

# Industrial Ethernet

One network,  
all options

# The PHOENIX CONTACT Industrial Ethernet network portfolio

## **Make the most of all your Ethernet network options.**

Phoenix Contact offers you more realtime, more wireless, more security, and more reliability. Industrial Ethernet from Phoenix Contact can be easily integrated in your automation infrastructure – because we make Ethernet easy.

Our experience in automation and in industrial Ethernet networks spans decades. We know and understand the expectations and demands placed on automation. Our products and solutions bring this to life.



## **We make Ethernet easy**

When we say, “We make Ethernet easy,” we are talking about controlling the complexity of high-performance Ethernet networks. As such, we have consistently designed our products with the knowledge, the tools, and the skills of the user in mind, the automation specialist.



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# You can count on us

**Much more than products, we also offer you support whenever you need it.**

We offer on-demand professional support, from consultation, to network analysis and design, right through to configuration support and startup. We not only support you over the phone or by e-mail, but also directly on site, if you so desire. Contact us for more information.

***Our specialists are also on hand to offer practical support, on site.***

*We offer support during the configuration and startup phases. We measure and assess the performance, availability, and security of your network and show you how you can optimize it. What's more, if your network is not working according to your expectations, we will eliminate any faults.*



***We will turn you into network specialists***

*Do you want to gain a better insight into network engineering for yourself or your staff? We provide instruction and practical training in automation which is tailored to your individual requirements.*



***We support you in the design and planning of your network.***

*We will develop unique solutions for you which are tailored to your exact requirements. Whether it's fail-safe network structures, concepts for protecting or remotely maintaining your machinery or high-performance wireless networks, we will find the right solution for you.*

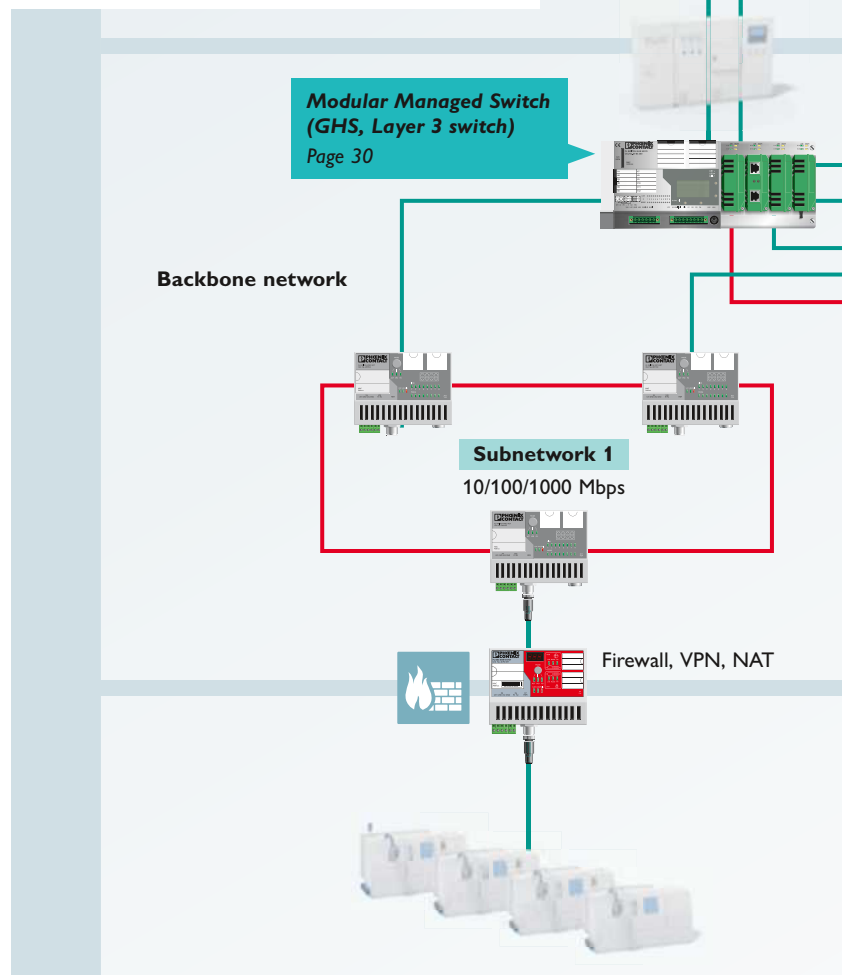
# Automation switches for the production network

Highly productive and efficient production requires well structured, high-performance, and robust network infrastructure. The ideal concept and the right components protect your system against automation system failures and costly downtimes.

With industrial switches from Phoenix Contact you can easily implement the high requirements of your production network with forward planning. As well as the appropriate products, we also offer you support in planning your production network optimally.

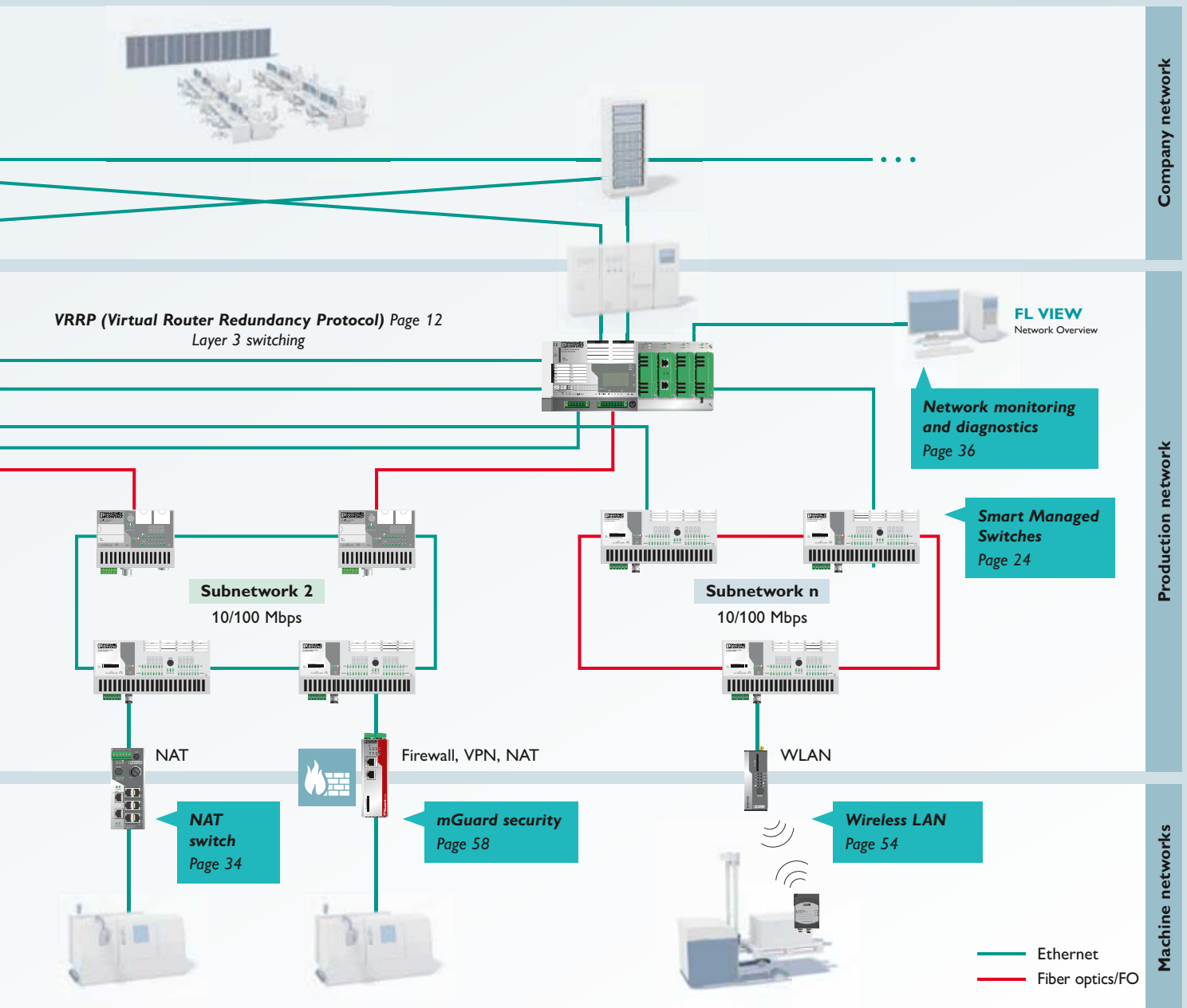
## Your advantages:

- Easy integration into automation and IT environments
- Various interfaces for high flexibility – optical, electrical or wireless
- Easy, consistent configuration and efficient diagnostics
- High reliability thanks to network that is structured into various subnetworks (Layer 3 switching)



## High-performance and failsafe connection between the production networks and the company network

- High flexibility thanks to the modular design of the industrial switches (Modular Managed Switch, GHS)
- Redundant connection to the company network via VRRP (Virtual Router Redundancy Protocol)
- Gigabit performance for high data throughput
- Support of IT standards (such as VLAN, SNMP, RSTP) for seamless integration
- Routing functions (Layer 3 switching) for consistent communication between the different IP subnetworks



Company network

Production network

Machine networks

VRRP (Virtual Router Redundancy Protocol) Page 12  
Layer 3 switching

FL VIEW  
Network Overview

Network monitoring  
and diagnostics  
Page 36

Smart Managed  
Switches  
Page 24

Subnetwork 2  
10/100 Mbps

Subnetwork n  
10/100 Mbps

NAT

Firewall, VPN, NAT

WLAN

NAT  
switch  
Page 34

mGuard security  
Page 58

Wireless LAN  
Page 54

— Ethernet  
— Fiber optics/FO

### High-availability and powerful production networks

- High network availability thanks to ring redundancy
- Flexible design of optical or electrical networks
- Flexible network structures such as line, ring or star
- Optimum PROFINET and EtherNet/IP support
- Configuration of virtual network structures via VLAN
- Easy device replacement thanks to replaceable configuration memory

### Reduction of downtimes thanks to automatic 24/7 network monitoring

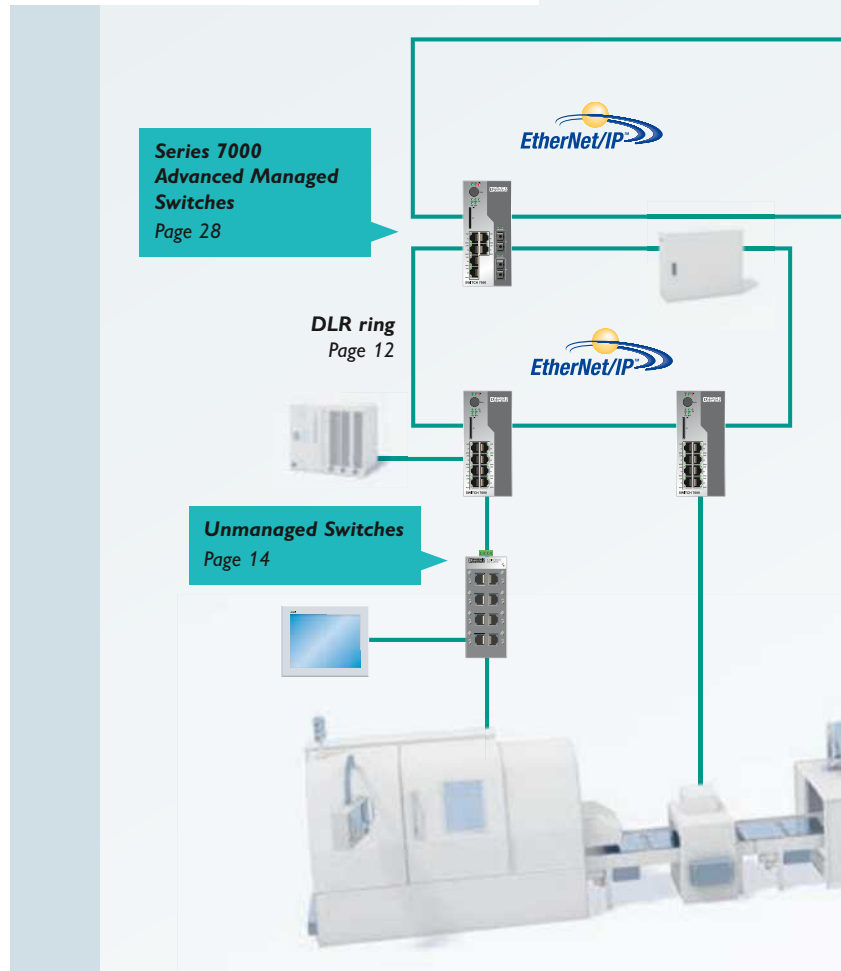
- Central monitoring of industrial networks
- Early alarm signaling of changes in the network
- Automatic detection and clear representation, even for complex networks
- Rapid error location even for temporary network problems
- Quick removal of errors thanks to comprehensive diagnostic functions and continual recording of network information

# Automation switches for the machine and system network

Communication in automation networks differs from communication in company networks in several key aspects. The switches must be tailored accordingly to the special requirements of the automation protocols such as PROFINET and EtherNet/IP. Automation switches combine IT functions with managed and realtime properties which optimally support these protocols. All necessary default settings are combined in user-friendly application profiles. Optionally, the switches can be easily configured and diagnosed from the controller's engineering tools.

## Your advantages:

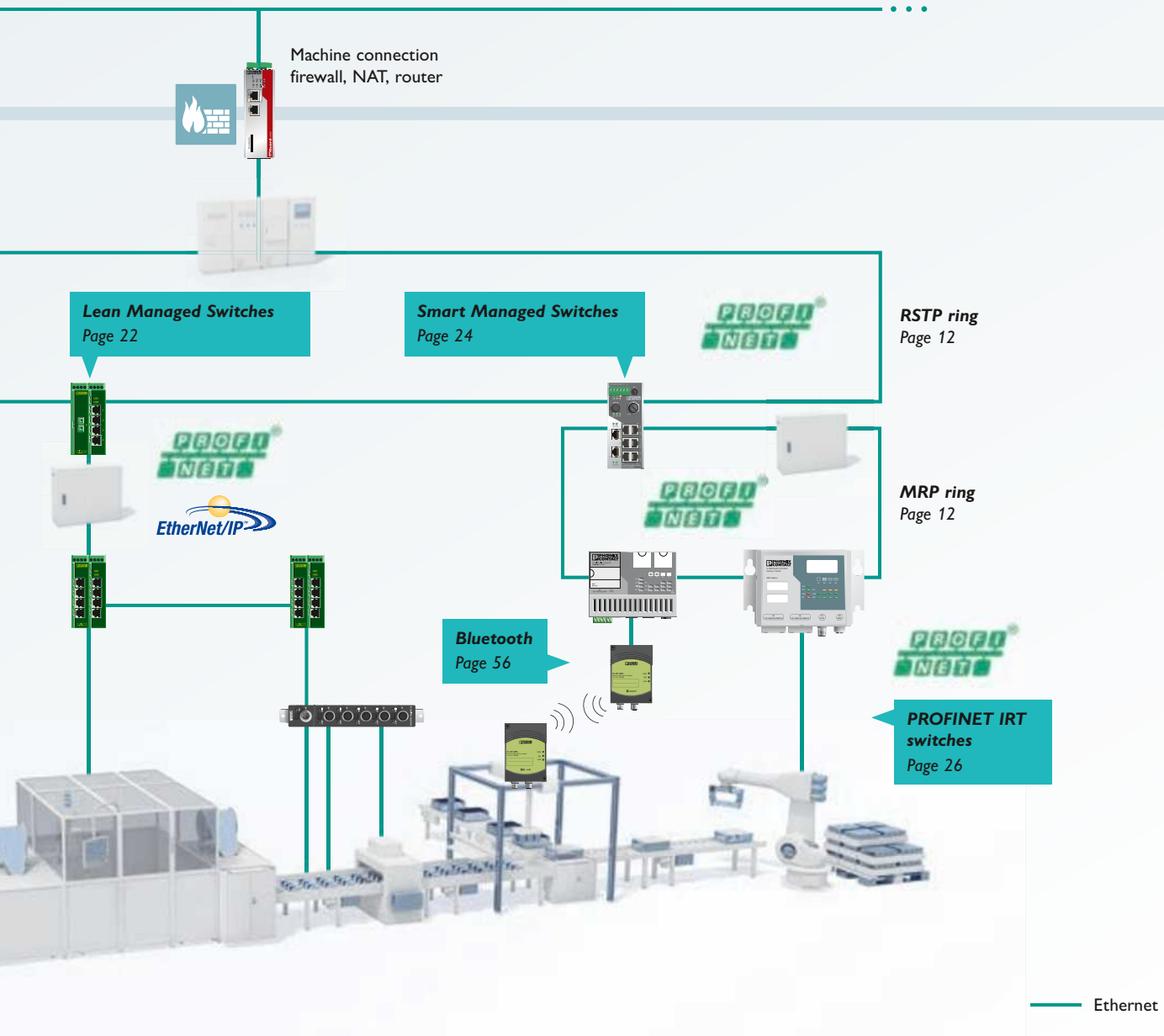
- Ideal realtime properties
- High fault tolerance for communication
- Optimum integration into the engineering
- Preset automation profiles, easily activated by button
- Easy device replacement thanks to parameterization memory
- Configuration of virtual network structures in a production network via VLAN
- Easy configuration and diagnostics



## Network infrastructure for EtherNet/IP

- Optimum integration of the network infrastructure into EtherNet/IP based automation and engineering systems
- The integrated Device Level Ring (DLR) EtherNet/IP redundancy mechanism prevents adverse effects to the control process in the event of a media failure
- Stable and realtime capable communication in Ethernet/IP networks





### Lean network infrastructure for industrial control networks

- Robust realtime communication in control networks such as EtherNet/IP and PROFINET
- Minimized data load in the network and high availability
- EtherNet/IP data streams are routed only to those devices that require them
- Increased fault tolerance thanks to the RSTP standard redundancy method

### Network infrastructure for PROFINET RT and IRT

- Optimum integration into PROFINET automation and engineering systems
- The integrated MRP PROFINET redundancy mechanism prevents adverse effects to the control process in the event of a media failure
- Stable and realtime-capable communication in PROFINET RT and PROFINET IRT networks
- Priority transmission of PROFINET packets using the cut-through method, independent of the remaining data traffic (IRT switches)

# Components for infrastructure networks

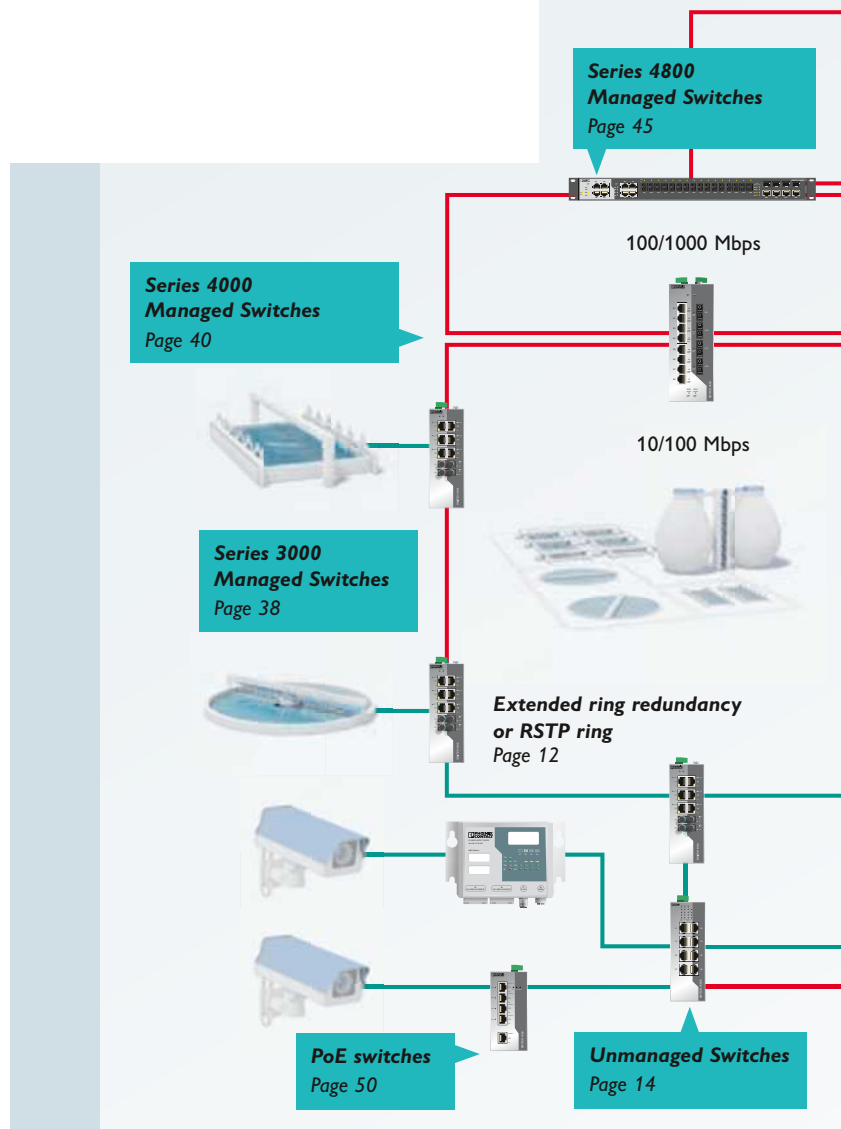
Industrial networks in the infrastructure have special requirements when it comes to the network components used.

The standard 3000 and 4000 series Managed Switches from Phoenix Contact offer you comprehensive IT-compatible functions for optimal networking of your system as well as connection to the control system.

Robust components in accordance with IEC 61850-3 and IEEE 1613 offer maximum availability even under extreme ambient conditions, particularly for use in energy systems.

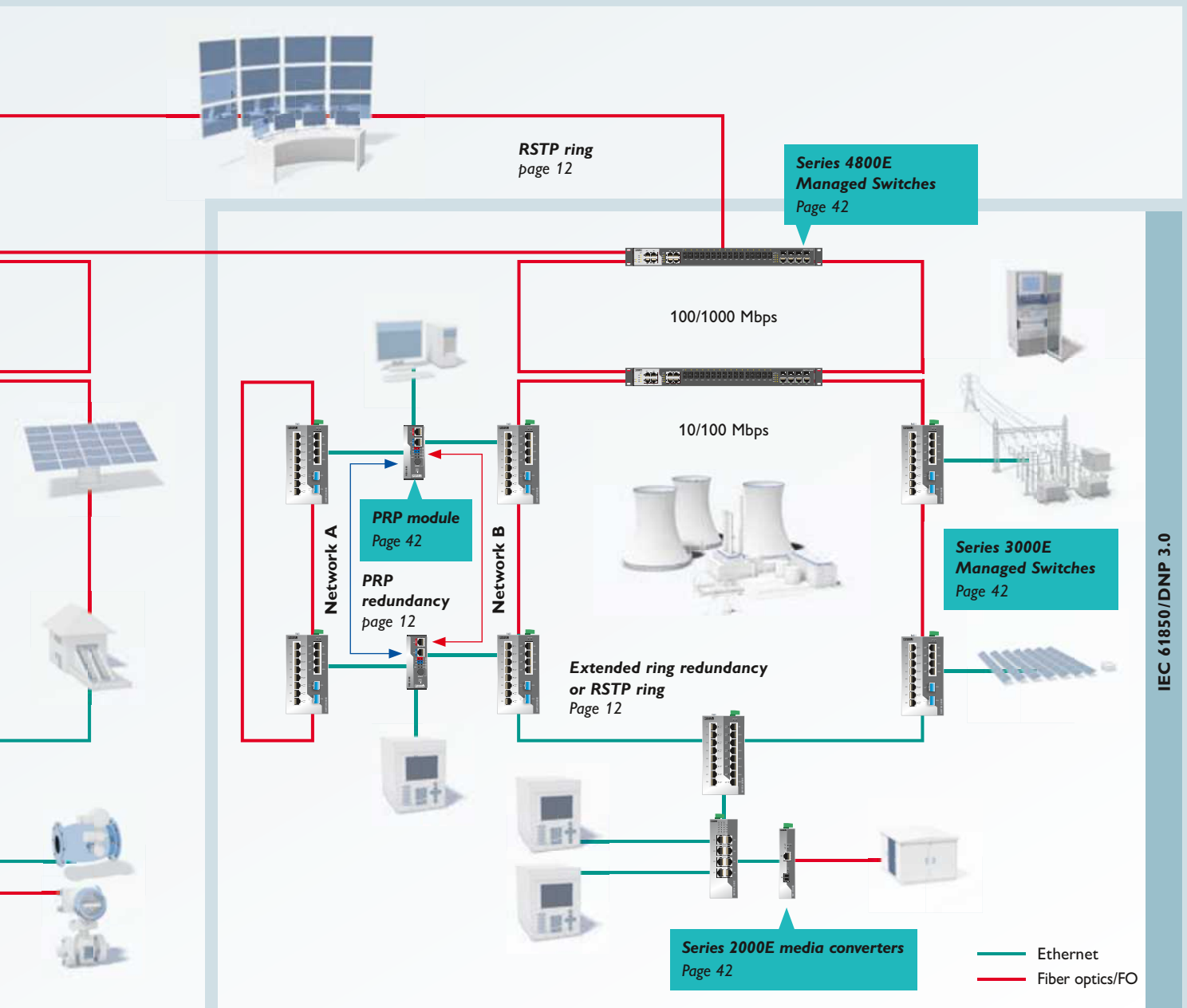
## Your advantages:

- Robust industrial switches with comprehensive IT functions
- Consistent integration into IT network management
- Optimized for communication according to IEC 60870-5-104, DNP3, and IEC 61850
- Comprehensive product portfolio



## Robust IT-compatible network infrastructure

- Comprehensive IT-compatible functions regarding security (security policies), redundancy, and network management
- Fiber optic transmission via multi-mode or single-mode fibers for error-free communication even over large distances



IEC 61850/DNP 3.0

**Fault tolerance thanks to fast redundancy mechanisms – including bumpless redundancy**

- High network availability and fault tolerance thanks to ring redundancy
- Extremely short recovery times ensure uninterrupted operation in the event of an error
- No recovery times or loss of packets in the event of network failure or failure of individual network components with the PRP redundancy module (Parallel Redundancy Protocol) according to IEC 62439

**Network infrastructure according to IEC 61850/DNP 3 for energy systems**

- Designed for the harshest electromagnetic, electrostatic, and climatic ambient conditions according to IEC 61850-3 and IEEE 1613
- Optimum support of realtime protocols such as GOOSE in accordance with IEC 61850
- Data packets are routed only to those devices that require them
- Minimized data load in the network for high availability

# Redundant networks for industrial applications

A communication failure in production can cause cost-intensive downtimes, the loss of important data or serious damages. Redundant network structures ensure that the availability of communication continues even if there is an error, which protects against production downtimes. Phoenix Contact offers you the right redundancy solution for various areas of application – from simple media redundancy through to parallel network redundancy.

## Your advantages:

- Failsafe networks in the event of an error
- Higher productivity thanks to higher network
- The right redundancy method for various areas of application
- Easy, consistent configuration and efficient diagnostics

|                                                         | Products                                                                             | Standard         | Reconfiguration time  | Topologies                                            | Max. devices            | Ring coupling | Applications                      |
|---------------------------------------------------------|--------------------------------------------------------------------------------------|------------------|-----------------------|-------------------------------------------------------|-------------------------|---------------|-----------------------------------|
| <b>RSTP/STP</b><br>Rapid spanning tree protocol         | LM, SMCS, series 7000, Modular Managed Switch, series 3000, series 4000, series 4800 | IEEE 802.1D-2004 | Up to several seconds | Ring, meshed structures, star, tree                   | 15 (for ring structure) | Yes           | IT and automation networks        |
| <b>RSTP</b><br>Fast ring detection + Large Tree Support | LM, SMCS, series 7000, GHS                                                           | –                | 100 to 500 ms         | Ring, meshed structures, star, tree                   | 57 (for ring structure) | Yes           | Automation networks               |
| <b>MRP</b><br>Media Redundancy Protocol                 | SMCS, Modular Managed Switch                                                         | IEC 62439-2      | 200 ms                | Ring                                                  | 50                      | No            | PROFINET automation networks      |
| <b>DLR</b><br>Device Level Ring                         | 7000 series                                                                          | –                | 3 ms                  | Ring                                                  | 50                      | No            | EtherNet/IP automation networks   |
| <b>PRP</b><br>Parallel Redundancy Protocol              | RED 2000E                                                                            | IEC 62439-3      | Bumpless              | Double networks in line, ring, star or tree formation | Any                     | –             | Energy systems, infrastructure    |
| <b>ERR</b><br>Extended ring redundancy                  | 3000 series<br>4000 series<br>4800 series                                            | –                | 15 ms                 | Ring                                                  | 200                     | Yes           | Infrastructure                    |
| <b>VRRP</b><br>Virtual Router Redundancy Protocol       | RFC 3768                                                                             | –                | Up to several seconds | Double and multiple routers                           | Any                     | –             | Connection to the company network |

## Redundancy in PROFINET networks

### MRP (Media Redundancy Protocol)

The MRP redundancy protocol is part of the IEC 62439 standard. MRP guarantees maximum recovery times of 200 ms in the event of an interruption in a ring topology with a maximum of 50 devices. MRP is supported by PROFINET switches and many PROFINET field devices to achieve increased reliability at device level in the machine network.

The integrated error diagnostics allow errors to be removed quickly.

## Redundancy in EtherNet/IP networks

### DLR (Device Level Ring)

The DLR redundancy protocol is part of the EtherNet/IP standard. It offers recovery times under 3 ms and therefore almost bumpless switch-over. DLR is supported by many EtherNet/IP field devices such as I/O modules or programmable controllers with an integrated 2-port switch function. The integrated error diagnostics allow errors to be removed quickly.

## Router redundancy for network coupling

### VRRP (Virtual Router Redundancy Protocol)

Redundant routers and VRRP are used to substantially increase network availability – particularly network transmissions, such as between office and production networks. This involves combining several physical routers to create a logical group, which appears as a logical virtual router in the network.

## Redundancy for infrastructure networks

### RSTP – Rapid Spanning Tree

RSTP is a standardized redundancy method (IEEE 802.1D-2004), which is supported by a range of switches regardless of their manufacturer. It supports ring and tree topologies and meshed networks.

Special add-ons:

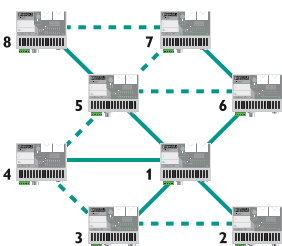
- Fast ring detection for shorter recovery times
- Large Tree Support for networks with up to 57 devices

### Extended ring redundancy

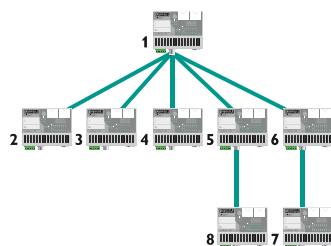
In critical infrastructure applications, this proprietary redundancy function offers a quick redundancy switch-over in the event of connection failure. The recovery time for up to 200 devices in a ring is just 15 ms. In total, up to three linked rings with more than 300 switches are possible.

### PRP (Parallel Redundancy Protocol)

In parallel redundant transmission according to the IEC 62439-3 PRP standard, all telegrams are transmitted twice via two autonomous networks. This means that uninterruptible (bumpless) communication is ensured even if a network fails. PRP does not require any reconfiguration time and is used particularly in critical areas of application such as in energy switchgear systems.

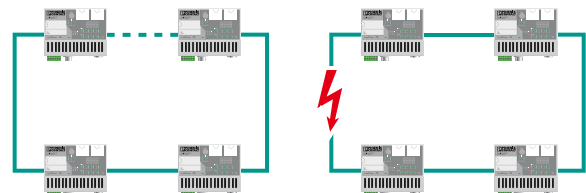


Meshed network structure



Logical tree structure

The redundancy protocol resolves physical ring or mesh structures in a logical line or tree topology and thus prevents unwanted cycling of telegrams.



If an error occurs, the network structure is reorganized so that all devices can be reached again.

# Unmanaged Switches

The SF, SFN, and 1000 series Unmanaged Switches are particularly reliable and maintenance-friendly. They are ideal for inexpensive, reliable Ethernet networks.

For applications over long distances or with high levels of interference, you have the choice between various versions with fiber optic ports. You can choose from a variety of twisted pair/fiber optic combinations with various ST and SC plugs.

## Your advantages:

- Auto negotiation and autocrossing also ensure easy network creation and expansion.
- Gigabit versions for high data throughput
- Electrical isolation and fiber optic versions for failure-free operation in industrial environments



**SF** and **SFN** devices with 5 to 16 ports are ideal for standard industrial applications. You can choose between ultra-narrow (SF) and narrow (SFN) devices for DIN rails. With up to three multi-mode fiberglass ports with SC or ST connectors, flexibility can be ensured in the network.

## Properties:

- LEDs and optional alarm contact
- Cable and port locking can be mounted on the switch
- Redundant power supply

**SFNB** devices are cost-optimized switches for basic applications. Available as a 5-port or 8-port version and with additional fiberglass port, they are suitable for small machines and monitoring applications with basic Ethernet functions.

**Properties:**

- Basic LED
- Cable and port locking can be mounted on the switch

**SFNT** devices are designed for use under extreme ambient conditions and in very demanding applications for the oil/gas sector, shipbuilding, and other outdoor applications. In addition, all SFNT switches have an alarm contact and link monitoring via important diagnostic options.

**Properties:**

- Temperature range: -40°C - +75°C
- LEDs and standard alarm contact
- Cable and port locking can be mounted on the switch
- Redundant power supply

The **SFN** series with **Gigabit performance** is ideal for use in complex systems with high requirements for transmission speeds.




In addition to the comprehensive range of functions of the SFN, the Gigabit version of the switch ensures data transfer that also meets high performance requirements thanks to the 1000 Mbps bandwidth.

**Properties:**

- LEDs
- Cable and port locking can be mounted on the switch
- Redundant power supply



## Unmanaged Switches order overview

|                                                                                     | Order No.               | Designation                 | Port configuration       |                                       |                               |                                    |
|-------------------------------------------------------------------------------------|-------------------------|-----------------------------|--------------------------|---------------------------------------|-------------------------------|------------------------------------|
|                                                                                     |                         |                             | 10/100 Mbps copper ports | 100 Mbps multi-mode-fiber optic ports | 10/100/1000 Gbps copper ports | 10/100/1000 Gbps fiber optic ports |
| <b>Switches with basic function: narrow</b>                                         |                         |                             |                          |                                       |                               |                                    |
|    | 2891001                 | FL SWITCH SFNB 5TX          | 5                        | –                                     | –                             | –                                  |
|                                                                                     | 2891014                 | FL SWITCH SFNB 5TX-50PK     | 5                        | –                                     | –                             | –                                  |
|                                                                                     | 2891002                 | FL SWITCH SFNB 8TX          | 8                        | 44580–                                | –                             | –                                  |
|                                                                                     | 2891027                 | FL SWITCH SFNB 4TX/FX       | 4                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891028                 | FL SWITCH SFNB 4TX/FX ST    | 4                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891029                 | FL SWITCH SFNB 4TX/FX SM20  | 4                        | 1 SM (SC duplex)                      | –                             | –                                  |
| <b>Switches for universal use: flat</b>                                             |                         |                             |                          |                                       |                               |                                    |
|    | 2832771                 | FL SWITCH SF 8TX            | 8                        | –                                     | –                             | –                                  |
|                                                                                     | 2832577                 | FL SWITCH SF 7TX/FX ST      | 7                        | 1 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2832726                 | FL SWITCH SF 7 TX/FX        | 7                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2832674                 | FL SWITCH SF 6TX/2FX ST     | 6                        | 2 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2832933                 | FL SWITCH SF 6TX/2FX        | 6                        | 2 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2832603                 | FL SWITCH SF 4TX/3FX ST     | 4                        | 3 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2832849                 | FL SWITCH SF 16TX           | 16                       | –                                     | –                             | –                                  |
|                                                                                     | 2832661                 | FL SWITCH SF 15TX/FX        | 15                       | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2832593                 | FL SWITCH SF 14TX/2FX       | 14                       | 2 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891041                 | FL SWITCH 1824              | 24                       | –                                     | –                             | –                                  |
| <b>Switches for universal use: narrow</b>                                           |                         |                             |                          |                                       |                               |                                    |
|   | 2891152                 | FL SWITCH SFN 5TX           | 5                        | –                                     | –                             | –                                  |
|                                                                                     | 2891020                 | FL SWITCH SFN 8TX-24VAC     | 8                        | –                                     | –                             | –                                  |
|                                                                                     | 2891021                 | FL SWITCH SFN 5TX-24VAC     | 5                        | –                                     | –                             | –                                  |
|                                                                                     | 2891022                 | FL SWITCH SFN 8TX-NF        | 8                        | –                                     | –                             | –                                  |
|                                                                                     | 2891023                 | FL SWITCH SFN 7TX/FX-NF     | 7                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891024                 | FL SWITCH SFN 6TX/2FX-NF    | 6                        | 2 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891097                 | FL SWITCH SFN 7TX/FX        | 7                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891110                 | FL SWITCH SFN 7TX/FX ST     | 7                        | 1 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891314                 | FL SWITCH SFN 6TX/2FX       | 6                        | 2 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891411                 | FL SWITCH SFN 6TX/2FX ST    | 6                        | 2 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891453                 | FL SWITCH SFN 4TX/FX ST     | 4                        | 1 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891851                 | FL SWITCH SFN 4TX/FX        | 4                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891929                 | FL SWITCH SFN 8TX           | 8                        | –                                     | –                             | –                                  |
|                                                                                     | 2891933                 | FL SWITCH SFN 16TX          | 16                       | –                                     | –                             | –                                  |
|                                                                                     | 2891934                 | FL SWITCH SFN 15TX/FX       | 15                       | 1 MM (SC duplex)                      | –                             | –                                  |
| 2891935                                                                             | FL SWITCH SFN 14TX/2FX  | 14                          | 2 MM (SC duplex)         | –                                     | –                             |                                    |
| <b>Switches with Gigabit ports</b>                                                  |                         |                             |                          |                                       |                               |                                    |
|  | 2891673                 | FL SWITCH SFN 8GT           | –                        | –                                     | 8                             | –                                  |
|                                                                                     | 2891518                 | FL SWITCH SFN 7GT/SX        | –                        | –                                     | 7                             | 1 MM (SC duplex)                   |
|                                                                                     | 2891398                 | FL SWITCH SFN 6GT/2SX       | –                        | –                                     | 7                             | 2 MM (SC duplex)                   |
|                                                                                     | 2891987                 | FL SWITCH SFN 6GT/2LX       | –                        | –                                     | 6                             | 2 SM, 10 km (SC duplex)            |
|                                                                                     | 2891563                 | FL SWITCH SFN 6GT/2LX-20    | –                        | –                                     | 6                             | 2 SM, 20 km (SC duplex)            |
|                                                                                     | 2891057                 | FL SWITCH 1924              | –                        | –                                     | 24                            | –                                  |
| <b>Robust switches for harsh ambient conditions</b>                                 |                         |                             |                          |                                       |                               |                                    |
|  | 2891003                 | FL SWITCH SFNT 5TX          | 5                        | –                                     | –                             | –                                  |
|                                                                                     | 2891004                 | FL SWITCH SFNT 4TX/FX       | 4                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891005                 | FL SWITCH SFNT 8TX          | 8                        | –                                     | –                             | –                                  |
|                                                                                     | 2891007                 | FL SWITCH SFNT 7TX/FX ST    | 7                        | 1 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891006                 | FL SWITCH SFNT 7TX/FX       | 7                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891025                 | FL SWITCH SFNT 6TX/2FX      | 6                        | 2 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891026                 | FL SWITCH SFNT 6TX/2FX ST   | 6                        | 2 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891043                 | FL SWITCH SFNT 5TX-C        | 5                        | –                                     | –                             | –                                  |
|                                                                                     | 2891044                 | FL SWITCH SFNT 4TX/FX-C     | 4                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891045                 | FL SWITCH SFNT 8TX-C        | 8                        | –                                     | –                             | –                                  |
|                                                                                     | 2891046                 | FL SWITCH SFNT 7TX/FX-C     | 7                        | 1 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891047                 | FL SWITCH SFNT 7TX/FX ST-C  | 7                        | 1 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891048                 | FL SWITCH SFNT 6TX/2FX-C    | 6                        | 2 MM (SC duplex)                      | –                             | –                                  |
|                                                                                     | 2891049                 | FL SWITCH SFNT 6TX/2FX ST-C | 6                        | 2 MM (ST)                             | –                             | –                                  |
|                                                                                     | 2891952                 | FL SWITCH SFNT 16TX         | 16                       | –                                     | –                             | –                                  |
| 2891953                                                                             | FL SWITCH SFNT 15TX/FX  | 15                          | 1 MM (SC duplex)         | –                                     | –                             |                                    |
| 2891954                                                                             | FL SWITCH SFNT 14TX/2FX | 14                          | 2 MM (SC duplex)         | –                                     | –                             |                                    |
| 2891064                                                                             | FL SWITCH 1001T-4POE    | 5                           | –                        | –                                     | –                             |                                    |
| 2891065                                                                             | FL SWITCH 1008E         | 8                           | –                        | –                                     | –                             |                                    |



| Narrow | Form factor |            | Supply voltage          | Redundant power supply with alarm contact | Functions               |                         |               |              |  |
|--------|-------------|------------|-------------------------|-------------------------------------------|-------------------------|-------------------------|---------------|--------------|--|
|        | Flat        | 19" format |                         |                                           | Link down alarm contact | QoS data prioritization | Cable locking | Port locking |  |
| x      | -           | -          | 12 – 48 V DC            | -                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | -                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | -                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | -                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | -                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | -                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | -          | 18 – 36 V DC            | x                                         | -                       | -                       | x             | -            |  |
| -      | x           | x          | 120/220 V AC            | -                                         | -                       | x                       | x             | -            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 12 – 32 V DC/20-28 V AC | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 12 – 32 V DC/20-28 V AC | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | -                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 12 – 48 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 9 – 36 V DC             | x                                         | -                       | x                       | x             | x            |  |
| x      | -           | -          | 12 – 48 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 48 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 18 – 57 V DC            | x                                         | -                       | -                       | x             | -            |  |
| x      | -           | -          | 12 – 57 V DC            | x                                         | -                       | -                       | x             | -            |  |

# Unmanaged Switches with IP67 protection

The industrial Ethernet switches for field applications offer clear advantages in terms of installation and assembly.

With a unique narrow design and symmetrical fixing clips with M6 threading, the IP67 switches are optimized for use in machine building.

## Your advantages:

- Quick and easy installation thanks to symmetric fastening points and innovative SPEEDCON technology
- Optimal support for PROFINET applications
- High degree of protection for adverse ambient conditions
- Universal use thanks to the extended temperature range

30 mm

## Narrow design width

Thanks to its particularly narrow design, the switch can be easily integrated anywhere.





### M12 circular connectors

M12 circular connectors in straight or angled form offer the user optimized assembly for the application.



### Standard switch – IP67

**FL SWITCH 1605 M12**  
Order No. 2700200

#### Ethernet interface

|                    |               |
|--------------------|---------------|
| Number of ports    | 5             |
| Transmission speed | 10/100 Mbps   |
| Connection method  | M12 D-encoded |

#### Function

|                                   |                                                                                                                     |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Basic functions                   | Unmanaged switch/auto negotiation, complies with standard IEEE 802.3, store-and-forward switching mode, PTCP filter |
| Status and diagnostics indicators | LEDs: U <sub>s</sub> (power supply), Link, and Activity per port                                                    |

#### Properties

|                                 |                         |
|---------------------------------|-------------------------|
| Supply voltage                  | 24 V DC (M12 connector) |
| Typical current consumption     | 40 mA (24 V DC)         |
| Protection                      | IP65/IP66/IP67          |
| Ambient temperature (operation) | -40°C – +70°C           |



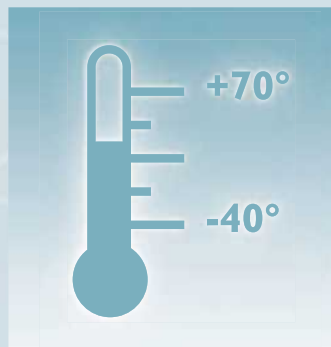
### Ethernet connectors that can be assembled

Thanks to the IDC displacement connection, quick and easy installation in the field is possible for Ethernet connectors that can be assembled.



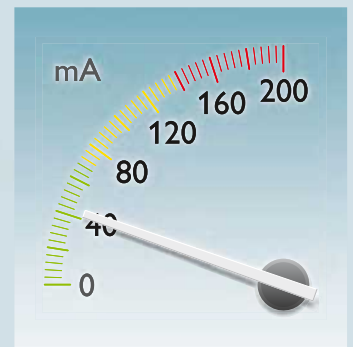
### Y-distributor

The Y-distributor simplifies voltage distribution in the field thanks to reduced wiring effort.



### Extended temperature range

The extended temperature range enables universal use.



### Low current consumption

Thanks to its particularly low power consumption, the switch is suitable for autonomous applications.

# Hubs for industrial networking

The industrial hubs are repeaters that are compliant with the IEEE 802.3 Ethernet standard and are best suited to automation applications with Powerlink or FL Net.

All components feature DIN rail mounting, a compact design, high electromagnetic compatibility, redundant power supply, and a wide temperature range. The hubs do not need to be configured and are transparent in the network.

## Your advantages:

- Create large networks cost-effectively thanks to hubs that are available with up to 16 ports
- Variable use thanks to selectable transmission speed
- Easy cascading with standard cables
- Fast data processing thanks to short latency



ETHERNET  
**POWERLINK**



### Hub/repeater (IEEE 802.3)

**FL HUB 8TX-ZF** 8 RJ45 ports  
Order No. 2832551

### Hub/repeater (IEEE 802.3)

**FL HUB 16TX-ZF** 16 RJ45 ports  
Order No. 2832564

#### Properties

Certification

CUL, CUL-EX LIS, UL, UL-EX LIS

CUL, CUL-EX LIS, UL, UL-EX LIS

#### Copper Ethernet interface

Transmission speed

10/100 Mbps (can be selected)

10/100 Mbps (can be selected)

Cable length

100 m

100 m

#### Functions

Configuration

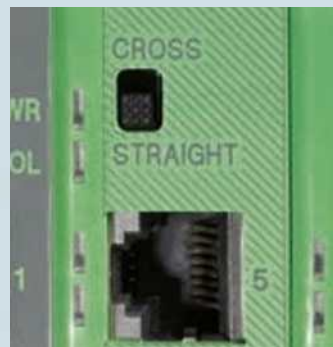
Transmission speed of 10 Mbps or 100 Mbps

Status and diagnostics indicators

LEDs: U<sub>S</sub> (supply voltage), COL (collision) when receiving data, link status LED per port

### Repeater function

Thanks to the switchable outcross port, the hubs can be connected together directly and thus enable the connection of up to 44 termination devices in a collision domain.



#### Outcross port

The outcross port can be used to cascade several hubs. This eliminates the need for crossed cables.



#### Data rate

The unique feature that enables the repeaters to be switched from 10 to 100 Mbps means that they can be adapted to the transmission speed of the termination devices.

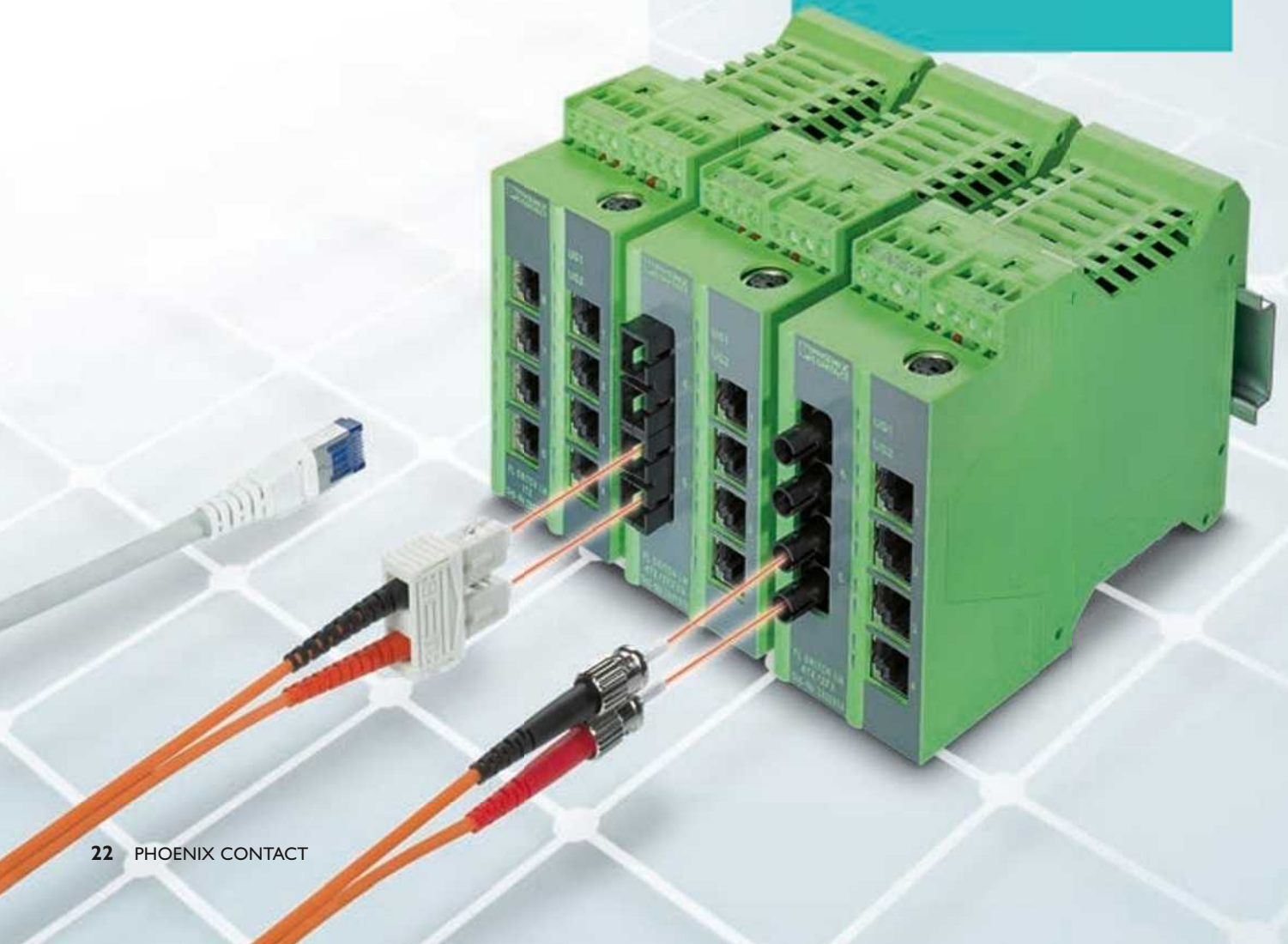
# Lean Managed Switches

Maximum diagnostics in the minimum amount of space.

Use the compact Lean Managed Switches to connect copper-based Ethernet devices or network segments to any fiber optic Ethernet network. Connection can be established directly or via redundant cables in any topologies. Data streams and connected automation devices can be diagnosed and analyzed comprehensively using the integrated software functions.

## Your advantages:

- Easy integration into existing networks and flexible redundancy for all topologies thanks to the RSTP standard
- High availability thanks to rapid redundancy switch-over through fast ring detection
- Diagnostics and analysis options thanks to integrated software functions
- Varied connection methods for high flexibility





### Lean Managed Switch, 5 copper ports

**FL SWITCH LM 5TX**  
Order No. 2989527

**FL SWITCH LM 5TX-E**  
Order No. 2989336

### Lean Managed Switch, 8 copper ports

**FL SWITCH LM 8TX**  
Order No. 2832632

**FL SWITCH LM 8TX-E**  
Order No. 2891466

**FL SWITCH LM 8TX-B**  
Order No. 2989446

### Lean Managed Switch, 1 fiber optic port

**FL SWITCH LM 4TX/1FX**  
Order No. 2989624

**FL SWITCH LM 4TX/1FX SM**  
Order No. 2989828

**FL SWITCH LM 4TX/1FX ST**  
Order No. 2989721

**FL SWITCH LM 4TX/1FX SM ST**  
Order No. 2989925

**FL SWITCH LM 4TX/1FX-E**  
Order No. 2989433

**FL SWITCH LM 4TX/1FX SM-E**  
Order No. 2989637

**FL SWITCH LM 4TX/1FX ST-E**  
Order No. 2989530

**FL SWITCH LM 4TX/1FX SM ST-E**  
Order No. 2989734

### Lean Managed Switch, 2 fiber optic ports

**FL SWITCH LM 4TX/2FX**  
Order No. 2832658

**FL SWITCH LM 4TX/2FX SM**  
Order No. 2891916

**FL SWITCH LM 4TX/2FX ST**  
Order No. 2989132

**FL SWITCH LM 4TX/2FX SM ST**  
Order No. 2989239

**FL SWITCH LM 4TX/2FX-E**  
Order No. 2891660

**FL SWITCH LM 4TX/2FX SM-E**  
Order No. 2891864

**FL SWITCH LM 4TX/2FX ST-E**  
Order No. 2989831

**FL SWITCH LM 4TX/2FX SM ST-E**  
Order No. 2989938

## Functions

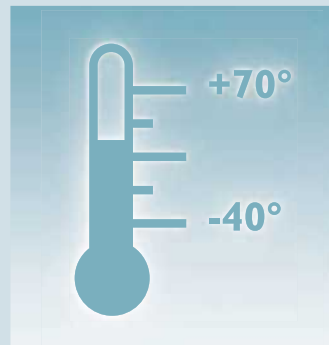
Store-and-forward switch, complies with standard IEEE 802.3, PROFINET conformance class A, PTCP filter, two priority classes according to IEEE 802.1P (QoS), BootP-compatible, Rapid Spanning Tree (RSTP), Large Tree Support, fast ring detection, IGMP snooping, port mirroring, static VLANs, status and diagnostic LEDs: US1 and US2 (redundant power supply), link and receive LED per port, 24 V power supply, DHCP server, saving the configuration on an external PC possible, multicast source detection, broadcast limiter, extended temperature range -40°C – +70°C

**Multi-mode ports:** up to 11 km, **single-mode ports:** up to 36 km, **copper ports:** up to 100 m, **standard versions:** UL, GL, DNV, BV, **E versions:** UL, UL Ex, IGMP snooping activated on delivery, **B versions:** temperature range 0°C – +55°C



### Redundancy switch-over

Fast redundancy switch-over ensures the uninterrupted operation of automation networks in the event of connection failure.



### Extended temperature range

The extended temperature range enables universal use even under extreme temperature conditions.



### Connection versatility

Thanks to the wide range of connection methods, the Lean Managed Switch can be optimally integrated in existing and newly created networks.

# Smart Managed Switches

The Smart Managed Switches offer excellent realtime properties with high data throughput at the same time.

They are ideal for use in the PROFINET RT or EtherNet/IP environments and support Fast Ethernet or Gigabit on all ports. They also provide the bandwidth required for the integration of IT realtime services such as video or voice-over-IP in automation networks.

## Your advantages:

- High data throughput thanks to Fast Ethernet or Gigabit on all ports
- Optimum user support thanks to the use of IT standards and automation protocols
- Easy configuration and diagnosis of switch functions thanks to web-based management, SNMP, and PROFINET device







### Smart Managed Narrow Switch

**FL SWITCH SMN 8TX-PN**  
Order No. 2989501

**FL SWITCH SMN 6TX/2POF-PN**  
Order No. 2700290

### Smart Managed Compact Switch

**FL SWITCH SMCS 16 TX**  
Order No. 2700996

**FL SWITCH SMCS 14TX/2FX**  
Order No. 2700997

**FL SWITCH SMCS 14 TX/2FX-SM**  
Order No. 2701466

### Smart Managed Compact Switch

**FL SWITCH SMCS 8GT**  
Order No. 2891123

**FL SWITCH SMCS 8TX**  
Order No. 2989226

**FL SWITCH SMCS 8TX PN**  
Order No. 2989103

### Smart Managed Compact Switch

**FL SWITCH SMCS 6GT/2SFP**  
Order No. 2891479

**FL SWITCH SMCS 6TX/2SFP**  
Order No. 2989323

#### Functions

Store-and-forward switch, complies with standard IEEE 802.3, four priority classes according to IEEE 802.1p (QoS), autocrossing, auto negotiation, Smart mode, N:1 port mirroring, SNMP v1 & v2c TCP/IP protocol, PROFINET device, multicast filtering with IGMP snooping and querier function, extended multicast filtering, auto query port, VLAN, LLDP, simple network time protocol (SNTP), Rapid Spanning Tree (RSTP) according to IEEE 802.1w, fast ring detection (FRD), Large Tree Support, MRP, an alarm contact, external configuration memory

PROFINET mode is activated by default.

The FL SWITCH SMCS 8GT and FL SWITCH SMCS 6GT/2SFP Gigabit versions also have an ATEX zone II approval and maritime approvals GL, BV, ABS, LR, and DNV.



#### Replaceable configuration memory

Replaceable configuration memory for storing device settings for easy device replacement and startup. In addition, the Media Redundancy Manager function is stored on the FL MEM PLUG/MRM.



#### Smart mode

Smart Managed Switches are suitable for use in PROFINET or even Ethernet/IP applications. The various operating modes can be configured easily on site without web-based management.



#### Flexible transmission distances

The optical SFP fiberglass plug-in modules are available in three versions: SX, LX, and longhaul. They enable transmission with 1000 Mbps over distances of up to 80 km.

# Switches for PROFINET IRT

Achieve Ethernet switching with maximum speed for PROFINET applications.

Thanks to integrated ERTEC technology, FL SWITCH IRT switches offer optimum realtime properties for PROFINET applications. The IRT switches detect PROFINET data packets due to their PROFINET ID and relay these data packets with the highest priority. The polymer fiber ports can form interference-free fiber optic rings that can be diagnosed – optionally with an additional fiber optic branch.

## Your advantages:

- Excellent realtime properties thanks to integrated ERTEC technology
- Optimum PROFINET integration thanks to hardware-based transmission of distances and fiber optic diagnostics
- Ideal for use in the field thanks to its IP67 protection class and push-pull connection technology (FL SWITCH IRT IP TX/3POF)



**PROFINET**  
Real Time



| IRT switch                                    | IRT switch                                                                                              | IP67 IRT switch                                      |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>FL SWITCH IRT 4TX</b><br>Order No. 2700689 | <b>FL SWITCH IRT TX 3POF</b><br>Order No. 2700692<br><b>FL SWITCH IRT 2TX 2POF</b><br>Order No. 2700691 | <b>FL SWITCH IRT IP TX/3POF</b><br>Order No. 2700697 |

**Ethernet interface**

|                    |             |             |             |
|--------------------|-------------|-------------|-------------|
| Number of ports    | 4           | 2 or 1      | 1           |
| Transmission speed | 10/100 Mbps | 10/100 Mbps | 10/100 Mbps |
| Connection method  | RJ45 socket | RJ45 socket | RJ45 socket |

**Fiber optic interface**

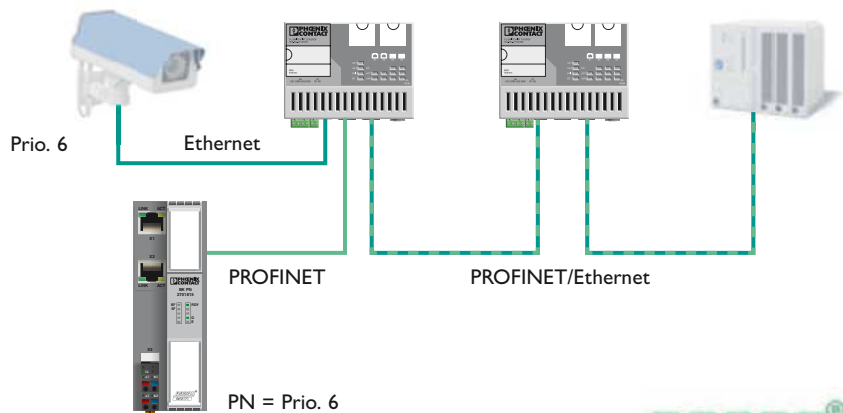
|                     |   |                                              |                                              |
|---------------------|---|----------------------------------------------|----------------------------------------------|
| Number of ports     | – | 2 or 3                                       | 3                                            |
| Transmission speed  | – | 100 Mbps (full duplex)                       | 100 Mbps (full duplex)                       |
| Transmission length | – | Up to 250 m<br>(depending on the fiber used) | Up to 250 m<br>(depending on the fiber used) |

**Functions**

|                                   |                                                                                                                                                                             |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic functions                   | Cut-through/store-and-forward switch, two priority classes according to IEEE 802.1P (QoS), TCP/IP protocol, DCP-compatible, integrated web server function, PROFINET device |
| Status and diagnostics indicators | 2 status LEDs per Ethernet port: LINK and Activity, supply voltage US1 and US2 (redundant supply voltage), and BF                                                           |

**Prioritized PROFINET data transmission**

The IRT switches scan the header of incoming data packets for a PROFINET ID and always forward PROFINET telegrams with the highest priority – and in the realtime data phase in the case of PROFINET IRT bandwidth reservation. In this way, even Ethernet telegrams with the highest priority rating (priority 6), which video streams also use for example, do not adversely affect PROFINET realtime communication.



# Advanced Managed Switches 7000 series

The Managed Switches in the 7000 series are the first switches available with the Device Level Ring (DLR) redundancy mechanism. The FL SWITCH 7000 is integrated directly into the ring and provides you with the option to connect up to six devices to the ring via this switch. Thanks to the Common Industrial Protocol (CIP), the FL SWITCH 7000 switches can be fully integrated into your EtherNet/IP network and configured and diagnosed from the control system. It can also be used in harsh industrial environments thanks to the extended temperature range of  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  and the robust metal housing.

## Your advantages:

- Minimum recovery time of  $< 3$  milliseconds for high-availability networks thanks to DLR
- Full configuration and diagnostics from the control system thanks to CIP
- Flexible universal applications thanks to different versions with copper and fiberglass ports





| Advanced Managed Switch                        | Advanced Managed Switch                            | Advanced Managed Switch                                  |
|------------------------------------------------|----------------------------------------------------|----------------------------------------------------------|
| <b>FL SWITCH 7008-EIP</b><br>Order No. 2701418 | <b>FL SWITCH 7006/2FX-EIP</b><br>Order No. 2701419 | <b>FL SWITCH 7005/FX-2FX-SM-EIP</b><br>Order No. 2701420 |

**Properties**

8 x 10/100 Mbps RJ45 ports

6 x 10/100 Mbps RJ45 ports and  
2 x 100 Mbps multi mode SC ports

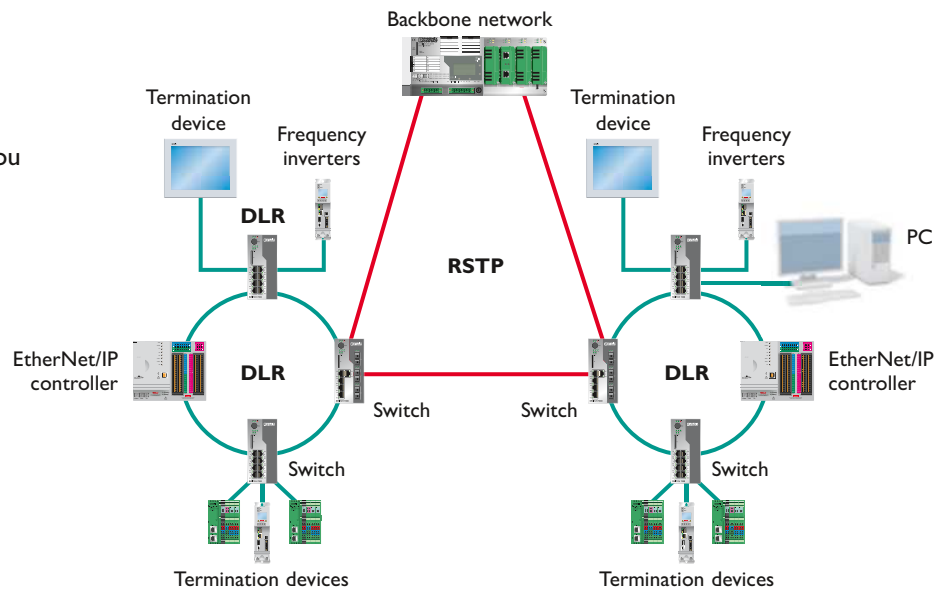
5x 10/100 Mbps RJ45 ports and  
1x 100 Mbps multi-mode SC port and  
2x 100 Mbps single-mode SC ports

**Functions**

Store-and-forward switch, complies with standard IEEE 802.3, eight priority classes according to IEEE 802.1p (QoS), autocrossing, auto negotiation, Smart mode, N:1 port mirroring, SNMP v1 & v2c TCP/IP protocol, EtherNet/IP, Common Industrial Protocol (CIP), PROFINET conformance class A, multicast filtering with IGMP snooping and querier, extended multicast filtering, auto query port functionality, static VLAN (IEE 802.1Q), link aggregation (802.3ad), MAC-based port security, link layer discovery protocol (LLDP), DHCP relay agent (option 82), address conflict detection (ACD), redundancy mechanisms: device level ring (DLR), Rapid Spanning Tree in accordance with IEEE 802.1w (RSTP) with fast ring detection (FRD), two relay contacts, SD card as external configuration memory, multi-mode fibers: up to 11 km, single-mode fibers: up to 36 km

**Device Level Ring redundancy**

The FL SWITCH 7000 gives you the option to couple your DLR ring redundantly to a higher-level switch via RSTP. This also allows you to increase the availability of your network.



# Modular Managed Switches

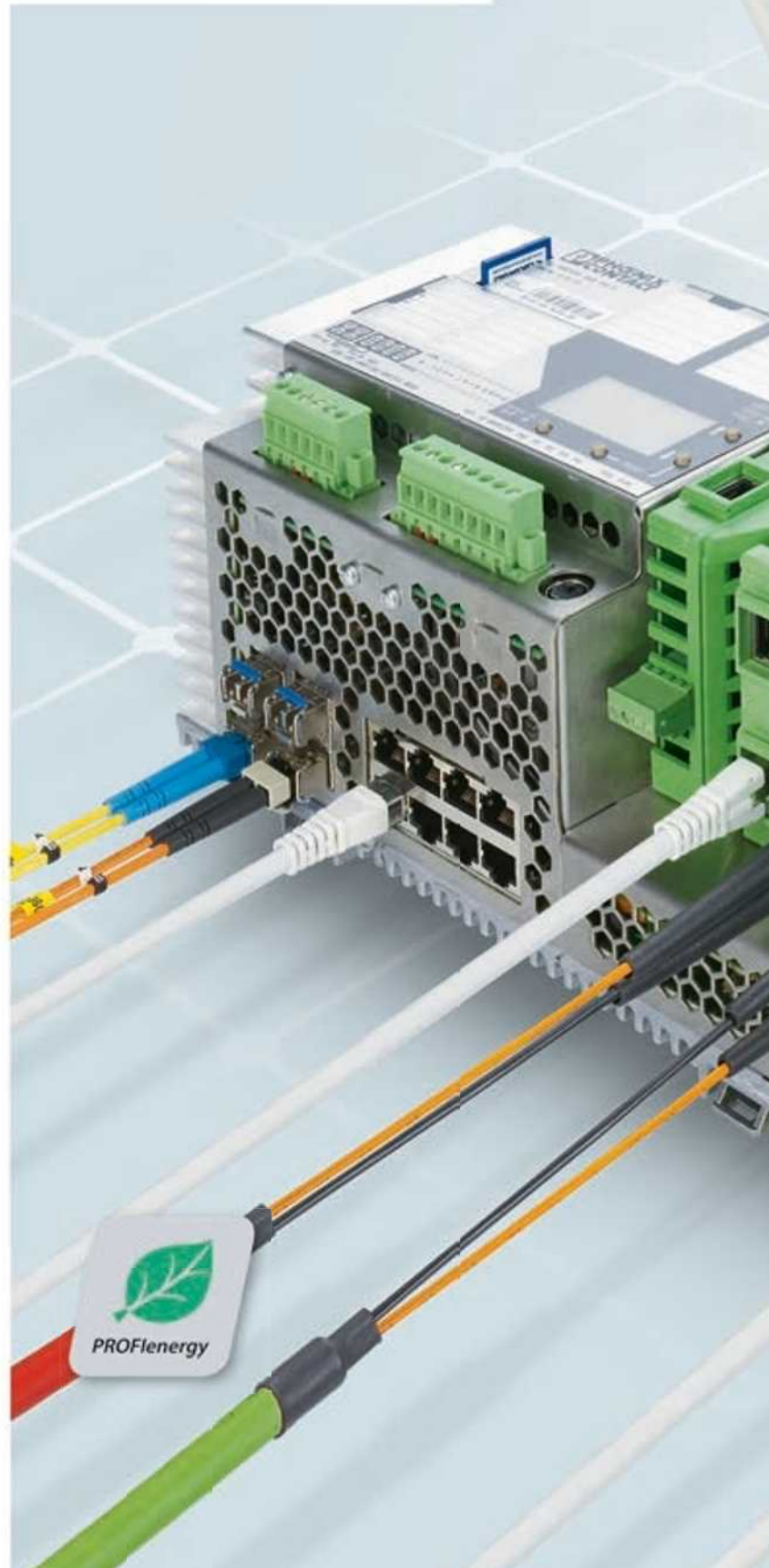
Our most powerful switch is the Modular Managed Switch. As a Gigabit switch, it is particularly suitable for use as an automation backbone and for connection to the higher-level company network.

There are two types of the Modular Managed Switch: you can choose between four or twelve Gigabit ports. Both versions offer four SFP slots, which can be fitted individually for various Gigabit fiberglass transmission standards.

The Modular Managed Switch is also available with Layer 3 function.

## Your advantages:

- Maximum performance with up to 12 integrated Gigabit ports
- User-friendly diagnostics and configuration thanks to the large operator display
- Fast connection to higher-level networks with optional Layer 3 function
- Energy-efficient operation thanks to PROFlenergy profile
- Flexible applications thanks to the wide range of media





**Easy operation**

The display operator interface provides user-friendly options for diagnostics and configuration without the need for additional software or tools. This makes the handling particularly easy and saves time.



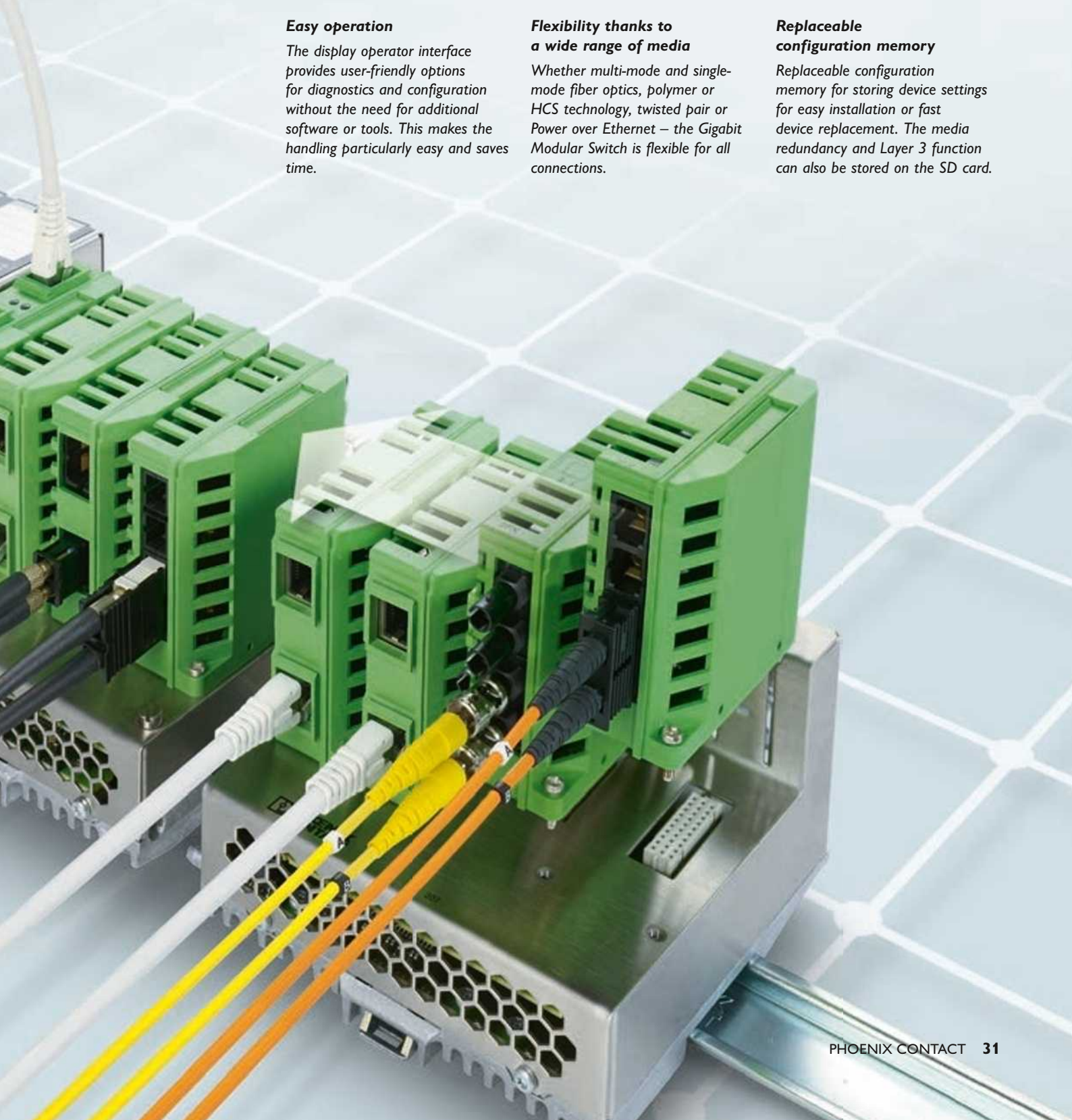
**Flexibility thanks to a wide range of media**

Whether multi-mode and single-mode fiber optics, polymer or HCS technology, twisted pair or Power over Ethernet – the Gigabit Modular Switch is flexible for all connections.



**Replaceable configuration memory**

Replaceable configuration memory for storing device settings for easy installation or fast device replacement. The media redundancy and Layer 3 function can also be stored on the SD card.





| Gigabit head station | Extension station<br>8 ports | SFP module | SD Flash card with<br>Layer 3 or MRM |
|----------------------|------------------------------|------------|--------------------------------------|
|----------------------|------------------------------|------------|--------------------------------------|

**FL SWITCH GHS 4G/12**  
Order No. 2700271

**FL SWITCH GHS 12G/8**  
Order No. 2989200

**FL SWITCH GHS 4G/12-L3**  
Order No. 2700787

**FL SWITCH GHS 12G/8-L3**  
Order No. 2700786

**FL FXT**  
Order No. 2989307

**FL SFP SX**  
Order No. 2891754

**FL SFP LX**  
Order No. 2891767

**FL SFP LX LH**  
Order No. 2989912

**SD FLASH 512 MB**  
Order No. 2988120

**FL SD FLASH/MRM**  
Order No. 2700270

**FL SD FLASH/L3/MRM**  
Order No. 2700607

**Software functions**

Store-and-forward switch, TCP/IP protocol, BootP-compatible, port mirroring, port security, PROFINET device, DHCP option 82 relay agent, autocrossing, auto negotiation, Smart mode, Rapid Spanning Tree (RSTP), fast ring detection, Media Redundancy Protocol, SNTp, EtherNet/IP, multicast filtering with IGMP snooping, static VLAN (IEEE 802.1Q) and GVRP configuration, SNMP, CLI, authentication according to IEEE 802.1X, port-specific storm control for broadcast, multicast, and unicast

**Properties**

Using the extension station, up to 8 additional ports can be connected to the Modular Managed Switch.

**Transmission mode:**

LC socket with 1000 Mbps

**SFP SX:** wavelength: 850 nm; transmission length: 550 m for 50/125 µm fiberglass, 300 m for 62.5/125 µm fiberglass

**SFP LX:** wavelength: 1310 nm; transmission length: 30 km for 9/125 µm fiberglass, 250 m for 62.5/125 µm fiberglass

**SFP LX LH:** wavelength: 1550 nm; transmission length: 80 km for 9/125 µm fiberglass

**SD Flash card with Layer 3 or MRM**

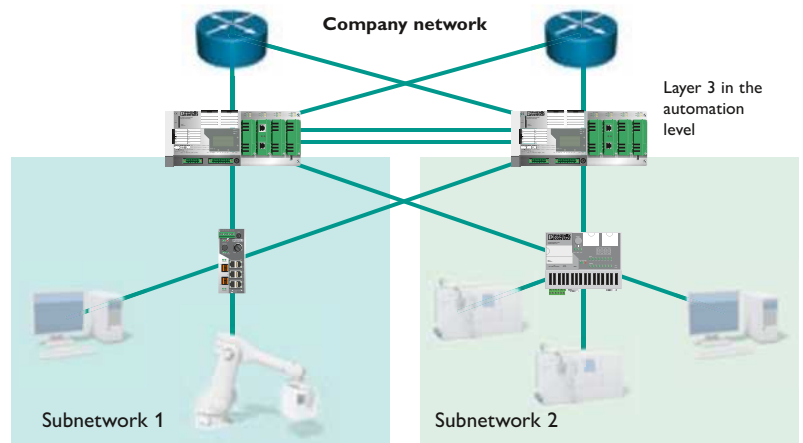
The **SD FLASH 512 MB** stores the configuration.

**FL SD FLASH/MRM:** This SD card not only stores switch configurations, but also includes the MRP master function. When the card is inserted, the FL SWITCH GHS becomes the master in the MRP ring.

**FL SD Flash/L3/MRM:** In addition to the two functions described above, this card also includes the Layer 3 function. This enables port-specific routing, VLAN-based routing, and the use of VRRP.

**Layer 3 function**

The Modular Managed Switch can be purchased with an integrated Layer 3 function or subsequently extended using an SD card with a Layer 3 license. This also means that the switch is able to support up to 28 instances of port-specific routing, static routing or the VRRP protocol for redundant router applications (Virtual Router Redundancy Protocol) (see graphic).







### Twisted pair ports

### Twisted pair ports

### Diagnostic function (SCRJ)

### Two SC multi-mode ports

**FL IF 2TX VS RJ-F**  
Order No. 2832344

**FL IF 2TX VS RJ-D**  
Order No. 2832357

**FL IF 2POF SCRJ-D**  
Order No. 2891084

**FL IF 2FX SC-F**  
Order No. 2832412

#### Properties

Replaceable interface module with 2 RJ45 ports, 10/100 Mbps, outlet direction forward

Replaceable interface module with 2 RJ45 ports, 10/100 Mbps, outlet direction downward

Replaceable interface module with 2 POF/HCS ports, 650 nm, 10/100 Mbps, SCRJ connection, outlet direction downward

Replaceable interface module with 2 SC multi-mode ports, 1300 nm, 100 Mbps full duplex, SC duplex connection, outlet direction forward

#### Certifications

ABS, cUL, cUL Ex LIS, GL, GLSW, DNV, UL, UL Ex LIS, BV

ABS, cUL, cUL Ex LIS, GL, GLSW, DNV, UL, UL Ex LIS, BV

UL, cUL

cUL, cUL Ex LIS, UL, UL Ex LIS, ABS



### Two SC multi-mode ports

### Two SC single-mode ports

### Two ST multi-mode ports

### Two Power over Ethernet ports

**FL IF 2FX SC-D**  
Order No. 2832425

**FL IF 2FX SM SC-D**  
Order No. 2832205

**FL IF 2FX SM ST-D**  
Order No. 2884033

**FL IF 2SPE-F**  
Order No. 2832904

#### Properties

Replaceable interface module with 2 SC multi-mode ports, 1300 nm, 100 Mbps, SC duplex connection, outlet direction downward

Replaceable interface module with 2 SC single-mode ports, 1300 nm, 100 Mbps, SC duplex connection, outlet direction downward

Replaceable interface module with 2 ST multi-mode ports, 1300 nm, 100 Mbps, ST duplex socket, outlet direction downward

Replaceable interface module with Power over Ethernet IEEE 802.3af, Power Source Equipment (PSE), with 10/100 Mbps, outlet direction forward

#### Certifications

ABS, cUL, cUL Ex LIS, DNV, GL, GLSW, UL, UL Ex LIS, BV

cUL, cUL Ex LIS, GL, GLSW, UL, UL Ex LIS, BV, DNV

cUL, UL, UL Ex LIS, cUL Ex LIS

cUL, cUL Ex LIS, UL, UL Ex LIS

# Smart Managed Narrow NAT switch

The FL NAT SMN 8TX offers you switch functions and NAT routing in just one DIN rail device. The network devices within the machine communicate via seven LAN ports. The eighth port is used as the WAN port for the connection to the higher-level company network.

## Your advantages:

- Particularly cost-effective thanks to switch and router function in one device
- Short configuration time thanks to optimum user interface
- Higher degree of availability thanks to support for redundant topologies
- Save space in the control cabinet with a design width of just 58 mm

## The NAT switch supports the following functions:

- Choice of four router modes:
  - 1:1 NAT router
  - IP masquerading
  - Virtual routing
  - Static routing
- Filtering data traffic by isolating broadcast domains
- Redundancy mechanisms
  - Rapid Spanning Tree
  - Fast ring detection
  - Media Redundancy Protocol (MRP)
- Configuration via web-based management
- Port mirroring
- IP address assignment via BootP, DHCP or statically
- MEM PLUG support



Routing  
Switching  
NAT



### Easy integration

In order that machines can be integrated into a network, all Ethernet devices must use individual IP addresses from the same higher-level network.

The FL NAT SMN 8TX with integrated 1:1 NAT ensures that the address areas within the machine remain the same, but are jumped to the desired IP address area for the higher-level automation network.

### NAT switch

**FL NAT SMN 8TX**  
Order No. 2989365

#### Ethernet interface

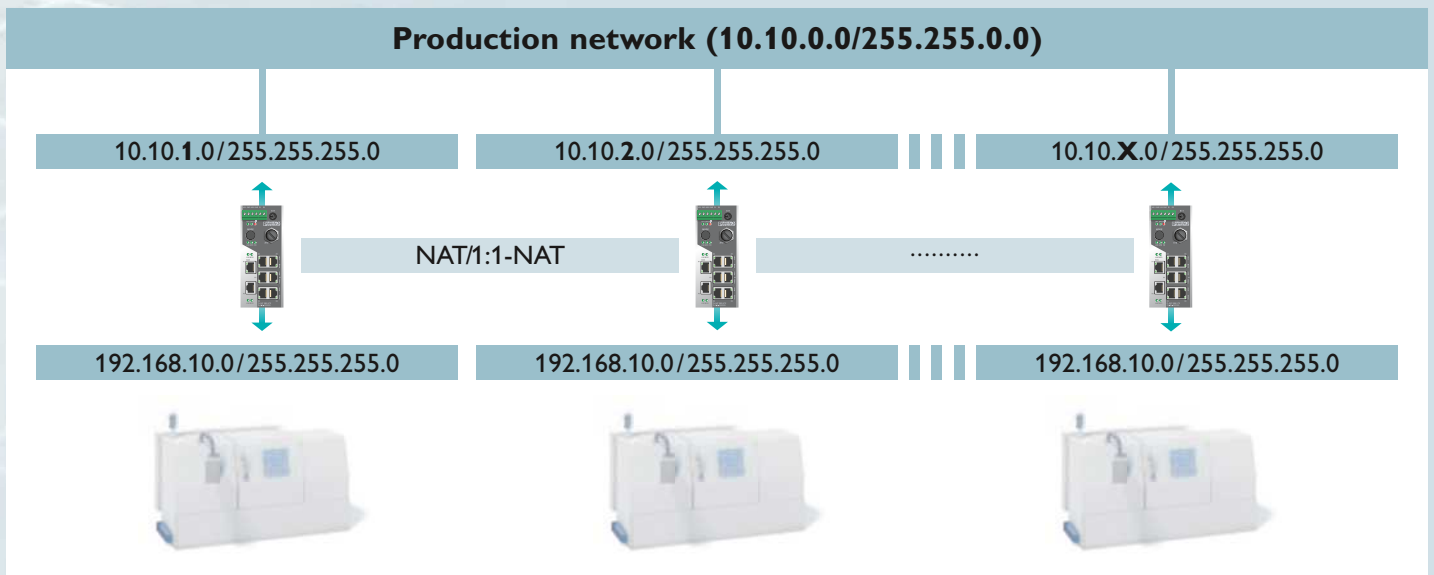
|                    |             |
|--------------------|-------------|
| Number of ports    | 8           |
| Transmission speed | 10/100 Mbps |
| Connection method  | RJ45        |

#### Function

|                 |                                                                                                                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Basic functions | Store-and-forward switch, complies with standard IEEE 802.3, BootP-compatible, Rapid Spanning Tree (RSTP), router, 1:1 NAT router, Spanning Tree 802.1d, Rapid Spanning Tree 802.1w, fast ring detection |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### Diagnostics

|                                   |                                                                                                                                                                 |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status and diagnostics indicators | 2 status LEDs per port: LINK and selection of Status Activity, 100 Mbps, full duplex, supply voltage $U_{S1}$ and $U_{S2}$ (redundant supply voltage), and FAIL |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|



# Software – Network management and diagnostics

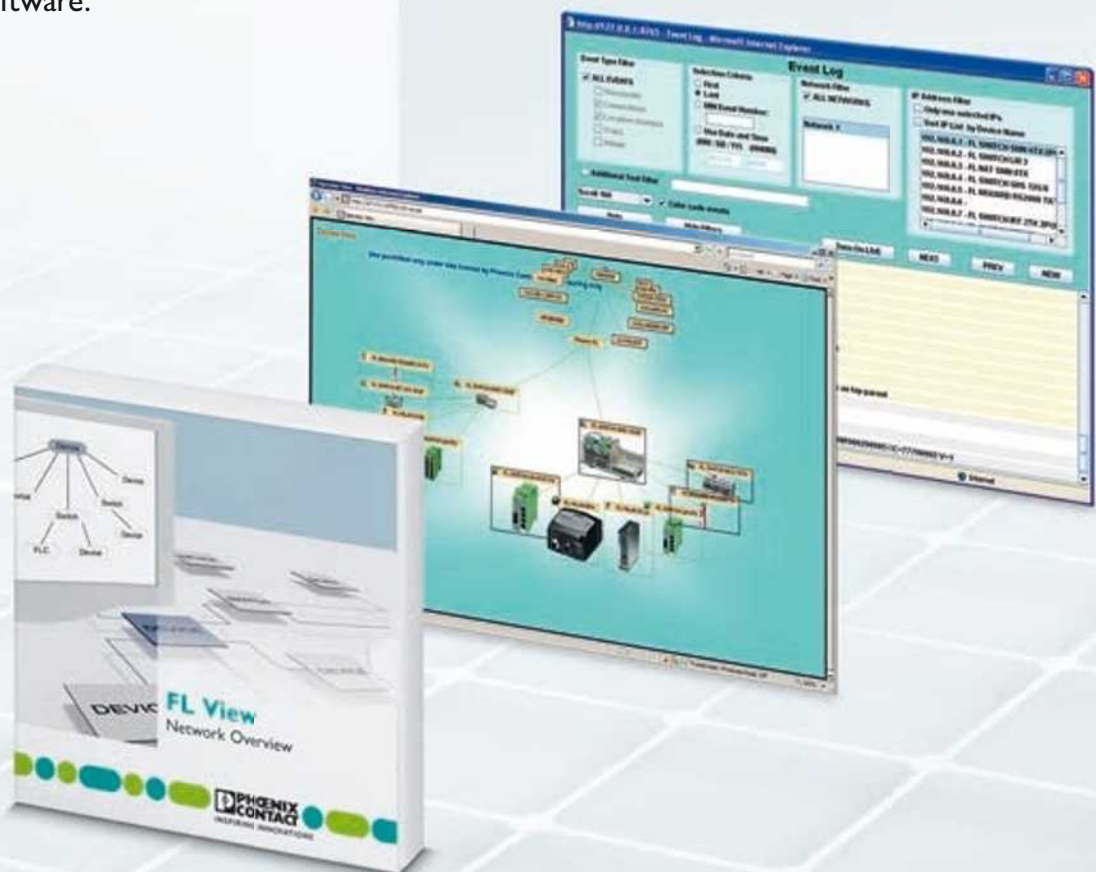
Configure and monitor your system intuitively using software tools from Phoenix Contact. We also offer a wide range of solutions that enable you to efficiently use Ethernet networks in automation systems.

Display complex networks and their devices clearly with the latest generation of the FL VIEW software. You can therefore speed up error detection and get hold of your system data more quickly.

The SNMP-OPC products ensure reliable communication between network management tools, automation hardware, and visualization software.

## Your advantages:

- Fast diagnostics thanks to continuous querying of the network devices
- Reduced downtimes and failure times thanks to a shorter response time in the network
- Direct access to the individual web interfaces of the devices
- Error detection even for temporary errors in the network



**FL VIEW**  
Network Overview



**CONFIG+**  
Network Configuration



**FL VIEW**

- FL VIEW 32 LITE**  
Order No. 2701744
- FL VIEW 64**  
Order No. 2701472
- FL VIEW 256**  
Order No. 2701473
- FL VIEW 512**  
Order No. 2701474

**SNMP OPC SERVER**

- FL SNMP OPC SERVER V3**  
Order No. 2701139
- FL SNMP OPC SERVER V3 LIC 100**  
Order No. 2701138

**SNMP OPC AGENT**

- FL SNMP OPC AGENT V3**  
Order No. 2701136
- FL SNMP OPC AGENT V3 LIC 100**  
Order No. 2701135

**CONFIG+**

- CONFIG+ DEMO CD** DVD-ROM  
Order No. 2868046
- CONFIG+** DVD-ROM  
Order No. 2868059
- CONFIG+ CPY** Copy license  
Order No. 2868062

**Properties**

- FL VIEW is a software product for detecting and monitoring industrial Ethernet networks with advanced features for PROFINET applications.
- FL VIEW automatically detects the topology and status of the networks and devices and transmits this in an animated realtime graphic.
- Different colors are used to display the status of network connections and network devices.
- Detection of the imminent failure of network components.

- The SNMP OPC server enables the integration of SNMP-compatible devices in any OPC-based HMI/SCADA system, thus transforming it into an inexpensive industrial network management system. It is designed to gather important information about the device and the connected network.
- Monitoring and configuration of SNMP-compatible devices in HMI and SCADA systems.
- SNMP Version v1 and v2c supported
- OPC clients OPC Data Access 1.0A/2.0 and OPC AE 1.0A (Alarms and Events) supported
- Integrated MIB browser for quick integration of data points
- Support of device profiles for easy configuration

- The OPC SNMP agent enables seamless vertical integration of OPC-based/connected automation systems into existing SNMP management structures. It can be used, for example, to monitor the operating states of Field Controllers in central network management systems (e.g., HP OpenView, IBM Tivoli, etc.).
- Monitoring of OPC servers
- Access to OPC servers
- SNMP proxy agent
- SNMP Version V1 and V2c supported
- Creation of SNMP traps from OPC alarms

- Config+ enables the connection of third-party software via FDT interface, whereby special device user interfaces for company or third-party devices (DTMs) can be integrated directly and the corresponding devices can be parameterized. The integrated diagnostic functions offered by Diag+ ensure fast and clear error localization in the event of an error.
- Project transfer to SafetyProg
- Configuration of Ethernet configurations
- Configuration of address assignment
- Configuration of multi-master projects
- Comparison of real and configured bus configurations



**Consistent automation**

The FL VIEW software automatically detects the network structure and devices of your system and displays them clearly. Different colors are used to indicate the status of network devices and connections. Long-term monitoring means that even past events can be identified and temporary errors can be analyzed.

# Standard Managed Switches 3000 series

The series 3000 standard Managed Switches offer you optimum performance and availability for demanding infrastructure applications. The standard Managed Switches support a range of IEEE standards and IT functions for consistent integration into your network structures. Special attention has been given to user-friendly operation and configuration.

## Your advantages:

- Ideally suited to demanding infrastructure applications thanks to versions with an extended temperature range
- High availability thanks to rapid redundancy switch-over in less than 15 ms
- Fiber optic versions for error-free communication over large distances
- Easy configuration and diagnostics thanks to user-friendly web-based management





### Standard Managed Switches

**FL SWITCH 3005**

Order No. 2891030

**FL SWITCH 3005T**

Order No. 2891032

- 5 RJ45 ports

**FL SWITCH 3008**

Order No. 2891031

**FL SWITCH 3008T**

Order No. 2891035

- 8 RJ45 ports

### Standard Managed Switches

**FL SWITCH 3016**

Order No. 2891058

**FL SWITCH 3016T**

Order No. 2891059

- 16 RJ45 ports

### Standard Managed Switches

**FL SWITCH 3004T-FX**

Order No. 2891033

- 4 RJ45 ports, 1 fiber optic port with SC connection

**FL SWITCH 3004T-FX ST**

Order No. 2891034

- 4 RJ45 ports, 1 fiber optic port with ST connection

### Standard Managed Switches

**FL SWITCH 3006T-2FX**

Order No. 2891036

- 6 RJ45 ports, 2 fiber optic ports with SC connection

**FL SWITCH 3006T-2FX ST**

Order No. 2891037

- 6 RJ45 ports, 2 fiber optic ports with ST connection

**FL SWITCH 3006T-F2X SM**

Order No. 2891033

- 6 RJ45 ports, 2 fiber optic ports with SC connection, single mode

### Technical features

Store-and-forward switch, complies with standard IEEE 802.3, autocrossing, auto negotiation, port mirroring, BootP & DHCP, SNMP, IGMP snooping, GMRP, 256 multicast groups, 64 VLANs, GVRP, trunking, QoS (4 queues), Diff Serve, ToS, CoS/configuration: web-based management, web adaptation to unique user, integrated help pages, SNMP (V1, V2, V3), serial interface, Telnet/security: user accounts, port security (24 MAC addresses/port) IEEE 802.1X Radius authentication, HTTPS

T versions with extended temperature range of -40°C – +75°C



#### Easy diagnostics

Easy configuration and diagnostics via web-based management, SNMP, and V.24.



#### User-oriented WBM

Configurable web pages and user roles provide an overview.



#### Extended temperature range

The extended temperature range enables universal use.

# Standard Managed Switches 4000 series

You can implement infrastructure networks with high-performance Gigabit data transmission using series 4000 standard Managed Switches. They are particularly suitable for connecting distributed devices in the field to the control level, thanks to integrated IT functions and high data throughput. The extended ring redundancy with recovery times of less than 15 ms ensures high availability.

## Your advantages:

- High-performance Gigabit data transmission
- Optimum integration of the network components in the company IT networks
- High availability thanks to rapid redundancy switch-over in less than 15 ms
- Easy configuration and diagnostics thanks to user-friendly web-based management



# Gigabit- Trunk- Ports





### Standard Managed Switches

**FL SWITCH 4008T-2SFP**  
Order No. 2891062  
• 8 RJ45 ports, 2 SFP ports

### Standard Managed Switches

**FL SWITCH 4008T-2GT-4FX SM**  
Order No. 2891061  
• 8 RJ45 ports, 2 of which with Gigabit interface, 4 fiber optic ports, single mode (40 km), with SC connection

### Standard Managed Switches

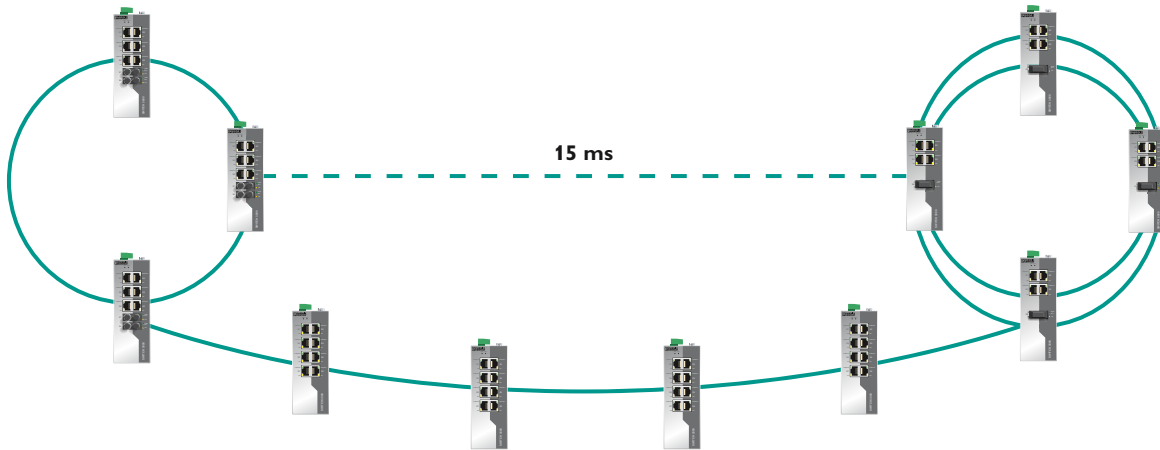
**FL SWITCH 4012T-2GT-2FX**  
Order No. 2891063  
• 12 RJ45 ports, 2 of which with Gigabit interface, 3 fiber optic ports with SC connection

**FL SWITCH 4008T-2GT-3FX SM**  
Order No. 2891160  
• 8 RJ45 ports, 2 of which with Gigabit interface, 3 fiber optic ports, single mode (40 km), with SC connection

**FL SWITCH 4012T-2GT-2FX ST**  
Order No. 2891161  
• 12 RJ45 ports, 2 of which with Gigabit interface, 2 fiber optic ports, multi mode, with ST connection

#### Technical features

Store-and-forward switch, complies with standard IEEE 802.3, autocrossing, auto negotiation, port mirroring, BootP & DHCP, SNTP, IGMP snooping, GMRP, 256 multicast groups, 64 VLANs, GVRP, trunking, QoS (4 queues), Diff Serve, ToS, CoS/configuration: web-based management, web adaptation to unique user; integrated help pages, SNMP (V1, V2, V3), serial interface, Telnet/security: user accounts, port security (24 MAC addresses/port) IEEE 802.1X Radius authentication, HTTPS  
T versions with extended temperature range of -40°C – +75°C



#### Extended ring redundancy

In critical infrastructure applications, the function offers a quick redundancy switch-over in the event of connection failure.

- 15 ms maximum recovery time for up to 200 devices in a ring
- Up to three linked rings with up to 600 switches supported
- Dual redundant rings for maximum fault tolerance

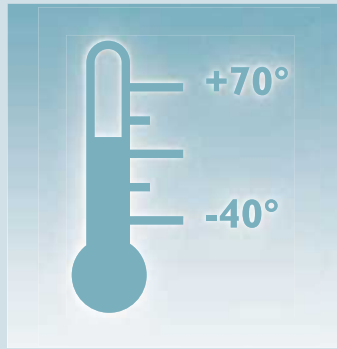
# Network infrastructure for energy systems

Network your energy system – with robust network infrastructure from Phoenix Contact. Our switches, media converters, and redundancy modules are suitable for the harshest ambient conditions according to IEC 61850-3 and IEEE 1613 and ensure high availability.

## Your advantages:

- Suitable for use under the harshest electromagnetic, electrostatic, and climatic ambient conditions
- Reliable, error-free data transmission over long distances thanks to fiber optic technology
- Fast redundancy mechanisms for high availability
- Wear-free and maintenance-free thanks to fanless device design





### **Robust**

Extended temperature range, impact resistance, shock resistance, and vibration resistance ensure that the products are particularly robust.



### **Reliable**

The products are resistant to electrostatic discharge (ESD), fast, transient disturbance variables (burst), surge voltages (surge), and magnetic fields.



### **Available**

Uninterrupted operation, even when voltage fluctuations occur, increases availability.

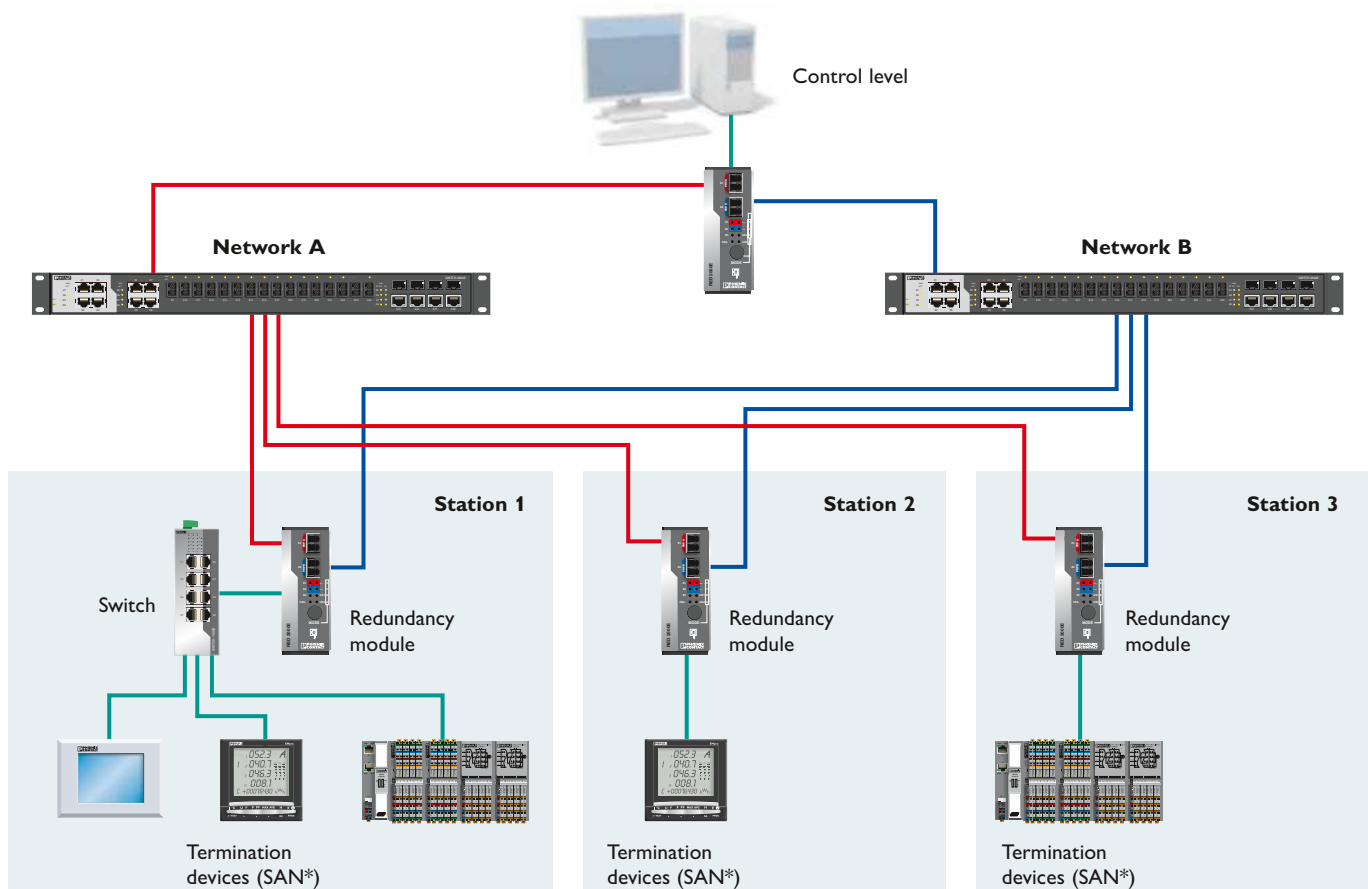


**IEC 61850-3**

### **Robust Ethernet infrastructure for energy systems:**

- Switches in 19" format and for the DIN rail
- Media converter for interference-free fiber optic connections
- Redundancy modules for maximum availability thanks to parallel network redundancy

## Parallel network redundancy with PRP



\*SAN = Single Attached Node

PRP network redundancy is based on two independent active paths between two devices. The sender uses two independent network interfaces which both send the same data in parallel. The redundancy control protocol therefore makes sure that the recipient only uses the first data packet and discards the second. If just one packet is received, the recipient knows that a failure has occurred on the other path.

### The advantages:

- Integration of non-PRP-capable devices in parallel networks for maximum availability
- No recovery times for uninterrupted operation in the event of an error (0 ms)
- No loss of packets in the event of network failure or failure of individual network components



### Managed Switches for 19" cabinets (without power supply)

#### FL SWITCH 4824E-4GC

Order No. 2891072

- 24 RJ45 ports and 4 Gigabit combo ports

#### FL SWITCH 4808E-16FX LC-4GC

Order No. 2891073

- 8 RJ45 ports, 16 LC multi-mode ports, and 4 Gigabit combo ports

#### FL SWITCH 4808E-16FX SM40 LC-4GC

Order No. 2891074

- 8 RJ45 ports, 16 LC single-mode ports, and 4 Gigabit combo ports

#### FL SWITCH 4808E-16FX-4GC

Order No. 2891079

- 8 RJ45 ports, 16 SC multi-mode ports, and 4 Gigabit combo ports

#### FL SWITCH 4808E-16FX SM-4GC

Order No. 2891080

- 8 RJ45 ports, 16 SC single-mode ports, and 4 Gigabit combo ports

### Managed Switches for the DIN rail

#### FL SWITCH 3016E

Order No. 2891066

- 16 RJ45 ports

#### FL SWITCH 3012E 2SFCX

Order No. 2891067

- 12 RJ45 ports, 2 100 Mbps SFP ports

### Unmanaged Switch

#### FL SWITCH 1008E

Order No. 2891065

- 8 RJ45 ports

Store-and-forward switch, extended ring and IEEE redundancy, multicast control, IGMP snooping, trunking, Port and Tagging VLANs, Port and IEEE 802.1x security, SNMP V3, user accounts

Store-and-forward switch, LED diagnostics, alarm signal contact, connection diagnostics which can be adjusted via DIP switches



### PRP redundancy modules

#### FL RED 2003E PRP

Order No. 2701863

- 2 RJ45 ports as redundancy ports, 1 RJ45 port for termination device

#### FL RED 2001E PRP 2LC

Order No. 2701864

- 2 LC multi-mode ports as redundancy ports, 1 RJ45 port for termination device

### Media converters

#### FL MC 2000E LC

Order No. 2891056

- 1 RJ45 port and 1 LC multi-mode port

#### FL MC 2000E SM40 LC

Order No. 2891156

- 1 RJ45 port and 1 LC single-mode port

### Modular power supply for 19" switches

#### FL SWITCH 4000E-P1

Order No. 2891075

- Voltage range: 48 V DC

#### FL SWITCH 4000E-P5

Order No. 2891076

- Voltage range: 110 V, 220 V DC, AC

### SFP modules

#### FL SFP FX multi mode

Order No. 2891081 100 Mbps

#### FL SFP FX SM

Order No. 2891082

single mode  
100 Mbps

#### FL SFP SX

Order No. 2891754

multi mode  
1000 Mbps

#### FL SFP LX

Order No. 2891767

single mode  
1000 Mbps

#### FL SFP LX

Order No. 2989912

single mode  
long haul  
1000 Mbps

# Media converters for optical conversion to fiber optics

For maximum immunity to interference and transmission ranges in industrial Ethernet applications, fiberglass media converters transparently convert Ethernet data to fiber optics. The media converters allow you to bridge distances up to 40 kilometers depending on your choice of device and cable.

The extended temperature range makes it possible to convert numerous industrial applications. In addition to this, the media converters offer comprehensive diagnostic options, increasing system availability.



## Advantages of optical communication

- Maximum immunity to interference and perfect electrical isolation thanks to optical data transmission
- Maximum transmission distances with an extremely high data rate
- Use in potentially explosive areas – approved for zone 2



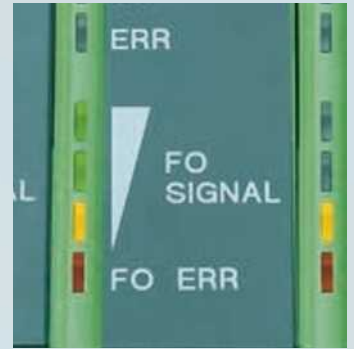
**Technology for every application**

Different fiber optic connection technologies for short, medium, and large distances.



**WDM – one fiber, numerous possibilities**

Bidirectional transmission using a single optical fiber for rotating applications.

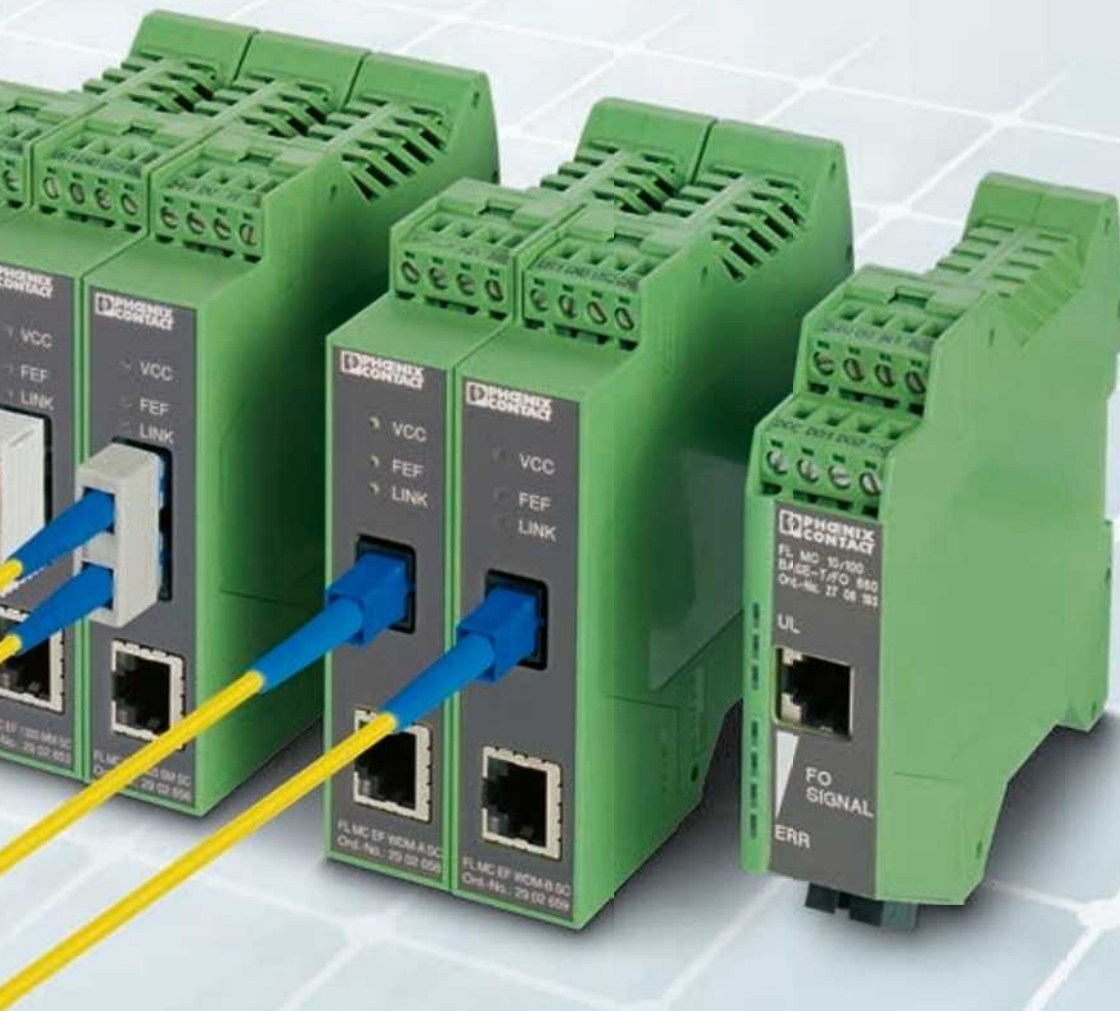


**High system availability**

Fiber optic diagnostics with LED bar graph for continuous diagnostics.

**The alternative solution for copper transmission**

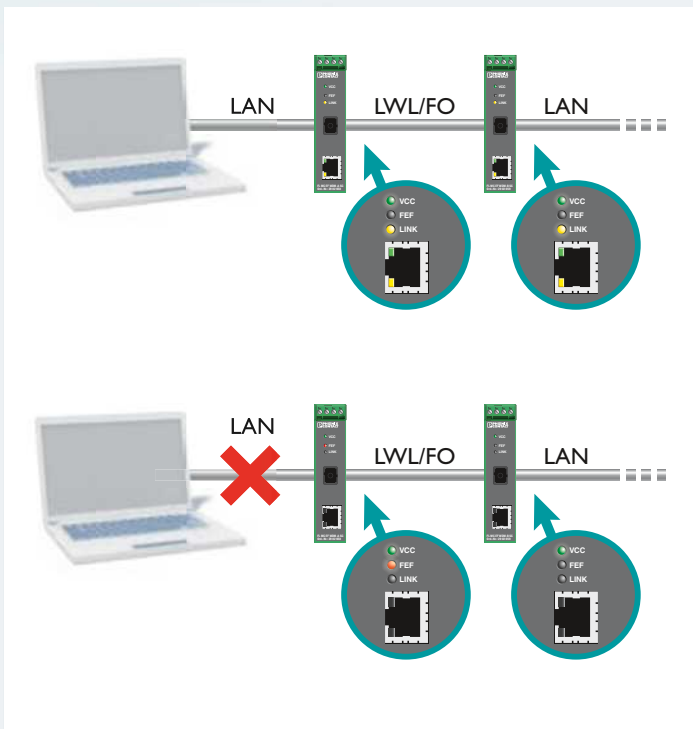
When copper cables reach their limits, this is where optical transmission comes into play. Fast Ethernet media converters from Phoenix Contact provide the right device for every application.





### Use in time-critical applications

The FL MC 2000T series devices can switch between the standard store-and-forward operating mode with auto negotiation and the pass through operating mode. This makes it possible to achieve very short delays (latency) of 700 nanoseconds. These devices are therefore ideal for applications with time-critical Ethernet protocols such as PROFINET, Powerlink, EtherCAT, and Sercos.



### Fast diagnostics in the event of a malfunction

In addition to numerous diagnostics LEDs, the media converter also has the link management function (link fault pass through). This provides permanent connection monitoring. Both sides of the network connection can therefore detect a lost link immediately. The entire connection over the optical path is therefore as transparent as it would be were communication purely copper-based. In the event of a network interruption, the transmission path is switched off. Redundancy mechanisms can be used directly. In the event of an error, this keeps the network load low and increases system availability.

In addition, when the FEF (far end fault) function signals a lost link to the media converters, this also enables the faulty segment to be localized.



### HCS(PCF) fibers for triple the transmission distance

With the special structure of its mixed fiber, the HCS gradient index fiber allows you to combine the advantages of two cables. Like fiberglass, it offers much larger ranges than a standard polymer or HCS(PCF) fiber. But the HCS GI fiber can be assembled in the field easily and quickly, in a similar way to a conventional plastic fiber.





### FO converter Standard

- FL MC EF 1300 MM SC**  
Order No. 2902853
- FL MC EF 1300 MM ST**  
Order No. 2902854
- FL MC EF 1300 SM SC**  
Order No. 2902856

### FO converter POF/HCS fibers

- FL MC 10/100 BASE-T/FO 660**  
Order No. 2708193

### FO converter Single fiber

- FL MC EF WDM-SET**  
Order No. 2902660
- FL MC EF WDM-A SC**  
Order No. 2902658
- FL MC EF WDM-B SC**  
Order No. 2902659

### FO converter Short latency

- FL MC 2000T SC**  
Order No. 2891315
- FL MC 2000T ST**  
Order No. 2904816
- FL MC 2000T SM20 SC**  
Order No. 2904817
- FL MC 2000T SM40 SC**  
Order No. 2904818

#### Properties

- 1300 nm light wavelength
- Devices for multi-mode or single-mode fibers and various connection technologies, SC and B-FOC(ST)
- LFTP (link fault pass through) and FEF (far end fault) diagnostic functions for continuous link monitoring for optimum availability
- Auto negotiation and auto MDI (x) for easy startup
- Ex approval for use in potentially explosive areas

- 660 nm light wavelength
- For distances up to 300 m with easy-to-use POF/HCS technology
- Bar graph function for permanent monitoring of optical connection and two potential-free relay outputs
- Pass through mode with short latency for time-critical applications

- 1310/1550 nm light wavelength
- Modulation of two light wavelengths on one optical fiber thanks to WDM (wavelength division multiplex) technology
- Full duplex communication using only one glass fiber
- Devices are used as a set
- Single-fiber transmission of optical signals in rotating applications with optical slip rings
- Save on cable fibers and plugs and also double the bandwidth of existing cable connections

- 1300 nm light wavelength
- Robust design in metal housing for EMC requirements
- Devices for multi-mode and single-mode fibers, up to 40 km
- SC duplex and B-FOC(ST) connection
- Redundant power supply
- Can be switched between store-and-forward with auto negotiation and pass through operating mode with short latency for time-critical applications

### Bidirectional transmission via a single optical fiber

The FL MC EF WDM series media converters enable full duplex communication with a single glass fiber via WDM technology. With the wavelength division multiplex method, two different wavelengths (1310/1550 nm) enable data to be transmitted and received (bidirectionally) – without limiting the transmission quality and bandwidth.

In rotating applications, the WDM media converters allow the installation of optical rotary joints, which are designed for a single optical fiber and have a cost advantage over fiber optic rotary transformers for multiple fibers.



Single-fiber media converters are particularly suitable for bidirectional transmission for rotating applications.

# Power over Ethernet (PoE) – Power and data transmission via Ethernet connections

Power over Ethernet devices suitable for industrial use enable the common transmission of power and data in industrial environments via an Ethernet connection (LAN). You can therefore integrate termination devices, such as WLAN access points, IP telephones, and IP cameras into your network quickly and cost-effectively.

## Your advantages:

- Easy device installation even at difficult-to-access places thanks to reduced cabling effort
- No additional power supply unit required for termination devices thanks to PoE on all ports
- Non-proprietary use supported thanks to standardization according to IEEE 802.3
- Fast retrofitting of existing systems thanks to easy handling

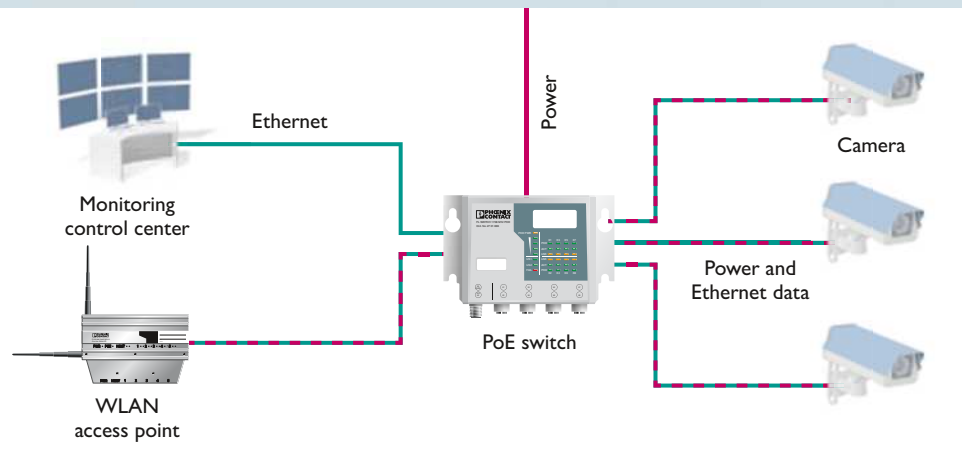




|                                  | <b>IP67 Power over Ethernet switch</b>                                                                                                                                                           | <b>Power-over-Ethernet switch</b>                                      | <b>Power over Ethernet module</b>                                                                                                                           |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | <b>FL SWITCH 1708-POE</b><br>Order No. 2701883<br>8 M12 PoE ports                                                                                                                                | <b>FL SWITCH 1001T-4POE</b><br>Order No. 2891064<br>4 RJ45 PoE ports   | <b>FL PSE 2TX</b><br>Order No. 2891013<br>2 RJ45 PoE ports                                                                                                  |
| <b>Properties</b>                |                                                                                                                                                                                                  |                                                                        |                                                                                                                                                             |
| Function                         | Store-and-forward switch, auto negotiation, complies with standard IEEE 802.3, 4 priority classes according to IEEE 802.1p, PoE according to IEEE 802.3at/802.3af, jumbo frames up to 9720 bytes | Unmanaged switch/auto negotiation, complies with standard IEEE 802.3at | Simultaneous transmission of power and data on one Ethernet cable according to IEEE 802.3af                                                                 |
| <b>Copper Ethernet interface</b> |                                                                                                                                                                                                  |                                                                        |                                                                                                                                                             |
| Transmission speed               | 10/100/1000 Mbps                                                                                                                                                                                 | 10/100 Mbps                                                            | 10/100 Mbps                                                                                                                                                 |
| Cable length                     | 100 m                                                                                                                                                                                            | 100 m (twisted pair)                                                   | 100 m (between transmitter and receiver)                                                                                                                    |
| <b>Power supply</b>              |                                                                                                                                                                                                  |                                                                        |                                                                                                                                                             |
| Supply voltage                   | 24 V DC M12, T-coded                                                                                                                                                                             | 24 V DC (redundant)                                                    | 24 V DC                                                                                                                                                     |
| Typical current consumption      | 300 mA (at $U_S = 24$ V DC) + PoE load                                                                                                                                                           | 440 mA (at $U_S = 24$ V DC) + PoE load                                 | approximately 100 mA, in no-load operation; approximately 1800 mA, with 24 V DC at the input and with maximum permissible load and 25°C ambient temperature |

### Integrate cameras easily

Integrate Power over Ethernet devices such as Gigabit cameras into your network without a control cabinet or additional supply voltage with the FL SWITCH 1708 M12 PoE. Thanks to its robust IP67 housing, you can install this communication node exactly where it is needed.



# Wireless Ethernet

Industrial wireless systems open up new options for flexible and efficient automation solutions. With wireless LAN or Bluetooth, you can eliminate the need for expensive cable runs and integrate mobile devices easily and reliably into your automation network. Wireless Ethernet systems from Phoenix Contact ensure reliable communication even under harsh conditions and are optimized for fast and stable PROFINET and EtherNet/IP transmission.

In addition to a comprehensive range of products, we also offer you support to ensure the design of your individual wireless network is perfectly tailored to your requirements.

## Your advantages:

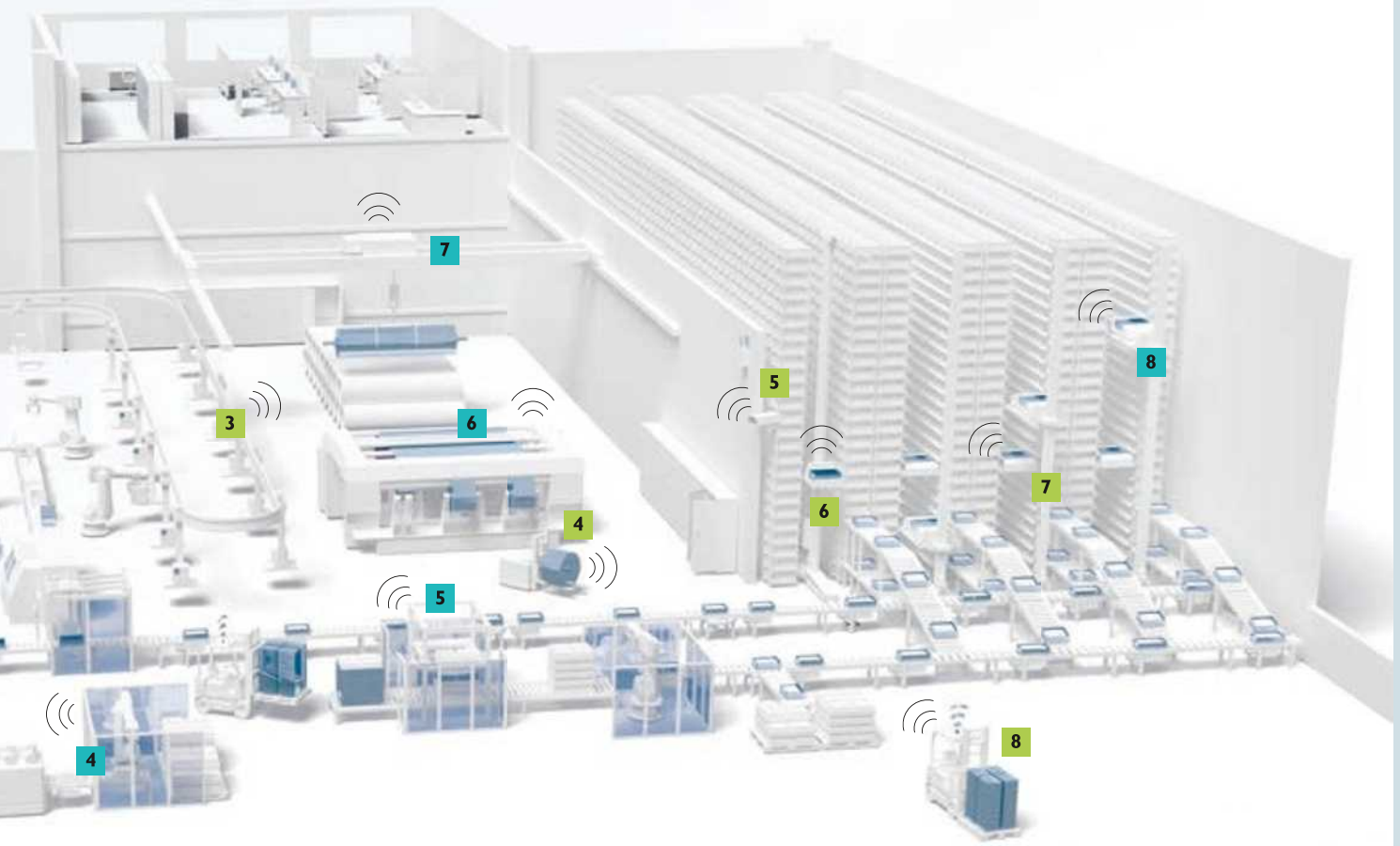
- Easy and reliable communication with mobile or difficult-to-access automation devices such as controllers or I/O modules
- Location-independent realtime access to network resources simplifies maintenance and reduces service costs and downtimes
- Easy and inexpensive construction of wireless network



## Reliable wireless communication for mobile automation systems

- Numerous industrial wireless applications are already in use and have proven their reliability even under the harshest conditions
- Safe wireless communication can also be achieved via SafetyBridge or PROFINET with PROFIsafe
- A comprehensive range of antennas means you can use the optimum antenna technology for any application

## Typical areas of application for wireless Ethernet



### Bluetooth

- |                            |                        |
|----------------------------|------------------------|
| 1 Robots                   | 6 Moving machine parts |
| 2 Process robots           | 7 Cranes               |
| 3 Handling machines        | 8 Lifting equipment    |
| 4 Packaging machines       |                        |
| 5 Pallet wrapping machines |                        |

### Wireless LAN

- |                                    |                      |
|------------------------------------|----------------------|
| 1 Mobile maintenance               | 6 Stacker crane      |
| 2 Terminals                        | 7 Warehouse shuttles |
| 3 Electric monorail systems        | 8 Fork-lift truck    |
| 4 Automated guided vehicle systems |                      |
| 5 Video monitoring                 |                      |

### Bluetooth for wireless device integration in industrial control networks

- Extremely robust wireless transmission even under harsh ambient conditions
- Ideal for replacing an Ethernet cable connection (point-to-point connection) to a moving or difficult-to-access automation device with a wireless solution
- Interference-free parallel operation with WLAN networks thanks to extended coexistence functions
- Parallel operation of numerous Bluetooth systems thanks to efficient frequency usage
- High working range – up to 250 m in free field

### Wireless LAN for a system-wide wireless infrastructure

- Sufficient reserves even for data-intensive applications thanks to fast data rates up to 300 Mbps
- MIMO antenna technology (multiple input, multiple output) for high reliability and performance in wireless communication in industrial, metal environments
- Devices move freely in the network thanks to fast roaming

# Wireless Ethernet – Industrial WLAN

The industrial WLAN modules combine robust industrial technology with high performance and modern MIMO (multiple input, multiple output) antenna technology. The central cluster management at the WLAN 5100 access point makes the configuration and maintenance of larger WLAN networks considerably easier. Using the Ethernet adapters, you can integrate automation components such as controllers or I/O modules into the WLAN network quickly and easily.

## Your advantages:

- Space-saving installation thanks to very compact device design
- Quick and easy startup
- Great distances thanks to high transmission power
- Optimized for operation in PROFINET and EtherNet/IP networks
- Reliable wireless communication thanks to MIMO technology
- Compatible with standards IEEE 802.11 a/b/g/n





### WLAN 5100 access point

**FL WLAN 5100**  
Order No. 2700718

**FL WLAN 5101**  
Order No. 2701093  
• For USA and Canada

**FL WLAN 5102**  
Order No. 2701850  
• For Japan

**SD-FLASH 2 GB**  
Order No. 2988162

### WLAN Ethernet adapter

**FL WLAN EPA**  
Order No. 2692791

• Integrated antenna IEEE 802.11b/g/n, 2.4 GHz

**FL WLAN EPA 5N**  
Order No. 2700488

• Integrated antenna IEEE 802.11a/n, 5 GHz

**FL WLAN EPA RSMA**  
Order No. 2701169

• External, replaceable omnidirectional antenna

### Control box sets

**FL RUGGED BOX OMNI-1**  
Order No. 2701430

• With omnidirectional antennas

**FL RUGGED BOX OMNI-2**  
Order No. 2701439

• With omnidirectional antennas and power supply unit

**FL RUGGED BOX DIR-1**  
Order No. 2701440

• With panel antenna

**FL RUGGED BOX**  
Order No. 2701204

• Without antenna accessories

### Antenna accessories

**ANT-DIR-2459-01**  
Order No. 2701186

• Panel antenna, 2.4/5 GHz, N connection

**RAD-ISM-2459-ANT-FOOD-6-0**  
Order No. 2692526

• Omnidirectional antenna, 2.4/5 GHz, vandalism proof, N connection

**RAD-PIG-RSMA/N-2**  
Order No. 2903265

• Antenna cable, 2 m long, N (male) > RSMA (male) connection

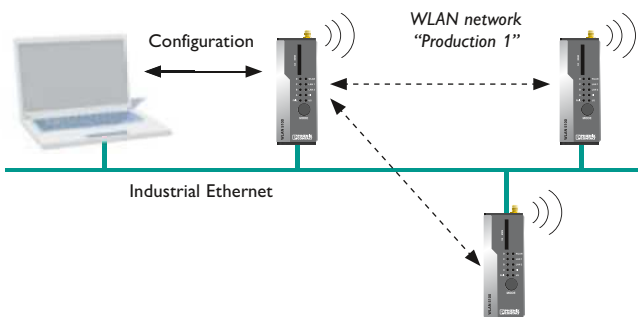
### Technical features

IEEE 802.11 a/b/g/n, WLAN access point, client, repeater, frequency band 2.4 GHz and 5 GHz, MIMO technology 3 x 3:2, up to 300 Mbps, cluster management

WLAN client, IEEE 802.11n, MIMO technology 1 x 1:1, IP65, M12 connections, power supply 9 – 30 V DC, operating mode: single-client and multi-client

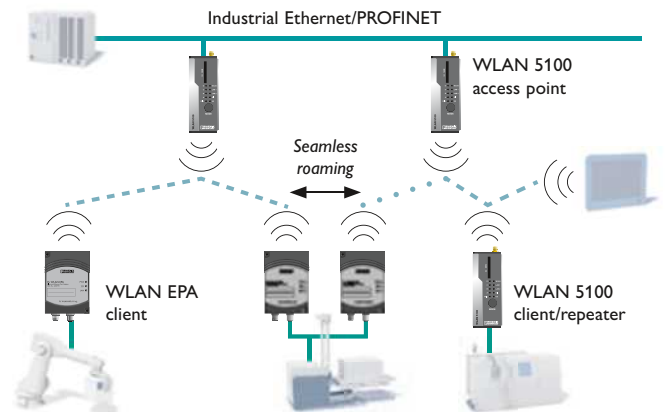
Control box set for constructing wireless systems for industrial applications, IP65, with DIN rail, plugs, and screw connections

Omnidirectional and panel antennas, IP68, other antennas and accessories at phoenixcontact.com



### Cluster management makes things easier

Cluster management, a feature of WLAN 5100, enables the quick configuration and startup of all access points via a single web interface.



### Typical WLAN network structure

The WLAN EPA enables interruption-free roaming in duo mode.

# Wireless Ethernet – Industrial Bluetooth

The industrial Bluetooth modules allow you to wirelessly transmit control data to mobile or difficult to access automation devices quickly and easily. Bluetooth communication is characterized by particularly robust transmission under difficult ambient conditions. This allows you to establish functionally safe communication via PROFI-safe or SafetyBridge technology.

## Your advantages:

- Interference-free parallel operation with WLAN networks thanks to adaptive frequency hopping (AFH), low emission mode (LEM), and black channel list (BCL)
- Quick and easy startup using the MODE button
- Integrated special antennas for reliable wireless connections in industrial environments (only EPA and EPA AIR SET)
- Optimized for operation in PROFINET networks
- Protected against manipulation and tapping thanks to encrypted communication
- High working range of up to 250 m
- Ethernet access point for Bluetooth devices which support PAN (Personal Area Network) Bluetooth profiles



SafetyBridge  
Technology

Designed by PHOENIX CONTACT





**Bluetooth Ethernet adapter**

**FL BT EPA**  
Order No. 2692788

- Internal antenna, max. 1 wireless connection

**Bluetooth Ethernet adapter set**

**FL BT EPA AIR SET**  
Order No. 2693091

- Solution set consisting of: 2 x FL BT EPA, cable, and plug, internal antennas

**Bluetooth access point**

**FL BT EPA MP**  
Order No. 2701416

- External, replaceable antenna (supplied), RSMA (male) connection, max. 7 wireless connections

**Antenna accessories**

**RAD-ISM-2400-ANT-VAN-3-0-RSMA**  
Order No. 2701358

- Omnidirectional antenna, vandalism proof, 3 dBi gain

**RAD-ISM-2400-ANT-OMNI-2-1-RSMA**  
Order No. 2701362

- Omnidirectional antenna, 2 dBi gain

**Technical features**

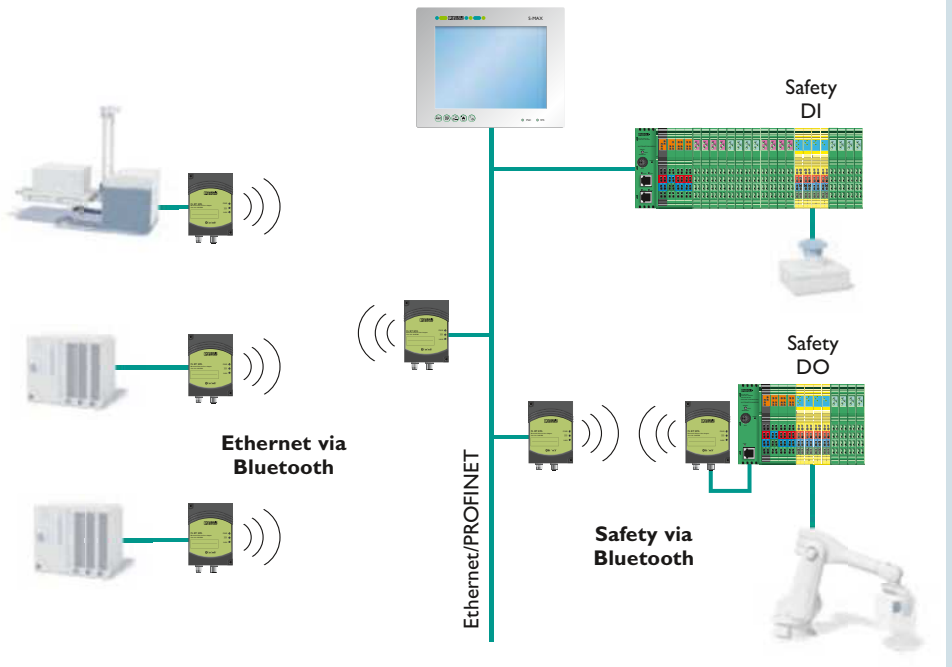
Bluetooth V2.1+EDR, frequency band 2.4 GHz, WLAN Black Channel List, Low Emission Mode (LEM), IP65 protection, M12 connections for voltage and LAN, power supply 9 – 30 V DC, autocrossing, PROFINET prioritizing, LLDP, 128-bit data encryption, ambient temperature -40°C – +65°C, web interface, SNMP, AT commands, UL/cUL Class 1 Div 2 hazardous location

Omnidirectional antennas with cables for FL BT EPA MP for remote mounting. Other antennas at phoenixcontact.com

**Bluetooth applications**

The Bluetooth BT EPA modules replace individual Ethernet or PROFINET cables leading to automation devices with a reliable wireless connection.

The BT EPA MP enables up to seven Bluetooth modules to be connected to the Ethernet network at the same time.



# Security for industrial networks

Failures, sabotage or data loss can lead to a great deal of economic damage. Secure your production with the mGuard industrial firewall/router solution from Phoenix Contact.

Based on a robust operating system, the mGuard industrial security product range offers perfectly coordinated security components: a bidirectional firewall, a flexible NAT router, a high-security VPN router, and industrial protection against malware as an option.

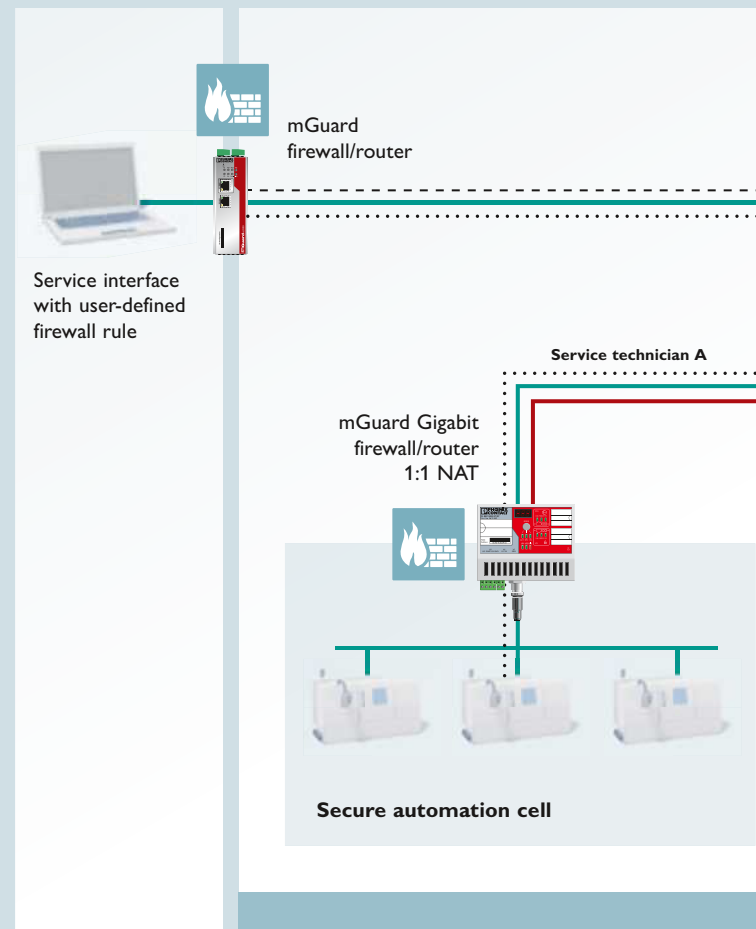
We are happy to assist you in creating a security concept for your network on request.

## Your advantages:

- Network segmentation in protected automation cells
- Reduced susceptibility of the production system to interference and increased availability
- Protects production or automation cells against the operator network and vice versa
- Easy and secure integration of machines into customer networks

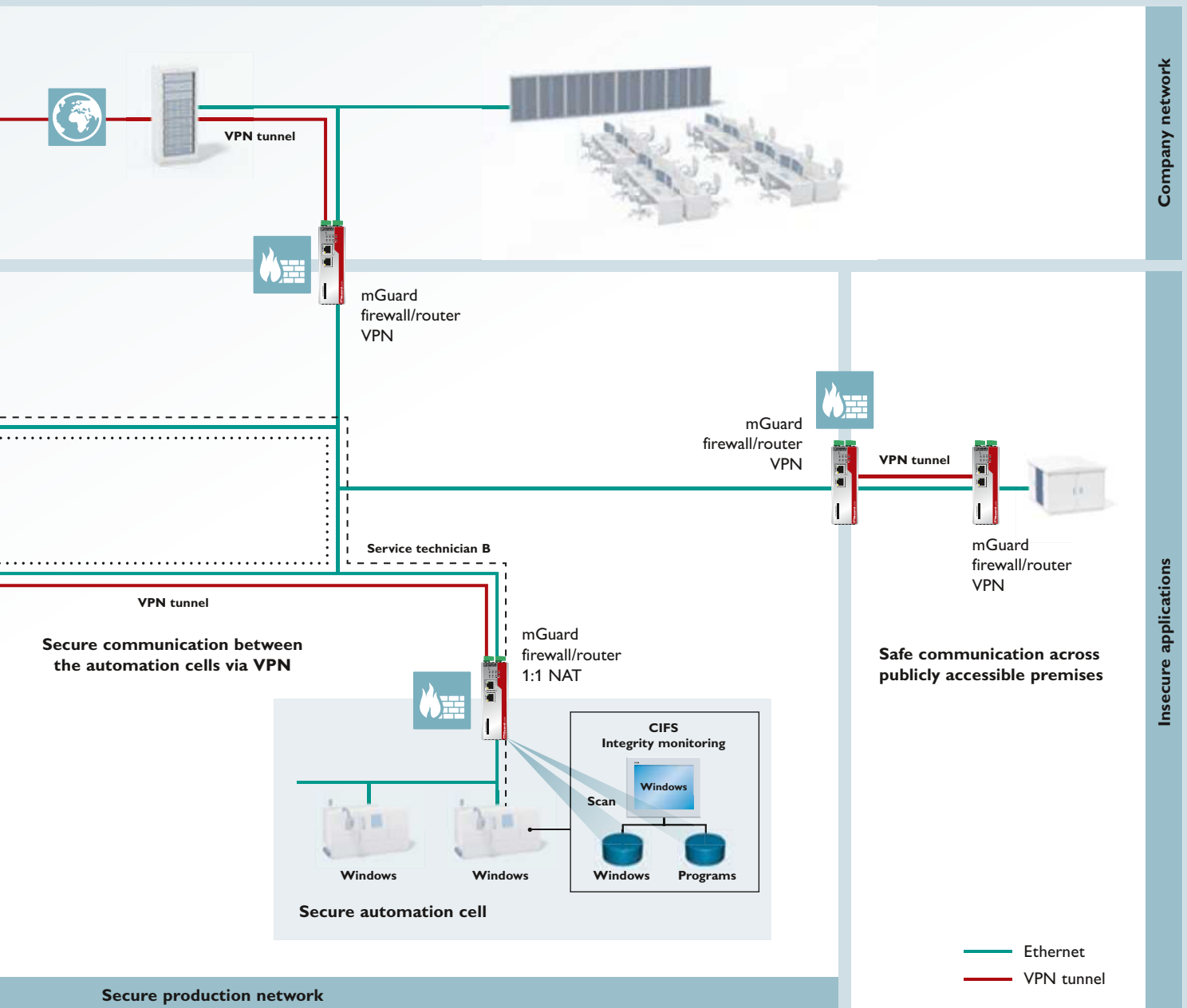


Secure site networking via VPN



## Secure connection of automation cells to the production network thanks to mGuard firewall and VPN

- Monitoring and filtering of the data traffic to and from the protected production and automation cells thanks to predefined firewall rules
- Secure communication between the automation cells via VPN tunnel with IPsec
- Stateful inspection firewall for dynamic filtering
- High data throughput thanks to high-performance hardware and hardware-based encryption



### Secure virus protection for Windows PCs thanks to mGuard CIFS Integrity Monitoring

- Dynamic monitoring of Windows-based automation systems (controller, operator interface, PC)
- Secure and reliable detection of changes and manipulations to files
- No virus patterns or regular updates required
- Low system loads and no influence on the realtime process
- Ideal for protecting computers with operating systems for which support has been set up (e.g., Windows XP)

### High-performance routing and easy machine integration via 1:1 NAT

- Virtual addressing (1:1 NAT) for easy integration of machines of the same design with an identical IP address area in the production network
- Increased reliability thanks to network that is structured into various subnetworks (routing)
- High data throughput thanks to high-performance hardware
- Latest certificates supported (x509.v3)

# Industrial security – Routers with integrated firewall

Protect your systems against unauthorized access by people or malware with the mGuard security product range from Phoenix Contact. With industrial router/firewall solutions and virus protection which is suitable for industrial applications, you can organize individual protection for your automation network.

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

## Your advantages:

- VPN, routing, and firewall in just one device
- High-performance encryption for the secure transmission of sensitive data
- Configuration memory for easy device replacement
- Management software for central configuration of remote devices





### 2-click firewall/ router

**FL MGuard RS2000 TX/TX VPN**  
Order No. 2700642

### Firewall/ router

**FL MGuard RS4000 TX/TX**  
Order No. 2700634

**FL MGuard RS4000 TX/TX VPN**  
Order No. 2200515

### Gigabit firewall/ router

**FL MGuard GT/GT**  
Order No. 2700197

**FL MGuard GT/GT VPN**  
Order No. 2700198

#### Ethernet interface

Copper interface 2 RJ45 ports, 10/100 Mbps

Fiber optic interface –

Copper interface 2 RJ45 ports, 10/100 Mbps

Fiber optic interface –

Copper interface 2 RJ45 ports, 10/100/1000 Mbps

Fiber optic interface 2 SFP ports, 1000 Mbps

#### Function

Routing 1:1 NAT, NAT, port forwarding, standard routing

Firewall Simple 2-click firewall

VPN Up to 2 parallel tunnels, secure encryption according to IPsec standard

Routing 1:1 NAT, NAT, port forwarding, standard routing

Firewall Stateful inspection firewall, separate incoming and outgoing rules

VPN Up to 10 parallel tunnels (optionally up to 250), secure encryption according to IPsec standard

Routing 1:1 NAT, NAT, port forwarding, standard routing

Firewall Stateful inspection firewall, separate incoming and outgoing rules, also filtering for fiber optics



### Central management software

**FL MGuard DM 100**  
Order No. 2700183

**FL MGuard DM UNLIMITED**  
Order No. 2981974

#### Function

Central management software for up to 100 (DM 100) or an unlimited number of (DM UNLIMITED) FL MGuard devices in the field, for installation on a PC. Additional service required.

### CIFS – Integrity Monitoring

**FL MGuard LIC CIM**  
Order No. 2701083

Virus protection suitable for industrial applications for Windows-based systems, works without updates or virus patterns, detects every change to the system

### Firewall/router for mobile applications

**FL MGuard SMART2**  
Order No. 2700640

**FL MGuard SMART2 VPN**  
Order No. 2700639

Firewall/router for office use or mobile service technicians, VPN version: 10 parallel tunnels (optionally up to 250), stateful inspection firewall, 1:1 NAT, NAT, port forwarding, standard routing

### Firewall/router with PCI connection

**FL MGuard PCI4000**  
Order No. 27001274

**FL MGuard PCI4000 VPN**  
Order No. 27001275

Router with stateful inspection firewall for PCI, VPN version: 10 parallel tunnels (optionally up to 250), stateful inspection firewall, 1:1 NAT, NAT, port forwarding, standard routing

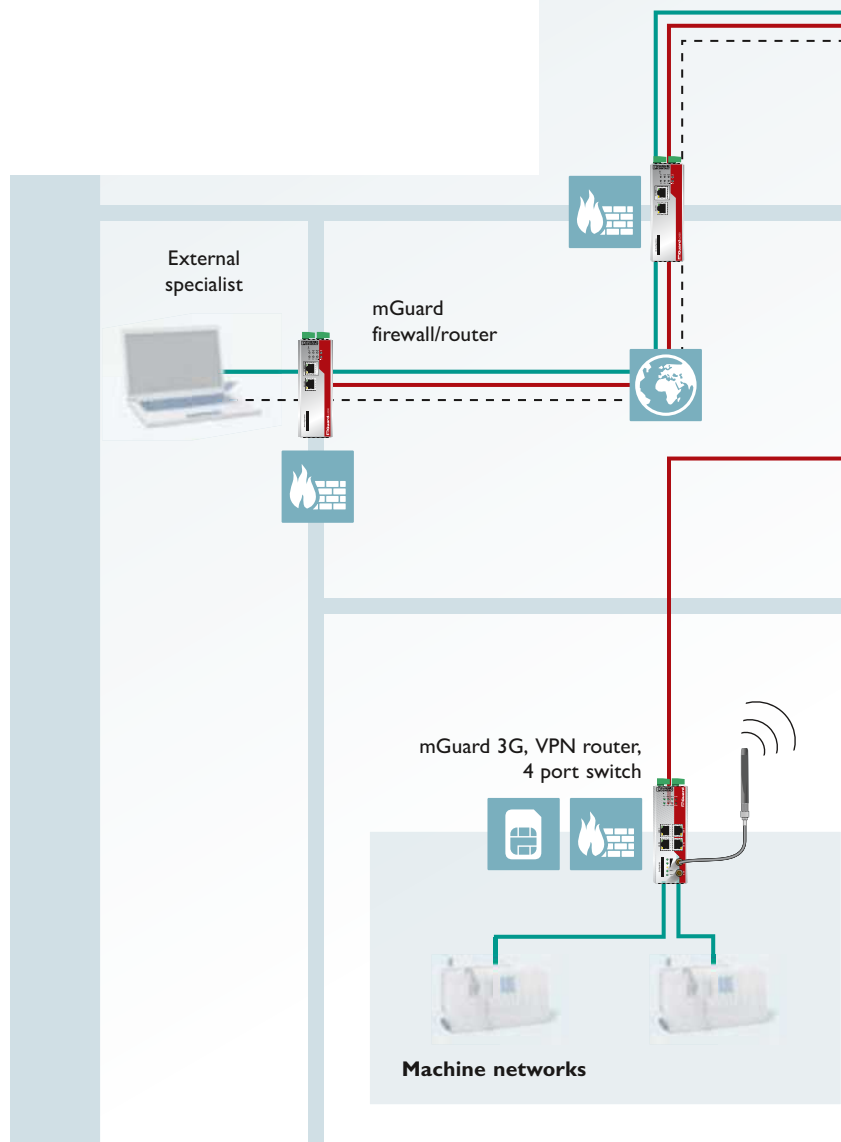
# Secure remote maintenance

Secure remote maintenance systems offer you worldwide access to the components connected in your machine network, such as drives or controllers.

mGuard security routers from Phoenix Contact are the basis for your secure Internet-based remote maintenance solution. Thanks to their integrated firewall, the security routers protect your systems and machine networks and monitor all incoming and outgoing data packets based on predefined rules. All data that is transmitted is securely encrypted.

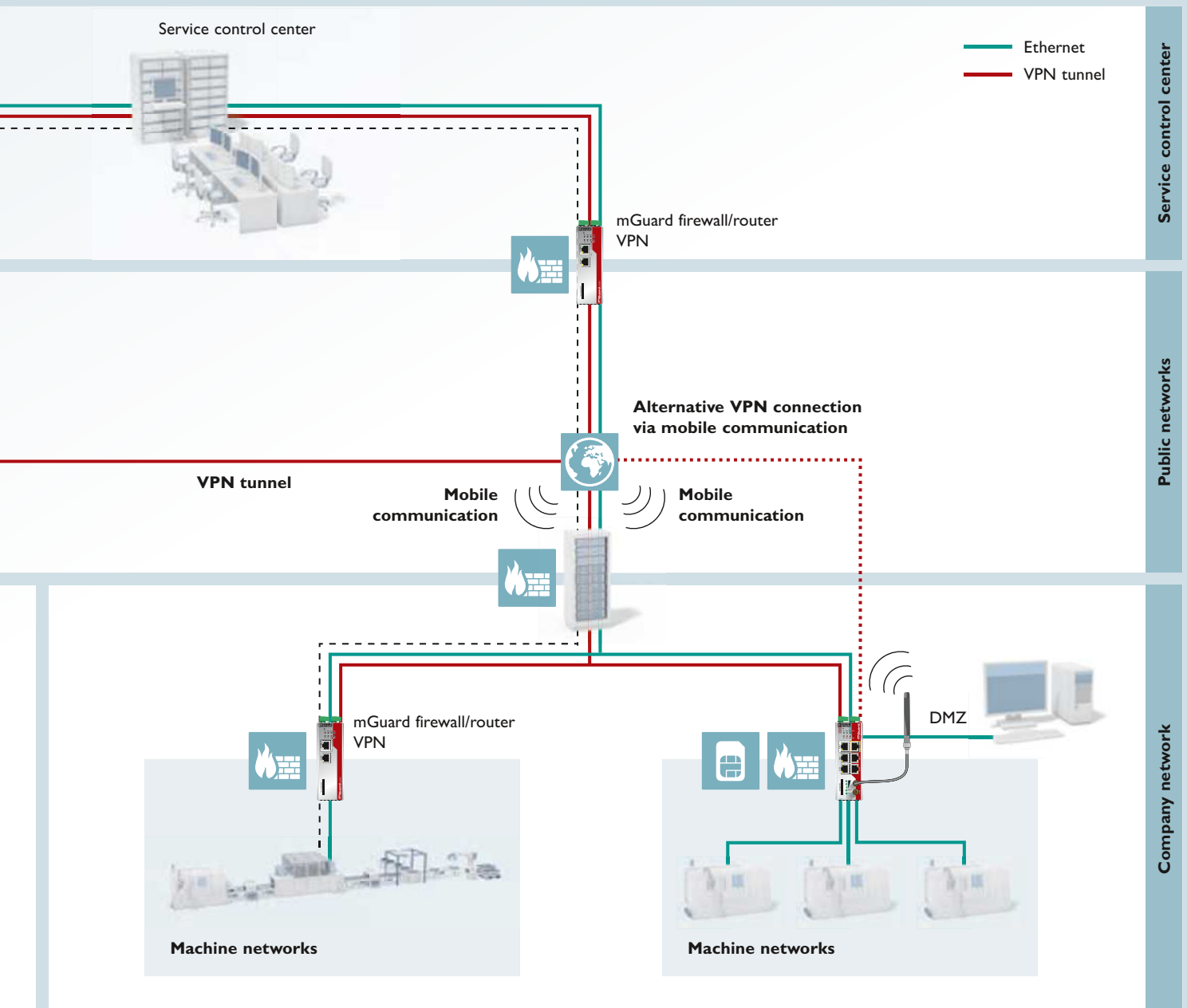
## Your advantages:

- Save travel costs and reduce downtimes thanks to location-independent VPN access
- Secure communication thanks to IPsec protocol and encryption according to AES (Advanced Encryption Standard)
- Company network and machines protected against unauthorized access during remote maintenance



## Secure VPN access to machines and systems

- The VPN connection is only established for maintenance purposes and always from the endpoint (e.g., machine) to the control center
- Controlled setup of the VPN connection using a key switch, SMS or software interface
- Protected against tapping and manipulation thanks to VPN tunnels with IPsec protocol and 256 bit AES encryption
- Additional security thanks to the combination of a firewall and VPN technology



### Easy integration of machines

- Flexible connection to the Internet via the company network or mobile phone networks
- Option to access machine networks with the same IP addresses thanks to 1:1 NAT function
- Establishment of secure VPN communication without changes to the company firewall thanks to TCP encapsulation (variable packaging of VPN packets)
- Plug-and-protect solution for secure Internet teleservices: transparent integration into machines and systems without installing software

### Flexible communication interfaces

- Secure communication directly over the customer's company network
- Worldwide access via the mobile communication interface (3G/UMTS/HSPA/CDMA)
- Mobile communication interface can be switched to WAN interface as redundancy path
- Integrated RS-232 interface for integrating existing serial equipment
- DMZ port (demilitarized zone) with dedicated firewall rules for increased security thanks to even stronger segmentation

# Industrial security – Routers for worldwide network access

The VPN-compatible FL MGUARDs are suitable for wired applications. They enable secure and easy remote maintenance of machines via the company network.

The TC MGUARDs are high-performance security wireless network routers and transmit sensitive data securely worldwide via the highspeed mobile phone networks.

The integrated firewall and encryption via IPsec enable safe remote maintenance of machines and systems.

## Your advantages:

- Maximum level of security with encrypted VPN connection and IPsec protocol
- VPN, routing, and firewall in just one device
- Highspeed data transmission via 3G and CDMA mobile phone networks
- Central management for remote configuration and current firmware updates
- COM server function for integrating existing serial devices







### Security router

### Security router

### Mobile phone router

### Mobile phone router

**FL MGuard RS2000 TX/TX VPN**  
Order No. 2700642

**FL MGuard RS4000 TX/TX VPN**  
Order No. 2200515

**TC MGuard RS2000 3G VPN**  
Order No. 2903441

**TC MGuard RS4000 3G VPN**  
Order No. 2903440

#### Properties

- Simple routing and remote maintenance applications
- Up to 2 VPN tunnels
- Secure encryption according to IPsec standard
- Configuration memory
- VPN enable button and VPN status LED
- Simple 2-click firewall

- Router with full scope of functions for demanding security and remote maintenance applications
- Up to 10 VPN tunnels
- Secure encryption according to IPsec standard
- Configuration memory
- VPN enable button and VPN status LED
- High-performance stateful inspection firewall

- Remote maintenance applications via UMTS/HSPA and American CDMA mobile phone networks
- Up to 2 VPN tunnels
- Secure encryption according to IPsec standard
- Configuration memory
- Two SIM card slots
- VPN enable button and VPN status LED
- Simple 2-click firewall
- Integrated four-port switch

- Remote maintenance applications via UMTS/HSPA and American CDMA mobile phone networks
- Up to 10 VPN tunnels
- Secure encryption according to IPsec standard
- Configuration memory
- Two SIM card slots
- VPN enable button and VPN status LED
- High-performance stateful inspection firewall
- Managed four port switch



#### GPS interface

Enables tracking and positioning for mobile applications and precise time synchronization.



#### SIM card redundancy

Two SIM card slots for maximum availability thanks to mobile communication redundancy.



#### SD memory card

For saving configurations for fast startup and easy device replacement.

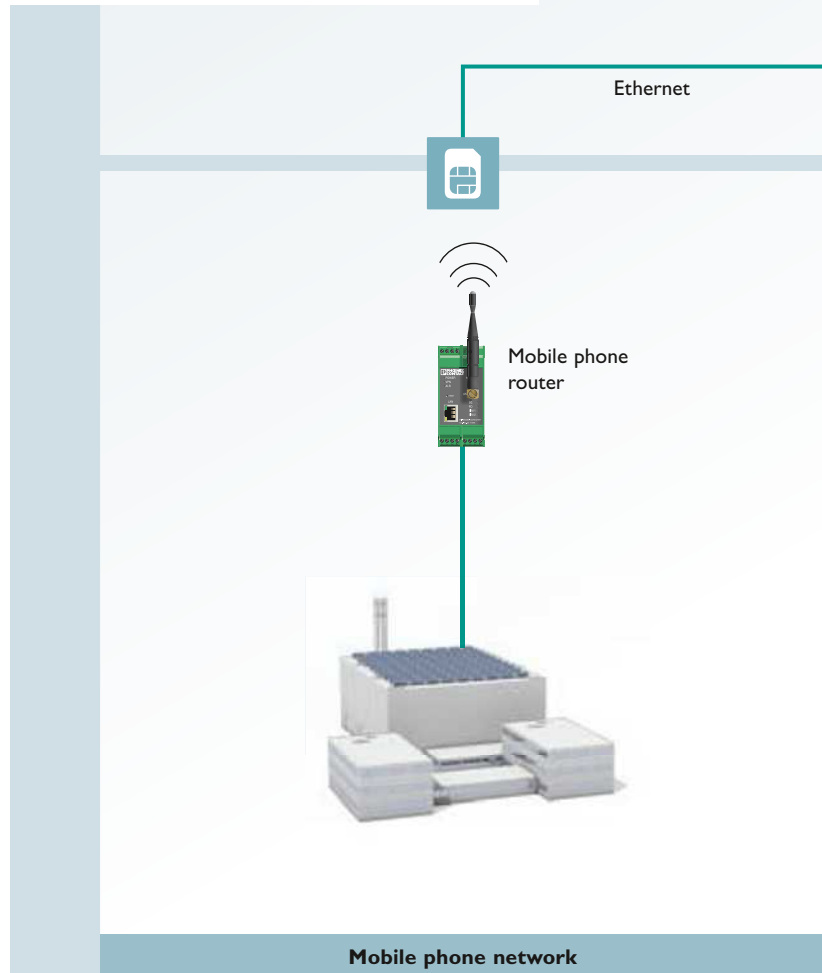
# Remote communication – We connect the world

Various communication methods are available for data transmission to remote or widespread networks or for monitoring machines and systems all over the world. The transmission methods involved are as different as the applications.

With remote communication products from Phoenix Contact, we offer you the optimum choice for your application.

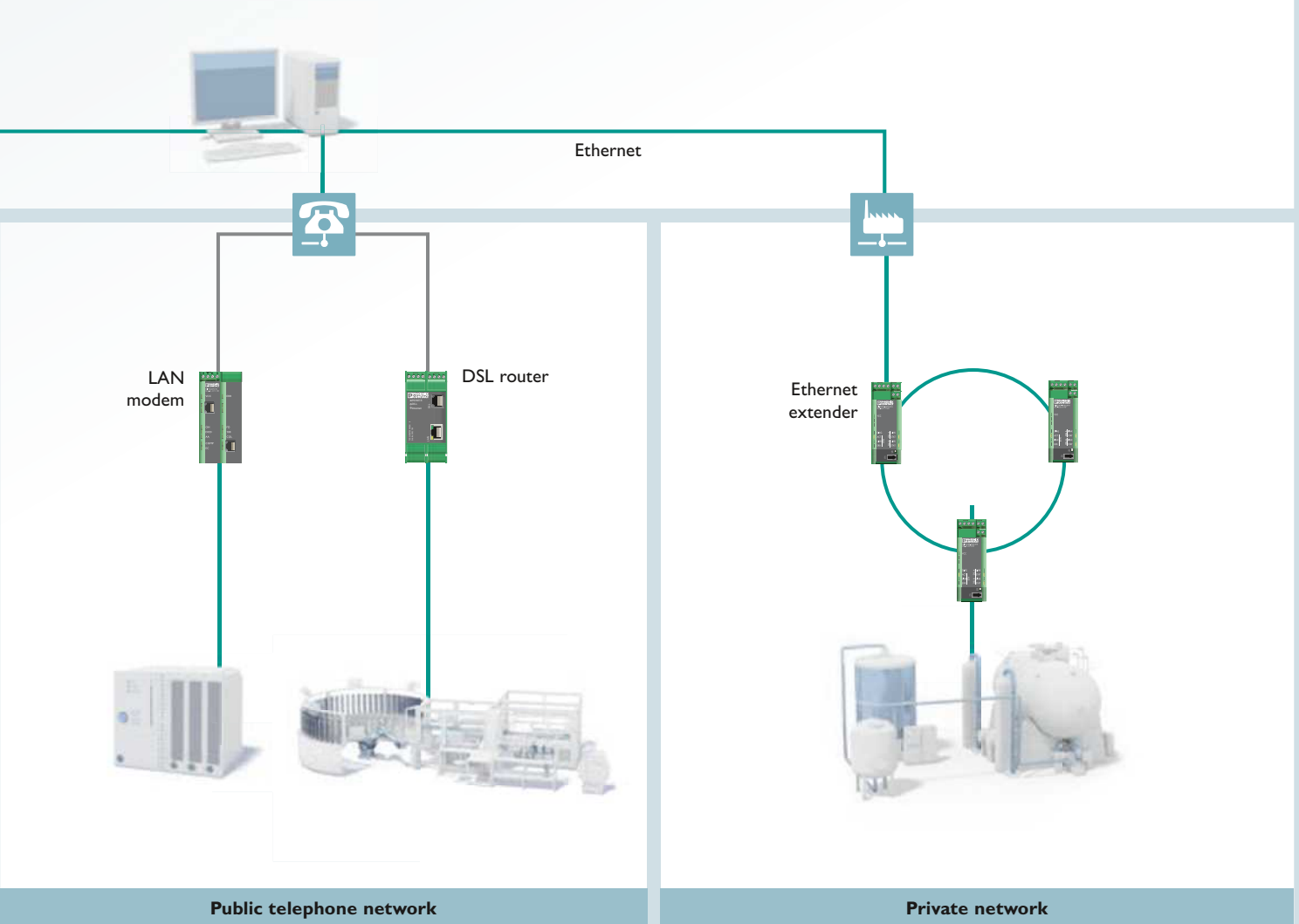
## Your advantages:

- **Mobile phone networks:**  
Communicate wirelessly at high speed with up to 7.2 Mbps
- **Public telephone network:**  
Access remote network devices directly using the telephone network, which is available worldwide
- **Private network:**  
Use existing copper cables for transmission speeds of up to 30 Mbps



## Mobile phone networks

- High-performance connections to remote machines or Ethernet networks via the Internet
- Mobile phone networks available worldwide mean that telephone connections and cables are no longer required
- Secure transmission of sensitive data via mobile communication thanks to VPN support and IPsec encryption
- Continuous data acquisition even from remote stations and efficient remote maintenance – everywhere and at all times



### Public telephone network

- Internationally recognized standards and extensive network expansion ensure worldwide availability
- Quick and easy startup and remote access thanks to the use of proven analog and digital transmission technologies
- Fast Internet connections thanks to the use of broadband ADSL (asymmetric digital subscriber line) technology in existing analog telephone infrastructure

### Private network

- Communication with remote Ethernet devices up to 20 km away via any existing copper cables such as in-house telephone lines
- Fast and cost-effective network construction as no special Ethernet cables are required
- Redundant ring structures ensure high availability

# Remote communication – We connect the world

Remote control technology and remote maintenance are important components of communication solutions. They facilitate the smooth connection of remote external stations or system components to your control system on different transmission paths.

Phoenix Contact provides you with a large range of industrial remote communication products for implementing your individual solution.

## Your advantages:

- Universal data links – worldwide and control-independent
- Secure communication – integrated security functions protect your applications and expertise.
- Robust hardware – durable, high-performance, and reliable use in harsh industrial environments





### Mobile phone router

### DSL router

### LAN modem

### Ethernet extender

**PSI-MODEM-3G/ROUTER**  
Order No. 2314008  
**PSI-MODEM-GSM/ETH**  
Order No. 2313355

**TC DSL ROUTER X400 A/B**  
Order No. 2902709  
**TC DSL ROUTER X500 A/B**  
Order No. 2902710

**PSI-MODEM/ETH**  
Order No. 2313300

**PSI-MODEM-SHDSSL/ETH**  
Order No. 2313643

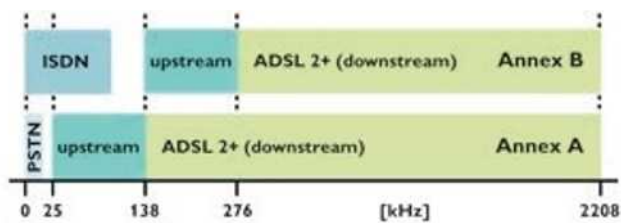
#### Properties

- Worldwide data links and alarm generation via GSM and 3G mobile phone networks
- Data rates of up to 7.2 Mbps
- 2 optional SIM card slots for maximum network availability
- Alarm generation by SMS and e-mail
- Support for IPsec and OpenVPN
- Easy configuration via web-based management
- Integrated firewall

- DSL modem and router in a single device
- All common DSL standards are supported
- Integrated Annex A/B switch-over
- Easy configuration via web-based management
- Alarm generation by e-mail
- COM server functionality
- Support for IPsec and OpenVPN
- Integrated firewall

- Worldwide data acquisition via the public telephone network
- Data rates of up to 56 kbps
- Dialing into remote networks with dial-up connection for quick and easy access to network devices
- Automatic link to remote networks for status transmission or in the case of malfunction

- Network very remote devices over distances of up to 20 km
- Transmission speed of up to 30 Mbps
- Fast startup, plug and play
- Point-to-point and line structure
- Ring redundancy for increased availability
- Two digital outputs for alarm generation
- Improved diagnostics



#### Annex A/B

The integrated Annex A/Annex B switch-over and individual selection between modem/router functionality offer maximum flexibility. Extensive preclarification of the provider requirements is not necessary.



#### Diagnostics

Built-in diagnostics for recording the strength of the mobile communication signal, monitoring the IP connection via the public network, and, for SHDSL, diagnosing cables with early warning.

# Integration of serial devices into the Ethernet network

The COM server closes the gap between the serial interfaces of automation devices and Ethernet communication of PC networks. By using the device server, you can also access non-network-capable devices via local networks or the Internet, e.g., to request the system state, perform a software update, carry out remote maintenance.

Depending on your application, choose between a basic device with standard functions, a universal device with integrated Modbus gateway, and a WLAN device for wireless connection of moving devices.

## Advantages for all device types:

- Universal use in various applications
- Network integration of serial devices via virtual COM ports
- Cable replacement in serial point-to-point connections

## Additional advantages with the universal device:

- Modbus gateway for bidirectional conversion of Modbus master and slaves with ASCII or RTU protocol to Modbus TCP protocol
- Conversion of RS-232/485 multipoint networks to Ethernet by means of adjustable address evaluation

RS-422/485  
ETHERNET  
RS-232





### Serial device server for 10/100 Base-T(X)

**FL COMSERVER UNI 232/422/485**  
Order No. 2313452  
TCP, UDP, Modbus TCP

**FL COMSERVER BASIC 232/422/485**  
Order No. 2313478  
TCP, UDP

### Serial device server for 10/100 Base-T(X)

**FL COMSERVER UNI 232/422/485T**  
Order No. 2904817  
TCP, UDP, Modbus TCP

**FL COMSERVER BAS 232/422/485T**  
Order No. 2904681  
TCP, UDP

### Serial device server for 802.11 WLAN

**FL COMSERVER WLAN 232/422/485**  
Order No. 2313559  
TCP, UDP

#### Copper Ethernet interface

Transmission speed/length 10/100 Mbps/100 m, shielded  
Protocols TCP/IP, UDP, Modbus TCP depending on the version

54 Mbps WLAN acc. to IEEE 802.11 b/g  
TCP/IP, UDP

#### Serial interface

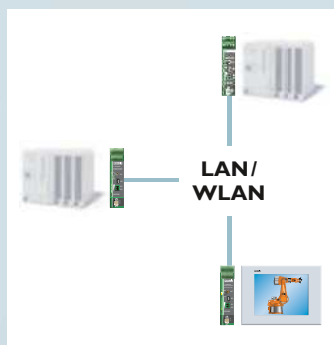
Interfaces RS-232, RS-422, RS-485  
Transmission speed 300 – 230400 bps, can be set via web-based management  
Data format/coding UART/NRZ, 7/8 Data, 1/2 Stop, 1 Parity, 10/11 bits  
Data flow control/protocols Software handshake, Xon/Xoff, hardware handshake RTS/CTS, 3964R-compatible, Modbus RTU/ASCII

RS-232, RS-422, RS-485  
300 – 230400 bps, can be set via configuration software  
UART/NRZ, 7/8 Data, 1/2 Stop, 1 Parity, 10/11 bits  
Software handshake, Xon/Xoff or hardware handshake RTS/CTS

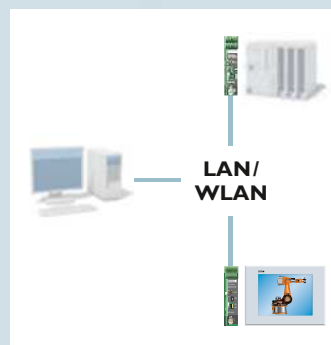
#### Functions

Management Web-based management, SNMP, Telnet and serial emergency access  
Operating temperature range -25°C – +60°C  
Power supply 19.2 – 28.8 V AC/DC

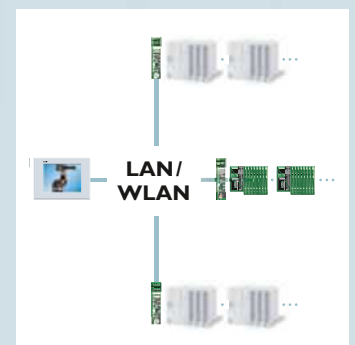
Configuration software  
-25°C – +60°C  
19.2 – 28.8 V AC/DC



**Serial tunneling**  
COM servers replace serial cables by using existing Ethernet networks.



**Virtual COM ports**  
Virtual COM ports redirect serial PC applications to Ethernet. The COM servers create new COM ports in the field.



**Modbus gateway**  
The UNI COM sever connects Modbus RTU to Modbus TCP networks and vice versa.

# Effective surge protection prevents unexpected failure

Uninterruptible production calls for the reliable transmission of all relevant data and signals.

In addition to unauthorized access and malware, surge voltages caused by lightning strikes or switching operations also present a danger to your network. In particular where cabling extends beyond a building, it is primarily the devices that are connected to an Ethernet cable that are at risk.

Protect your components with surge protection from Phoenix Contact to avoid the expense of repairs and system downtimes and the loss of important data.

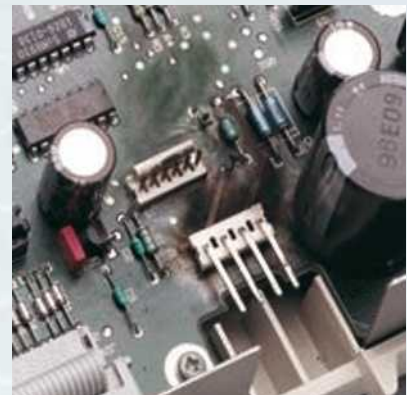
## Your advantages:

- Protection according to Class EA (CAT.6A)
- Reliable transmission up to 10 Gbps
- Power over Ethernet (PoE+) "Mode A" and "Mode B"
- RJ45 attachment plug with separate grounding cable and ground connection snap-on foot for NS 35 DIN rails



## Microelectronics are at particular risk

Sensitive electronic components are the most commonly affected by surge voltage damage.







**DATATRAB adapter/  
DIN rail module**

**DATATRAB  
19" versions**

**PLUGTRAB  
type 3 arresters**

**DT-LAN-CAT.6+**  
Order No. 2881007

**D-LAN-19"-24**  
Order No. 2838791

24 Ports

**PT 2-PE/S-230AC/FM**  
Order No. 2858357  
plug, base element, 230 V AC

**D-LAN-19"-16**  
Order No. 2880147

16 Ports

**PT 2-PE/S-120AC/FM**  
Order No. 2856812  
plug, base element, 120 V AC

**D-LAN-19"-8**  
Order No. 2880163

8 Ports

**Description**

Ethernet (10GBaseT) & PoE, token ring, CDDI, according to Class Ea/CAT6

Ethernet (1000 Base T), token ring, CDDI, according to Class D/Cat. 5e, EN 50173

Type 3 surge protection for 1-phase power supplies

**Technical data**

IEC test classification/EN type

B2/C1/C2/C3/D1

C1/C2/C3

III/T3

Maximum continuous voltage  $U_c$

3.3 V DC

6 V DC

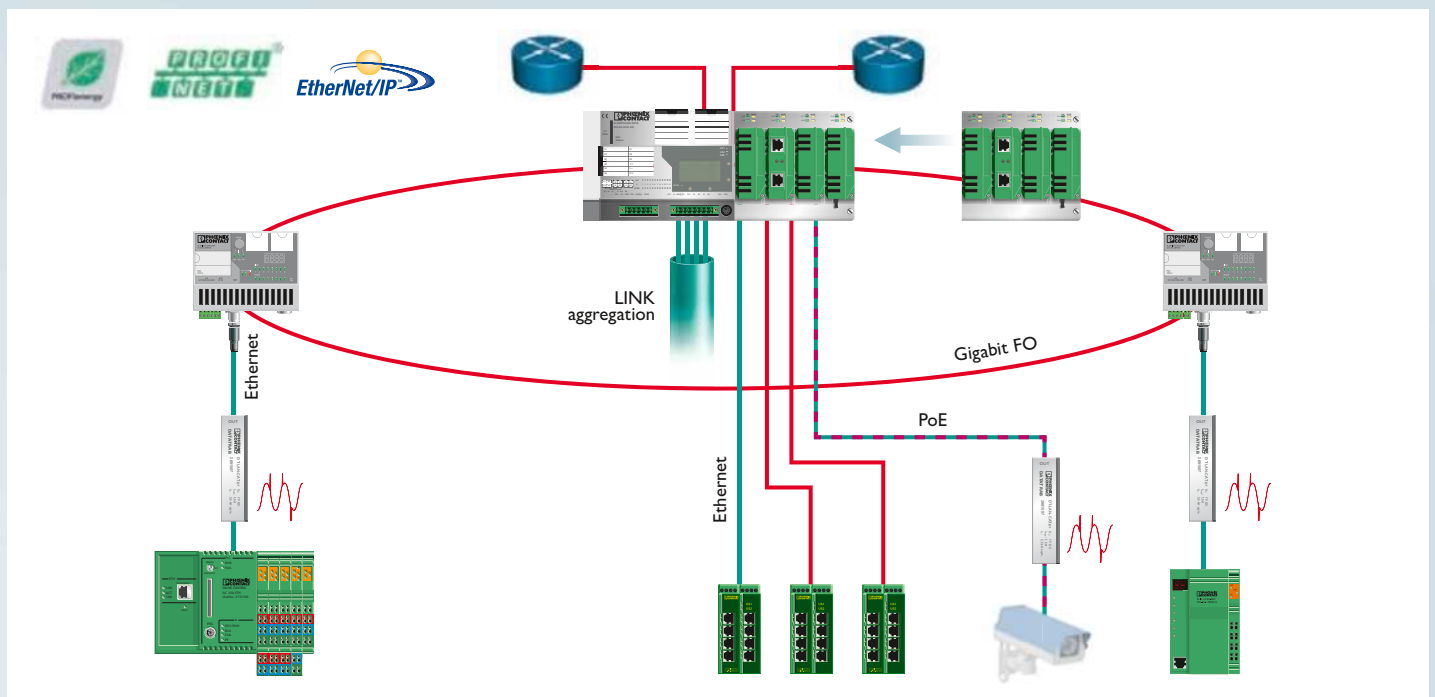
230 V AC/120 V AC

Nominal discharge current  $I_n$  (8/20) $\mu$ s (Core-Core/Core-Ground)

100 A/2 kA

350 A/350 A

3 kA/2.5 kA



**DATATRAB:** High-speed surge protection for unrivaled Gigabit performance

# Network isolators for electrical isolation up to 4 kV

The FL ISOLATOR electrically isolates copper-based Ethernet devices with transmission speeds of up to 1 Gbps. The Ethernet isolator is simply installed before the network device to be protected. High-voltage areas in power distributions up to 4 kV can thus be safely decoupled from the data network, for example, and voltage equalization currents avoided.

## Your advantages:

- High network availability thanks to electrical isolation of the data cables and cable shielding up to 4 kV
- Easy installation – no power supply required
- Fulfills the high environmental requirements of approval for railway applications

Ethernet





### Ethernet isolator up to 100 Mbps

Network isolator for electrical isolation up to 4 kV, 2 x M12 connection, for transmission speeds up to 100 Mbps, mounting on the wall or DIN rail

#### FL ISOLATOR 100-M12

Order No. 2902985

#### FL ISOLATOR 100-M12 RMS

Order No. 2904671

with adapter for DIN rail mounting

### Ethernet isolator up to 1000 Mbps

Network isolator for electrical isolation up to 4 kV, 2 x RJ45 socket for transmission speeds up to 100 Mbps and 1000 Mbps

#### FL ISOLATOR 1000-RJ/RJ

Order No. 2313915

transmission speed 1000 Mbps

#### FL ISOLATOR 100-RJ/RJ

Order No. 2313931

transmission speed 100 Mbps

### Ethernet isolator up to 100 Mbps

Network isolator for electrical isolation up to 4 kV, 1 x RJ45 socket, 1 x COMBICON plug-in screw terminal block, for transmission speeds of up to 100 Mbps

#### FL ISOLATOR 100-RJ/SC

Order No. 2313928

| Ethernet interface              |                                                     |                                                     |                                                             |
|---------------------------------|-----------------------------------------------------|-----------------------------------------------------|-------------------------------------------------------------|
| Transmission speed              | 10/100 Mbps                                         | 10/100/1000 Mbps                                    | 10/100 Mbps                                                 |
| Connection method               | M12/M12                                             | RJ45 socket/RJ45 socket, shielded                   | RJ45 socket/COMBICON plug-in screw terminal block, shielded |
| Transmission length             | ≤ 100 m (depending on the data rate and cable used) | ≤ 100 m (depending on the data rate and cable used) | ≤ 100 m (depending on the data rate and cable used)         |
| General data                    |                                                     |                                                     |                                                             |
| Ambient temperature (operation) | -40°C – +70°C                                       | -25°C – +75°C                                       | -25°C – +75°C                                               |
| Electrical isolation            | Ethernet/Ethernet                                   | Ethernet/Ethernet                                   | Ethernet/Ethernet                                           |
| Test voltage                    | 4 kV AC (50 Hz, 1 min.)                             | 4 kV AC (50 Hz, 1 min.)                             | 4 kV AC (50 Hz, 1 min.)                                     |
| Standards/specifications        | EN 50121 and EN 50155 (for railway applications)    | EN 50121 and EN 50155 (for railway applications)    | EN 50121 and EN 50155 (for railway applications)            |

### Ethernet isolators for special requirements

The FL ISOLATOR 100-M12 is equipped with M12 connection technology and is used predominantly in rail vehicles, where large potential differences can occur between individual train segments. The protocol-transparent Ethernet isolators ensure immediate electrical isolation of the data cable and cable shielding up to 4 kV.

The devices meet the requirements for railway applications according to EN 50155 and EN 50121.



Error-free data communication across all train segments

# 19" components for data technology based on copper and fiber optics

The standardized 19" technology permits space-saving, efficient, and safe data communication in computing centers and control rooms.

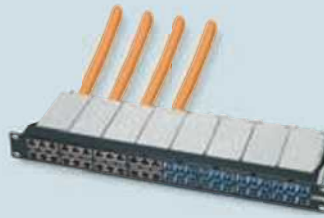
The coordinated range of 19" products from Phoenix Contact includes system components and connection technology.

Design your unique 19" application with us – from the field level to the control system.



## Your advantages:

- Coordinated connection technology and system components from a single source
- Application-specific design thanks to a comprehensive 19" product range
- The cost of expanding existing systems is minimized thanks to modular 19" components
- Unique identifiers thanks to markings and marking systems for terminal blocks, conductors, cables, and devices



### Reliable network communication

#### Managed Switches

- High port density in a unit of a certain height
- RJ45 ports and multi-mode or single-mode fiber optic connection available as options
- High availability, due to replaceable or redundant power supplies available as an option

#### Unmanaged switches

- High port density in a unit of a certain height with 24 RJ45 ports

### High system availability

- Surge protection for the power supply
- Suitable for installation in storey distributors
- Protection of all eight signal wires of the data cable
- Reliable transmission speeds up to 1 Gbps
- Up to 24 ports with RJ45 connection
- Option of direct and indirect ground connection

### Easy distribution

- 19" distribution field with space for eight modules, with a total of 48 ports with RJ45 connection
- Easy front release without the need for special tools
- Plug and play thanks to pre-assembled modules
- Transmission speeds of up to 10 Gbps
- Cable length according to customer requirements
- Optimized strain relief for every module
- GHMT certification

### Structured cabling

Standardized connectors, if desired, with UL approval for:

#### Copper

- Transmission speeds of up to 10 Gbps
- Consistent shielding concept

#### Fiber optics

- Fiber qualities: OM2, OM3, OM4 (50/125 μm) and OM1 (62.5/125 μm)
- Use of low bend fibers
- Free from halogen and fire retardant (LSFH)

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**Ethernet extender in 19" format**



**Uninterruptible power supplies**



**Robust industrial PCs**

For more system components and matching accessories, please visit [phoenixcontact.com](http://phoenixcontact.com)

# Copper-based data cabling for networks and fieldbuses

Complex automation processes call for high volumes of data at ever-increasing transmission speeds. Benefit now from high-performance connectors and cables for on-site assembly.

Whether it's future-proof high-speed cabling up to 10 Gbps or innovative, efficient hybrid cabling – we will find the perfect solution for your automation network.

## Main features

- Up to 10 Gbps
- Solutions from IP20 to IP69K
- 4- and 8-pos. versions
- IDC, pierce or spring connection
- 360° shielding concepts



Ethernet



**sercos**  
the automation bus

## Advantages at a glance



**Fast assembly** without special tools – with IDC and pierce fast connection



**Wide range of plugs** from RJ45 to M12



**Flexible device connection** thanks to versatile housing feed-throughs for devices and control cabinets



**Reliable protection** against extreme temperatures, liquids, vibrations, and UV light



**Fast data transmission** thanks to data rates up to 10 Gbps and components that meet the CAT6<sub>A</sub> standard









**Special shielding concepts** with 360° EMC shielding guarantee a high level of resistance to EMI and ESD

### Why 10 Gbps?

Transmission speeds and data volumes are constantly increasing. Data transmission speeds of up to 10 Gbps are being used in more and more applications. This can also be achieved in industrial environments using special CAT6<sub>A</sub> components. This means that you can now achieve fast and smooth data exchange throughout your entire company network.



## RJ45 connectors

|                                 |         | IP20 connectors                                                                                       |                                                                                                                  |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
|---------------------------------|---------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------|
|                                 |         | RJ45 Crimp                                                                                            | RJ45 QUICKON                                                                                                     | RJ45 INDUSTRIAL                                                                                                              |                                                                                                                                |                                                                                                                                   | Version 1                                                                                                                       |         |
| <b>Contact insert</b>           |         | <br>Crimp connection | <br>IDC displacement connection | <br>IDC displacement connection, straight | <br>IDC displacement connection, angled TOP | <br>IDC displacement connection, angled BOTTOM | <br>Displacement connection, bayonet locking |         |
| <b>Ethernet</b>                 |         | Plastic, gray                                                                                         | Plastic, green                                                                                                   | Plastic, black                                                                                                               | Metal                                                                                                                          | Metal                                                                                                                             | Metal                                                                                                                           | Metal   |
| 8-pos., CAT5                    |         |                                                                                                       |                                                                                                                  | 1402420                                                                                                                      |                                                                                                                                |                                                                                                                                   |                                                                                                                                 | 1419182 |
| 8-pos., CAT5 IDC crimp          | 1652716 | 1654743                                                                                               | 1654756                                                                                                          |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| 8-pos., CAT6 IDC crimp          | 1652729 |                                                                                                       |                                                                                                                  |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| 8-pos., CAT6 pierce crimp       | 1404388 |                                                                                                       |                                                                                                                  |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| 8-pos., CAT6 <sub>A</sub> IDC   |         |                                                                                                       |                                                                                                                  | 1419001                                                                                                                      | 1406333                                                                                                                        | 1406339                                                                                                                           | 1406336                                                                                                                         |         |
| 8-pos., CAT6 <sub>A</sub> crimp | 1418853 | 1654743                                                                                               | 1654756                                                                                                          |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| <b>PROFINET</b>                 |         |                                                                                                       |                                                                                                                  |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| 4-pos., CAT5                    |         |                                                                                                       |                                                                                                                  | 1658435                                                                                                                      |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| 8-pos., CAT5e                   |         |                                                                                                       |                                                                                                                  |                                                                                                                              | 1406334                                                                                                                        | 1406340                                                                                                                           | 1406337                                                                                                                         |         |
| <b>VARAN</b>                    |         |                                                                                                       |                                                                                                                  |                                                                                                                              |                                                                                                                                |                                                                                                                                   |                                                                                                                                 |         |
| 6 pos.                          |         |                                                                                                       |                                                                                                                  |                                                                                                                              | 1406335                                                                                                                        | 1406341                                                                                                                           | 1406338                                                                                                                         |         |

## M12 connector

|                                   |         | M12 connectors, IP65/67 |         |                      |         |                  |        |
|-----------------------------------|---------|-------------------------|---------|----------------------|---------|------------------|--------|
|                                   |         | IDC connection          |         | Piercecon connection |         | Screw connection |        |
| <b>Networks</b>                   |         | Straight                | Angled  | Straight             | Angled  | Straight         | Angled |
| <b>Ethernet</b><br>CAT5, 4 pos.,  | Pin     | 1543223                 | 1553624 |                      |         |                  |        |
|                                   | Socket  | 1553611                 | 1553637 |                      |         |                  |        |
| <b>Ethernet</b><br>CAT5, 8-pos.,  | Pin     | 1543236                 | 1553653 |                      |         |                  |        |
|                                   | Socket  | 1553640                 | 1553666 |                      |         |                  |        |
| <b>Ethernet</b><br>CAT6A, 8-pos., | Pin     |                         |         | 1417430              | 1417443 |                  |        |
|                                   | Pin Pg7 | 1554513                 | 1554539 |                      |         | 1521258          |        |
| <b>PROFINET</b>                   | Pin Pg9 |                         |         |                      |         | 1521261          |        |
|                                   | Socket  | 1554526                 | 1554542 |                      |         |                  |        |
| <b>VARAN</b>                      | Pin     | 1429130                 | 1429156 |                      |         |                  |        |
|                                   | Socket  | 1429143                 | 1429169 |                      |         |                  |        |



## IP65/67 connectors

| Version 4                                                                        |                        | Version 6                                                                         |         | Version 14                                                                        |           |                         | Version 14 RJ45 ADVANCE                                                             |                       |                         |  |
|----------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------------------|-----------|-------------------------|-------------------------------------------------------------------------------------|-----------------------|-------------------------|--|
|  |                        |  |         |  |           |                         |  |                       |                         |  |
| IDC displacement connection, push-pull interlocking                              |                        | IDC displacement connection, push-pull interlocking                               |         | IDC displacement connection, push-pull interlocking                               |           |                         | IDC displacement connection, push-pull interlocking                                 |                       |                         |  |
| Plastic, black                                                                   | Bend protection sleeve | Pin insert                                                                        | Plastic | Metal                                                                             | Metal EMC | Zinc die-cast, straight | Stainless steel, straight                                                           | Zinc die-cast, angled | Stainless steel, angled |  |
|                                                                                  | 1656990                | 1658493                                                                           | 1657834 | 1608016                                                                           | 1403367   |                         |                                                                                     |                       |                         |  |
|                                                                                  | 1652732                | 1658671                                                                           |         |                                                                                   |           |                         |                                                                                     |                       |                         |  |
|                                                                                  | 1652732                | 1658671                                                                           |         |                                                                                   |           |                         |                                                                                     |                       |                         |  |
|                                                                                  | 1652732                | 1658671                                                                           |         |                                                                                   |           |                         |                                                                                     |                       |                         |  |
| 1407413                                                                          |                        |                                                                                   | 1422205 | 1422108                                                                           |           | 1407890                 | 1407906                                                                             | 1408011               | 1407912                 |  |
|                                                                                  | 1652732                | 1658671                                                                           |         |                                                                                   |           |                         |                                                                                     |                       |                         |  |
|                                                                                  |                        |                                                                                   | 1608126 | 1608100                                                                           | 1403366   |                         |                                                                                     |                       |                         |  |
|                                                                                  |                        |                                                                                   |         |                                                                                   |           | 1407889                 | 1407908                                                                             | 1407895               | 1407914                 |  |
|                                                                                  |                        |                                                                                   |         |                                                                                   |           | 1464014                 |                                                                                     | 1464016               |                         |  |

## M12 flush-type connectors

### M12 flush-type connectors, IP65/67



Solder connection



Cable connection

| Networks                                                | Cable length | Pin     | Socket  | Pin     | Socket  |
|---------------------------------------------------------|--------------|---------|---------|---------|---------|
| <b>Ethernet</b> CAT5, 4-pos., solder connection         |              | 1456514 | 1456527 |         |         |
| <b>Ethernet</b> CAT5, 4-pos., cable type 93E            | 2 m          |         |         |         | 1405866 |
| <b>Ethernet</b> CAT5, 8-pos., solder connection         |              | 1456530 | 1456543 |         |         |
| <b>Ethernet</b> CAT5, 8-pos., solder connection, THR    |              |         | 1557549 |         |         |
| <b>Ethernet</b> CAT5, 8-pos., cable type 94B            | 5 m          |         |         |         | 1407877 |
| <b>Ethernet</b> CAT5, 8-pos., cable type 94C            | 2 m          |         |         |         | 1412820 |
| <b>Ethernet</b> CAT6A, 8-pos., solder connection        |              |         | 1440669 |         |         |
| <b>Ethernet</b> CAT6A, 8-pos., cable type 94F           | 0.5 m        |         |         |         | 1424135 |
|                                                         | 1 m          |         |         |         | 1424148 |
|                                                         | 2 m          |         |         |         | 1424151 |
|                                                         | 5 m          |         |         |         | 1424164 |
| <b>Ethernet</b> CAT5, 8-pos., hybrid, solder connection |              |         | 1407503 |         |         |
| <b>Ethernet</b><br>CAT5, 8-pos., hybrid, cable type 94H | 0.5 m        |         |         |         | 1407504 |
|                                                         | 1 m          |         |         |         | 1407505 |
|                                                         | 2 m          |         |         |         | 1407506 |
|                                                         | 5 m          |         |         |         | 1407507 |
| <b>PROFINET</b> 4-pos., solder connection               |              | 1456556 | 1456569 |         |         |
| <b>PROFINET</b> 4-pos., solder connection, THR          |              |         | 1542648 |         |         |
| <b>PROFINET</b> 4-pos., with polarity protection        |              |         | 1542619 |         |         |
| <b>PROFINET</b> 4-pos., cable type 93B                  | 0.5 m        |         |         | 1427805 | 1437766 |
|                                                         | 1 m          |         |         | 1437818 | 1437779 |
|                                                         | 2 m          |         |         | 1437821 | 1437782 |
|                                                         | 5 m          |         |         | 1437834 | 1437795 |
| <b>PROFINET</b> 4-pos., cable type 93C                  | 2 m          |         |         |         | 1416209 |
| <b>PROFINET</b> 4-pos., cable type 93R                  | 3 m          |         |         |         | 1416263 |
| <b>Sercos</b> solder connection                         |              | 1457979 | 1457966 |         |         |
| <b>Sercos</b> cable type 93K                            | 0.5 m        |         |         | 1410158 | 1419154 |
|                                                         | 1 m          |         |         | 1419159 | 1419155 |
|                                                         | 2 m          |         |         | 1419160 | 1419156 |
|                                                         | 5 m          |         |         | 1419161 | 1419157 |
| <b>EtherCAT</b> solder connection                       |              | 1456556 | 1456569 |         |         |
| <b>EtherCAT</b> cable type 93K                          | 0.5 m        |         |         | 1419138 | 1419134 |
|                                                         | 1 m          |         |         | 1419139 | 1419135 |
|                                                         | 2 m          |         |         | 1419140 | 1419136 |
|                                                         | 5 m          |         |         | 1419141 | 1419137 |

## Heavy-duty connectors HEAVYCON design B

### Contact inserts



Ethernet connector, crimp connection VS 1.0, connection cross section 0.08 – 0.5 mm<sup>2</sup>



Module for Ethernet connector



EMC connector, crimp connection, CK 1,6, connection cross section 0.14 – 2.5 mm<sup>2</sup>



EMC module for the EMC connector

| Networks               | Ethernet connector, crimp connection VS 1.0 |         | Module for Ethernet connector |         | EMC connector, crimp connection, CK 1,6 |         | EMC module for the EMC connector |         |
|------------------------|---------------------------------------------|---------|-------------------------------|---------|-----------------------------------------|---------|----------------------------------|---------|
|                        | Socket                                      | Pin     | Socket                        | Pin     | Socket                                  | Pin     | Socket                           | Pin     |
| <b>Ethernet 8-pos.</b> | 1587726                                     | 1587713 |                               |         |                                         |         |                                  |         |
| 1 module slot          |                                             |         | 1587700                       | 1587690 |                                         |         |                                  |         |
| <b>Ethernet 4-pos.</b> |                                             |         |                               |         | 1636091                                 | 1636088 |                                  |         |
| 2 module slots         |                                             |         |                               |         |                                         |         | 1678570                          | 1678567 |

## Sensor/actuator cabling and industrial connectors

### M12 connector with crimp connection



Bus system connectors for assembly with Pg9 screw connection, crimp connection, IP67, 5 – 8 mm cable diameter, for Ethernet and PROFINET

### M12 Y-distributor for power connectors



M12 SPEEDCON Y-distributor, IP65/67, M12 pin to 2 x M12 socket

| 4 pos. | M12 connector with crimp connection |         | M12 Y-distributor for power connectors |
|--------|-------------------------------------|---------|----------------------------------------|
|        | straight                            | angled  | Hybrid                                 |
|        | 1411046                             | 1411047 | 1410632                                |

## IP67 panel feed-throughs and couplings

### Panel feed-through



Control cabinet panel feed-through, IP65/IP67, M12 to RJ45, straight and angled

### M12 flush-type socket



M12 flush-type socket for 10 Gbps (CAT6A), M12 flush-type socket hybrid (CAT5e) for up to 4 x 6 A, Y-coded

### RJ45 coupling








IP67, CAT5e, with protective cover



IP67, CAT5e, with protective cover for push/pull interlocking

| Networks                                 | Panel feed-through |         | M12 flush-type socket |         |         | RJ45 coupling |         |               |
|------------------------------------------|--------------------|---------|-----------------------|---------|---------|---------------|---------|---------------|
|                                          | 90°                | 180°    | straight              | angled  | Hybrid  | gray          | black   | nickel-plated |
| <b>Ethernet 8-pos., A-coded</b>          | 1405057            | 1405060 |                       |         |         |               |         |               |
| <b>Ethernet 8-pos., X-coded</b>          | 1404548            | 1404549 |                       |         |         |               |         |               |
| <b>Ethernet/PROFINET 4-pos., D-coded</b> | 1657261            | 1657494 |                       |         |         |               |         |               |
| <b>Ethernet 8-pos.</b>                   |                    |         | 1440669               | 1424180 | 1456666 |               |         |               |
| <b>Ethernet/PROFINET</b>                 |                    |         |                       |         |         | 1689268       | 1658684 | 1405183       |






## RJ45 panel mounting frames and socket inserts, IP20 RJ45 patch panels




|                                                                                     |                                    | IP20 panel mounting frame                                                         |                                                                                    |                                                                                     |                                                                                     |                |               |
|-------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|---------------|
|                                                                                     |                                    | IP20                                                                              | Version 1                                                                          | Version 4                                                                           |                                                                                     |                |               |
|                                                                                     |                                    |  |  |  |  |                |               |
|                                                                                     |                                    | 1-way, for modular socket inserts                                                 | Bayonet locking                                                                    | Push-pull interlocking                                                              | For round push-pull                                                                 |                |               |
| Socket inserts                                                                      |                                    | Cable connection                                                                  | Order No.                                                                          | Plastic, gray                                                                       | Metal                                                                               | Plastic, black | Plastic, gray |
|    | Keystone, CAT5                     | 1689459                                                                           | 1689433                                                                            |                                                                                     |                                                                                     |                | 1689844       |
|                                                                                     | Keystone, CAT6 <sub>A</sub>        | 1653168                                                                           | 1689433                                                                            |                                                                                     |                                                                                     |                | 1689844       |
|                                                                                     | Freenet, CAT5                      | 1652936                                                                           |                                                                                    |                                                                                     |                                                                                     |                | 1653744       |
|                                                                                     | Freenet, CAT6 <sub>A</sub>         | 1424009                                                                           |                                                                                    |                                                                                     |                                                                                     |                | 1653744       |
|                                                                                     | Contact insert for bayonet locking |                                                                                   |                                                                                    | 1419185                                                                             |                                                                                     |                |               |
| PCB mounting                                                                        |                                    |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                |               |
|   | Straight, CAT6                     | 1653090                                                                           |                                                                                    |                                                                                     |                                                                                     |                |               |
|                                                                                     | Angled, CAT5                       | 1688586                                                                           |                                                                                    |                                                                                     |                                                                                     |                |               |
|                                                                                     | Angled, CAT6                       | 1653087                                                                           |                                                                                    |                                                                                     |                                                                                     |                |               |
|                                                                                     | Angled, CAT6 <sub>A</sub>          | 1420401                                                                           |                                                                                    |                                                                                     |                                                                                     |                |               |
|                                                                                     | Straight, CAT5                     | 1407409                                                                           |                                                                                    |                                                                                     |                                                                                     | 1407411        |               |
| Angled, CAT5                                                                        | 1407408                            |                                                                                   |                                                                                    |                                                                                     | 1407410                                                                             |                |               |
| Socket to socket                                                                    |                                    |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                |               |
|  | Keystone, CAT5                     | 1689064                                                                           | 1689433                                                                            |                                                                                     |                                                                                     |                | 1689844       |
|                                                                                     | Keystone, CAT6                     | 1653155                                                                           | 1689433                                                                            |                                                                                     |                                                                                     |                | 1689844       |
|                                                                                     | Freenet, CAT5                      | 1405617                                                                           |                                                                                    |                                                                                     |                                                                                     |                | 1653744       |
|                                                                                     | Version 1 panel mounting frame set |                                                                                   |                                                                                    | 1419184                                                                             |                                                                                     |                |               |
|                                                                                     | Version 4 panel mounting frame set |                                                                                   |                                                                                    |                                                                                     |                                                                                     | 1407412        |               |

## RJ45 patch panels, IP20, CAT5e, for DIN rail mounting

|                 |        |  |  |  |
|-----------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                 | Shielding, either directly on DIN rail (8 and 4-pos.) or via RC combination (8-pos. only) | Shielding, either directly on DIN rail or via RC combination                        | Shielding, either directly on DIN rail or via RC combination                          | Shielding, either directly on DIN rail or via RC combination                          |
| Networks        | with screw connection                                                                     | with spring-cage connection                                                         | with IDC connection                                                                   | with socket/socket connection                                                         |
| Ethernet 8-pos. | 2901643                                                                                   | 2901642                                                                             | 2901645                                                                               | 2901646                                                                               |
| Ethernet 4-pos. | 2744610                                                                                   |                                                                                     |                                                                                       |                                                                                       |

## IP65/67 panel mounting frames

| Version 6                                                                        |                                                                                   |                | Version 14                                                                        |                                                                                     |                                                                                     |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |                |  |  |  |
| mounting cutout<br>interlocking                                                  | For a square mounting cutout<br>Push-pull interlocking                            |                |                                                                                   | Push-pull interlocking                                                              |                                                                                     |
| Plastic, black                                                                   | Plastic, gray                                                                     | Plastic, black | Metal, round                                                                      | Metal, square                                                                       | Plastic, square                                                                     |
| 1658053                                                                          | 1689080                                                                           | 1658642        |                                                                                   |                                                                                     |                                                                                     |
| 1658053                                                                          | 1689080                                                                           | 1658642        |                                                                                   |                                                                                     |                                                                                     |
| 1658668                                                                          |                                                                                   |                | 1405222                                                                           | 1405358                                                                             | 1608197                                                                             |
| 1658668                                                                          |                                                                                   |                | 1405222                                                                           | 1405358                                                                             | 1608197                                                                             |
|                                                                                  |                                                                                   |                |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1689446                                                                           | 1658655        |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1689446                                                                           | 1658655        |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1689446                                                                           | 1658655        |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                |                                                                                   | 1608029                                                                             | 1657847                                                                             |
|                                                                                  |                                                                                   |                |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                |                                                                                   |                                                                                     |                                                                                     |
| 1658053                                                                          | 1689080                                                                           | 1658642        |                                                                                   |                                                                                     |                                                                                     |
| 1658053                                                                          | 1689080                                                                           | 1658642        |                                                                                   |                                                                                     |                                                                                     |
| 1658668                                                                          |                                                                                   |                | 1405222                                                                           | 1405358                                                                             | 1608197                                                                             |
|                                                                                  |                                                                                   |                |                                                                                   |                                                                                     |                                                                                     |





|                                                                                         |                                                                                                                |                                                                                                              |
|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
|      |                             |                           |
| Consistent shield, extended<br>temperature range -40°C – +85°C,<br>narrow overall width | Cable sharing module with cable outlet<br>on the front, option of shield contacting<br>on DIN rail via jumpers | Cable sharing module with cable outlet<br>on the top, option of shield contacting<br>on DIN rail via jumpers |
| with socket/socket connection                                                           | with spring-cage connection                                                                                    | with spring-cage connection                                                                                  |
| 2904933                                                                                 | 2903532                                                                                                        | 2904577                                                                                                      |

## RJ45 patch panels and terminal outlets

|                                                                                             |           |  |  |
|---------------------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Components for 19" technology</b>                                                        | Order No. | RJ45 patch panel, IDC connection                                                   | RJ45 patch fields                                                                   |
| 19" frame, empty (gray, black)                                                              |           |                                                                                    |                                                                                     |
| Jumpering panel, 19"                                                                        |           |                                                                                    |                                                                                     |
| Dummy frame, size of one module, for use in the frame                                       |           |                                                                                    |                                                                                     |
| RJ45 module, 6 x RJ45 to 6 x RJ45, 10 Gbps, can be unlocked from the front, variable length |           |                                                                                    |                                                                                     |
| <b>Socket insert, Freetnet</b>                                                              |           |                                                                                    |                                                                                     |
| Socket to cable, CAT5                                                                       | 1652936   |                                                                                    |                                                                                     |
| Socket to cable, CAT6 <sub>A</sub>                                                          | 1424009   |                                                                                    |                                                                                     |
| Socket to socket, CAT5                                                                      | 1405617   |                                                                                    |                                                                                     |
| <b>Patch fields</b>                                                                         |           |                                                                                    |                                                                                     |
| 2 RJ45 network connections, CAT5e                                                           |           |                                                                                    | 2891165                                                                             |
| 2 RJ45 network connections, CAT6                                                            |           |                                                                                    | 2891068                                                                             |
| 8 RJ45 network connections, CAT5e                                                           |           |                                                                                    | 2891178                                                                             |
| 9 RJ45 network connections, CAT6                                                            |           |                                                                                    | 2891071                                                                             |
| Patch panel                                                                                 |           | 1658118                                                                            |                                                                                     |

|                                                   |  | Version 6                                                                             |                                                                                       |
|---------------------------------------------------|--|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                                                   |  |  |  |
| <b>Connections</b>                                |  | RJ45 coupling, gray                                                                   | RJ45 coupling, black                                                                  |
| 1 x RJ45, cable diameter 5 mm – 8 mm              |  |                                                                                       |                                                                                       |
| 1 x RJ45, cable diameter 7 mm – 10.5 mm           |  |                                                                                       |                                                                                       |
| 1 x RJ45/1 x power, cable diameter 5 mm – 8 mm    |  |                                                                                       |                                                                                       |
| 1 x RJ45/1 x power, cable diameter 7 mm – 10.5 mm |  |                                                                                       |                                                                                       |
| 1 x RJ45/RJ45                                     |  | 1689268                                                                               | 1658684                                                                               |
| 1 x power/power                                   |  |                                                                                       |                                                                                       |
| 2 x RJ45                                          |  |                                                                                       |                                                                                       |
| 1 x RJ45/1 x power                                |  |                                                                                       |                                                                                       |

## RJ45 patch panels, IP20

|  |  |  |  |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| 19" frame, empty, for 8 modules                                                  | Patch panel, 19" mounting, with 16 slots                                          | Surface-mounted socket, for RJ45 inserts                                            | Flush-type socket, for RJ45 inserts                                                 |
| 1407986 / 1409140                                                                |                                                                                   |                                                                                     |                                                                                     |
| 1407994 / 1409283 / 1409284                                                      |                                                                                   |                                                                                     |                                                                                     |
| 1407988                                                                          |                                                                                   |                                                                                     |                                                                                     |
| 1407995                                                                          |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1652994                                                                           | 1653003                                                                             | 1653016                                                                             |
|                                                                                  | 1652994                                                                           | 1653003                                                                             | 1653016                                                                             |
|                                                                                  | 1652994                                                                           | 1653003                                                                             | 1653016                                                                             |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                     |                                                                                     |

## RJ45 terminal outlets, IP65/67

| Version 14                                                                          |                                                                                     |                                                                                     |                                                                                       |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|  |  |  |  |
| Terminal outlet                                                                     | Terminal outlet                                                                     | RJ45 and power robot interface                                                      | RJ45 robot interface                                                                  |
|                                                                                     |                                                                                     |                                                                                     | 1403678                                                                               |
|                                                                                     |                                                                                     |                                                                                     | 1403686                                                                               |
|                                                                                     |                                                                                     | 1403682                                                                             |                                                                                       |
|                                                                                     |                                                                                     | 1403688                                                                             |                                                                                       |
|                                                                                     |                                                                                     |                                                                                     | 1403685                                                                               |
|                                                                                     |                                                                                     |                                                                                     | 1403684                                                                               |
| 1404278                                                                             | 1404281                                                                             |                                                                                     |                                                                                       |
|                                                                                     | 1404333                                                                             |                                                                                     |                                                                                       |

## Industrial patch cables and hybrid cables, office patch cables, accessories

### Ethernet industrial patch cables

RJ45 plug, IP20



Ethernet patch cable, transmission category: CAT5, outer sheath material: PUR, structure: 4x2xAWG26 SF/UTP, outside diameter: 6.4 mm, temperature: -40°C – +70°C

| Networks |       | straight/straight | straight/angled | angled/angled |
|----------|-------|-------------------|-----------------|---------------|
| Ethernet | 0.3 m | 1417993           | 1418002         | 1418015       |
|          | 0.5 m | 1418028           | 1418031         | 1418044       |
|          | 1 m   | 1418067           | 1418070         | 1418099       |
|          | 2 m   | 1418109           | 1418125         | 1418138       |
|          | 5 m   | 1418141           | 1418154         | 1418167       |
|          | 10 m  |                   |                 |               |
| PROFINET | 0.3 m |                   |                 |               |
|          | 1 m   |                   |                 |               |
|          | 2 m   |                   |                 |               |



### Accessories


### Accessories (for office patch cables only)

| Color-coding                                                                                                          |         | RJ45 protective cap                          | Security frame                                                        |         | Security element                                                                                                       | Safe clip                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------|-----------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| <p>Color coding for IP20 patch cables, for easy visual color coding of connections (for office patch cables only)</p> |         | <p>Dust protection caps for RJ45 sockets</p> | <p>Security frame for SFN switches and patch fields including key</p> |         | <p>Self-locking security element for IP20 patch cables, to prevent malicious disconnection of Ethernet connections</p> | <p>Safe clip for IP20 patch cables, to prevent accidental disconnection of Ethernet connections</p> |
| for IP20 patch cables                                                                                                 |         | CAT6, S/FTP shielding                        |                                                                       |         |                                                                                                                        |                                                                                                     |
| Black                                                                                                                 | 2891194 | 2832991                                      | Green                                                                 | 2891615 | Lockable element                                                                                                       | 2891424                                                                                             |
| Blue                                                                                                                  | 2891291 |                                              | Red                                                                   | 2891712 | Key                                                                                                                    | 2891521                                                                                             |
| Brown                                                                                                                 | 2891495 |                                              | White                                                                 | 2891819 |                                                                                                                        |                                                                                                     |
| Yellow                                                                                                                | 2891592 |                                              | Lock                                                                  | 2891220 |                                                                                                                        |                                                                                                     |
| Gray                                                                                                                  | 2891699 |                                              | Key                                                                   | 2891327 |                                                                                                                        |                                                                                                     |
| Green                                                                                                                 | 2891796 |                                              |                                                                       |         |                                                                                                                        |                                                                                                     |
| Red                                                                                                                   | 2891893 |                                              |                                                                       |         |                                                                                                                        |                                                                                                     |
| Violet                                                                                                                | 2891990 |                                              |                                                                       |         |                                                                                                                        |                                                                                                     |





| Ethernet hybrid cables                                                                                                                                                                                                                                               |                         | PROFINET industrial patch cables                                                                                                                                                                                                               |                 |               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|
| M12 plug, IP67/IP69K                                                                                                                                                                                                                                                 | Open cable end          | RJ45 plug, IP20                                                                                                                                                                                                                                |                 |               |
|  <p>Ethernet hybrid patch cable, transmission category: CAT5e, outer sheath material: PUR, structure: 1x4xAWG26/1x4xAWG20, outside diameter: 7.6 mm, temperature: -40°C – +90°C</p> |                         |  <p>PROFINET patch cable, transmission category: CAT5, outer sheath material: PVC, structure: SF/Q, outside diameter: 6.5 mm, temperature: -40°C – +70°C</p> |                 |               |
| straight/straight                                                                                                                                                                                                                                                    | straight/open cable end | straight/straight                                                                                                                                                                                                                              | straight/angled | angled/angled |
| 1407491                                                                                                                                                                                                                                                              | 1407487                 |                                                                                                                                                                                                                                                |                 |               |
| 1407492                                                                                                                                                                                                                                                              | 1407488                 |                                                                                                                                                                                                                                                |                 |               |
| 1407493                                                                                                                                                                                                                                                              | 1407489                 |                                                                                                                                                                                                                                                |                 |               |
| 1407494                                                                                                                                                                                                                                                              | 1407490                 |                                                                                                                                                                                                                                                |                 |               |
|                                                                                                                                                                                                                                                                      |                         | 1418413                                                                                                                                                                                                                                        | 1418183         | 1418196       |
|                                                                                                                                                                                                                                                                      |                         | 1418235                                                                                                                                                                                                                                        | 1418248         | 1418251       |
|                                                                                                                                                                                                                                                                      |                         | 1418264                                                                                                                                                                                                                                        | 1418277         | 1418280       |

| Color-coding                                                                                                               |         |
|----------------------------------------------------------------------------------------------------------------------------|---------|
|  <p>Marking label for FL PATCH GUARD</p> |         |
| for office patch cables                                                                                                    |         |
| Black                                                                                                                      | 2891136 |
| Blue                                                                                                                       | 2891233 |
| Orange                                                                                                                     | 2891330 |
| Yellow                                                                                                                     | 2891437 |
| Turquoise                                                                                                                  | 2891534 |
| Green                                                                                                                      | 2891631 |
| Red                                                                                                                        | 2891738 |
| Violet                                                                                                                     | 2891835 |

| Office patch cables                                                                                                                                                                                                                                                                     |                       |                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|
| Assembled patch cable, IP20                                                                                                                                                                                                                                                             |                       |                       |
|  <p>Outer sheath material: LSFROH, outside diameter: 5.5 mm, material of individual wires: Cu litz wire, individual wires per module: 8, cross section of individual wires: 0.14 mm<sup>2</sup></p> |                       |                       |
| Ethernet                                                                                                                                                                                                                                                                                | CAT5, S/UTP shielding | CAT6, S/FTP shielding |
| 0.3 m                                                                                                                                                                                                                                                                                   | 2832250               | 2891181               |
| 0.5 m                                                                                                                                                                                                                                                                                   | 2832263               | 2891288               |
| 1 m                                                                                                                                                                                                                                                                                     | 2832276               | 2891385               |
| 1.5 m                                                                                                                                                                                                                                                                                   | 2832221               | 2891482               |
| 2 m                                                                                                                                                                                                                                                                                     | 2832289               | 2891589               |
| 3 m                                                                                                                                                                                                                                                                                     | 2832292               | 2891686               |
| 5 m                                                                                                                                                                                                                                                                                     | 2832580               | 2891783               |
| 7.5 m                                                                                                                                                                                                                                                                                   | 2832616               | 2891880               |
| 10 m                                                                                                                                                                                                                                                                                    | 2832629               | 2891877               |
| 12.5 m                                                                                                                                                                                                                                                                                  |                       | 2891369               |
| 15 m                                                                                                                                                                                                                                                                                    |                       | 2891372               |
| 20 m                                                                                                                                                                                                                                                                                    |                       | 2891576               |

## Assembled cables, Ethernet, 4-pos., shielded

|                                                                                     |          | M8 plug                                                                           | M8 socket                                                                         | RJ45 plug                                                                          |                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                     |          |                                                                                   |                                                                                   | IP20                                                                               | Version 6                                                                           | Version 14, metal                                                                   |
|                                                                                     |          |  |  |  |  |  |
| Open cable end                                                                      | OE       | M8MS                                                                              | M8FS                                                                              | R4AC                                                                               | R4MC                                                                                | R4RC                                                                                |
|    | 1 m      | 1407344                                                                           |                                                                                   | 1405633                                                                            |                                                                                     |                                                                                     |
|                                                                                     | 2 m      | 1407345                                                                           |                                                                                   |                                                                                    | 1405675                                                                             |                                                                                     |
|                                                                                     | 5 m      | 1407346                                                                           |                                                                                   |                                                                                    |                                                                                     | 1405743                                                                             |
|                                                                                     | 10 m     | 1407347                                                                           |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | Variable | 1408719                                                                           | 1408716                                                                           |                                                                                    |                                                                                     |                                                                                     |
| M8 plug                                                                             | M8M2     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|    | 1 m      | 1407348                                                                           |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 2 m      | 1407349                                                                           |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 5 m      | 1407350                                                                           |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 10 m     | 1407351                                                                           |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | Variable | 1408718                                                                           | 1408715                                                                           |                                                                                    |                                                                                     |                                                                                     |
| RJ45 plug, IP20                                                                     | R4AC     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|    | 1 m      | 1407352                                                                           |                                                                                   | 1408933                                                                            |                                                                                     |                                                                                     |
|                                                                                     | 2 m      | 1407353                                                                           |                                                                                   | 1408934                                                                            | 1405921                                                                             |                                                                                     |
|                                                                                     | 5 m      | 1407354                                                                           |                                                                                   | 1408935                                                                            |                                                                                     | 1405992                                                                             |
|                                                                                     | 10 m     | 1407355                                                                           |                                                                                   | 1408936                                                                            |                                                                                     |                                                                                     |
|                                                                                     | Variable | 1408717                                                                           | 1408714                                                                           |                                                                                    |                                                                                     |                                                                                     |
| RJ45 plug                                                                           | R4MC     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| Version 6                                                                           | 1 m      |                                                                                   |                                                                                   |                                                                                    | 1408937                                                                             |                                                                                     |
|  | 2 m      |                                                                                   |                                                                                   |                                                                                    | 1408938                                                                             |                                                                                     |
|                                                                                     | 5 m      |                                                                                   |                                                                                   |                                                                                    | 1408939                                                                             |                                                                                     |
|                                                                                     | 10 m     |                                                                                   |                                                                                   |                                                                                    | 1408940                                                                             |                                                                                     |
|                                                                                     | Variable |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| RJ45 plug, metal                                                                    | R4RC     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| Version 14                                                                          | 1 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 1408941                                                                             |
|  | 2 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 1408942                                                                             |
|                                                                                     | 5 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 1408943                                                                             |
|                                                                                     | 10 m     |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 1408945                                                                             |
|                                                                                     | Variable |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| RJ45 plug, plastic                                                                  | R4QC     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| Version 14                                                                          | 1 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|  | 2 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 5 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 10 m     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | Variable |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| M12 plug, SPEEDCON                                                                  | MSD SCO  |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|  | 1 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 2 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 5 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 10 m     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | Variable |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
| M12 plug, SPEEDCON                                                                  | MRD SCO  |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|  | 1 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 2 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 5 m      |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | 10 m     |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                                                                                     | Variable |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |

|                                                                                  | M12 plug                                                                          |                                                                                   | M12 socket                                                                        |                                                                                     | M12 flush-type socket                                                               |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Version 14, plastic                                                              | SPEEDCON                                                                          |                                                                                   | SPEEDCON                                                                          |                                                                                     | Rear mounting                                                                       |
|  |  |  |  |  |  |
| R4QC                                                                             | MSD SCO                                                                           | MRD SCO                                                                           | FSD SCO                                                                           | FRD SCO                                                                             | FSDBP                                                                               |
|                                                                                  | 1407356                                                                           |                                                                                   | 1407380                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407357                                                                           |                                                                                   | 1407381                                                                           |                                                                                     | 1405866                                                                             |
| 1405772                                                                          | 1407358                                                                           |                                                                                   | 1407382                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407359                                                                           |                                                                                   | 1407383                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1408713                                                                           | 1408705                                                                           | 1408697                                                                           | 1408690                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1407360                                                                           |                                                                                   | 1407384                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407361                                                                           |                                                                                   | 1407385                                                                           |                                                                                     | 1406085                                                                             |
| 1406030                                                                          | 1407362                                                                           |                                                                                   | 1407386                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407363                                                                           |                                                                                   | 1407387                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1408712                                                                           | 1408704                                                                           | 1408696                                                                           | 1408698                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1407364                                                                           |                                                                                   | 1407388                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407365                                                                           |                                                                                   | 1407389                                                                           |                                                                                     | 1406247                                                                             |
|                                                                                  | 1407366                                                                           |                                                                                   | 1407390                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407367                                                                           |                                                                                   | 1407391                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1408710                                                                           | 1408703                                                                           | 1408695                                                                           | 1408688                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1407368                                                                           |                                                                                   | 1407392                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407369                                                                           |                                                                                   | 1407393                                                                           |                                                                                     | 1406519                                                                             |
|                                                                                  | 1407370                                                                           |                                                                                   | 1407394                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407371                                                                           |                                                                                   | 1407395                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1408709                                                                           | 1407802                                                                           | 1408694                                                                           | 1408687                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| 1408947                                                                          | 1407372                                                                           |                                                                                   | 1407396                                                                           |                                                                                     |                                                                                     |
| 1408948                                                                          | 1407373                                                                           |                                                                                   | 1407397                                                                           |                                                                                     | 1406603                                                                             |
| 1408946                                                                          | 1407374                                                                           |                                                                                   | 1407398                                                                           |                                                                                     |                                                                                     |
| 1408949                                                                          | 1407375                                                                           |                                                                                   | 1407399                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1408707                                                                           | 1408701                                                                           | 1408693                                                                           | 1408686                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  | 1407376                                                                           |                                                                                   | 1407400                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407377                                                                           |                                                                                   | 1407401                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407378                                                                           |                                                                                   | 1407402                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1407379                                                                           |                                                                                   | 1407403                                                                           |                                                                                     |                                                                                     |
|                                                                                  | 1408706                                                                           | 1408700                                                                           | 1408692                                                                           | 1408684                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   | 1408699                                                                           | 1408691                                                                           | 1408683                                                                             |                                                                                     |

## Assembled cables, Ethernet, 8-pos., shielded




### RJ45 plug

|                                                                                                   |          | IP20    | Version 6 | Version 14, metal | Version 14, plastic |
|---------------------------------------------------------------------------------------------------|----------|---------|-----------|-------------------|---------------------|
| Open cable end                                                                                    | OE       | R4AC    | R4MC      | R4RC              | R4QC                |
|                  | 1 m      |         |           |                   |                     |
|                                                                                                   | 2 m      |         |           |                   |                     |
|                                                                                                   | 5 m      | 1407699 | 1407725   | 1407783           | 1407819             |
|                                                                                                   | 10 m     |         |           |                   |                     |
|                                                                                                   | Variable |         |           |                   |                     |
| RJ45 plug, IP20                                                                                   | R4AC     |         |           |                   |                     |
|                  | 1 m      | 1408950 |           |                   |                     |
|                                                                                                   | 2 m      | 1408951 |           |                   |                     |
|                                                                                                   | 5 m      | 1408952 | 1407932   | 1407990           | 1412024             |
|                                                                                                   | 10 m     | 1408953 |           |                   |                     |
|                                                                                                   | Variable |         |           |                   |                     |
| RJ45 plug                                                                                         | R4MC     |         |           |                   |                     |
| Version 6<br>   | 1 m      |         | 1408955   |                   |                     |
|                                                                                                   | 2 m      |         | 1408956   |                   |                     |
|                                                                                                   | 5 m      |         | 1408954   |                   |                     |
|                                                                                                   | 10 m     |         | 1408958   |                   |                     |
|                                                                                                   | Variable |         |           |                   |                     |
| RJ45 plug, metal                                                                                  | R4RC     |         |           |                   |                     |
| Version 14<br> | 1 m      |         |           | 1408961           |                     |
|                                                                                                   | 2 m      |         |           | 1408962           |                     |
|                                                                                                   | 5 m      |         |           | 1408959           |                     |
|                                                                                                   | 10 m     |         |           | 1408963           |                     |
|                                                                                                   | Variable |         |           |                   |                     |
| RJ45 plug, plastic                                                                                | R4QC     |         |           |                   |                     |
| Version 14<br> | 1 m      |         |           |                   | 1408965             |
|                                                                                                   | 2 m      |         |           |                   | 1408966             |
|                                                                                                   | 5 m      |         |           |                   | 1408964             |
|                                                                                                   | 10 m     |         |           |                   | 1408967             |
|                                                                                                   | Variable |         |           |                   |                     |
| M12 plug, SPEEDCON                                                                                | MS SCO   |         |           |                   |                     |
|                | 1 m      |         |           |                   |                     |
|                                                                                                   | 2 m      |         |           |                   |                     |
|                                                                                                   | 5 m      |         |           |                   |                     |
|                                                                                                   | 10 m     |         |           |                   |                     |
|                                                                                                   | Variable |         |           |                   |                     |
| M12 plug, SPEEDCON                                                                                | MR SCO   |         |           |                   |                     |
|                | 1 m      |         |           |                   |                     |
|                                                                                                   | 2 m      |         |           |                   |                     |
|                                                                                                   | 5 m      |         |           |                   |                     |
|                                                                                                   | 10 m     |         |           |                   |                     |
|                                                                                                   | Variable |         |           |                   |                     |









| M12 plug                                                                         |                                                                                   | M12 socket                                                                        |                                                                                    | M12 flush-type socket                                                               |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEEDCON                                                                         |                                                                                   | SPEEDCON                                                                          |                                                                                    | Rear mounting                                                                       |
|  |  |  |  |  |
| MS SCO                                                                           | MR SCO                                                                            | FS SCO                                                                            | FR SCO                                                                             | FSBP                                                                                |
| 1407404                                                                          |                                                                                   | 1407439                                                                           |                                                                                    |                                                                                     |
| 1407405                                                                          |                                                                                   | 1407440                                                                           |                                                                                    |                                                                                     |
| 1407406                                                                          |                                                                                   | 1407441                                                                           |                                                                                    | 1407877                                                                             |
| 1407507                                                                          |                                                                                   | 1407442                                                                           |                                                                                    |                                                                                     |
| 1408682                                                                          | 1408675                                                                           | 1408665                                                                           | 1408657                                                                            |                                                                                     |
| 1407414                                                                          |                                                                                   | 1407443                                                                           |                                                                                    |                                                                                     |
| 1407415                                                                          |                                                                                   | 1407444                                                                           |                                                                                    |                                                                                     |
| 1407416                                                                          |                                                                                   | 1407445                                                                           |                                                                                    | 1412082                                                                             |
| 1407417                                                                          |                                                                                   | 1407446                                                                           |                                                                                    |                                                                                     |
| 1408681                                                                          | 1408674                                                                           | 1408664                                                                           | 1408655                                                                            |                                                                                     |
| 1407422                                                                          |                                                                                   | 1407451                                                                           |                                                                                    |                                                                                     |
| 1407423                                                                          |                                                                                   | 1407452                                                                           |                                                                                    |                                                                                     |
| 1407424                                                                          |                                                                                   | 1407453                                                                           |                                                                                    | 1412231                                                                             |
| 1407425                                                                          |                                                                                   | 1407454                                                                           |                                                                                    |                                                                                     |
| 1408679                                                                          | 1408671                                                                           | 1408662                                                                           | 1408653                                                                            |                                                                                     |
| 1407426                                                                          |                                                                                   | 1407455                                                                           |                                                                                    |                                                                                     |
| 1407427                                                                          |                                                                                   | 1407456                                                                           |                                                                                    |                                                                                     |
| 1407428                                                                          |                                                                                   | 1407457                                                                           |                                                                                    | 1412503                                                                             |
| 1407429                                                                          |                                                                                   | 1407458                                                                           |                                                                                    |                                                                                     |
| 1408678                                                                          | 1408670                                                                           | 1408661                                                                           | 1408652                                                                            |                                                                                     |
| 1407430                                                                          |                                                                                   | 1407459                                                                           |                                                                                    |                                                                                     |
| 1407431                                                                          |                                                                                   | 1407460                                                                           |                                                                                    |                                                                                     |
| 1407432                                                                          |                                                                                   | 1407461                                                                           |                                                                                    | 1412590                                                                             |
| 1407433                                                                          |                                                                                   | 1407462                                                                           |                                                                                    |                                                                                     |
| 1408677                                                                          | 1408668                                                                           | 1408660                                                                           | 1408651                                                                            |                                                                                     |
| 1407434                                                                          |                                                                                   | 1407463                                                                           |                                                                                    |                                                                                     |
| 1407435                                                                          |                                                                                   | 1407464                                                                           |                                                                                    |                                                                                     |
| 1407436                                                                          |                                                                                   | 1407465                                                                           |                                                                                    |                                                                                     |
| 1407437                                                                          |                                                                                   | 1407466                                                                           |                                                                                    |                                                                                     |
| 1408676                                                                          | 1408667                                                                           | 1408659                                                                           | 1408650                                                                            |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                    |                                                                                     |
|                                                                                  | 1408666                                                                           | 1408658                                                                           | 1408649                                                                            |                                                                                     |



## Assembled cables for Ethernet networks

|                  | Type 93E                                                                                                               | Type 94A                                                                               | Type 94B                                                                                                                                                      |
|------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | 2 x 2 x 28 AWG<br>7 x 0.25 mm                                                                                          | 4 x 2 x 24 AWG<br>single-strand, twisted pair                                          | 4 x 2 x 28 AWG<br>7 x 0.25 mm                                                                                                                                 |
|                  |                                       |      |                                                                            |
|                  | Ethernet cable for flexible use. The cable is halogen-free, oil-resistant, and its transmission properties meet CAT5e. | Ethernet cable for fixed installation. The cable's transmission properties meet CAT5e. | Ethernet cable for flexible installation. The cable is resistant to oil and chemicals and is flame-retardant. The cable's transmission properties meet CAT5e. |
| By the meter     | 1416415                                                                                                                | 1416415                                                                                | 1417333                                                                                                                                                       |
| 100 m ring       | 1416305                                                                                                                | 1416305                                                                                | 1416567                                                                                                                                                       |
| Assembled cables |                                                                                                                        |                                                                                        | 1416428                                                                                                                                                       |

## Assembled cables for PROFINET networks

|                  | Type 93A                                                                                                        | Type 93B                                                                                                                                                                                                           | Type 93C                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | 4 x 22 AWG single-strand                                                                                        | 4 x 22 AWG, 7 x 0.25 mm                                                                                                                                                                                            | 4 x 22 AWG, 7 x 0.25 mm                                                                                                                                                                        |
|                  |                              |                                                                                                                                |                                                                                                           |
|                  | PROFINET cable for fixed installation. The cable is flame-retardant and its transmission properties meet CAT5e. | PROFINET cable for flexible installation. The cable is oil resistant. It is UV-resistant according to UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable's transmission properties meet CAT5e. | PROFINET cable for use in drag chains. The cable is halogen-free and oil resistant. It is UV-resistant and therefore suitable for outdoor use. The cable's transmission properties meet CAT5e. |
| By the meter     | 1416486                                                                                                         | 1417362                                                                                                                                                                                                            | 1417491                                                                                                                                                                                        |
| 100 m ring       | 1416392                                                                                                         | 1416389                                                                                                                                                                                                            | 1416376                                                                                                                                                                                        |
| Assembled cables |                                                                                                                 | 1416499                                                                                                                                                                                                            | 1416509                                                                                                                                                                                        |

| Type 94D                                                                                                                                                                                                           | Type 94E                                                                                                                                                                                    | Type 94F                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 x 2 x 26 AWG<br>7 x 0.18 mm, twisted pair                                                                                                                                                                        | 4 x 2 x 23 AWG<br>single-strand, twisted pair                                                                                                                                               | 4 x 2 x 26 AWG<br>7 x 0.16 mm, twisted pair                                                                                                                                                            |
|                                                                                                                                   |                                                                                                            |                                                                                                                     |
| Ethernet cable for flexible installation. The cable is oil resistant. It is UV-resistant according to UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable's transmission properties meet CAT5e. | Ethernet cable for fixed installation. The cable is resistant to oil and chemicals and is flame-retardant. It is also halogen-free and its transmission properties meet CAT6 <sub>A</sub> . | Ethernet cable for flexible installation. The cable is resistant to oil and chemicals and is flame-retardant. It is also halogen-free and the cable's transmission properties meet CAT6 <sub>A</sub> . |
| 1416444                                                                                                                                                                                                            | 1416460                                                                                                                                                                                     | 1417359                                                                                                                                                                                                |
| 1416334                                                                                                                                                                                                            | 1416334                                                                                                                                                                                     | 1416347                                                                                                                                                                                                |
|                                                                                                                                                                                                                    |                                                                                                                                                                                             | 1402609                                                                                                                                                                                                |

| Type 93R                                                                                                                                                                                                        | Type 937                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 x 22 AWG, 19 x 0.15 mm                                                                                                                                                                                        | 4 x 22 AWG, 7 x 0.25 mm                                                                                                                                    |
|                                                                                                                              |                                                                         |
| PROFINET cable for robot applications. The cable is oil resistant. It is UV-resistant according to UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable's transmission properties meet CAT5e. | PROFINET cable for railway applications. The cable is oil resistant. It meets fire safety standard BS6853. The cable's transmission properties meet CAT5e. |
| 1417388                                                                                                                                                                                                         | 1402687                                                                                                                                                    |
| 1416363                                                                                                                                                                                                         | 1416363                                                                                                                                                    |
| 1416512                                                                                                                                                                                                         | 1402611                                                                                                                                                    |

## Assembled cables, PROFINET, 4-pos., shielded

|                                                                                     |          | RJ45 plug |         |                   |                     |
|-------------------------------------------------------------------------------------|----------|-----------|---------|-------------------|---------------------|
|                                                                                     |          | IP20      |         | Version 14, metal | Version 14, plastic |
| Open cable end                                                                      | OE       | R4AC      | R4ACR   | R4RC              | R4QC                |
|    | 1 m      |           |         |                   |                     |
|                                                                                     | 2 m      |           |         |                   |                     |
|                                                                                     | 5 m      |           |         | 1416162           | 1416168             |
|                                                                                     | 10 m     |           |         |                   |                     |
|                                                                                     | Variable |           |         |                   |                     |
| RJ45 plug, IP20                                                                     | R4AC     |           |         |                   |                     |
|    | 1 m      | 1408968   | 1418248 |                   |                     |
|                                                                                     | 2 m      | 1408969   | 1418277 |                   |                     |
|                                                                                     | 5 m      | 1408970   |         | 1416138           | 1416141             |
|                                                                                     | 10 m     | 1408971   |         |                   |                     |
|                                                                                     | Variable |           |         |                   |                     |
| RJ45 plug, IP20                                                                     | R4ACR    |           |         |                   |                     |
|   | 1 m      |           | 1409002 |                   |                     |
|                                                                                     | 2 m      |           | 1409003 |                   |                     |
|                                                                                     | 5 m      |           | 1409004 |                   |                     |
|                                                                                     | 10 m     |           | 1409005 |                   |                     |
|                                                                                     | Variable |           |         |                   |                     |
| RJ45 plug, metal                                                                    | R4RC     |           |         |                   |                     |
| Version 14                                                                          | 1 m      |           |         | 1408974           |                     |
|  | 2 m      |           |         | 1408975           |                     |
|                                                                                     | 5 m      |           |         | 1408972           |                     |
|                                                                                     | 10 m     |           |         | 1408976           |                     |
|                                                                                     | Variable |           |         |                   |                     |
| RJ45 plug, plastic                                                                  | R4QC     |           |         |                   |                     |
| Version 14                                                                          | 1 m      |           |         |                   | 1408978             |
|  | 2 m      |           |         |                   | 1408979             |
|                                                                                     | 5 m      |           |         |                   | 1408977             |
|                                                                                     | 10 m     |           |         |                   | 1408980             |
|                                                                                     | Variable |           |         |                   |                     |
| M12 plug, SPEEDCON                                                                  | MSD SCO  |           |         |                   |                     |
|  | 1 m      |           |         |                   |                     |
|                                                                                     | 2 m      |           |         |                   |                     |
|                                                                                     | 5 m      |           |         |                   |                     |
|                                                                                     | 10 m     |           |         |                   |                     |
|                                                                                     | Variable |           |         |                   |                     |
| M12 plug, SPEEDCON                                                                  | MRD SCO  |           |         |                   |                     |
|  | 1 m      |           |         |                   |                     |
|                                                                                     | 2 m      |           |         |                   |                     |
|                                                                                     | 5 m      |           |         |                   |                     |
|                                                                                     | 10 m     |           |         |                   |                     |
|                                                                                     | Variable |           |         |                   |                     |





| M12 plug                                                                         |                                                                                   | M12 socket                                                                        |                                                                                    | M12 flush-type socket                                                               |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| SPEEDCON                                                                         |                                                                                   | SPEEDCON                                                                          |                                                                                    | Rear mounting                                                                       |
|  |  |  |  |  |
| MSD SCO                                                                          | MRD SCO                                                                           | FSD SCO                                                                           | FRD SCO                                                                            | FSDBP                                                                               |
| 1407495                                                                          |                                                                                   | 1407528                                                                           |                                                                                    | 1437779                                                                             |
| 1407496                                                                          |                                                                                   | 1407529                                                                           |                                                                                    | 1437782                                                                             |
| 1407497                                                                          |                                                                                   | 1407530                                                                           |                                                                                    | 1437795                                                                             |
| 1407498                                                                          |                                                                                   | 1407531                                                                           |                                                                                    |                                                                                     |
| 1408640                                                                          | 1408633                                                                           | 1408623                                                                           | 1408615                                                                            |                                                                                     |
| 1407499                                                                          |                                                                                   | 1407532                                                                           |                                                                                    |                                                                                     |
| 1407500                                                                          |                                                                                   | 1407533                                                                           |                                                                                    |                                                                                     |
| 1407501                                                                          |                                                                                   | 1407534                                                                           |                                                                                    |                                                                                     |
| 1407502                                                                          |                                                                                   | 1407535                                                                           |                                                                                    |                                                                                     |
| 1408639                                                                          | 1408632                                                                           | 1408622                                                                           | 1408613                                                                            |                                                                                     |
| 1407508                                                                          |                                                                                   | 1407536                                                                           |                                                                                    |                                                                                     |
| 1407509                                                                          |                                                                                   | 1407537                                                                           |                                                                                    |                                                                                     |
| 1407510                                                                          |                                                                                   | 1407538                                                                           |                                                                                    |                                                                                     |
| 1407511                                                                          |                                                                                   | 1407539                                                                           |                                                                                    |                                                                                     |
| 1408638                                                                          | 1408631                                                                           | 1408621                                                                           | 1408612                                                                            |                                                                                     |
| 1407516                                                                          |                                                                                   | 1407544                                                                           |                                                                                    |                                                                                     |
| 1407517                                                                          |                                                                                   | 1407545                                                                           |                                                                                    |                                                                                     |
| 1407518                                                                          |                                                                                   | 1407546                                                                           |                                                                                    |                                                                                     |
| 1407519                                                                          |                                                                                   | 1407547                                                                           |                                                                                    |                                                                                     |
| 1408636                                                                          | 1408628                                                                           | 1408619                                                                           | 1408610                                                                            |                                                                                     |
| 1407520                                                                          |                                                                                   | 1407548                                                                           |                                                                                    |                                                                                     |
| 1407521                                                                          |                                                                                   | 1407549                                                                           |                                                                                    |                                                                                     |
| 1407522                                                                          |                                                                                   | 1407551                                                                           |                                                                                    |                                                                                     |
| 1407523                                                                          |                                                                                   | 1407552                                                                           |                                                                                    |                                                                                     |
| 1408635                                                                          | 1408626                                                                           | 1408618                                                                           | 1408609                                                                            |                                                                                     |
| 1407524                                                                          |                                                                                   | 1407553                                                                           |                                                                                    |                                                                                     |
| 1407525                                                                          |                                                                                   | 1407554                                                                           |                                                                                    |                                                                                     |
| 1407526                                                                          |                                                                                   | 1407555                                                                           |                                                                                    |                                                                                     |
| 1407527                                                                          |                                                                                   | 1407556                                                                           |                                                                                    |                                                                                     |
| 1408634                                                                          | 1408625                                                                           | 1408617                                                                           | 1408608                                                                            |                                                                                     |
|                                                                                  | 1408624                                                                           | 1408616                                                                           | 1408607                                                                            |                                                                                     |

# Fiber-optic-based data cabling for networks

High transmission speed, low attenuation, resistant to electromagnetic interference: fiber optic cables are among the modern transmission media for industrial systems and infrastructure applications. Whatever the fiber type or interface – you can choose the right connection technology from our extensive portfolio.

## Main features

- Up to 40 Gbps
- Solutions from IP20 to IP65/IP67
- For all common fiber types
- Maximum protection against the effects of EMI and ESD



Ethernet



**sercos**  
the automation bus

## Advantages at a glance



**Wide choice of versions** from SC-RJ, LC, SC, FSMA to ST, plus fiber types POF, PCF, GOF



**Extensive range of cables** for all applications, networks, and standard interfaces.



**Fast assembly** in the field using professional tools



**Reliable protection** against extreme temperatures, liquids, and UV light



**High data rates** up to 40 Gbps



**Integrated locking** prevents accidental disconnection

### Choose the right fiber type for your application

- POF (polymer optical fiber) for short transmission paths up to 100 m and a maximum data rate of up to 100 Mbps
- PCF (polymer-clad fiber) for medium-length transmission paths up to 500 m and a maximum data rate of up to 1 Gbps
- GOF (glass optical fiber) multi mode for long transmission paths up to 550 m at 10 Gbps
- GOF single mode for up to 50 km and a data rate of up to 40 Gbps

## Fiber optic connectors, panel mounting frames, and socket inserts

| Description                                               | Socket insert                                                                     | Connectors                                                                        |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                           | Freenet system                                                                    | IP20                                                                              | IP65/IP67                                                                           |                                                                                     |                                                                                     |
|                                                           |                                                                                   |                                                                                   | M12 OPTIC                                                                           | Version 1                                                                           | Version 6                                                                           |
|                                                           |  |  |  |  |  |
|                                                           | SC-RJ to SC-RJ                                                                    | SC-RJ, fast connection technology                                                 | M12, adhesive connection technology                                                 | SC-RJ, adhesive connection technology                                               | SC-RJ, fast connection technology                                                   |
| <b>Polymer fiber 980/1000 µm (POF)</b>                    |                                                                                   |                                                                                   |                                                                                     | Metal                                                                               |                                                                                     |
| SC-RJ                                                     |                                                                                   | 1654879                                                                           |                                                                                     | 1419189                                                                             | 1657009                                                                             |
| Freenet system, SC-RJ to SC-RJ                            | 1652978                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| M12 to M12, pre-assembled cable                           |                                                                                   |                                                                                   | 1416680                                                                             |                                                                                     |                                                                                     |
| M12 to SC-RJ, pre-assembled cable                         |                                                                                   |                                                                                   | 1416648                                                                             |                                                                                     |                                                                                     |
| AVAGO transceiver (type: AFBR5978Z)                       |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ to SC-RJ                                            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| <b>Polymer-clad fiber 200/230 µm (PCF)</b>                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ single-wire diameter 2.9 mm                         |                                                                                   | 1654866                                                                           |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ single-wire diameter 2.2 mm                         |                                                                                   | 1404087                                                                           |                                                                                     |                                                                                     | 1657012                                                                             |
| F-SMA set, 4 connectors, single-wire diameter 2.9 mm      |                                                                                   | 2799487                                                                           |                                                                                     |                                                                                     |                                                                                     |
| B-FOC (ST) set, 4 connectors, single-wire diameter 2.9 mm |                                                                                   | 2708481                                                                           |                                                                                     |                                                                                     |                                                                                     |
| Freenet system, SC-RJ to SC-RJ                            | 1652978                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| M12 to M12, pre-assembled cable                           |                                                                                   |                                                                                   | 1416693                                                                             |                                                                                     |                                                                                     |
| M12 to SC-RJ, pre-assembled cable                         |                                                                                   |                                                                                   | 1416651                                                                             |                                                                                     |                                                                                     |
| AVAGO transceiver (type: AFBR5978Z)                       |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ to SC-RJ                                            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| <b>Fiberglass multi mode 50/125 µm; single mode (GOF)</b> |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ, multi mode                                         |                                                                                   | 1657070                                                                           |                                                                                     | 1419187                                                                             | 1657083                                                                             |
| SC-RJ, single mode                                        |                                                                                   |                                                                                   |                                                                                     | 1419188                                                                             |                                                                                     |
| SC duplex, multi mode                                     |                                                                                   | 1658529                                                                           |                                                                                     |                                                                                     |                                                                                     |
| LC duplex, multi mode                                     |                                                                                   |                                                                                   |                                                                                     | 1419190                                                                             |                                                                                     |
| LC duplex, single mode                                    |                                                                                   |                                                                                   |                                                                                     | 1419191                                                                             |                                                                                     |
| Freenet system, SC-RJ to SC-RJ                            | 1652978                                                                           |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| AVAGO transceiver (type: AFBR5978Z)                       |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ to SC-RJ multi mode                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| SC-RJ to SC-RJ single mode                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Multi-mode LC duplex/LC duplex                            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Single-mode LC duplex/LC duplex                           |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |

## Panel mounting frames






### IP65/IP67

| Version 14                                                                       |                                                                                   | Version 1                                                                         | Version 6                                                                         |                | Version 14                                                                         |                                                                                     |                                                                                     |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |                |  |  |  |
| SC-RJ, fast connection technology                                                | SC-RJ, fast connection technology                                                 | SC-RJ, bayonet locking                                                            | For a round mounting cutout                                                       |                | Push-pull interlocking                                                             | Push-pull interlocking                                                              | Push-pull interlocking                                                              |
| Metal                                                                            | Plastic                                                                           |                                                                                   | Plastic, gray                                                                     | Plastic, black | Metal, round cutout                                                                | Metal, square cutout                                                                | Plastic                                                                             |
| 1608032                                                                          | 1657850                                                                           |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   | 1653744                                                                           | 1658668        | 1405235                                                                            | 1405374                                                                             | 1608210                                                                             |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   | 1658545                                                                           |                |                                                                                    | 1608061                                                                             | 1657889                                                                             |
|                                                                                  |                                                                                   | 1420197                                                                           |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
| 1608045                                                                          | 1657863                                                                           |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   | 1653744                                                                           | 1658668        | 1405235                                                                            | 1405374                                                                             | 1608210                                                                             |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   | 1658545                                                                           |                |                                                                                    | 1608061                                                                             | 1657889                                                                             |
|                                                                                  |                                                                                   | 1420197                                                                           |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   | 1653744                                                                           | 1658668        |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   | 1658545                                                                           |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   | 1420197                                                                           |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   | 1420207                                                                           |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   | 1420210                                                                           |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   | 1420223                                                                           |                                                                                   |                |                                                                                    |                                                                                     |                                                                                     |

## Fiber optic patch cables

|                                                                                                                                                                                   |     | with single-mode fiberglass (OS1)                                                 |                                                                                     |                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Diameter of individual wires: 2.8 mm, outside dimensions: 2.8 mm x 5.7 mm, outer cable sheath: FRNC, halogen-free, flame-retardant, ambient temperature (operation): -5°C – +70°C |     |  |  |  |
|                                                                                                                                                                                   |     | B-FOC (ST) plug to B-FOC (ST) plug                                                | SC duplex plug to SC duplex plug                                                    | LC plug to LC plug                                                                  |
|                                                                                                                                                                                   |     | ST-ST plug                                                                        | SC-SC plug                                                                          | LC-LC plug                                                                          |
|                                                                                                                                                                                   |     | 1 m                                                                               | 2901836                                                                             | 2901829                                                                             |
|                                                                                                                                                                                   | 2 m | 2901837                                                                           | 2901830                                                                             | 2989284                                                                             |
|                                                                                                                                                                                   | 5 m | 2901838                                                                           | 2901831                                                                             | 2901826                                                                             |
| Diameter of individual wires: 2.8 mm, outside dimensions: 2.8 mm x 5.7 mm, outer cable sheath: FRNC, halogen-free, flame-retardant, ambient temperature (operation): -5°C – +70°C |     |  |  |  |
|                                                                                                                                                                                   |     | SC duplex plug to B-FOC (ST) plug                                                 | LC plug to SC duplex plug                                                           | LC plug to B-FOC (ST) plug                                                          |
|                                                                                                                                                                                   |     | SC-ST plug                                                                        | LC-SC plug                                                                          | LC-ST plug                                                                          |
|                                                                                                                                                                                   |     | 1 m                                                                               | 2901832                                                                             | 2989190                                                                             |
|                                                                                                                                                                                   | 2 m | 2901833                                                                           | 2989297                                                                             | 2989349                                                                             |
|                                                                                                                                                                                   | 5 m | 2901834                                                                           | 2901827                                                                             | 2901828                                                                             |

## Assembled fiber optic cables (POF)







| Fiber optic polymer fiber cables |                                                                                                                        |                                                                                                                               |                                                                                                                                                                          |                                                                                                                                   |                                                                                                                                                                         |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | Type KDHEAVY-1011                                                                                                      | Type RUGGED-1012                                                                                                              | Type RUGGED FLEX-1013                                                                                                                                                    | Type PROFINET-B-1000                                                                                                              | Type PROFINET-C-1003                                                                                                                                                    |
|                                  |                                     |                                            |                                                                                      |                                              |                                                                                    |
|                                  | Universal POF cable that can be assembled, 980/1000, type KDHEAVY-1011, UV and oil-resistant, halogen-free, PUR sheath | Robust POF cable that can be assembled, 980/1000, type RUGGED-1012, UV and oil-resistant, halogen-free, reinforced PUR sheath | Robust POF cable that can be assembled, 980/1000, type RUGGED-FLEX-1013, suitable for drag chains and torsion, UV and oil-resistant, halogen-free, reinforced PUR sheath | Robust POF cable that can be assembled, 980/1000, type PROFINET-B-1000, UV and oil-resistant, halogen-free, reinforced PUR sheath | Rugged POF cable that can be assembled, 980/1000, type PROFINET-C-1003, suitable for drag chains and torsion, UV and oil-resistant, halogen-free, reinforced PUR sheath |
|                                  | POF                                                                                                                    | POF                                                                                                                           | POF                                                                                                                                                                      | POF                                                                                                                               | POF                                                                                                                                                                     |
| By the meter                     | 2744319                                                                                                                | 2744322                                                                                                                       | 2744335                                                                                                                                                                  | 2313397                                                                                                                           | 2313407                                                                                                                                                                 |
| IP20                             | 2901553                                                                                                                | 2901548                                                                                                                       | 2901549                                                                                                                                                                  | 2901551                                                                                                                           | 2901552                                                                                                                                                                 |
| IP65                             | 1402188                                                                                                                | 1402185                                                                                                                       | 1402187                                                                                                                                                                  | 1402172                                                                                                                           | 1402175                                                                                                                                                                 |

**with multi-mode fiberglass (OM2)**




|                                                                                  |                                                                                   |                                                                                   |                                                                                    |                                                                                     |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |
| B-FOC (ST) plug to B-FOC (ST) plug                                               | SC duplex plug to SC duplex plug                                                  | LC plug to LC plug                                                                | SCRJ plug to SCRJ plug                                                             | SC duplex plug to SCRJ plug                                                         |
| ST-ST plug                                                                       | SC-SC plug                                                                        | LC-LC plug                                                                        | SCRJ-SCRJ plug                                                                     | SC-SCRJ plug                                                                        |
| 2901815                                                                          | 2901805                                                                           | 2989158                                                                           | 2901823                                                                            | 2901812                                                                             |
| 2901816                                                                          | 2901807                                                                           | 2989255                                                                           | 2901824                                                                            | 2901813                                                                             |
| 2901817                                                                          | 2901808                                                                           | 2901799                                                                           | 2901825                                                                            | 2901814                                                                             |
|  |  |  |  |  |
| SC duplex plug to B-FOC                                                          | LC plug to SC duplex plug                                                         | LC plug to B-FOC (ST) plug                                                        | B-FOC (ST) plug to SCRJ plug                                                       | LC plug to SCRJ plug                                                                |
| SC-ST plug                                                                       | LC-SC plug                                                                        | LC-ST plug                                                                        | ST-SCRJ plug                                                                       | LC-SCRJ plug                                                                        |
| 2901809                                                                          | 2989161                                                                           | 2989174                                                                           | 2901820                                                                            | 2901802                                                                             |
| 2901810                                                                          | 2989268                                                                           | 2989271                                                                           | 2901821                                                                            | 2901803                                                                             |
| 2901811                                                                          | 2901800                                                                           | 2901801                                                                           | 2901822                                                                            | 2901804                                                                             |

**Fiber optic HCS (PCF) cables**




**Fiber optic fiberglass cables**

| Type PROFINET-B-HCS-1018                                                                                                         | Type PROFINET-C-HCS-GI-1005                                                                                                                                                                                                         | Type HCS-RUGGED-1014                                                                                                                                          | Type HCS-Outdoor-1015                                                                                                                                                                           | Type GDM-RUGGED-1016                                                                                                                              | Type GD-Outdoor-1017                                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                |                                                                                                                                                  |                                                                            |                                                                                                              |                                                              |                                                                                                                    |
| Rugged HCS cable that can be assembled, 200/230, type PROFINET-B-HCS-1018, increased temperature range, halogen-free, PVC sheath | Rugged HCS GI cable that can be assembled, 200/230, type PROFINET-C-HCS-GI-1005, suitable for drag chains and torsion, UV and oil-resistant, halogen-free, reinforced PUR sheath, increased bandwidth for applications up to 1 Gbps | Rugged HCS cable that can be assembled, 200/230, type HCS-RUGGED-1014, increased temperature range, UV and oil-resistant, halogen-free, reinforced PUR sheath | HCS outdoor cable that can be assembled, 200/230, type HCS-OUTDOOR-1015, UV-resistant, for underground runs, non-metal rodent protection, longitudinally and transversely watertight, PE sheath | Rugged fiberglass multi-mode cable that can be assembled, 50/125, type GDM-RUGGED-1016, UV and oil-resistant, halogen-free, reinforced PUR sheath | Fiberglass multi-mode cable that can be assembled, 50/125, type GD-OUTDOOR-1017, UV-resistant, for underground runs, non-metal rodent protection, longitudinally and transversely watertight, PE sheath |
| HCS                                                                                                                              | HCS-GI                                                                                                                                                                                                                              | HCS                                                                                                                                                           | HCS                                                                                                                                                                                             | Glass                                                                                                                                             | Glass                                                                                                                                                                                                   |
| 2313766                                                                                                                          | 2313410                                                                                                                                                                                                                             | 2799885                                                                                                                                                       | 2799445                                                                                                                                                                                         | 2799322                                                                                                                                           | 2799432                                                                                                                                                                                                 |
| 2901556                                                                                                                          | 2901554                                                                                                                                                                                                                             | 2901555                                                                                                                                                       | 2901557                                                                                                                                                                                         | 2901558                                                                                                                                           | 2901559                                                                                                                                                                                                 |
| 1402190                                                                                                                          | 1402189                                                                                                                                                                                                                             | 1402191                                                                                                                                                       |                                                                                                                                                                                                 | 1402193                                                                                                                                           |                                                                                                                                                                                                         |

## Push-pull power connectors and panel mounting frames







| Description                     |         |                | Panel mounting frames                                                              |                                                                                     |                                                                                     |
|---------------------------------|---------|----------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                 |         |                |  |  |  |
| Connection technology           | Voltage | Contact insert | Metal                                                                              | Plastic                                                                             | Metal, square cutout                                                                |
| Solder connection, angled       | 24 V    | 1657915        | 1608087                                                                            | 1608281                                                                             |                                                                                     |
| Solder connection, straight     | 24 V    | 1609565        | 1608087                                                                            | 1608281                                                                             |                                                                                     |
| Solder connection, angled       | 400 V   | 1609549        | 1608087                                                                            | 1608281                                                                             |                                                                                     |
| Solder connection, straight     | 400 V   | 1609581        | 1608087                                                                            | 1608281                                                                             |                                                                                     |
| Spring connection, fixed coding | 24 V    |                |                                                                                    |                                                                                     | 1405248                                                                             |
| Spring connection, fixed coding | 400 V   |                |                                                                                    |                                                                                     | 1405167                                                                             |
| Spring connection, free coding  | 24 V    |                |                                                                                    |                                                                                     | 1408235                                                                             |
| 2 x MSTB to 1 x MSTB connector  | 24 V    |                |                                                                                    |                                                                                     |                                                                                     |
| 2 x MSTB to 1 x 7/8" connector  | 24 V    |                |                                                                                    |                                                                                     |                                                                                     |
| 4 x MSTB                        | 24 V    |                |                                                                                    |                                                                                     |                                                                                     |

## Fiber optic terminal outlets and couplings





|                                                                                     |                                                            | IP20 patch panels and couplings |
|-------------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------|
| Patch panel                                                                         |                                                            | Order No.                       |
|  | SC-RJ, 1 slot, DIN rail mounting                           | 1658121                         |
|                                                                                     | SC-RJ, 16 slots, 19" mounting, for Freenet contact inserts | 1652994                         |
| Outlet box                                                                          |                                                            | Order No.                       |
|  | Surface-mounted socket, 2 slots                            | 1653003                         |
|                                                                                     | Surface-mounted socket, 6 slots                            | 1653029                         |
|                                                                                     | Flush-type socket, 2 slots                                 | 1653016                         |
| Couplings                                                                           |                                                            | Order No.                       |
|  | 2 x F-SMA/F-SMA                                            | 2799416                         |
|                                                                                     | 2 x B-FOC(ST®)/B-FOC(ST®)                                  | 2799429                         |
|                                                                                     | 1 x SC-RJ/SC-RJ (duplex)                                   | 1652978                         |
|                                                                                     | 1 x LC duplex/LC duplex (multi mode)                       | 2700312                         |
|                                                                                     | 1 x LC duplex/LC duplex (single mode)                      | 2700313                         |
|                                                                                     | 1 x SC duplex/SC duplex                                    | 2901788                         |



## IP65/67 panel mounting frames and connectors, version 14

|                                                                                  |                                                                                   | Connectors                                                                        |                                                                                   | Y-distributor                                                                       | H-distributor                                                                       |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |  |  |
| Metal, round cutout                                                              | Plastic, square cutout                                                            | Metal, push-pull interlocking                                                     | Plastic, push-pull interlocking                                                   | Metal, push-pull interlocking                                                       | Metal, push-pull interlocking                                                       |
| 1608249                                                                          | 1608294                                                                           | 1608074                                                                           | 1657892                                                                           |                                                                                     |                                                                                     |
| 1608252                                                                          | 1608304                                                                           |                                                                                   | 1608236                                                                           |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   | 1409036                                                                           |                                                                                   |                                                                                     |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   | 1404799                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   | 1404812                                                                             |                                                                                     |
|                                                                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     | 1405387                                                                             |

## IP65/67 terminal outlets and couplings

| Couplings                                                                           |                                                    | Order No. |
|-------------------------------------------------------------------------------------|----------------------------------------------------|-----------|
|  | 1 x M12/M12                                        | 1416677   |
|                                                                                     | 1 x SC-RJ/SC-RJ version 6                          | 1410050   |
|                                                                                     | 1 x SC-RJ/SC-RJ version 14                         | 1405206   |
| Terminal outlets                                                                    |                                                    | Order No. |
|  | 2 x SC-RJ version 14                               | 1404320   |
|                                                                                     | 2 x SC-RJ version 6                                | 1404317   |
|                                                                                     | 1 x SC-RJ/1 x power                                | 1404346   |
| Robot interfaces                                                                    |                                                    | Order No. |
|  | 1 x SC-RJ, cable diameter 5 mm – 8 mm              | 1404319   |
|                                                                                     | 1 x SC-RJ, cable diameter 7 mm – 10.5 mm           | 1404324   |
|                                                                                     | 1 x SC-RJ/1 x power, cable diameter 5 mm – 8 mm    | 1404321   |
|                                                                                     | 1 x SC-RJ/1 x power, cable diameter 7 mm – 10.5 mm | 1404325   |
| M12 transceiver for POF                                                             |                                                    | Order No. |
|  | Transceiver with 650 nm                            | 1416716   |

## Tools

### Assembly tool, HCS



Assembly tool for HCS fiber, for local assembly of IP20 and IP67 fiber optic plugs, for B-FOC (ST), SC duplex, and SCRJ pin arrangements





### Fiber cleaving tool, HCS



Fiber cleaving tool for HCS and HCS GI fiber, suitable for B-FOC, SC duplex, and SCRJ plugs

|            | B-FOC   | SCRJ    | B-FOC   | SCRJ    |
|------------|---------|---------|---------|---------|
|            | 2708465 | 2708876 | 2708478 | 2313122 |
| Refill set |         |         |         |         |



| Polishing tool, POF                                                                        |                   | Cutting tool, POF                                                                 | Stripping tool                                                                     | Crimping pliers                                                                     |
|--------------------------------------------------------------------------------------------|-------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           |                   |  |  |  |
| Polishing tool set for polymer fibers, for field assembly of IP20 and IP67 SCRJ connectors |                   | Cutting tool set for polymer fibers, for field assembly of IP20 SCRJ connectors   | Stripping tool for multi-stage stripping of shielded cables                        | Pliers with die, for RJ45 connector crimp contacts                                  |
| with magnifier                                                                             | without magnifier |                                                                                   |                                                                                    |                                                                                     |
| 1658820                                                                                    | 2477131           | 1405246                                                                           | 1657407                                                                            | 1652365                                                                             |
| 1656673                                                                                    | 2799348           |                                                                                   |                                                                                    |                                                                                     |



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