FIBER OPTICS

INFRASTRUCTURE

SECURITY

Industrial
ETHERNET

WIRELESS

CABLING

We make
Ethernet easy

Ethernet infrastructure
for industrial automation

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 safety, and more reliability. Industrial Ethernet from Phoenix Contact can be easily integrated into your automation infrastructure – because we make Ethernet easy.

Our experience in automation spans decades, and we have more than ten years of experience in industrial Ethernet networks. We know and understand the expectations, demands, and needs of the automation industry, and this is reflected in our range of products and solutions.

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.

Table of contents

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 by 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 an automation network specialist – if you so desire.

Do you want to gain a better insight into network engineering for yourself or your staff? We provide perfectly tailored instruction and practical training in line with your requirements and needs.

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 you need 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.

Switches for industrial networking

Switches are basic Ethernet infrastructure components via which controllers, field devices, and higher-level production management level communicate with one another. To a large degree, they determine the realtime properties, data throughput, and network and system availability.

Through the support of various topologies, such as star, linear or tree, and the use of different media, e.g., multi-mode and single-mode glass fibers, Ethernet networking can be successfully adapted to the specified system topology.

Which is the right switch for you?

The following table shows the different performance classes of the Phoenix Contact switch portfolio. Select the ideal device series for your application based on the key functions.

For detailed functions, properties, and an order overview, read on.

Filtering	Quality of Service
	VLAN
	Multicast/IGMP snooping
Redundancy	Rapid Spanning Tree redundancy
	Fast ring detection
	Large Tree Support
	Extended ring redundancy 15 ms
	Media Redundancy Protocol to IEC 62439
Managed features	Port configuration, statistics, and utilization
	Simple Network Time Protocol (SNTP)
	Extended IT functions
Layer 3	Layer 3 – routing functions
Automation protocols	EtherNet/IP, extended multicast filtering
	EtherNet/IP, Auto Query Port
	PROFINET I/O device
	PROFINET Conformance Class B
	PROFINET MRP redundancy

Industrial ETHERNET

IEEE 802

Industrial IT Switches

IT-compatible IEEE switching functions are available for use in industrial environments – in the control cabinet or in the field.

Find the best port combinations for your application in the comprehensive standard function portfolio.

The new 3000 series Managed Switches support comprehensive IT-compatible functions. IEEE security policies, redundancy, and network management enable consistent integration into IT network structures.

Automation Switches

Automation switches are tailored to the needs of automation protocols such as PROFINET and EtherNet/IP. They combine IT functions with managed and realtime properties tailored to these automation protocols.

All necessary default settings are combined in a user-friendly operating mode.

Optionally, the switches can be configured and diagnosed from the controller's engineering tools.

Standard Function Switches	IP67 Switches	3000 Series Managed Switches	Lean Managed Switches	Smart Managed Switches	Gigabit Modular Switches
Page 8 – 11	Page 12/13	Page 14 – 17	Page 18 – 21	Page 22 – 25	Page 28 – 31
• *	•	•	•	•	•
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* Not for SFNB and SF/SFN 16-port, ** Not for all versions

Standard Function Switches

SF and SFN switches are particularly reliable and maintenance-friendly. They are part of the Unmanaged Switches category and are ideal for inexpensive and reliable Ethernet networks.

Fiber optic connections are particularly suitable for applications over long distances or with high levels of interference.
Our solutions enable you to choose from a variety of twisted pair/fiber optic combinations with various ST and SC plugs.

Easy:
Auto negotiation and autocrossing also ensure easy network creation and expansion.

High-performance:
Gigabit versions ensure high data throughput.

Interference-free:
The electrical decoupling and fiber optic options ensure interference-free operation even in very harsh industrial environments.

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

Properties:

• LEDs + optional alarm contact

• Optional security:
  Cable and port lock

• 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
- Optional security: Cable lock

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 + standard alarm contact
- Mounting on the switch: Cable and port lock
- Redundant power supply

The **SFN** series with **Gigabit performance** is ideal for use in complex systems with high requirements for the transmission speed. 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
- Mounting on the switch: Cable and port lock
- Redundant power supply

Standard Switches with narrow design – SFN
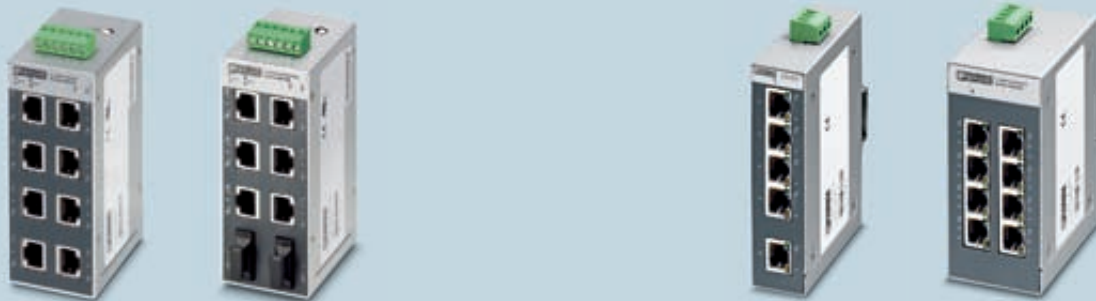
Temperature range: 0°C ... 60°C

FL SWITCH SFN 5TX 5 Cu ports, no fiber optics
Order No. 2891152 18.5 ... 30.2 V DC

FL SWITCH SFN 4TX/FX ST 4 Cu ports, 1 ST MM
Order No. 2891453 18.5 ... 30.2 V DC

FL SWITCH SFN 4TX/FX 4 Cu ports, 1 SC MM
Order No. 2891851 18.5 ... 30.2 V DC

FL SWITCH SFN 8TX 8 Cu ports, no fiber optics
Order No. 2891929 18.5 ... 30.2 V DC

FL SWITCH SFN 7TX/FX 7 Cu ports, 1 SC MM
Order No. 2891097 18.5 ... 30.2 V DC

FL SWITCH SFN 7TX/FX ST 7 Cu ports, 1 ST MM
Order No. 2891110 18.5 ... 30.2 V DC

FL SWITCH SFN 6TX/2FX 6 Cu ports, 2 SC MM
Order No. 2891314 18.5 ... 30.2 V DC

FL SWITCH SFN 6TX/2FX ST 6 Cu ports, 2 ST MM
Order No. 2891411 18.5 ... 30.2 V DC

FL SWITCH SFN 5TX-24VAC 5 Cu ports, no fiber optics
Order No. 2891021 20 ... 28 V AC

FL SWITCH SFN 8TX-24VAC 8 Cu ports, no fiber optics
Order No. 2891020 20 ... 28 V AC

FL SWITCH SFN 7TX/FX-NF 7 Cu ports, 1 SC MM
Order No. 2891023 18.5 ... 30.2 V DC

FL SWITCH SFN 6TX/2FX-NF 6 Cu ports, 2 SC MM
Order No. 2891024 18.5 ... 30.2 V DC

FL SWITCH SFN 16TX 16 Cu ports, no fiber optics
Order No. 2891933 12 ... 48 V DC

FL SWITCH SFN 15TX/FX 15 Cu ports, 1 SC MM
Order No. 2891934 12 ... 48 V DC

FL SWITCH SFN 14TX/2FX 14 Cu ports, 2 SC MM
Order No. 2891935 12 ... 48 V DC

Standard Switches in 19" housing

24 CU ports, 100 V AC ... 240 V AC

FL SWITCH 1824
Order No. 2891041

Standard Gigabit Switches – SFN

Temperature range: -25°C ... 60°C/*0°C ... 60°C/**-25°C ... 75°C

FL SWITCH SFN 8GT** 8 Cu ports, no fiber optics, 9 ... 30.2 V DC
Order No. 2891673

FL SWITCH SFN 7GT/SX** 7 Cu ports, 1 SC MM, 18.5 ... 30.2 V DC
Order No. 2891518

FL SWITCH SFN 6GT/2SX 6 Cu ports, 2 SC MM, 9 ... 30.2 V DC
Order No. 2891398

FL SWITCH SFN 6GT/2LX 6 Cu ports, 2 SC SM, 9 ... 30.2 V DC
Order No. 2891987

FL SWITCH SFN 6GT/2LX-20* 6 Cu ports, 2 SC SM, 9 ... 30.2 V DC
Order No. 2891563

Standard Switches with basic function – SFNB

Temperature range: -10°C ... 60°C/*0°C ... 60°C

FL SWITCH SFNB 5TX 5 Cu ports, no fiber optics, 12 ... 48 V DC
Order No. 2891001

FL SWITCH SFNB 8TX 8 Cu ports, no fiber optics, 9 ... 32 V DC
Order No. 2891002

FL SWITCH SFNB 4TX/FX* 4 Cu ports, 1 SC MM, 12 ... 48 V DC
Order No. 2891027

FL SWITCH SFNB 4TX/FX ST* 4 Cu ports, 1 ST MM, 12 ... 48 V DC
Order No. 2891028

FL SWITCH SFNB 4TX/FX SM20* 4 Cu ports, 1 SC SM, 12 ... 48 V DC
Order No. 2891029

Standard Switches with extended temperature range – SFNT

Mounting plate for SFNT Switches

Temperature range: -40°C ... 75°C,
also available as coated versions -C

FL SWITCH SFNT 5TX   5 Cu ports, no fiber optics
Order No. 2891001   9 ... 32 V DC

FL SWITCH SFNT 4TX/FX   4 Cu ports, 1 SC MM
Order No. 2891002   9 ... 32 V DC

FL SWITCH SFNT 8TX   8 Cu ports, no fiber optics
Order No. 2891027   9 ... 32 V DC

FL SWITCH SFNT 7TX/FX   7 Cu ports, 1 SC MM
Order No. 2891028   9 ... 32 V DC

FL SWITCH SFNT 7TX/FX ST   7 Cu ports, 1 ST SM
Order No. 2891029   9 ... 32 V DC

FL SWITCH SFNT 6TX/2FX   6 Cu ports, 2 SC MM
Order No. 2891028   9 ... 32 V DC

FL SWITCH SFNT 6TX/2FX ST 6 Cu ports, 2 ST SM
Order No. 2891029   9 ... 32 V DC

FL SWITCH SFNT 16TX   16 Cu ports, no fiber optics
Order No. 2891001   12 ... 48 V DC

FL SWITCH SFNT 15TX/FX   15 Cu ports, 1 SC MM
Order No. 2891002   12 ... 48 V DC

FL SWITCH SFNT 14TX/2FX 15 Cu ports, 1 ST MM
Order No. 2891027   12 ... 48 V DC

FL PA SFNT 5-8
Order No. 2891012

Standard Switches with narrow design – SF

Rail adapter for SF Switches

Temperature range: 0°C ... 55°C

FL SWITCH SF 8TX   8 Cu ports, no fiber optics
Order No. 2832771   18.5 ... 30.2 V DC

FL SWITCH SF 7TX/FX   7 Cu ports, 1 SC MM
Order No. 2832726   18.5 ... 30.2 V DC

FL SWITCH SF 7TX/FX ST   7 Cu ports, 1 ST MM
Order No. 2832577   18.5 ... 30.2 V DC

FL SWITCH SF 6TX/2FX   6 Cu ports, 2 SC MM
Order No. 2832933   18.5 ... 30.2 V DC

FL SWITCH SF 6TX/2FX ST   6 Cu ports, 2 ST MM
Order No. 2832674   18.5 ... 30.2 V DC

FL SWITCH SF 4TX/3FX ST   4 Cu ports, 4 ST MM
Order No. 2832603   18.5 ... 30.2 V DC

FL SWITCH SF 16TX   16 Cu ports, no fiber optics
Order No. 2832849   18.5 ... 30.2 V DC

FL SWITCH SF 15TX/FX   15 Cu ports, 1 SC MM
Order No. 2832661   18.5 ... 30.2 V DC

FL SWITCH SF 14TX/2FX   14 Cu ports, 2 SC MM
Order No. 2832593   18.5 ... 30.2 V DC

For vertical mounting
FL RA SF8
Order No. 2832519

IP67 –
Ethernet switching in the field

The new generation of Ethernet switches for field applications offers 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 mechanical engineering.

Quick and easy mounting

- Electrical connections:
  Innovative SPEEDCON technology with Plug&Turn
- Mounting: Axial arrangement of fixing clips outside the housing

30 mm

Slim overall width

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

SPEEDCON LOCKING

M12 circular plug-in connectors

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

FL SWITCH 1605 M12
Order No. 2700200

Ethernet interface	
Number of ports	5
Transmission speed	10/100 Mbps
Connection technology	M12 D-encoded

Function	
Basic functions	Unmanaged switch/auto negotiation, complies with standard IEEE 802.3, store-and-forward switching mode
Status and diagnostic indicators	LEDs: US (power supply), Link, and Activity per port

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

Ethernet plug-in connectors that can be assembled

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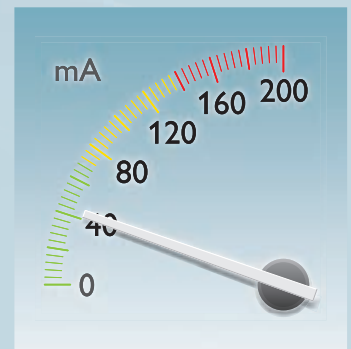
Y-distributor

Easy voltage distribution in the field.
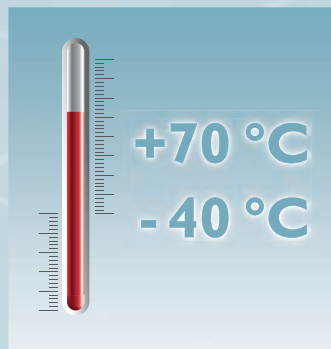
Extended temperature range

The extended temperature range enables universal use.

Low current consumption

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

Managed Switch 3000

The new Managed Switches of the 3000 series are tailored to the demands of infrastructure applications.

Indeed, the switches support comprehensive IT-compatible functions. IEEE security policies, redundancy and network management enable consistent integration into IT network structures.

Short redundancy switching times of 15 milliseconds and use even under extreme temperatures are the special features of the 3000 series.

Special attention has been given to the user-friendly operation and configuration.

Features
- Comprehensive IT-compatible functions (IEEE standards)
- High-performance network redundancy
- Numerous network performance options (performance management)
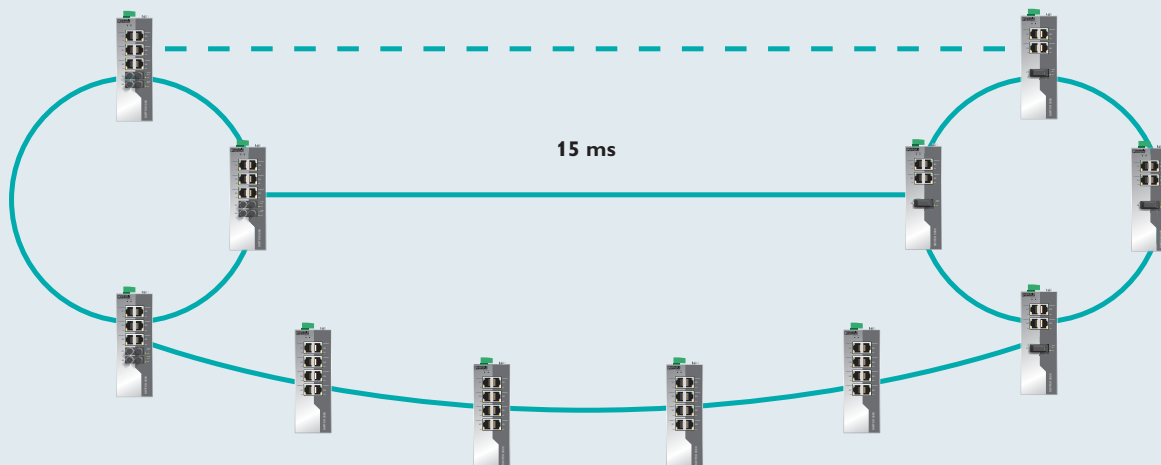- Security options (network security)

Applications: Energy, water/sewage, transport and traffic

Extended Ring Redundancy 15 ms

Application and functions of FL SWITCH 3000 Managed Switches

15 ms

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 134 devices in a ring*

• *Up to three linked rings with more than 300 switches supported*

Flexible redundancy topologies

• *Dual homing, redundant ring-to-ring coupling or linking of rings are possible*

• *IEEE redundancy standards such as STP/RSTP/MST ensure IT-compatibility.*

Safety functions

Comprehensive security functions protect against unauthorized network access:

• The 802.1x RADIUS authentication initially verifies the network device on the central server

• MAC-based port security of terminal devices

• Encrypted management access with HTTPS and SNMPv3

Management of network performance

To increase network performance, comprehensive filtering and prioritizing functions can be configured:

• Prioritizing of IP data packets over TOS field (type of service)

• Classification of IP data packets (differentiated services)

• Quality of Service with four priority queues

• Static and dynamic VLANs

• Flow control, storm control, and traffic shaping

| Managed Switch, 5 ports, copper	Managed Switch, 8 ports, copper	Managed Switch, 5 ports, 1 FO	Managed Switch, 8 ports, 2 FO
FL SWITCH 3005 Order No. 2891030	**FL SWITCH 3008** Order No. 2891031	**FL SWITCH 3004T-FX ST** Order No. 2891034	**FL SWITCH 3006T-2FX** Order No. 2891036
FL SWITCH 3005T Order No. 2891032	**FL SWITCH 3008T** Order No. 2891035	**FL SWITCH 3004T-FX** Order No. 2891033	**FL SWITCH 3006T-2FX ST** Order No. 2891037
Functions			
Store & forward switch, complies with 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, SNMPv3, HTTPS	Store & forward switch, complies with 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, SNMPv3, HTTPS	Store & forward switch, complies with 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, SNMPv3, HTTPS	Store & forward switch, complies with 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, SNMPv3, HTTPS

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.
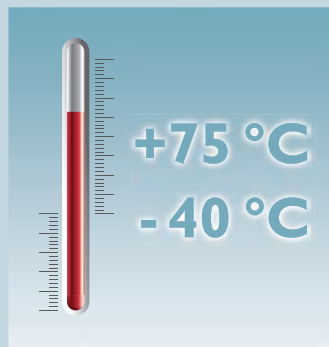
Extended temperature range

The extended temperature range enables universal use.

Narrow design

The narrow design enables the space-saving installation in the control cabinet.

Lean Managed Switches

Maximum diagnostics in the minimum amount of space.

Compact and fiber optics-compatible Lean Managed Switches 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. Using the integrated software functions, data streams and connected automation devices can be diagnosed and analyzed comprehensively.

Various connection options

In addition to an SC plug, Lean Managed Switches are equipped with proven, tried and tested ST/BFOC fiberglass plugs. The variety of connections enables use in the widest range of applications.

Network expansion or modernization using existing and previously installed fiberglass cabling is therefore no problem for Lean Managed Switches.
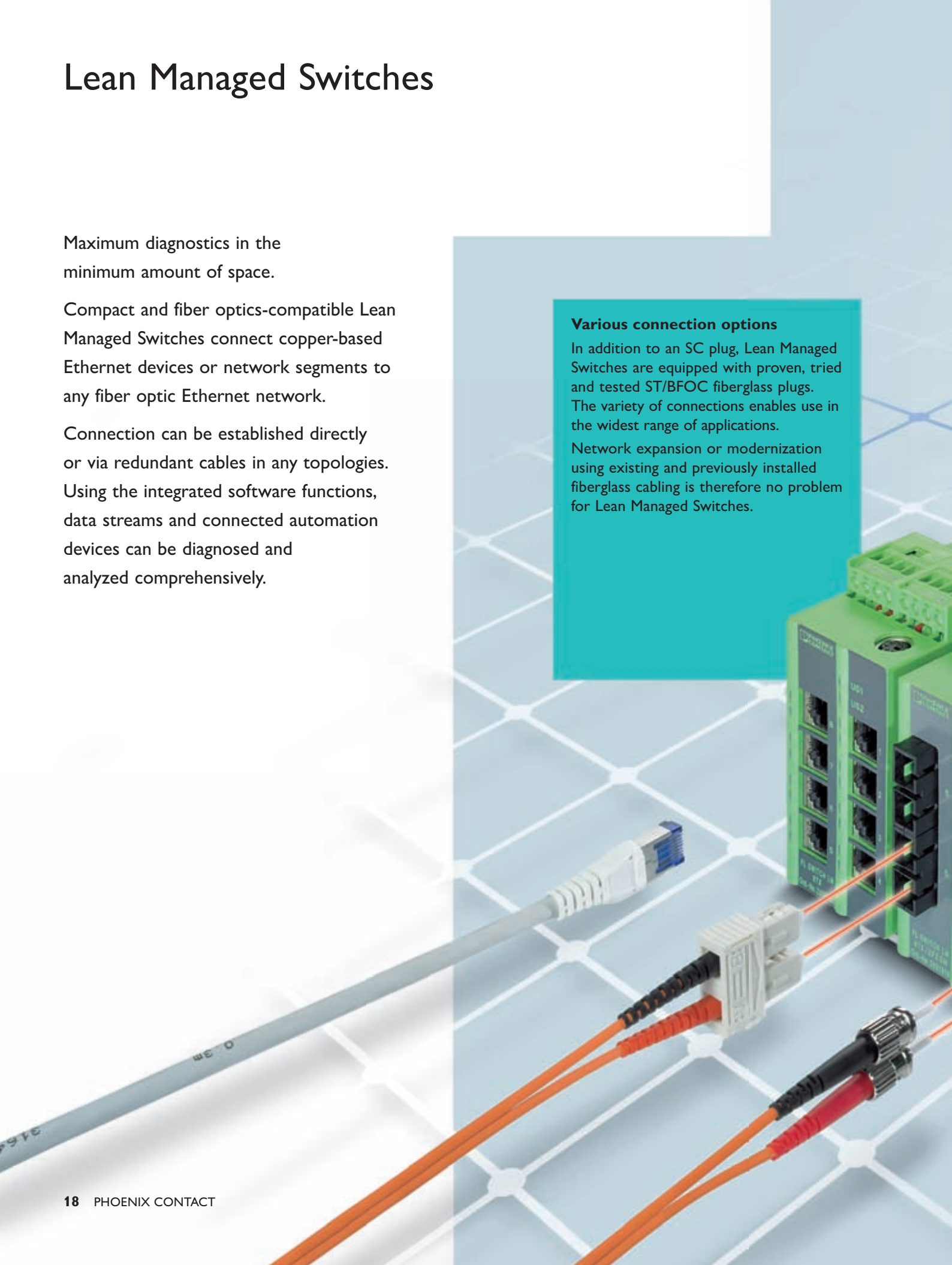
Redundancy switch-over

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.

+70 °C
- 40 °C

Connection versatility

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

LEAN MANAGED SWITCHES

Diagnostic Configuration

## Availability through redundancy

- RSTP is an industry standard (IEEE 802.1w) which is used universally by manufacturers, thereby ensuring compatibility through standardization.

- It can be easily integrated into existing networks. Flexible redundancy for all topologies: Ring, tree or combinations of the two topologies are supported.

- RSTP automatically resolves network loops.

- It enables the redundant connection of devices in order to ensure a high level of network availability.

- The protocol is integrated in every Lean Managed Switch. This means that no ring manager is required.

Application and functions of Lean Managed Switches

Up to 57 switches in the ring

Ring III

Ring I

Ring II
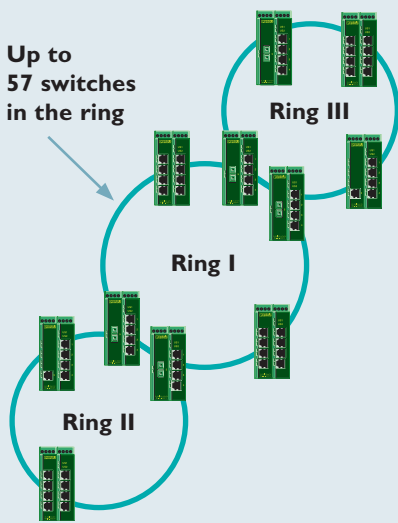
Redundancy with RSTP

The non-proprietary RSTP standard redundancy method offers the option to resolve meshed networks in a tree structure. The Large Tree Support extension also enables larger networks to be created than with the RSTP standard. The number of switches can thus be extended up to 57 switches in the ring. Large Tree Support is supported by all Phoenix Contact automation switches.
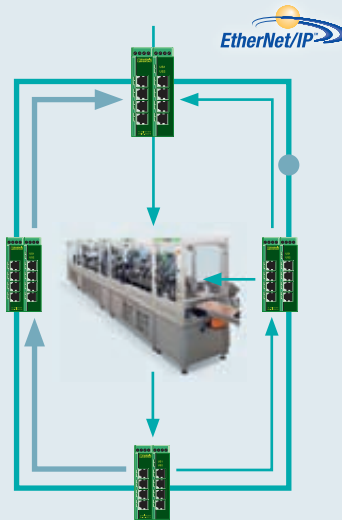
EtherNet/IP

Redundancy with EtherNet/IP

The Auto Query Port function activates the automatic selection of additional query ports by means of RSTP or fast ring detection. Redundant ports are thereby automatically integrated in every multicast group. In the case of redundancy switch-over, the multicast packets are not blocked because the ports required are already members of the groups.

IGMP querier

Multicast filtering

Controllers using input data

IO: Multicast transmitter
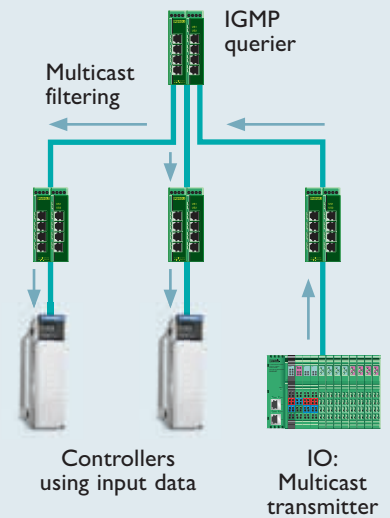
EtherNet/IP

Lean Managed Switches have filter and querier functions for optimum EtherNet/IP support. These functions can be used to route data streams to just those devices that require the data. This minimizes the data load in the network and ensures a high level of availability.

Multicast filtering is activated by default upon delivery for "E" devices.

Fast ring detection

Fast ring detection can be used to shorten the switch-over time in meshed networks to 100 to 500 ms. Since the switch-over time of standard RSTP is usually insufficient for automation solutions, with fast ring detection it is possible to operate automation networks that can switch topology without aborting the controller connection.

Security through segmentation

The segmentation of a physical network into several logical networks using Virtual Local Area Network (VLAN) provides the following advantages:

• Increased network performance and security by separating data traffic
• Prioritization of data or termination devices
• New devices can be flexibly assigned to a logical network via the configuration

Easy diagnostics

All the functions of the switch can be configured and monitored via web-based management using a browser.

The standard IT function SNMP enables quick and easy configuration and monitoring of Lean Managed Switches using manufacturer-independent IT tools. Port mirroring provides help with troubleshooting in the network. Data streams of individual ports can be mirrored at another port so that they can be recorded for analysis.

Lean Managed Switch, copper

FL SWITCH LM 5TX
Order No. 2989527
FL SWITCH LM 5TX-E
Order No. 2989336

Lean Managed Switch, copper

FL SWITCH LM 8TX
Order No. 2832632
FL SWITCH LM 8TX-E
Order No. 2891466

Lean Managed Switch, 1 FO

FL SWITCH LM 4TX/1FX
Order No. 2989624
FL SWITCH LM 4TX/1FX-E
Order No. 2989433
FL SWITCH LM 4TX/1FX SM
Order No. 2989828
FL SWITCH LM 4TX/1FX SM-E
Order No. 2989637
FL SWITCH LM 4TX/1FX ST
Order No. 2989721
FL SWITCH LM 4TX/1FX ST-E
Order No. 2989530
FL SWITCH LM 4TX/1FX SM ST
Order No. 2989925
FL SWITCH LM 4TX/1FX SM ST-E
Order No. 2989734

Lean Managed Switch, 2 FO

FL SWITCH LM 4TX/2FX
Order No. 2832658
FL SWITCH LM 4TX/2FX-E
Order No. 2891660
FL SWITCH LM 4TX/2FX SM
Order No. 2891916
FL SWITCH LM 4TX/2FX SM-E
Order No. 2891864
FL SWITCH LM 4TX/2FX ST
Order No. 2989132
FL SWITCH LM 4TX/2FX ST-E
Order No. 2989831
**FL SWITCH LM 4TX/2FX SM ST**
Order No. 2989239
FL SWITCH LM 4TX/2FX SM ST-E
Order No. 2989938

Functions

Store-and-forward switch, complies with IEEE 802.3, suitable for PROFINET with 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 supply voltage), link and receive LED per port, 24 V supply voltage, DHCP server, configuration memory on an external PC, multicast source detection / **Multi-mode ports:** 11 km fiberglass with F-G 62.5/125 0.7 dB/km F100, 6.4 km fiberglass with F-G 50/125 0.7 dB/km F1200, 3.0 km fiberglass with F-G 62.5/125 2.6 dB/km F1000, 2.8 km fiberglass with F-G 50/125 1.6 dB/km F800 / **Single-mode ports:** 36 km fiberglass with F-G 9/125 0.36 dB/km, 32 km fiberglass with F-G 9/125 0.4 dB/km, 26 km fiberglass with F-G 9/125 0.5 dB/km / **Copper ports:** 100 m, extended temperature range -40°C – 70°C, configuration: Web-based management, SNMP, serial (V.24), Factory Manager / **Standard versionapprovals:** UL, GL, DNV, BV / **Approvals for E versions:** UL, UL EX, IGMP snooping, activated by default upon delivery

Comprehensive approvals enable worldwide use
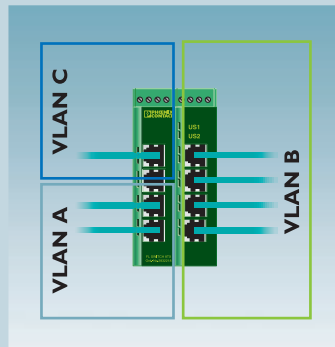
VLAN for logical network segmentation

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

Multicast filtering for efficient EtherNet/IP networks

Smart Managed Switches

Smart Managed Switches offer excellent realtime properties with high data throughput at the same time.
The industrial DIN rail switches support Fast Ethernet or Gigabit on all ports and are ideal for use in the PROFINET RT or EtherNet/IP environment. At the same time, they provide the bandwidth required for the integration of IT realtime services, such as video or Voice-over-IP in automation networks.

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

For automation applications that require a compact block switch, Managed Compact Switches with 14 TX or 16 TX and two fiberglass ports are the perfect choice.

The switches are ideal for PROFINET realtime and EtherNet/IP applications and support the necessary management functions. High-performance full wire speed switching fabric provides high data throughput and optimum time response.

MRP-capability

Based on standard IEC 62439, the Media Redundancy Protocol (MRP) enables ring topologies with maximum switch-over times of 200 ms.

In the event of an error, the MRP manager routes the data stream to a free cable so that communication can continue without restriction.

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.

Possible applications and 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 glass fiber plug-in modules SX, LX, and Longhaul allow data transmission over distances of up to 80 km. The 1000 BASE-SX module handles distances of up to 550 m. Single-mode fibers are used with 1000 Base-LX for paths of up to 30 km in length.

Smart Managed Compact Switches are DIN rail switches suitable for industrial use, which support Gigabit Ethernet on all ports. Versions for Fast Ethernet applications are of course also available.
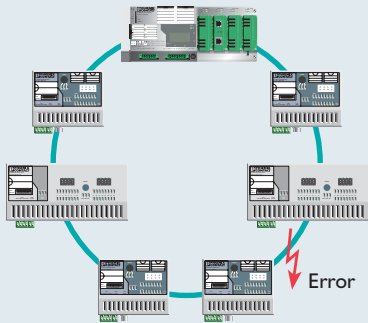
Gigabit interfaces in SFP format are used for data transmission over distances of up to 80 km.

1 GBit/s

SMART MANAGED SWITCHES

Application and functions of Smart Managed Switches

Error

MRP

Redundant ring topology standardized according to IEC 62439 "High availability automation networks." MRP is part of PROFINET standard IEC 61158 and guarantees switch-over times of 200 ms.

In a network with a ring topology, the MRP manager disables a port logically so that the ring is only interrupted logically. Data is sent in the network and the MRP manager sends test telegrams permanently via the logically disabled port. In the event of an error, this port is released for data telegrams.


LLDP

In order to precisely define the network topology of LANs, the Link Layer Discovery Protocol (LLDP) offers a corresponding mechanism.

The LLDP protocol sets one device in the LAN so that it sends information about itself and stores information received from its neighboring devices. This information can be requested by a network management system using the SNMP protocol.

The LLDP protocol is sent periodically and thus also notices any changes in the network topology. All Smart Managed Switches support the LLDP protocol.

PROFINET alarm
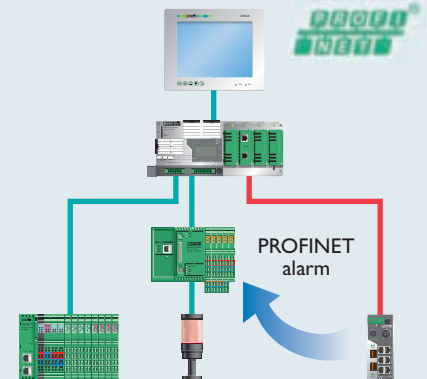
PROFINET I/O device

- *Switches are detected as PROFINET I/O devices (PC Worx and Step 7)*
- *Configuration via I/O controller (ILC, S7)*
- *DCP (Discovery Configuration Protocol): For IP addresses and device names*
- *Diagnostics can be read by the control program*
- *If the optical power in the polymer fiber falls below a threshold, a PROFINET alarm is triggered*

FL MEM PLUG

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.

FL MEM PLUG
Order No. 2891259

FL MEM PLUG/MRM
Order No. 2891275

EtherNet/IP

Smart Managed Switches have multicast filter and querier functions for optimum EtherNet/IP support. These functions can be used to route data streams to just those devices that require the data. This minimizes the data load in the network and ensures a high level of availability.

IGMP multicast filtering

The Internet Group Management Protocol (IGMP) describes a method for distributing information via multicast applications between routers and termination devices at IP level (Layer 3).

Smart Managed Switches can evaluate this information using IGMP snooping and dynamically filter multicasts.

Extended multicast filtering

Smart Managed Switches can also filter multicasts in network segments where no IGMP information is exchanged.

Smart Managed Narrow Switch	Managed Compact Switch	Smart Managed Compact Switch	Smart Managed Compact Switch
FL SWITCH SMN 6TX/2POF-PN Order No. 2700290	**FL SWITCH MCS 16TX** Order No. 2832700	**FL SWITCH SMCS 8GT** Order No. 2891123	**FL SWITCH SMCS 6GT/2SFP** Order No. 2891479
	FL SWITCH MCS 14/2FX Order No. 2832713	**FL SWITCH SMCS 8TX** Order No. 2989226	**FL SWITCH SMCS 6TX/2SFP** Order No. 2989323

Functions

Store-and-forward switch, complies with standard IEEE 802.3, two priority classes according to IEEE 802.1 P, TCP/IP protocol, BootP-compatible, port mirroring, integrated web server function, Rapid Spanning Tree (RSTP), port security, PROFINET I/O device, autocrossing, auto negotiation, Smart mode, fast ring detection, Media Redundancy Protocol, EtherNet/IP, multicast filtering with IGMP snooping, extended multicast filtering, Auto Query port function, memory plug support, static VLAN (IEEE 802.1Q)

Store-and-forward switch, complies with standard IEEE 802.3, two priority classes according to IEEE 802.1 P, TCP/IP protocol, BootP-compatible, port mirroring, integrated web server function, Rapid Spanning Tree (RSTP), port security, PROFINET I/O device, autocrossing, auto negotiation, Smart mode, fast ring detection, Media Redundancy Protocol, EtherNet/IP, multicast filtering with IGMP snooping, extended multicast filtering, Auto Query port function, memory plug support, static VLAN (IEEE 802.1Q)

Web-based management, SNMP, serial (V.24)

Web-based management, SNMP, serial (V.24), MEM PLUG

LEDs: U_S (supply voltage), LINK and selection of state: Activity, speed, transmission mode, LED per port, operating mode can be configured in Smart mode

LEDs: US (supply voltage), 1 x Link and 1 x Activity each, speed, transmission mode can be selected, LED per port, operating mode can be configured in Smart mode
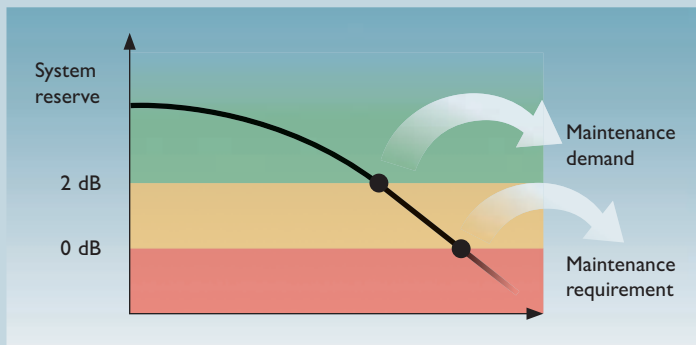
The Ethernet switch suitable for industrial use with six Fast Ethernet ports in RJ45 format and two fiber optic ports in POF format has PROFINET mode activated by default upon delivery.

DHCP option 82 relay agent, SNTP, time synchronization, dynamic VLANs: GVRP

Proactive POF diagnostics

If the value falls below the 2 dB system reserve, the maintenance demand is triggered via PROFINET and the maintenance engineer is informed. Furthermore, the system reserve can be monitored continuously via WBM/SNMP.

Approvals and applications

The SMCS switches are suitable for installation in ATEX zone 2.

PROFINET Switches

Ethernet switching with maximum speed for PROFINET applications.

Thanks to integrated ERTEC technology, the new 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-resistant and diagnosable fiber optic rings – optionally with additional fiber optic branch.

Quick realtime switching
PROFINET packets are detected by realtime switches and transmitted as a priority using the cut-through method, independently of the remaining data traffic.
This thereby ensures that PROFINET data packets are transmitted at maximum speed.

	IRT Switch	**IRT Switch**
	FL SWITCH IRT 2TX 2POF Order No. 2700691	**FL SWITCH IRT TX 3POF** Order No. 2700692
Ethernet interface		
Number of ports	2	1
Transmission speed	10/100 Mbps	10/100 Mbps
Connection technology	RJ45 socket	RJ45 socket
Fiber optic interface		
Number of ports	2	3
Transmission speed	100 Mbps (full duplex)	100 Mbps (full duplex)
Transmission length	Up to 250 m (depending on the fiber used)	Up to 250 m (depending on the fiber used)
Function		
Basic functions	Cut-through/store-and-forward switch, 2 priority classes according to IEEE 802.1P, TCP/IP protocol, DCP-compatible, integrated web server function, PROFINET I/O device	Cut-through/store-and-forward switch, 2 priority classes according to IEEE 802.1P, TCP/IP protocol, DCP-compatible, integrated web server function, PROFINET I/O device
Status and diagnostic indicators	2 status LEDs per Ethernet port: LINK and Activity, supply voltage U_{S1} and U_{S2} (redundant supply voltage), and BF	2 status LEDs per Ethernet port: LINK and Activity, supply voltage U_{S1} and U_{S2} (redundant supply voltage), and BF

Diagnostics for fiber optic paths

PROFINET enables the FL SWITCH IRT to diagnose fiber optic paths and makes a controller's diagnostic data available. It is therefore possible to continuously monitor the quality of the fiber optic paths. For improved assessment of the fiber optic path, FL IRT switches also make the distances between two devices in the PROFINET I/O device available to the maintenance engineer.

Modular Smart Managed Switches

Our most powerful switch is the new Gigabit Modular Switch. It is particularly suitable for use as an automation backbone and for connection to the higher-level company network. Layer 3 functions can be activated with the FL SD FLASH/L3/MRM.

The Gigabit Modular Switch is available in two versions. 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, such as 1000 BASE-SX, 1000BASE-LX or longhaul.

Conservation of resources and energy efficiency

Climate protection and energy conservation are important topics in modern society and industry. A high-performance communication network is essential in order to increase energy efficiency. Therefore despite its high level of performance, the switch is particularly energy efficient.
In order to conserve additional resources, the switch is prepared for operation with the PROFIenergy profile.
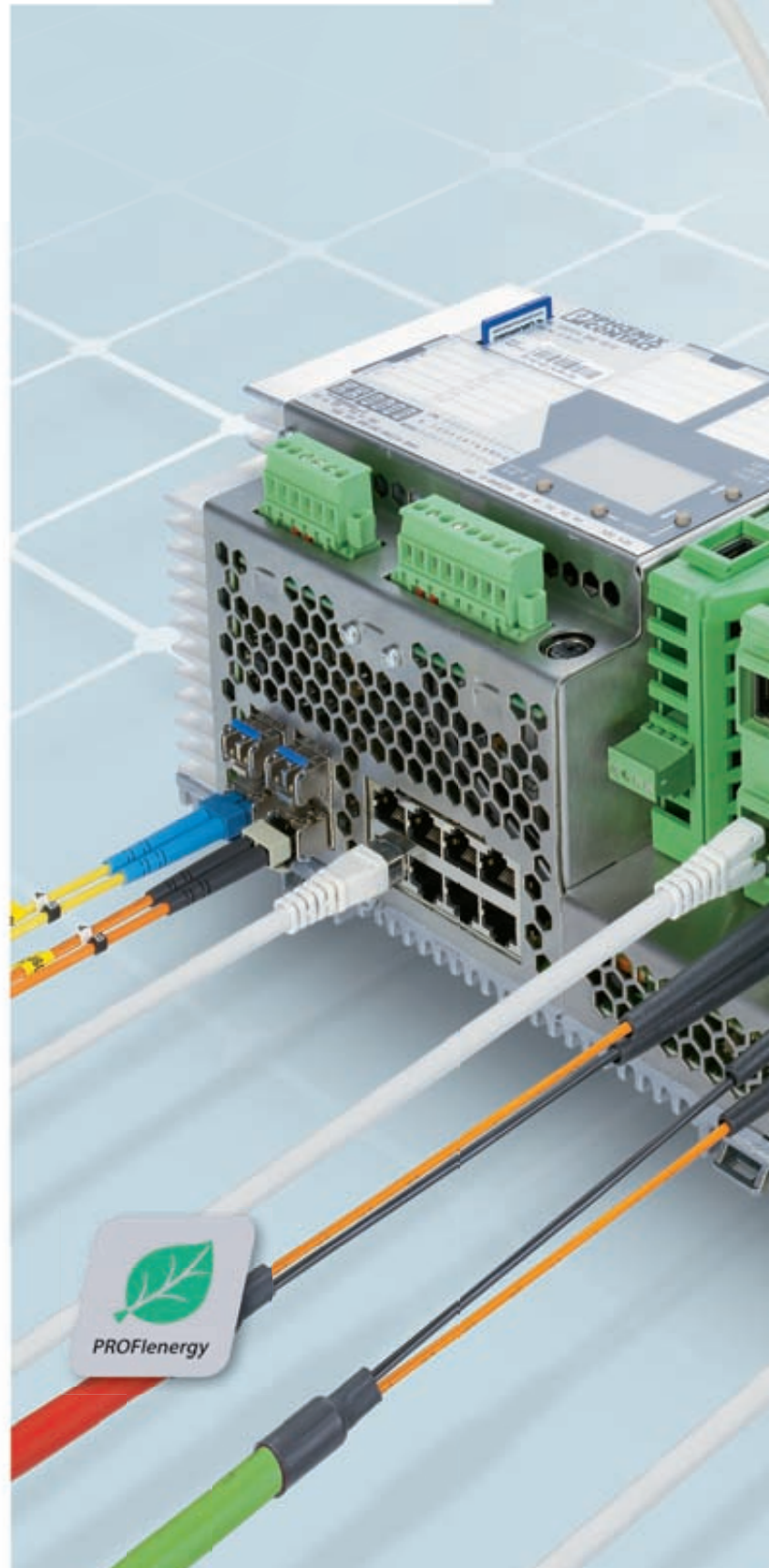
Easy operation

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

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.
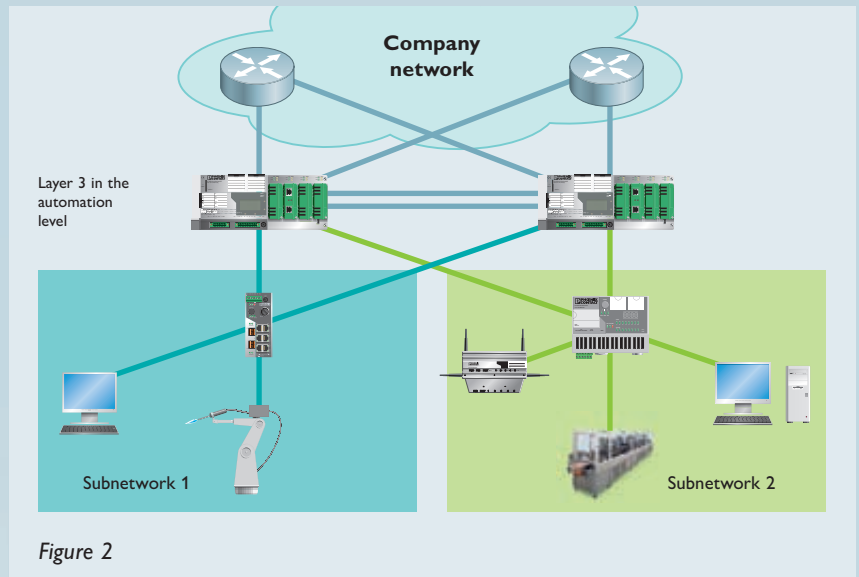
Replaceable configuration memory

Replaceable configuration memory for storing device settings for easy device replacement and installation. In addition, the media redundancy and Layer 3 functions are stored on the SD Flash.

MODULAR SMART MANAGED SWITCHES
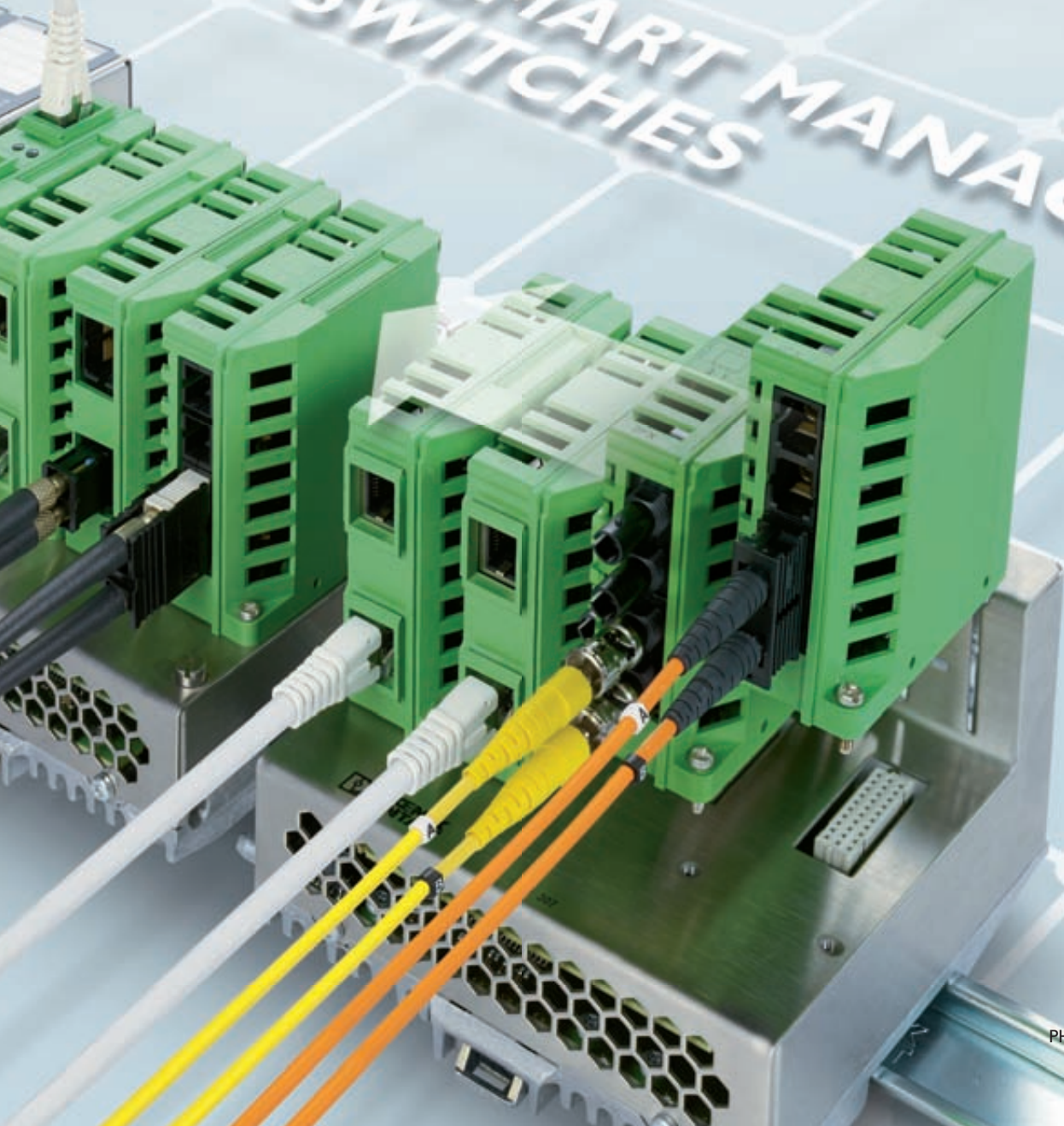
Application and functions of Gigabit Modular Switches

Figure 1

Figure 2
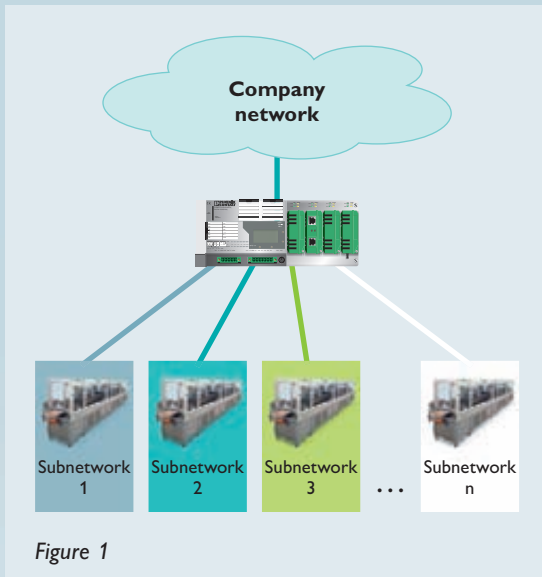
In addition to excellent performance at Layer 2 level, the Gigabit Modular Switch can be used as a Layer 3 switch with the help of the FL SD FLASH L3/MRM memory card. Routing is increasingly used when IT networks are connected to automation networks.

By inserting an SD Flash card with Layer 3 license, the switch is now able to support up to 28 instances of port-specific routing, static routing (see Figure 1) or, for redundant router applications, the VRRP protocol (Virtual Router Redundancy Protocol) (see Figure 2).

If data packets in automation networks are to be transmitted to other subnetworks, this can be very easily set by using static routes in the switches.

If you wish to operate the routers redundantly in a network and therefore to increase network availability, VRRP is used.

Several physical routers are combined to create a logical group, which appears as a logical virtual router in the network.
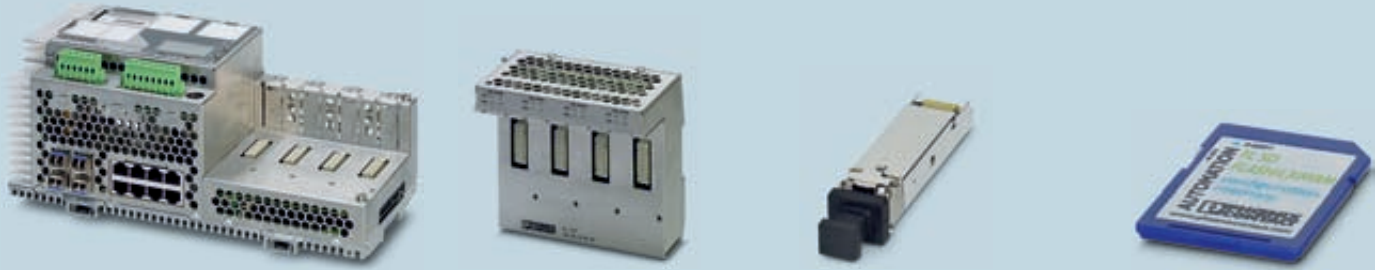
Gigabit head station

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

Software functions

Store-and-forward switch, TCP/IP protocol, BootP-compatible, port mirroring, port security, PROFINET I/O 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

Extension station 8 ports

FL FXT
Order No. 2989307

Properties

Using the extension module, up to 8 additional ports can be connected on the Gigabit Modular Switch.

SFP modules

FL SFP SX
Order No. 2891754

FL SFP LX
Order No. 2891767

FL SFP LX LH
Order No. 2989912

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

SD FLASH 256 MB
Order No. 2988120

FL SD FLASH/MRM
Order No. 2700270

FL SD FLASH/L3/MRM
Order No. 2700607

The **SD FLASH 256 MB** stores the configuration.

FL SD FLASH/MRM: This SD Flash card not only stores switch c onfigurations, 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 and the use of VRRP.

User-friendly user interfaces – We speak your language

In addition to configuration via web-based management (WBM), the FL SWITCH GHS …G/… also supports input and configuration via command lines. Configuration via a command line interface (CLI) is widely used in IT. IT personnel will therefore recognize the familiar configuration interface.

Automation specialists can configure and diagnose the switch as a PROFINET I/O device in engineering tools (PCWorx, Step 7).
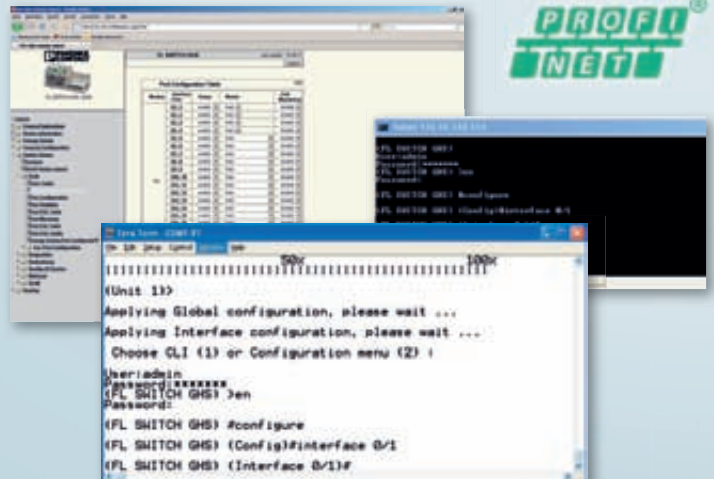
Plug-in modules for the Modular Smart Managed Switches

	With twisted pair ports	With twisted pair ports	With diagnostic function (SCRJ)
	FL IF 2TX VS RJ-F (2 RJ45 ports, no FO ports) Order No. 2832344	**FL IF 2TX VS RJ-D** (2 RJ45 ports, no FO ports) Order No. 2832357	**FL IF 2POF SCRJ-D** (650 nm, 2 POF/HCS) Order No. 2891084
Properties			
Use	Replaceable interface module, with two RJ45 ports, 10/100 Mbps	Replaceable interface module, with two RJ45 ports, 10/100 Mbps	Replaceable interface module, with 10/100 Mbps
Certification	ABS, CUL, CUL-EX LIS, GL, GL-SW, DNV, UL, UL-EX LIS, BV	ABS, CUL, CUL-EX LIS, GL, GL-SW, DNV, UL, UL-EX LIS, BV	UL, CUL
Copper Ethernet interface			
Transmission speed	10/100 Mbps	10/100 Mbps	–
Cable length	100 m	100 m	–
Connection technology/outlet direction	Front (-F)	Downward (-D)	–
Fiber optic Ethernet interface			
Transmission speed	–	–	10/100 Mbps full duplex
Maximum cable length	–	–	50 m (including 3 dB system reserve, polymer fiber with F-K 980/1000 230 dB/km) 100 m (HCS fiber with F-S 200/230 10 dB/km) 250 m (HCS GI 200/230)
Connection technology/outlet direction	–	–	SCRJ Downward

With two SC multi-mode ports	With two SC multi-mode ports	With two SC single-mode ports	With two ST multi-mode ports
FL IF 2FX SC-F (1300 nm, 2 SC multi-mode) Order No. 2832412	**FL IF 2FX SC-D** (1300 nm, 2 SC multi-mode) Order No. 2832425	**FL IF 2FX SM SC-D** (1300 nm, 2 SC single-mode) Order No. 2832205	**FL IF 2FX ST-D** (1300 nm, 2 ST multi-mode) Order No. 2884033
Replaceable interface module, with 100 Mbps	Replaceable interface module, with 100 Mbps	Replaceable interface module, with 100 Mbps	Replaceable interface module, with 100 Mbps
CUL, CUL-EX LIS, UL, UL-EX LIS, ABS	ABS, CUL, CUL-EX LIS, DNV, GL, GL-SW, UL, UL-EX LIS, BV	CUL, CUL-EX LIS, GL, GL-SW, UL, UL-EX LIS, BV, DNV	CUL, UL, UL-EX LIS, CUL-EX LIS
–	–	–	–
–	–	–	–
–	–	–	–
100 Mbps, full duplex	100 Mbps, full duplex	100 Mbps, full duplex	100 Mbps, full duplex
6.4 km fiberglass with F-G 50/125 0.7 dB/km F1200	6.4 km fiberglass with F-G 50/125 0.7 dB/km F1200	36 km fiberglass with F-G 9/125 0.36 dB/km	6.4 km fiberglass with F-G 50/125 0.7 dB/km F1200
2.8 km fiberglass with F-G 50/125 1.6 dB/km F800	2.8 km fiberglass with F-G 50/125 1.6 dB/km F800	32 km fiberglass with F-G 9/125 0.4 dB/km	2.8 km fiberglass with F-G 50/125 1.6 dB/km F800
10 km fiberglass with F-G 62.5/125 0.7 dB/km F1000	10 km fiberglass with F-G 62.5/125 0.7 dB/km F1000	26 km fiberglass with F-G 9/125 0.5 dB/km	10 km fiberglass with F-G 62.5/125 0.7 dB/km F1000
3 km fiberglass with F-G 62.5/125 2.6 dB/km F600	3 km fiberglass with F-G 62.5/125 2.6 dB/km F600		3 km fiberglass with F-G 62.5/125 2.6 dB/km F600
250 m (HCS GI 200/230)	250 m (HCS GI 200/230)		250 m (HCS GI 200/230)
SC duplex Front	SC duplex Downward	SC duplex Downward	ST socket Downward

User-friendly handling

The new HCS GI fiber enables quick and easy local assembly of fiber optic plugs for ranges up to 250 m for polymer fibers (plastic fibers) and up to 2000 m on 1300 nm fiberglass. Further information about HCS GI fiber optic cables can be found on page 44/45.

FL FOC PN-C-HCS-GI-200/230
Order No. 2313410

Smart Managed Narrow NAT Switch

The FL NAT SMN 8TX NAT switch is the first DIN rail device to combine switch functions with NAT routing. 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.

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 jumpered to the desired IP address area for the higher-level automation network.

The NAT switch supports the following functions:

- Choice of three router modes
  - 1:1 NAT router
  - IP masquerading
  - Virtual 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

NAT Switch

FL NAT SMN 8TX
Order No. 2989365

Ethernet interface	
Number of ports	8
Transmission speed	10/100 Mbps
Connection technology	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, Media Redundancy Protocol (MRP) according to IEC 62439

Diagnostics	
Status and diagnostic 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

Production network (10.10.0.0 / 255.255.0.0)

10.10.**1**.0 / 255.255.255.0	10.10.**2**.0 / 255.255.255.0	10.10.X.0 / 255.255.255.0
NAT / 1:1 NAT	....	
192.168.10.0 / 255.255.255.0	192.168.10.0 / 255.255.255.0	192.168.10.0 / 255.255.255.0
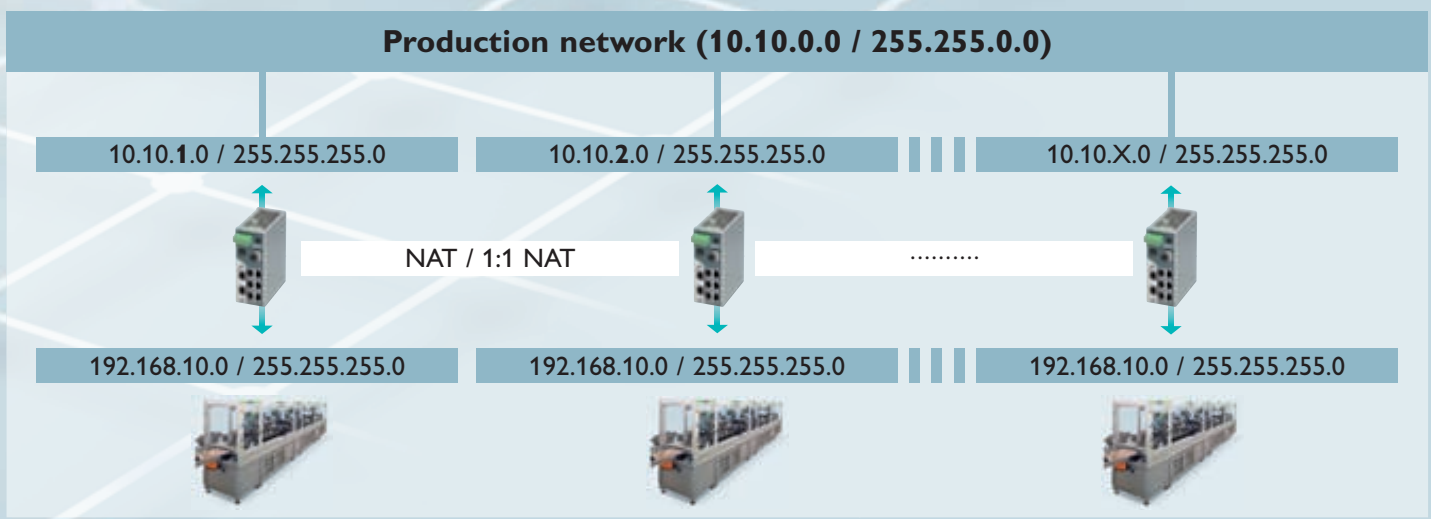
Power over Ethernet –
Power and data transmission
via Ethernet connections

For the first time ever, Power over
Ethernet modules suitable for industrial
use enable the common transmission of
power and data in industrial environments
via an Ethernet connection (LAN). Power
over Ethernet standard IEEE 802.3 af
is used here. This means that
termination devices such as WLAN access
points, IP phones and cameras,
which are also increasingly being
used in industrial environments,
can be connected quickly and
inexpensively.

No power supply connection
When it comes to installation in areas
that are difficult to access, such as walls
or ceilings, there is no need for a
separate power supply connection as
power and data are supplied via the
LAN connection. The investment
costs for power supply units and the
associated installation costs for supplying
power to termination devices can thus
be completely eliminated.
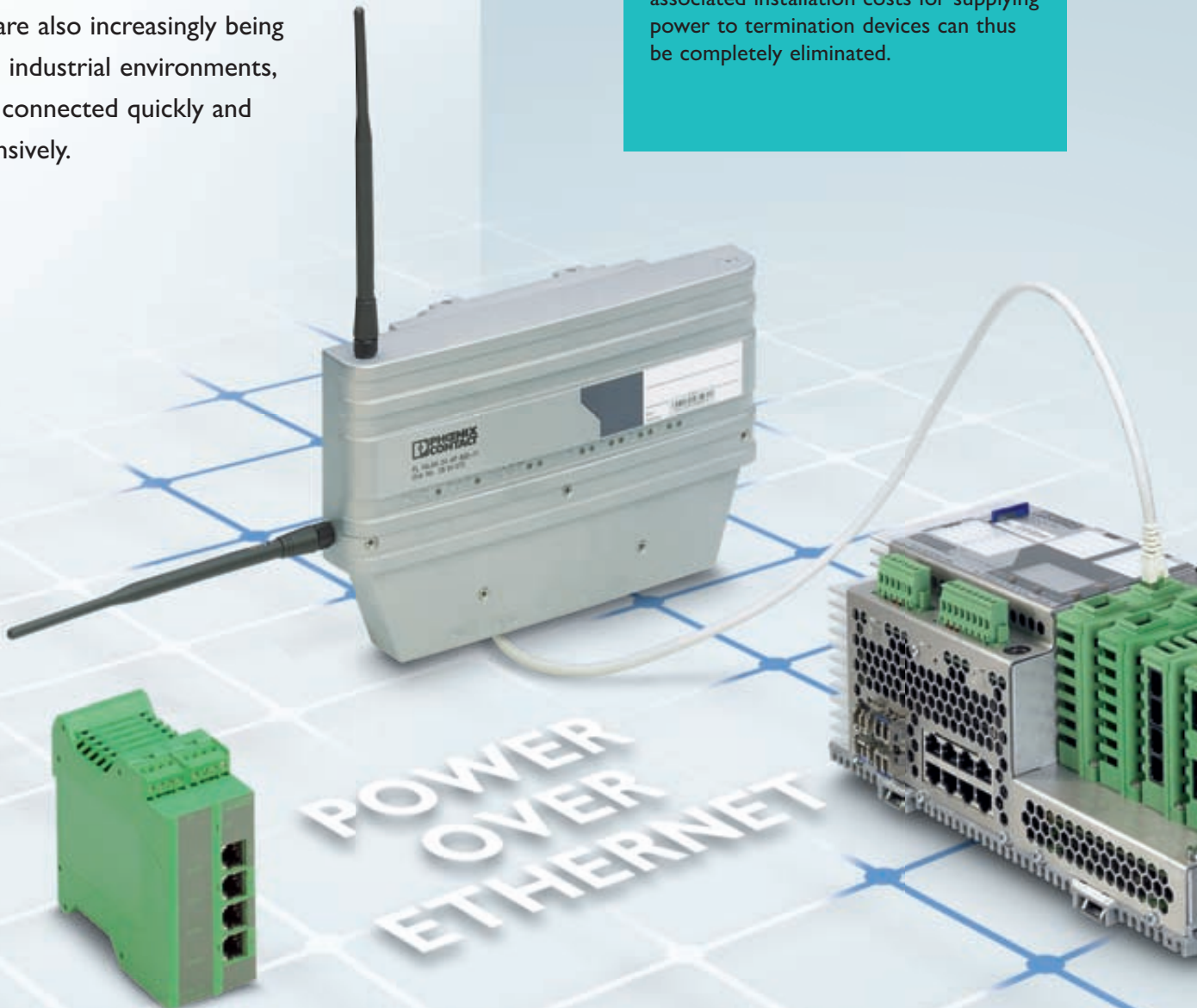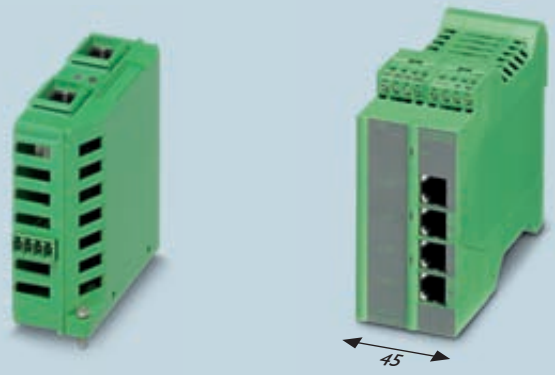
	Interface module for Gigabit Modular Switch	**Power over Ethernet module**
	FL IF 2PSE-F 2 RJ45 PoE ports Order No. 2832904	**FL PSE 2TX** 2 RJ45 PoE ports Order No. 2891013
Properties		
Function	Replaceable interface module with Power over Ethernet IEEE 802.3af, Power Source Equipment (PSE), with 10/100 Mbps	Simultaneous transmission of power and data on one Ethernet cable according to IEEE 802.3af
Certification	CUL, CUL-EX LIS, UL, UL-EX LIS	CUL, CUL-EX LIS, UL, UL-EX LIS
Device type	Endspan device	Midspan device
Copper Ethernet interface		
Transmission speed	10/100 Mbps	10/100 Mbps
Cable length	100 m (between transmitter/receiver)	100 m (between transmitter/receiver)
Connection technology/outlet direction	Downward	–
Power supply		
Supply voltage	48 V DC	24 V DC
Typical current consumption	10 mA in no-load operation; 900 mA, approximately with maximum permissible load	100 mA, approx. in no-load operation; 1800 mA, approx. with 24 V at the input and with maximum permissible load and 25°C ambient temperature
Use		
Configuration	Not required	
Status and diagnostic indicator	LEDs: US (supply voltage), Power over Ethernet detection per port	

Ethernet data

Power

Ethernet data and power
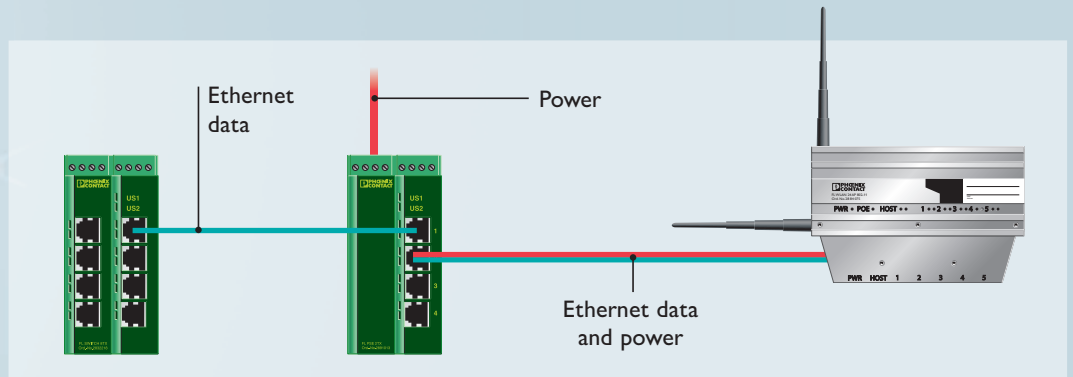
Hubs for industrial networking

If automation tasks are automated with Powerlink or FL Net, our hubs are the ideal choice for these tasks.

All components are suitable for industrial use, i.e., they feature DIN rail mounting, a compact design, a high level of electromagnetic compatibility, redundant power supply, and a wide temperature range. The hubs do not need to be configured and are transparent in the network.

Ethernet Powerlink

The Factoryline hubs are standard-compliant repeaters in accordance with Ethernet standard IEEE 802.3.

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.

ETHERNET
POWERLINK

ETHERNET H

45

90

	Hub/repeater **(IEEE 802.3)**	Hub/repeater **(IEEE 802.3)**
	FL HUB 8TX-ZF 8 RJ45 ports Order No. 2832551	**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 applied for
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 diagnostic indicators	LEDs: US (supply voltage), COL (collision) when receiving data, link status LED per port	

Repeater function

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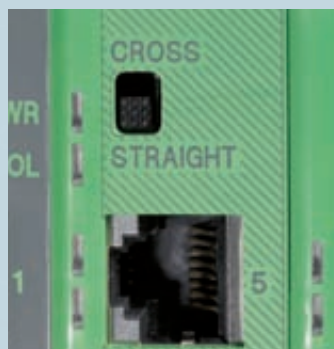
Outcross port

The outcross port can be used to cascade several hubs and 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.

Fiber optic media converters – 1300 nm

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 with a 1300 nm wavelength guarantee interference-free network extension for distances of up to 36,000 m.

The extended temperature range and various diagnostic functions round off the industrial solution.

Link diagnostics

The diagnostic functions LFP (link fault pass through) and FEF (Far End Fault) enable the state of the entire path to be monitored by the connected termination devices. A link failure on the copper port automatically leads to a link interrupt of the fiber optic path and of the link on partner's the copper port. This prevents further attempts to establish communication. The network load is reduced. The connection via both media converters serves as a pure copper compound.

FIBER OPTICS

	FO converter – multi-mode fiber, SC	**FO converter – multi-mode fiber, ST**	**FO converter – single-mode fiber, SC**
	For converting 10/100 Base-TX to multi-mode fiberglass (RJ45 socket, shielded, SC duplex, 1300 nm)	For converting 10/100 Base-TX to multi-mode fiberglass (RJ45 socket, shielded, B-FOC (ST), 1300 nm)	For converting 10/100 Base-TX to single-mode fiberglass, SC duplex connection (RJ45 socket, shielded, SC duplex, 1300 nm)
	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
Copper Ethernet interface			
Transmission speed/length	10/100 Mbps/100 m, shielded	10/100 Mbps/100 m, shielded	10/100 Mbps/100 m, shielded
Link through	LFP, Link fault pass through	LFP, Link fault pass through	LFP, Link fault pass through
MDI/MDI-X switchover	Auto MDI (x)	Auto MDI (x)	Auto MDI (x)
Auto negotiation modes	Auto – or can be set via DIP switches	Auto – or can be set via DIP switches	Auto – or can be set via DIP switches
Signal LEDs	Activity, link status, 10/100 Mbps	Activity, link status, 10/100 Mbps	Activity, link status, 10/100 Mbps
Fiber optic Ethernet interface			
Transmission length including 3 dB system reserve	6400 m, with F-G 50/125 0.7 dB/km F 1000 2800 m, with F-G 50/125 1.6 dB/km F800 10,000 m, with F-G 62.5/125 0.7 dB/km F 1000 2000 m, with HCS GI fiber with 2 GK 200/230	6400 m, with F-G 50/125 0.7 dB/km F 1200 2800 m, with F-G 50/125 1.6 dB/km F800 10,000 m, with F-G 62.5/125 0.7 dB/km F 1000 2000 m, with HCS GI fiber with 2 GK 200/230	36,000 m, with F-G 9/125 0.36 dB/km 32,000 m, with F-G 9/125 0.4 dB/km 26,000 m, with F-G 9/125 0.5 dB/km
Signal LEDs	Far end fault (FEF), link	Far end fault (FEF), link	Far end fault (FEF), link

Technology for every application
With polymer, HCS (PCF), multi-mode or single-mode devices, the right technology is available for every application with various fiber optic connection methods in FSMA, B-FOC (ST), SCRJ or SC duplex format thus enabling short, medium, and long distances to be covered.

Reduced wiring effort
With the optional DIN rail connector and a system power supply unit, there is minimal wiring effort for the power supply, including for redundant applications.

FO media converter – 660 nm and WDM

The media converters with a wavelength of 660 nm are the first to enable distances of 300 m to be covered using inexpensive and easy to use POF/HCS technology. The devices continuously monitor the fiber optic path and indicate the status via an LED bar graph and alarm contact.
In addition, the fiber optic T-coupler provides diagnostic data in web-based management and as SNMP objects in the network. Devices in all industrial Ethernet systems, such as PROFINET, EtherNet/IP, Modbus TCP, etc., can therefore be used.

Full duplex via one fiber

The media converters FL MC EF WDM... enable full duplex communication with a single glass fiber via WDM technology (Wavelength Division Multiplex).

Features:
- 1310 nm and 1550 nm wavelengths to transmit and receive
- Single-mode fiberglass
- SC simplex connection

Application:
- Single-fiber transmission of optical signals in rotating applications with optical slip rings, e.g., wind power and automotive industry, rotary tables
- Doubling the bandwidth or stablishing separate networks in existing wiring (separate outgoing/return line)

FIBER OPTICS

	FO converter – single fiber, WDM	**FO converter – SCRJ, 660 nm**	**Fiber optic T-coupler – SCRJ, 660 nm**
	For converting 10/100 Base-TX to a simplex single mode fiber (RJ45 socket, shielded, SC simplex, 1310/1550 nm)	For converting 10/100 Base-T to polymer or HCS fiber, SCRJ connection (RJ45 socket, shielded, SCRJ, 660 nm)	For converting 2 x 10/100 Base-T to 2 x polymer or HCS fiber, SCRJ connection (RJ45 socket, shielded, SCRJ, 660 nm)
	FL MC EF WDM-SET Order No. 2902660	**FL MC 10/100BASE-T/FO 660** Order No. 2708193	**FL MC ETH/FO 660 T** Order No. 2313164
Copper Ethernet interface			
Transmission speed/length	10/100 Mbps/100 m, shielded	10/100 Mbps/100 m, shielded	10/100 Mbps/100 m, shielded
Link through	LFP, Link fault pass through	Link down, automatically forwarded to the second connection	–
MDI/MDI-X switch-over	Auto MDI (x)	Can be switched internally between line (1:1) and crossover connection	Auto MDI (x)
Auto negotiation modes	Auto – or can be set via DIP switches	Either transparent via TP and FO (default) or locally on TP	Auto – or can be permanently set via web-based management
Fiber optic Ethernet interface			
Signal LEDs	Far end fault (FEF), link	Link/Activity, 4 stage bar graph (optical receiving power)	Per fiber optic port: Link/Activity, 4-stage bar graph (optical receiving power)
Switching output	–	Two floating relay outputs	Two floating relay outputs
Transmission length including 3 dB system reserve	38 km (with F-E 9/125 0.36 dB/km) 34 km (with F-E 9/125 0.4 dB/km) 28 km (with F-E 9/125 0.5 dB/km)	70 m Polymer fiber at 10 Mbps, with F-K 980/1000, 230 dB/km 300 m HCS fiber at 10 Mbps, with F-S 200/230, 8 dB/km 50 m Polymer fiber at 100 Mbps, with F-K 980/1000, 230 dB/km 100 m HCS fiber at 100 Mbps, with F-S 200/230, 8 dB/km 300 m with HCS GI fiber with F-GK 200/230 at 100 Mbps	50 m (polymer fiber with F-P 980/1000 230 dB/km at 100 Mbps) 100 m (HCS fiber with F-K 200/230 8 dB/km at 100 Mbps) 300 m (HCS GI fiber with F-GK 200/230 at 100 Mbps)

High level of availability
Continuous fiber optic diagnostics with LED bar graph and floating switch contact enable fast startup and preventive maintenance for the connection.

HCS(PCF) gradient index fiber 200/230 μm

With the special structure of its mixed fiber, the HSC gradient index fiber offers the option of combining the advantages of two different cables. Similarly to fiberglass, it offers much greater ranges than a standard polymer or HCS(PCF) fiber. Yet, the HCS GI fiber can be assembled in the field easily and quickly, in a similar way to a conventional plastic fiber.

Quick assembly of fiber optic plugs

The new HCS GI fiber enables easy assembly of fiber optic plugs. The plugs are available in B-FOC (ST), SC duplex, and SCRJ versions and can be re-used at any time. In contrast to existing HCS (PCF) cables, the new gradient index profile offers increased bandwidth. Here, ranges of up to 300 m can be achieved on 660 nm POF/HCS devices and up to 2000 m on 1300 nm glass multi-mode devices, as well as 300 m on Gigabit devices.

Ethernet

PROFI NET®

Modbus

FIBER OPTICS

HCS GI fiber optic cable

Rugged installation cable, easy to assemble, 200/230 µm, type PROFINET-C-HCS-GI-1005, for 10/100/1000 Mbps Ethernet systems

FL FOC PN-C-HCS-GI-200/230
Order No. 2313410

HCS fiber optic cable

Rugged HCS cable that can be assembled, 200/230 µm, type PROFINET-B-HCS-1018, increased temperature range, halogen-free, PVC sheath

FL FOC PN-B-HCS-200/230
Order No. 2313766

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

PSM-HCS-KONFTOOL/SC-RJ
Order No. 2708876
PSM-HCS-KONFTOOL/B-FOC
Order No. 2708465

HCS GI plug

Fiber optic plugs for local assembly of HCS GI cables, for B-FOC or SC duplex pin arrangements and SCRJ plugs

PSM-SET-B-FOC/4-HCS/PN
Order No. 2313782
PSM-SET-SCRJ-DUP/2-HCS/PN
Order No. 2313546
PSM-SET-SC-DUPLEX/2-HCS/PN
Order No. 2313779

Technical data

300 m on 660 nm POF systems at 100 Mbps

2000 m on 1300 nm GOF systems at 100 Mbps

300 m on 1300 nm Gigabit GOF systems

300 m on 660 nm POF systems at 10 Mbps

100 m on 660 nm POF systems at 100 Mbps

Comprising quick mounting plugs, stripping blade, stripping pliers, aramid yarn scissors, fiber stripper, fiber cleaving tool, and microscope

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+70 °C
- 20 °C

100
1000
10
MBps Ethernet
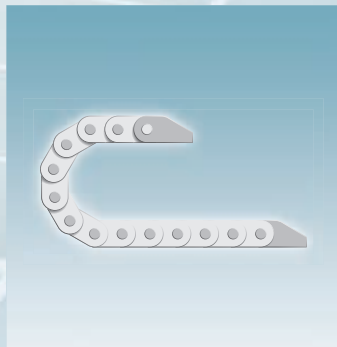
Suitable for use with drag chains
Highly flexible round cable for use in trailing cables or drag chains.

Extended temperature range
The extended temperature range enables universal use.
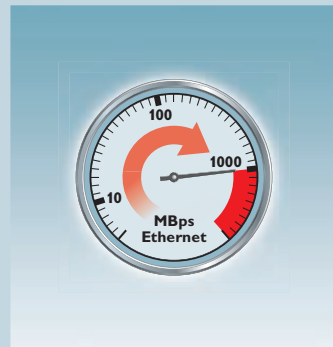
High-speed data transmission
The gradient index fiber enables all transmission speeds of 10/100/1000 Mbps.

Flame-retardant
Halogen-free and flame-retardant installation cables for the highest of standards.

Wireless Ethernet – New possibilities with Industrial WLAN

Phoenix Contact's industrial WLAN network solutions open up new possibilities for you to create production and logistics processes more efficiently, reliably, and simply. Phoenix Contact's safe and cost-effective industrial WLAN solution enables:

Reliable, safe, and fast communication with mobile or moving automation and production systems.

Realtime access to network resources and service information for increasing productivity and accelerating decision processes.

Special features:
- Designed for operation in harsh industrial environments
- Reliable and high-performance communication
- Rugged and electromagnetically compatible device design
- Long range
- Maximum data integrity

Rugged **WLAN access points** for creating networks directly in the field without a control cabinet.

Applications: Warehousing and logistics, production, and plant networking

INDUSTRIAL WLAN

Industrial **WLAN adapter** for the easy integration of automation systems in the WLAN network.

The compact, high-speed **WLAN access point** for use in the control cabinet or distributed control boxes.

Simulation software for quick and easy planning of wireless systems.
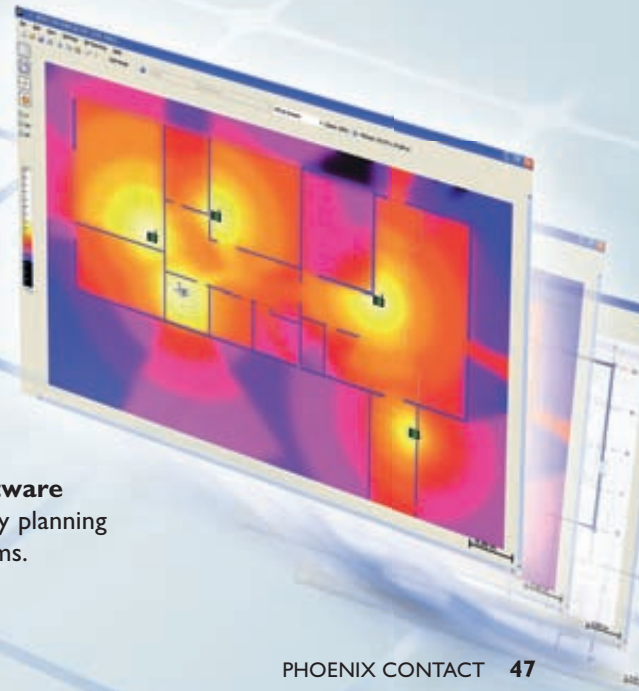
Wireless Ethernet –
Next generation Industrial WLAN

The latest generation of WLAN modules offers you maximum reliability, data throughput, and range.

In extremely compact metal housing, the new WLAN 5100 combines rugged industrial technology with high 802.11n performance and modern MiMo technology. The central cluster management makes configuration and maintenance of WLAN networks considerably faster and easier.

CM technology
CM technology (cluster management) enables central configuration and monitoring of all WLAN 5100 access points of a WLAN network quickly and easily with a web browser.

Designed by PHOENIX CONTACT

* Compared to current 802.11b/g WLAN devices. The range depends on the antennas used and the ambient conditions. The actual performance can vary according to range, connection speed, ambient conditions, size of the network and other factors.

IEEE 802.11n

4x

2,4 GHz 5 GHz

Higher-performance – IEEE 802.11n

The new WLAN 5100 offers the advantages of the new WLAN standard IEEE 802.11n to industrial applications.

Further – up to 4 times the range

With its high-performance WLAN module, the new WLAN 5100 achieves distinctly higher ranges* – also used with WLAN 802.11a/g clients. Fewer access points per surface are therefore needed, which decreases infrastructure costs.

Flexible – 2.4 GHz and 5 GHz bands

The WLAN 5100 supports all current WLAN standards in the 2.4 GHz band and the increasingly more important 5 GHz band. Three parallel channels are available in the 2.4 GHz band, whereas 19 can be used in the 5 GHz band.

802.11a/g/n							
802.11a/g							
802.11b							
0	50	100	150	200	250	300	
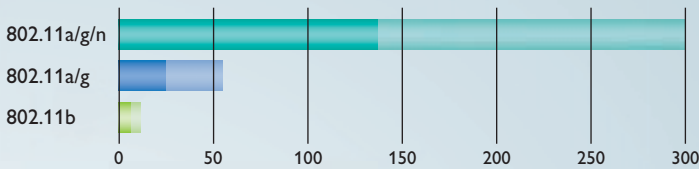
Faster – up to 300 Mbps

The new high-speed WLAN 5100 achieves a 5-times higher data rate* via the wireless path when compared to the current IEEE 802.11a/g standard. Indeed, it now virtually achieves the net data rate of fast Ethernet speed. As such, wireless communication is no longer the network's bottleneck.
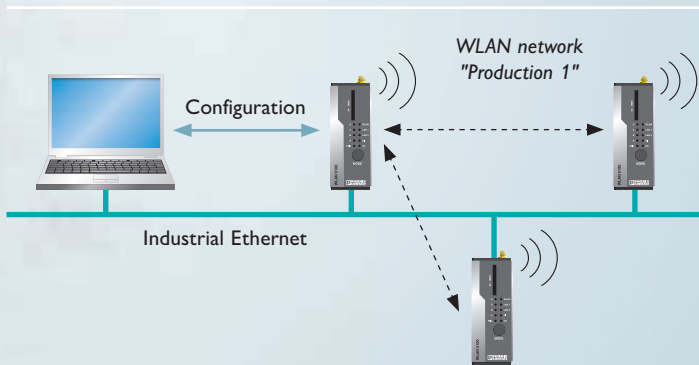
It couldn't get any easier – with CM technology

CM technology with WLAN 5100 enables easy implementation of comprehensive WLAN networks with fast roaming and a high level of security, while incurring minimal configuration and administration costs. All access points of a WLAN network are established in a matter of minutes and integrated into existing networks.

More reliable – with MiMo technology

MiMo technology (multiple input, multiple output) with three antennas significantly increases the ruggedness, speed, and range of the wireless communication. This is particularly noticeable under challenging industrial conditions.
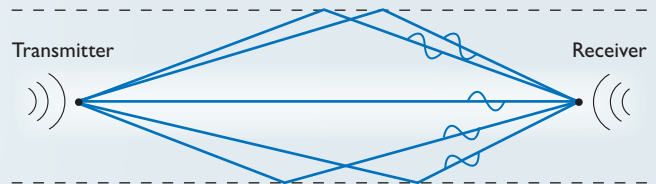
WLAN 802.11a/g transmits and receives only one data stream via an antenna; reflections can lead to strong signal fluctuations at the receiver.
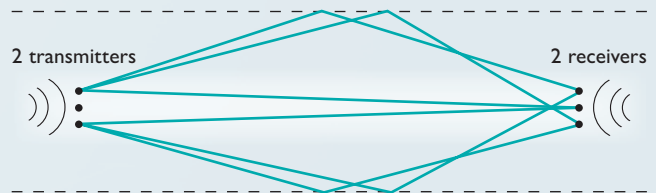
WLAN 802.11n transmits and receives several parallel data streams, for which the reflections are used strategically in the space.

Application and functions of Industrial WLAN

PLC

Industrial Ethernet/PROFINET
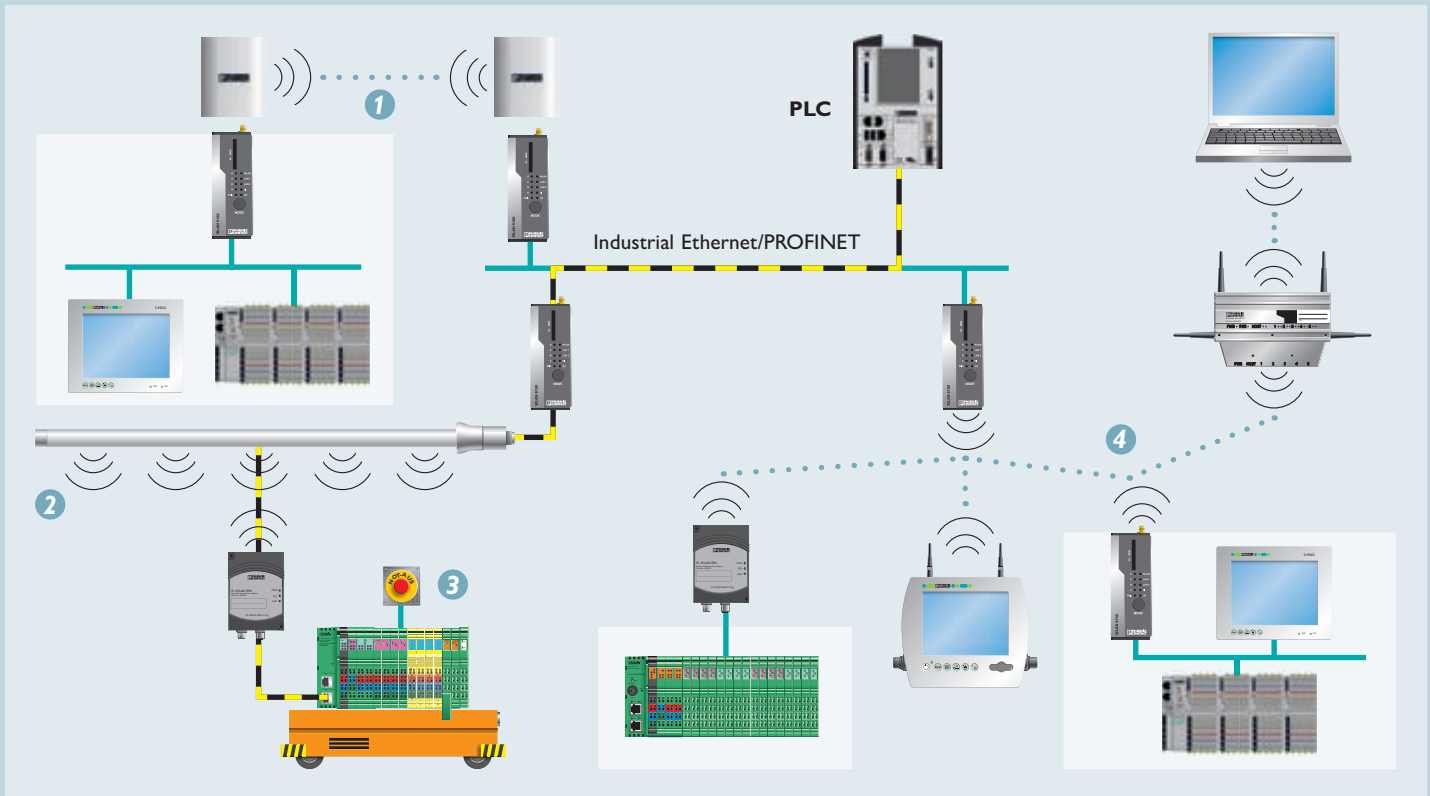
1 Radio links

With WLAN 5100 and directional wireless antennas, quick communication links can be established over a distance of up to several kilometers (clear line of sight), e.g., for plant networking.

2 Guided transport systems

The use of a special leaky cable antenna is recommended for the implementation of very reliable communications links along the route of guided transport systems, e.g., electric monorails, cranes, etc.

3 Safety with SafetyBridge, PROFIsafe

The transmission of functionally safe data is also possible over Industrial WLAN with SafetyBridge Technology or PROFINET/PROFIsafe.

4 WDS/repeater mode

With WLAN 5100, wireless network structures can be flexibly established with repeater mode and WDS function.

Antennas and accessories

For antennas and accessories for indoor and outdoor industrial applications, please refer to the catalog or visit www.phoenixcontact.com.

WLN
simulation software

FL WST BASIC
Order No. 2692254

A free light version can be downloaded from www.phoenixcontact.com.

WLAN
access point

FL WLAN 24 AP 802-11
Order No. 2884075

FL WLAN 24 DAP 802-11
Order No. 2884279

FL WLAN 230 AP 802-11
Order No. 2884444

FL WLAN 24 AP 802-11-US
Order No. 2700448

FL WLAN 24 DAP 802-11-US
Order No. 2700451

FL WLAN 230 AP 802-11-US
Order No. 2700452

WLAN 5100
access point

FL WLAN 5100
Order No. 2700718

SD-FLASH 256 MB
Order No. 2988120

WLAN
Ethernet adapter

FL WLAN EPA
Order No. 2692791

FL WLAN EPA 5N
Order No. 2700488

FL WLAN EPA RSMA
Order No. 2701169

Properties

Easy to operate software tool for wireless planning. Simulated wireless fields based on transmission power, frequency band, antennas, and pre-defined ambient conditions. Wireless coverage – according to signal strength or quality – is indicated in a color display.

WLAN access point, 24 V DC, PoE; IEEE 802.11 a/b/g; 2.4 GHz; 5 GHz, client adapter; IP65; antenna diversity; web-based management; 802.11i, WPA2, WPA-PSK, RADIUS, WEP, TKIP, AES

WLAN access point/client, repeater, 24 V DC, 2 x RJ45, 10/100 Mbps, 3 x R-SMA antenna connection, IEEE 802.11b/g/a/n (2.4/5 GHz); IP20; configuration via web-based management; and clustering, WPS, security: 802.11i, WPA2, WPA-PSK, 802.1x, WEP, TKIP, AES, -25°C up to +60°C, 39 x 100 x 115 mm (W x Hx D)

WLAN client adapter, 9...30 V DC, IP65, IEEE 802.11b/g/n; 2.4 GHz (EPA); IEEE 802.11a/n, 5 GHz (EPA 5N), internal antenna, circularly polarized; mode button; web-based management; SNMP, AT commands; EPA RSMA: external antenna connection, IEEE 802.11a/b/g/n 802.11i, WPA2, WPA-PSK, RADIUS, WEP, TKIP, AES

The library contains all elements for a quick startup

Large wiring space

Two Ethernet connections for easy installation

Special integrated antenna for reliable connections
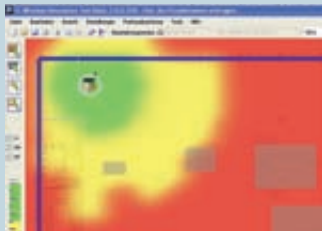
Different simulation modes visualize the wireless coverage

Configuration memory for easy device replacement

Replaceable memory cards for easy device replacement
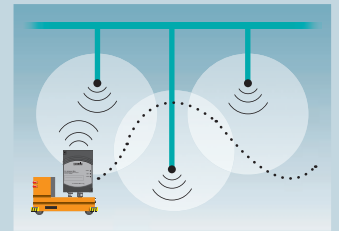
Fast roaming between access points

Wireless Ethernet – Industrial Bluetooth

The Bluetooth modules let you easily, reliably and cost-effectively integrate mobile or difficult to access automation devices or I/O modules into your Ethernet automation network.

With the additional "Black Channel Listing" and the "Low Emission Mode" Industrial Bluetooth can also be operated without errors, in parallel to WLAN networks. The quick and straightforward startups are yet another advantage of this solution.

Special features:
- Extremely reliable wireless transmission through redundant transmission channels
- Working ranges of up to 100 m in open factories and up to 250 m in open areas (depending on ambient conditions)
- Pressing the Mode key easily and quickly establishes a secure wireless path.

PROFIsafe

PROFINET

SafetyBridge Technology
Designed by PHOENIX CONTACT

EtherNet/IP

Modbus
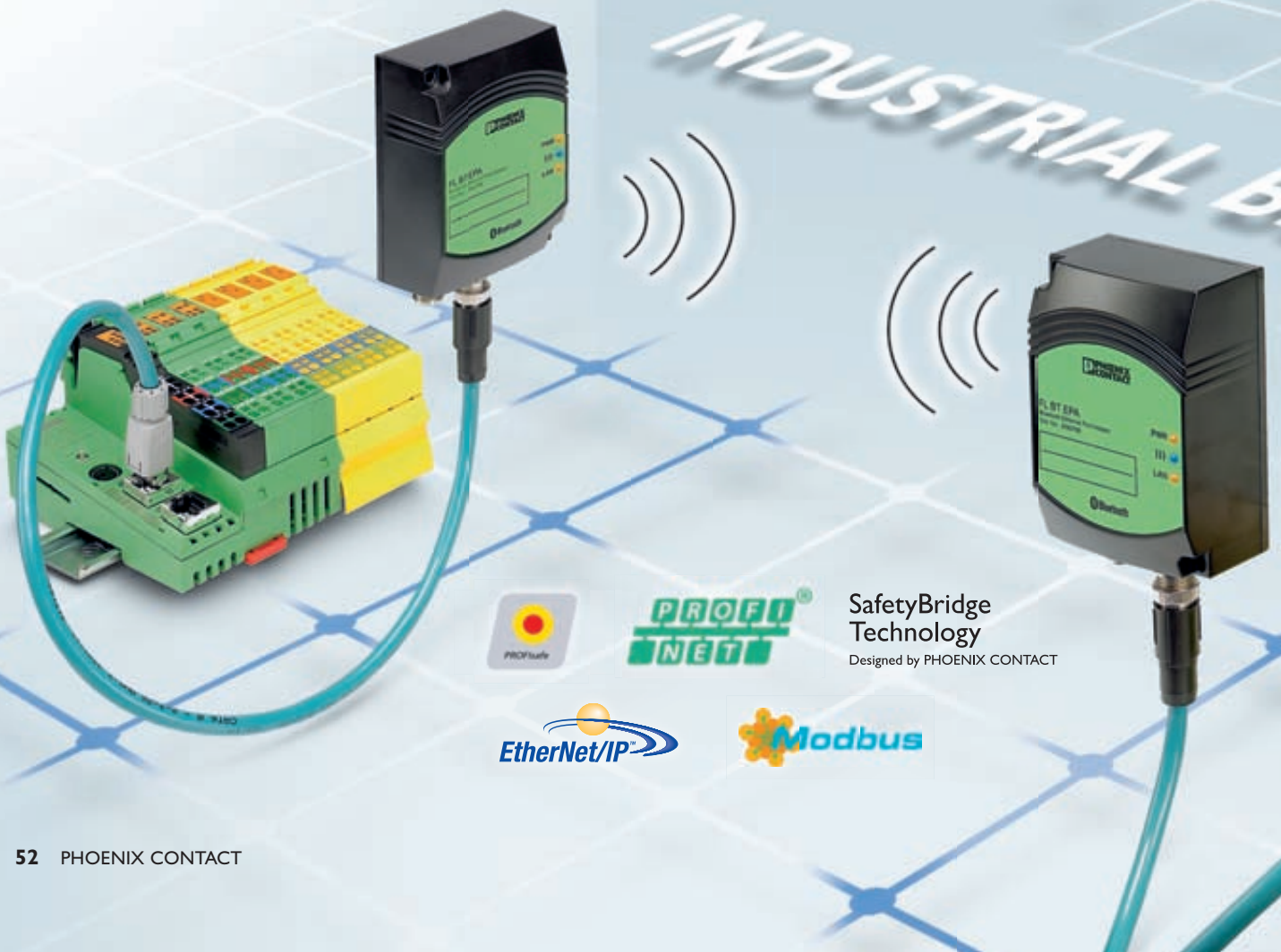
	Bluetooth Ethernet adapter	**Bluetooth Ethernet adapter set**	**Bluetooth access point**
	FL BT EPA Order No. 2692788	**FL BT EPA AIR SET** Order No. 2693091	**FL BLUETOOTH AP** Order No. 2737999
Technical data	**Properties**		
Properties	Factoryline Wireless Bluetooth Ethernet port adapter; Bluetooth V2.0; 2.4 GHz frequency band; 1 wireless interface; WLAN black channel list; LEM; IP65; connections: M12 for 9 to 30 V DC, M12 for LAN; autocrossing; PROFINET and PROFIsafe-compatible; internal antenna	Bluetooth Ethernet port adapter set; Bluetooth V2.0; 2.4 GHz frequency band; 1 wireless interface per module; WLAN black channel list; LEM; IP65; M12 connection for 9 to 30 V DC and LAN; autocrossing; PROFINET and PROFIsafe-compatible; internal antenna	Bluetooth access point, Bluetooth V2.0, 2.4 GHz frequency band, 1 wireless interface, WLAN black channel list, LEM, IP20, COMBICON connection for 9 to 30 V DC, RJ45 connection for LAN, 9-pos. D-SUB RS-232, SMA(f) antenna connection
Configuration	Web interface, SNMP, AT commands	Web interface, SNMP, AT commands	Web interface, SNMP
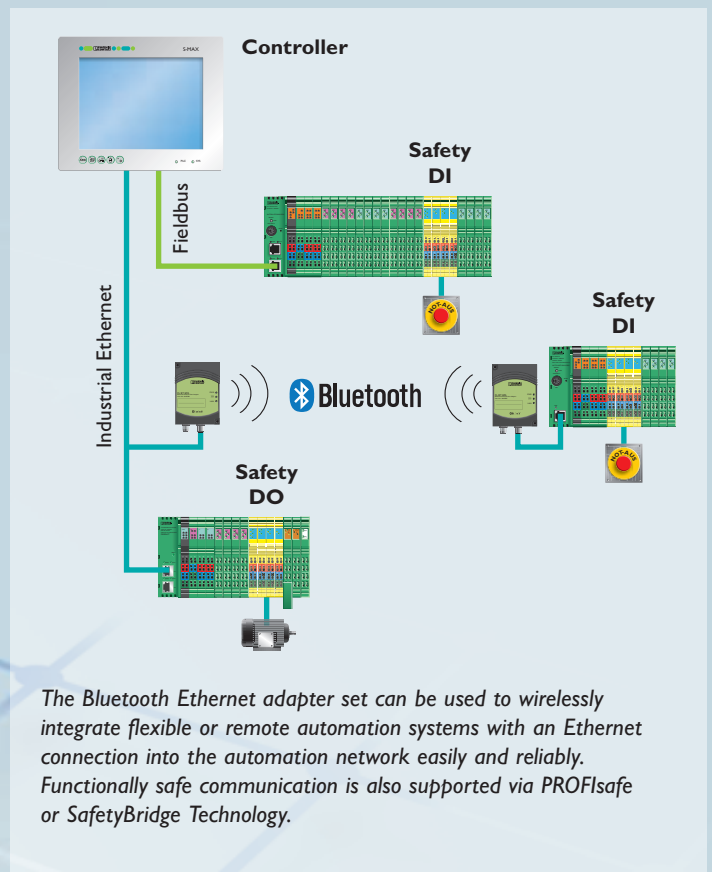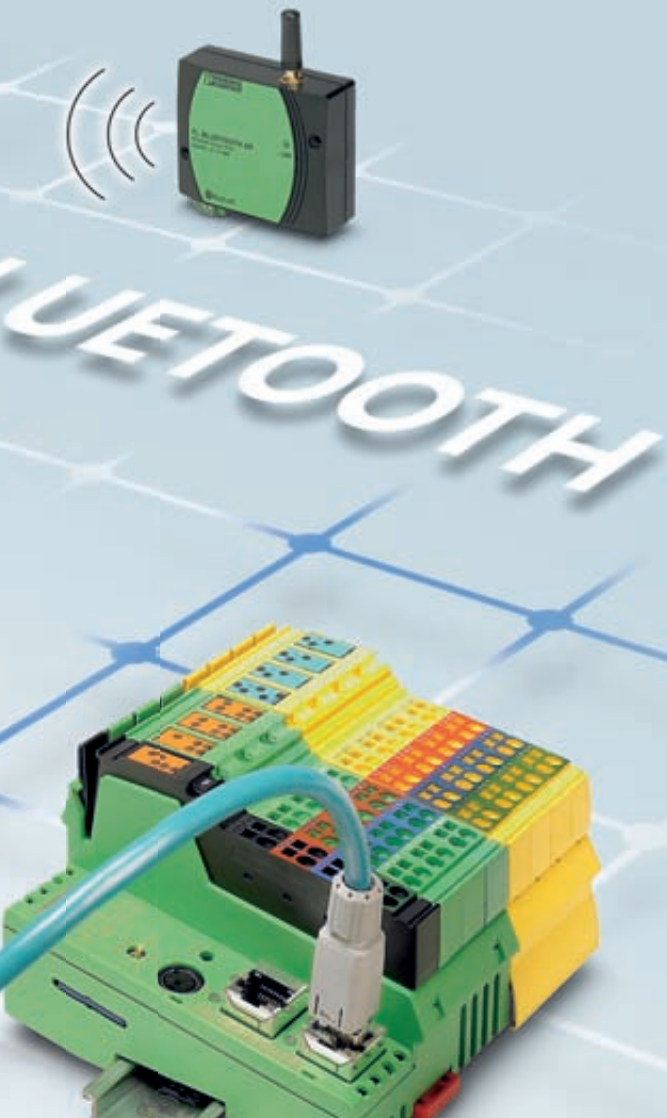
The Bluetooth Ethernet adapter set can be used to wirelessly integrate flexible or remote automation systems with an Ethernet connection into the automation network easily and reliably. Functionally safe communication is also supported via PROFIsafe or SafetyBridge Technology.

Ethernet security – Factoryline router with integrated firewall

Companies are only successful if their production systems operate securely and without errors. Failure, sabotage or data loss can cause large-scale economic damage, which is why Phoenix Contact offers FL MGUARD: An industrial firewall/ router solution for the individual protection of automation systems. The devices have a metal housing, an extended temperature range, and an SD card slot for easy device replacement.

Easy configuration with 2-click firewall for RS2000 or comprehensive set of rules for RS4000
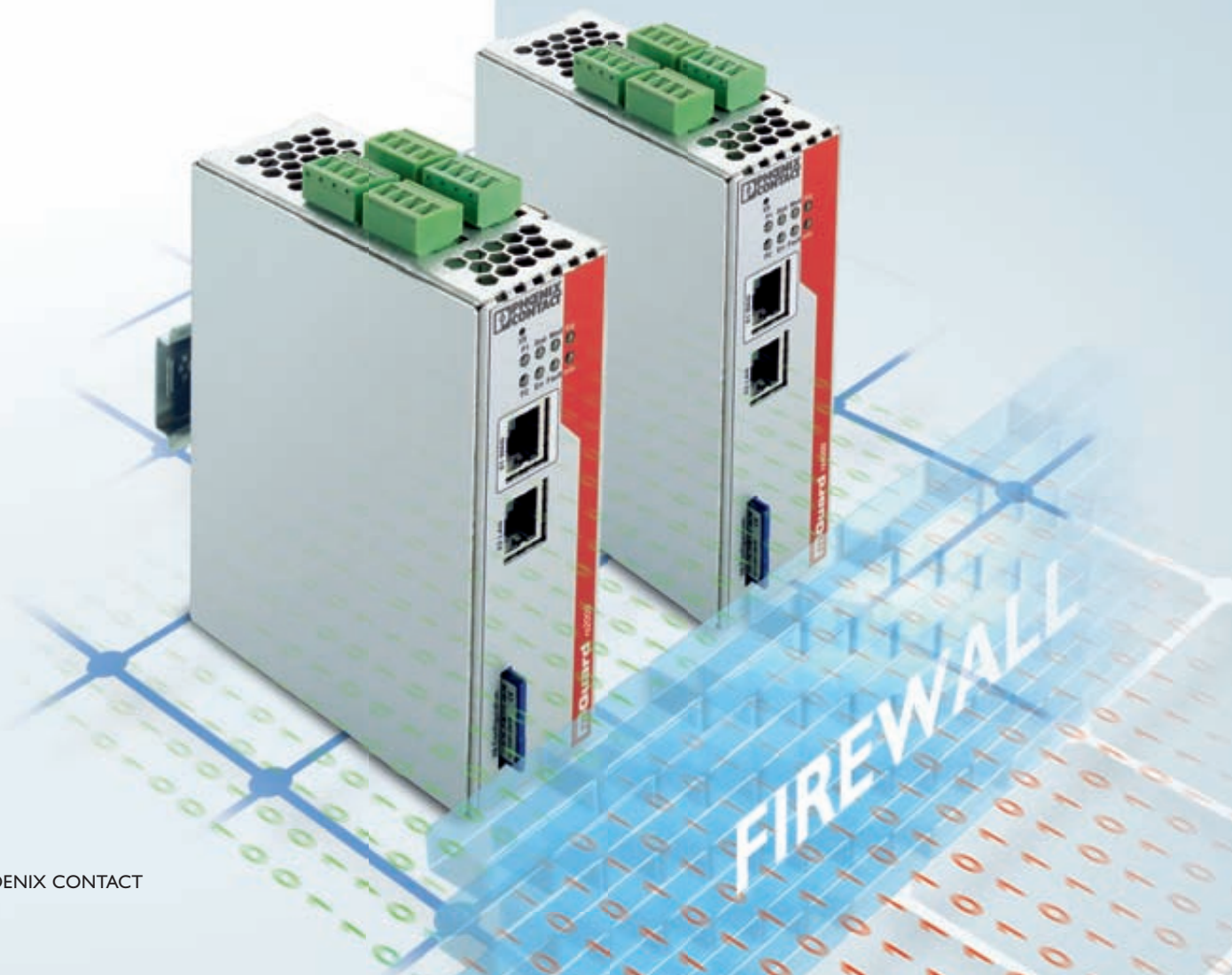
	2-click firewall/ router	Firewall/ router	Gigabit firewall/ router
	FL MGUARD RS2000 TX/TX VPN Order No. 2700642	**FL MGUARD RS4000** Order No. 2700634	**FL MGUARD GT/GT** 2 RJ45 ports Order No. 2700197 2 SFP ports
Copper Ethernet interface			
Transmission speed	10/100 Mbps	10/100 Mbps	10/100/1000 Mbps
Fiber optic Ethernet interface			
Transmission speed	–	–	1000 Mbps
Function			
Routing	1:1 NAT, NAT, port forwarding, standard routing	1:1 NAT, NAT, port forwarding, standard routing	1:1 NAT, NAT, port forwarding, standard routing
Firewall	Simple 2-click firewall, up to 99 Mbps Data throughput, -25°C to 65°C, slot for SD card	Stateful inspection firewall, separate incoming/outgoing rules, up to 99 Mbps Data throughput, -25°C to 65°C, slot for SD card	Stateful inspection, separate incoming and outgoing rules, filtering even for fiber optics, configuration memory, data throughput of up to 200 Mbps
Application/use			
	Reduction in the effects of technical defects, reduction in engineering effort (1:1 NAT), reduced number of IP addresses, easier protection against unauthorized access	Reduction in the effects of technical defects, reduction in engineering effort (1:1 NAT), reduced number of IP addresses, protection against unauthorized access and overload, protection against attacks	Reduction in the effects of technical defects, reduction in engineering effort (1:1 NAT), reduced number of IP addresses, protection against unauthorized access and overload, protection against attacks

Virtual addressing/NAT

If identical machines are operated in parallel in a network, each machine must be configured individually. Our FL MGUARD components support the 1:1 NAT function, which means that production cells that occupy an identical IP address area can be used in a higher-level network.

Production network (10.10.0.0/16)

NAT/1:1 NAT

10.10.**1**.0/24	10.10.**2**.0/24	10.10.**N**.0/24
192.168.10.0/24	192.168.10.0/24	192.168.10.0/24
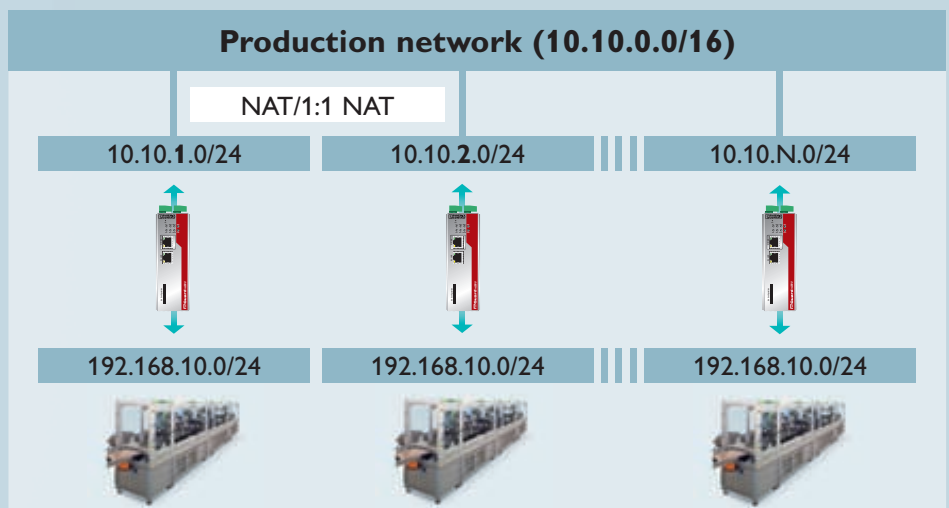
Ethernet security –
Factoryline router with VPN

VPN-compatible FL MGUARD devices encrypt all data according to the secure IPsec standard. Secure and easy remote maintenance of machines via public networks is thus possible. Access to the remote maintenance VPN tunnel is monitored and controlled via a firewall. In addition, machines and systems can be conveniently and easily networked using the extensive routing functions.

From simple field devices with VPN to complete remote maintenance centers.

Distributed protection

FL MGUARD devices are integrated into the network as a stand-alone system where they protect a part of the system network, a complete production cell or an individual automation component – with no adverse effect on the system to be protected. All incoming and outgoing data packets are monitored based on predefined rules.
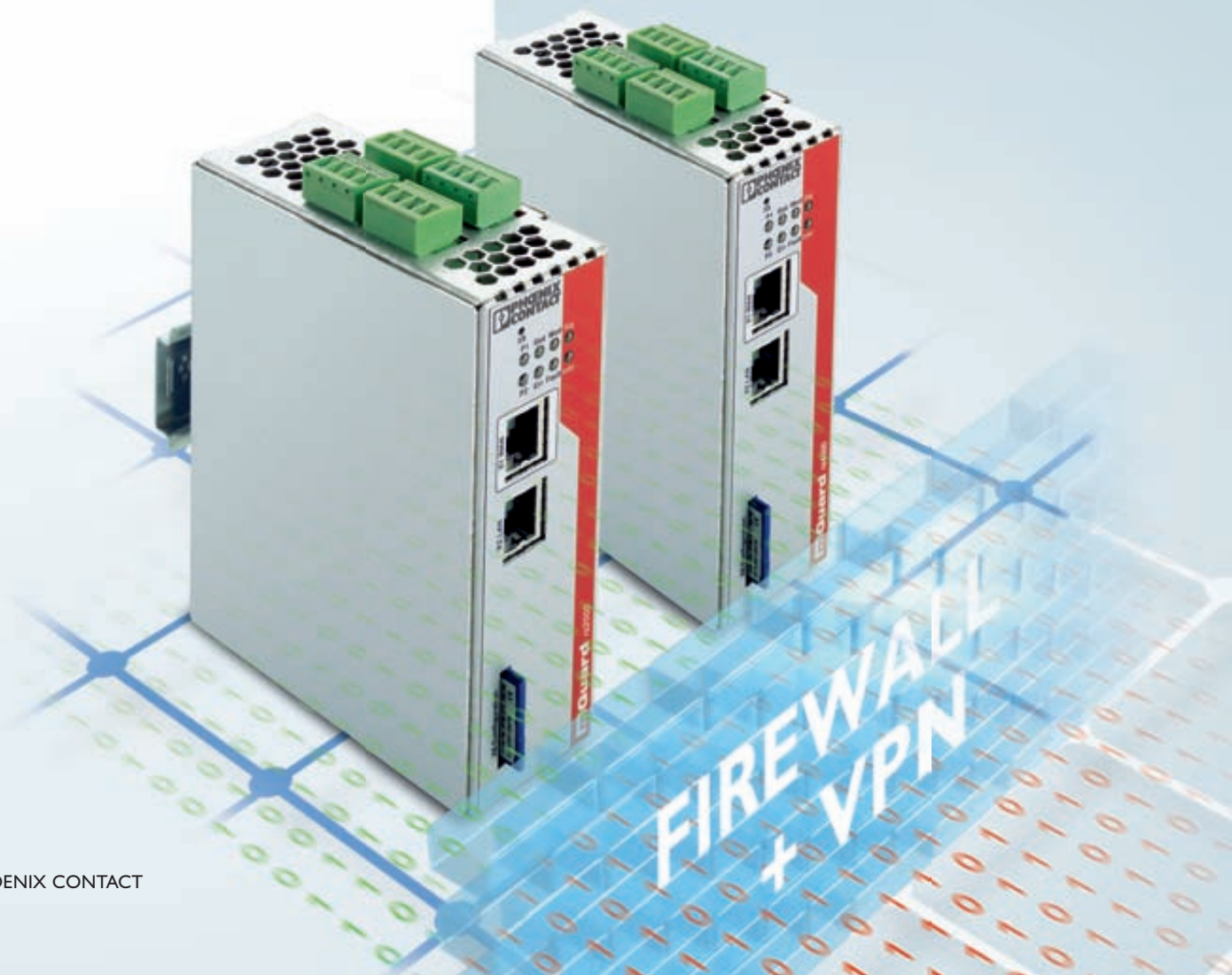
	2-click firewall/ router with VPN	Firewall/ router with VPN	Gigabit firewall/ router with VPN
	FL MGUARD RS2000 TX/TX VPN Order No. 2700642	**FL MGUARD RS4000 TX/TX VPN** Order No. 2200515	**FL MGUARD GT/GT VPN** Order No. 2700198
Copper Ethernet interface			
Transmission speed	10/100 Mbps	10/100 Mbps	10/100/1000 Mbps
Fiber optic Ethernet interface			
Transmission speed	–	–	1000 Mbps
Function			
VPN	Up to 2 parallel tunnels	Up to 10 parallel tunnels (up to 250 as an option)	Up to 10 parallel tunnels (up to 250 as an option)
	Secure encryption according to IPsec standard	Secure encryption according to IPsec standard	Secure encryption according to IPsec standard
	Configuration memory	Configuration memory	Configuration memory
	VPN enable button and VPN status LED	VPN enable button and VPN status LED	VPN enable button and VPN status LED
	Central management solution	Central management solution	Central management solution
VPN throughput	35 Mbps	35 Mbps	> 70 Mbps
Application/use			
	High-performance encryption for the secure transmission of sensitive data	High-performance encryption for the secure transmission of sensitive data	High-performance encryption for the secure transmission of sensitive data
	For easy routing and/or easy remote maintenance applications	Router/firewall with full scope of functions for demanding security and/or remote maintenance applications	Fiberglass interfaces in SFP format
	SD card slot	Optional CIFS – Integrity Monitoring, SD card slot	Optional CIFS – Integrity Monitoring
	No additional software required	No additional software required	No additional software required

Properties

- Maximum level of security thanks to IPsec on Layer 3
- Latest certificates supported (x509.v3)
- Connection for VPN enable button and VPN status LED
- Only outgoing UDP connection from the operator's network
- Comprehensive routing functions
- Stateful inspection firewall for dynamic filtering

Secure remote maintenance concept

Service center

RS4000

Specialist in the company

FL MGUARD, to which the machines connect

FL MGUARD, to which external specialists connect

External specialist

RS2000

Specialist, at home or anywhere in the world

Customer network

Machine network

RS2000

Outgoing UDP connection (initiated by the operator, e.g., via key switch)

Customer network

Machine network

RS4000

Customer firewall

Machine network

RS4000

Distributed protection

- Save on travel costs and shorten downtimes
- Service provider (service portal)
- High level of service quality secures customer loyalty
- Reduced expenditure for warranty
- Remote maintenance, routing, and firewall with just one device
- Central management for remote configuration
- Operator network protected against unauthorized access during remote maintenance

- No security "problems" should equipment be stolen or staff replaced
- Administrative work does not increase with the number of machines – consultation with the customer's IT department is all that is required
- The customer controls the enabling of remote maintenance
- Easy integration of machines in customer networks
- Machine is protected against the operator network and vice versa

Professional service

Predefined service packages for security – successfully used between startup and the complete concept.

The service packets range from FL MGUARD's startup, to network diagnostics and software installation, right through to creating a complete security concept – we are on hand with help and advice.

	CIFS – Integrity Monitoring	For mobile applications	PCI firewall/router with VPN
	FL MGUARD LIC CIM Order No. 2701083	**FL MGUARD SMART2** Order No. 2700640 **FL MGUARD SMART2 VPN** Order No. 2700639	**FL MGUARD PCI 533/VPN** (2 RJ45 ports, 533 MHz) Order No. 2989417
Description			
	Virus protection suitable for industrial applications for Windows-based systems, works without updates or virus patterns, detects every change to the system	Router with intelligent firewall, up to 99 Mbps data throughput (wire speed performance), stateful inspection firewall for maximum security and extremely easy configuration, optional VPN according to IPsec standard, hardware encryption with up to 35 Mbps	Copper Ethernet interface, 10/100 Mbps
Functions			
	CIFS compares a system's IST state with a reference state; every change to the system is detected and reported. Even manipulations from unknown viruses, worms, and Trojans are reliably detected.	The FL SMART is particularly suitable for the mobile and stationary protection of workstations and environments close to the production process with low requirements for industrial hardening.	Up to 10 parallel tunnels (optionally up to 250), secure encryption according to IPsec standard, central management solution, ≤ 70 Mbps (533 MHz)
Application/use			
	CIFS is primarily used for the protection of non-patchable systems.	Suitable as secure firewall between office and production networks, as a remote maintenance client or as a security router for small workgroups.	High-performance encryption for the secure transmission of sensitive data, protection of an individual PC, no additional software required.

Protected industrial PC with Windows data release

Data   Backup   Windows   Programs

Internal network
External network
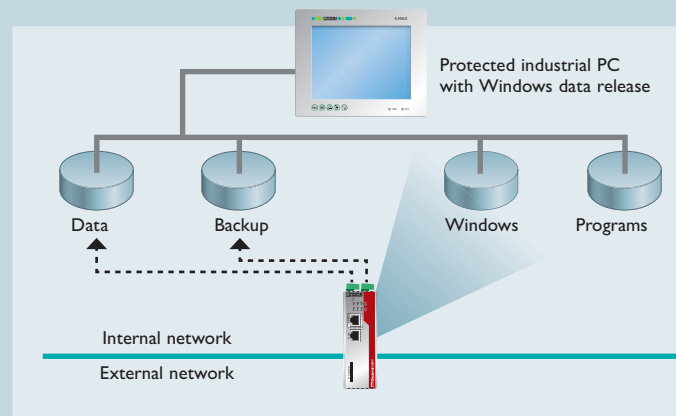
CIFS Integrity Monitoring – CIM

CIFS Integrity Monitoring is an antivirus sensor suitable for industrial applications – that is able to detect whether a Windows-based system (controller, operator interface, PC) has been attacked by malicious software without the need to load virus patterns. CIFS therefore offers the first ever dynamic monitoring of Windows systems, without affecting communication. CIFS recognizes and reports changes/manipulations to data.

Industrial telecommunications – We connect the world

Global networking of machines and systems. Alarm generation, remote maintenance, and continuous data acquisition.

From classic analog modems to fast mobile phone network routers: The perfect system for every application.

Global communication

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

LAN modem analog

PSI-MODEM/ETH
Order No. 2313300

Properties

Universal data links 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 machines and systems

Automatic link to remote networks for status transmission or in the case of malfunction

SHDSL Ethernet extender

PSI-MODEM-SHDSL/ETH
Order No. 2313643

Networking remote devices

Distances of up to 20 km

Transmission speed of up to 30 Mbps

Fast startup, plug and play

Point-to-point, redundancy, and line structures

Integrated log book for cable monitoring

Two digital switching outputs for alarm generation

Also available with PROFIBUS and serial interface as an alternative

Mobile phone router GPRS/EDGE

PSI-MODEM-GSM/ETH
Order No. 2313355

Worldwide data links and alarm generation via GSM mobile phone networks

GSM quad band (850 MHz/900 MHz/ 1800 MHz/1900 MHz)

Data rates of up to 210 kbps

Alarm generation by SMS and e-mail

Easy and straightforward mobile phone link to remote stations in IP networks

Firewall and VPN reliably protect your application against unauthorized access

Easy configuration via web-based management

Mobile phone router UMTS/HSPA

PSI-MODEM-3G/ROUTER
Order No. 2314008

Worldwide high-speed data links and alarm generation via 3G mobile phone networks

UMTS/HSPA triband (850 MHz/ 900 MHz/2100 MHz) with GPRS/ EDGE fallback

Data rates of up to 7.2 Mbps

Two SIM card slots for maximum network availability

Alarm generation by SMS and e-mail

Easy and straightforward mobile phone link to remote stations in IP networks

Firewall and VPN reliably protect your application against unauthorized access

Easy configuration via web-based management
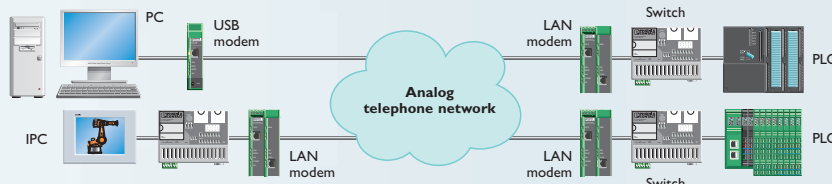
Analog telephone network
• Via public, analog phone network
• Manual dial-in to remote networks with a dial-up connection
• Automatic selection of higher-level networks from subnetworks

GSM mobile phone network
• Via GPRS/EDGE TCP/IP data up to 210 kbps

3G mobile phone network
• Via UMTS/HSPA TCP/IP data up to 7.2 Mbps
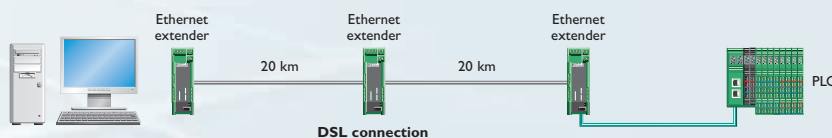
High-speed DSL connection
• Using copper cables up to 20 km in length
• Up to 30 Mbps depending on the cables
• Transparent connections for Ethernet, PROFIBUS, and serial applications

Integration of serial devices in the Ethernet network

The FL COMSERVER closes the gap between the serial RS-232, RS-422, and RS-485 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 or transmit visualization data.

You can choose between various devices depending on the application. A basic device with standard functions, a universal device with integrated Modbus gateway, and a WLAN device for the wireless connection of mobile applications are available.

Numerous fields of application

The following applications can be implemented with the FL COMSERVER…:

- Network integration of serial devices via virtual COM ports, for access to device data
- Cable replacement in serial point-to-point connections without limiting the range

The FL COMSERVER UNI also supports:

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

22.5

22.5

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

For converting a serial interface to Ethernet

FL COMSERVER UNI 232/422/485
Order No. 2313452   TCP, UDP, Modbus TCP, PPP
FL COMSERVER BASIC 232/422/485
Order No. 2313478   TCP, UDP

Serial device server for 802.11 Wireless LAN

For converting a serial interface to Wireless LAN

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

Copper Ethernet interface		
Transmission speed/length	10/100 Mbps/100 m, shielded	54 Mbps WLAN according to IEEE 802.11 b/g
Protocols	TCP/IP, UDP, Modbus TCP, PPP, TFTP, HTTP	TCP/IP, UDP
Serial interface		
Interfaces	RS-232, RS-422, RS-485	RS-232, RS-422, RS-485
Transmission speed	300, 600, 1200, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 187500, 230400 bps, can be set via web-based management	300, 600, 1200, 2400, 4800, 7200, 9600, 19200, 38400, 57600, 115200, 187500, 230400 bps, can be set via configuration software
Data format/coding	Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length	Serial asynchronous UART/NRZ, 7/8 data, 1/2 stop, 1 parity, 10/11-bit character length
Data flow control/protocols	Software handshake, Xon/Xoff, hardware handshake RTS/CTS, 3964R-compatible, Modbus RTU/ASCII	Software handshake, Xon/Xoff or hardware handshake RTS/CTS
Functions		
Management	Web-based management, SNMP, Telnet and serial emergency access	Configuration software
Status and diagnostic indicators	LEDs: UL (communications power), TD + RD (serial data activity), FD (full duplex), 100 (100 Mbps operation), Link (Ethernet), Activity (Ethernet), ERR (error)	LEDs: UL (communications power), TD + RD (serial data activity), 4-stage bar graph (wireless reception performance), SER ERR (serial error)
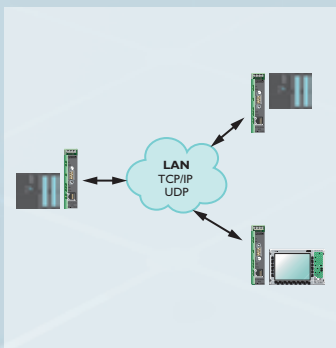
Serial tunneling
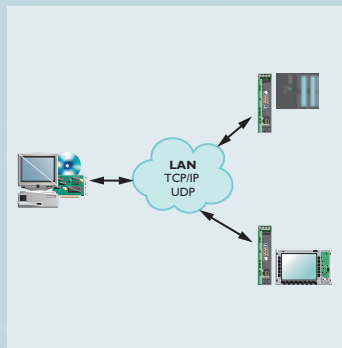
Virtual COM ports
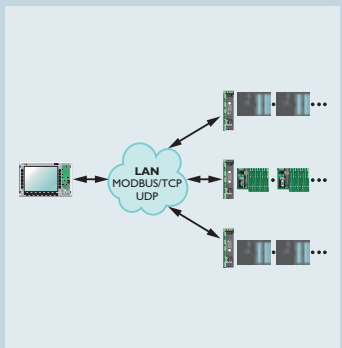
Modbus gateway

Software –
SNMP OPC products and Config+

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

Since both SNMP and OPC belong to the Windows-based worldwide standardized technologies and interfaces, network management, automation components, and visualizations can easily be combined, without the need for special drivers.

Increased safety thanks to diagnostic functions

Thanks to the comprehensive diagnostic functions, the software ensures the availability of the network. With the help of individual port diagnostics, you can monitor connections, operating modes, and data transmission rates at all times.

SNMP OPC SERVER

FL SNMP OPC SERVER V3
Order No. 2701139

FL SNMP OPC SERVER V3 LIC 100
Order No. 2701138

Properties

The OPC server enables the integration of SNMP-compatible devices into any OPC-based HMI/ SCADA system, thereby transforming it into an inexpensive industrial network management system.
Its purpose is 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

SNMP OPC AGENT

FL SNMP OPC AGENT V3
Order No. 2701136

FL SNMP OPC AGENT V3 LIC 100
Order No. 2701135

The OPC SNMP agent enables the seamless vertical integration of OPC-based/connected automation systems in existing SNMP manage-ment 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+

CONFIG+ DEMO CD   DVD-ROM
Order No. 2868046

CONFIG+   DVD-ROM
Order No. 2868059

CONFIG+ CPY   Copy license
Order No. 2868062

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 parameterized. In the event of an error, the integrated diagnostic functions of Diag+ enable fast and clear error localization.

Project transfer to SafetyProg

Configuration of Ethernet configurations

Configuration of address assignment

Configuration of multi-master projects

Comparison of real/configured bus configurations

MDC wizard

When a network is configured in Config+, the network components can be configured efficiently using the Multiple Device Configuration wizard (MDC wizard).

The main advantage of the MDC wizard is the use of a device container by means of which new devices can be easily downloaded.

Effective surge protection prevents unexpected failure

Uninterruptible production calls for the reliable transmission of all relevant data and signals. This not only involves measures to prevent unauthorized access such as viruses, worms, and Trojans. Surge voltage damage due to a lightning strike or switching operations must also be prevented here.

In addition to the expense involved in repairing damaged or replacing destroyed electrical and electronic equipment, surge voltages can also lead to the loss of software and data, and therefore system downtime. In particular where cabling extends beyond a building, it is primarily the devices that are connected to an Ethernet cable that are at risk.

Secure data and telecommunications
With a comprehensive surge protection concept, you can increase the availability of your systems.

High risk potential

Since each circuit works with its own specific voltage, a surge voltage occurs if the upper tolerance limit is exceeded. The type of damage caused depends on the dielectric strength of the components as well as the energy that can be converted in the affected circuit.

In a circuit in which a 230 V AC relay is operated, a coupled voltage of 500 V does not cause any significant damage. In a 5 V DC circuit, the same surge voltage reaches 100 times the nominal voltage of the affected component and will therefore definitely destroy it.

Microelectronics are at particular risk
Sensitive electronic components are the most commonly affected by surge voltage damage.

The TRABTECH protective circuit principle

In order to incorporate an effective protection concept against surge voltages, all the devices and system areas that need to be protected must be determined and the required protection level evaluated.
A distinction is made between the various circuit types according to the following areas:

- **Power supply unit**
- **Measurement, control, and regulation technology (MCR)**
- **Data processing and telecommunications systems**
- **Transceiver devices**

A protection area is then defined for the devices/systems to be protected. Surge protective devices, which correspond to the nominal data of the interface of the device to be protected, must be installed at all points where "cable" and "protective circuit" intersect. This ensures that no surge voltages can be coupled from outside.

Transceiver systems

Measurement and control protection

Information technology

Power supply unit

Application and functions of surge protection
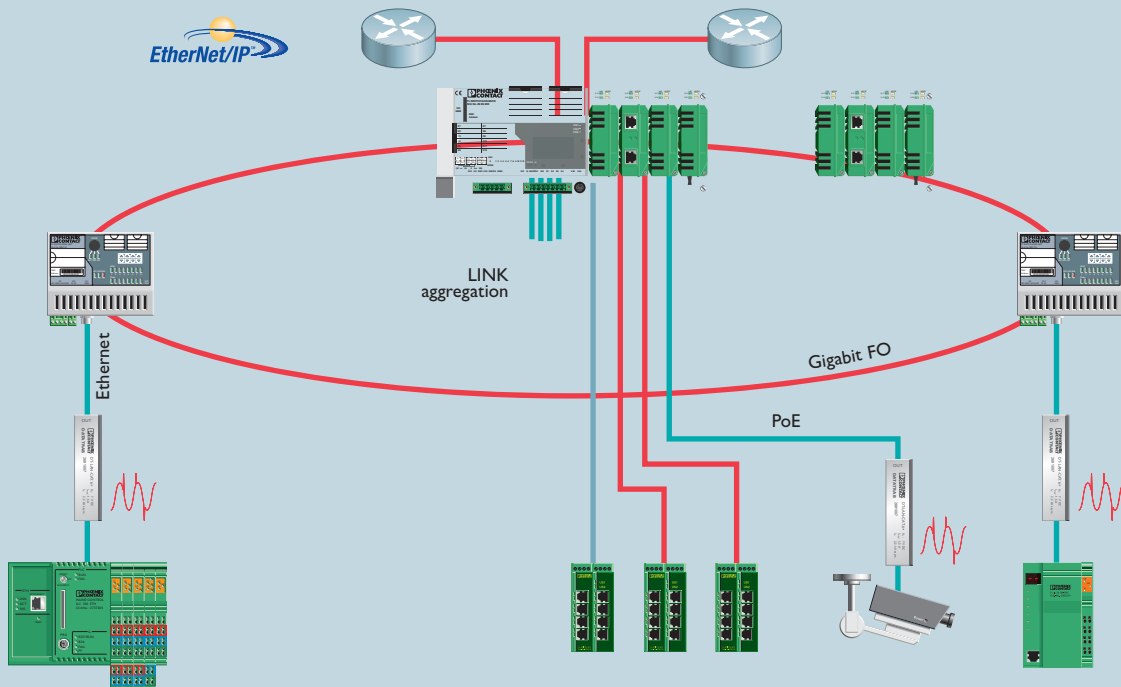
DATATRAB: *High-speed surge protection for unrivaled Gigabit performance*

Description

Technical data

IEC category/EN type

Nominal voltage U_N

Maximum continuous voltage UC

Nominal current IN

Nominal discharge surge current I_n (8/20) µs
(Core-Core/Core-Ground)

Total surge current (8/20) µs

Connection technology

Test standards

Remote indication contact

DATATRAB adapter/ DIN rail module	DATATRAB 19" versions	COAXTRAB antenna adapters	PLUGTRAB type 3 arresters
DT-LAN-CAT.6+ Order No. 2881007	**D-LAN-19"-24** (24 ports) Order No. 2838791 **D-LAN-19"-20** (20 ports) Order No. 2880134 **D-LAN-19"-16** (16 ports) Order No. 2880147 **D-LAN-19"-12** (12 ports) Order No. 2880150 **D-LAN-19"-8** (8 ports) Order No. 2880163 **D-LAN-19"-4** (4 ports) Order No. 2880176	**CN-UB-280DC-SB** (N connector, plug/socket) Order No. 2818148 **CN-UB-280DC-BB** (N connector, socket/socket) Order No. 2818850 **CN-UB-G1** (replacement gas-filled surge arrester) Order No. 2818203 **CN-UB/MP** (mounting plate) Order No. 2818135 **CN-UB/MP-90DEG-50** (mounting plate, angled 90°) Order No. 2803137	**PT 4-PE/S-230AC** (3-phase) (plug, base element, 230 V AC) Order No. 2882459 **PT 2-PE/S-230AC/FM** (single-phase) (plug, base element, 230 V AC) Order No. 2858357 **PT 2-PE/S-120AC/FM** (single-phase) (plug, base element, 120 V AC) Order No. 2856812 **PT 2-PE/S-24AC-ST** (single-phase) (plug, 24 V AC) Order No. 2839318 **PT-BE/FM** (single-phase) (base element with universal foot) Order No. 2839282
Ethernet (10GBaseT) & PoE, token ring, CDDI, according to Class Ea/CAT6	Ethernet (10GBaseT), token ring, CDDI, according to Class D/CAT5e of EN 50173	Attachment plug with surge protection for coaxial cables	Type 3 surge protection for single-phase (PT 2-PE/S) and 3-phase (PT 4-PE/S) power supply units
B2/C1/C2/C3/D1	C1/C2/C3	C2/C3/D1	III/T3
–	–	–	230/120/24 V AC
3.3 V DC	6 V DC	280 V DC/195 V AC	253/150/34 V AC
1.5 A (25°C)	1.5 A (25°C)	5 A (25°C)	26 A (at 30°C)
100 A/2 kA	350 A/350 A	20 kA/20 kA	3-phase: 1.5 kA per channel Single-phase: 3/2.5/1 kA
10 kA	10 kA	20 kA	–
RJ45	RJ45	50 Ω N connector	Screw connection
IEC 61643-21/EN 50173-1	IEC 61643-21/DIN EN 50173-1	IEC 61643-21	IEC 61643-1/VDE 0675-6/NF C61-740
–	–	–	N/C contact

FL ISOLATOR
for electrical isolation up to 4 kV

The new 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.

Operation under the harshest conditions is ensured by an extended temperature range of -25°C to +75°C and a coated PCB which protects against aggressive environmental influences. The device therefore meets the requirements for railway applications (rolling stock).

Special features
- Electrical isolation of data cables and cable shielding
- Dielectric strength of up to 4 kV
- Transmission speed of up to 1 Gbps
- No power supply required
- Coated PCB for protection against aggressive environmental influences
- Approval for rolling stock in railway applications
- Version with screw connection can also be used as patch field

Ethernet

	Ethernet isolator up to 1 Gbps	**Ethernet isolator up to 100 Mbps**	**Ethernet isolator up to 100 Mbps**
	Network isolator for electrical isolation up to 4 kV, 2 x RJ45 socket, for transmission speeds of up to 1 Gbps	Network isolator for electrical isolation up to 4 kV, 2 x RJ45 socket, for transmission speeds of 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 1000-RJ/RJ Order No. 2313915	**FL ISOLATOR 100-RJ/RJ** Order No. 2313931	**FL ISOLATOR 100-RJ/SC** Order No. 2313928
Ethernet interface			
Transmission speed	10/100/1000 Mbps	10/100 Mbps	10/100 Mbps
Connection technology	RJ45 socket/RJ45 socket, shielded	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 (operating)	-25°C – 75°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.)
Electromagnetic compatibility	Conformance with EMC directive 2004/108/EC	Conformance with EMC directive 2004/108/EC	Conformance with EMC directive 2004/108/EC
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)
Dimensions	22.5 x 99 x 92 mm	22.5 x 99 x 92 mm	22.5 x 99 x 92 mm

In addition to the RJ45 socket, the FL ISOLATOR 100-RJ/SC also has a plug-in screw terminal block. This enables the user-friendly connection of field cables. The device is therefore ideal for use as a patch field with electrical isolation for cabling that extends beyond the control cabinet.

Copper-based cabling for Ethernet and PROFINET with up to 10 Gbps

In modern automation solutions, the individual specific fieldbus systems (automation island networks) communicate with one another in the automation island. Devices for communication and data acquisition, which work with high transmission speeds, are also integrated as part of the automation application. High-performance plug-in connectors and cables that can be assembled locally are therefore required here. The structured building cabling of the office environment can only be used to a certain extent here.

Regardless of whether it's future-proof high-speed wiring with up to 10 Gbps, or innovative, rational hybrid cabling – we will find the perfect solution for your automation network.

Ethernet

RJ45/IP20
IDC or
crimp connection

RJ45/IP67
crimp or
IDC connection

M12/IP67
molded or
pierce connection

IDC and pierce connection

For the quick on-site assembly of patch cables, RJ45 and M12 plug-in connectors are available with our fast connection technologies QUICKON and PIERCECON.

No special tools are required to assemble the plug-in connectors. The wires are easily connected without stripping in the plug-in connector.

SPEEDCON LOCKING

Ethernet cabling with twisted pair and star-quad cable

Symmetrical copper cables are used in industrial Ethernet cabling. Twisted pair cables with two or four twisted wire pairs are usually used, which as a minimum meet the requirements of CAT5e according to ISO/IEC 11801.

The cables are fitted with an overall shield comprising braided shield and protective foil (SF/UTP cable). In category $CAT6_A$ cables, the wire pairs also have a foil shield (S/FTP cable).

S/FTP   *SF/UTP*   *Star-quad*

For PROFINET cabling, star-quad cables with a conductor cross section of 22 AWG have been specified, which also meet the requirements of category CAT5e.

M12 hybrid – up to 4 x 6 A and 100 Mbps in one interface

The data and power cables are reliably shielded in the hybrid plug-in connector. This prevents crosstalk effects and electromagnetic malfunctions.
It enables data transmission speeds of up to 100 Mbps for simultaneous power transmission of up to 6 A per pin.

The hybrid plug-in connector enables you to go without one device connection and thereby reduce space requirements and connection time for wiring.

Hybrid cables use two shielded twisted pair data cables of category CAT5e with a cross section of 0.15 mm² as well as four power cables with a 0.6 mm² conductor cross section.

Hybrid

M12 hybrid/IP69K
molded

Technical data	
Rated current	Up to 6 A per pin (power) Up to 0.5 A per pin (data)
Rated voltage	30 V (power and data)
Number of positions	8
Protection	IP67/IP69K
Data transmission speed	Up to 100 Mbps

SPEEDCON LOCKING

RJ45 plug-in connectors, IP20/IP67

RJ45 plug-in connector, IP20

RJ45 plug-in connector, IP20, with IDC displacement connection, for cable diameter of 4.5 mm to 8.0 mm

Ethernet	Order No.
8-pos., gray	1419001
8-pos., black	1402420

PROFINET	Order No.
4-pos., gray	1658435

RJ45 plug-in connector, IP67, version 6

RJ45 plug-in connector, IP67, with IDC displacement connection, for 26 to 22 AWG, for cable diameter of 5.0 mm to 8.0 mm

Ethernet	Order No.
8-pos., gray	1656990
8-pos., black	1658493

PROFINET	Order No.

RJ45 plug-in connector IP67, version 14

RJ45 plug-in connector, IP67, metal housing, with push/pull interlocking, for 26 to 22 AWG, for cable diameter of 5.0 mm to 8.0 mm

Ethernet	Order No.
8-pos., QUICKON, CAT5e	1608016
8-pos., IDC, CAT6$_A$	1418853

PROFINET	Order No.
4-pos., metal	1608100

RJ45 plug-in connector, IP67, version 14

RJ45 plug-in connector, IP67, plastic housing, with push/pull interlocking, for 26 to 22 AWG, for cable diameter of 5.0 mm to 8.0 mm

Ethernet	Order No.
8-pos., QUICKON, CAT5e	1608113
8-pos., IDC, CAT6$_A$	1422205

PROFINET	Order No.
4-pos., plastic	1608126

RJ45 sleeve housing, version 6

RJ45 sleeve housing, IP67, for pin inserts 1652716 and 1652729, for cable diameter of 5.0 mm to 8.5 mm

Ethernet	Order No.
Gray	1652732
Black	1658671

RJ45 pin insert

RJ45 pin insert, 8-pos., shielded, IDC displacement connection, for 1 Gbps (CAT5e) and 10 Gbps (CAT6$_A$)

Ethernet	Order No.
CAT5e	1652716
CAT6$_A$	1418853

RJ45 bend protection sleeve

RJ45 bend protection sleeve for pin inserts 1652716 and 1652729, for cable diameter of up to 7 mm, IP20

Ethernet	Order No.
Gray	1654743
Green	1654756

M12 plug-in connectors, IP67

M12 plug-in connector, IP67, pin

M12 plug-in connector, straight and angled version, IP67, pin, shielded, with IDC displacement connection

Ethernet	Order No.
4-pos., D-encoded, straight	1543223
8-pos., A-encoded, straight	1543236
4-pos., D-encoded, angled	1553624
8-pos., A-encoded, angled	1553653

PROFINET	Order No.
4-pos., D-encoded, straight	1554513
4-pos., D-encoded, angled	1554539

M12 plug-in connector, IP67, socket

M12 plug-in connector, straight and angled version, IP67, socket, shielded, with IDC displacement connection

Ethernet	Order No.
4-pos., D-encoded, straight	1553611
8-pos., A-encoded, straight	1553640
4-pos., D-encoded, angled	1553637
8-pos., A-encoded, angled	1553666

PROFINET	Order No.
4-pos., D-encoded, straight	1554526
4-pos., D-encoded, angled	1554542

M12 plug-in connector – 10 Gbps

M12 plug-in connector for 10 Gbps, in straight and angled version

Ethernet	Order No.
8-pos., 10 Gbps, straight	1417430
8-pos., 10 Gbps, angled	1417443

Panel feed-throughs, IP67

Couplings, IP67

M12 to RJ45 socket – 90° and 180°

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

Ethernet	Order No.
8-pos., A-encoded, 90°	1405057
8-pos., A-encoded, 180°	1405060
8-pos., X-encoded, 90°	1404548
8-pos., X-encoded, 180°	1404549

Ethernet/PROFINET	Order No.
4-pos., D-encoded, 90°	1657261
4-pos., D-encoded, 180°	1657494

M12 flush-type socket – 10 Gbps and hybrid

M12 flush-type socket for 10 Gbps (CAT6$_A$), M12 flush-type socket hybrid (CAT5e) for up to 4 x 6 A, Y-encoded

Ethernet	Order No.
8-pos., 10 Gbps, straight solder connection	1440669
8-pos., 10 Gbps, angled solder connection	1424180
8-pos., hybrid, up to 4 x 6 A	1456666

For plug-in connector version 6

RJ45 coupling, IP67, CAT5e, with protective cover

Ethernet/PROFINET	Order No.
Gray	1689268
Black	1658684

For plug-in connector version 14

RJ45 coupling, IP67, CAT5e, with protective cover for push/pull interlocking

Ethernet/PROFINET	Order No.
Nickel-plated	1405183

RJ45 panel mounting frames, IP67

Version 6 – for Freenet system

RJ45 panel mounting frame for round mounting cutout, IP67, with seal, without mounting screws

Ethernet	Order No.
Gray	1653744
Black	1658668

Version 6 – for PCB connection

RJ45 panel mounting frame for rectangular mounting cutout, IP67, with seal, without mounting screws

Ethernet	Order No.
Gray	1689446
Black	1658655

Version 6 – for keystone system

RJ45 panel mounting frame for rectangular or round mounting cutout, IP67, with seal, without mounting screws, for keystone contact inserts

Ethernet	Order No.
Gray (rectangular)	1689080
Black (rectangular)	1658642
Gray (round)	1689844
Black (round)	1658053

Version 6 – protective cover

Protective cover, flat, to cover the contact insert in the panel mounting frame, sealed according to IP67 protection

Ethernet	Order No.
Gray	1652606
Black	1658066

Version 14 – for Freenet system

RJ45 panel mounting frame for rectangular or round mounting cutout, IP67, for push/pull interlocking, for Freenet system, with seal, without mounting screws

Ethernet/PROFINET	Order No.
Metal (rectangular)	1405358
Plastic (rectangular)	1608197
Metal (round)	1405222

Version 14 – for PCB connection

RJ45 panel mounting frame for rectangular mounting cutout, IP67, for push/pull interlocking, for PCB connection, with seal, without mounting screws

Ethernet/PROFINET	Order No.
Metal	1608029
Plastic	1657847

Version 14 – protective cover

Protective cover, to cover the contact insert in the panel mounting frame, sealed according to IP67 protection

Ethernet/PROFINET	Order No.
Metal	1608142

Version 14 – contact retention clip

Contact retention clip, to cover the contact insert in the panel mounting frame, version 14, sealed according to IP65/IP67 protection

Ethernet/PROFINET	Order No.
Plastic	1405293

RJ45 socket inserts

Freenet – socket inserts

RJ45 socket insert, 8-pos., shielded, with cable connection or socket to socket, for Freenet system

Ethernet/PROFINET	Order No.
CAT5e, with cable connection	1652936
CAT6$_A$, with cable connection	1424009
CAT5e, socket to socket	1405617

Keystone – socket inserts

RJ45 socket insert, 8-pos., shielded, with cable connection or socket to socket, for keystone system

Ethernet	Order No.
CAT5e, with cable connection	1689459
CAT6, with cable connection	1653168
CAT5e, socket to socket	1689064
CAT6, socket to socket	1653155

PCB connection

RJ45 socket insert, 8-pos., shielded, for PCB mounting, with straight solder pins

Ethernet/PROFINET	Order No.
CAT5e socket, angled	1688586
CAT6 socket, angled	1653087
CAT6 socket, straight	1653090
CAT6$_A$ socket, angled	1420401

Tools

Stripping tool

Stripping tool for multi-stage stripping of shielded cables

Ethernet/PROFINET	Order No.
Stripping tool	1657407

Crimping pliers

Pliers with die, for RJ45 plug-in connector crimp contacts

Ethernet	Order No.
Crimping pliers	1653265

Split-core tool

Split-core tool for connecting copper wires to LSA-PLUS strips

Ethernet/PROFINET	Order No.
IDC split-core tool	2765505

Hand punch pliers

Punch-out tool, universal

Ethernet	Order No.
Universal	1689514

RJ45 patch panels, IP20

With screw connection	With spring-cage connection	With IDC connection	With socket/socket connection
DIN rail mounting, IP20, CAT5e, shielding, either directly on DIN rail (8 and 4-pos.) or via RC combination (8-pos. only)	DIN rail mounting, IP20, CAT5e, shielding, either directly on DIN rail or via RC combination	DIN rail mounting, IP20, CAT5e, shielding, either directly on DIN rail or via RC combination	DIN rail mounting, IP20, CAT5e, shielding, either directly on DIN rail or via RC combination

Ethernet	Order No.	**Ethernet**	Order No.	**Ethernet**	Order No.	**Ethernet**	Order No.
FL-PP-RJ45-SC, 8-pos.	2901643	FL-PP-RJ45-SCC	2901642	FL-PP-RJ45-LSA	2901645	FL-PP-RJ45/RJ45	2901646
FL-CAT5-TERMINALBOX, 4-pos.	2744610						

CAT6 patch panel

Patch panels for 19" rack, IP20

With IDC connection	Patch panel for 19" rack	RJ45 socket insert	RJ45 socket insert
RJ45 patch panel, IDC connection, DIN rail mounting, IP20, CAT6	Patch panel, 19" mounting, 16 slots for Freenet and SCRJ socket inserts, IP20	RJ45 socket insert for 19" rack, 8-pos., shielded, socket to socket	RJ45 socket inserts for 19" rack, 8-pos., shielded, with cable connection

Ethernet/PROFINET	Order No.	**Ethernet/PROFINET**	Order No.	**Ethernet/PROFINET**	Order No.	**Ethernet/PROFINET**	Order No.
Single	1658118	16 slots	1652994	CAT5e	1405617	CAT5e	1652936
						$CAT6_A$	1424009

RJ45 angled patch connectors, IP20

CAT5e

Angled patch connector, IP20, 2 or 8 RJ45 connections, CAT5e, metal housing

Ethernet/PROFINET	Order No.
2 x RJ45	2891165
8 x RJ45	2891178

CAT5e – security version

Angled patch connector, IP20, 2 or 8 RJ45 connections, CAT5e, metal housing including Layer 1 security elements

Ethernet/PROFINET	Order No.
2 x RJ45	2832687
8 x RJ45	2832690

CAT6

Angled patch connector, IP20, 2 or 8 RJ45 connections, CAT6, metal housing

Ethernet/PROFINET	Order No.
2 x RJ45	2891068
8 x RJ45	2891071

Terminal outlets, IP67

2 x RJ45 – version 6

Terminal outlet, IP67, 2 RJ45 slots, with protective plugs, 2 cable entries

Ethernet	Order No.
Terminal outlet, 2 x RJ45 V6	1404278

2 x RJ45 – version 14

Terminal outlet, IP67, 2 RJ45 slots, with protective plugs, 2 cable entries

Ethernet/PROFINET	Order No.
Terminal outlet, 2 x RJ45 V14	1404281

1 x Power/1 x RJ45 – version 14

Terminal outlet, IP67, 1 power slot and 1 RJ45 slot, with protective plugs, 2 cable entries

Ethernet/PROFINET	Order No.
Terminal outlet, 1 x Power/1 x RJ45 V14	1404333

2 x M12 connection

Terminal outlet, IP67, 2 slots, with protective plugs, 2 cable entries

Ethernet	Order No.
8-pos., A-encoded	1404304

PROFINET	Order No.
4-pos., D-encoded	1404304

Ethernet industrial patch cables

Ethernet

RJ45 plug, IP20, straight

RJ45 plug, IP20, angled

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

Straight/straight	Order No.
0.3 m	1417993
0.5 m	1418028
1 m	1418067
2 m	1418109
5 m	1418141

Straight/angled	Order No.
0.3 m	1418002
0.5 m	1418031
1 m	1418070
2 m	1418125
5 m	1418154

Angled/angled	Order No.
0.3 m	1418015
0.5 m	1418044
1 m	1418099
2 m	1418138
5 m	1418167

Ethernet hybrid cables

Ethernet

M12 plug, IP67/IP69K, straight

Open cable end

Ethernet hybrid patch cable, transmission category: CAT5e,
outer sheath material: PUR, structure: 1x4xAWG26/1x4xAWG20,
outside diameter: 7.6 mm, temperature: -40°C to +90°C

Straight/straight	Order No.
0.5 m	1402425
1 m	1402426
2 m	1402427
5 m	1402428
10 m	1402439
15 m	1402440
20 m	1402441

Straight/open CE	Order No.
1 m	1402442
2 m	1402443
5 m	1402444
10 m	1402445
15 m	1402446
20 m	1402447

Office patch cables

Assembled patch cable, IP20, CAT5

Outer sheath material: LSFROH, shielding: SF/UTP,
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^2

Ethernet	Order No.
0.3 m	2832250
0.5 m	2832263
1 m	2832276
1.5 m	2833221
2 m	2832289

Ethernet	Order No.
3 m	2832292
5 m	2832580
7.5 m	2832616
10 m	2832629

Assembled patch cable, IP20, CAT6

Outer sheath material: LSFROH, shielding: S/FTP,
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^2

Ethernet	Order No.
0.3 m	2891181
0.5 m	2891288
1 m	2891385
1.5 m	2891482
2 m	2891589
3 m	2891686

Ethernet	Order No.
5 m	2891783
7.5 m	2891880
10 m	2891877
12.5 m	2891369
15 m	2891372
20 m	2891576

PROFINET industrial patch cables

Accessories

RJ45 plug, IP20, straight

RJ45 plug, IP20, angled

Color coding – IP20 patch cable

RJ45 protective cap

PROFINET patch cable, transmission category: CAT5,
outer sheath material: PVC, structure: SF/Q, outside diameter: 6.5 mm,
temperature: -40°C to 70°C

Color coding for IP20 patch cables, for easy visual color coding of connections (for office patch cables only)

Dust protection caps for RJ45 sockets

Straight/straight	Order No.
0.3 m	1418413
1 m	1418235
2 m	1418264

Straight/angled	Order No.
0.3 m	1418183
1 m	1418248
2 m	1418277

Angled/angled	Order No.
0.3 m	1418196
1 m	1418251
2 m	1418280

Ethernet/PROFINET	Order No.
Black	2891194
Blue	2891291
Brown	2891495
Yellow	2891592
Gray	2891699
Green	2891796
Red	2891893
Violet	2891990

	Order No.
FL RJ45 PROTECT CAP	2832991

Accessories (for office patch cables only)

Security frame

Security element

Safe clip

Color coding – FL PATCH GUARD

Security frame for SFN switches and patch fields including key

Self-locking security element for IP20 patch cables, to prevent malicious disconnection of Ethernet connections

Safe clip for IP20 patch cables, to prevent accidental disconnection of Ethernet connections

Marking label for FL PATCH GUARD

Ethernet/PROFINET	Order No.
Green	2891615
Red	2891712
White	2891819
Lock	2891220
Key	2891327

Ethernet/PROFINET	Order No.
Lockable element	2891424
Key	2891521

Ethernet/PROFINET	Order No.
Safe clip	2891246

Ethernet/PROFINET	Order No.
Black	2891136
Blue	2891233
Orange	2891330
Yellow	2891437
Turquoise	2891534
Green	2891631
Red	2891738
Violet	2891835

2 x 2 x 28 AWG
7 x 0.25 mm

Ethernet cable – type 93E

Ethernet cable for flexible use.
The cable is halogen-free, oil-resistant, and meets transmission properties according to CAT5e.

CAT5e

Ethernet	Order No.
By the meter	1416415
100 m ring	1416305

4 x 2 x 24 AWG
Single-stran, twisted pair

Ethernet cable – type 94A

Ethernet cable for fixed installation.
The cable meets transmission properties according to CAT5e.

CAT5e

Ethernet	Order No.
By the meter	1416415
100 m ring	1416305

4 x 2 x 28 AWG
7 x 0.25 mm

Ethernet cable – type 94B

Ethernet cable for flexible installation.
The cable is resistant to oil and chemicals and is flame-retardant. The cable meets transmission properties according to CAT5e.

CAT5e

Ethernet	Order No.
By the meter	1417333
100 m ring	1416567
Assembled cable	1416428

Ordering example

For an Ethernet cable, fitted with an RJ45 plug at one end and an RJ45 plug with IP67 protection at the other end, with crossover wiring, and 4.5 m in length, the ordering data is as follows:

Order No.		Plug 1		Plug 2		Wiring		Length (m)
1416428	/	IP67	/	IP20	/	CO	/	4.5

Wiring:
CO = Crossover
LI = Line

Length (m):
Increments:
0.2 – 3 m = 0.1 m
> 3 m = 0.5 m

Minimum order amount = 25 pcs.

4 x 2 x 26 AWG
7 x 0.18 mm, twisted pair

Ethernet cable – type 94D

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 meets transmission properties according to CAT5e.

CAT5e

Ethernet	Order No.
By the meter	1416444
100 m ring	1416334

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4 x 2 x 23 AWG
Single-stran, twisted pair

Ethernet cable – type 94E

Ethernet cable for fixed installation. The cable is resistant to oil and chemicals and is flame-retardant. In addition, it is halogen-free and meets transmission properties according to CAT6A.

CAT6$_A$

Ethernet	Order No.
By the meter	1416460
100 m ring	1416334

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4 x 2 x 26 AWG
7 x 0.16 mm, twisted pair

Ethernet cable – type 94F

Ethernet cable for flexible installation. The cable is resistant to oil and chemicals and is flame-retardant. In addition, it is halogen-free and meets transmission properties according to CAT6A.

CAT6$_A$

Ethernet	Order No.
By the meter	1417359
100 m ring	1416347
Assembled cable	1402609

OE	IP20	IP67	IP67B	PPCME	PPCPL	M12MS	M12MSS
Open end	RJ45 plug with IP20 protection	RJ45 plug with IP67 protection	RJ45 plug with IP67 protection, black	RJ45 push/pull plug with IP67 protection, metal	RJ45 push/pull plug with IP67 protection, plastic, black	M12 plug, straight	M12 plug, 10 Gbps (CAT6$_A$)

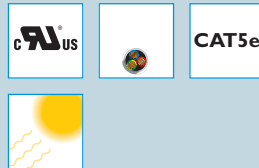| 4 x 22 AWG Single-strand	4 x 22 AWG 7 x 0.25 mm	4 x 22 AWG 7 x 0.25 mm
PROFINET cable – type 93A	**PROFINET cable – type 93B**	**PROFINET cable – type 93C**
PROFINET cable for fixed installation. The cable is flame-retardant and meets transmission properties according to CAT5e.	PROFINET cable for flexible installation. The cable is oil-resistant. It is UV-resistant according to UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable meets transmission properties according to 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 meets transmission properties according to CAT5e.

PROFINET	Order No.	PROFINET	Order No.	PROFINET	Order No.
By the meter	1416486	By the meter	1417362	By the meter	1417491
100 m ring	1416392	100 m ring	1416389	100 m ring	1416376
		Assembled cable	1416499	Assembled cable	1416509

Ordering example

For a PROFINET cable, fitted with an RJ45 plug at one end and a metal RJ45 push/pull plug with IP67 protection at the other end, and 4.5 m in length, the ordering data is as follows:

Order No.		Plug 1		Plug 2		Length (m)
1416509	/	**PPCME**	/	**IP20**	/	**4.5**

Increments:
0.2 – 3 m = 0.1 m
> 3 m = 0.5 m

Minimum order amount = 25 pcs.

4 x 22 AWG
19 x 0.15 mm

PROFINET cable – type 93R

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 meets transmission properties according to CAT5e.

PROFINET	Order No.
By the meter	1417388
100 m ring	1416363
Assembled cable	1416512

4 x 22 AWG
7 x 0.25 mm

PROFINET cable – type 937

PROFINET cable for railway applications. The cable is oil-resistant. It meets fire safety standard BS6853. The cable meets transmission properties according to CAT5e.

PROFINET	Order No.
By the meter	1402687
100 m ring	1416363
Assembled cable	1402611

OE	IP20	PPCME	PPCPL	MSD	FSDBPS	FPN
Open end	RJ45 plug with IP20 protection	RJ45 push/pull plug with IP67 protection, metal	Push/pull RJ45 plug with IP67 protection, plastic, black	M12 plug, straight	M12 flush-type socket, SPEEDCON, rear mounting	RJ45 Freenet socket module

Fiber optic-based cabling
for Ethernet and PROFINET

Even greater demands are being placed on industrial data links due to increasing data volumes and transmission speeds as interference from ambient conditions grows.

In light of this, there is the option of changing the transmission medium from copper to fiber optic (FO) technology. The technology used must therefore be easy to install, startup, maintain, and replace in the event of an error.

The use of fiber optics in harsh industrial environments is recommended for the following reasons:

- Fiber optics are not affected by EMI on the transmission path.
- Significantly greater ranges and transmission speeds can be achieved than with twisted pair cabling.
- There are no restrictions on the number of devices and type of network topology.
- Due to the high electrical isolation of connected devices, compensating currents and surge voltages via the data cable are avoided.

Ethernet

The application determines the transmission medium

The main applications of fiber optic technology differ according to the various performance features of the individual fiber types. Polymer and HCS fibers are often used in factory automation, where primarily short distances of up to 100 m need to be covered without any interference.
Inexpensive device technology and easy installation and maintenance using plugs that can be assembled in the field are an advantage here.

Long distances in process technology systems and in the traffic and telecommunications sector are best covered by glass fibers. While multi-mode technology can be used to cover distances of up to 10,000 m, single mode technology can connect devices which are up to 36,000 m away to the network.

The integrated fiber optic diagnostics continuously monitor the optical power and provide early warning of system failure

Quick assembly of fiber optic plugs

Fiber optic networking is often considered time-consuming and expensive due to plug assembly. The new HCS GI fiber, which enables the easy local assembly of fiber optic plugs, is the exception to the rule. The new GI fiber features increased bandwidth due to the gradient index profile used. Here, ranges of up to 300 m can be achieved on 660 nm POF/HCS devices and up to 2000 m on 1300 nm glass multi-mode devices at a transmission speed of 100 Mbps.

300 m can be achieved for Gigabit devices. Plugs are available for the various devices in the range in B-FOC (ST), SC duplex, and SCRJ format.

Standard	Transmission speed	Core/fiber diameter	Fiber material	Plug	Maximum range	Wavelength
10Base-POF	10 Mbps	980/1000 µm 200/230 µm	Polymer fiber HCS fiber	FSMA	70 m 300 m	660 nm
10Base-FL	10 Mbps	50/125 µm 62.5/125 µm	Fiberglass	B-FOC (ST)	3800 m	850 nm
100Base-POF (e.g., PROFINET)	100 Mbps	980/1000 µm 200/230 µm	Polymer fiber HCS GI fiber	SCRJ or FSMA	50 m 300 m	660 nm
100Base-SX	100 Mbps	50/125 µm 62.5/125 µm	Fiberglass	B-FOC (ST)	3800 m	850 nm
100Base-FX	100 Mbps	50 (62.5)/125 µm 200/230 µm	Fiberglass HCS GI fiber	SC duplex or B-FOC (ST)	10,000 m 2000 m	1300 nm
100Base-FX	100 Mbps	9/125 µm	Fiberglass	SC duplex	36,000 m	1300 nm
1000Base-SX	1000 Mbps	50/125 µm 62.5/125 µm	Fiberglass	SC duplex or LC	260 m Fiber optic 50/125 550 m Fiber optic 62.5/125	850 nm
1000BASE-LX	1000 Mbps	9/125 µm 200/230 µm	Fiberglass HCS GI fiber	SC duplex or LC	10 km 20 km (as LX-20) 300 m	1300 nm

Fiber and plug types

Depending on the system requirements, the user can create redundant star, tree, linear or ring structures. To this end, different fiber types and plugs have been specified in various standards. The table shows the key features of polymer, HCS, and glass fibers and the corresponding standards.

M12 plug-in connectors

M12 plug-in connector – IP67

M12 fiber optic plug-in connector, IP67, duplex, with crimp connection technology

Ethernet	Order No.
For POF fiber A4a	1416606

Transceiver

M12 fiber optic transceiver, IP65, duplex, for POF and PCF fiber, for PCB mounting, M16 fastening thread

Ethernet	Order No.
650 nm wavelength	1416716

Coupling

M12 fiber optic coupling, IP65, duplex, for POF, PCF, and GOF fiber types, with wall bracket

Ethernet	Order No.
	1416677

Assembled fiber optic cable

Fiber optic panel feed-through, M12 to SCRJ/IP20, for installation inside housing, length: 5 m

Ethernet	Order No.
POF	1416648
PCF	1416651
GOF	1416664

SCRJ plug-in connectors

SCRJ plug-in connector – IP20

SCRJ plug-in connector, IP20, duplex, with fast connection technology:
- For 980/1000 µm polymer fiber
- For 200/230 µm HCS fiber
- For 50/125 µm or 62.5/125 µm fiberglass

Ethernet	Order No.
POF	1654879
HCS	1654866
GOF	1657070

PROFINET	Order No.
POF	1654879
HCS	1404087

SCRJ plug-in connector – IP67, POF

SCRJ plug-in connector, IP67, duplex, with fast connection technology, for 980/1000 µm polymer fiber

Ethernet	Order No.
POF, version 6	1657009
Marking label	0814775

PROFINET	Order No.
POF, metal, version 14	1608032
POF, plastic, version 14	1657850

SCRJ plug-in connector – IP67, HCS

SCRJ plug-in connector, IP67, duplex, with fast connection technology, for 200/230 µm HCS fiber

Ethernet	Order No.
HCS, version 6	1657012
Marking label	0814775

PROFINET	Order No.
HCS, metal, version 14	1608045
HCS, plastic, version 14	1657863

SCRJ plug-in connector – IP67, GOF

SCRJ plug-in connector, IP67, duplex, with fast connection technology, for 50/125 µm and 62.5/125 µm fiberglass

Ethernet	Order No.
GOF, version 6	1657083
Marking label	0814775

SCRJ panel mounting frames, IP67

Version 6 – for SCRJ

SCRJ panel mounting frame for round mounting cutout, IP67, with seal, without mounting screws

Ethernet	Order No.
Gray	1653744

Version 14 – for PCB connection

SCRJ panel mounting frame for rectangular mounting cutout, IP67, for AVAGO transceiver (type AFBR5978BZ) on PCB, with seal, without mounting screws

Ethernet/PROFINET	Order No.
Metal	1608061
Plastic	1657889

Version 14 – for Freenet system

SCRJ panel mounting frame for Freenet system with SCRJ coupling for POF and HCS fiber, for rectangular mounting cutout, IP67, with seal, without mounting screws

Ethernet/PROFINET	Order No.
Metal	1405374
Plastic	1608210

Version 14 – for Freenet system

SCRJ panel mounting frame for Freenet system with SCRJ coupling for POF and HCS fiber, for round mounting cutout, IP67, with seal, without mounting screws

Ethernet/PROFINET	Order No.
Metal	1405235

Socket insert

SCRJ socket insert, duplex, can be used for POF, HCS, and GOF fiber types

Ethernet	Order No.
SCRJ coupling	1652978

Protective cover – version 6

Protective cover, flat, to cover the contact insert in the panel mounting frame, sealed according to IP67 protection

Ethernet	Order No.
Gray	1652606

Contact retention clip – version 14

Contact retention clip, to cover the contact insert in the panel mounting frame, version 14, sealed according to IP65/ IP67 protection

PROFINET	Order No.
Plastic	1405293

Protective cover – version 14

Protective cover, to cover the contact insert in the panel mounting frame, version 14, sealed according to IP65/ IP67 protection

PROFINET	Order No.
Metal	1608142

SCRJ patch panels, IP20/SCRJ coupling, IP67

With socket/socket connection

Patch panel, SCRJ, DIN rail mounting, IP20,
for POF, HCS, and GOF fiber types

Ethernet/PROFINET	Order No.
Single	1658121

Patch panel for 19" rack

Patch panel, 19" mounting, 16 slots
for Freenet and SCRJ socket inserts, IP20

Ethernet/PROFINET	Order No.
16 slots	1652994
SCRJ socket insert for 19" rack, for POF, HCS, and GOF fiber types	1654358

For plug-in connector – version 14

SCRJ coupling, IP67, metal, with protective cover,
for plug-in connector version 14

PROFINET	Order No.
Nickel-plated	1405206

SCRJ terminal outlets, IP67

2 x SCRJ – version 6

Terminal outlet, IP67, 2 SCRJ slots,
with protective plugs, 2 cable entries

Ethernet	Order No.
Terminal outlet, 2 x SCRJ, V6	1404317

2 x SCRJ – version 14

Patch panel, 19" mounting, 16 slots
for Freenet and SCRJ socket inserts, IP20

Ethernet/PROFINET	Order No.
Terminal outlet, 2 x SCRJ, V14	1404320

1 x SCRJ/1 x Power – version 14

Terminal outlet, IP67, 2 SCRJ slots,
with protective plugs, 2 cable entries

PROFINET	Order No.
Terminal outlet, Power/SCRJ, V14	1404346

Tools

Assembly tool – GOF

Assembly tool for fiberglass, for field assembly of IP20 and IP67 SCRJ plug-in connectors, as well as SC duplex

Ethernet	Order No.
EU version	1658228
US version	1658231

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

Ethernet/PROFINET	Order No.
PSM-HCS-KONFTOOL/B-FOC	2708465
PSM-HCS-KONFTOOL/SCRJ	2708876

Fiber cleaving tool – HCS

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

Ethernet/PROFINET	Order No.
PSM-HCS-CLEAVETOOL/B-FOC	2708478
PSM-HCS-CLEAVETOOL/SCRJ	2313122

Polishing tool – POF

Polishing tool set for polymer fibers, for field assembly of IP20 and IP67 SCRJ plug-in connectors

Ethernet/PROFINET	Order No.
Polishing tool	1658820
Refill set	1656673

Cutting tool – POF

Cutting tool set for polymer fibers, for field assembly of IP20 SCRJ plug-in connectors

Ethernet/PROFINET	Order No.
Cutting tool	1657096

HCS GI plug

Fiber optic plugs for local assembly of HCS GI cables, for B-FOC (ST), SC duplex, and SCRJ pin arrangements, 4 ferrules per set

Ethernet/PROFINET	Order No.
PSM-SET-B-FOC/4-HCS/PN	2313782
PSM-SET-SC-DUPLEX/2-HCS/PN	2313779
PSM-SET-SCRJ-DUP/2-HCS/PN	2313546

Fiber optic patch cables

ST-ST plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). B-FOC (ST) plug to B-FOC (ST) plug. 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

FL MM PATCH … ST-ST	Order No.
1 m	2901815
2 m	2901816
5 m	2901817

SC-SC plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). SC duplex plug to SC duplex plug. 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

FL MM PATCH … SC-SC	Order No.
1 m	2901805
2 m	2901807
5 m	2901808

LC-LC plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). LC plug to LC plug. 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

FL MM PATCH … LC-LC	Order No.
1 m	2989158
2 m	2989255
5 m	2901799

SCRJ-SCRJ plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass. SCRJ plug to SCRJ plug. 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

FL MM PATCH … SCRJ-SCRJ	Order No.
1 m	2901823
2 m	2901824
5 m	2901825

SC-ST plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). SC duplex plug to B-FOC (ST) plug. 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

FL MM PATCH … SC-ST	Order No.
1 m	2901809
2 m	2901810
5 m	2901811

LC-SC plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). LC plug to SC duplex plug. 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

FL MM PATCH … LC-SC	Order No.
1 m	2989161
2 m	2989268
5 m	2901800

LC-ST plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). LC plug to B-FOC (ST) plug. 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

FL MM PATCH … LC-ST	Order No.
1 m	2989174
2 m	2989271
5 m	2901801

ST-SCRJ plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). B-FOC (ST) plug to SCRJ plug. 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

FL MM PATCH … ST-SCRJ	Order No.
1 m	2901820
2 m	2901821
5 m	2901822

SC-SCRJ plug – multi-mode

Fiber optic patch cable with multi-mode fiberglass (OM2). SC duplex plug to SCRJ plug. 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

FL MM PATCH … SC-SCRJ	Order No.
1 m	2901812
2 m	2901813
5 m	2901814

ST-ST plug – single-mode

Fiber optic patch cable with single-mode fiberglass (OS1). B-FOC (ST) plug to B-FOC (ST) plug. 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

FL SM PATCH … ST-ST	Order No.
1 m	2901836
2 m	2901837
5 m	2901838

SC-SC plug – single-mode

Fiber optic patch cable with single-mode fiberglass (OS1). SC duplex plug to SC duplex plug. 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

FL SM PATCH … SC-SC	Order No.
1 m	2901829
2 m	2901830
5 m	2901831

LC-LC plug – single-mode

Fiber optic patch cable with single-mode fiberglass (OS1). LC plug to LC plug. 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

FL SM PATCH … LC-LC	Order No.
1 m	2989187
2 m	2989284
5 m	2901826

LC-SCRJ plug – multi mode

Fiber optic patch cable with multi-mode fiberglass (OM2). LC plug to SCRJ plug. 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

FL MM PATCH … LC-SCRJ	Order No.
1 m	2901802
2 m	2901803
5 m	2901804

SC-ST plug – single-mode

Fiber optic patch cable with single-mode fiberglass (OS1). SC duplex plug to B-FOC (ST) plug. 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

FL SM PATCH … SC-ST	Order No.
1 m	2901832
2 m	2901833
5 m	2901834

LC-SC plug – single-mode

Fiber optic patch cable with single-mode fiberglass (OS1). LC plug to SC duplex plug. 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

FL SM PATCH … LC-SC	Order No.
1 m	2989190
2 m	2989297
5 m	2901827

LC-ST plug – single-mode

Fiber optic patch cable with single-mode fiberglass (OS1). LC plug to B-FOC (ST) plug. 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

FL SM PATCH … LC-ST	Order No.
1 m	2989242
2 m	2989349
5 m	2901828

Assembled fiber optic cables (POF)

Fiber optic polymer fiber cable – type KDHEAVY-1011
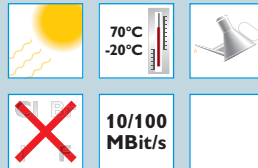
Universal POF cable that can be assembled, 980/1000, type KDHEAVY-1011, UV and oil-resistant, halogen-free, PUR sheath
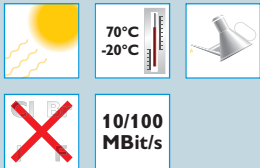
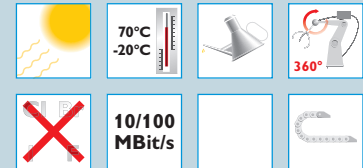| POF	Order No.
By the meter	2744319
IP20	2901553
IP65	1402188

Fiber optic polymer fiber cable – type RUGGED-1012

Rugged POF cable that can be assembled, 980/1000, type RUGGED-1012, UV and oil-resistant, halogen-free, reinforced PUR sheath

POF	Order No.
By the meter	2744322
IP20	2901548
IP65	1402185

Fiber optic polymer fiber cable – type RUGGED-FLEX-1013

Rugged 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

POF	Order No.
By the meter	2744335
IP20	2901549
IP65	1402187

Ordering example for cable sold by the meter

For a POF cable 70 m in length, the ordering data is as follows:

Order No.	Length (m)
2744335 /	70

Length:
Min. 0.4 m
Max. 500 m
(cable drum)

Increments:
0.25 = 1 m – 5 m
1 m = 5 m – 500 m

Ordering example for a configured cable

For a POF cable, fitted with an SCRJ plug at one end and a plastic SCRJ push/pull plug-in connector at the other end, and 15 m in length, the ordering data is as follows:

Order No.	Plug 1	Plug 2	Length (m)
1402187 /	SCRJ /	PPCPL /	15

Note

Please select order numbers

IP20: For assembled cable with IP20 plugs at both ends or IP20 at one end and open end at the other

IP65: For assembled cable with at least one IP65/IP67 plug

Length:
Min. 0.4 m
Max. 100 m

Increments:
0.25 = 1 m – 5 m
1 m = 5 m – 100 m

## Fiber optic polymer fiber cable – type PROFINET-B-1000

Rugged POF cable that can be assembled, 980/1000, type PROFINET-B-1000, UV and oil-resistant, halogen-free, reinforced PUR sheath
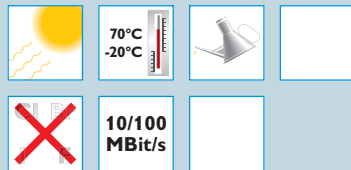
POF	Order No.
By the meter	2313397
IP20	2901551
IP65	1402172

Fiber optic polymer fiber cable – type PROFINET-C-1003

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
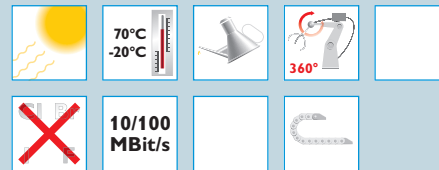
POF	Order No.
By the meter	2313407
IP20	2901552
IP65	1402175

OE	FSMA	B-FOC	SCRJ	IP67	PPCPL	PPCME
Open cable end	FSMA plug	B-FOC (ST) plug	SCRJ plug	SCRJ plug with IP67 protection	SCRJ push/pull plug, plastic, with IP65/ IP67 protection	SCRJ push/pull plug, metal, with IP65/ IP67 protection

Assembled fiber optic cables (HCS and glass)

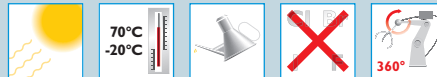## Fiber optic HCS (PCF) cable – type PROFINET-B-HCS-1018

Rugged HCS cable that can be assembled, 200/230, type PROFINET-B-HCS-1018, increased temperature range, halogen-free, PVC sheath

90°C / -40°C   10/100 MBit/s

HCS	Order No.
By the meter	2313766
IP20	2901556
IP65	1402190

## Fiber optic HCS (PCF) cable – type PROFINET-C-HCS-GI-1005

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

70°C / -20°C   360°   max. 1 GBit/s

HCS-GI	Order No.
By the meter	2313410
IP20	2901554
IP65	1402189

Fiber optic HCS (PCF) cable – type HCS-RUGGED-1014

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
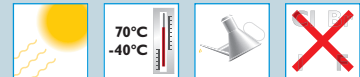
70°C / -40°C   10/100 MBit/s

HCS	Order No.
By the meter	2799885
IP20	2901555
IP65	1402191

Ordering example for cable sold by the meter

For a fiberglass cable 70 m in length, the ordering data is as follows:

Order No.		Length (m)
2799322	/	70

Length:
Min. 1 m
Max. 1000 m
(cable drum)
Increment:
1 m = 1 m – 1000 m

Ordering example for a configured cable

For a fiberglass cable, fitted with an SCRJ plug at one end and a plastic SCRJ push/pull plug-in connector at the other end, and 15 m in length, the ordering data is as follows:

Order No.		Plug 1		Plug 2		Length (m)
1402193	/	SCRJ	/	PPCPL	/	15

Note

Please select order numbers:

IP20: For assembled cable with IP20 plugs at both ends or IP20 at one end and open end at the other

IP65: For assembled cable with at least one IP65/IP67 plug

Length:
Min. 1 m
Max. 1000 m
Increment:
1 m = 1 m – 1000 m

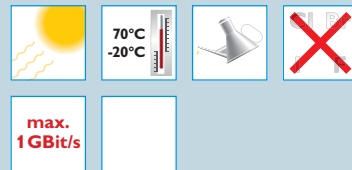## Fiber optic HCS (PCF) cable – type HCS-OUTDOOR-1015

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

70°C -20°C

10/100 MBit/s
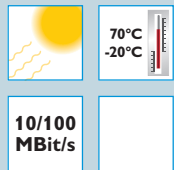
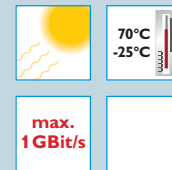| HCS	Order No.
By the meter	2799445
IP20	2901557

Fiber optic fiberglass cable – type GDM-RUGGED-1016

Rugged fiberglass multi-mode cable that can be assembled, 50/125, type GDM-RUGGED-1016, UV and oil-resistant, halogen-free, reinforced PUR sheath

70°C -20°C

max. 1 GBit/s

Glass	Order No.
By the meter	2799322
IP20	2901558
IP65	1402193

Fiber optic fiberglass cable – type GD-OUTDOOR-1017

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

70°C -25°C

max. 1 GBit/s

Glass	Order No.
By the meter	2799432
IP20	2901559

OE	FSMA	B-FOC	SCRJ	SCDUP	LC	IP67	PPCPL	PPCME
Open cable end	FSMA plug	B-FOC (ST) plug	SCRJ plug	SC duplex plug	LC plug	SCRJ plug with IP67 protection	SCRJ push/pull plug, plastic, with IP65/IP67 protection	SCRJ push/pull plug, metal, with IP65/IP67 protection

Power cabling for PROFINET networks

MSTB panel mounting frames, IP67, version 14

For PCB connection

PCB connection, for rectangular mounting cutout, with seal, without mounting screws

PROFINET	Order No.
Metal	1608087
Plastic	1608281

For cable connection

With integrated contact insert for cable connection with spring-cage connection, for rectangular mounting cutout, with seal, without mounting screws

PROFINET	Order No.
24 V, metal	1608249
24 V, plastic	1608294
400 V, metal	1608252
400 V, plastic	1608304

For cable connection

With integrated contact insert for cable connection with spring-cage connection, for round mounting cutout, with seal, without mounting screws

PROFINET	Order No.
24 V, metal	1405248
400 V, metal	1405167

Protective cover/ contact retention clip

Protective cover to cover the contact insert in the panel mounting frame, IP65/IP67 protection
Contact retention clip, to cover the contact insert in the panel mounting frame, IP65/IP67 protection

PROFINET	Order No.
Protective cover, metal	1404045
Contact retention clip, plastic	1405303

MSTB plug-in connectors, IP67

MSTB socket inserts

24 V – version 14

M12 fiber optic plug-in connector, IP65, duplex, with crimp connection technology

PROFINET	Order No.
Metal	1608074
Plastic	1657892

400 V – version 14

M12 fiber optic transceiver, IP65, duplex, for POF and PCF fiber, for PCB mounting, M16 fastening thread

PROFINET	Order No.
Plastic	1608236

MSTB – 24 V

MSTB contact insert, for PCB mounting, 24 V, 5-pos., RAL 9005 (black)

PROFINET	Order No.
Straight solder pins	1609565
Angled solder pins	1657915

MSTB – 400 V

MSTB contact insert, for PCB mounting, 24 V, 5-pos., RAL 3000 (red)

PROFINET	Order No.
Straight solder pins	1609581
Angled solder pins	1609549

Power distributors, IP67

Y-distributor with MSTB plug	Y-distributor with 7/8" plug	H-distributor	Mounting foot
Y-distributor with assembled power cable, 5-pos., IP65/IP67, MSTB plug-in connector with metal housing to 2 x socket in metal housing	Y-distributor with assembled power cable, 5-pos., IP65, 7/8" plug-in connector with metal housing to 2 x socket in metal housing	H-distributor, IP65/IP67, metal housing, 4 x MSTB contact inserts, without mounting screws	

PROFINET	Order No.	PROFINET	Order No.	PROFINET	Order No.	PROFINET	Order No.
0.2 m	1404799	0.2 m	1404812	0.2 m	1405387	Mounting foot	1405390
Variable	1405484/…	Variable	1405497/…				

Assembled power cables

	24 V, MSTB, metal	24 V, MSTB, plastic	400 V, MSTB, plastic
24 V, MSTB, metal, 2.5 mm2			
1 m	1609170		
2 m	1609183		
5 m	1609196		
24 V, MSTB, plastic, 2.5 mm2			
1 m		1609251	
2 m		1609264	
5 m		1609277	
400 V, MSTB, plastic, 2.5 mm2			
1 m			1609374
2 m			1609387
5 m			1609390
24 V, 7/8", metal, 1.5 mm2			
1 m	1609219	1609293	
2 m	1609222	1609303	
5 m	1609235	1609316	

Other cable lengths available on request

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presented here and on the world of solutions
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