232/485)

Option 4



I/O and Modbus parallel

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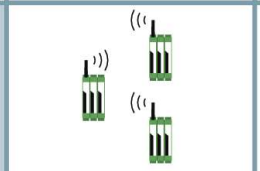
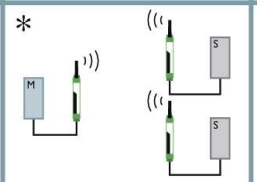
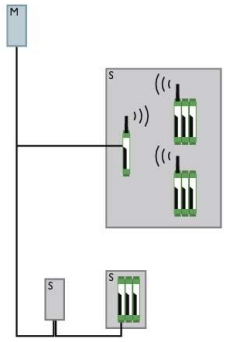
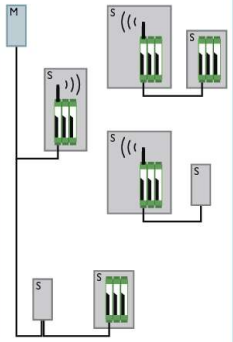
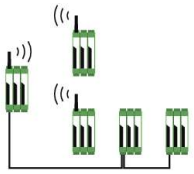
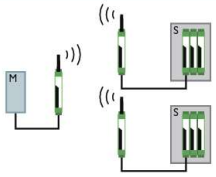
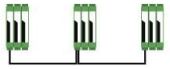
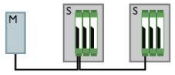
Radioline System – Application overview

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

Radioline Multipoint Multiplexer

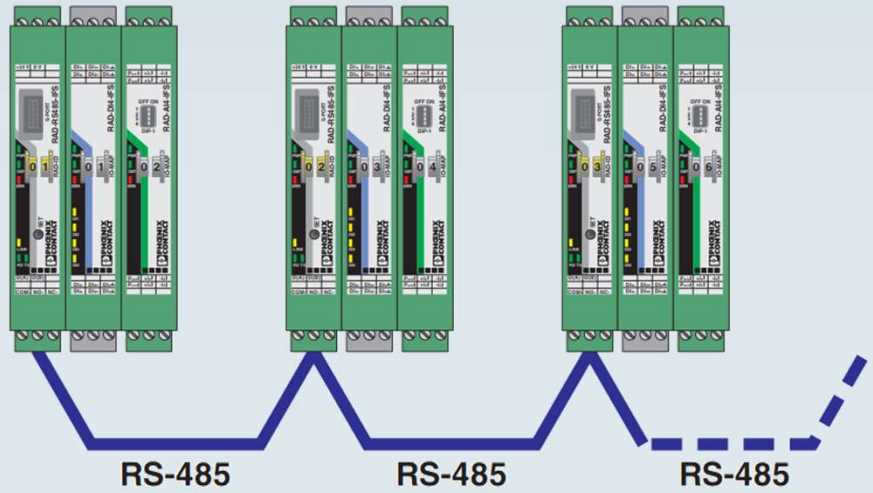
I/O-Mapping via 2-wire-cables

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

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

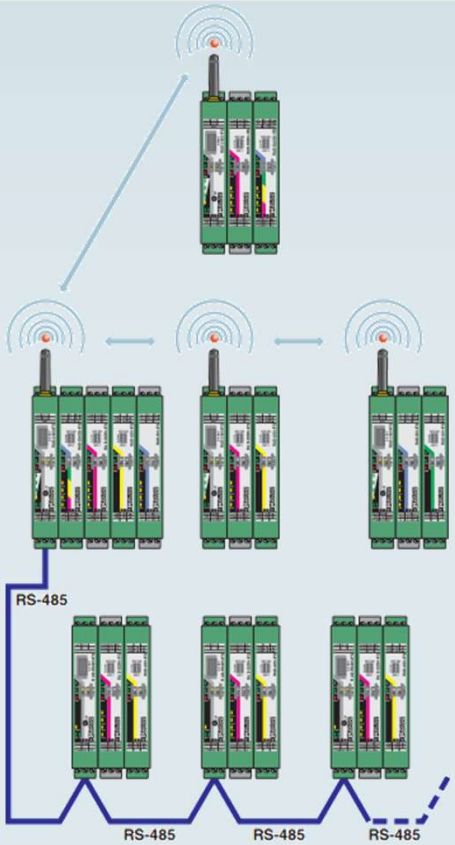
Intermedia communication
Wireless and wired modules form a combined system.

Radioline Multipoint Multiplexer I/O to I/O



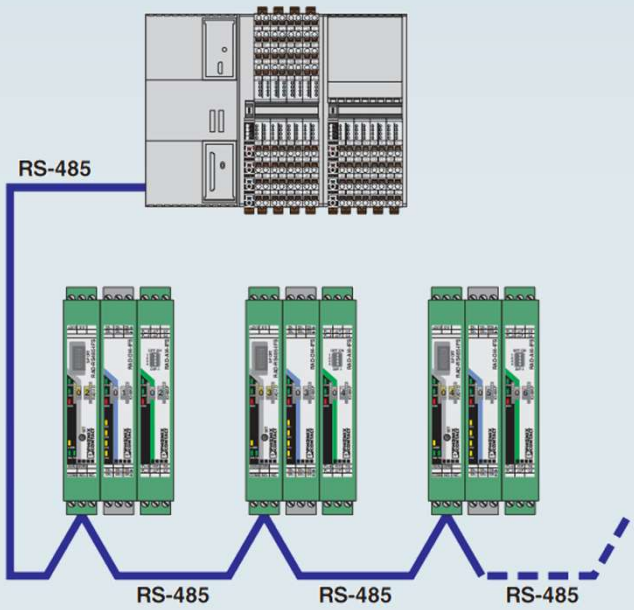
- Multipoint multiplexer – easy I/O distribution between multiple stations
- Up to 99 stations via RS-485
- Addressing using yellow thumbweel
- Easy I/O mapping using white thumbwheel on the extention modules
- Fast startup via Plug and Play

Radioline Multipoint Multiplexer and Wireless



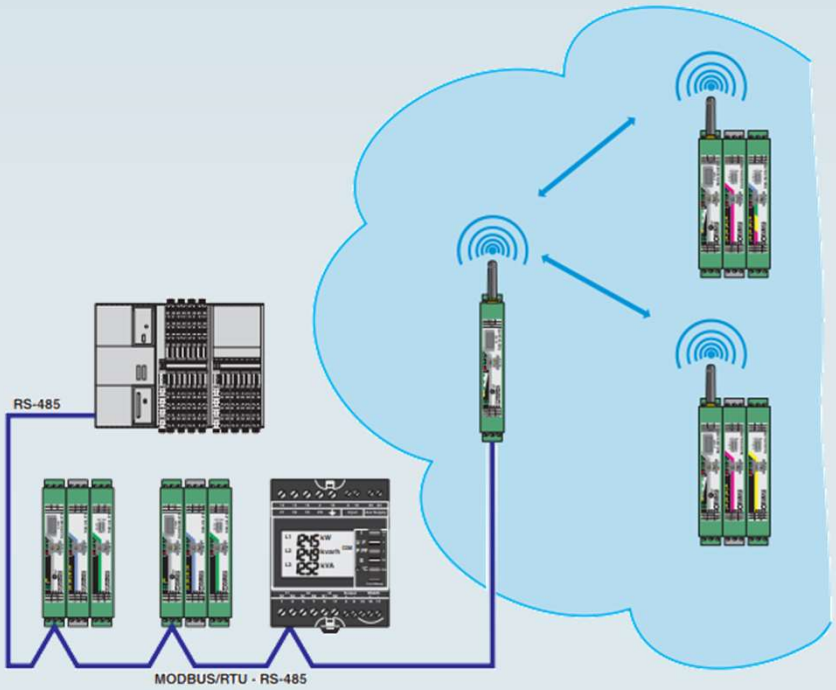
- Cross-media distribution of I/O signals
- Up to 250 stations in total:
  - 98 RS-485 stations and
  - 152 wireless stations
- Easy I/O mapping using white thumbwheel on the extention modules
- Fast startup via Plug and Play

Radioline Modbus RTU slave (I/O to serial)



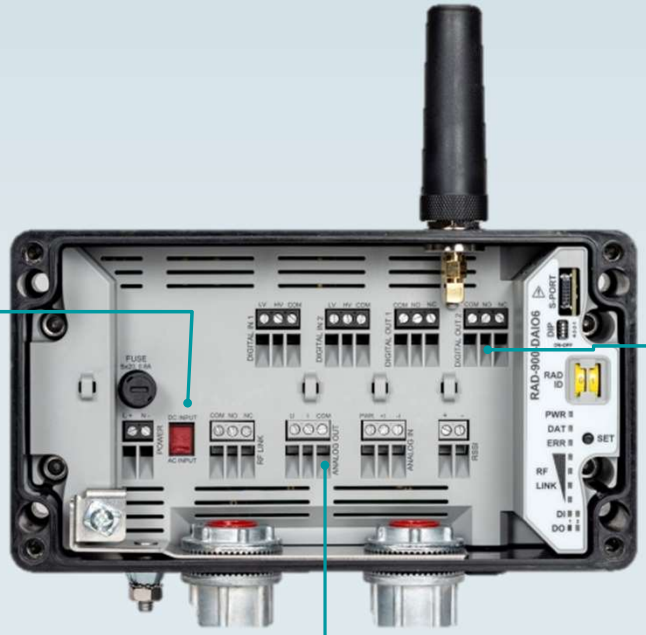
- Operation as a bus coupler for Modbus RTU with Radioline extendsion modules
- As a Modbus slave to any master
- Up to 98 stations per Modbus newtork
- Integration in existing Modbus newtorks
- Fast startup via Plug and Play
- Default setting of the RS-485 interface: 19.2/8/E/1

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 – RAD-900-DAIO6



Fused AC/DC
Power selection

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

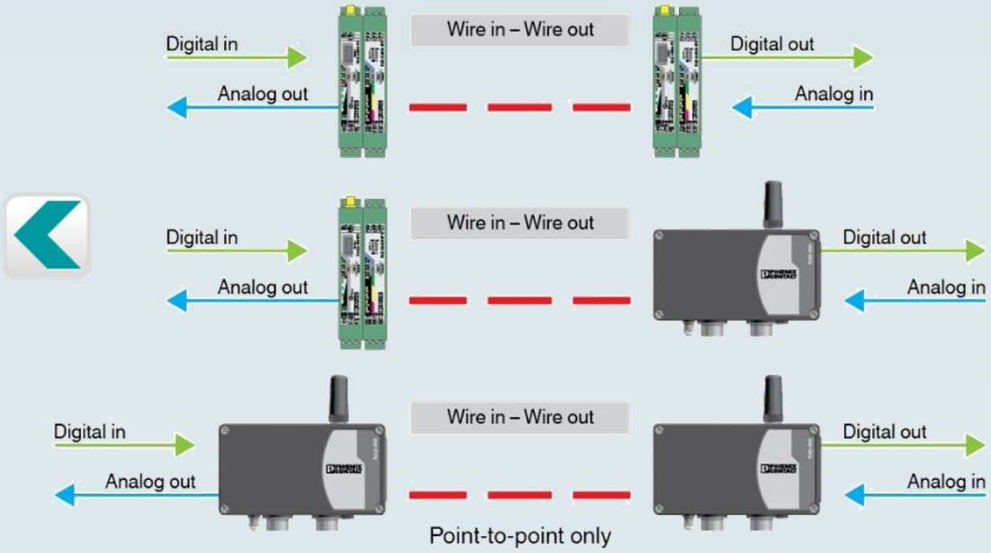
Dual half-inch NPT fittings for
power and data isolation

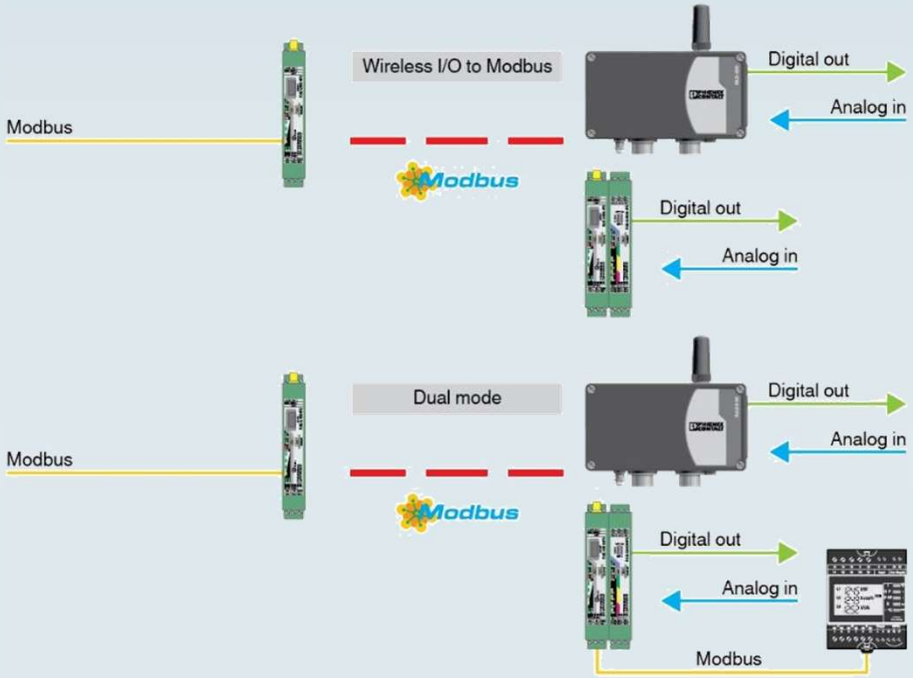
Seperated terminals and wire-tie
loops for cable management

- 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**

Radioline – RAD-900-DAIO6

Modes of operation





Wireless

Wireless module - RAD-RUGGED-BOX-CONF - 1091638

Radioline switchgear and controlgear assembly in impact-proof IP66 outdoor housing with universal power supply 100...240 V AC, surge protection and antenna feedthrough. Type of wireless module (frequency band), type and number of I/O extension modules are configurable.

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Order key

1091638/900/DAIO6/DAIO6/DAIO6

INSPIRING INNOVATIONS

ESSENTIAL Wireless

TRUSTED WIRELESS

Intuitive start-up

- Thanks to comfortable software wizards

Universal use

- Fully transparent cable replacement for serial RS-485 interfaces

Modbus

Article information

- RAD-EE-2400-RS485
- Art-No. 1081818

Worldwide use

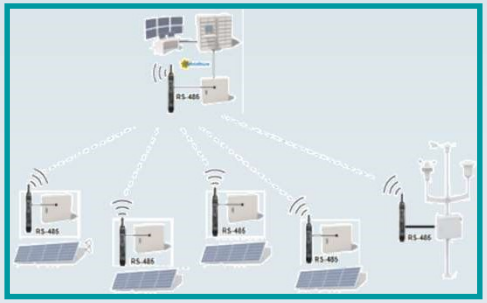
- Special radio module with reduced functionality for price-sensitive PV applications
- License- free 2,4-GHz band
- CE, FCC, UL approval
- Adjustable data rates
- Range up to 500 m

Reliable communication

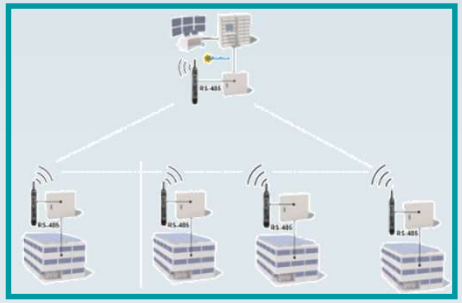
- Interference-free communication through automatic and manual coexistence mechanisms
- Immune to electromagnetic interference
- Mesh network with up to 250 nodes

PHOENIX CONTACT
INSPIRING INNOVATIONS

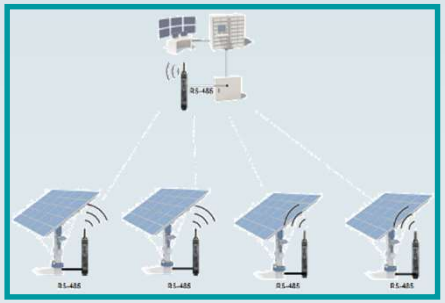
ESSENTIAL Wireless – Application examples



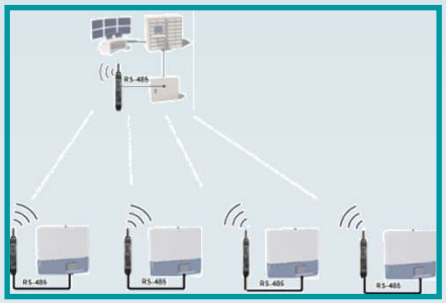
Wireless string monitoring in open field installations



Wireless monitoring of rooftop systems

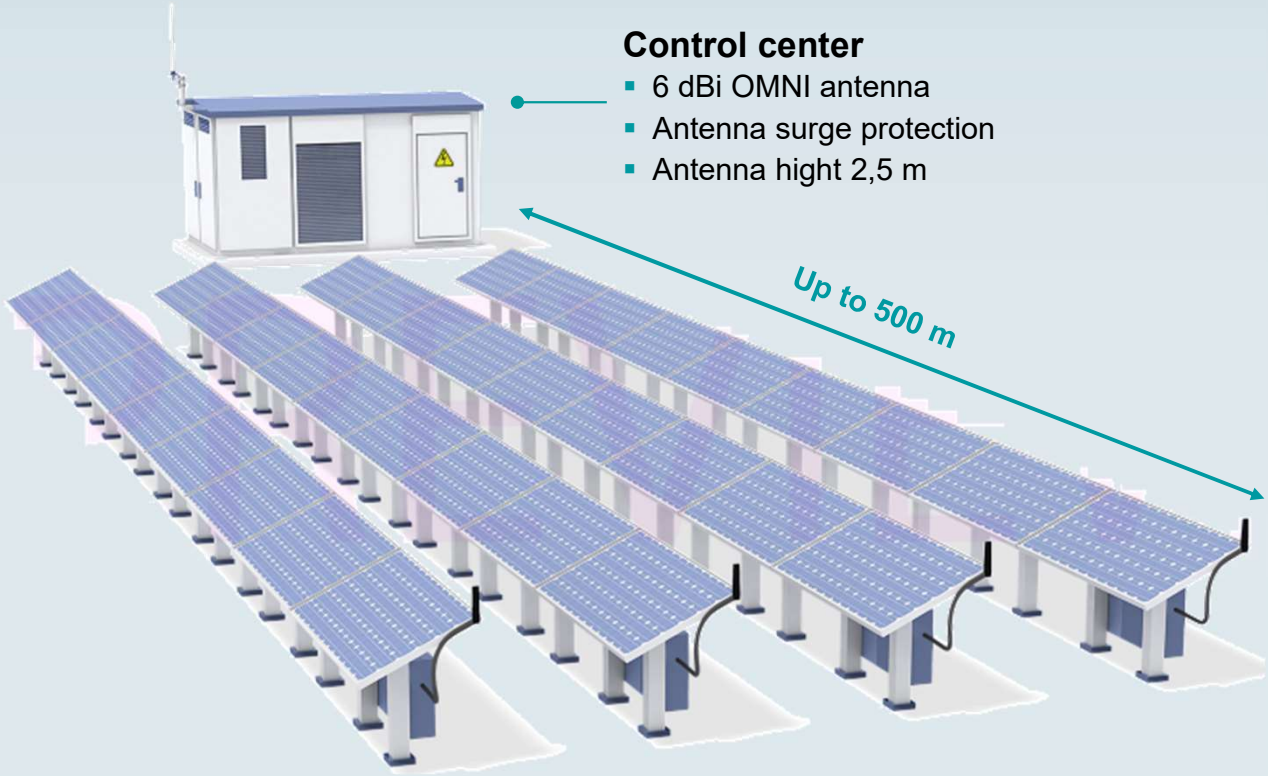


Wireless monitoring of tracking systems



Wireless monitoring of inverters

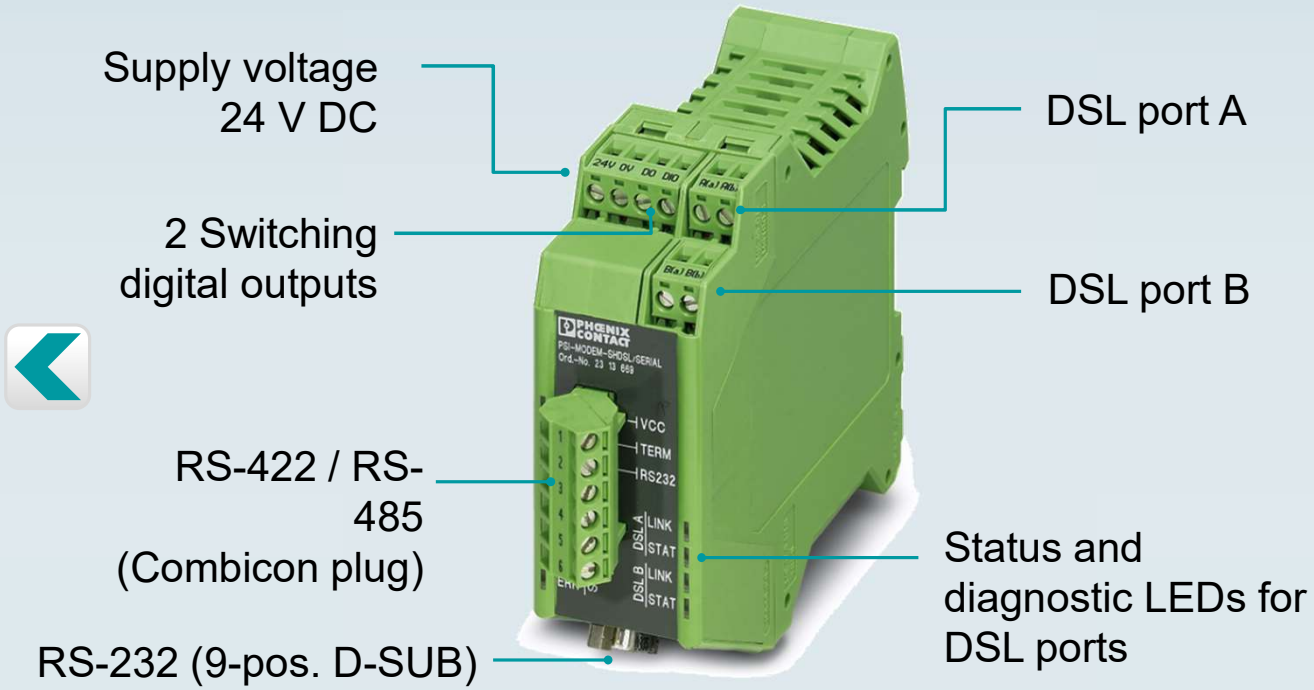
ESSENTIAL Wireless - Application



Control center
- 6 dBi OMNI antenna
- Antenna surge protection
- Antenna hight 2,5 m

String monitoring box
- 2 dBi OMNI antenna
- Can be sticked directly to control cabinet or PV module
- Antenna hight 1,5 m

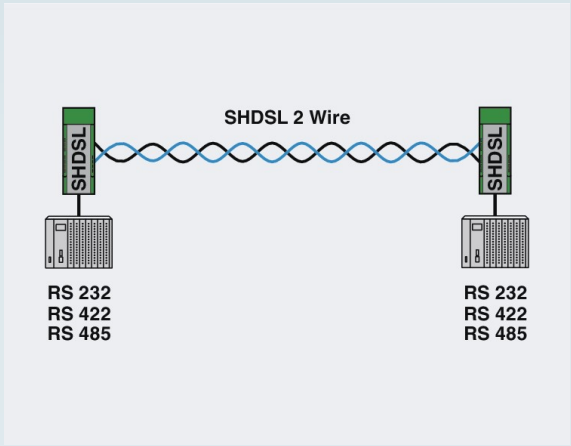
Extender - Serial



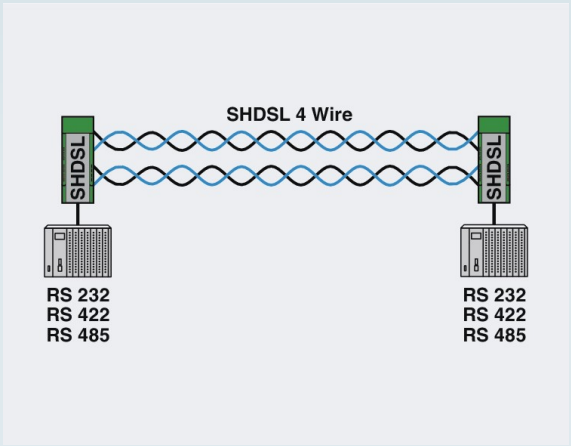
- Distances up to 20 km
- Transparent protocol
- Point-to-Point and line structures
- RS-232, up to 230,4 kbps
- RS-422, up to 2000 kbps
- RS-485 W2, up to 2000 kbps
- Diagnostic via USB port or LEDs
- Configuration software

Extender – Serial

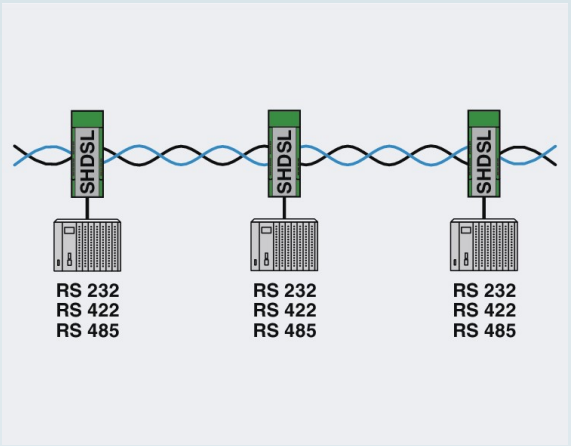
Topologies:



Point-to-Point
2-wire

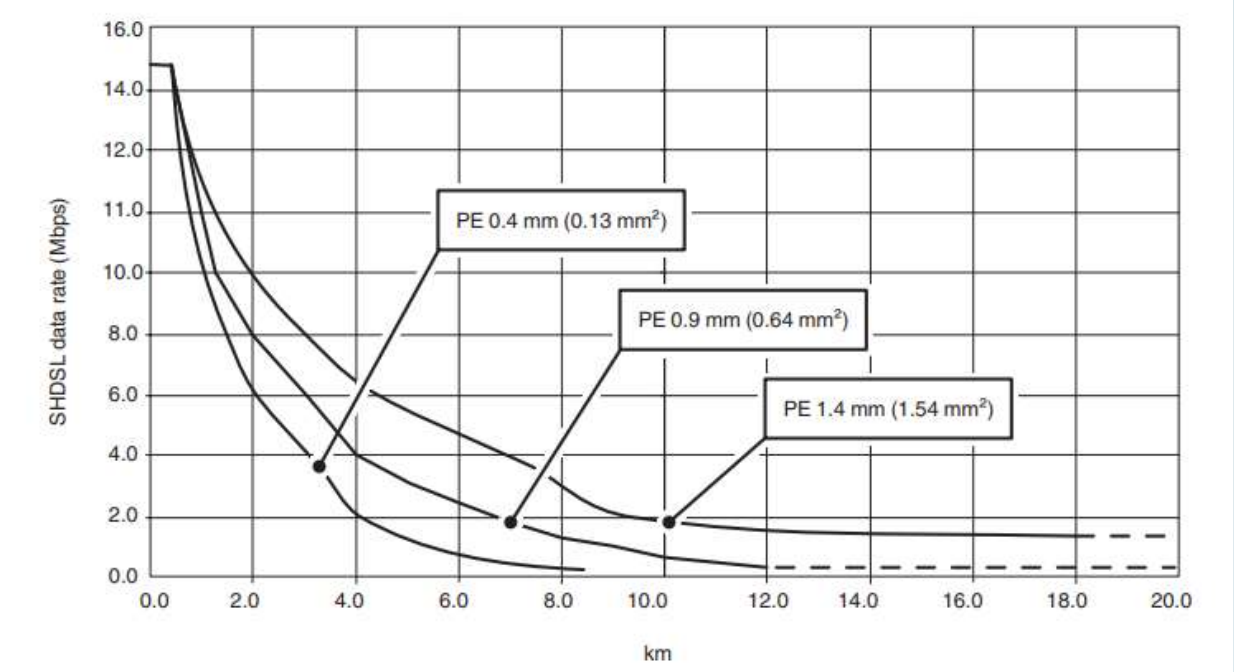


Point-to-Point
4-wire



Line
2-wire

Extender – Serial and PROFIBUS



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

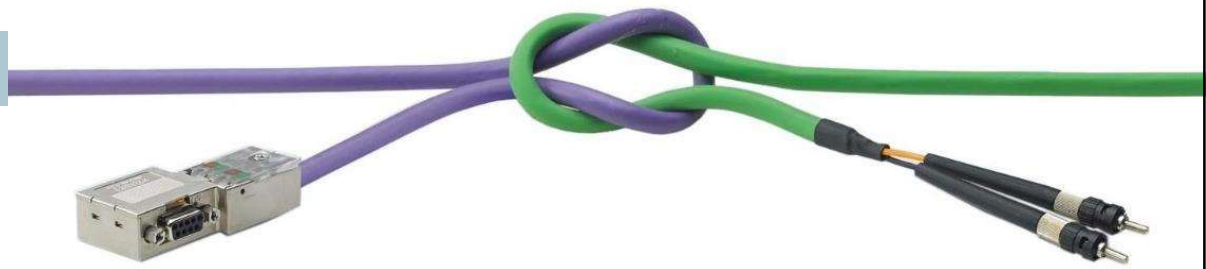
Extender – Serial & PROFIBUS

	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

INSPIRING INNOVATIONS

Agenda

- Different Fieldbuses
- Interbus, CAN, Modbus RTU/ASCII
- PROFIBUS
- Physical basics of RS-485
- Termination of bus lines
- Active Termination
- SUBCON D-Sub connectors
- Repeater



PROFIBUS

Organization

- International: “PI” – PROFIBUS & PROFINET International

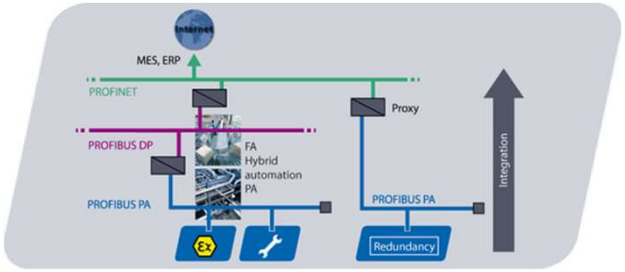
  Germany: “PNO” – PROFIBUS user organization
- Worldwide 27 local organization (RPA, Regional PB+PN association) with 1400 members

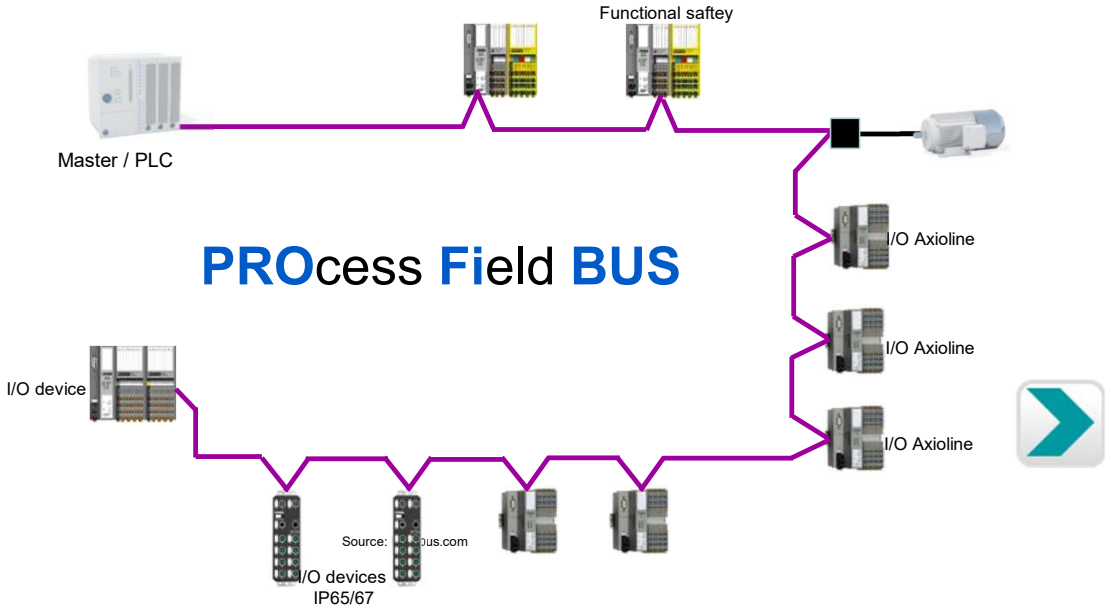
PROFIBUS • PROFINET

INSPIRING INNOVATIONS

PROFIBUS

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





PROFIBUS • PROFINET

INSPIRING INNOVATIONS

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.

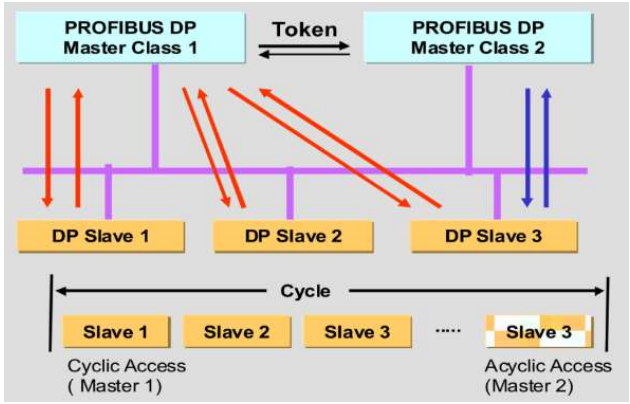
- **PROFIBUS PA** (**P**rocess **A**utomation) refers to the following features:
  - Bus powered by using the Manchester encorded Bus Powered (MBP) physical layer according to IEC 61158-2
  - Intrinsically safe design
  - Configuration over the bus
  - Device profile

PROFIBUS

PROFIBUS DP (**D**ecentralized **P**eriphery)

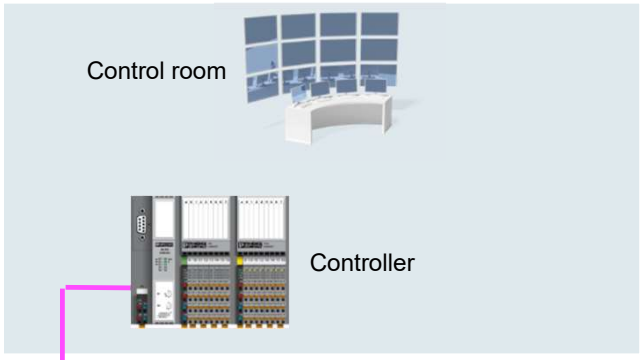
A single open communication protocol for all applications

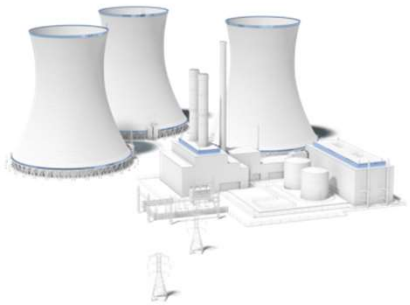
- "Master-Slave" procedure -
  The master controls one or more slaves
- “Token Passing" procedure -
  The token is passed on via the network



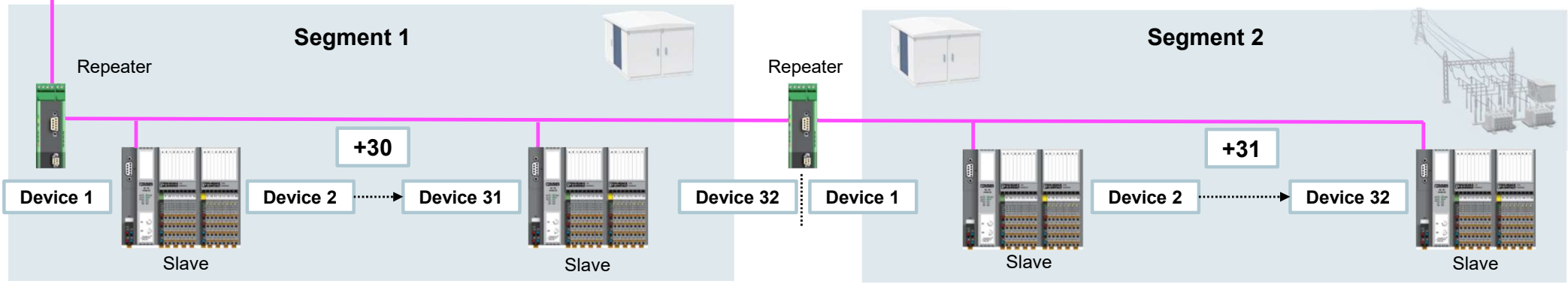
PHOENIX CONTACT
INSPIRING INNOVATIONS

PROFIBUS – Network specification

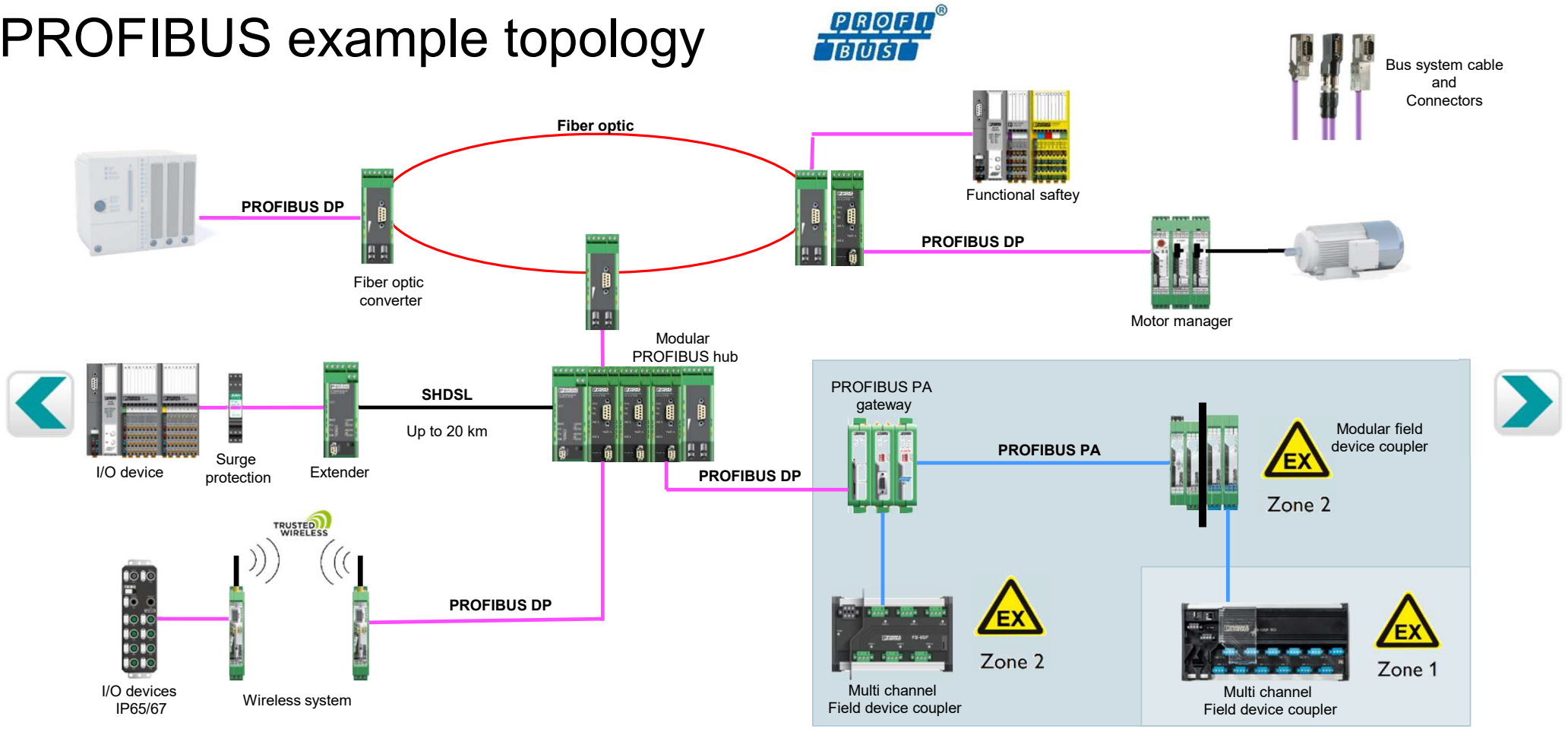




- Max 32 devices in one segment
- Address oriented protocol
- Maximum 128 bus addresses (0.....127)
- Maximum 125 network participants (master and slave) Rest for diagnostics, programming, broadcast, reserve

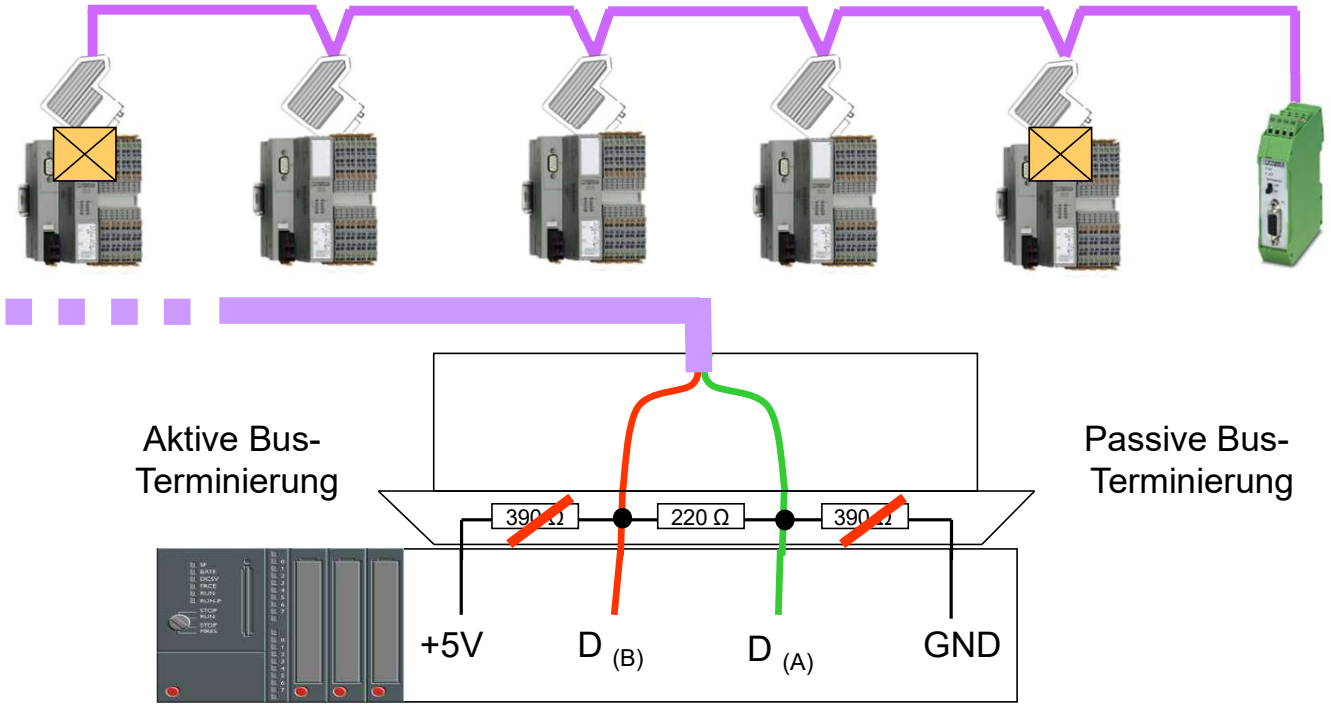


PROFIBUS example topology



INSPIRING INNOVATIONS

PROFIBUS


Aktive Bus-
Terminierung
Passive Bus-
Terminierung
390 Ω
220 Ω
390 Ω
+5V
D (B)
D (A)
GND

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

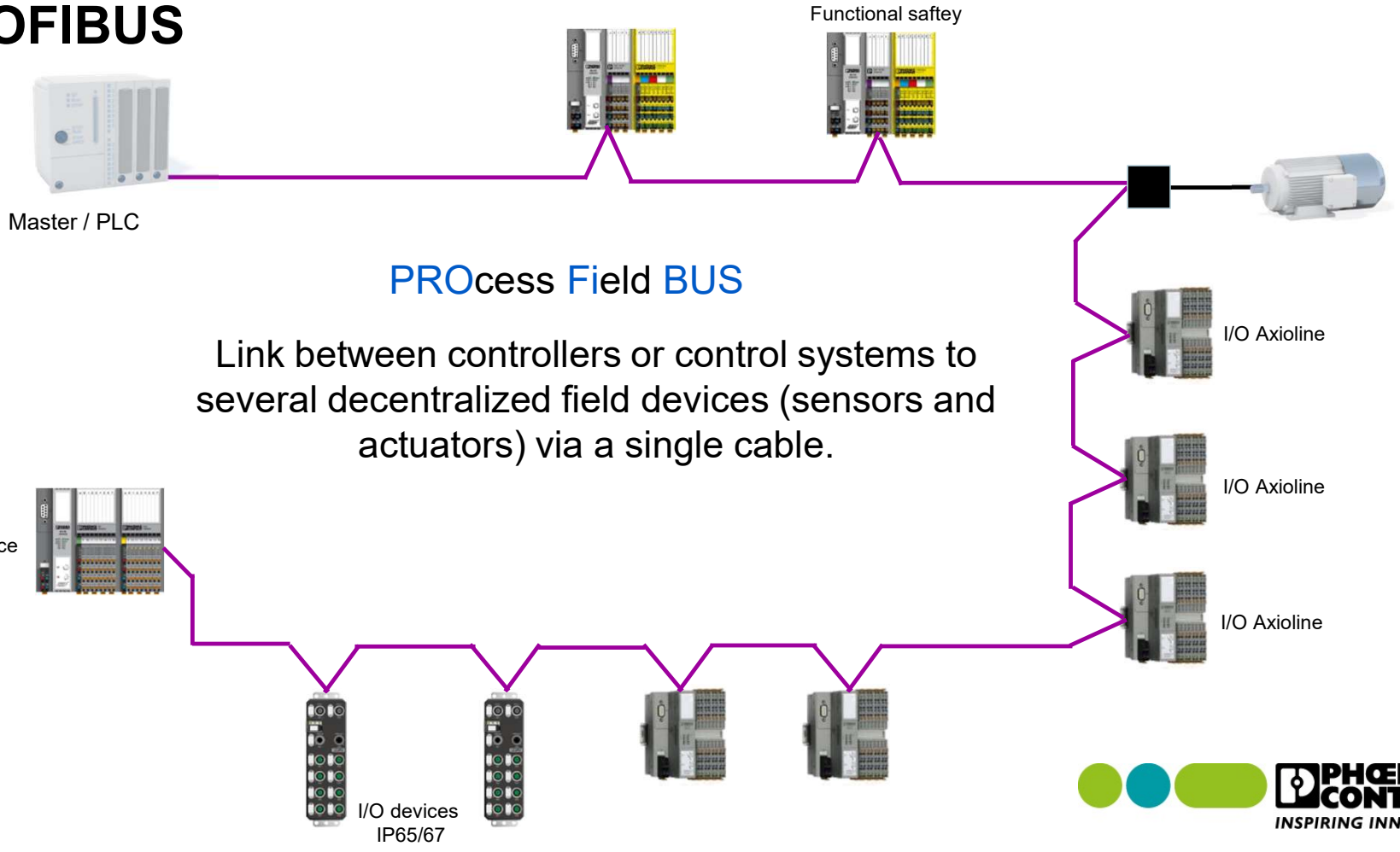
Plant Managers
- Lower costs
- Faster and more flexible production
- Better production quality
- Safer plants
- Increased ROI

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

INSPIRING INNOVATIONS

Fieldbus Technology

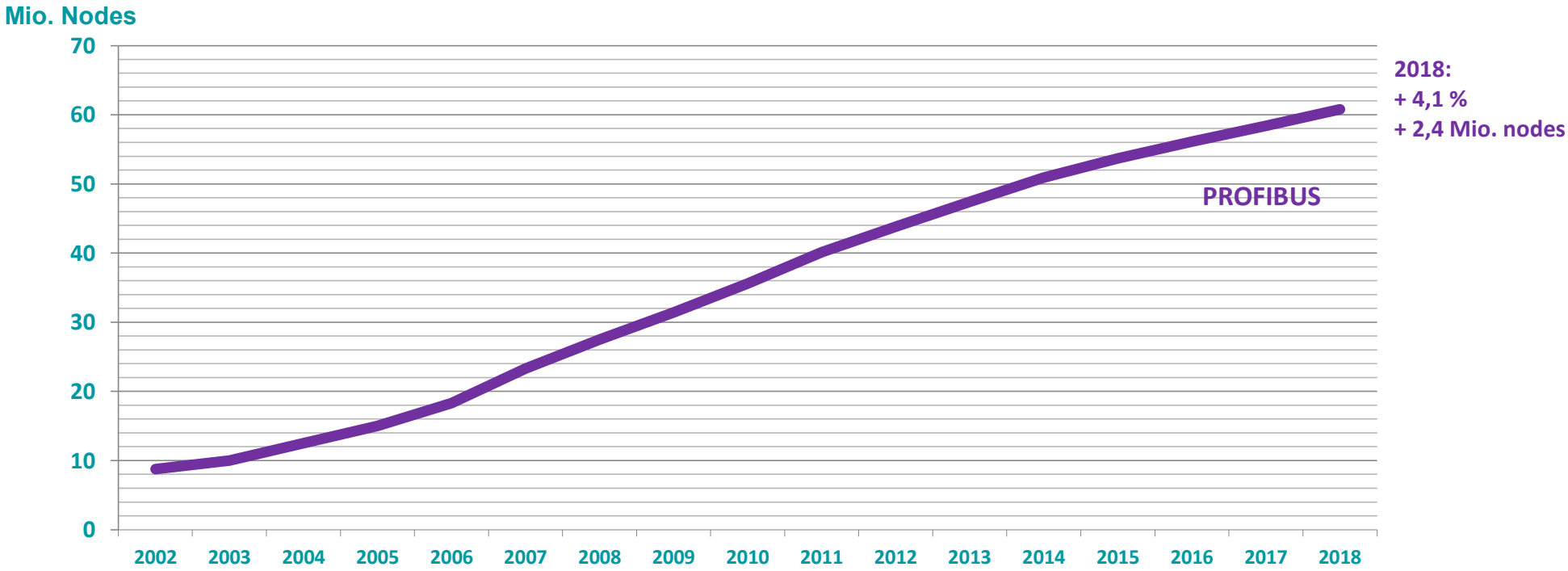
PROFIBUS



PHOENIX CONTACT
INSPIRING INNOVATIONS

PROFIBUS

Number of sold PB devices

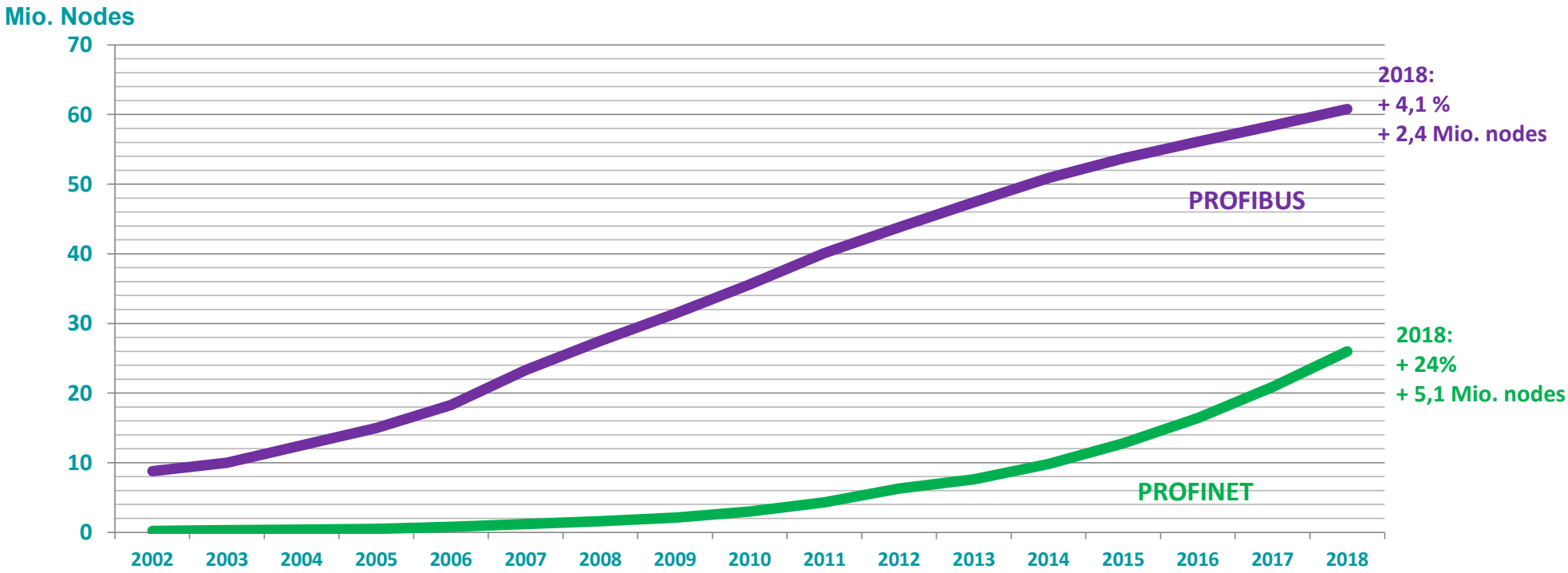


Quelle: PI / PNO https://de.profibus.com/

INSPIRING INNOVATIONS

PROFIBUS

Number of sold PB devices



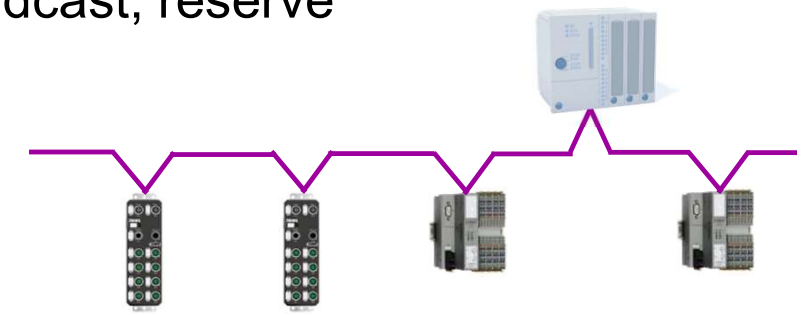
Quelle: PI / PNO https://de.profibus.com/

INSPIRING INNOVATIONS

Physical network specification

Technology

- address oriented protocol
- max. 128 bus addresses (0…..127)
- max. 125 field devices (Master and Slave)
  rest for diagnostics/programming, broadcast, reserve
- max. 32 devices per segment

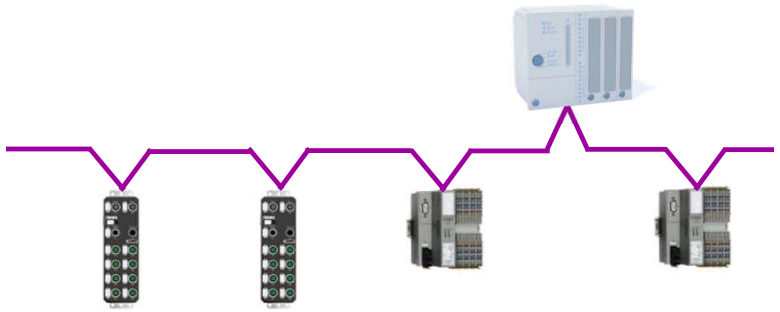


PROFIBUS

Physical network specification

Technology

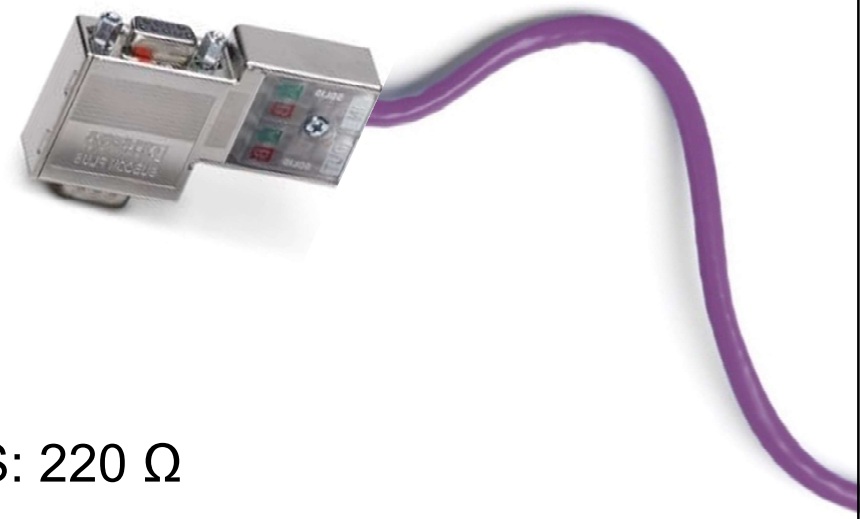
- RS-485 2-wire interface, half duplex
- multi-point interconnection
- multi-master
- line structure



INSPIRING INNOVATIONS

PROFIBUS

Physical network specification



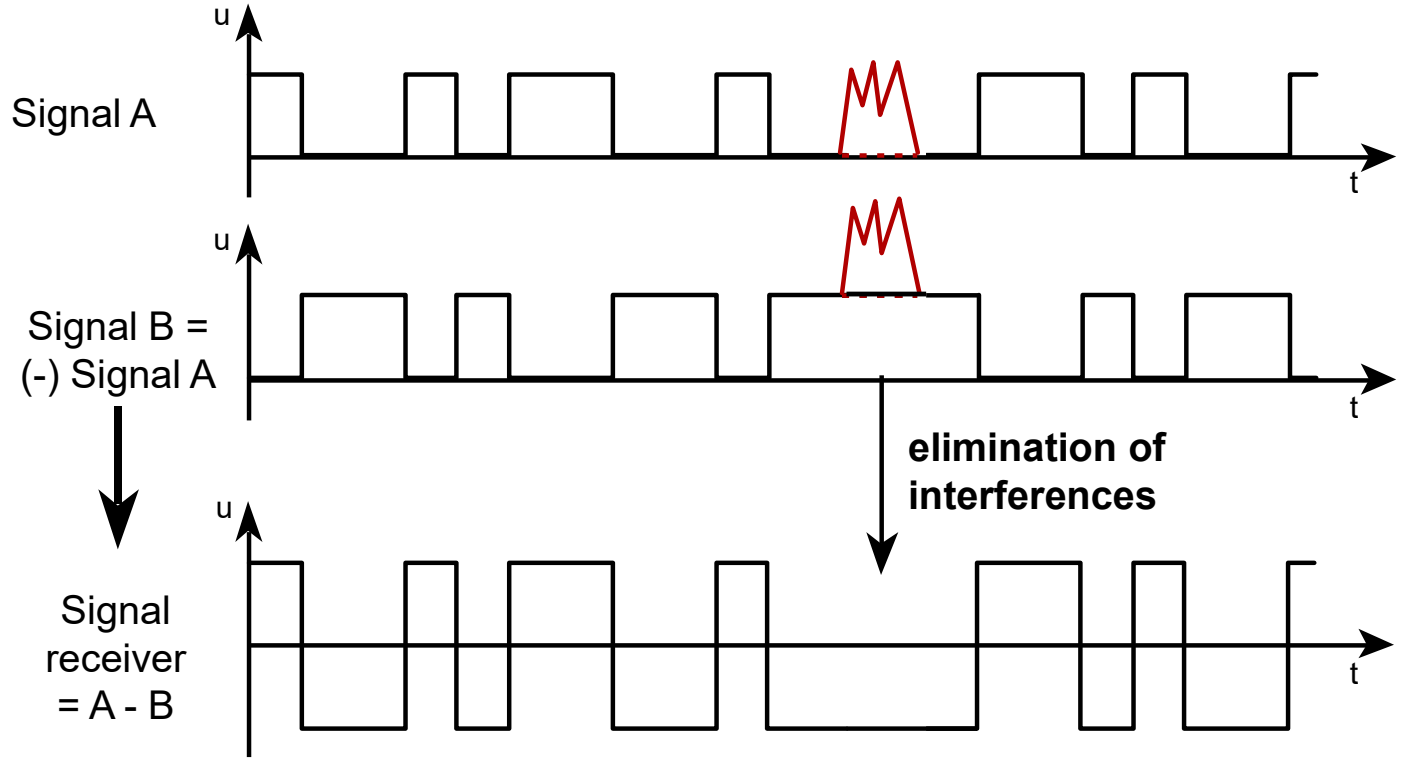
RS-485 2-wire

- balanced differential voltage interface
- electrical features as RS-422
- shielded “Twisted pair” – cable
- line termination (approx. 120 Ω), PROFIBUS: 220 Ω
- max. bus expansion 1200 m
- max. transmission rate 10 mbps,
  PROFIBUS: 12 mbps

PHOENIX CONTACT
INSPIRING INNOVATIONS

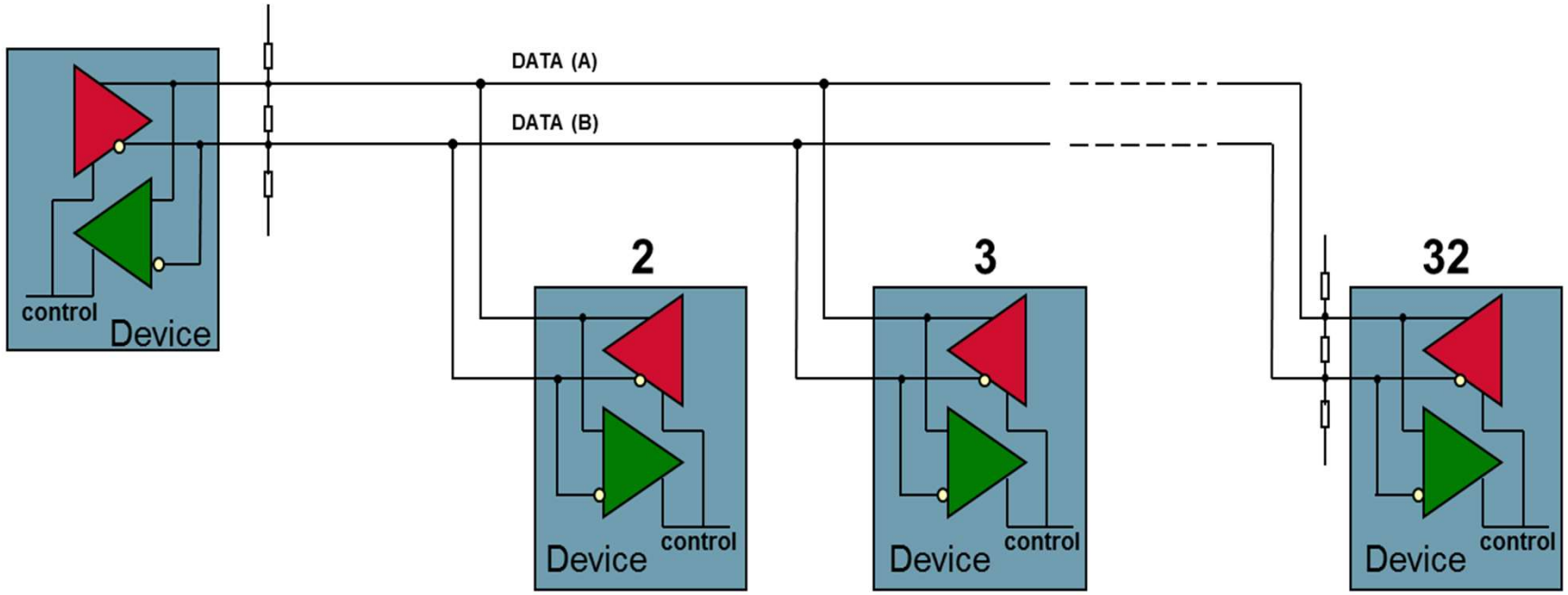
PROFIBUS

RS-485 Differential Voltage Detection



PROFIBUS

RS-485 – 2 wire

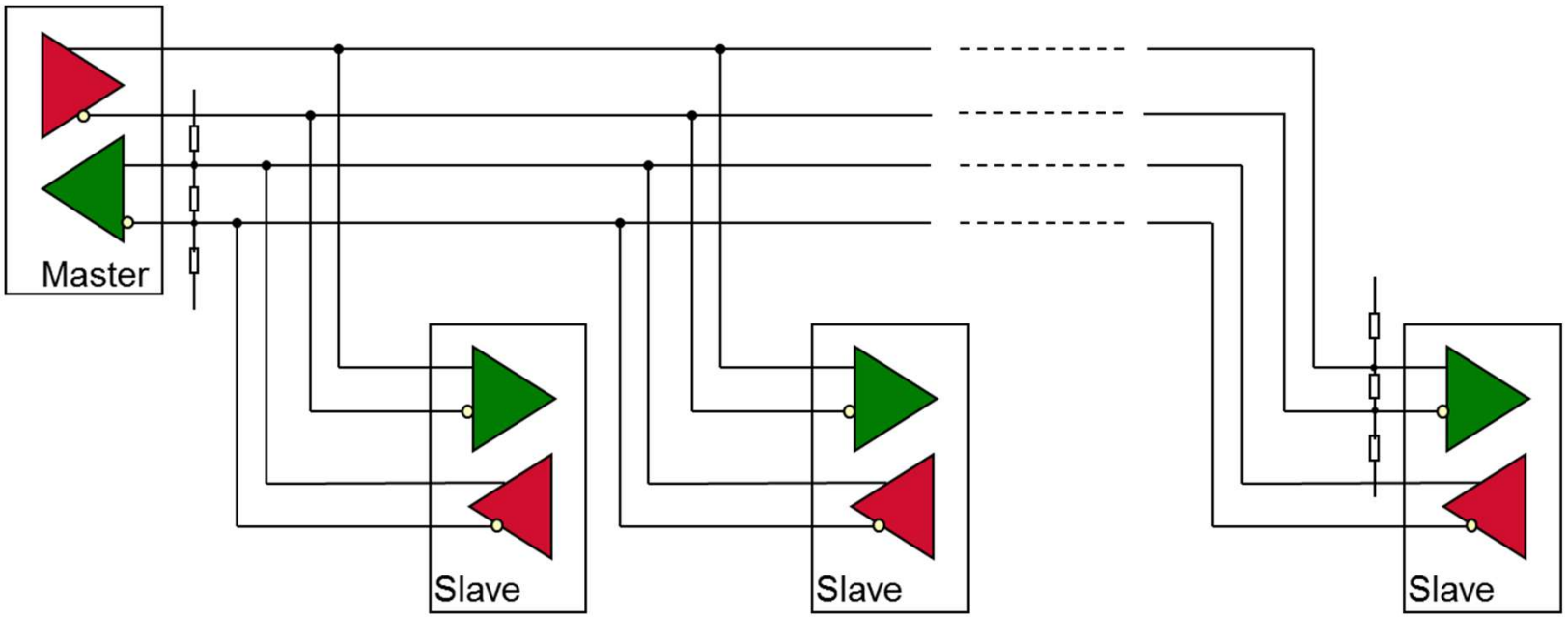


- **Multi master** system
- 2-wire **half-duplex**
- Max. **32 devices**
- Active line **termination**

INSPIRING INNOVATIONS

RS 485 2/4 wire

RS-485 – 4 wire (not PROFIBUS)

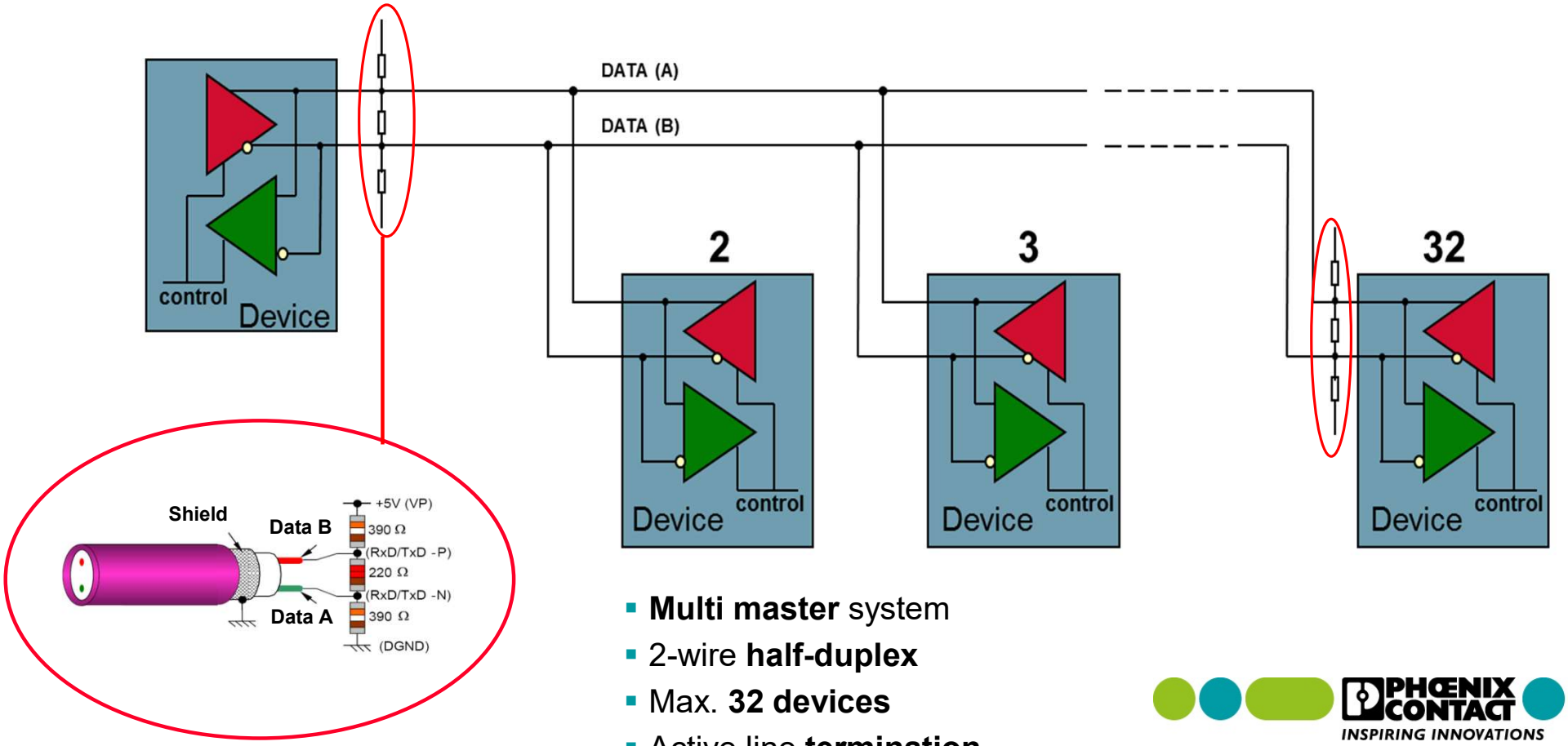


- **Master/slave**-topology
- 4-wire **full-duplex**
- Max. **32 devices**
- Active line **termination**

PHOENIX CONTACT
INSPIRING INNOVATIONS

PROFIBUS

RS-485 – 2 wire

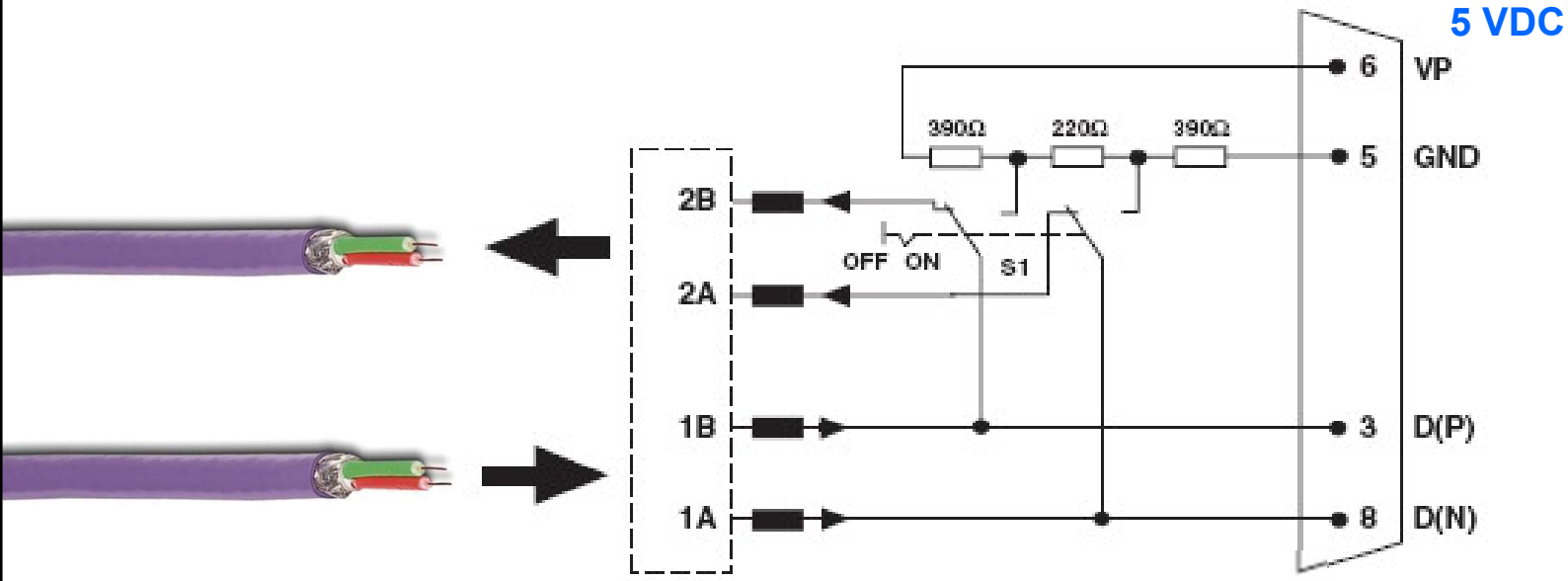


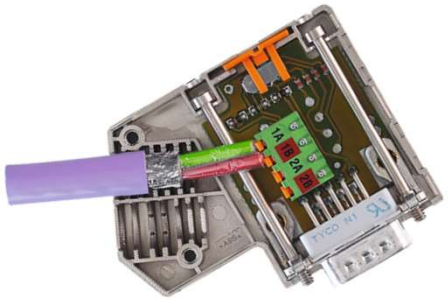
- **Multi master** system
- 2-wire **half-duplex**
- Max. **32 devices**
- Active line **termination**

INSPIRING INNOVATIONS

PROFIBUS

Termination



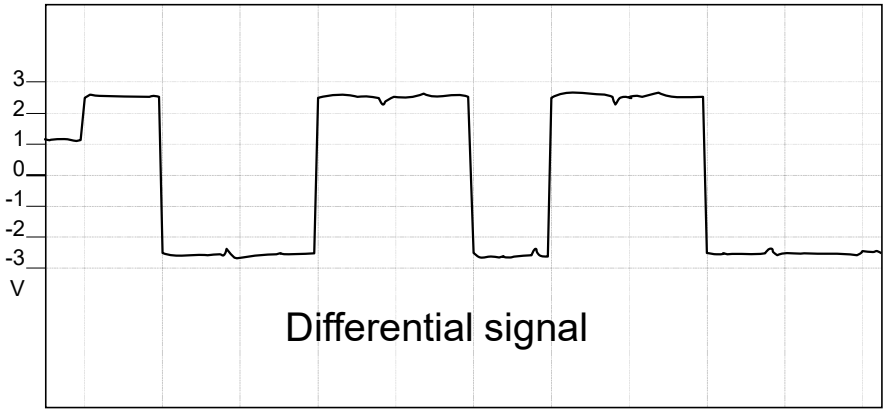


INSPIRING INNOVATIONS

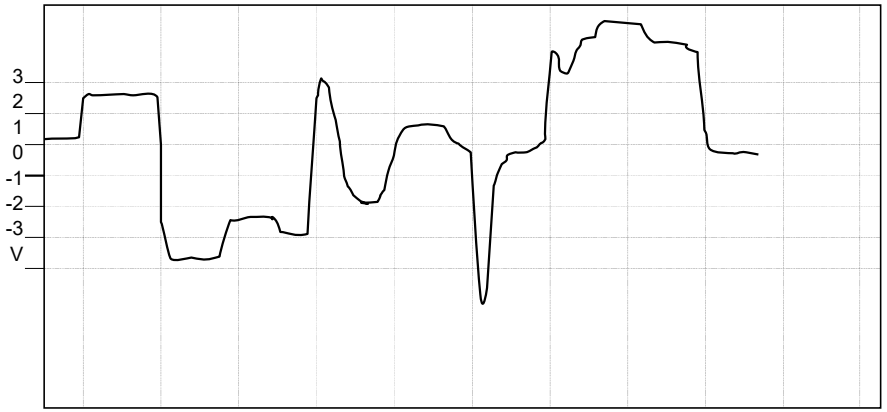
PROFIBUS

Termination

- Correct Profibus signal



- Profibus signal with termination resistor only on one side of the line.



PHOENIX CONTACT
INSPIRING INNOVATIONS

PROFIBUS

Termination

Master / PLC

Functional saftey

I/O Axioline

I/O Axioline

I/O Axioline

I/O device

I/O devices
IP65/67

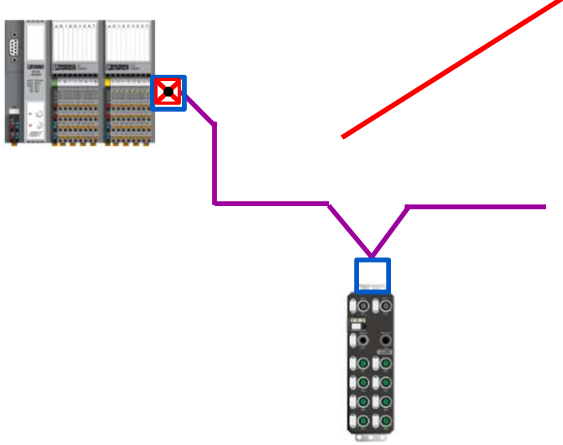
= Terminierung „Ein“

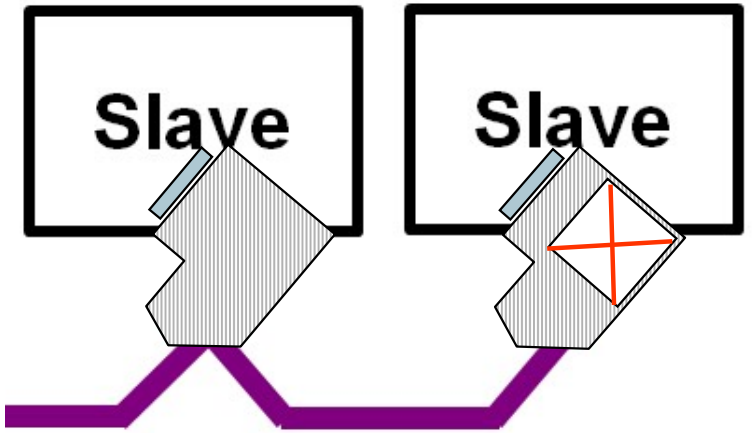
= Terminierung „Aus“

INSPIRING INNOVATIONS

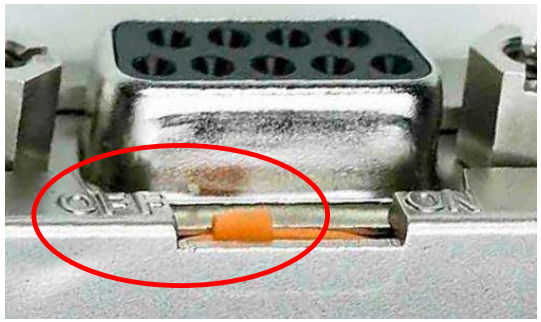
PROFIBUS

Termination

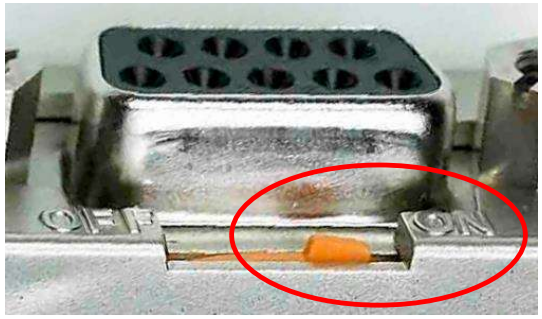




2 cable
Termination:
„OFF“



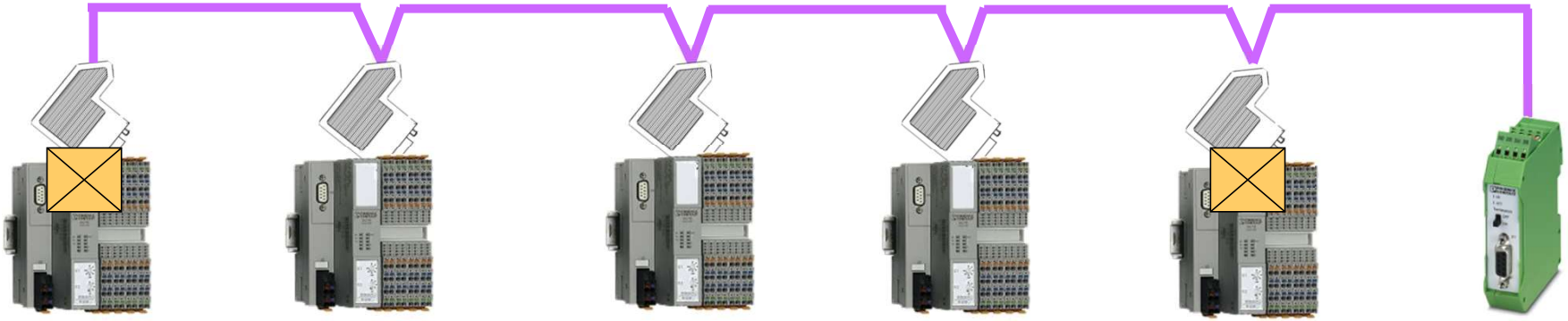
1 cable
Termination:
„ON“



Termination

PROFIBUS

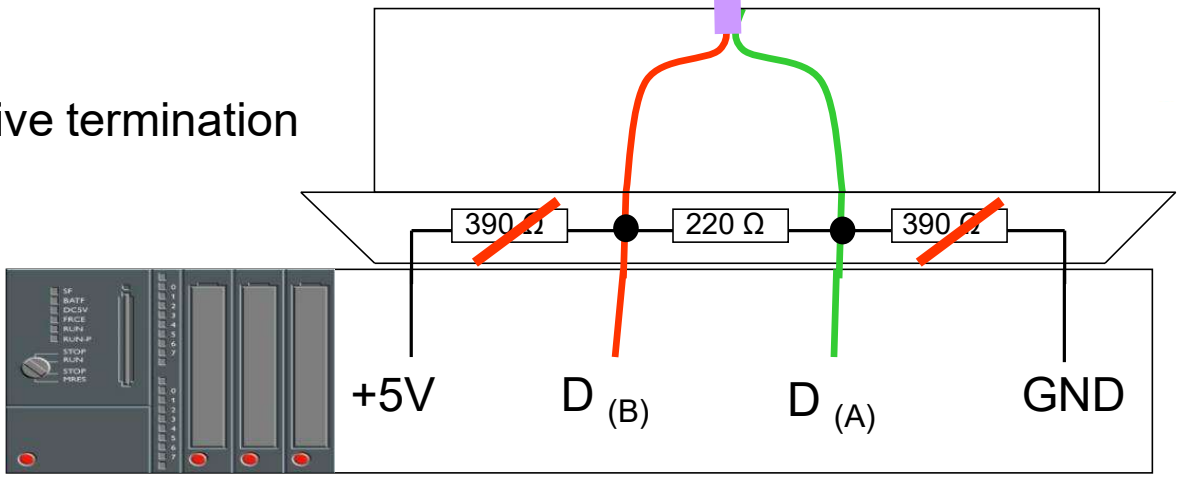
Active Termination



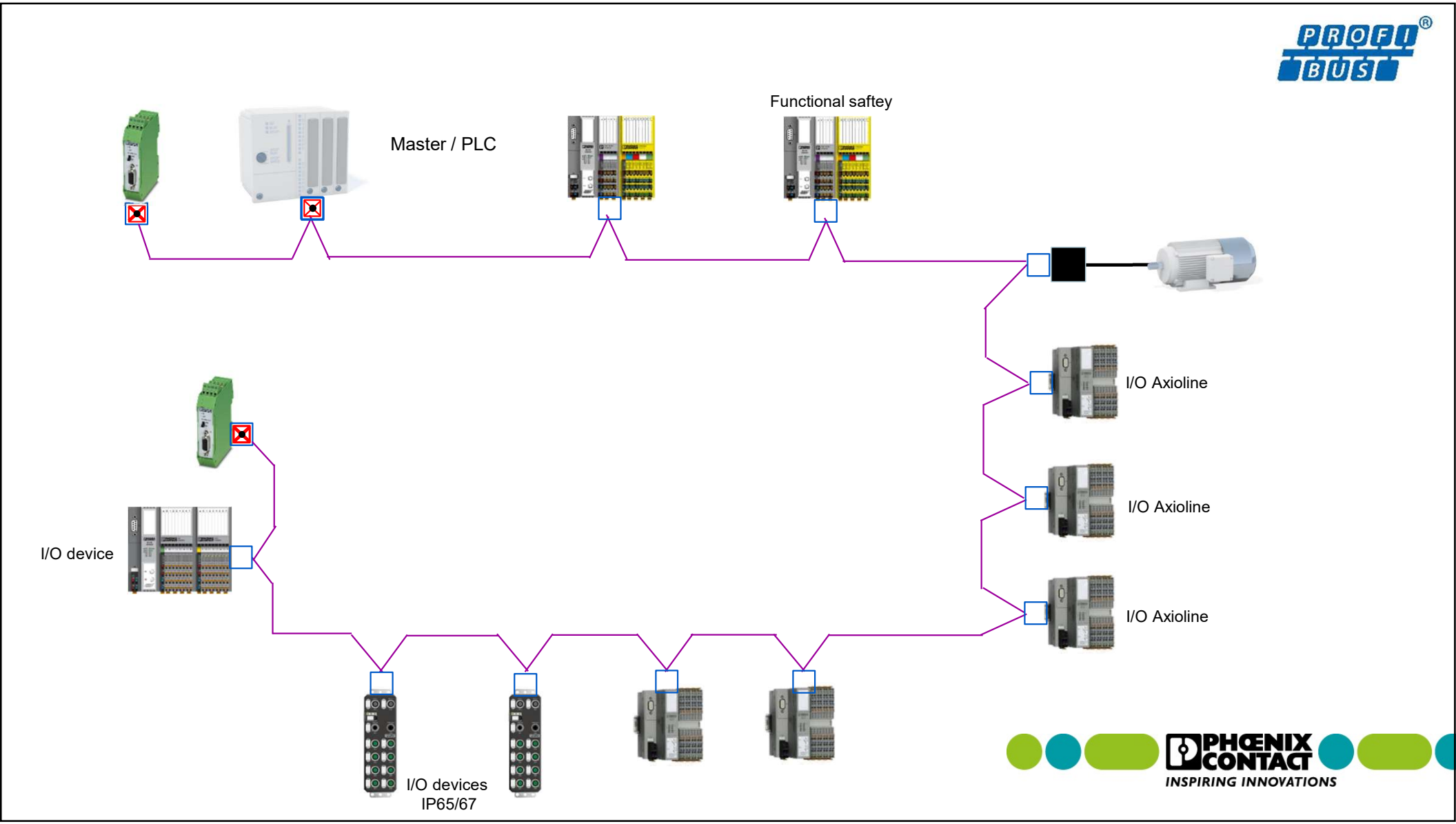
PSI-TERMINATOR-PB-TBUS - 2702636

Active termination

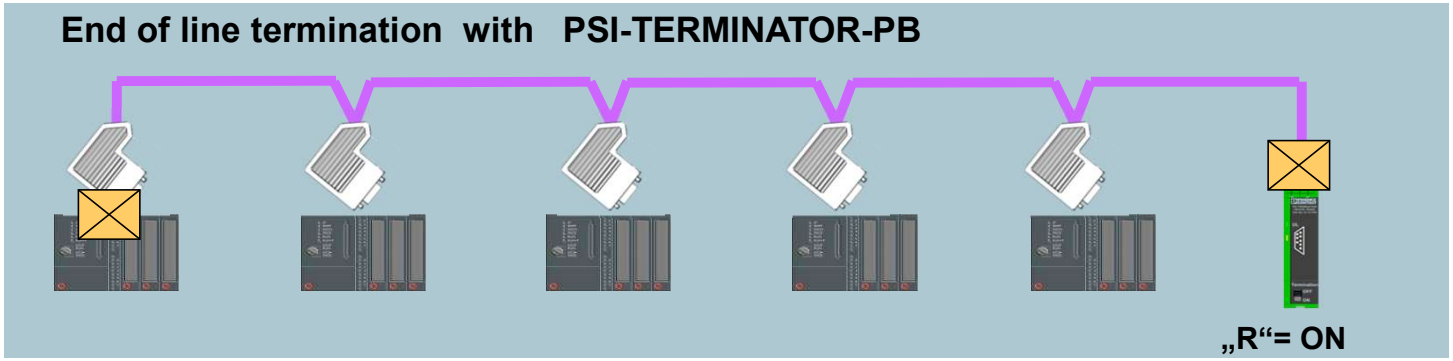
Passive termination



PHOENIX CONTACT
INSPIRING INNOVATIONS


Master / PLC
Functional saftey
I/O Axioline
I/O Axioline
I/O Axioline
I/O device
I/O devices
IP65/67
INSPIRING INNOVATIONS

Active Termination



PROFIBUS Push-In
D(A), D(B)

Status LEDs

Termination On/Off

24 V DC Power supply

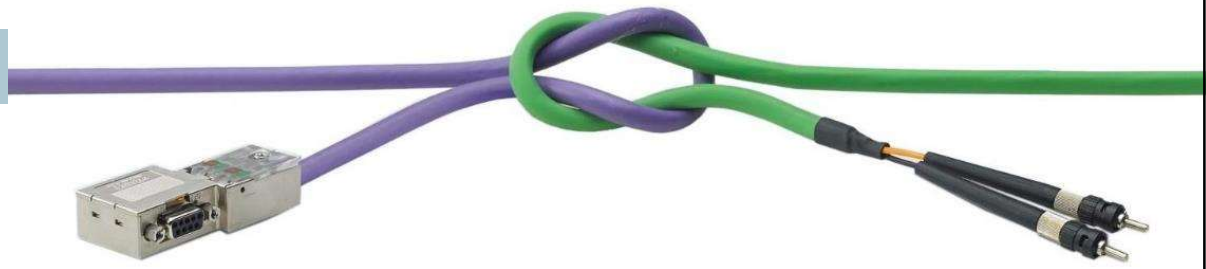
T-Bus function for power

D-SUB, programming port

PHOENIX CONTACT
INSPIRING INNOVATIONS

Agenda

- Different Fieldbuses
- Interbus, CAN, Modbus RTU/ASCII
- PROFIBUS
- Physical basics of RS-485
- Termination of bus lines
- Active Termination
- SUBCON D-Sub connectors
- Repeater



Fieldbus Technology

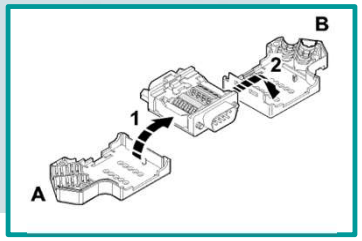
SUBCON Fast Connection Plugs

PHOENIX CONTACT
INSPIRING INNOVATIONS

SUBCON… D-SUB fast connection plugs

Universal D-SUB connectors for all interfaces

- Comfortable screw
- 9-, 15- and 25-pin
- One or two cable entries for Point-to-point and bus links
- High shielding effect by metallic housing
- Reversible terminal block for easy change of the D-SUB orientation and cable feed



PHOENIX CONTACT
INSPIRING INNOVATIONS

SUBCON… D-SUB fast connection plugs

SUBCON PLUS…

35° 90° Axial

- Screw terminals or IDC technology
- Optionally with connection for programming devices
- For solid and stranded copper conductors
- Metalized housing

PHOENIX CONTACT
INSPIRING INNOVATIONS

SUBCON… D-SUB fast connection plugs

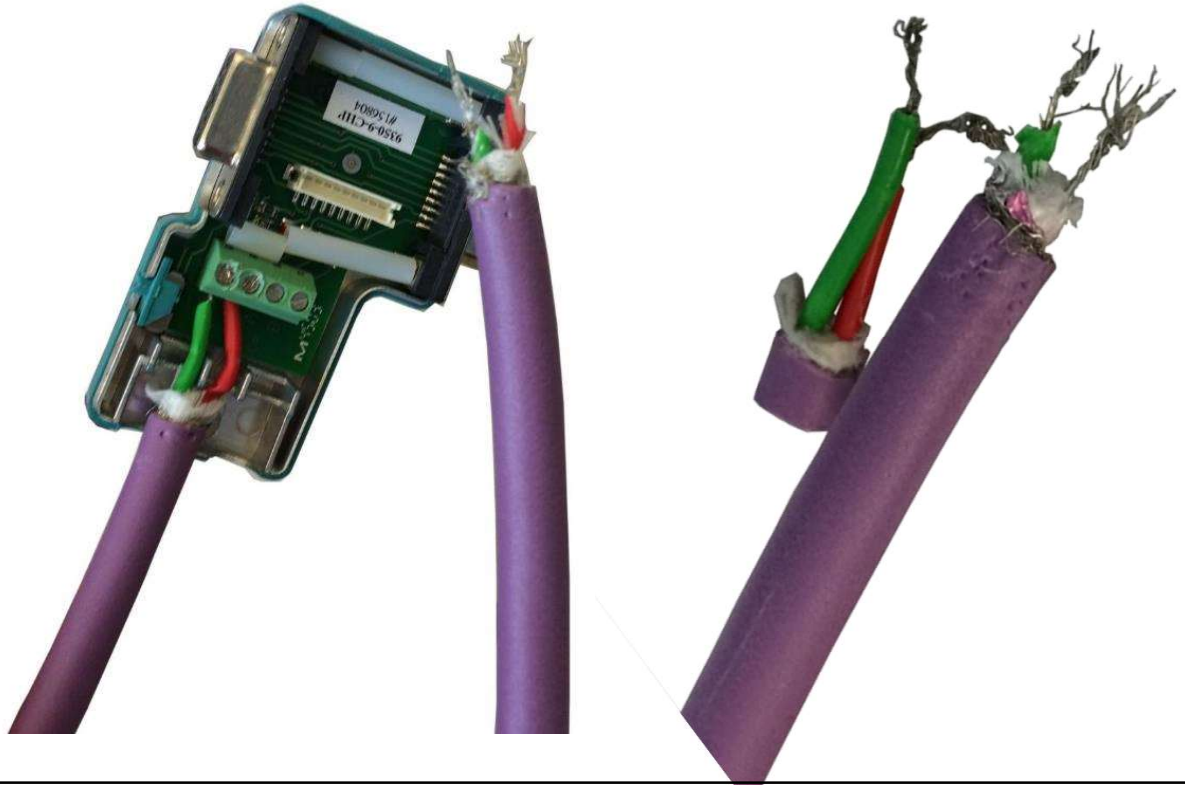
SUBCON PLUS…M12

- Plug&Play between IP20 and IP65
- Direct assembly of M12 cables
- Different angles of M12 orientation
- Fault-free Installation
- Full moulded housing

PHOENIX CONTACT
INSPIRING INNOVATIONS

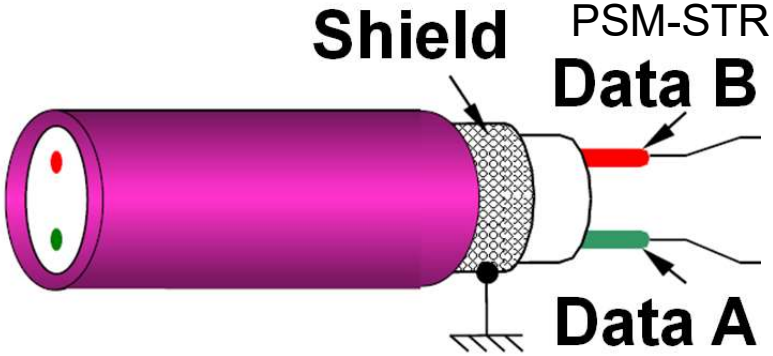
Installation errors

- Cable connection → most common cause of error!



Installation errors

- Cable connection → most common cause of error!
- Cable crossing **Data A ←→ Data B**



PSM-STRIP-FC/PROFIB

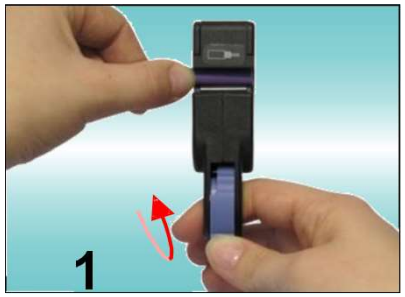
B – Bositive (+)

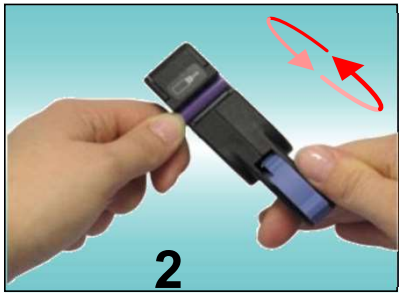
A – Negative (-)

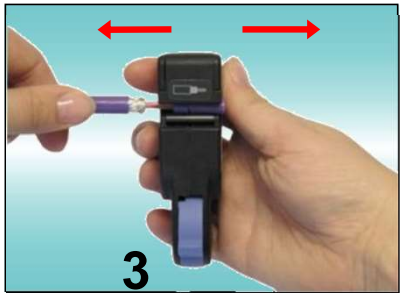
Remember: Bread → B - Red

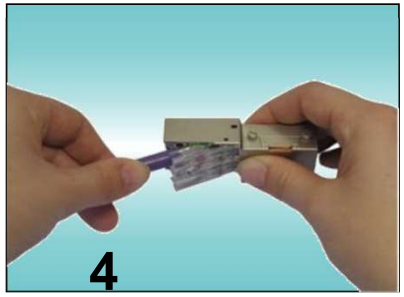
PROFIBUS

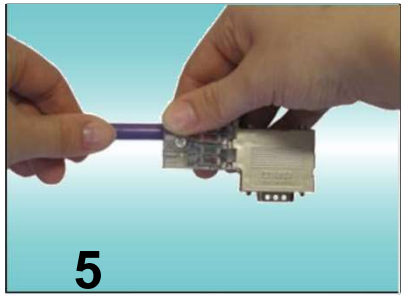
PSM-STRIP-FC/PROFIB

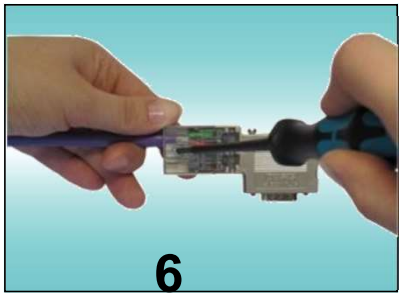












The easiest on site termination

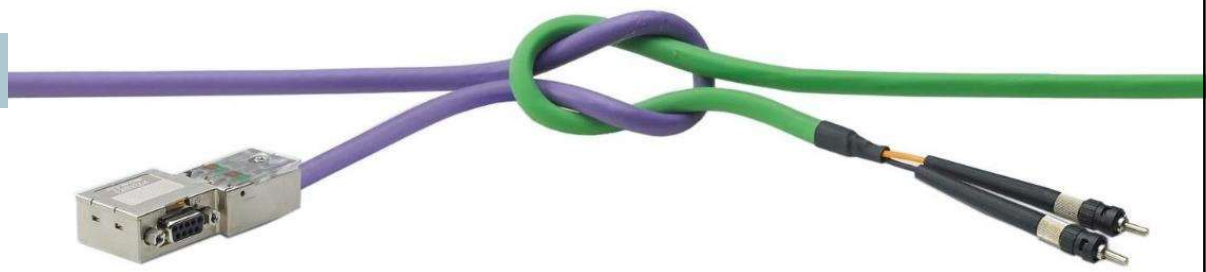
in **< 1 min**

INSPIRING INNOVATIONS

Fieldbus Technology

Agenda

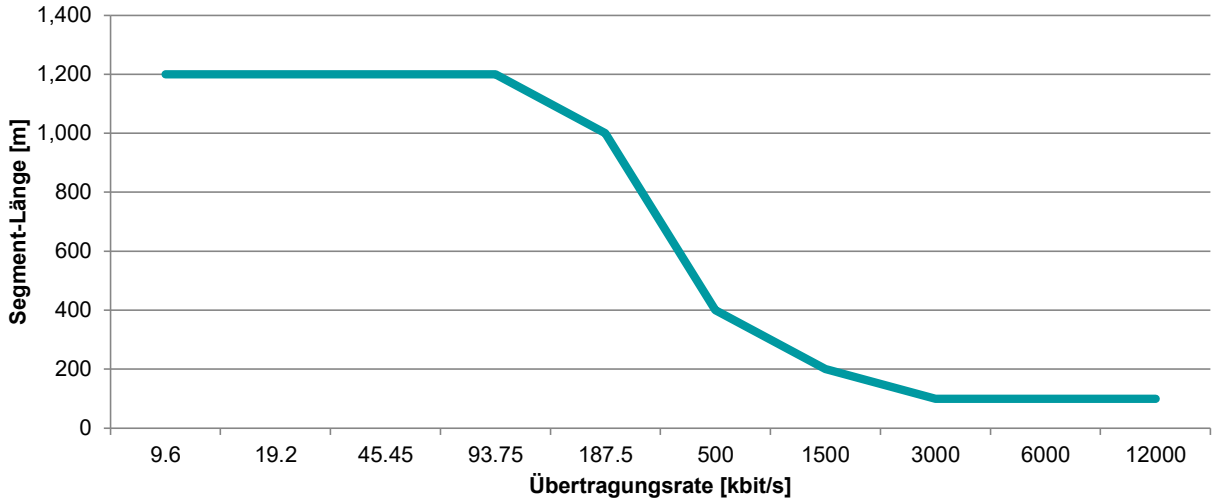
- Different Fieldbuses
- Interbus, CAN, Modbus RTU/ASCII
- PROFIBUS
- Physical basics of RS-485
- Termination of bus lines
- Active Termination
- SUBCON D-Sub connectors
- Repeater



INSPIRING INNOVATIONS

PROFIBUS

RS-485 / Profibus Installation – Important Facts

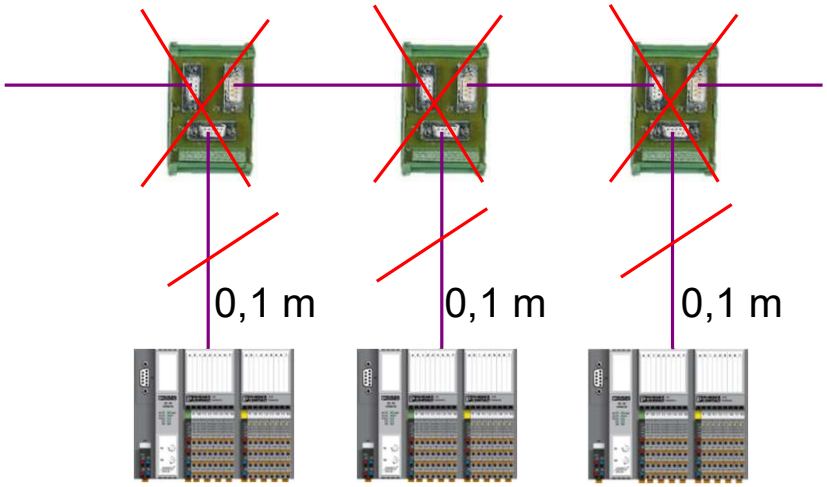


- Max. 1200 m
- Max. 12 Mbit/s
- Max. 3 m Stich

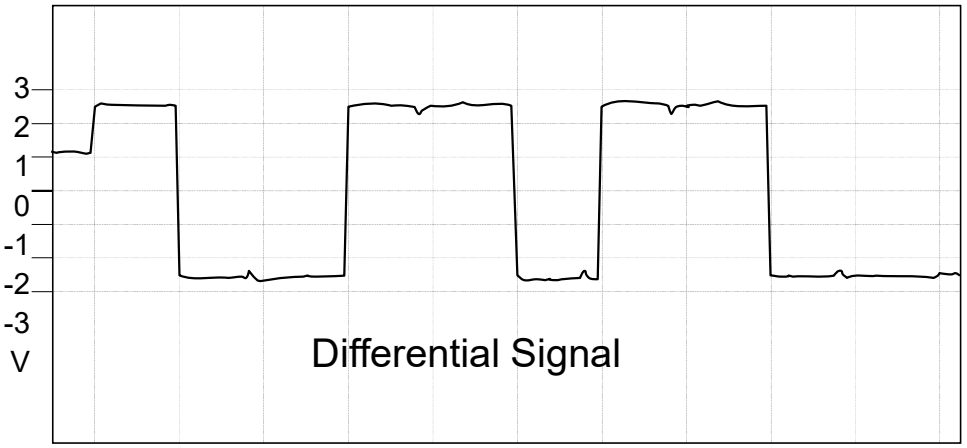
Data rate [kbps]	9,6	19,2	45,45	93,75	187,5	500	1.500	3.000	6.000	12.000
Segment-length [m]	1.200	1.200	1.200	1.200	1.000	400	200	100	100	100
Branch length per segment [m]	3	3	3	3	2	1	0,3	---	---	---

INSPIRING INNOVATIONS

→ PROFIBUS DP - Installation



Always without branch length!



Data rate [kbps]	9,6	19,2	45,45	93,75	187,5	500	1.500	3.000	6.000	12.000
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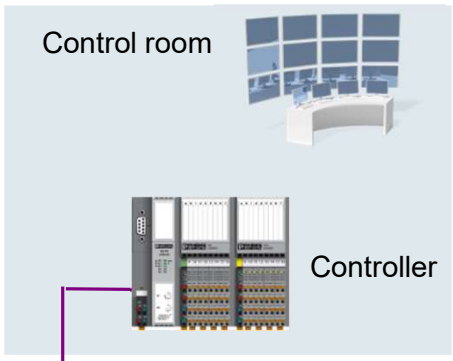
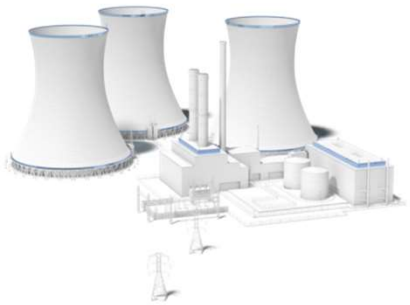
Branch length per segment [m]	3	3	3	3	2	1	0,3	---	---	---

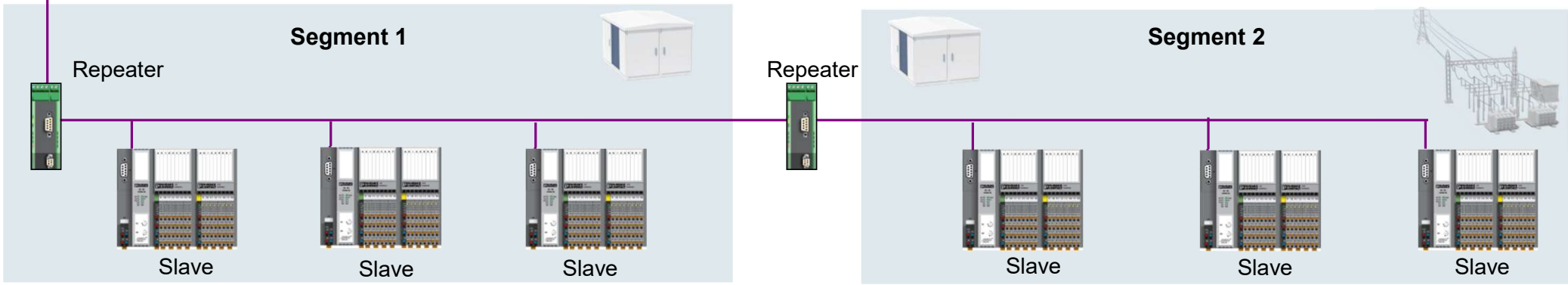
PROFIBUS

Networking with Repeater





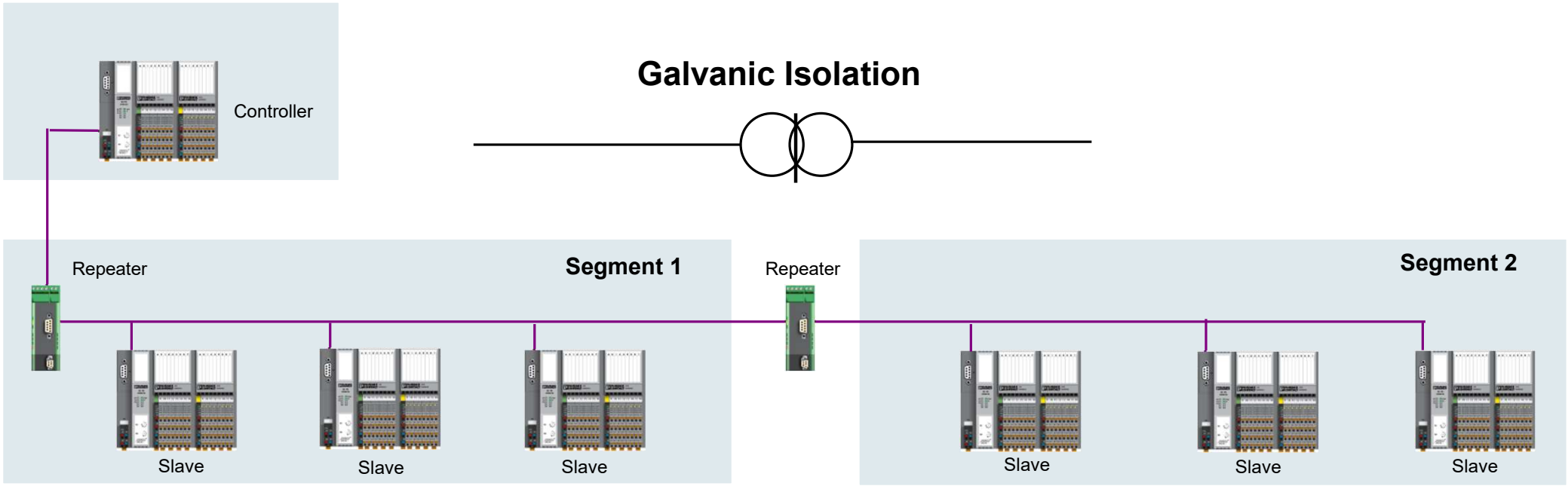
- No PROFIBUS device
- No network address
- No GSD File
- Transparent in the network



INSPIRING INNOVATIONS

PROFIBUS

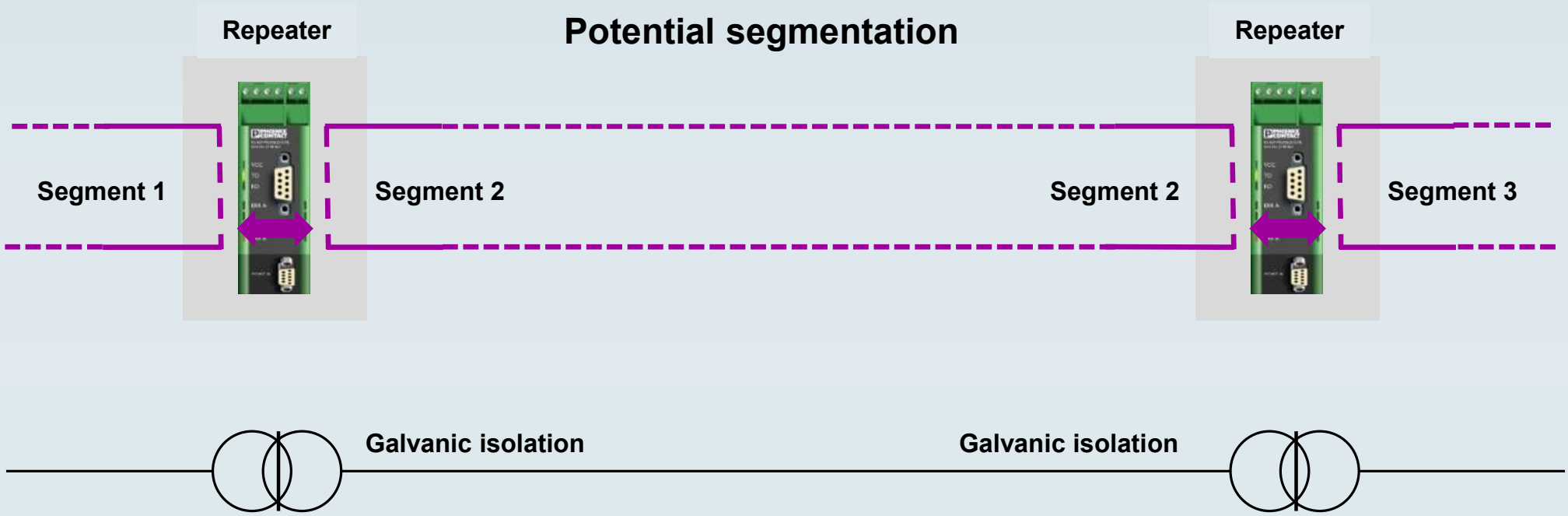
Repeater for galvanic isolation



→ Non-reactive at Potential Current and Short Circuit

PHOENIX CONTACT
INSPIRING INNOVATIONS

Repeater – Potential segmentation



Repeater – Copper transmission

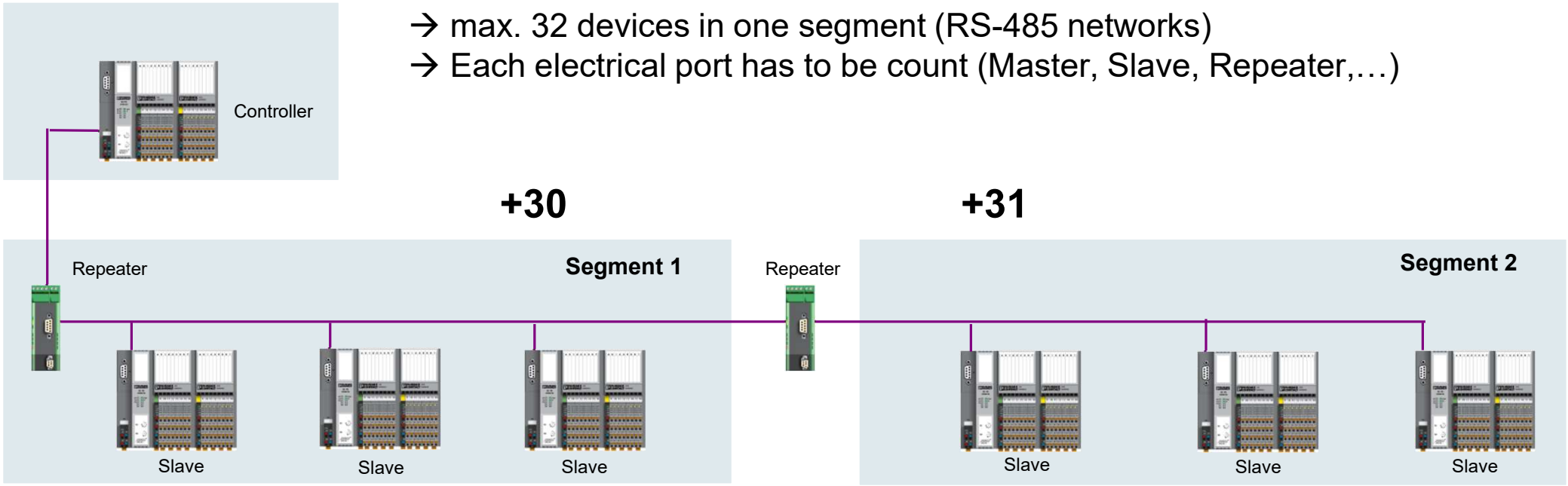
	PSI-REP-DNET CAN	PSI-REP-PROFIBUS/12MB	PSI-REP-RS485W2
Device type	CANopen/Device Net repeater	PROFIBUS repeater	RS-485 repeater
Data rate	1000 kbps	up to 12Mbps	500 kbps
Copper range	1000 m	1200 m	1200 m
Interfaces	2 x copper	2 x copper	2 x copper
Order number	2313423	2708863	2313096

INSPIRING INNOVATIONS

PROFIBUS

Repeater to extend the network

→ max. 32 devices in one segment (RS-485 networks)
→ Each electrical port has to be count (Master, Slave, Repeater,…)



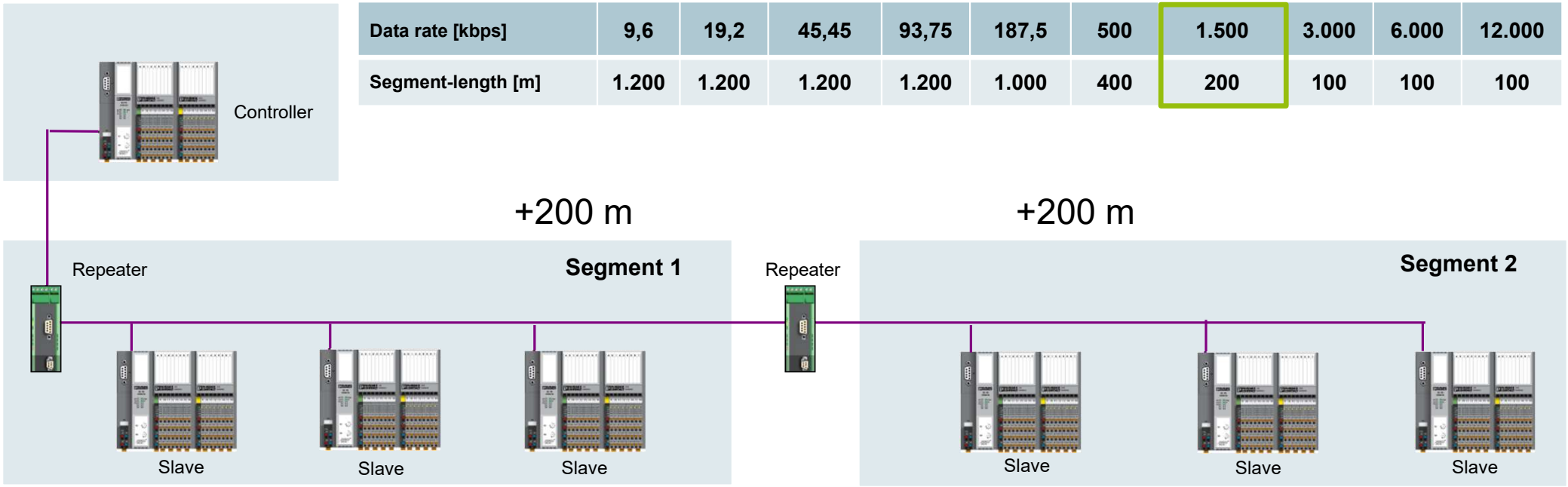
→ To increase the number of devices

PHOENIX CONTACT
INSPIRING INNOVATIONS

PROFIBUS

Repeater for more distance

Data 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



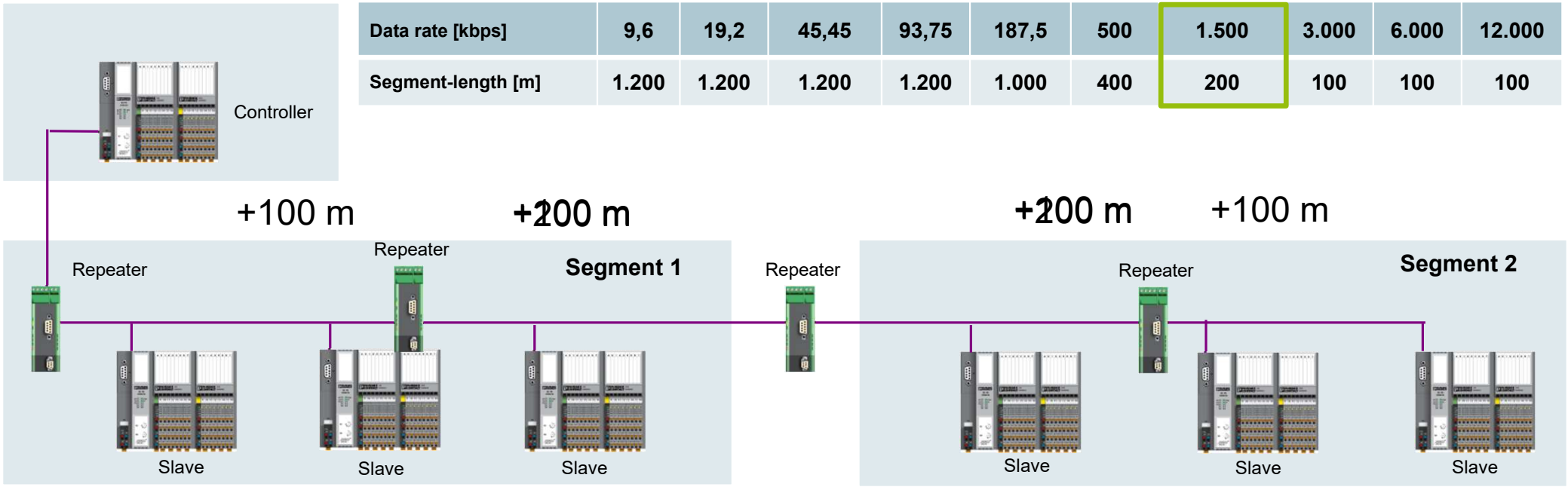
→ To increase the distance

PHOENIX CONTACT
INSPIRING INNOVATIONS

PROFIBUS

Repeater for faster networks

Data 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

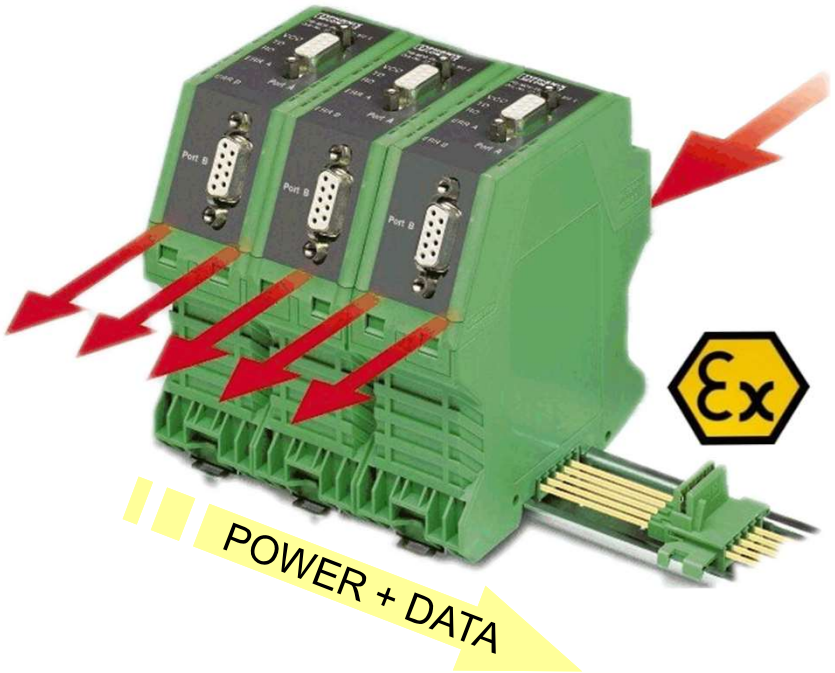


→ To increase the speed, data rate

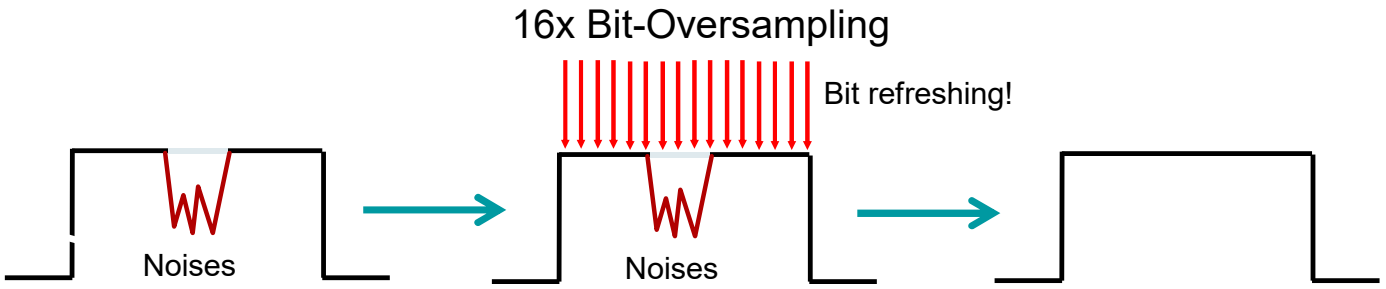
INSPIRING INNOVATIONS

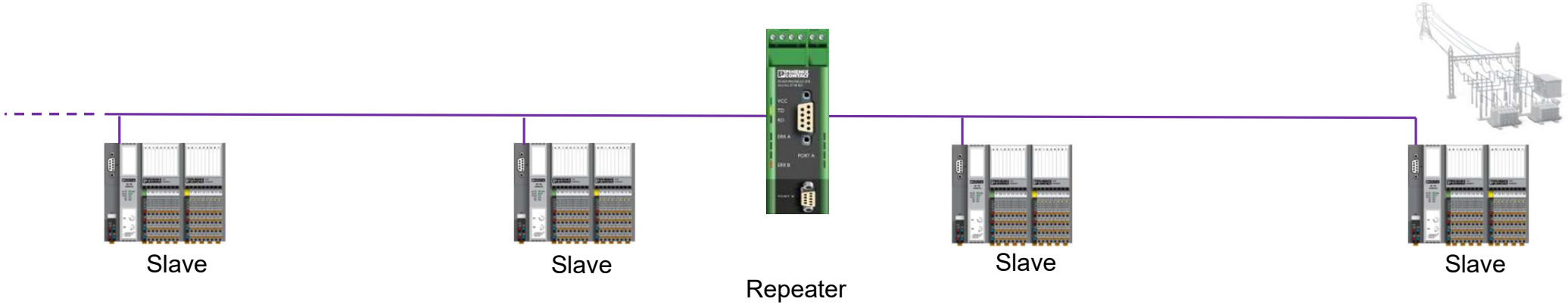
Repeater – Special features

- Bit-Oversampling
- Bit-Retiming
- Start-delimiter detection for PROFIBUS
- Modular Station setup
- Approved for hazardous locations ATEX zone 2 / class 1 div. 2



Repeater – Bit-Oversampling





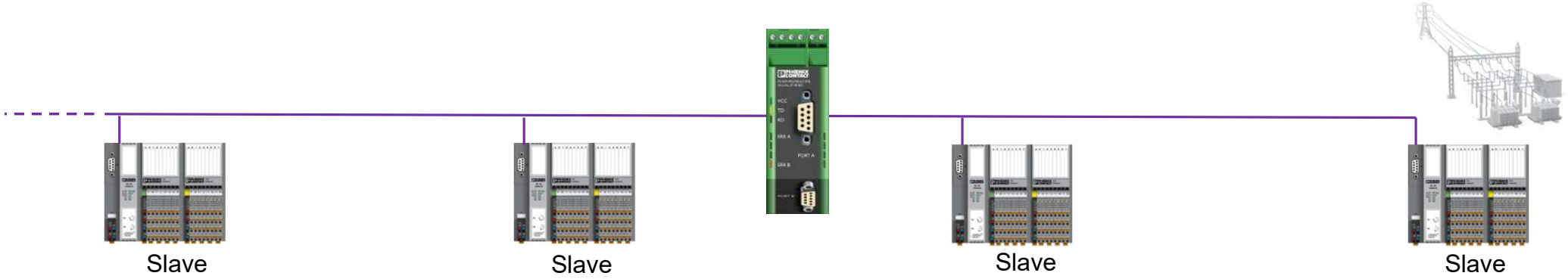
→ Each bit is up to 16 times over sampled

PROFIBUS

Repeater – Bit-Retiming

Up to 35% deformation → the bit will be correct detected

Creation of a “brand-new” bit pattern



→ Unlimited cascading levels possible

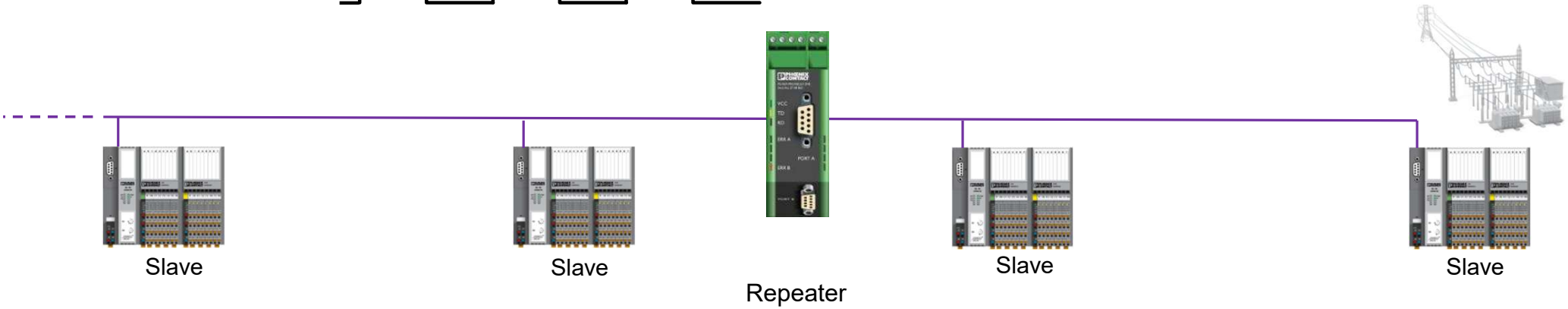
PHOENIX CONTACT
INSPIRING INNOVATIONS

Repeater – Special features

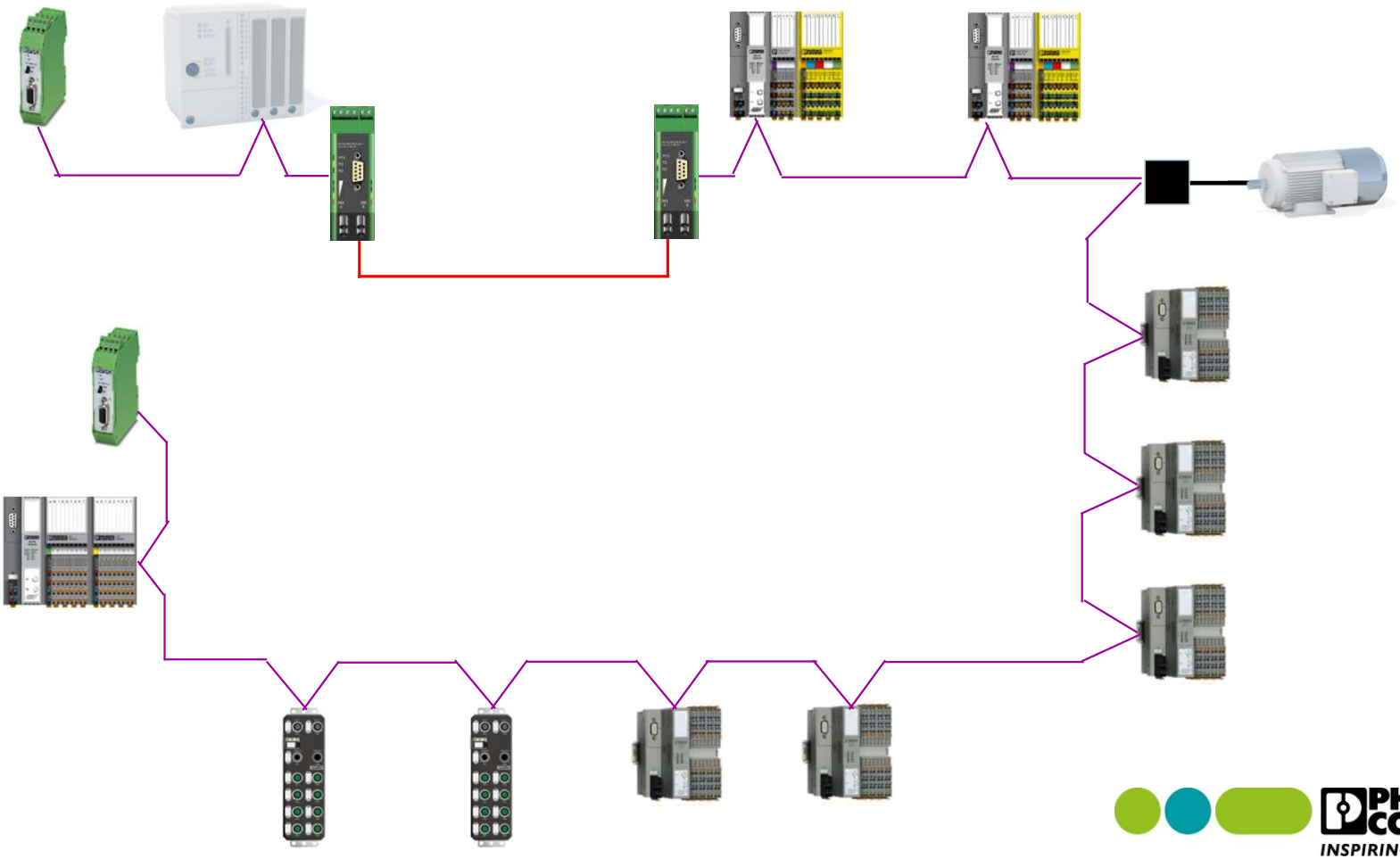
Detection of the PROFIBUS telegram start-delimiter

Telegram with invalid Start-Delimiter

Invalid telegrams or interferences will not be transferred

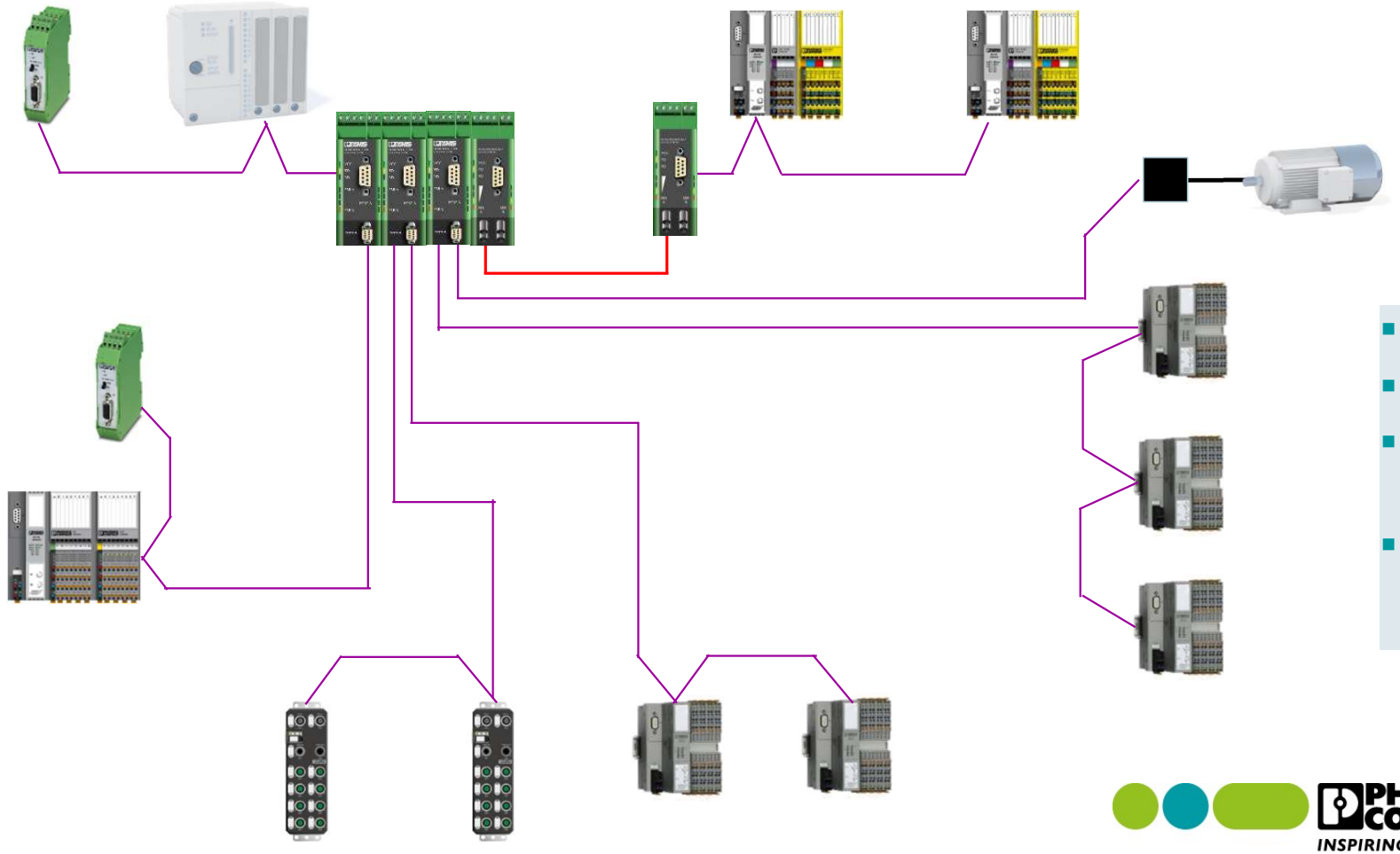


PROFIBUS Repeater → Modular Concept



INSPIRING INNOVATIONS

PROFIBUS Repeater → Modular Concept

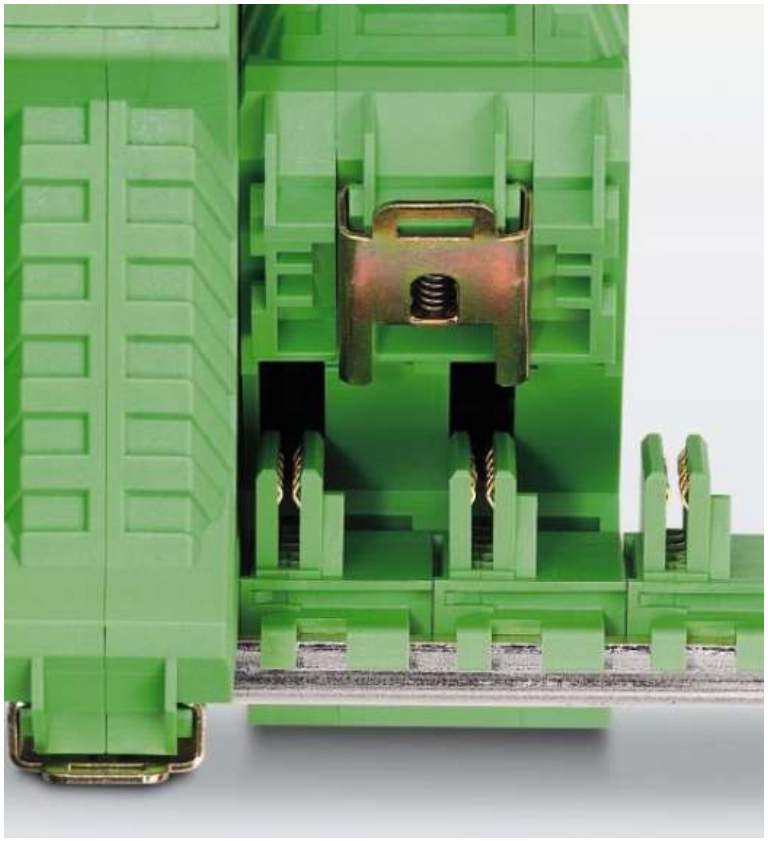


- Star
- Tree
- Line

- Galvanic isolation

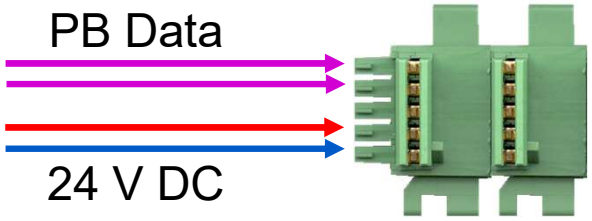
Repeater – Modular concept

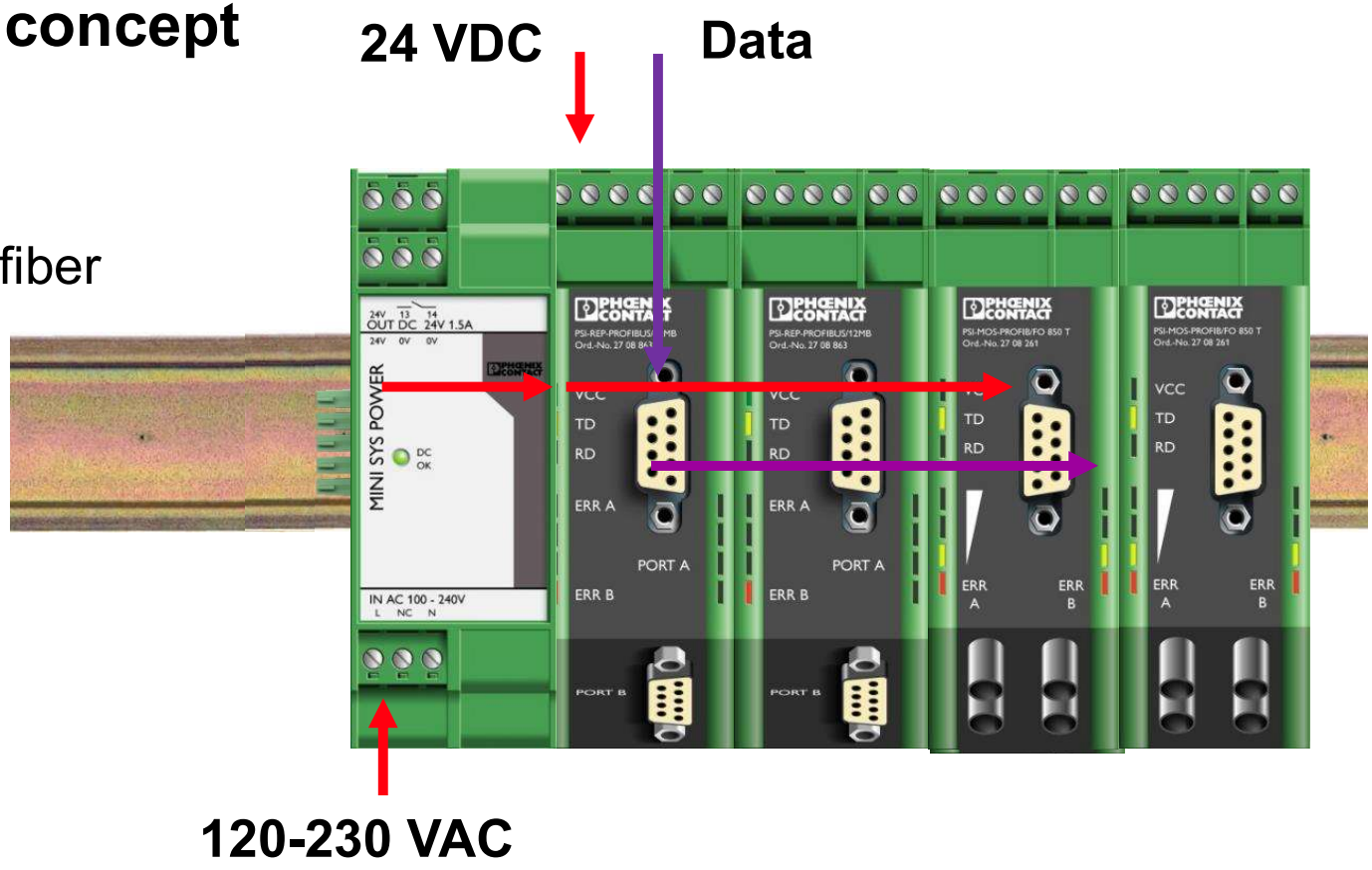
- **Modular** extensible and ´hot swappable´
- With automatic cross-connection for **power** and **data**



Repeater – Modular concept

- Combined station setup with PSI-MOS… fiber optic converter and SHDSL-Modem!
- Up to 10 devices
  → 20 PB Ports

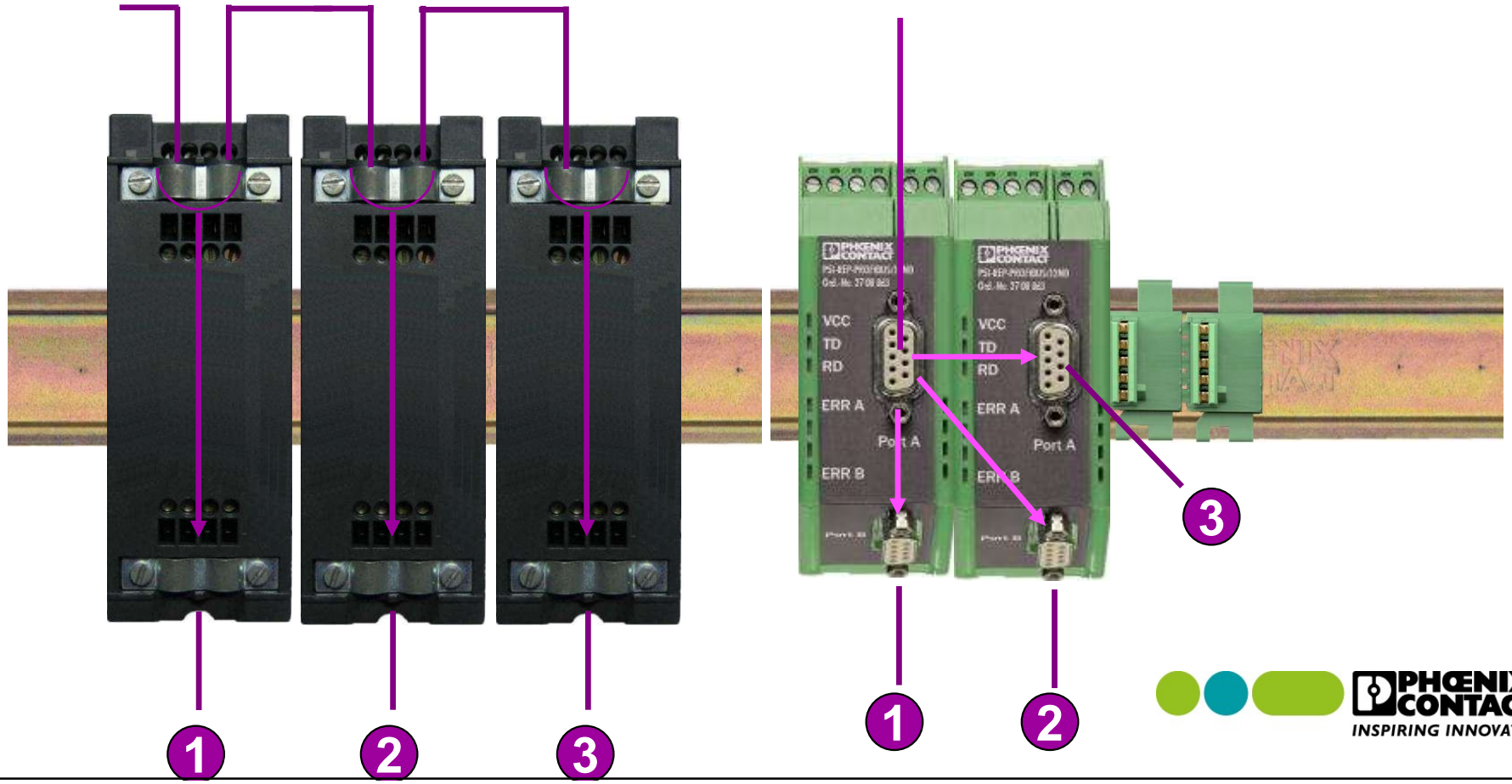




INSPIRING INNOVATIONS

PROFIBUS

Repeater – Modular concept



PHOENIX CONTACT
INSPIRING INNOVATIONS

Repeater – Modular concept

- Individual network structures in copper and fiber optics
- Automatic cross-connection for power and data
- Hot swappable

Fieldbus Technology

More Repeater for RS-485

PSM-ME-RS485/RS485-P

- for **all** RS-485- 2wire based networks
- data rate up to 1.5 mbps

PSI-REP-RS485W2

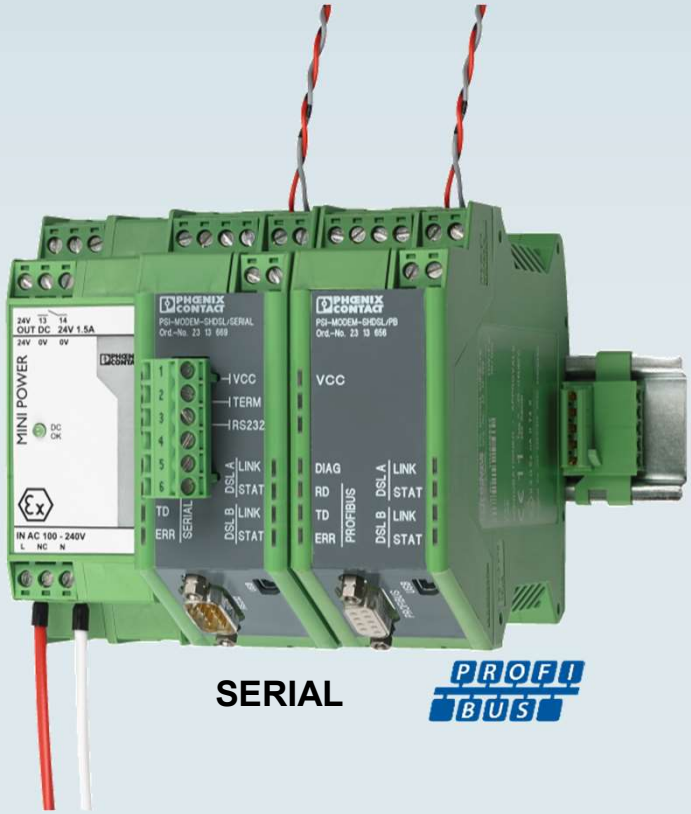
Modbus

RS 485

- Up to 500 kbps for Modbus and RS485 2-wire
- Modular by T-Bus functionality

PHOENIX CONTACT
INSPIRING INNOVATIONS

Extender – Serial & PROFIBUS



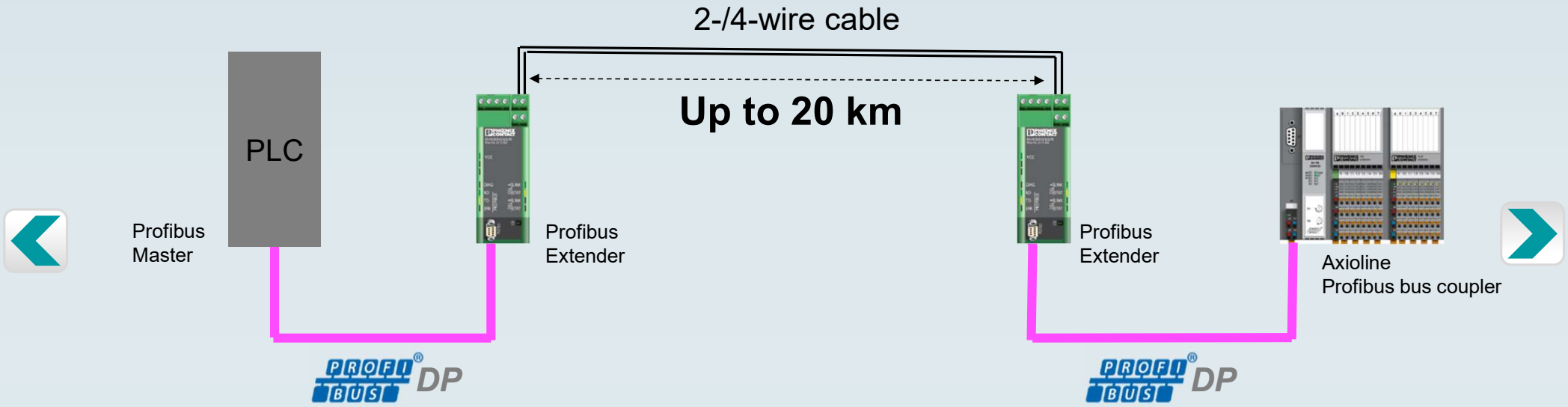
- PROFIBUS and Serial extender for copper-based transmission up to 20 km
- Robust SHDSL modulation method
- Does not required a special cable
- Any 2- or 4-wire cable can be used
- Point-to-Point, line and star structures

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

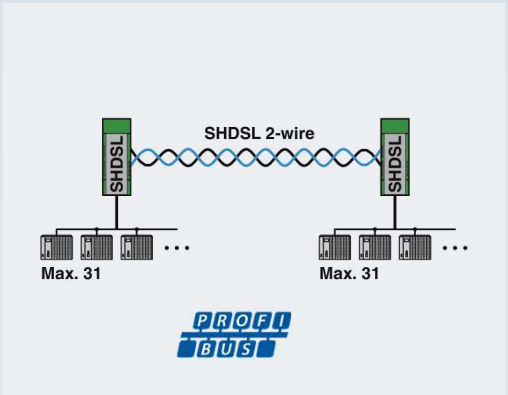
Extender – PROFIBUS

Example:

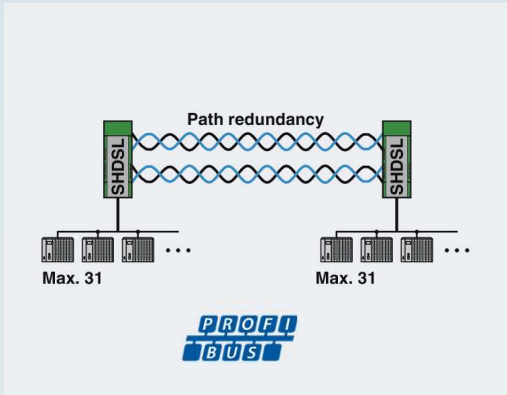


Extender – PROFIBUS

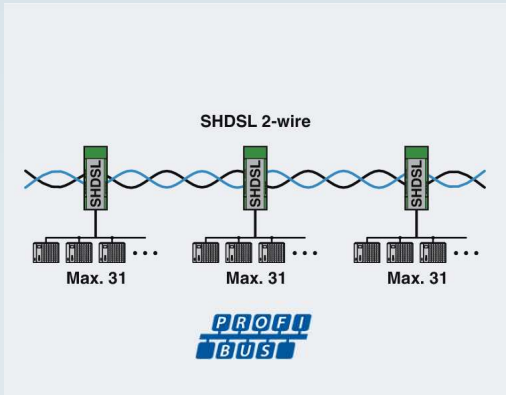
Topologies:



Point-to-Point
2-wire



Point-to-Point
4-wire



Line
2-wire

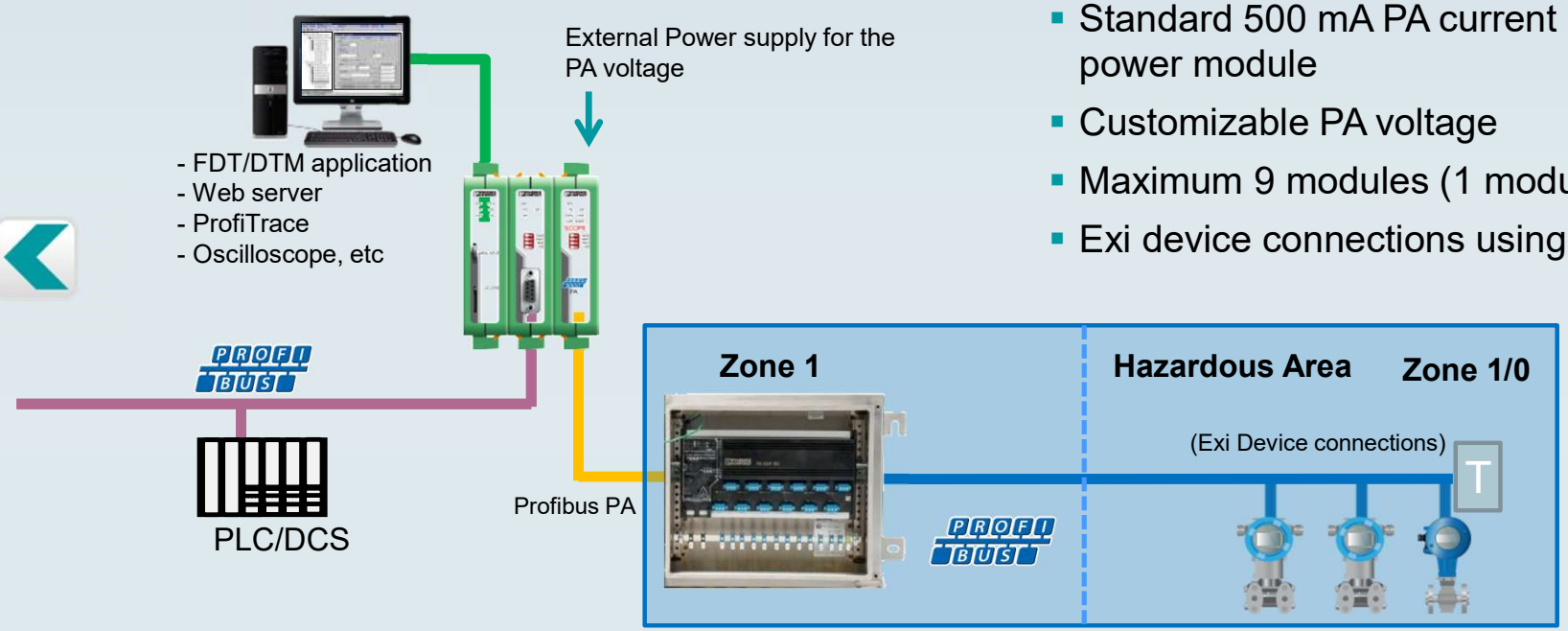
PROFIBUS data rate for point-to-point
is up to 1,5 Mbps

PROFIBUS data rate for linear
structure is up to 500 kbps

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

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**

Protocol Converter

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

Protocol Converter - MODBUS – DP/PA/FF

Converts Modbus RTU variables to modern digital Fieldbus signals

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

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

2-wire RS485 interface (1200…115.2kbps)

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

Protocol Converter HART – DP/PA/FF

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

Converts HART instrument data to modern digital Fieldbus signals

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

2-wire HART loop signal connections using terminal blocks

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

Protocol Converter

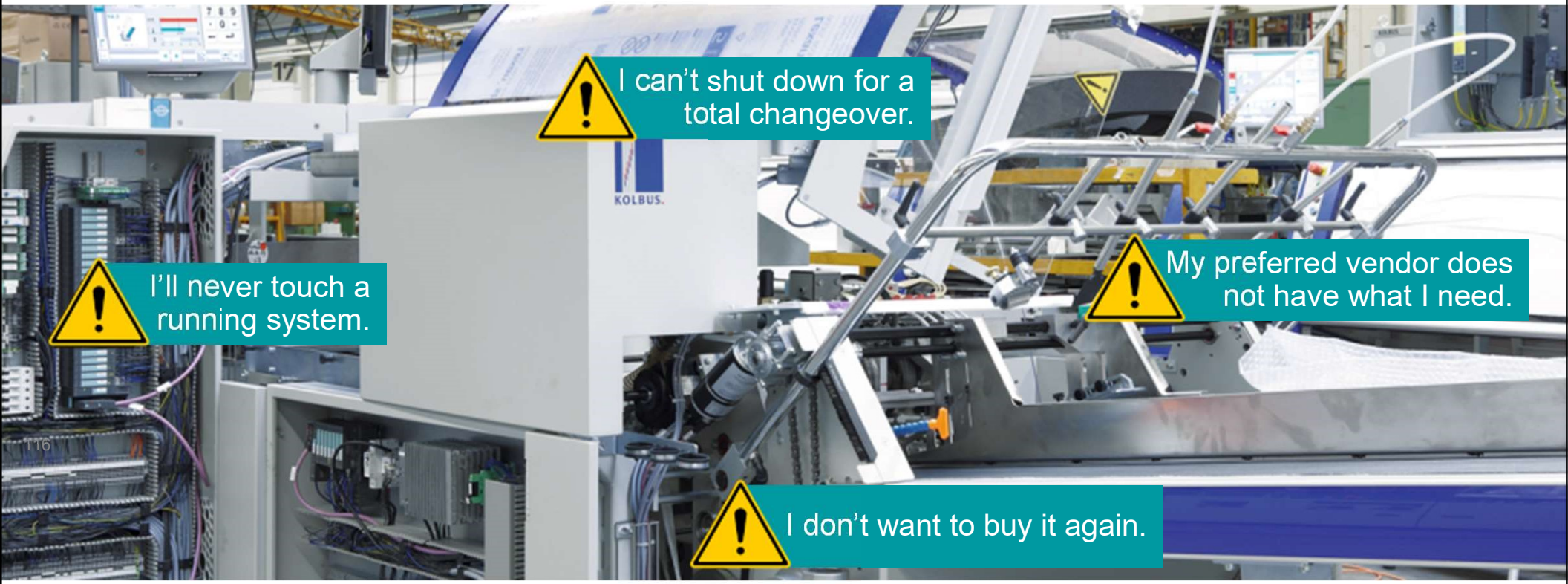
	GW PL FF/MODBUS	GW PL PA/MODBUS	GW PL DP/MODBUS	GW PL FF/HART	GW PL PA/HART	GW PL DP/HART
Description	Modbus/RTU to FOUNDATION Fieldbus protocol converter	Protocol converter capable of connecting four Modbus/RTU devices to a PROFIBUS PA network	Modbus/RTU to PROFIBUS DP protocol converter	Protocol converter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

Goals of industry

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

Device servers and protocol converters

The challenges

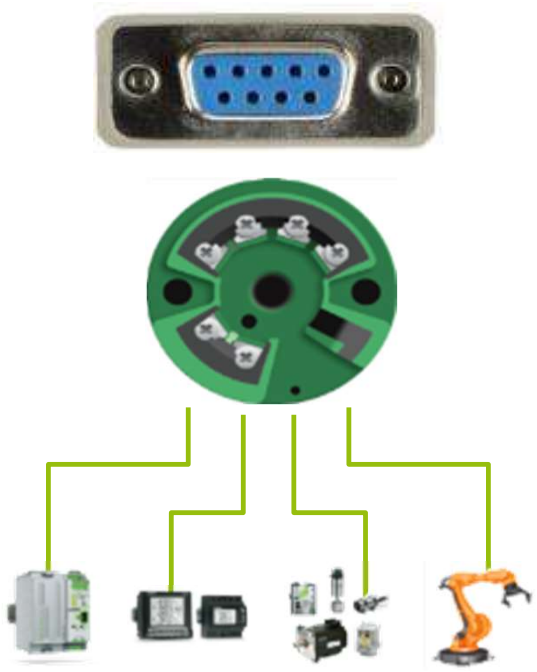


PHOENIX CONTACT
INSPIRING INNOVATIONS

Device servers and protocol converters

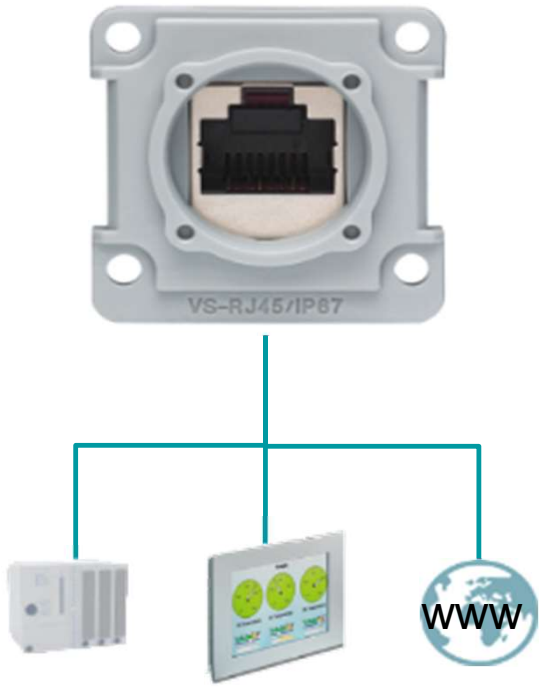
Customer needs

Legacy devices



?!?

Ethernet



PHOENIX CONTACT
INSPIRING INNOVATIONS

Device servers and protocol converters

Your gateway to the digital age

HART-IP

PROFINET

EtherNet/IP

TCP/IP

Modbus

ASCII

HART

ISA G3 Harsh Severity Level tested
Industrial EMC

Devices for any industry
-40…70°C

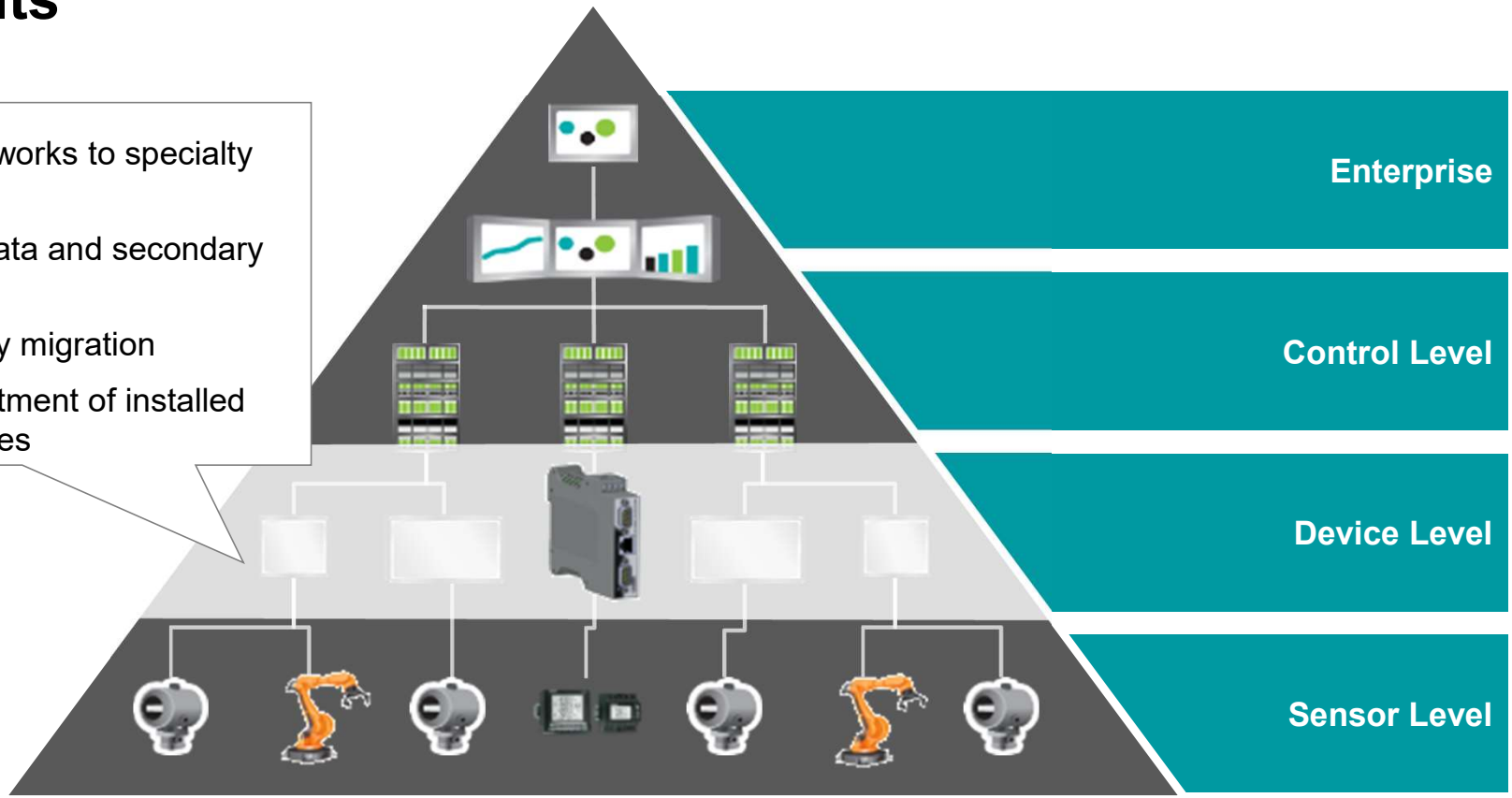
UL, ATEX, IECEX Zone 2

PHOENIX CONTACT
INSPIRING INNOVATIONS

Device servers and protocol converters

User benefits

- Connect existing networks to specialty field devices
- Access diagnostic data and secondary variables
- Facilitates technology migration
- Extend lifetime investment of installed controllers and devices



PHOENIX CONTACT
INSPIRING INNOVATIONS

Definitions

A **DEVICE SERVER** (also referred to as 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).

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 also called a **GATEWAY**, although a gateway typically has higher functionality.

Device servers

Serial to TCP/IP or UDP

- Point to point serial tunneling
- Point to multi-point serial tunneling
- Virtual com port

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INSPIRING INNOVATIONS

Device servers and protocol converters

Functionality

Device Servers
Serial tunneling (point to point)
Serial tunneling (multiplexing)
Virtual COM port
Windows driver

new

EtherNet/IP to Modbus
Class 1 and Class 3 messaging
Directly write to tag or file
Shared memory
Modbus Device ID Aliasing

Modbus TCP/RTU
Serial Modbus (server) to Modbus TCP (client)
Serial Modbus (client) to Modbus TCP (server)
Modbus Master to Modbus Master
Modbus Device ID Aliasing

Modbus TCP to ASCII*
Read and write ASCII strings
Configurable device ID
Directly write to Modbus master or slave

EtherNet/IP to ASCII*
Read and write ASCII strings
Class 1 and Class 3 messaging
Directly write to tag or file

PROFINET IO to ASCII*
Read and write ASCII strings
Fully configurable via GSDML file

PHOENIX CONTACT
INSPIRING INNOVATIONS

* ASCII may be serial or TCP/IP

Device servers

USPs and features

Compact, DIN rail mount form factor

Simple configuration and built-in diagnostics

IT security to the edge of the network

256-bit AES encryption for secure transfer of sensitive data

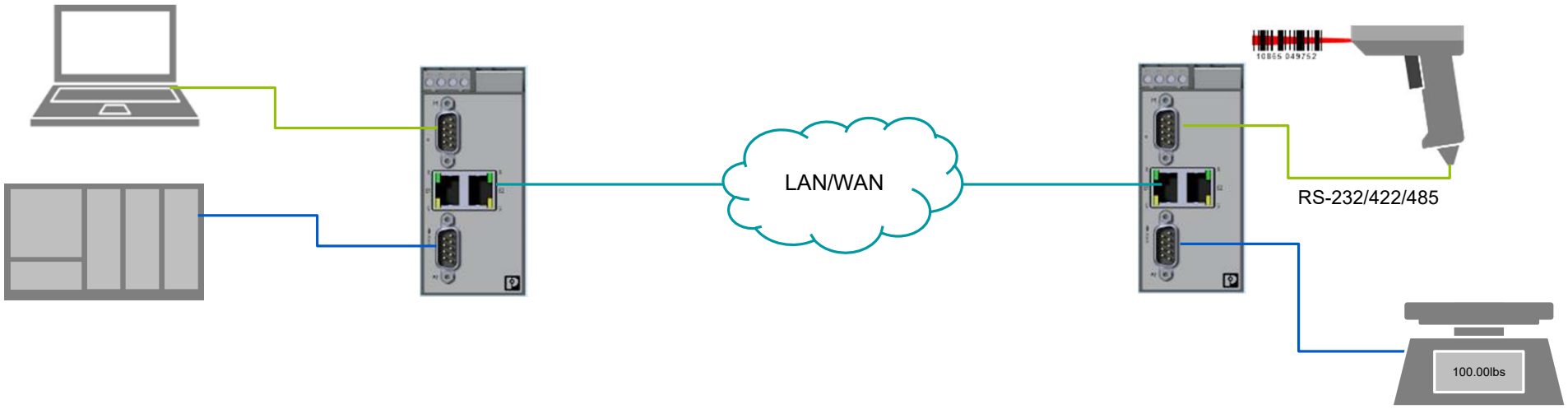
User authentication to prevent unauthorized access

Windows COM port driver for seamless integration

PHOENIX CONTACT
INSPIRING INNOVATIONS

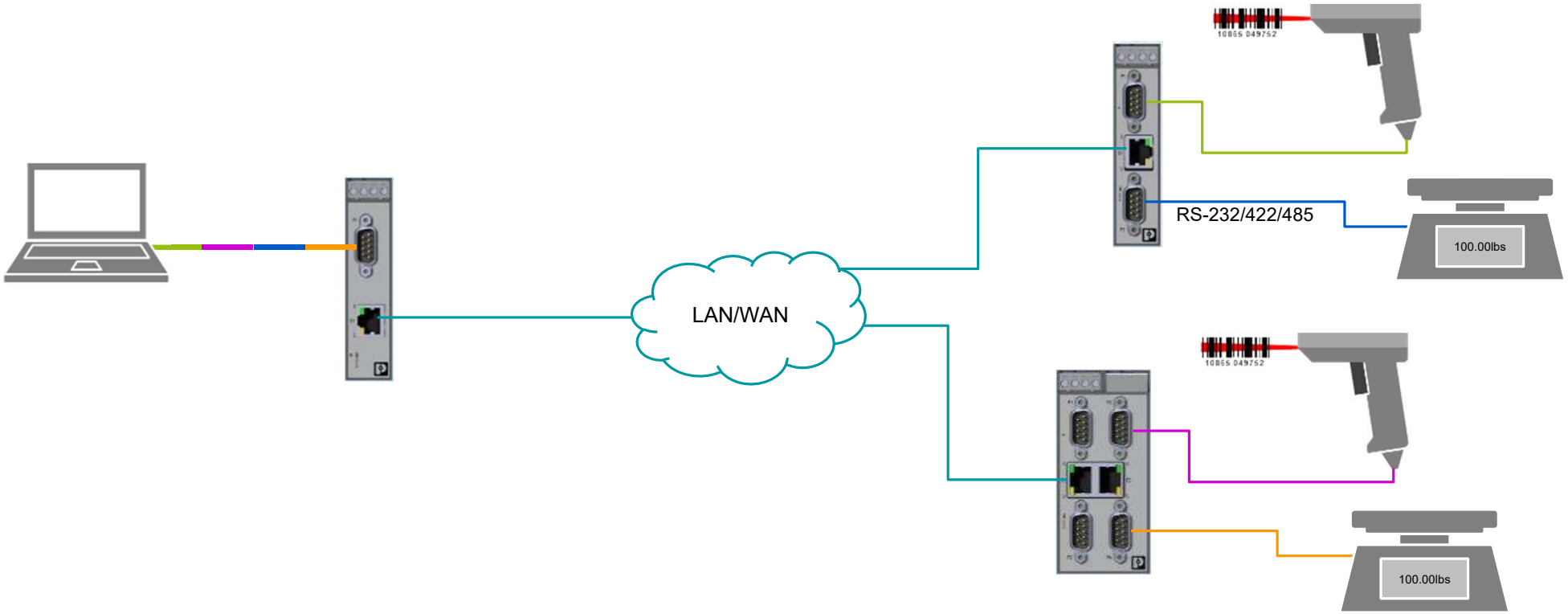
Application example

Serial Tunneling (point to point)



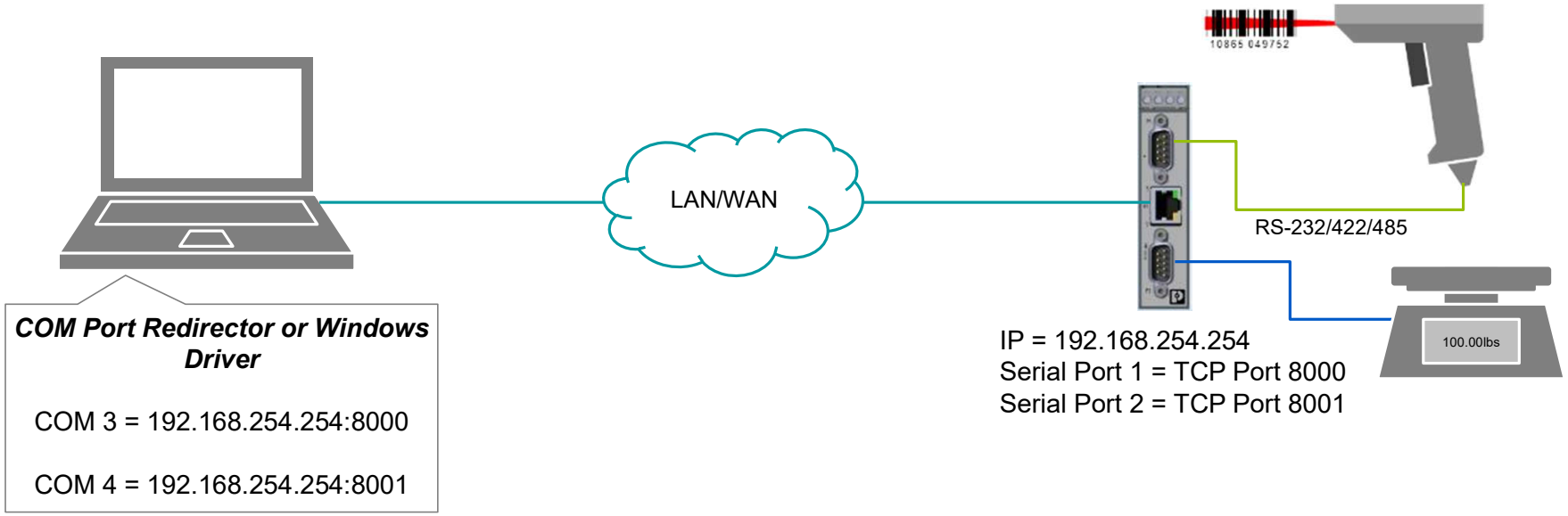
Application example

Serial Tunneling (multiplexing)



Application example

Virtual COM Port



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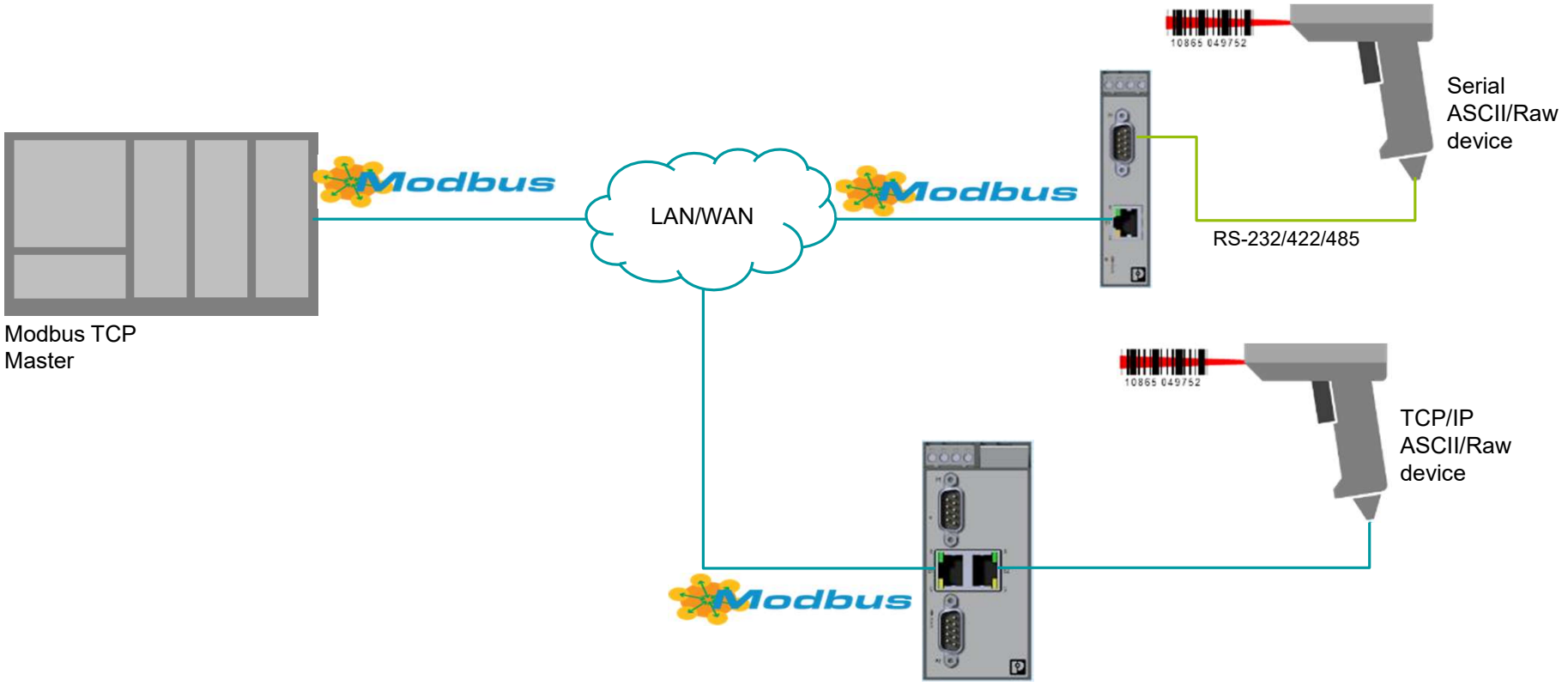
INSPIRING INNOVATIONS

Application example

ASCII to Modbus TCP



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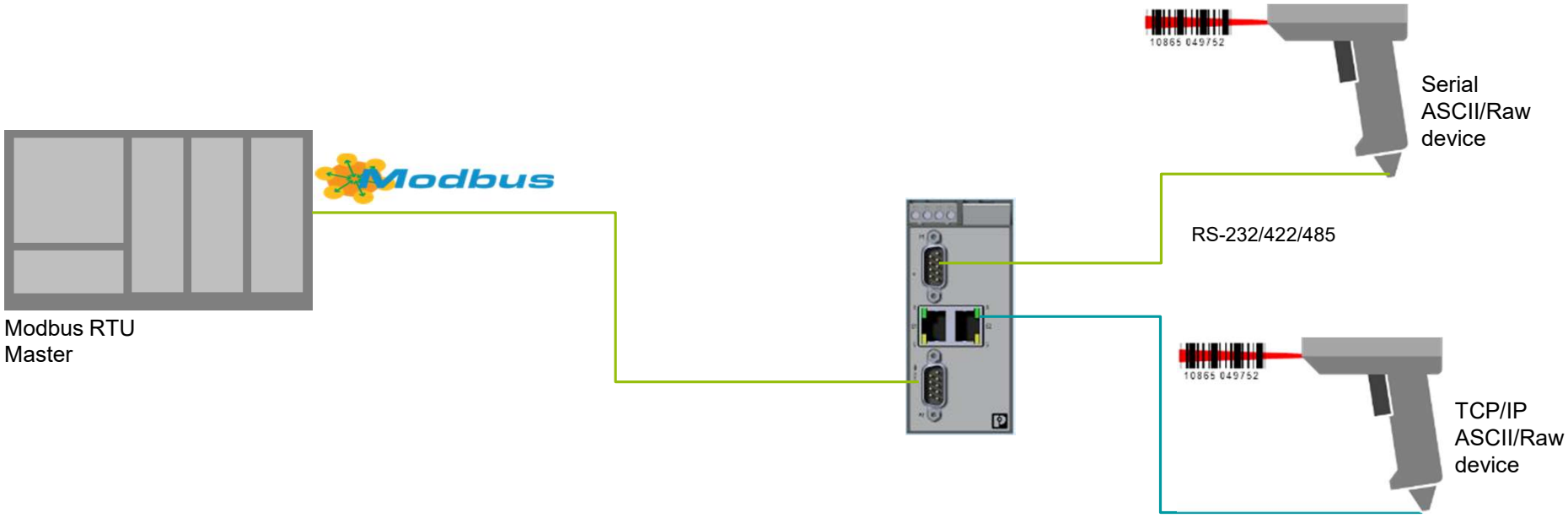
INSPIRING INNOVATIONS

Application example

ASCII to Modbus RTU



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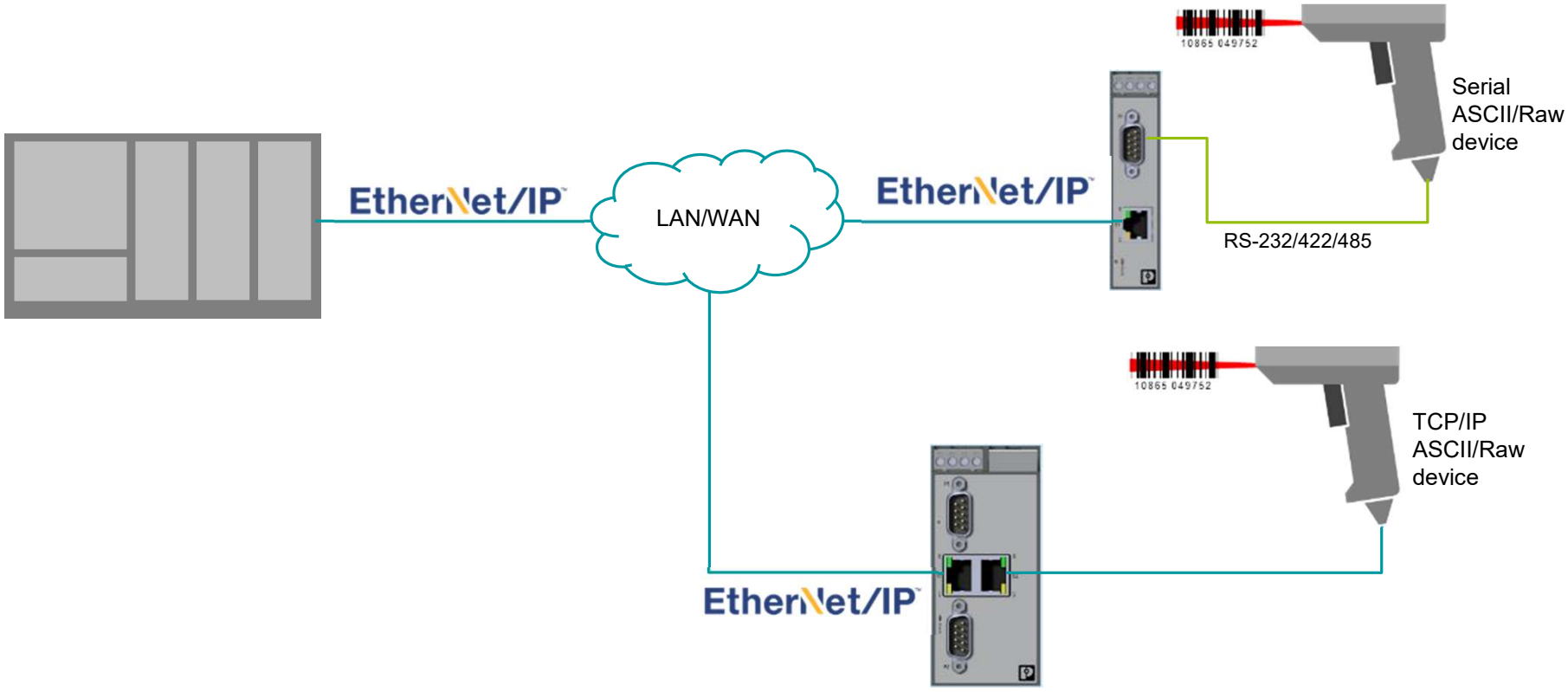
INSPIRING INNOVATIONS

Application example

ASCII to Ethernet/IP



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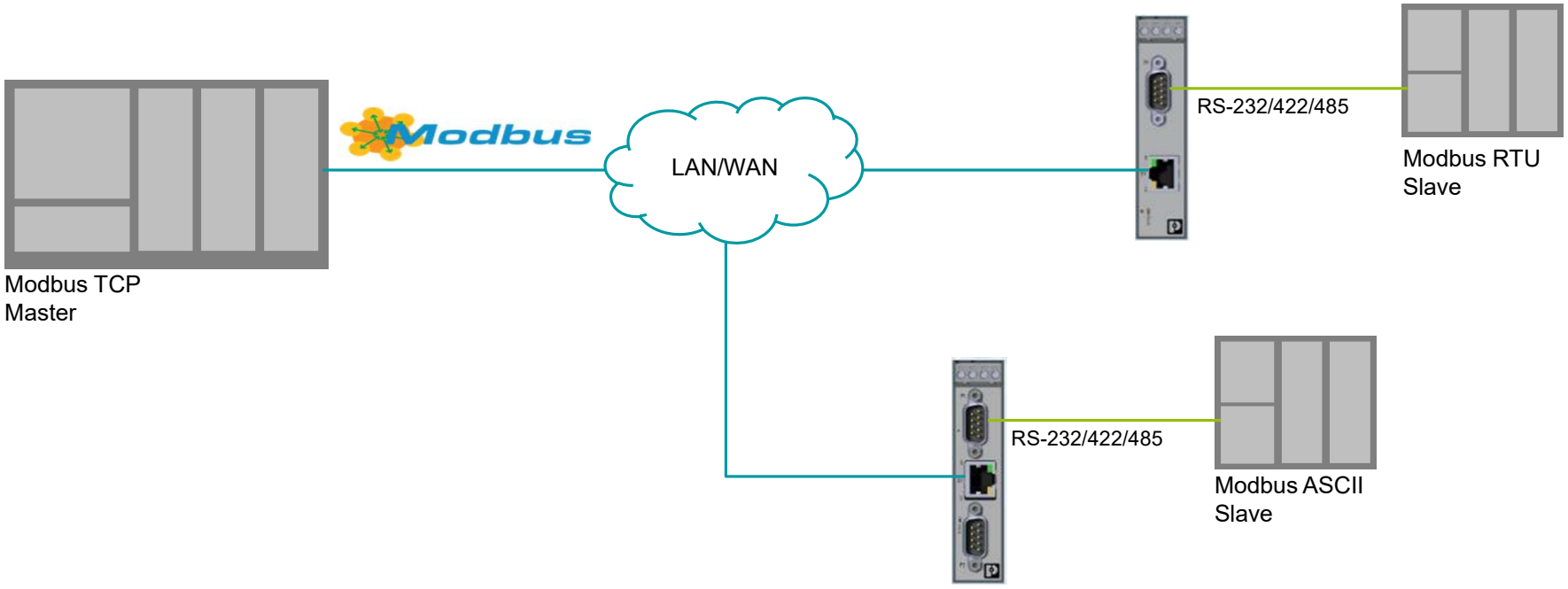
Application example

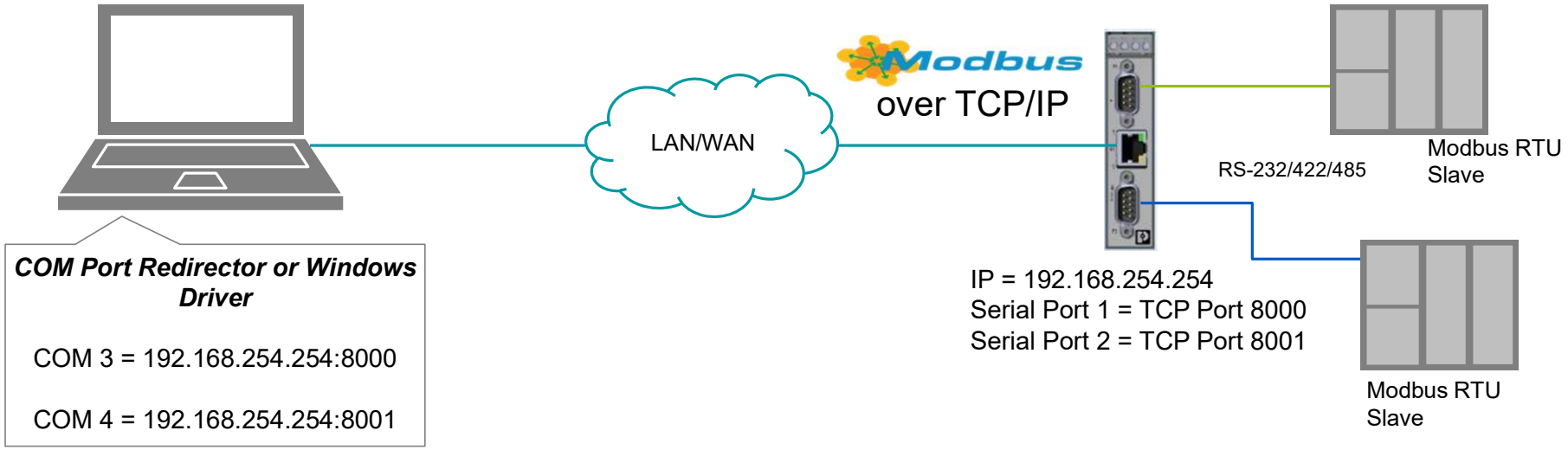
Modbus RTU/ASCII to Modbus TCP



PHOENIX CONTACT
INSPIRING INNOVATIONS

Application example

Virtual COM Port with Modbus over TCP/IP



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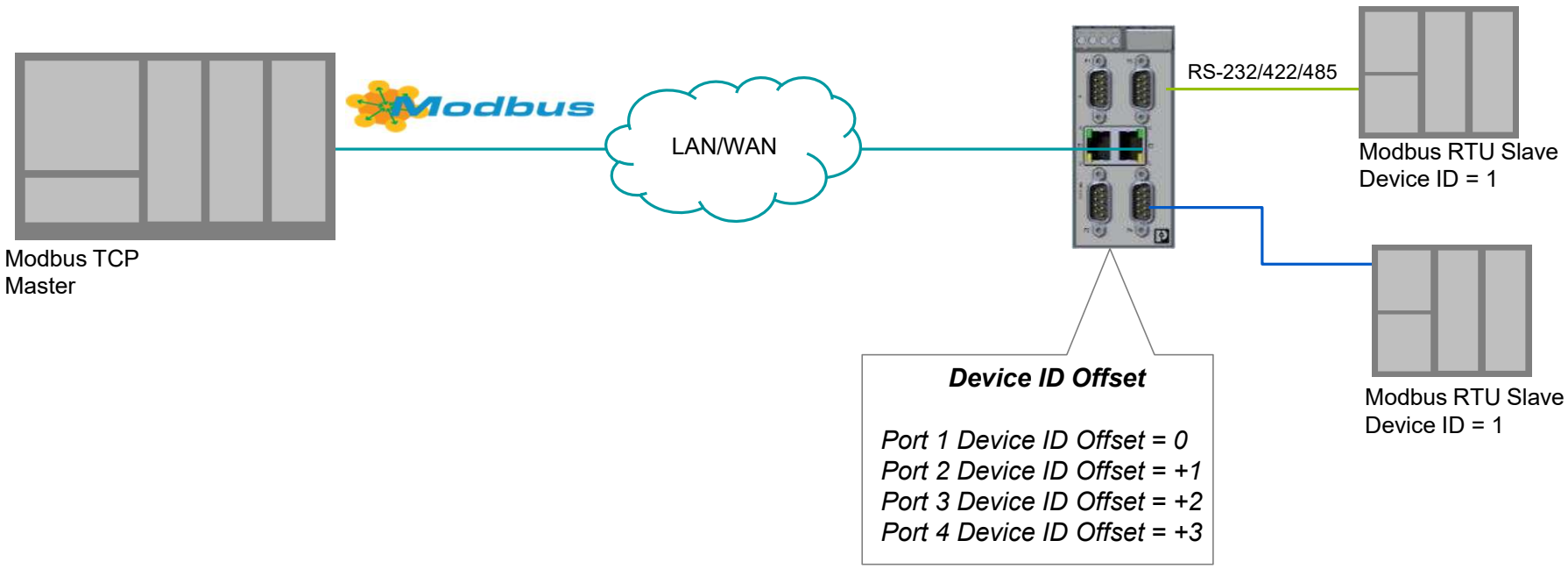
INSPIRING INNOVATIONS

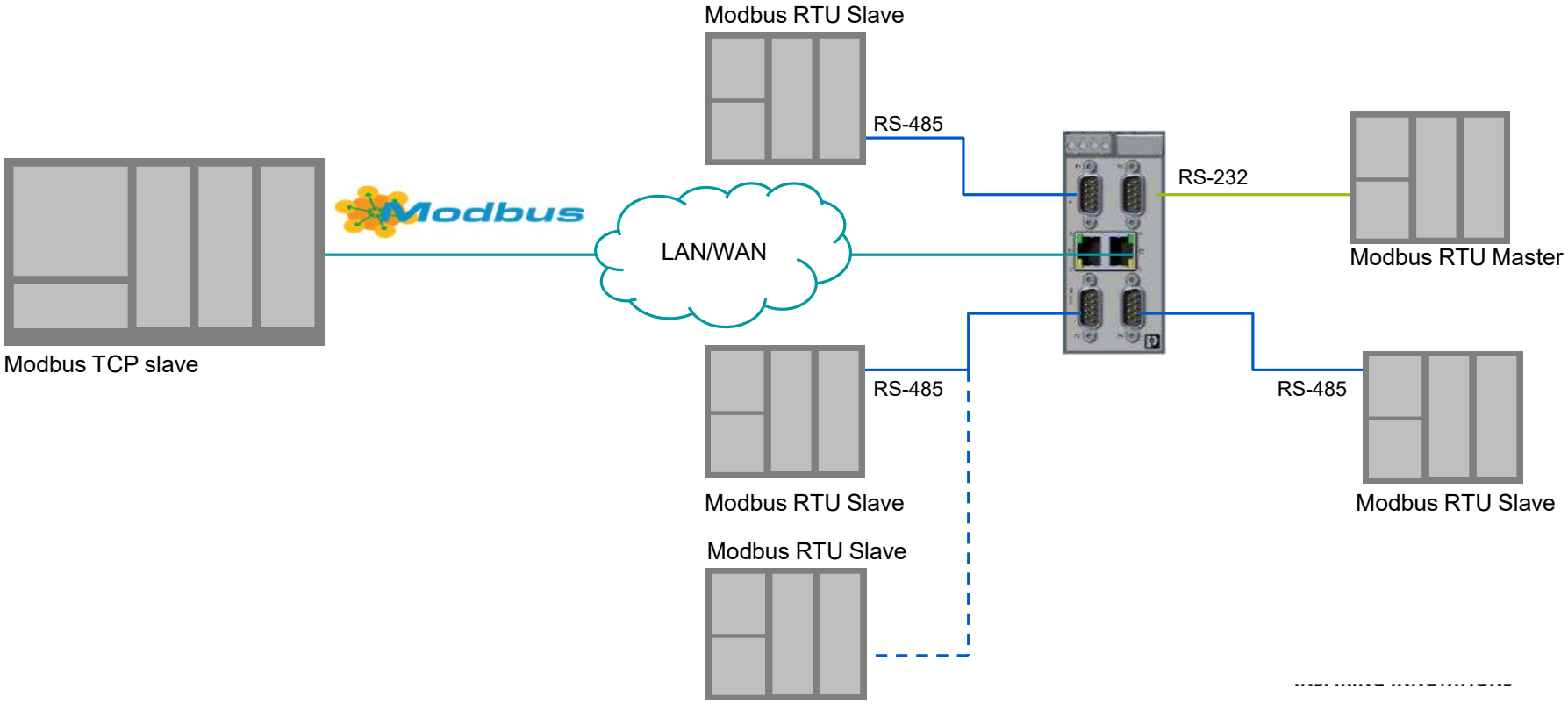
Application example

Multiple devices with the same Device ID



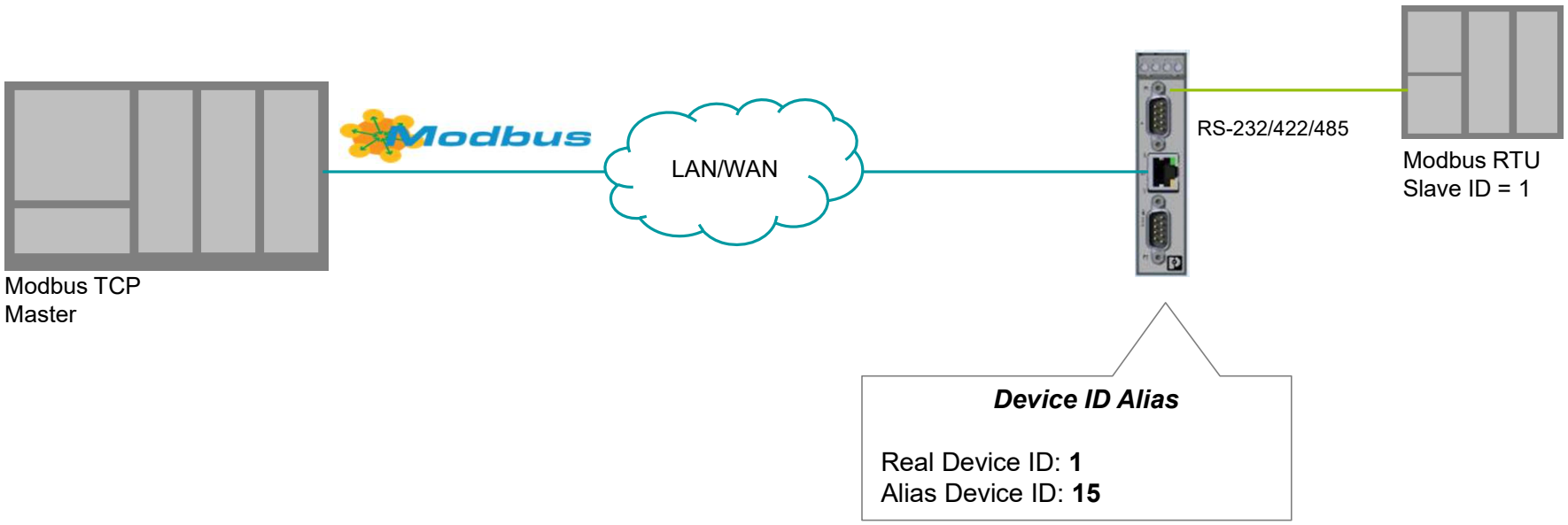
Application example

Multiple devices with the same Device ID



Application example

Modbus Device Aliasing



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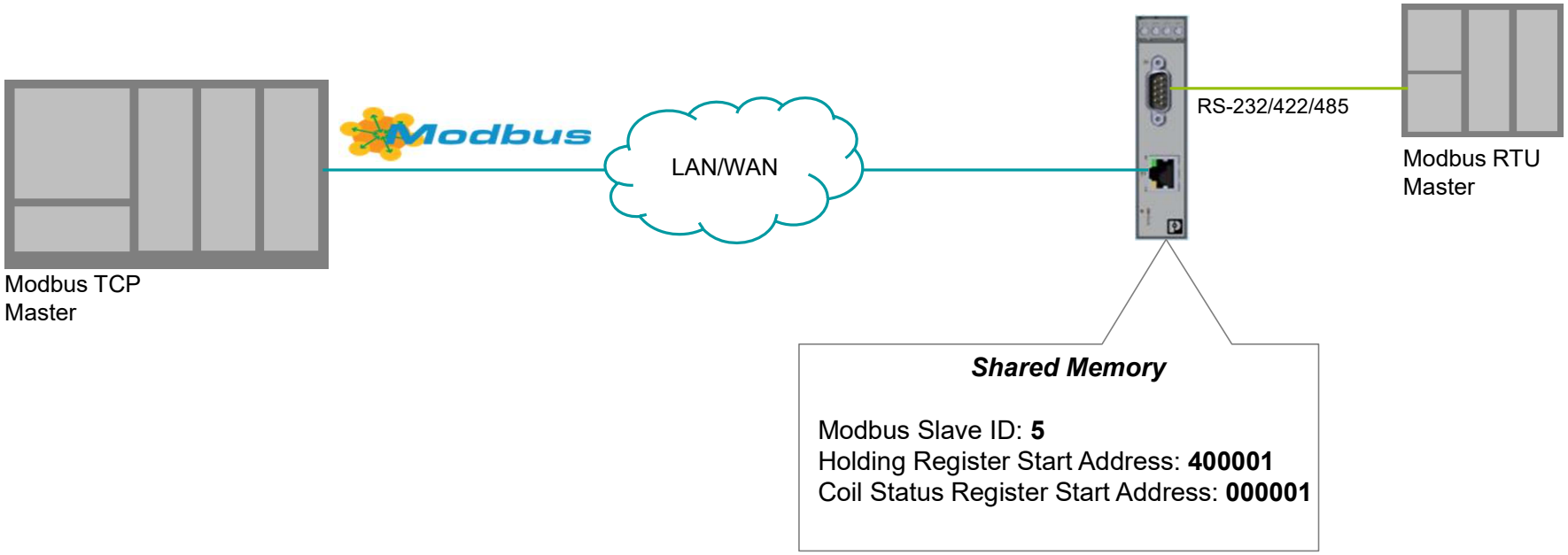
Application example

Modbus Shared Memory (Master to Master)



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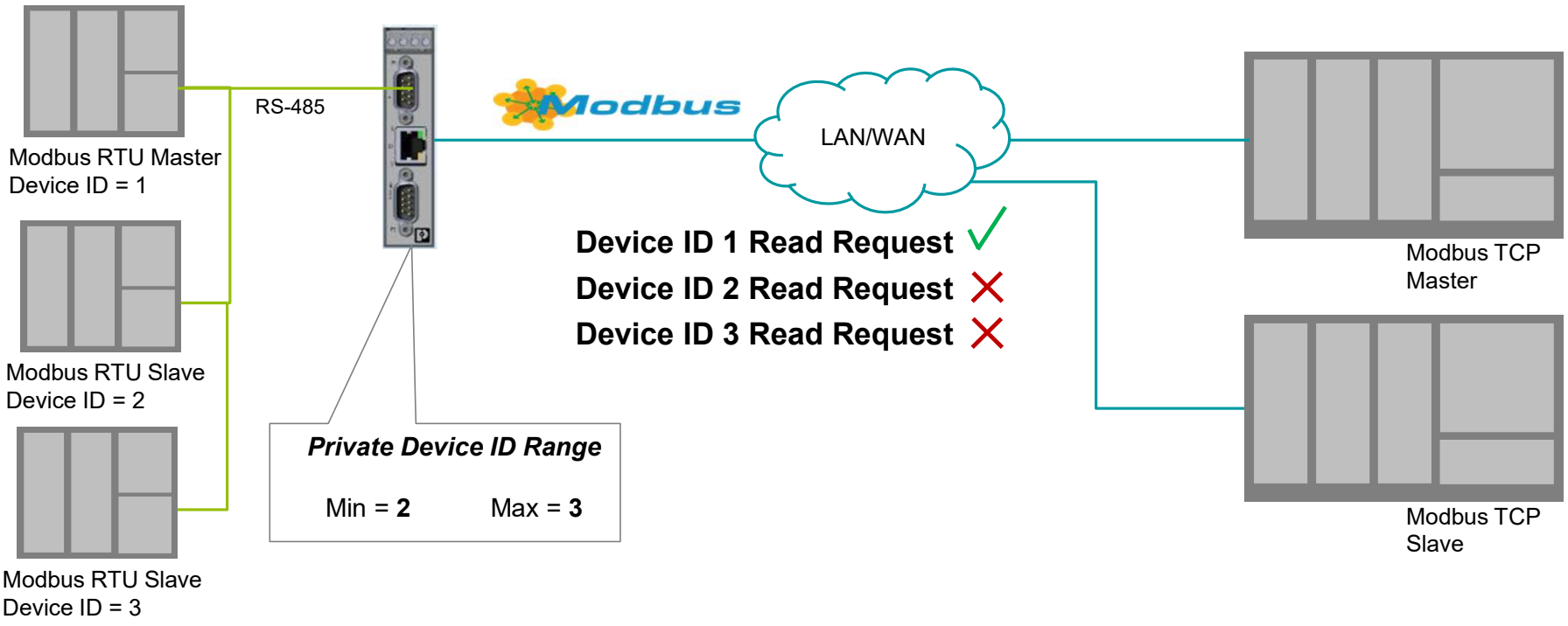
Application example

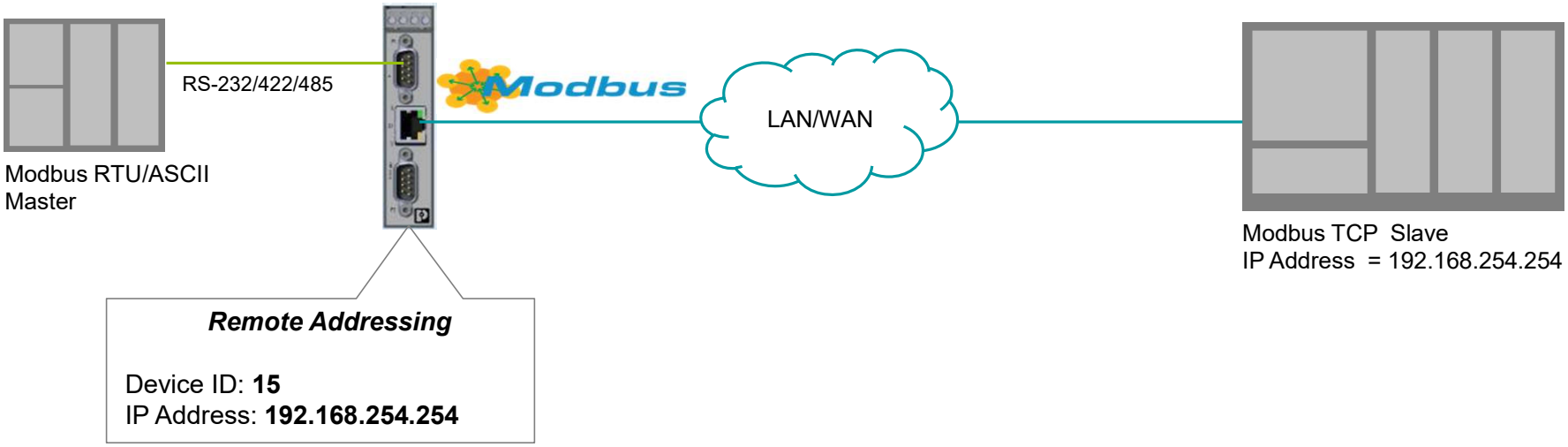
Private Modbus Networks



PHOENIX CONTACT
INSPIRING INNOVATIONS

Application example

Serial Modbus master to Modbus TCP slave



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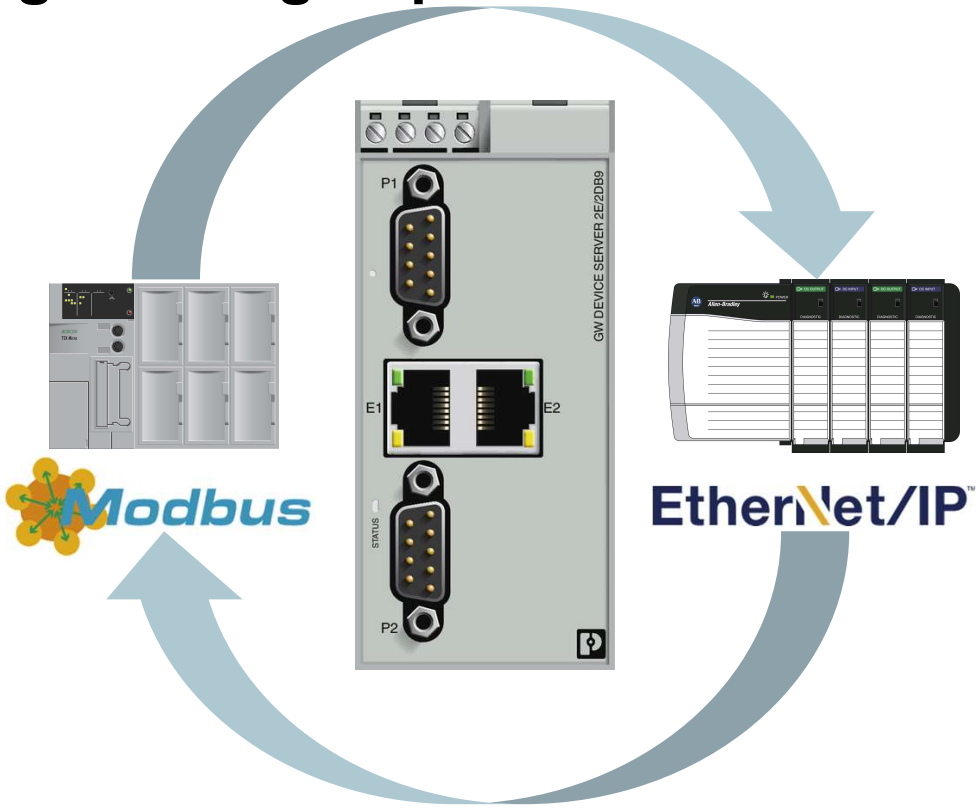
INSPIRING INNOVATIONS

Communication methods

Tag/File – no programming required

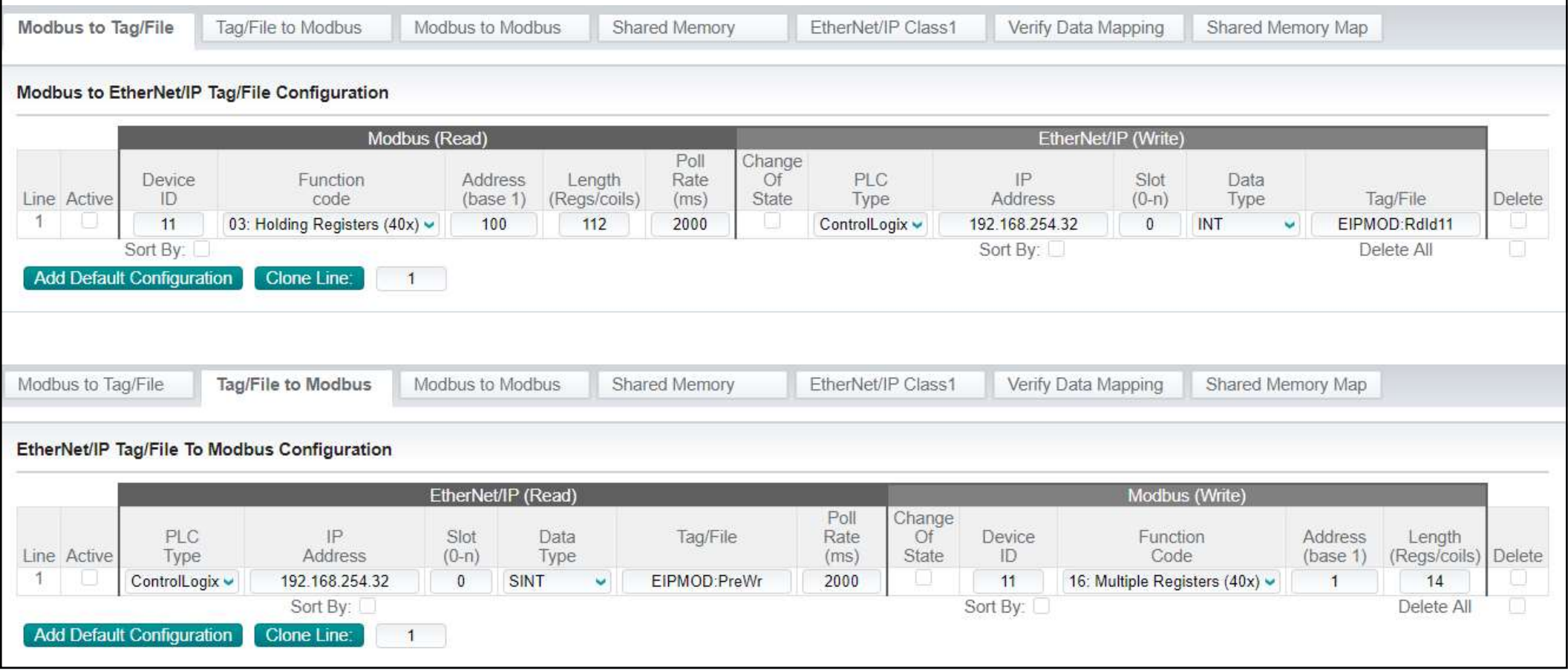
Modbus
Device ID
Function code
Address
Poll rate



EtherNet/IP
PLC type
IP address
Data type
Tag/File name

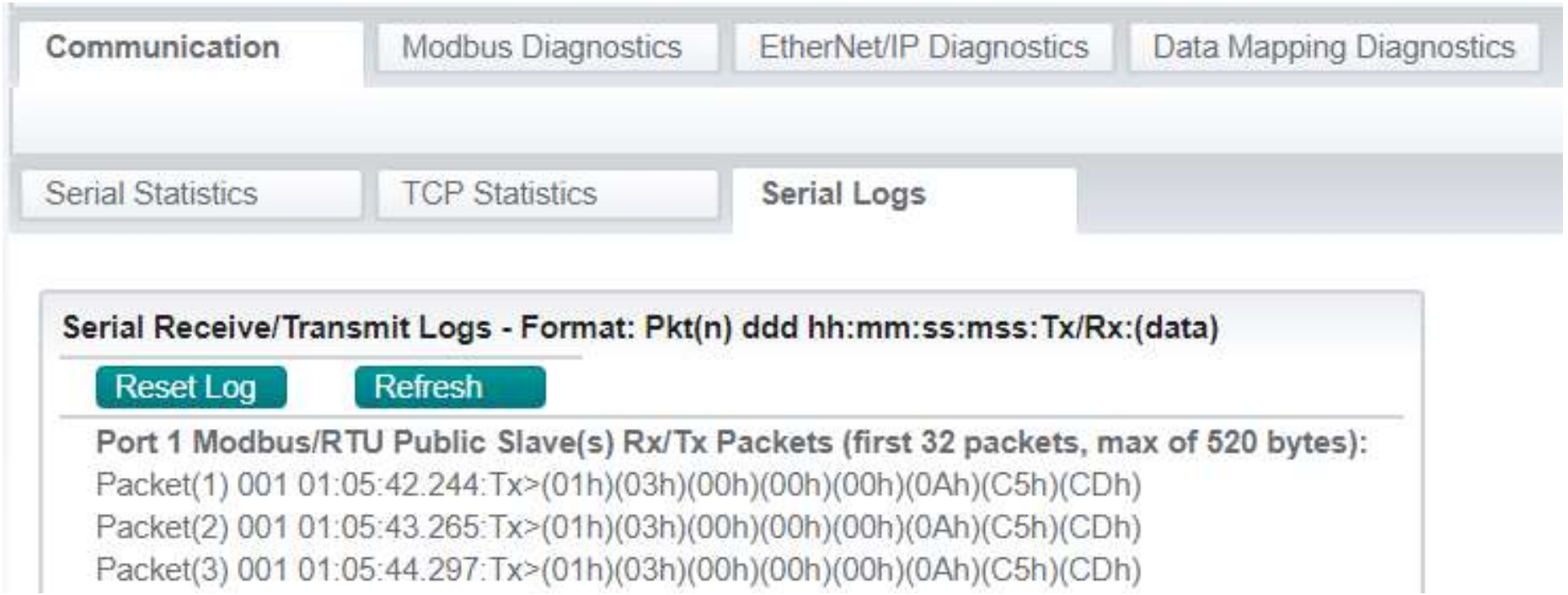
Communication methods

Tag/File – no programming required



Advanced diagnostics

Log files



Unique features

Shared Memory

Shared Memory Contents

Shared Holding Register Block 1

Display Format: HEX

Data lines per row: 10

Description: 200 holding registers
Write Messages: 8
Read Messages: 206
Blocked Messages: 0

Reset

Address	+0	+1	+2	+3	+4	+5	+6	+7	+8	+9
400001	FFFF	FFFD	FF00	00FF	ABCD	1234	6789	00DD	0000	0000
400011	0000	0000	0000	0000	0000	0000	0000	0000	0000	0000

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QRG Quick Reference Guide

GW MODBUS TCP/RTU shared memory

Modbus master-to-master communication

Quick Reference Guide

QRG_916_EN_02_GW-MODBUS-shared-memory.doc

© PHOEND

Pos.	Qty.	Order-No.	Type-Description	Description
1	1	2702764	GW MODBUS TCP/RTU 1E/1DB9	Modbus gateway (shown in this Guide)
2		2702765 2702766 2702767	GW MODBUS TCP/RTU 1E/2DB9 GW MODBUS TCP/RTU 2E/2DB9 GW MODBUS TCP/RTU 2E/4DB9	Modbus gateway variants with multiple ports
3	2			Modbus master

QUICK Reference Guide

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INSPIRING INNOVATIONS

Applications

Remote configuration (IT infrastructure)

- **Problem:** Network infrastructure devices at a satellite office unexpectedly quit communicating over Ethernet. IT personnel need to access serial ports for troubleshooting and configuration.
- **Solution:** A GW DEVICE SERVER 2E/4DB9 is connected to the managed switch, router, firewall, and WAN optimization appliance inside the IT cabinet. A virtual COM port number is assigned to each serial port, allowing remote access.

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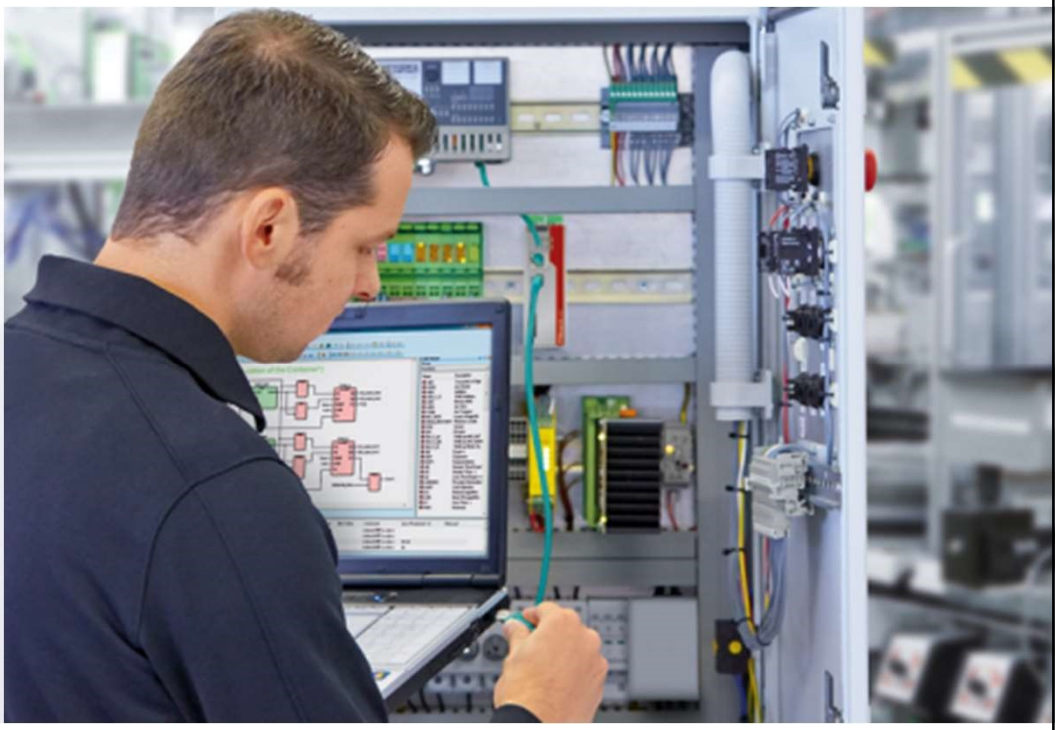
INSPIRING INNOVATIONS

Applications

Diagnostics for legacy PLC (machine building)

- **Problem:** A back-up power generator control system utilizes a PLC with an RS-232 interface. Modern laptops no longer have native RS-232 port.
- **Solution:** A GW DEVICE SERVER 1E/1DB9 is installed in the control cabinet. The technician creates a virtual COM port and sends AT commands to PLC for diagnostics.



PHOENIX CONTACT
INSPIRING INNOVATIONS

Protocol converters

ASCII* to Modbus

- ASCII to Modbus TCP (client)
- ASCII to Modbus TCP (server)
- ASCII to Modbus RTU (client)
- ASCII to Modbus ASCII (client)

* ASCII may be serial or TCP/IP

PHOENIX CONTACT
INSPIRING INNOVATIONS

Protocol converters

ASCII* to EtherNet/IP

EtherNet/IP™

- ASCII to EtherNet/IP (write to tag/file)
- ASCII to EtherNet/IP (PLC reads)
- EtherNet/IP (Class I implicit)

* ASCII may be serial or TCP/IP

PHOENIX CONTACT
INSPIRING INNOVATIONS

Protocol converters

Serial Modbus to Modbus TCP

- Serial Modbus (client) to Modbus TCP (server)
- Serial Modbus (server) to Modbus TCP (client)
- Modbus Master to Modbus Master
- Modbus Device ID Aliasing
- Serial Modbus over TCP/IP
- Private Modbus devices

Configure Phoenix Contact's Gateways - Modbus RTU to Modbus TCP slave

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INSPIRING INNOVATIONS

Applications

Material handling (automotive)

- **Problem:** A major auto manufacturer needs to route car doors (i.e. compact car, sedan, van, SUV, etc.) to the proper assembly line by scanning bar codes on the doors.
- **Solution:** A bar code scanner is connected to a GW MODBUS TCP/ASCII 1E/1DB9. The bar code is scanned and sent to a Modbus PLC, the PLC directs the AGV carrying the car door to the correct assembly line.

Applications

Machine access control (food and beverage)

- **Problem:** A major brewery wants to shut down idle bottling machines to save power, and also wants to limit the ability to start machine to authorized operators.
- **Solution:** An operator will scan their ID badge to start machine. The ID (bar code) reader is connected to a GW EIP/ASCII 1E/1DB9, which converts the ASCII string to EtherNet/IP. A Rockwell PLC determines whether the operator is authorized and starts the machine.

PHOENIX CONTACT
INSPIRING INNOVATIONS

Serial Device Server / Gateways

Serial Device Server and **Gateways** enables easy integration of legacy serial devices and buses into Ethernet networks.

Serial Device Server / Gateways

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

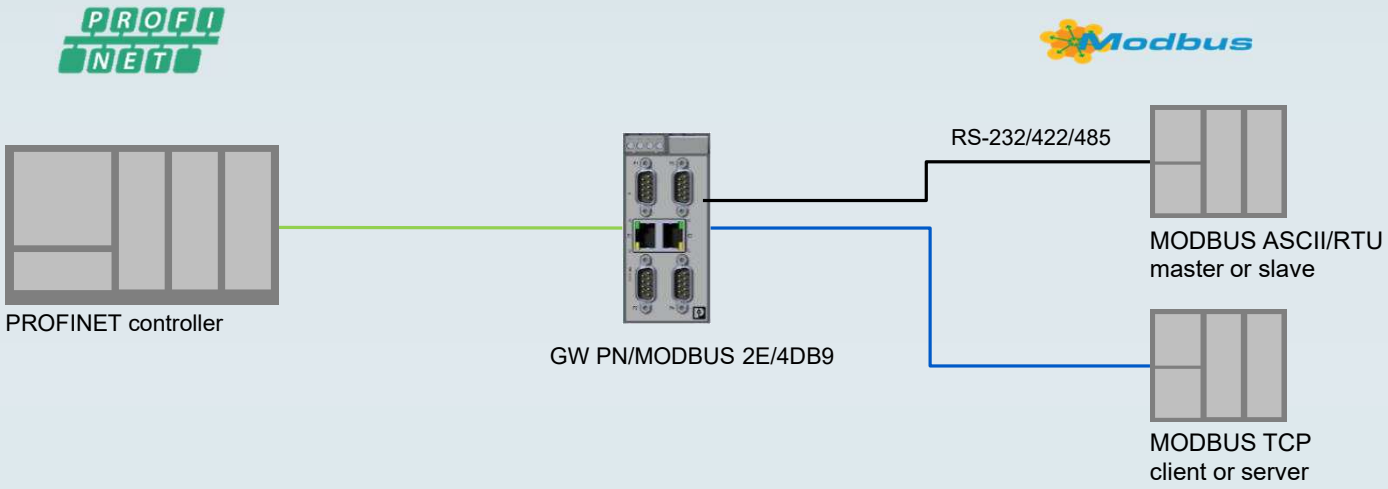
Windows COM port driver for seamless integration

Application example:

- PROFINET to MODBUS ASCII/ RTU / TCP
- PROFIBUS DP to PROFINET
- 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

PROFINET to MODBUS ASCII / RTU / TCP

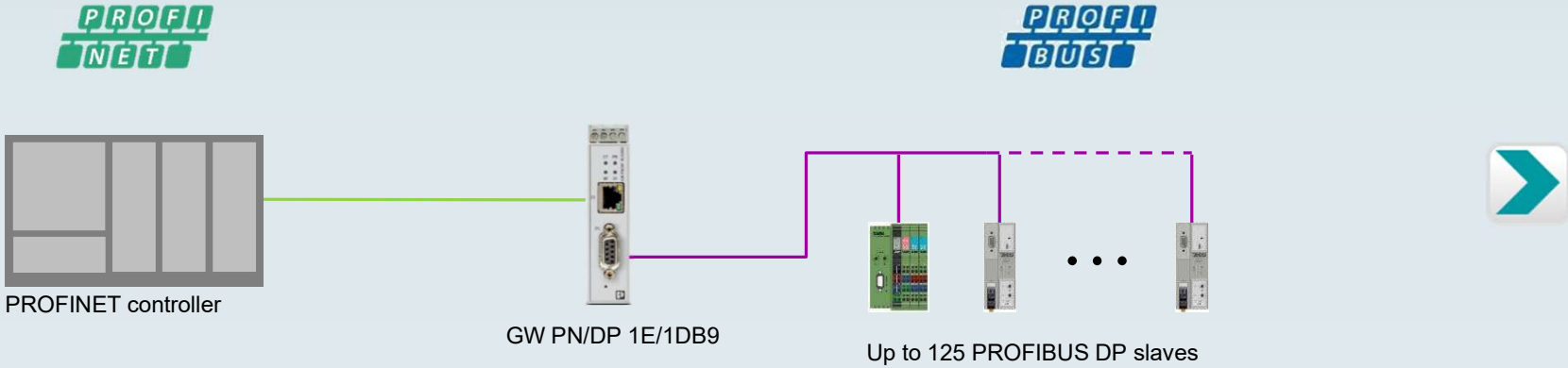


PROFINET to MODBUS ASCII / RTU / TCP

- Functions as a PROFINET slave and a MODBUS client/master and/or MODBUS server/slave
- Supports up to 1600 MODBUS registers and up to 2560 MODBUS coils
- Multiport options available to meet every application
- GSDML files available for simple integration into Profinet controllers

Device servers - Application example

PROFIBUS DP to PROFINET

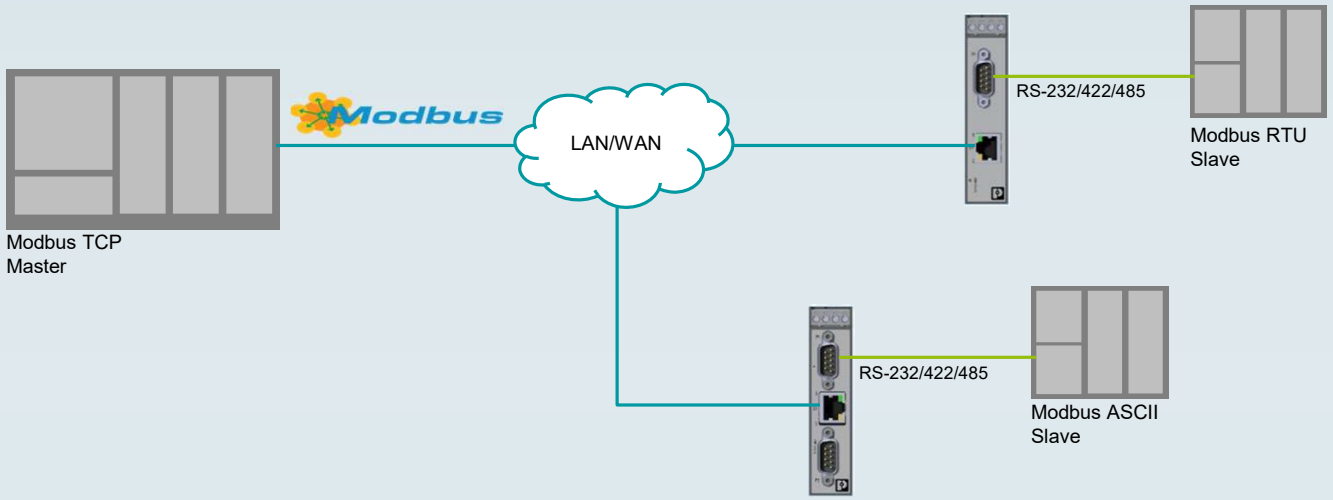


PROFINET to MODBUS ASCII / RTU / TCP

- Functions as a PROFINET slave and PROFIBUS DP master
- Supports up to 31 PROFIBUS DP slaves directly and up to 125 slaves using repeaters
- GSDML generator for simple integration into PROFINET controllers
- DTM file for simple configuration of PROFIBUS DP network

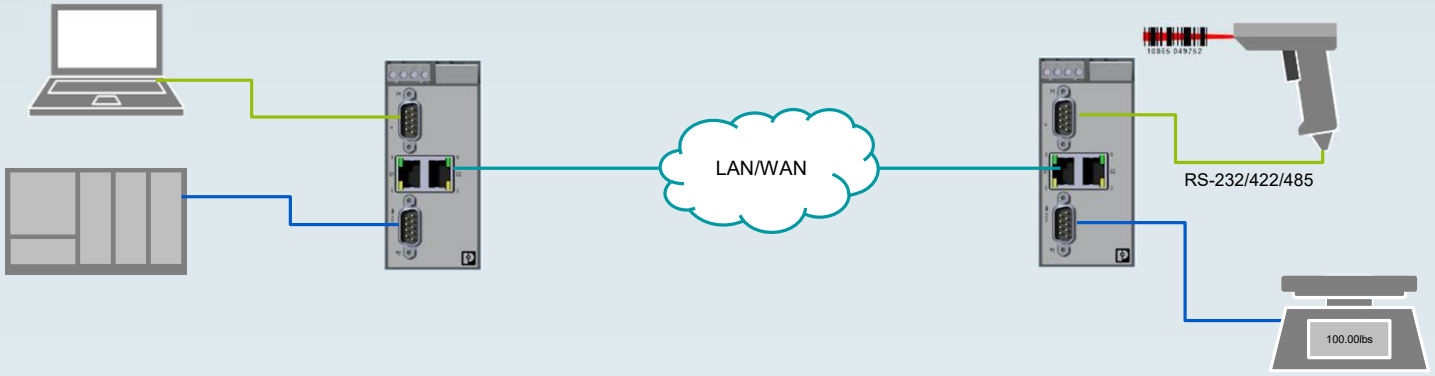
Device servers - Application example

Modbus RTU/ASCII to Modbus TCP



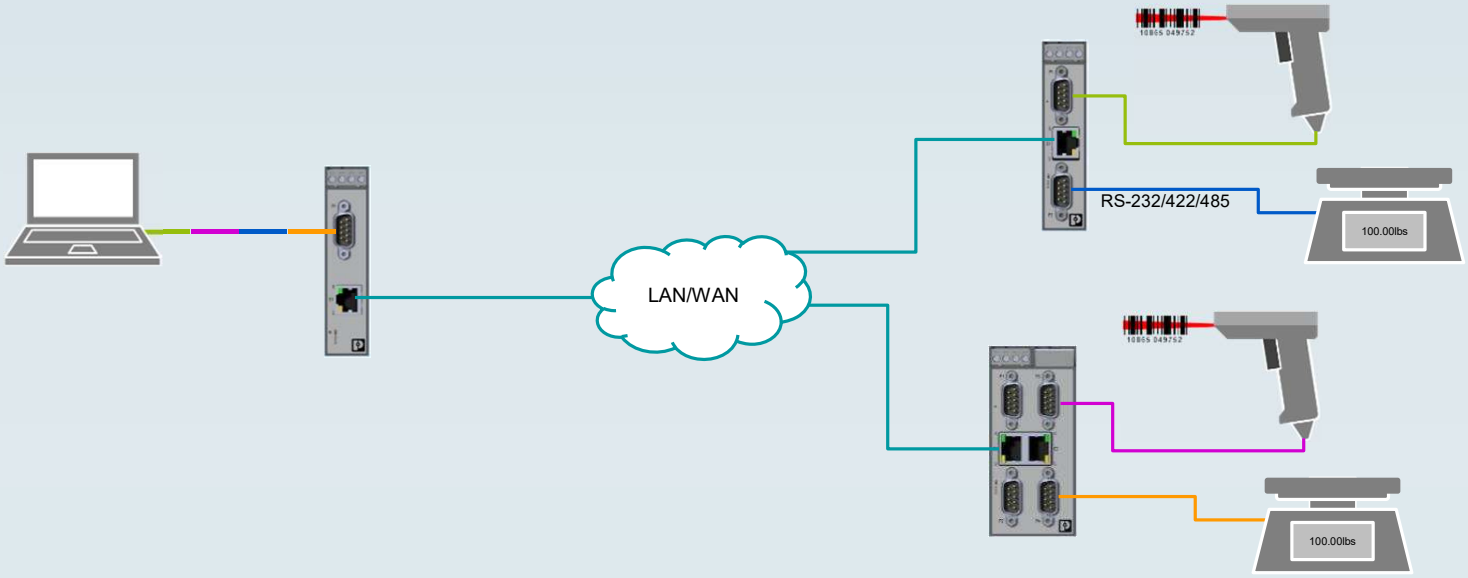
Device servers - Application example

Serial Tunneling (point to point)



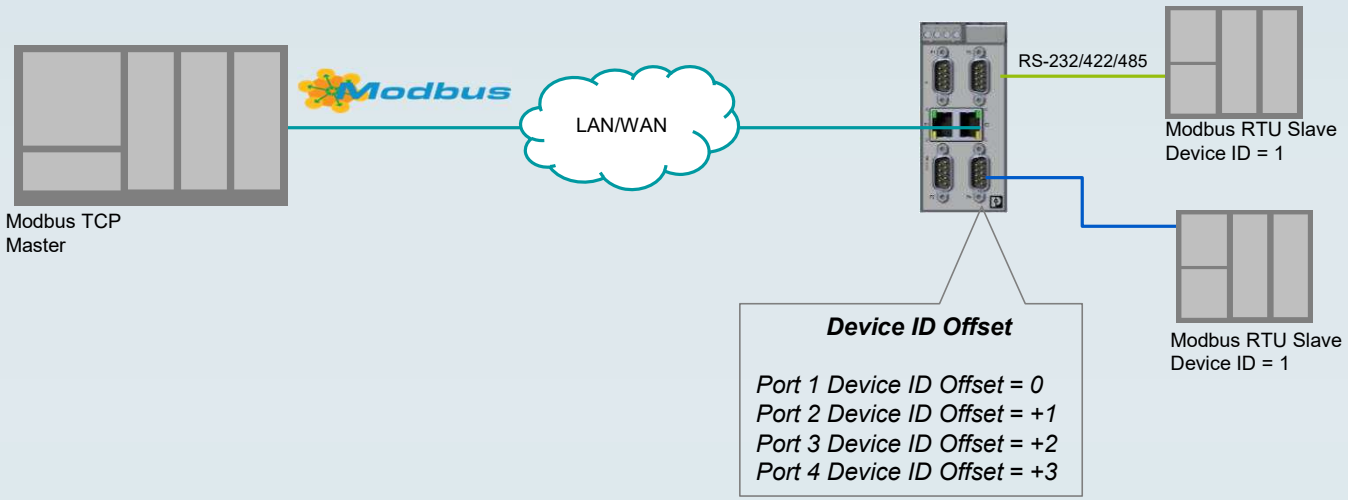
Device servers - Application example

Serial Tunneling (multiplexing)



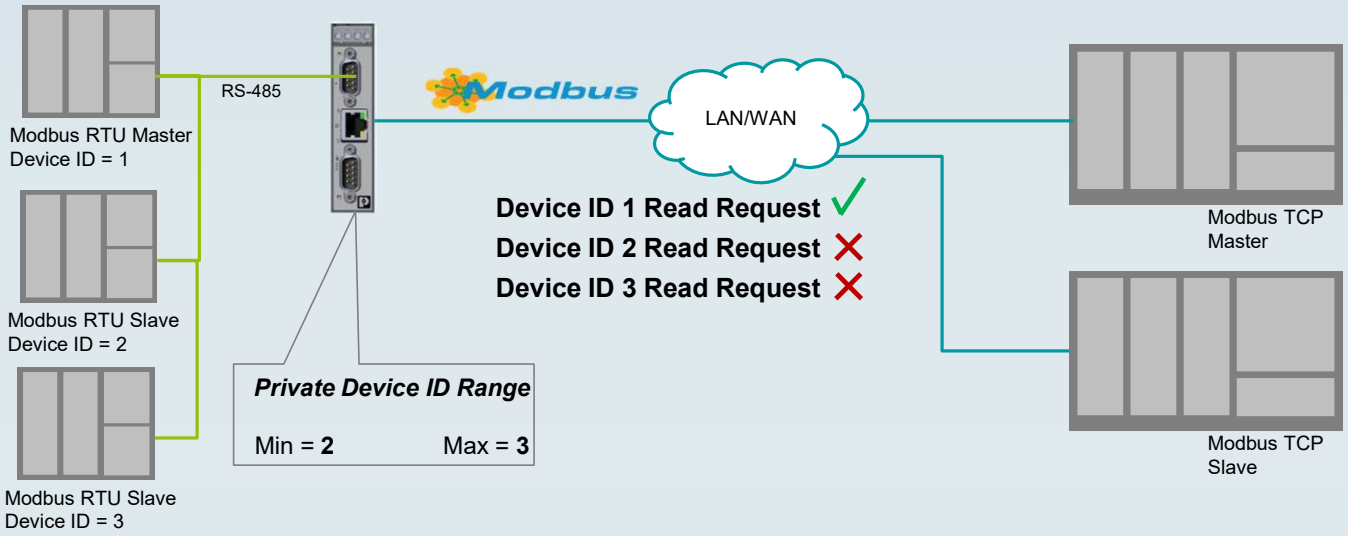
Device servers - Application example

Multiple devices with the same Device ID



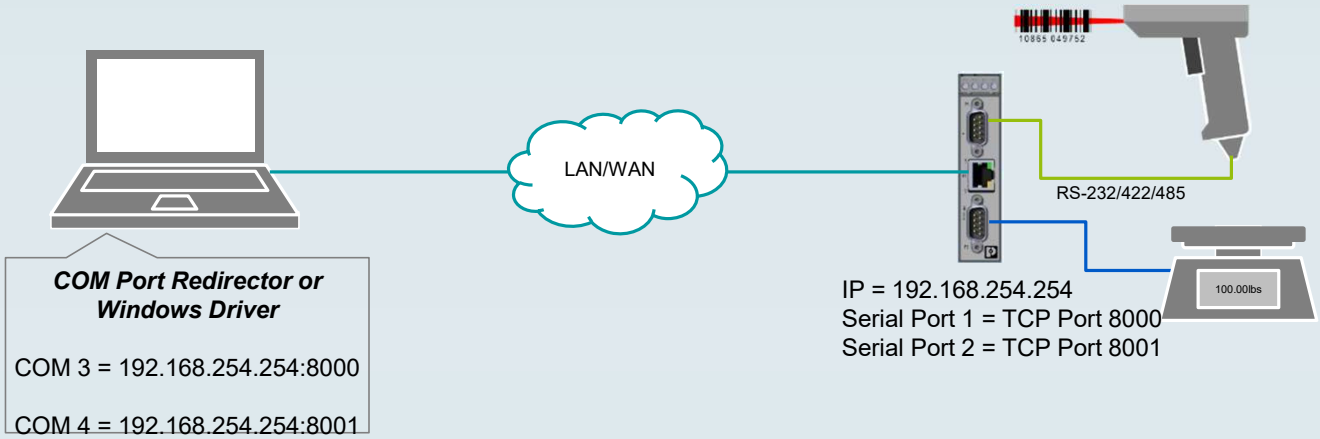
Device servers - Application example

Private Modbus Networks



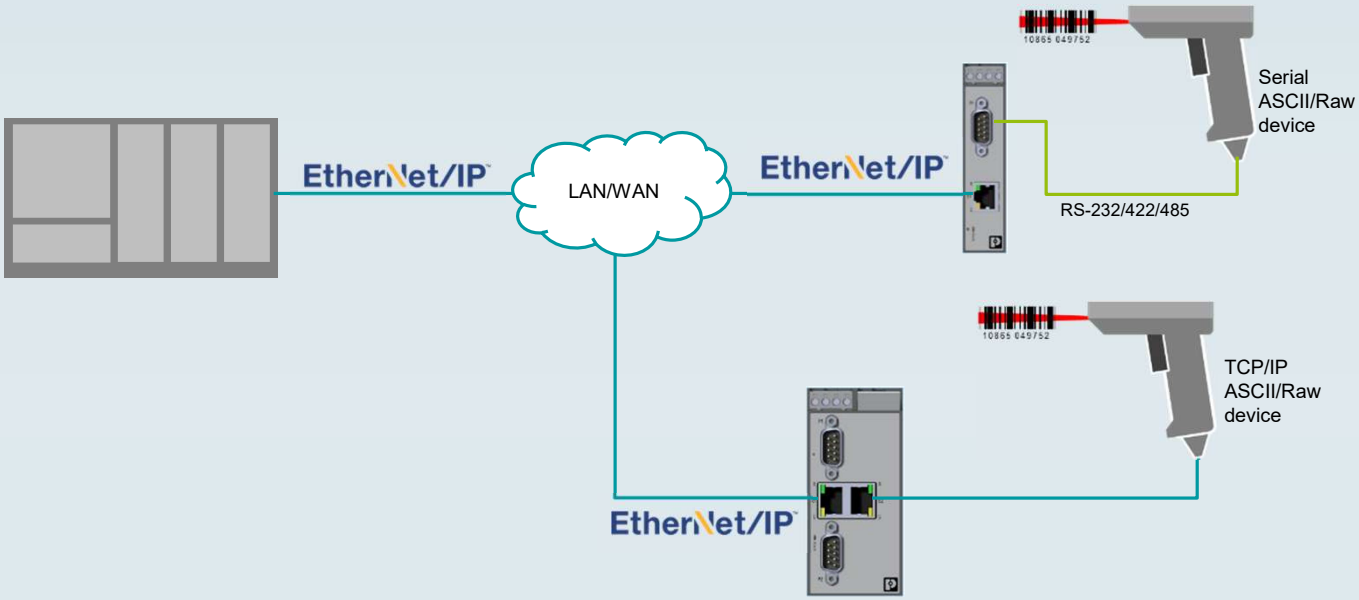
Device servers - Application example

Virtual COM Port



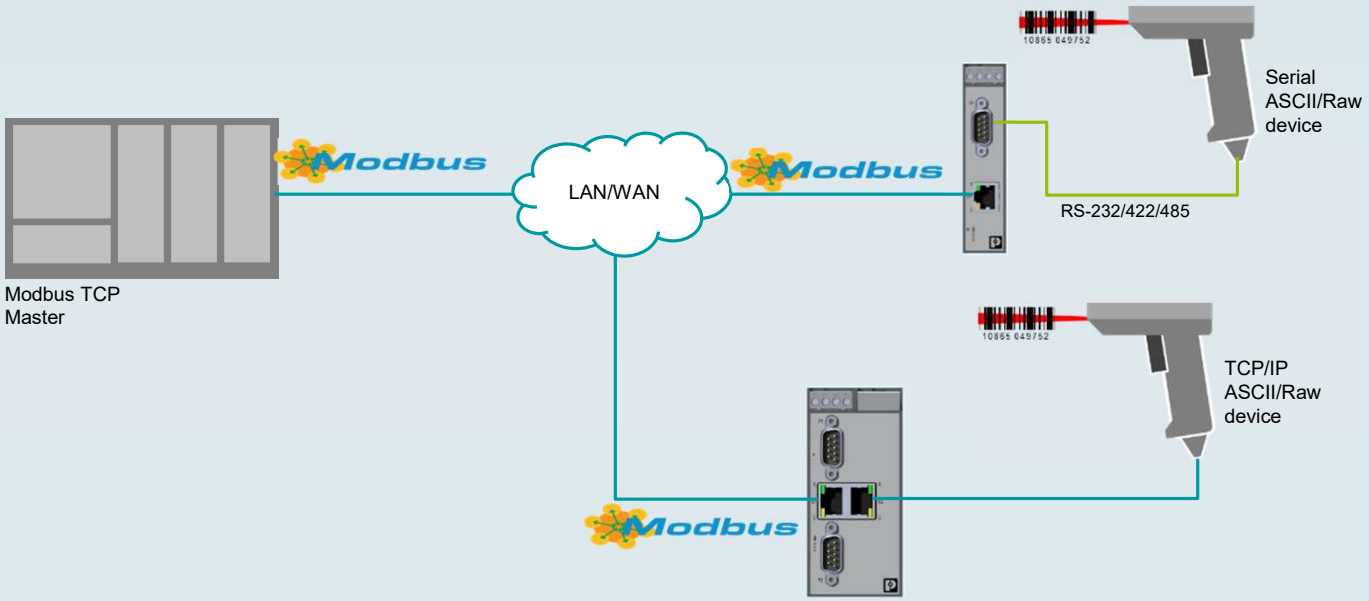
Device servers - Application example

ASCII to Ethernet/IP



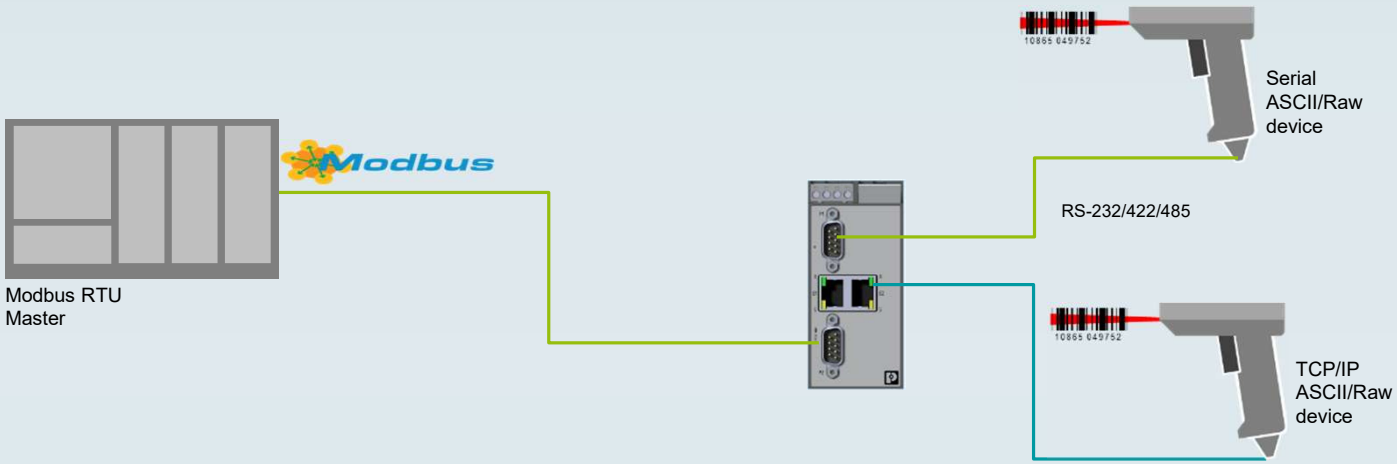
Device servers - Application example

ASCII to Modbus TCP



Device servers - Application example

ASCII to Modbus RTU



Serial Device Server





	FL COMSERVER BASIC	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	2702758	2702760	2702761	2702763

INSPIRING INNOVATIONS

Gateways









	FL COMSERVER UNI	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	2702764	2702765	2702766	2702767	2702768	2702769	2702770	2702771

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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

Gateways

	GW EIP/MODBUS 1E/1DB9	GW EIP/MODBUS 1E/2DB9	GW EIP/MODBUS 2E/2DB9	GW EIP/MODBUS 2E/4DB9	GW PN/MODBUS 1E/1DB9	GW PN/MODBUS 1E/2DB9	GW PN/MODBUS 2E/2DB9	GW PN/MODBUS 2E/4DB9
Protocol	**Modbus to Ethernet/IP**				**Modbus to Profinet**			
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)				ATEX, IECEx, UL (Class I, Division 2)			
Order no.	1062540	1062423	1062380	1062388	1105707	1105708	1105709	1105710

Gateways

	GW PN/DP 1E/1DB9
Protocol	**Profibus DP to Profinet**
Ethernet interface	1x RJ45
Serial interface (RS-232/422/485)	1x D-SUB 9
Special features	Connect up to 125 PROFIBUS DP slaves to a PROFINET host
Order no.	1108712

INSPIRING INNOVATIONS

Thank You

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