Industrial Ethernet

One network, all options

PHŒNIX CONTACT

INSPIRING INNOVATIONS

The Industrial Ethernet network portfolio from PHOENIX CONTACT

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

Thanks to our many years of experience in automation and industrial Ethernet networks, we are familiar with and understand your expectations and requirements. This is evident and embodied in our 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. Therefore, we have consistently designed our products with the knowledge, the tools, and the skills of the user in mind, the automation specialist.

Contents

Find out more with the web code

For detailed information, use the web codes provided in this brochure. Simply enter # and the four-digit number in the search field on our website.

[i] Web code: #1234 (example)

Or use the direct link:
phoenixcontact.net/webcode/#1234

Networked production

Highly productive and efficient production requires well structured, high-performance, and secure network infrastructure. The ideal concept and the right components protect your system against automation system failures and costly downtimes. With industrial network products from Phoenix Contact you can easily implement the high requirements of your production network in a future-proof manner. As well as the appropriate products, we also offer you support in planning your production network optimally.
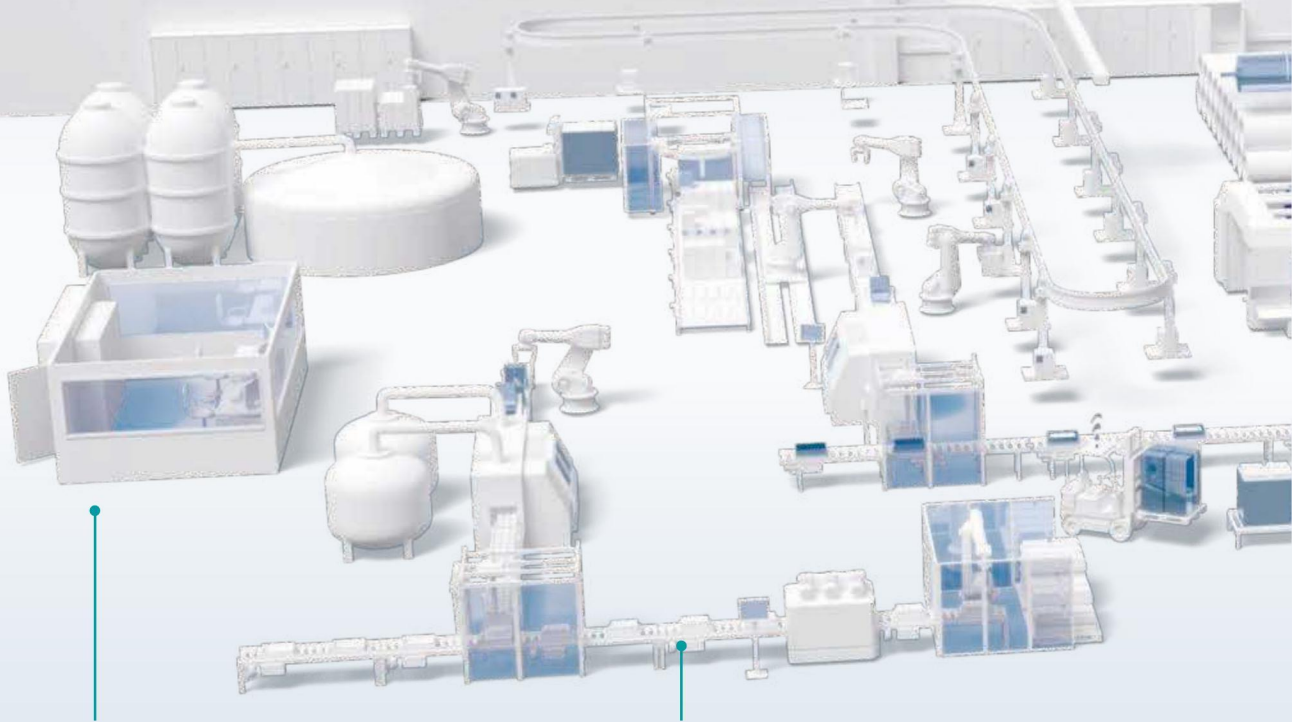
High-availability production network

Without high-performance and robust network infrastructure, modern production no longer works. The ideal concept protects your system against costly failures. We offer the right redundancy solutions, from simple media redundancy through to parallel network structures.

Integration of machines

When integrating third-party machines into the production network, challenges such as IP address conflicts or different IP networks must be solved. We offer:
- High-performance routing solutions between various subnetworks
- A simple solution to IP address conflicts with 1:1 NAT

Connection to the company network

When it comes to communication between company and production networks, different, sometimes contradictory requirements come into conflict with one another. We offer:
• Seamless integration through support of automation and IT standards
• High-performance and failsafe solutions
• Consistent communication between the different Ethernet subnetworks

Communication with mobile systems

Communication with unmanned transport systems and warehouse shuttles requires a reliable and uninterrupted wireless LAN connection. We offer:
• Fast, optimized roaming
• Fast and reliable WLAN availability with large wireless coverage
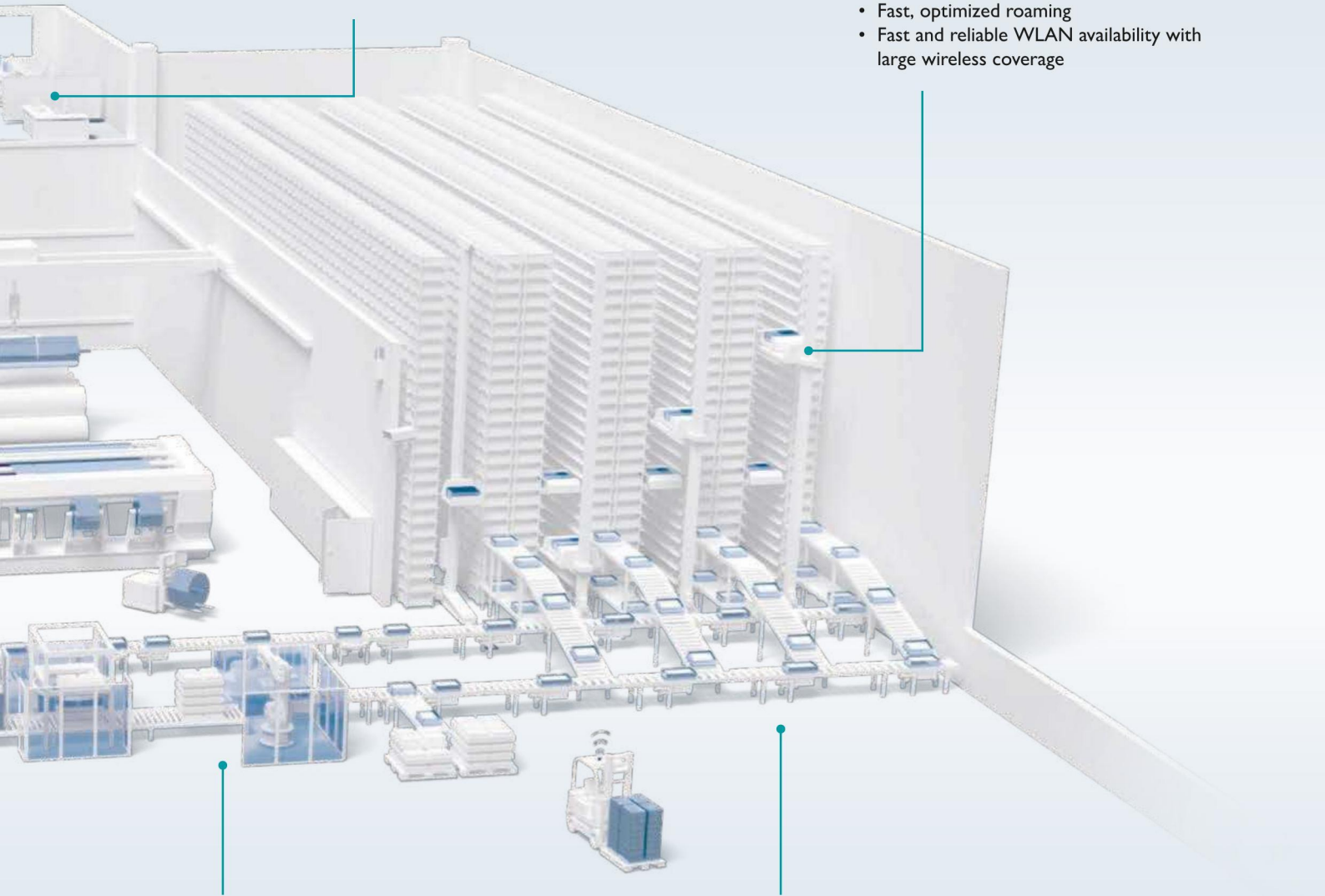
Cyber security

In networked systems, secure protection against unauthorized access by people or malware is essential. We offer:
• Products and solutions for secure system networks in accordance with IEC 62443 and ISA-99
• Secure access solutions for external service engineers via the Internet
• Industrial virus protection for Windows control systems

Network management

In order to detect problems in the production network prior to an actual failure, you must monitor your production network on a continual basis. However, if a failure does occur, the diagnostic data gathered helps you to swiftly find the error and eliminate it. We offer network management software for network configuration and diagnostics.
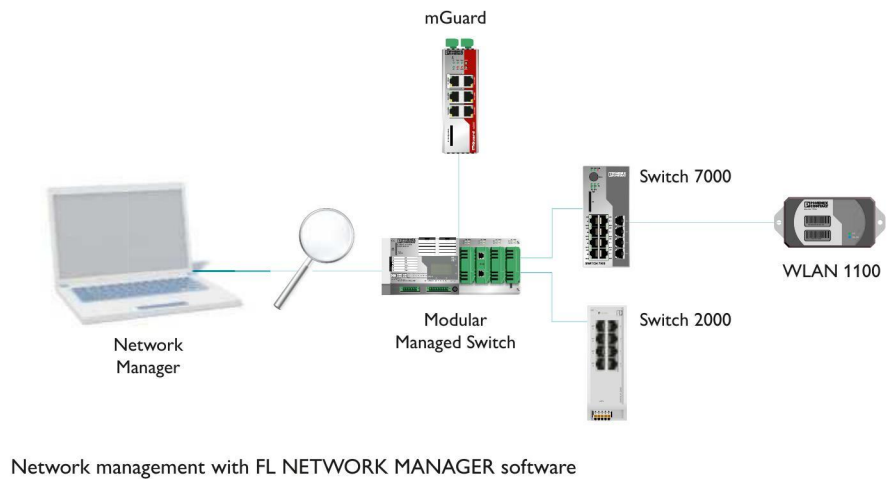
Solutions for the production network

Network management

Large production networks include many different network components that all have to be configured and diagnosed. Easily put Phoenix Contact Managed Switches, WLAN components, and security appliances into operation using network management software. You can centrally assign IP addresses for network devices, configure several devices at the same time, and update the firmware.

Further information on software from page 62

mGuard

Switch 7000

WLAN 1100

Switch 2000

Modular Managed Switch

Network Manager

Network management with FL NETWORK MANAGER software

High-performance and failsafe connection to the company network

The Virtual Router Redundancy Protocol (VRRP) allows you to redundantly connect your routers to the company network. Gigabit performance ensures high data throughput, while support of IT standards provides seamless integration (e.g., VLAN, SNMP, RSTP). For consistent communication between up to 28 different IP subnetworks, you can use the Layer 3 function.
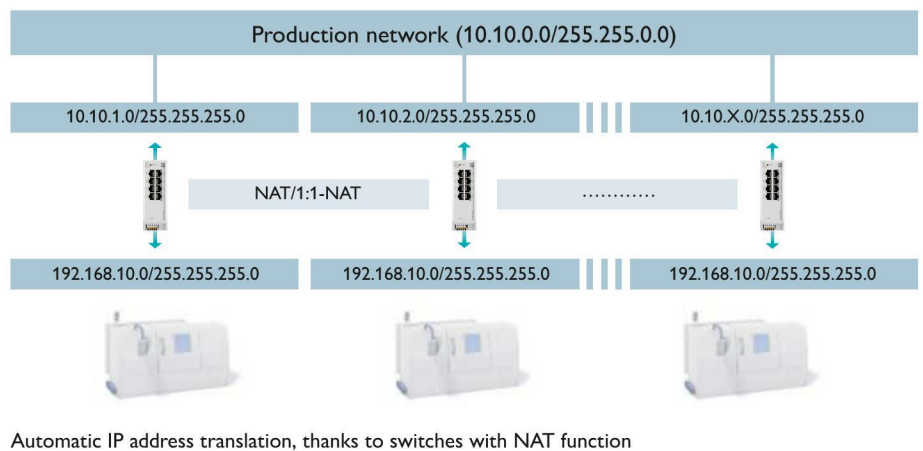
Further information on Modular Managed Switches from page 31

Company network

Layer 3 at automation level

Subnetwork 1

Subnetwork 2
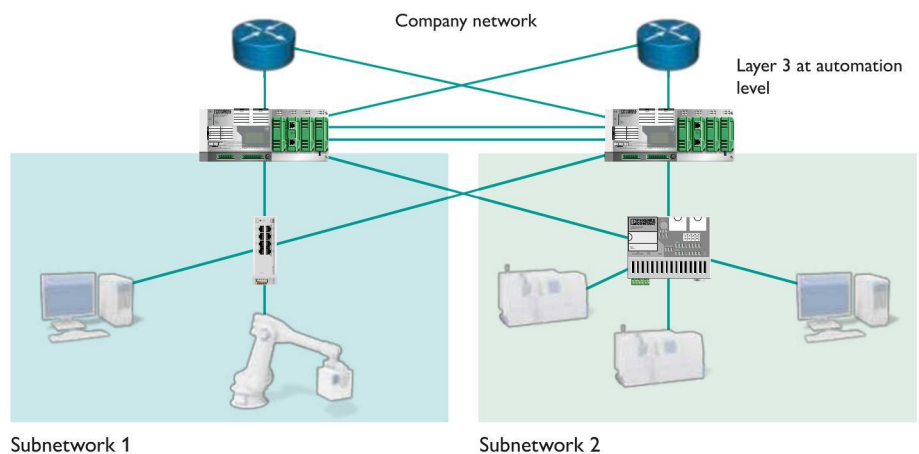
Integration of machines with the same IP address

Machines and their devices have their own, permanently configured IP addresses. When integrated into higher-level production networks, IP address conflicts may therefore occur. However, you do not need to adapt the IP addresses to the production network, which is a time-consuming task. Our NAT switches or mGuard routers easily translate the address areas within the machine to the desired IP address area in the higher-level automation network.

Further information on NAT switches from page 30 and mGuard security routers from page 50

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

Automatic IP address translation, thanks to switches with NAT function

High network availability due to network redundancy

Fast redundancy switch-over ensures the uninterrupted operation of automation networks in the event of connection failure. We offer:
- DLR (Device Level Ring) for EtherNet/IP™ networks
- MRP (Media Redundancy Protocol) for PROFINET networks
- RSTP (Rapid Spanning Tree Protocol) for standard industrial IT networks

Further information on Managed Switches from page 26

Switch

Ring redundancy

Switch-over in the event of an error
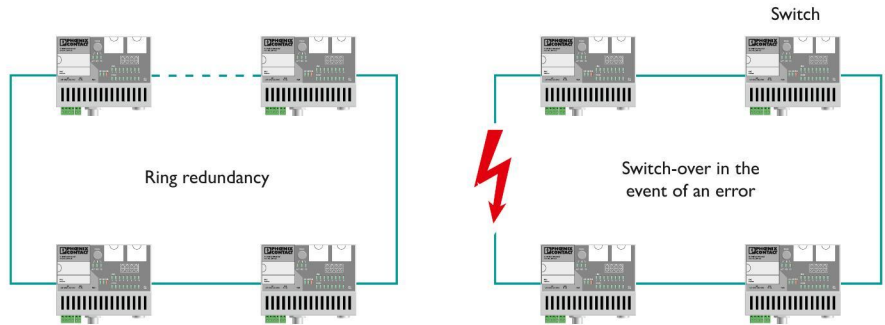
If an error occurs, the network structure is reorganized so that all devices can be reached again

Reliable wireless LAN solution for mobile systems

WLAN products from Phoenix Contact offer optimized roaming and enable wireless cells to be changed in a matter of milliseconds. Realtime communication between the controller and carry system is thus ensured, even in data-intensive applications. Observance of the 802.11n standard as well as use of MIMO antenna technology also ensure stable communication in the industrial environment.

Further information on industrial WLAN from page 47

Industrial Ethernet/PROFINET

WLAN 5110
Access Point

Roaming

WLAN 1100

WLAN 5110
client/repeater
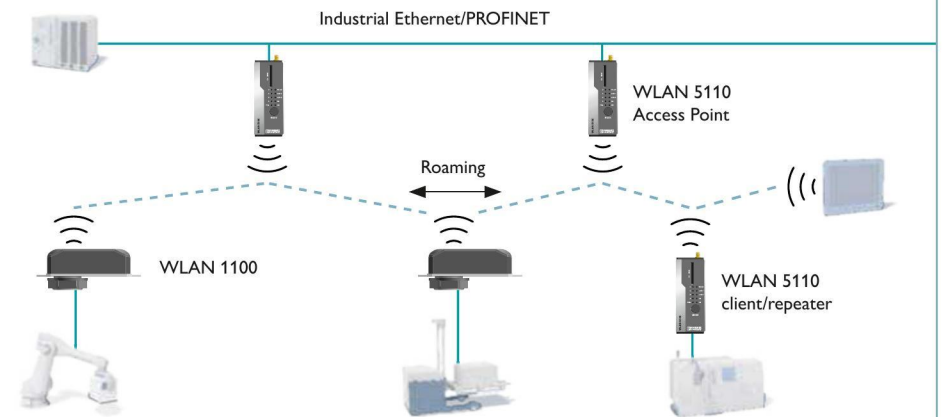
Wireless machine communication with industrial WLAN

Industrial mGuard security solutions

The mGuard firewall routers securely protect your network against hazards that result from increased networking. Firewall rules based on user authentication and the conditional firewall enable person-, company-, and situation-dependent activation of different firewall rules. CIFS Integrity Monitoring detects anomalies on Windows control computers.

Further information on mGuard security routers from page 50

Ethernet

mGuard firewall/router
1:1 NAT

CIFS Integrity Monitoring

Windows

Scan

Windows   Windows   Windows   Programs
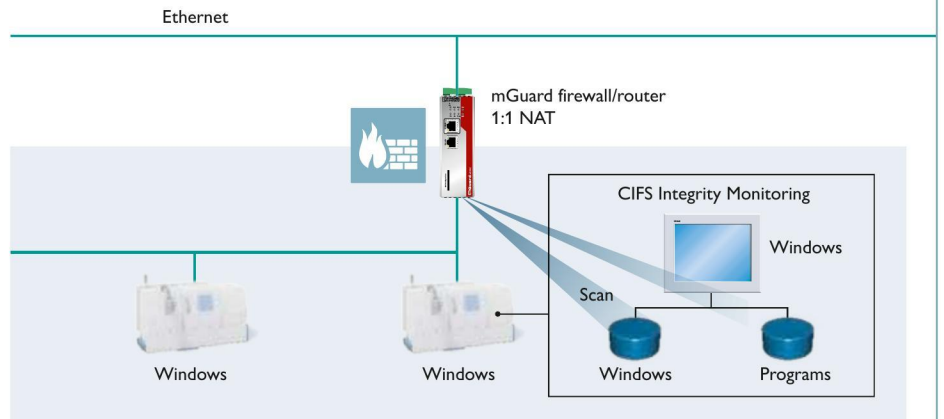
CIFS Integrity Monitoring for protecting computers with Windows operating systems

The networked machine

Today, modern production machines are often networked in various ways. Whether it be with the Internet for remote maintenance, the company network for exchanging production data or with other machines and I/O systems for automated production. However, greater networking also means larger networks, more communication, and increasing security requirements. Phoenix Contact offers you industrial Ethernet solutions and components specially tailored to machine networks, which can be used to tackle not just today's but also future requirements.

Central network configuration and monitoring

In order to start up network components quickly and easily, central network management software is needed. We provide easy, central configuration of components, initial IP address assignment as well as a fast and simple firmware update.

Stable machine networks

The number of Ethernet devices in the machine network continues to rise. In order to guarantee stability and availability in the future as well, intelligent networks are needed for automatic error detection and troubleshooting. We offer intelligent switches for growing networks.

Realtime-capable control network

For realtime communication in PROFINET and EtherNet/IP™ control networks as well as optimum integration into the engineering systems, the use of high-performance automation switches is a prerequisite. We offer network components for PROFINET RT, IRT, and EtherNet/IP™.

Easy and secure remote maintenance

Simple and secure access to the machine network is a prerequisite for fast and efficient service. We offer:
• A remote maintenance solution for different operator networks and security standards
• Easy connection via the mGuard Secure Cloud
• Maximum security, thanks to IPsec and VPN
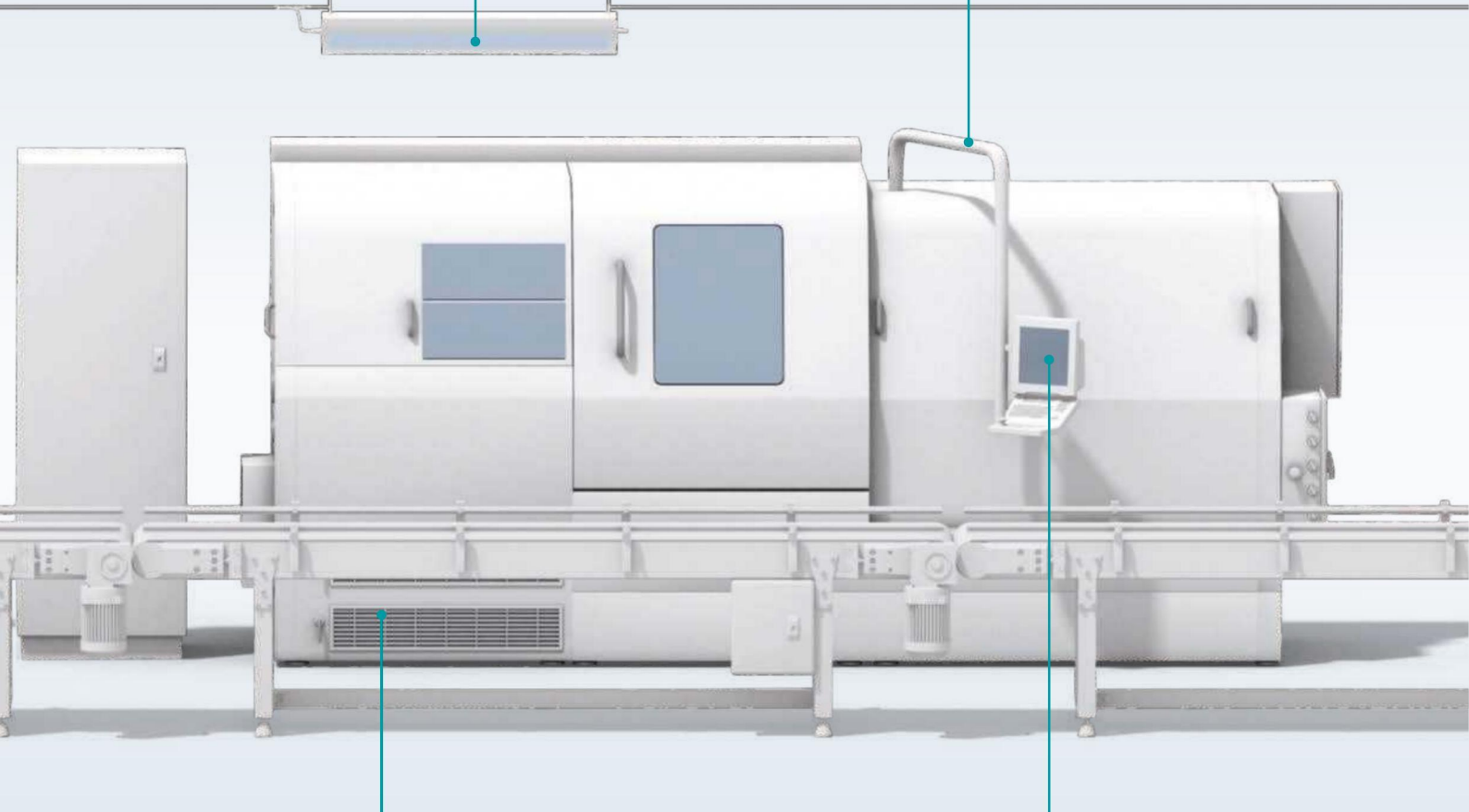
Operation with smart devices

The current trend is to use tablets or smart glasses to set up and operate machines or for visual support. WLAN access to the machine network is therefore a basic requirement. We offer Access Points with integrated antennas, extensive and reliable wireless reception as well as solutions for simple password management.

Integration into the production network

Today, machines are often integrated into a higher-level network. In spite of transparent data exchange, unauthorized access and undesired communication load must be prevented. We offer secure data exchange with the company network, protect the machine against undesired network load, and enable integration into any production networks without IP address adaptation.

Solutions for the machine and system network

Stable machine networks

Intelligent switches offer extensive configuration and monitoring options for the machine network. In doing so, the data load in the network is reduced using multicast filter functions. Redundancy mechanisms maintain communication even in the case of undesired loops or device failures.

Further information on switches for growing networks from page 26

Multicast
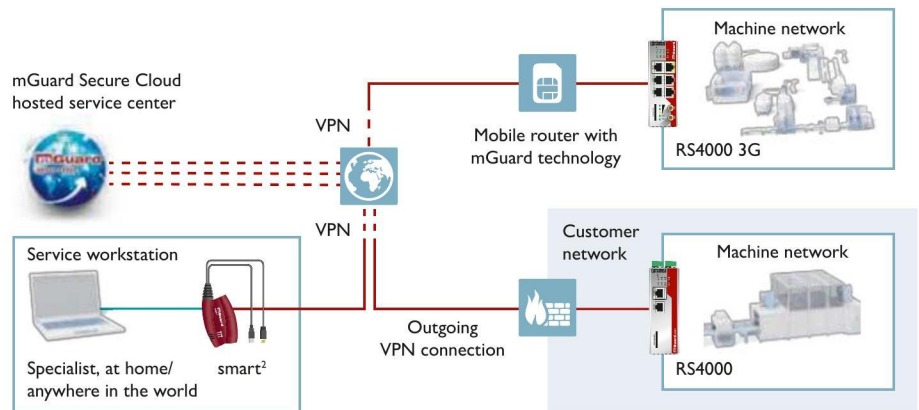
Multicast

Without IGMP snooping

With IGMP snooping
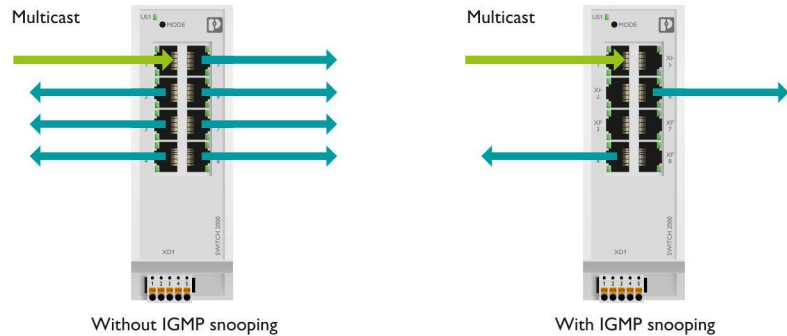
Multicast filters reduce the data load in the network

Easy and secure remote maintenance

mGuard Secure Cloud offers machine builders and system manufacturers a turnkey complete VPN solution, which enables secure remote maintenance without special IT knowledge – from a simple VPN Cloud Client to an extensive security solution including remote maintenance. The wide range of remote maintenance components means that the highly varied requirements of the network operator can be fulfilled.

Further information on secure remote maintenance from page 54

mGuard Secure Cloud hosted service center

Machine network

VPN

Mobile router with mGuard technology

RS4000 3G

VPN

Customer network

Machine network

Service workstation

Outgoing VPN connection

RS4000

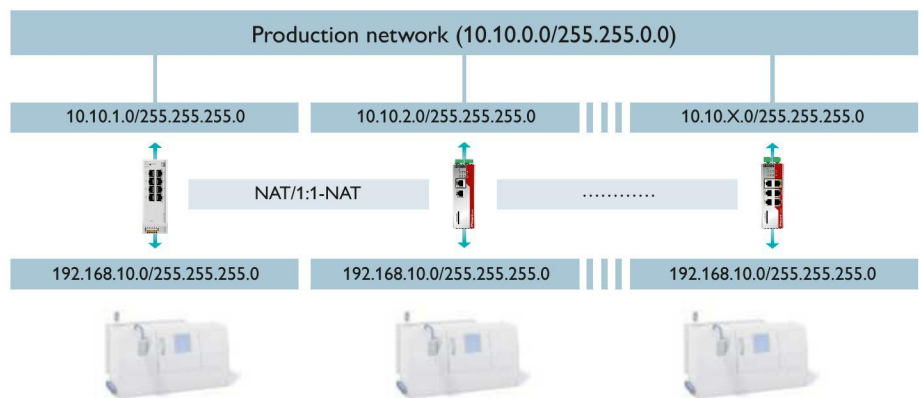Specialist, at home/ anywhere in the world

smart^2

Secure remote maintenance concept with mGuard components

Secure integration into the production network

Machine connection via an NAT or security router enables transparent communication and protects the machine network against unwanted communication at the same time. Faults and threats from the production network are effectively kept away from the machine network. The availability and realtime capability of internal machine communication is thus ensured.

Further information on NAT switches from page 30 and mGuard security routers from page 50

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

Machine connection with NAT and security routers

Machine operation with smart devices

Users should be able to connect their smart devices to the machine network as easily as possible. However, if the WLAN password is known and has not been changed in a long time, this also allows third parties uncontrolled access to the machine network.

The WLAN 1100 wireless module enables automated key management through the machine control system. This means that secure WLAN machine access can be easily implemented.

Further information on industrial WLAN from page 47
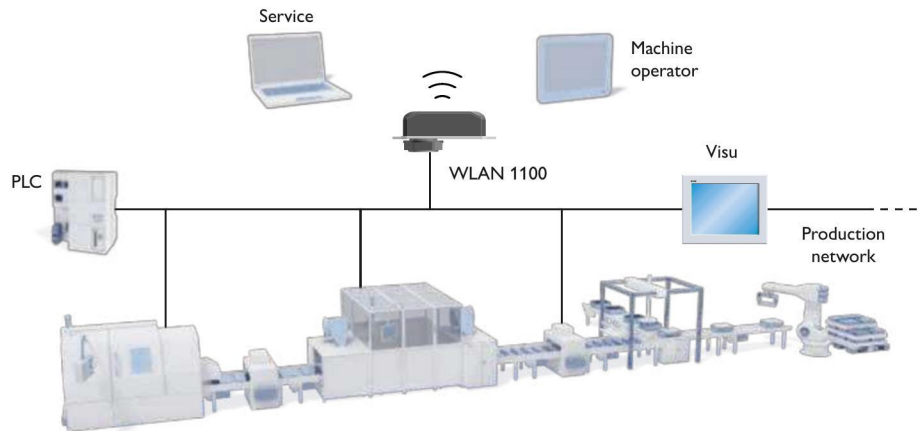
Wireless machine operation and service with wireless LAN

Realtime-capable control network

Automation switches combine IT functions with managed and realtime properties which optimally support PROFINET and EtherNet/IP™ protocols. They ensure stable and realtime-capable communication.

The integrated, fast redundancy methods, such as the Device Level Ring (DLR) for EtherNet/IP™ and the Media Redundancy Protocol (MRP) for PROFINET, prevent the control process from being adversely affected even in the case of device failure.

Further information on managed automation switches from page 26
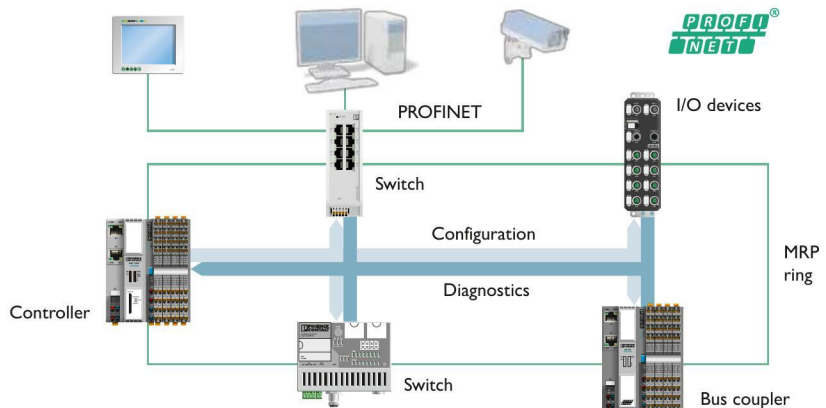
MRP redundancy for a failsafe machine network

Central network configuration and monitoring

Following installation and cabling of the network devices, the central configuration and monitoring of the Phoenix Contact network components can be quickly and easily performed with the FL Network Manager software. This can be done individually or based on prepared machine projects, thereby simplifying configuration and startup for series machine builders in particular.

Further information on software from page 62
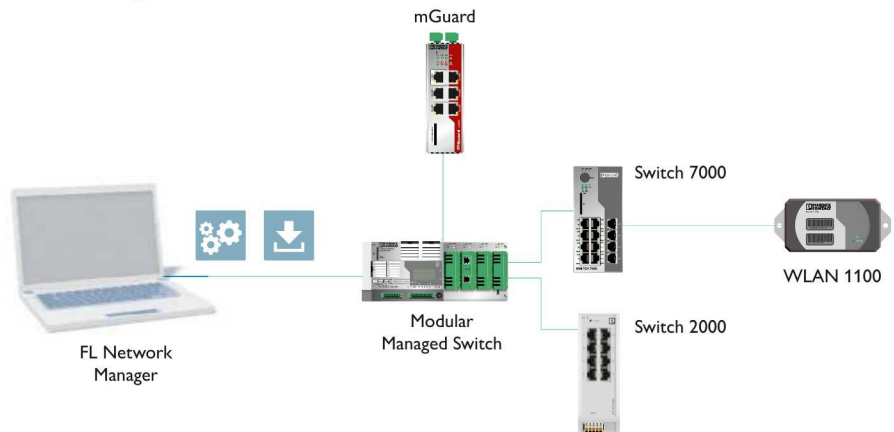
Network configuration and startup with FL Network Manager software

Networked infrastructure

In today's industry, virtually all plants are networked via Ethernet. High requirements are placed on the network infrastructure and network components used. Continuous network availability, support of application-specific standards and communication protocols, bridging of large distances, and reliable operation under harsh ambient conditions are just some of the requirements. In particular, to protect communication against attacks and tampering, protected network solutions are required.
Phoenix Contact offers network solutions and components for secure and reliable networking of your systems.

High-availability networks for energy systems

The IEC 61850 standard stands for global standardization in regard to communication and engineering processes in energy systems. We offer network components for use under the harshest electromagnetic, electrostatic, and climatic ambient conditions in accordance with IEC 61850-3/IEEE 1613. Parallel network redundancy with PRP guarantees maximum availability.

Network availability

In critical infrastructures, interference-free and failsafe communication even across large distances is a fundamental requirement. We offer robust switches with an extensive range of IT functions and fast redundancy mechanisms, which ensure uninterrupted communication in the event of connection failure.

Power over Ethernet

The installation of distributed network devices in the system, such as surveillance cameras or WLAN Access Points, can be extremely time consuming due to the long transmission paths. Here, Power over Ethernet technology considerably reduces cabling effort.
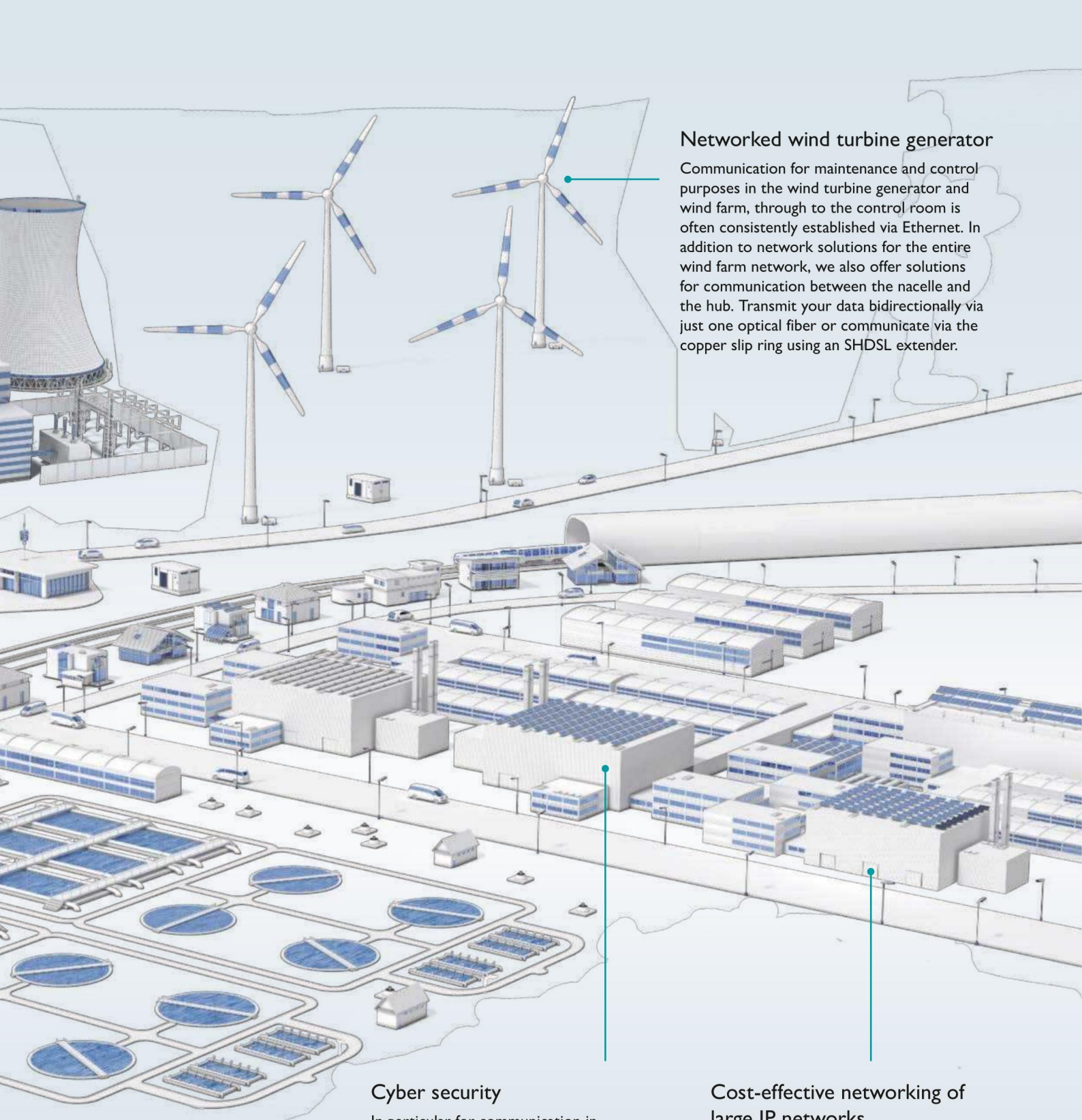
Networked wind turbine generator

Communication for maintenance and control purposes in the wind turbine generator and wind farm, through to the control room is often consistently established via Ethernet. In addition to network solutions for the entire wind farm network, we also offer solutions for communication between the nacelle and the hub. Transmit your data bidirectionally via just one optical fiber or communicate via the copper slip ring using an SHDSL extender.

Cyber security

In particular for communication in large-scale networked systems, special protective measures are required to prevent unauthorized access or tampering. We offer extensive mGuard security solutions, such as Deep Packet Inspection for the highest possible level of security in communication and help you to effectively plan a secure network.

Cost-effective networking of large IP networks

In extensive applications, subsequent networking for process data acquisition presents an economic challenge. Using existing, in-house copper wires in combination with Ethernet extenders is an inexpensive alternative to new installations.

Solutions for infrastructure networks

Power over Ethernet

In the case of Power over Ethernet (PoE), data and energy are transmitted over a standard Ethernet cable. This considerably reduces the cabling effort for the network devices installed in the field, such as surveillance cameras or WLAN Access Points. PoE is standardized in IEEE 802.3 and thus non-proprietary use is supported. Thanks to PoE splitters, you can also supply standard Ethernet devices with energy via PoE.
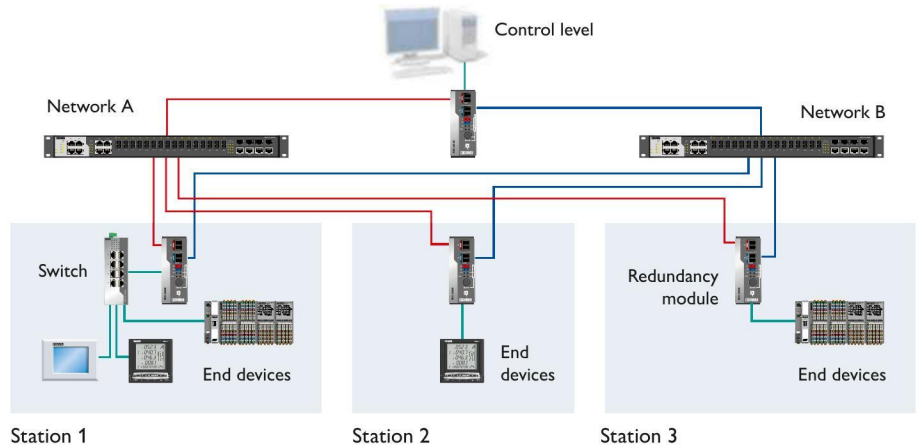
Further information on Power over Ethernet from page 42

PS = Power supply

—— Ethernet
—— Current
‑ ‑ ‑ PoE

Streamlined and cost-effective cabling thanks to PoE
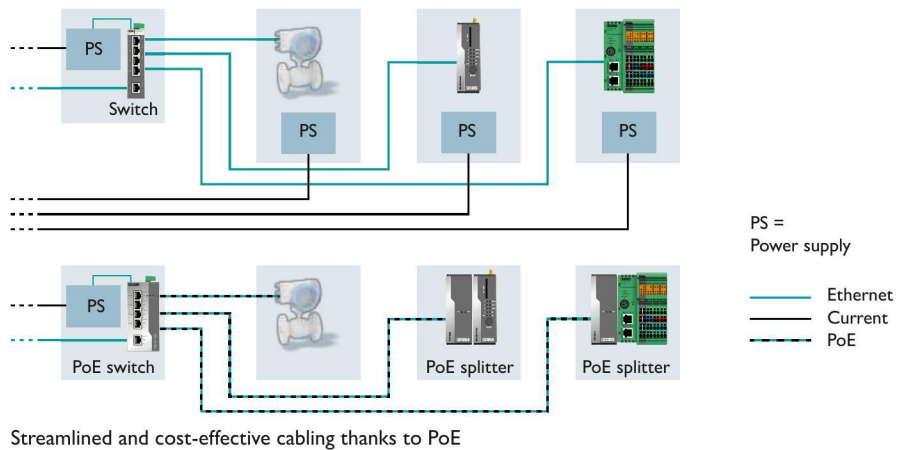
Parallel network redundancy with PRP

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

Further information on PRP redundancy modules from page 67

Control level

Network A

Network B

Switch

Redundancy module

End devices

End devices

End devices

Station 1

Station 2

Station 3

Extended ring redundancy for high network availability

In critical infrastructure applications, the extended ring redundancy offers a quick redundancy switch-over in the event of connection failure. This enables a switching time (recovery time) of a maximum of 15 ms for up to 200 devices in one ring. Up to three linked rings with up to 600 switches are also supported. Dual redundant rings enable maximum fault tolerance.

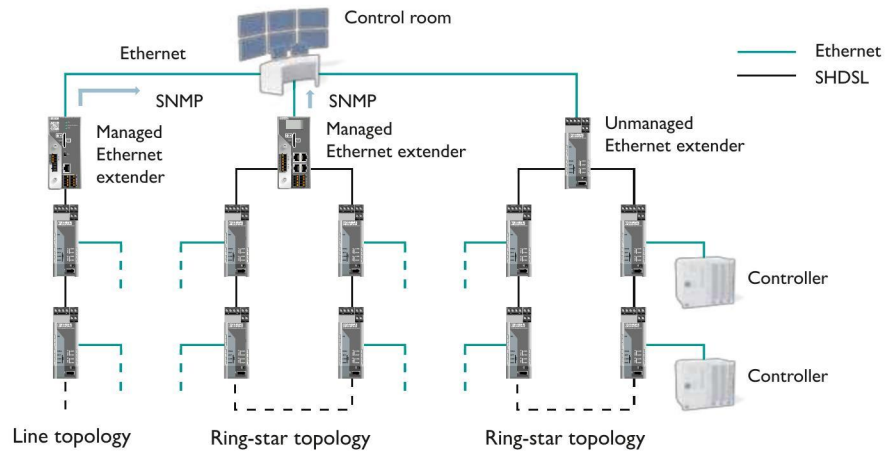Further information on Managed Switches from page 26

15 ms
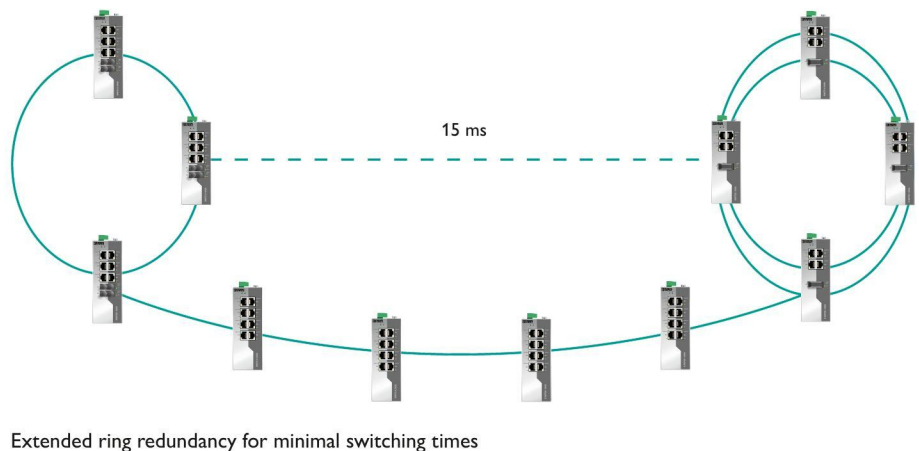
Extended ring redundancy for minimal switching times

Ethernet communication via any 2-wire cable up to 20 km

With the Ethernet extenders, not only can you connect simple point-to-point Ethernet applications, but also extended IP networks of up to 20 km. Thanks to managed Ethernet extenders, unmanaged Ethernet extenders can now also be diagnosed centrally via IP. The system generates a warning using SNMP when unexpected events occur, such as path weakening.

Further information on Ethernet extenders from page 55

Control room

Ethernet

SNMP

SNMP

Ethernet

SHDSL

Managed Ethernet extender

Managed Ethernet extender

Unmanaged Ethernet extender

Controller

Controller

Line topology

Ring-star topology

Ring-star topology

Networked wind turbine generator

With the WDM method, two different wavelengths (1310/1550 nm) enable data to be transmitted and received simultaneously – without limiting the transmission quality or bandwidth. This means that interference-free full duplex communication is possible in rotating applications. SHDSL modems enable double redundancy to be established via the copper slip ring using SHDSL technology and two Ethernet extenders.

Further information about WDM products from page 21 and 39 and modems from page 54

FO converter

FO

Switch

SHDSL

SHDSL modem
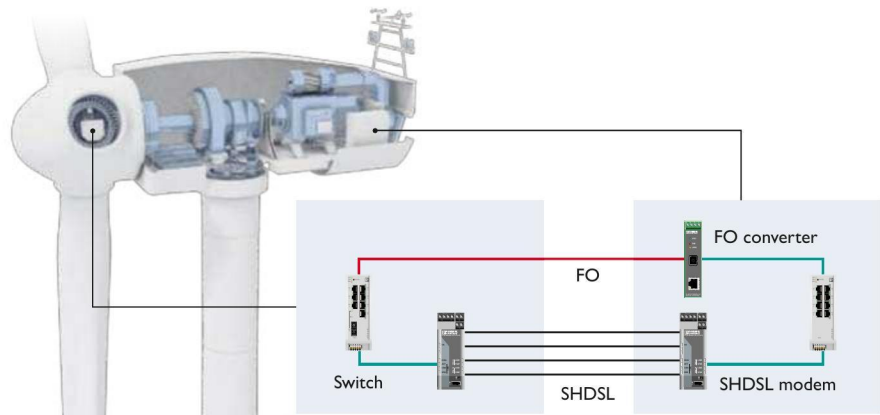
Redundant communication solution for secure data transmission to the hub

Cyber security

With distributed remote control solutions based on our mGuard security routers, you can protect your systems reliably against unauthorized access. In the case of Deep Package Inspection (DPI), the content of the data packet is also checked in addition to IP addresses and port regulation. This increases the safety level in the case of OPC Classic or Modbus/TCP communication, for example.

Further information on mGuard security routers from page 50 and remote maintenance from page 54

Controller

Server

Deep Packet Inspection
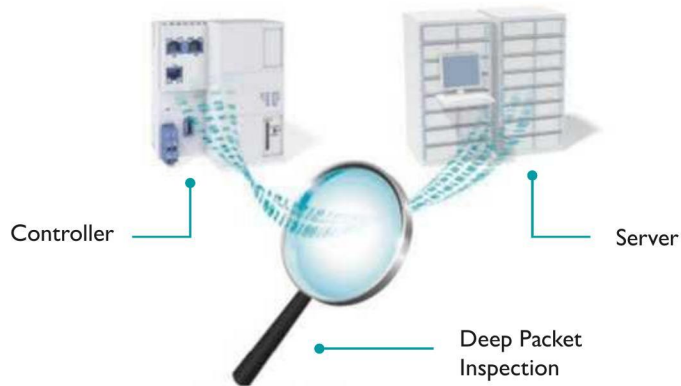
Deep Packet Inspection for OPC Classic and Modbus/TCP

# The networked process system

Transparent communication from the sensor through to the control center is a prerequisite for optimum control of continuous processes in process engineering systems.

Robust, high-availability, and secure Ethernet networks are therefore increasingly becoming the basis for communication in modern process systems. Secure protection against unauthorized access by people or malware is a must. Phoenix Contact offers industrial Ethernet solutions and components for high-performance and secure networking of process systems.
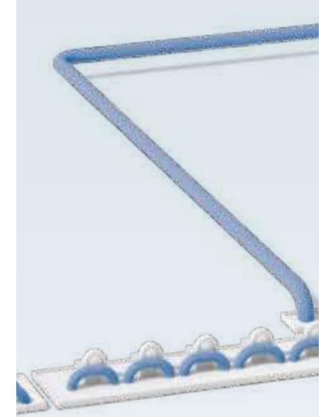
Integration of modular systems

When it comes to integrating new, modular system parts into the system network, a number of challenges need to be overcome. These include IP address conflicts or secure Internet access for remote maintenance. We offer high-performance routing solutions between various subnetworks, an easy solution for IP address conflicts as well as secure remote maintenance of individual system parts.
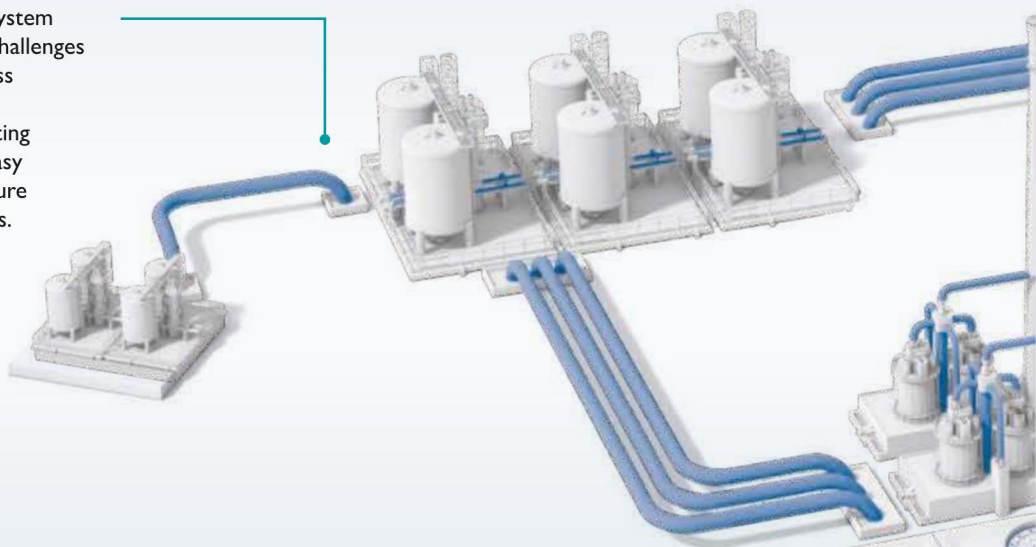
WLAN in the Ex area

The use of tablets or smart glasses for maintenance and diagnostic purposes is also on the increase in process systems. To ensure that the wireless Ethernet infrastructure can also be operated safely in potentially explosive areas, special protective measures are required. We offer WLAN Access Points, which are designed for operation in Zone 2 or can be mounted directly in control cabinets, thanks to integrated antennas.
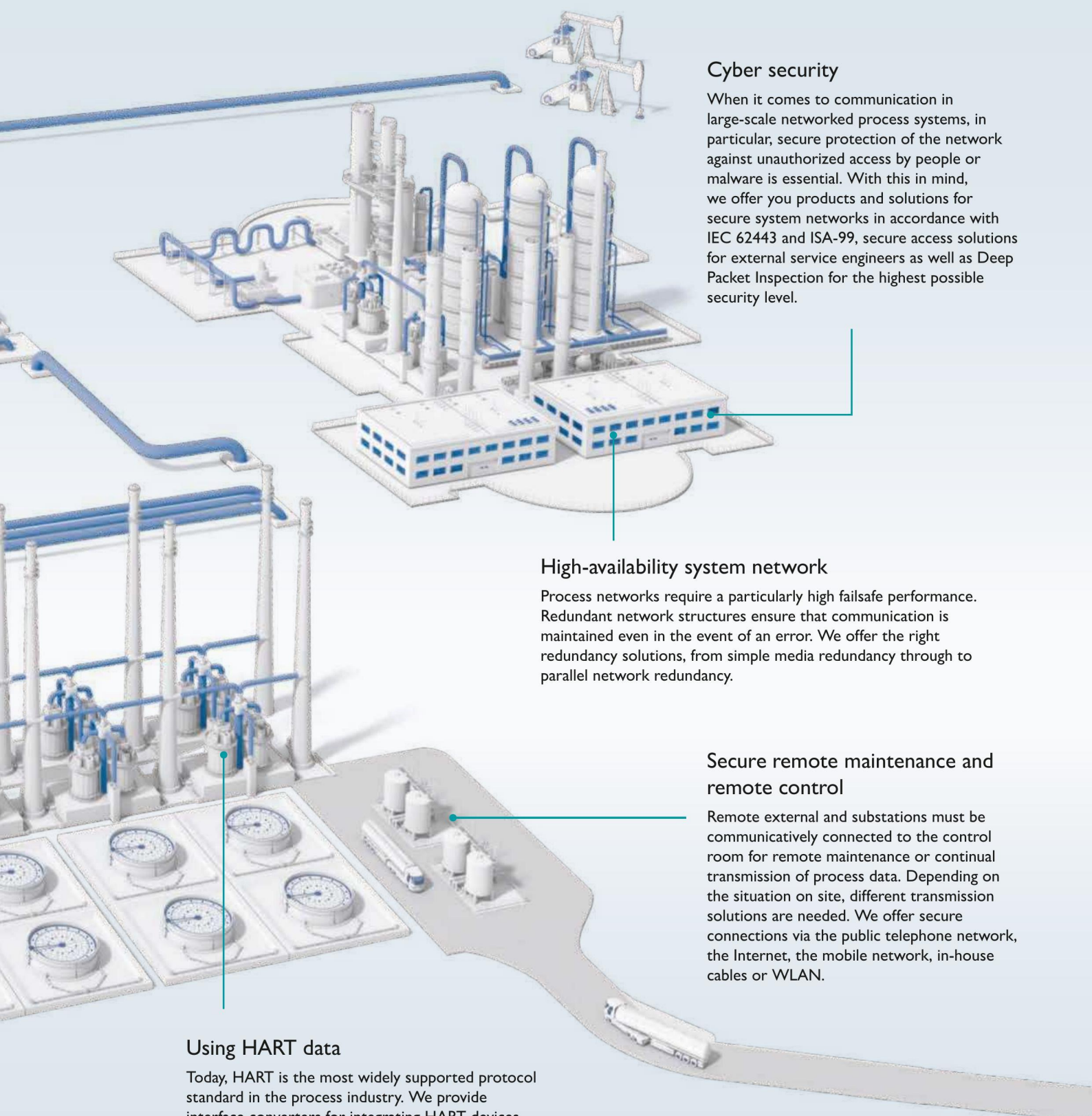
Cyber security

When it comes to communication in large-scale networked process systems, in particular, secure protection of the network against unauthorized access by people or malware is essential. With this in mind, we offer you products and solutions for secure system networks in accordance with IEC 62443 and ISA-99, secure access solutions for external service engineers as well as Deep Packet Inspection for the highest possible security level.

High-availability system network

Process networks require a particularly high failsafe performance. Redundant network structures ensure that communication is maintained even in the event of an error. We offer the right redundancy solutions, from simple media redundancy through to parallel network redundancy.

Secure remote maintenance and remote control

Remote external and substations must be communicatively connected to the control room for remote maintenance or continual transmission of process data. Depending on the situation on site, different transmission solutions are needed. We offer secure connections via the public telephone network, the Internet, the mobile network, in-house cables or WLAN.

Using HART data

Today, HART is the most widely supported protocol standard in the process industry. We provide interface converters for integrating HART devices into your Ethernet network. For smooth processing, you can transmit the otherwise slow HART signals at Ethernet speed to the control system.
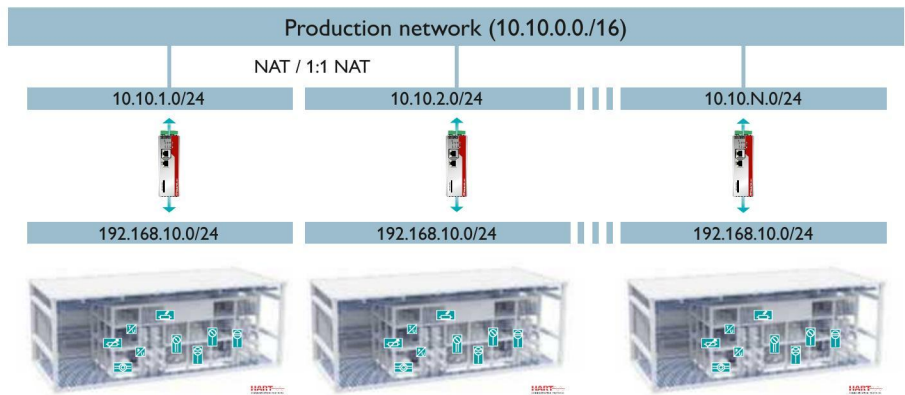
Solutions for process networks

Solution to IP address conflicts

Modular system parts and their devices have their own permanently configured IP addresses. When integrated into higher-level system networks, this can therefore cause IP address conflicts. To avoid the time-consuming process of adapting IP addresses to the production network, NAT switches or mGuard routers can easily translate the address areas within the machine to the desired IP address area in the higher-level automation network.

Further information on NAT switches from page 30 and mGuard security routers from page 50

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 |

Access to system parts with the same IP addresses, thanks to 1:1 NAT function

WLAN in potentially explosive areas

You can also benefit from the advantages of well-established industrial WLAN products from Phoenix Contact in potentially explosive areas. In addition to compact WLAN modules for direct mounting on control cabinets and systems, we offer ready-made WLAN Access Point solutions for potentially explosive areas.

Further information on industrial WLAN from page 47

High-performance omnidirectional antennas

GRP housing

WLAN 5100
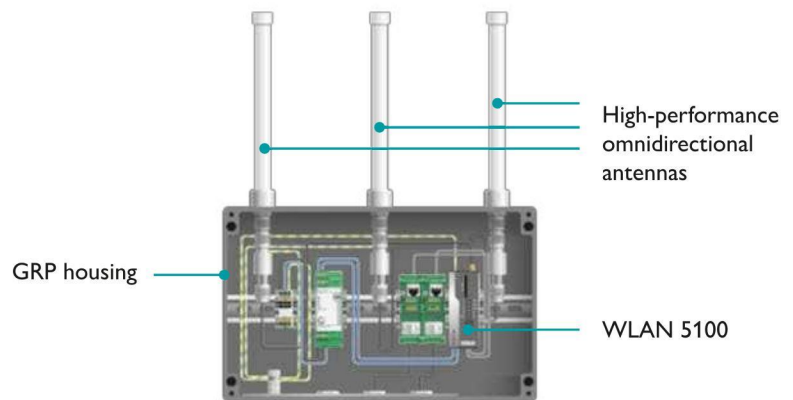
WLAN solutions for potentially explosive areas

Rapid Spanning Tree for high-availability systems

RSTP is a standardized redundancy method (IEEE 802.1D-2004) which is supported by virtually all Managed Switches from Phoenix Contact. It supports ring and tree topologies and meshed networks. Special extensions include Fast Ring Detection for faster switching times and Large Tree Support for networks with up to 57 devices.

Further information on Managed Switches from page 26
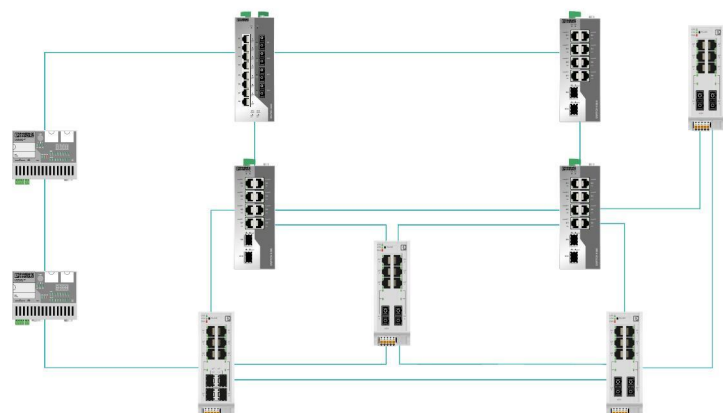
RSTP redundancy for high network availability

Cyber security

The mGuard firewall routers securely protect your network against many hazards that result from increased networking. Reliably protect your system parts against unauthorized access by using secure VPN connections with an integrated firewall. Deep Packet Inspection (DPI) also inspects the content of data packets and increases the safety level in the case of OPC Classic or Modbus/TCP communication.

Further information on mGuard security routers on from page 50

Control room/ DCS

DMZ

Remote service

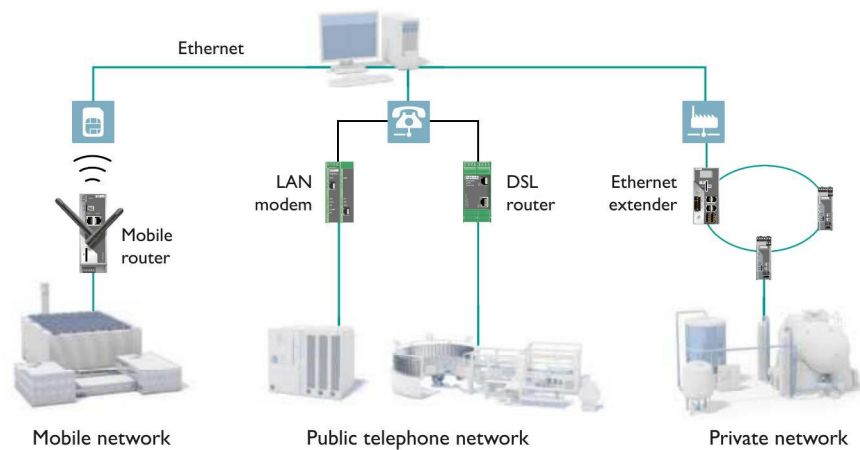VPN connection

VPN connection

System

NAT

Remote station
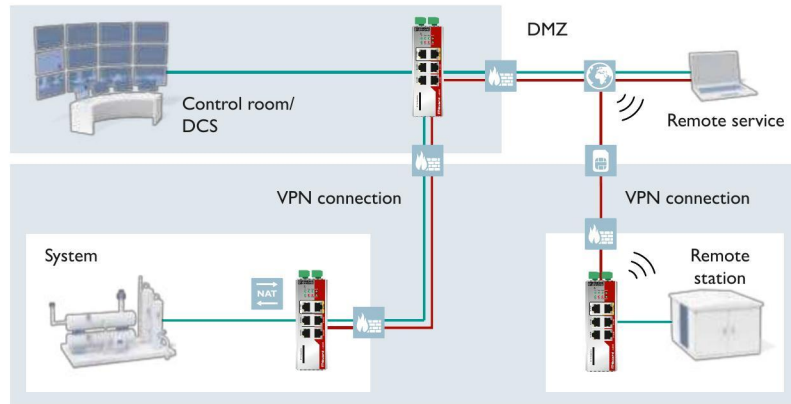
Protection of process systems with mGuard technology

Remote communication

Various communication methods are available for data transmission to remote or widespread networks or for monitoring systems all over the world. Communicate wirelessly at high speed via mobile networks. Access remote network devices via the telephone network, which is available worldwide, or use 2-wire in-house cables for transmission speeds of up to 30 Mbps.

Further information about remote communication from page 54

Ethernet

Mobile router

LAN modem

DSL router

Ethernet extender

Mobile network

Public telephone network

Private network

Using HART data

Ethernet HART multiplexers are an easy and cost-effective option for converting HART signals into Ethernet-based protocols. You can connect up to 40 HART devices via your own HART master. This enables communication at Ethernet speed. The modular design provides a scalable solution for modern distributed control systems and phased roll-outs.

Further information on HART multiplexers on page 58

LAN/WAN

Modbus

EtherNet/IP

PROFINET

DSC/PLC

4 to 20 mA

4 to 20 mA
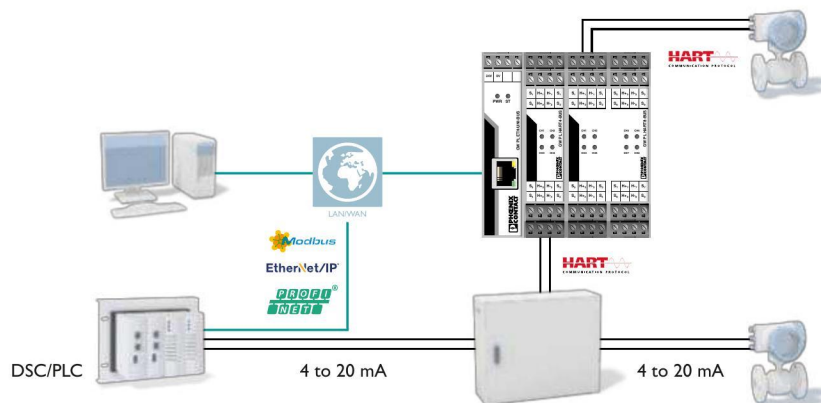
HART multiplexers can also be easily retrofitted in existing systems

Media converters for conversion to fiber optics

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

The extended temperature range means that they can be used for numerous industrial applications. In addition to this, the media converters offer comprehensive diagnostic options, thereby increasing system availability.

ℹ️ Web code: #1269

For standard applications

Class 1000 media converters are designed for applications with basic requirements. They offer an easy and inexpensive entry-level solution for converting to FO technology in industrial Ethernet networks.

For realtime protocols

Class 2000 media converters are ideal for applications with time-critical Ethernet protocols such as Powerlink, EtherCAT® or Sercos. Thanks to the switch-over to pass through operation, they enable very short delays (latency).

Your advantages

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

With special approvals

Thanks to the ATEX approval and DNV shipbuilding approval, you can use the devices from the FL MC EF class in the process industry, machine building and wind power, through to shipbuilding. With single-mode fiberglass, you can achieve transmission ranges of up to 36 km.
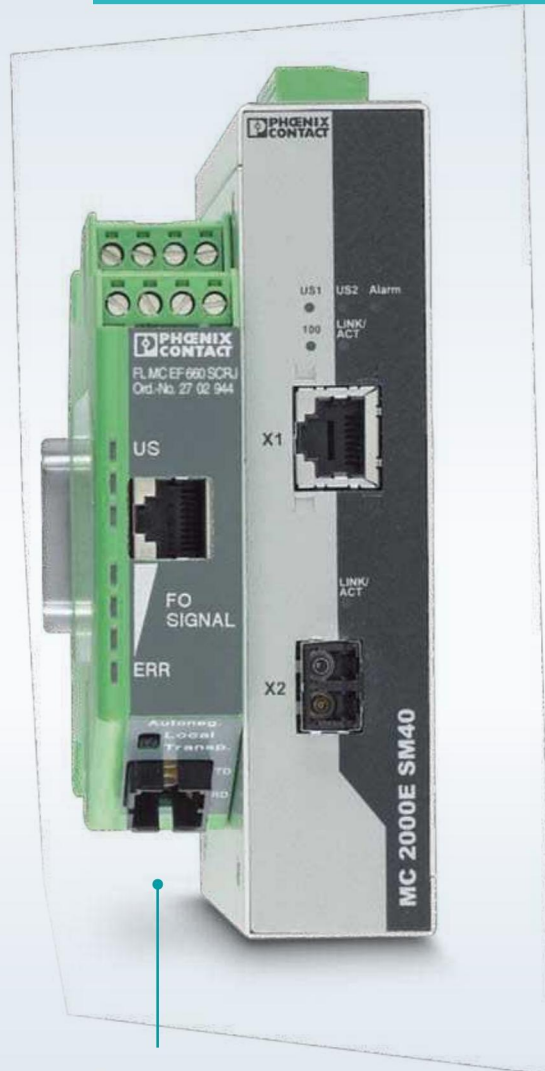
For special applications

We provide perfect solutions, even for special applications such as rotating applications, PROFINET networks or use in the energy industry.

Product overview media converters

Features	Transmission	Connection method	Range	Light wavelength	Special features	Designation	Order no.
Media converters for standard requirements							
Temperature range: 0°C … +60°C, for an easy entry-level solution for converting to FO technology							
	Multimode fiberglass	SC duplex	Up to 9.6 km	1310 nm	Autonegotiation and MDI (x)	FL MC 1000 SC	2891320
	Multimode fiberglass	B-FOC (ST®)	Up to 9.6 km			FL MC 1000 ST	2891321
Media converters for realtime protocols							
Supply voltage: 12 … 48 V DC (redundant), temperature range: -40°C … +75°C, robust metal housing							
	Multimode fiberglass	SC duplex	Up to 9.6 km	1310 nm	Store-and-forward or pass through mode can be selected via DIP switch with a short latency time of 835 ns. They can therefore be used for realtime Ethernet protocols.	FL MC 2000T SC	2891315
	Multimode fiberglass	B-FOC (ST®)	Up to 9.6 km			FL MC 2000T ST	2891316
	Single mode fiberglass	SC duplex	Up to 20 km			FL MC 2000T SM20 SC	2891317
	Single mode fiberglass	SC duplex	Up to 40 km			FL MC 2000T SM40 SC	2891318
Media converters with special approvals for explosion protection or shipbuilding							
Temperature range: -40°C … +65°C, approvals: ATEX, UL, and DNV							
	Multimode fiberglass	SC duplex	Up to 10 km	1310 nm	LFPT and FEF diagnostic functions, autonegotiation and auto MDI (x), backplane bus for redundant or alternative power supply.	FL MC EF 1300 MM SC	2902853
	Multimode fiberglass	B-FOC (ST®)	Up to 10 km			FL MC EF 1300 MM ST	2902854
	Single mode fiberglass	SC duplex	Up to 36 km			FL MC EF 1300 SM SC	2902856
Media converters in accordance with IEC 61850-3 and IEEE 1613							
Supply voltage: 12 … 57 V DC (redundant), temperature range: -40°C … +75°C							
	Multimode fiberglass	LC duplex	Up to 9.6 km	1310 nm	4 kV insulation voltage, high EMC protection	FL MC 2000E LC	2891056
	Single mode fiberglass		Up to 40 km			FL MC 2000E SM40 LC	2891156
Media converters for single-fiber transmission							
Temperature range: -40°C … +65°C, full duplex data transmission on one fiber for rotating applications or saving fiber							
	Multimode and single mode fiberglass	SC simplex	Up to 38 km	1310/1550 nm	Converters A and B	FL MC EF WDM-SET SC	2902660
					Converter A	FL MC EF WDM-A SC	2902658
					Converter B	FL MC EF WDM-B SC	2902659

Features	Transmission	Connection method	Range	Light wavelength	Special features	Designation	Order no.
Media converters for PROFINET, T-coupler							
Perfect electrical isolation over short distances with POF or PCF cable							
	Polymer fiber PCF	SC-RJ	Up to 100 m	660 nm	T-coupler with two FO connections and two RJ45 sockets	FL MC ETH/FO 660 T	2313164
					Single-port media converter	FL MC EF 660 SCRJ	2702944

Technology for every application

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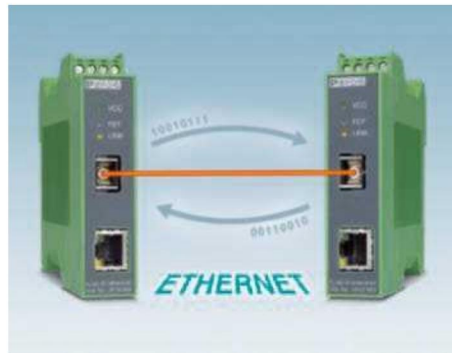
One fiber, numerous possibilities

Bidirectional transmission using a single optical fiber for rotating applications.

Continuous diagnostics

Fiber optic diagnostics with LED bar graph for high system availability.

Fast diagnostics in the event of a malfunction

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

Use in time-critical applications

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

Unmanaged Switches

Unmanaged Switches from Phoenix Contact excel with standard functions, a variable number of ports, and various designs. Thanks to a high level of immunity, robust metal housing, and a wide temperature range, they are entirely suitable for industrial applications. Select the right switch for your application.

ℹ Web code: #1550

Cost-optimized for basic applications

Available with 5 or 8 ports and an optional fiberglass port, SNFB switches are ideal for small machines and monitoring applications with basic Ethernet functions.
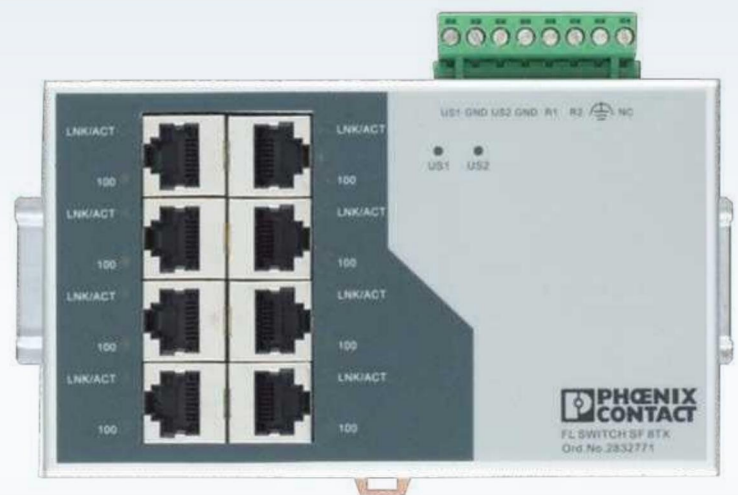
For standard industrial applications

You can choose between ultra flat (SF) and narrow (SFN) devices with 5 to 16 ports. With up to three multimode fiberglass ports with SC or ST connectors, flexibility can be ensured in the network. In addition, the Gigabit versions of the SFN ensure data transfer that also meets high performance requirements.

Your advantages

☑ Autonegotiation and autocrossing ensure easy network creation and expansion

☑ Gigabit variants for high data throughput

☑ Electrical isolation and fiber optic versions for failure-free operation in industrial environments
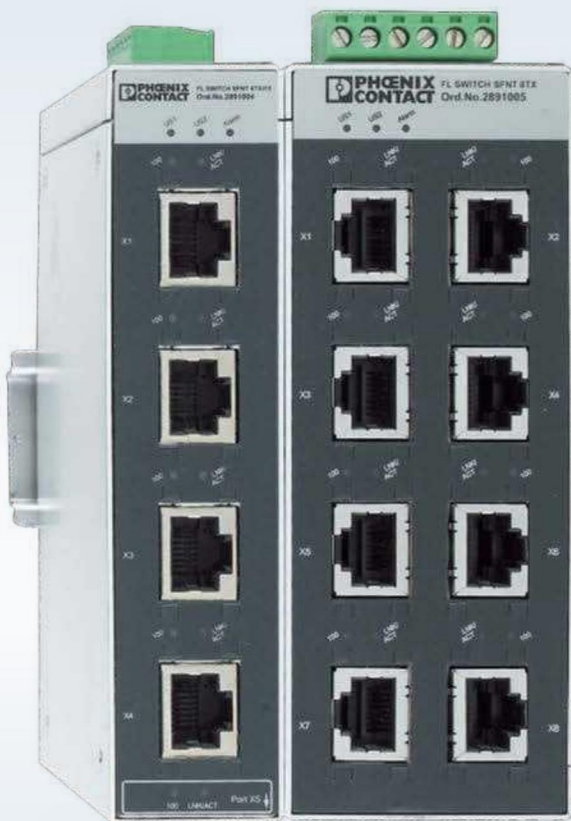
For harsh ambient conditions

SFNT devices are designed for use in very demanding applications for the Oil and Gas sector, shipbuilding, and other outdoor applications. All versions with a signal contact and link monitoring have important diagnostic options.

For field applications

Thanks to the unique narrow design and extended temperature range, the IP67 switch is ideal for use in machine building. In addition, the M12 connections enable quick and easy startup of the switch.

Managed Switches: Automation Switches

Communication in automation networks differs from communication in company networks in several key aspects. The switches must be tailored to the specific requirements of industrial environments as well as the automation protocols used there.

Phoenix Contact offers innovative Managed Switches tailored to your system with an optimum performance spectrum. Select the medium, connections, approvals, supported protocols, and scope of functions to suit your needs.

For growing networks

The 2000 series Managed Switches offer clear configuration and diagnostics options as well as automatic error detection and troubleshooting. Alongside a wider range of functions, the 2200 and 2300 versions also offer communication via fiberglass and approvals for the process industry.

Web code: #1551
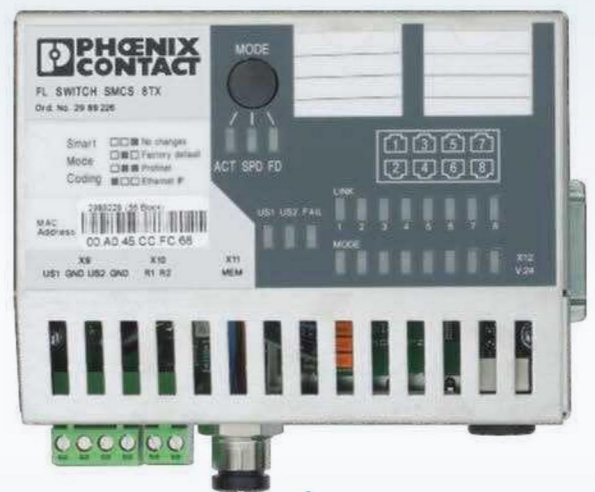
For PROFINET Class B

The Managed Switches of the 2200, 2300 and SMCS series offer excellent realtime properties with high data throughput. They are ideal for use in a PROFINET RT environment. Through support of Fast Ethernet or Gigabit on all ports, they can be integrated into IT realtime services, such as video or voice-over IP.

Web code: #1552

Your advantages

☑ Easy integration into existing networks and flexible redundancy for all topologies, thanks to the RSTP standard

☑ High availability, thanks to rapid redundancy switch-over through fast ring detection

☑ Diagnostics and analysis options, thanks to integrated software functions

☑ Varied connection methods for high flexibility

For PROFINET IRT

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

ⓘ Web code: #1553

Optimized for EtherNet/IP™

The 7000 series Managed Switches support the Device Level Ring (DLR) redundancy mechanism. The switch is integrated directly into the ring and provides you with the option to connect up to six devices to it. Thanks to the Common Industrial Protocol (CIP), the FL SWITCH 7000 switches can be fully integrated into your EtherNet/IP™ control system.

ⓘ Web code: #1554

Managed Switches: Industrial IT switches

The 3000 series Managed Switches offer you optimum performance and availability for demanding infrastructure applications. They support a range of IEEE standards and IT functions for consistent integration into your network structures. The 4000 series also enables high-performance gigabit data transmission and is therefore particularly well suited to connecting distributed devices in the field to the control level. For use in energy systems, versions are also available in accordance with IEC 61850-3 and IEEE 1613.

[i] Web code: #1555
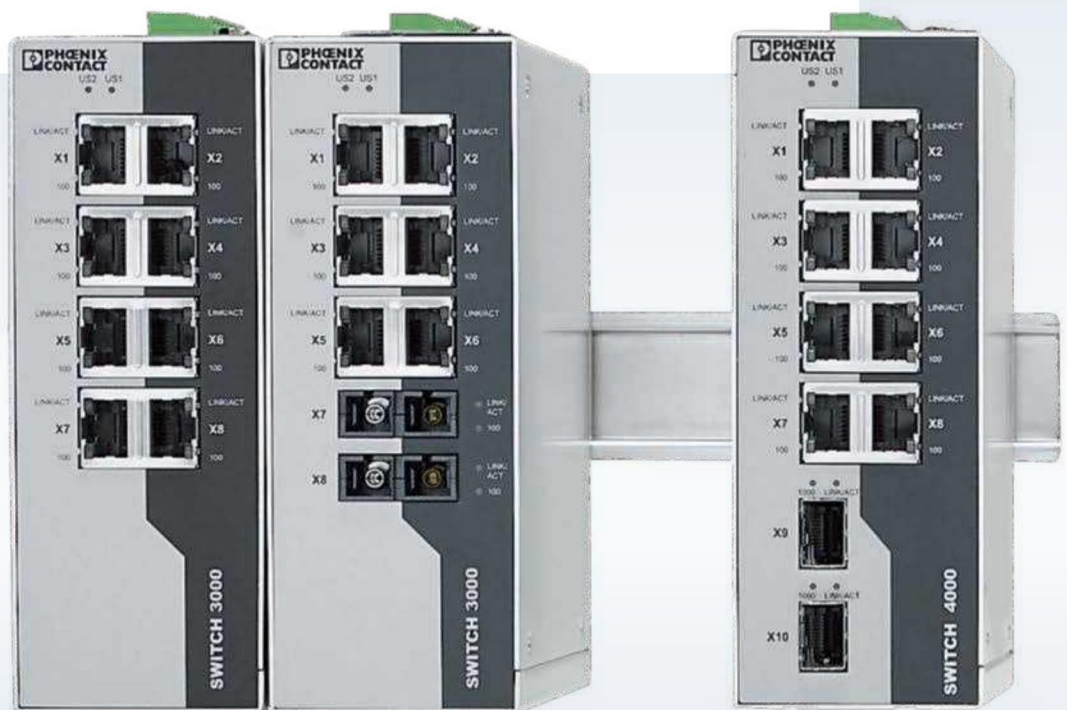
For standard applications

Switches from the 3000 and 4000 series are perfectly suited to challenging infrastructure applications. Thanks to rapid redundancy switch-over in less than 15 ms, they ensure a high level of availability. Fiber optic versions facilitate error-free communication over large distances. Special attention has been paid to user-friendly operation and configuration.

For high network availability

The PRP redundancy modules enable parallel network redundancy without switching time in case of failure and ensure high availability for your network. They are suitable for use under the harshest electromagnetic, electrostatic, and climatic ambient conditions in accordance with IEC 61850-3/IEEE 1613.

For energy systems

The E-versions of the series 3000 and 4000 switches are even suitable for use under the harshest ambient conditions in accordance with IEC 61850-3 and IEEE 1613. Thanks to the extended temperature range, impact resistance, shock resistance, and vibration resistance, the fanless switches are particularly robust. The products are resistant to electrostatic discharge (ESD), fast, transient disturbance variables (burst), surge voltages (surge), and magnetic fields.

Managed Switches:
Routers and Layer 3 switches

With industrial routers and Layer 3 switches from Phoenix Contact, you can integrate machines, production systems or entire subnetworks into your higher-level company network. The switches with NAT routing function combine the properties of a Managed Switch with those of a 1:1 NAT router – in a single DIN rail device. The Managed Switches with a modular design form the backbone of your automation application.

Web code: #1556

For easy integration into the network

The FL NAT 2000 switches offer you switch functions and NAT routing in just one DIN rail device. The NAT switches have a total of 8 ports that you can use as LAN or WAN ports based on the application. This enables a redundant connection of machines to your higher-level network.

For the most demanding requirements

Our most powerful switch is the Modular Managed Switch. As a gigabit switch with optional Layer 3 function, it is particularly suitable for use as an automation backbone and for connection to the higher-level company network. A large range of combinable media modules as well as use in PROFINET RT and EtherNet/IP™ offer maximum flexibility.

Switches overview

Switches				
	Unmanaged Switches Page 36	**2000/2100 class switches** Page 38	**2200/2300 class switches** Page 38	**3000 class switches** Page 40
Port speed (Mbps)	10/100/1000	10/100/1000	10/100/1000	10/100
Alarm contact/alarm output	(●) / –	– / –	– / ●	● / –
Filter functions				
Quality of Service	(●)	●	●	●
VLAN	–	●	●	●
Multicast/IGMP snooping	–	●	●	●
Redundancy				
Rapid Spanning Tree Redundancy (RSTP)	–	●	●	●
Fast Ring Detection (FRD)	–	–	●	–
Large Tree Support	–	–	●	–
Extended ring redundancy 15 ms	– / –	–	–	●
MRP manager/client	– / –	– / ●	● / ●	– / –
Management functions				
Address Conflict Detection (ACD)	–	●	●	–
Port configuration, statistics, and utilization	–	●	●	●
DHCP server	–	Port-based	Pool-/port-based, Option 82	–
Link Layer Discovery Protocol (LLDP)	–	●	●	●
Command Line Interface (CLI)	–	●	●	–
Automation protocols				
EtherNet/IP™, extended multicast filtering	–	●	●	–
EtherNet/IP™, CIP	–	–	–	–
PROFINET device	–	–	●	–
PROFINET conformance class	(A)	A	B	A
Approvals/certificates				
Maritime approvals	(●)	–	(●)	–
Ex approvals	(●)	–	(●)	(●)
IEC 61850-3	(●)	–	–	(●)

– not available, ● available, (●) available in selected models

RSPSupply - 1-888-532-2706 - https://www.RSPSupply.com
See the product details here

	4000/4800 class switches	Smart Managed Switches	PROFINET IRT switches	7000 class switches	Modular Managed Switch	NAT switch
Page	Page 40	Page 38	Page 39	Page 39	Page 41	Page 41
	10/100/1000	10/100/1000	10/100	10/100/1000	10/100/1000	10/100/1000
	● / –	● / –	● / –	● / –	● / –	– / (●)
	●	●	●	●	●	●
	●	●	–	●	●	●
	●	●	–	●	●	●
	●	●	–	●	●	●
	–	●	–	●	●	(●)
	–	●	–	●	●	(●)
	●	–	–	–	–	–
	– / –	● / ●	● / ●	– / –	● / ●	(●) / ●
	–	●	–	●	–	●
	●	●	●	●	●	●
	–	–	–	Pool-/port-based, Option 82	Option 82	Port-based (pool-based, Option 82)
	●	●	●	●	●	●
	–	–	–	–	●	●
	–	●	–	●	●	●
	–	–	–	●	–	–
	–	●	●	–	●	(●)
	A	B	C	A	B	(B)
	–	(●)	–	–	–	(●)
	(●)	(●)	–	–	–	(●)
	(●)	–	–	–	–	–

Product overview Unmanaged Switches

Features	Copper ports	Fiber optic ports	Port speed	Quality of Service	Special features	Order no.
Unmanaged Switches with basic function: FL SWITCH SFNB						
Supply voltage: 12 … 48 V DC, temperature range: -10°C … +60°C						
	5 x RJ45	–		–	–	2891001
	4 x RJ45	1 x MM (SC duplex)		–	–	2891027
		1 x MM (ST)	10/100 Mbps	–	–	2891028
		1 x SM (SC duplex)		–	–	2891029
	8 x RJ45	–		–	–	2891002
Unmanaged Switches for universal use: FL SWITCH SF						
Supply voltage: 18 … 36 V DC, temperature range: 0°C … +55°C						
	8 x RJ45	–		–	–	2832771
	7 x RJ45	1 x MM (SC duplex)		–	–	2832726
		1 x MM (ST)		–	–	2832577
	6 x RJ45	2 x MM (SC duplex)		–	–	2832933
	6 x RJ45	2 x MM (ST)	10/100 Mbps	–	–	2832674
	4 x RJ45	3 x MM (ST)		–	–	2832603
	16 x RJ45	–		–	–	2832849
	15 x RJ45	1 x MM (SC duplex)		–	–	2832661
	14 x RJ45	2 x MM (SC duplex)		–	–	2832593
Unmanaged Switches for universal use: FL SWITCH SFN						
Supply voltage: 9 … 36 V DC, temperature range: 0°C … +60°C						
	5 x RJ45	–	10/100 Mbps	●	–	2891152
		–		●	With PTCP filter for PROFINET	2891151
		–		●	12 … 32 V DC/20-28 V AC	2891021
		–	10/100/1000 Mbps	●	-25°C … +75°C	2891444
	8 x RJ45	–		●	–	2891929
		–	10/100 Mbps	●	Flow control switched off	2891022
		–		●	With PTCP filter for PROFINET	2891018
		–		●	12 … 32 V DC/20-28 V AC	2891020
		–	10/100/1000 Mbps	●	-25°C … +75°C	2891673
	7 x RJ45	1 x MM (SC duplex)	10/100 Mbps	●	–	2891097
				●	Flow control switched off	2891023
		1 x MM (ST)		●	–	2891110
		1 x MM (SC duplex)	10/100/1000 Mbps	●	-40°C … +75°C	2891518
	6 x RJ45	2 x MM (SC duplex)	10/100 Mbps	●	–	2891314
				●	Flow control switched off	2891024
		2 x MM (ST)		●	–	2891411
		2 x MM (SC duplex)	10/100/1000 Mbps	●	-40°C … +75°C	2891398

Features	Copper ports	Fiber optic ports	Port speed	Quality of Service	Special features	Order no.
	6 x RJ45	2 x SM (SC duplex)	10/100/1000 Mbps	●	-25°C … +75°C, 10 km	2891987
				●	-25°C … +75°C, 20 km	2891563
	4 x RJ45	1 x MM (SC duplex)		●	–	2891851
		1 x MM (ST)		●	–	2891453
	16 x RJ45	–	10/100 Mbps	–		2891933
	15 x RJ45	1 x MM (SC duplex)		–	12 … 48 V DC	2891934
	14 x RJ45	2 x MM (SC duplex)		–		2891935

Unmanaged Switches for universal use

Supply voltage: 120/220 V AC, temperature range: 0°C … +60°C

Features	Copper ports	Fiber optic ports	Port speed	Quality of Service	Special features	Order no.
	24 x RJ45	–	10/100 Mbps	●	19" mounting	2891041
		–	10/100/1000 Mbps	●		2891057

Robust Unmanaged Switches for harsh ambient conditions: FL SWITCH SFNT

Supply voltage: 9 … 36 V DC, temperature range: -40°C … +75°C

Features	Copper ports	Fiber optic ports	Port speed	Quality of Service	Special features	Order no.
	5 x RJ45	–	10/100 Mbps	●	ATEX, IECEx (Class I, Div. 2)	2891003
		–		●	Protective coating	2891043
		–	10/100/1000 Mbps	●	–	2891390
		–		●	Protective coating	2891391
	4 x RJ45	1 x MM (SC duplex)		●	ATEX, IECEx (Class I, Div. 2)	2891004
		2 x MM (SC duplex)		●	Protective coating	2891044
	8 x RJ45	–		●	ATEX, IECEx (Class I, Div. 2)	2891005
		–		●	Protective coating	2891045
		–		●	IEC 61850-3, 12 … 57 V DC	2891065
	7 x RJ45	1 x MM (SC duplex)	10/100 Mbps	●	ATEX, IECEx (Class I, Div. 2)	2891006
				●	Protective coating	2891046
		1 x MM (ST)		●	–	2891007
				●	Protective coating	2891047
	6 x RJ45	2 x MM (SC duplex)		●	–	2891025
				●	Protective coating	2891048
		2 x MM (ST)		●	–	2891026
				●	Protective coating, 12 … 48 V DC	2891049
	16 x RJ45	–		●	ATEX, IECEx, 12 … 48 V DC	2891952
	15 x RJ45	1 x MM (SC duplex)		●	12 – 48 V DC	2891953
	14 x RJ45	2 x MM (SC duplex)		●		2891954

Product overview Unmanaged Switches

Features	Copper ports	Fiber optic ports	Port speed	Quality of Service	Special features	Order no.
Robust switches with IP67 protection						
Supply voltage: 24 V DC, temperature range: -40°C … +70°C						
	5 x M12	–	10/100 Mbps	●	With PTCP filter for PROFINET	2700200
Power over Ethernet switches: FL SWITCH 1000						
Supply voltage: 18 … 57 V DC, extended temperature range: -40°C … +75°C, IEEE 802.3 af/at (PoE+)						
	8 x M12 POE	–	10/100/1000 Mbps	●	-40°C … + 70°C, 18-32 V DC, 30 W per port, max. 200 W	2701883
	4 x RJ45 (PoE), 1 x RJ45	–	10/100 Mbps	●	30 W per port, max. 120 W	2891064
	2 x RJ45 (PoE),	2 x SFP	10/100/1000 Mbps	●	52-57 V DC, 30 W per port, max. 60 W	1026765
	4 x RJ45 (PoE), 1 x RJ45	–		●	30 W per port, max. 120 W	1026937
	4 x RJ45 (PoE), 1 x RJ45	1 x SFP		●		1026932
	8 x RJ45 (PoE)	2 x SFP		●		1026929

Flexible fields of application

Switches in a flat, slim, 19" design that enable flexible selection of the installation location for wall mounting.

Power over Ethernet versions

Series 1000 Power over Ethernet switches enable connection of PoE-capable end devices without additional configuration.

Detect disconnections

Thanks to link monitoring, 1000 and SFNT series switches identify disconnections and enable fast elimination of faults.

Product overview managed automation switches

Features	Copper Ports	Fiber optic ports	Combo ports	Port speed	Special features	Designation FL SWITCH...	Order no.
Intelligent switches for the machine: Switch 2000 and 2100							
Supply voltage: 18 … 32 V DC, temperature range: 0°C … +60°C, IP20, front port outlet direction							
	5 x RJ45	–	–		–	2005	2702323
	8 x RJ45	–	–	10/100 Mbps	–	2008	2702324
	16 x RJ45	–	–		–	2016	2702903
	5 x RJ45	–	–		–	2105	2702665
	8 x RJ45	–	–	10/100/1000 Mbps	–	2108	2702666
	16 x RJ45	–	–		–	2116	2702908
Managed Switches for universal use: Switch 2200 and 2300							
Supply voltage: 12 … 57 V DC (redundant), temperature range: -40°C … +70°C, IP20, front port outlet direction, PROFINET Class B Approvals: DNV/GL, BV, ABS, LR, RINA, IECEx, ATEX Zone 2							
	5 x RJ45	–	–			2205	2702326
	8 x RJ45	–	–			2208	2702327
	7 x RJ45	1 x MM SC	–			2207-FX	2702328
	7 x RJ45	1 x SM SC	–			2207-FX SM	2702329
	6 x RJ45	2 x MM SC	–			2206-2FX	2702330
	6 x RJ45	2 x SM SC	–			2206-2FX SM	2702331
	6 x RJ45	2 x MM ST	–			2206-2FX ST	2702332
	6 x RJ45	2 x SM ST	–	10/100 Mbps		2206-2FX SM ST	2702333
	6 x RJ45	2 x SFX	–		Digital alarm output, Fast Ring Detection, Large Tree Support, MRP Manager, up to 32 static VLANs, pool-based DHCP server and option 82	2206-2SFX	2702969
	4 x RJ45	2 x SFX	2 x SFX/RJ45			2204-2TC-2SFX	2702334
	16 x RJ45	–	–			2216	2702904
	14 x RJ45	2 x MM SC	–			2214-2FX	2702905
	14 x RJ45	2 x SM SC	–			2214-2FX SM	2702906
	14 x RJ45	2 x SFX	–			2214-2SFX	1006188
	12 x RJ45	2 x SFX	2 x SFX/RJ45			2212-2TC-2SFX	2702907
	8 x RJ45	–	–			2308	2702652
	6 x RJ45	2 x SFP	–			2306-2SFP	2702970
	4 x RJ45	2 x SFP	2 x SFP/RJ45	10/100/1000 Mbps		2304-2GC-2SFP	2702653
	16 x RJ45	–	–			2316	2702909
	14 x RJ45	2 x SFP	–			2314-2SFP	1006191
	12 x RJ45	2 x SFP	2 x SFP/RJ45			2312-2GC-2SFP	2702910
	8 x RJ45	–	–			2208 PN	1044024
	6 x RJ45	2 x SFX	–			2206-2SFX PN	1044028
	16 x RJ45	–	–	10/100 Mbps		2216 PN	1044029
	14 x RJ45	2 x SFX	–		PROFINET (preset), PROFINET status LEDs	2214-2SFX PN	1044030
	8 x RJ45	–	–			2308 PN	1009220
	6 x RJ45	2 x SFP	–			2306-2SFP PN	1009222
	16 x RJ45	–	–	10/100/1000 Mbps		2316 PN	1031673
	14 x RJ45	2 x SFP	–			2314-2SFP PN	1031683

Product overview managed automation switches

Features	Copper Ports	Fiber optic ports	Combo ports	Port speed	Special features	Designation FL SWITCH…	Order no.
Managed Switches for PROFINET Class B: FL SWITCH SMCS							
Supply voltage: 18 … 32 V DC (redundant), temperature range: 0°C … +60°C, IP20, bottom port outlet direction							
	4 x RJ45	–	–		PROFINET preset	SMCS 4TX-PN	2989093
	8 x RJ45	–	–	10/100 Mbps	–	SMCS 8TX	2989226
		–	–		PROFINET preset	SMCS 8TX-PN	2989103
		–	–		GL, BV, ABS, LR, DNV, and ATEX Zone 2	SMCS 8GT	2891123
	6 x RJ45	2 x SFP	–	10/100/1000 Mbps	–	SMCS 6TX/2SFP	2989323
			–		GL, BV, ABS, LR, DNV, and ATEX Zone 2	SMCS 6GT/2SFP	2891479
	16 x RJ45	–	–			SMCS 16TX	2700996
	14 x RJ45	2 x MM FX-SC	–	10/100 Mbps	Extended temperature range: -40°C … +70°C	SMCS 14TX/2FX	2700997
		2 x SM FX-SC	–			SMCS 14TX/2FX-SM	2701466
Managed Switches for PROFINET IRT							
Supply voltage: 18.5 … 30.2 V DC (redundant), temperature range: -25°C … +60°C, IP20							
	4 x RJ45	–	–		–	IRT 4TX	2700689
	2 x RJ45	2 x POF SC-RJ	–	10/100 Mbps	–	IRT 2TX 2POF	2700691
	1 x RJ45	3 x POF SC-RJ	–		–	IRT TX 3POF	2700692
			–		IP67	IRT IP TX/3POF	2700697
Managed Switches for EtherNet/IP: FL SWITCH 7000							
Supply voltage: 12 … 58 V DC (redundant), temperature range: -40°C … +70°C, IP20, DLR, CIP							
	8 x RJ45	–	–		–	7008-EIP	2701418
	6 x RJ45	2 x MM SC	–	10/100 Mbps	–	7006/2FX-EIP	2701419
	5 x RJ45	1 x MM SC 2 x SM SC	–		–	7005/FX-2FXSM-EIP	2701420
	4 x RJ45	–	4 x SFP/RJ45		2 x gigabit combo ports	7004-2TC-2GC-EIP	2702175
		–		10/100 Mbps or 10/100/1000 Mbps	4 x gigabit combo ports	7004-4GC-EIP	2701553
	6 x RJ45	–	4 x SFP/RJ45		2 x gigabit combo ports	7006-2GC-EIP	2701554

Accessories: SFP modules

Features	Port	Transmission speed	Transmission length	Wavelength	Special features	Designation FL SFP…	Order no.
	LC MM	100 Mbps	2 km	1310 nm	–	FX	2891081
	LC SM		40 km		–	FX SM	2891082
	LC SM (WDM)		20 km	1310/1550 nm	WDM module A	FE WDM20-A	2702437
				1500/1310 nm	WDM module B	FE WDM20-B	2702438
				1310/1500 nm, 1550/1310 nm	WDM module A and B	FE WDM20-SET	2702439
	LC MM	1000 Mbps	1 km	850 nm	–	SX	2891754
			2 km		–	SX2	2702397
	LC SM		10 km	1310 nm	–	LX10-B	1025401
			30 km		–	LX	2891767
			80 km	1550 nm	Long haul	RS	2989912
	LC SM (WDM)		10 km	1310/1550 nm	WDM module A	WDM10-A	2702440
				1550/1310 nm	WDM module B	WDM10-B	2702441
				1310/1500 nm, 1550/1310 nm	WDM module A and B	WDM10-SET	2702442
	RJ45		100 m	–	–	GT	2989420

Easy configuration

The Managed Switches enable configuration using the web browser, SD card, SNMP, CLI or the controller.

Support of conventional protocols

Phoenix Contact Managed Switches support functions for use in PROFINET and EtherNet/IP applications.

Flexible transmission length

Thanks to SFP ports and compatible SFP modules, adapt the switches to your application and bridge even large distances.

Product overview managed industrial IT switches

Features	Copper ports	Fiber optic ports	Combo ports	Port speed	Special features	Designation FL SWITCH…	Order no.
Managed Switches for infrastructure applications: FL SWITCH 3000/4000							
Supply voltage: 24 … 48 V DC (redundant), extended temperature range: -40°C … +75°C, IP20							
	5 x RJ45	–	–	10/100 Mbps	-10°C … +60°C	3005	2891030
		–	–		–	3005T	2891032
	8 x RJ45	–	–		-10°C … +60°C	3008	2891031
		–	–		ATEX, IECEx (CID2)	3008T	2891035
	16 x RJ45	–	–		-10°C … +60°C	3016	2891058
		–	–		–	3016T	2891059
	4 x RJ45	1 x MM FX-SC	–		–	3004T-FX	2891033
		1 x MM FX-ST	–		–	3004T-FX ST	2891034
	6 x RJ45	2 x MM FX-SC	–		ATEX, IECEx (CID2)	3006T-2FX	2891036
		2 x MM FX-ST	–		–	3006T-2FX ST	2891037
		2 x SM FX-SC	–		–	3006T-2FX SMSM	2891060
	12 x RJ45	2 x SFP	–		–	3012E-2SFX	2891067
	8 x RJ45	2 x SFP	–	10/100 Mbps or 1000 Mbps	ATEX, IECEx, CID2	4008T-2SFP	2891062
	10 x RJ45	3 x SM FX-SC	–	8 x 10/100 Mbps 2 x 10/100/1000 Mbps 3 x 100 Mbps	–	4008T-2GT-3FX SM	2891160
		4 x SM FX-SC	–	8 x 10/100 Mbps 2 x 10/100/1000 Mbps 4 x 100 Mbps	–	4008T-2GT-4FX SM	2891061
	14 x RJ45	2x FX-SC	–	12 x 10/100 Mbps 2 x 10/100/1000 Mbps 4 x 100 Mbps	–	4012T-2GT-2FX	2891063
		2 x FX-ST	–		–	4012T-2GT-2FX ST	2891161
Managed Switches in accordance with IEC 61850-3/IEEE 1613: FL SWITCH 3000E/4000E							
Extended temperature range: -40°C … +70°C, IP20							
	16 x RJ45	–	–	10/100 Mbps	24 … 48 V DC	3016E	2891066
	12 x RJ45	2 x SFP	–			3012E-2SFX	2891067
		2 x MM FX-SC	–			3012E-2FX	2891120
		2 x SM FX-SC	–			3012E-2FX SM	2891119
	8 x RJ45	16 x MM LC	4 x SFP or RJ45	8 x 10/100 Mbps 16 x 100 Mbps 4 x 1000 Mbps	Requires replaceable, redundant power supply (see accessories on page 41)	4808E-16FX LC-4GC	2891073
		16 x SM LC				4808E-16FX SM LC-4GC	2891074
		16 x MM SC				4808E-16FX-4GC	2891079
		16 x SM SC				4808E-16FX SM-4GC	2891080
		16 x MM ST				4808E-16FX ST-4GC	2891085
		16 x SM ST				4808E-16FX SM ST-4GC	2891086
	24 x RJ45	–		24 x 100 Mbps 4 x 1000 Mbps		4824E-4GC	2891072
	–	24 x MM SC				4800E-24FX-4GC	2891102
		24 x SM SC				4800E-24FX SM-4GC	2891104
Managed Power over Ethernet Switches							
Supply voltage: 52 … 57 V DC, extended temperature range: -40°C … +75°C, IEEE 802.3 af/at (PoE+), prepared for IEEE 802.3 bt (PoE ++)							
	4 x RJ45 (PoE)	1 x SFP		10 / 100 Mbps (RJ45) 1000 Mbps (SFP)	60 W per port, max. 180 W	4000T-4POE-SFP	1026924
	8 x RJ45 (PoE)	2 x SFP				4000T-8POE-2SFP	1026923
	8 x RJ45 (PoE), 4 x RJ45	4 x SFP		10/100/1000 Mbps	60 W per port, max. 240 W	4004T-8POE-4SFP	1026922

Product overview Managed Switches with routing function and accessories

Features	Copper ports	FO/combo ports	Port speed	Special features	Designation	Order no.
Managed Switches with routing functions						
Supply voltage: 18 V DC … 32 V DC, temperature range: 0°C … +60°C, IP20						
	8 x RJ45	–	10/100 Mbps	–	FL NAT 2008	2702881
Supply voltage: 12 … 57 V DC, temperature range: -40°C … +70°C, IP20, approvals: DNV/GL, BV, ABS, LR, RINA, IECEx, ATEX Zone 2						
	8 x RJ45	–	10/100 Mbps	Digital alarm output, Fast Ring Detection, Large Tree Support, MRP Manager, up to 32 static VLANs, pool-based DHCP server and Option 82	FL NAT 2208	2702882
	4 x RJ45	2 x combo ports (SFP or RJ45), 2 x SFP	10/100/1000 Mbps		FL NAT 2304-2GC-2SFP	2702981
Modular Managed Switch						
Supply voltage: 18.5 … 30.2 V DC, temperature range: -20°C … +55°C, IP20						
	4x RJ45	4 x combo ports (SFP or RJ45)	10/100/1000 Mbps	Can be extended up to 24 ports	FL SWITCH GHS 4G/12	2700271
				Can be extended up to 24 ports, Layer 3	FL SWITCH GHS 4G/12-L3	2700786
	8 x RJ45	4 x SFP		Can be extended up to 28 ports	FL SWITCH GHS 12G/8	2989200
				Can be extended up to 28 ports, Layer 3	FL SWITCH GHS 12G/8-L3	2700787

Features	Function	Port configuration	Connection direction	Fiber optic length	Special features	Order no.
Accessories for modular Managed Switches						
	Extension module	–	–	–	For up to 8 ports	2989307
	Media module	Copper, RJ45	Bottom	–	–	2832357
			Front	–	–	2832344
			Front	–	PoE	2832904
		FO, MM SC	Bottom	1300 nm	–	2832425
			Front		–	2832412
		FO, SM SC	Bottom		–	2832205
		FO, MM ST	Bottom		–	2884033
		POF/PCF, SC-RJ	Bottom	650 nm	–	2891084

Features	Function	Port configuration	Voltage range	Designation	Order no.
Replaceable power supply for FL SWITCH 48xxE					
	Modular power supply for 19" switches	–	48 V DC	4800E-P1	2891075
		–	110 V, 220 V DC/AC	4800E-P5	2891076

Power over Ethernet (PoE)

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

ℹ️ Web code: #1557

Injectors

The compact stand-alone solution is available in various performance classes of up to 60 watts. In addition to the RJ45 socket, the PoE injectors feature alternative connection technologies for the field cable and integrated surge protection.

Unmanaged Switches

The extended temperature range of the Unmanaged PoE Switches allows for reliable operation in harsh environments. Furthermore, the switches have full gigabit ports and jumbo frames that were developed specifically for the high data requirements of surveillance cameras.

Your advantages

☑ Easy device installation, thanks to reduced cabling effort

☑ Non-proprietary use supported, thanks to standardization in accordance with IEEE 802.3

☑ Fast retrofitting of existing systems, thanks to easy handling

Managed Switches

The Managed PoE Switches offer a high level of flexibility with multiple port constellations, high power budgets of 60 watts per port for the use of PoE-operated high power devices. PoE-specific managed features make it possible to control, plan, and monitor devices from a remote location.

Splitter

The PD 1001 PoE splitter splits data and power locally and therefore enables even non-PoE-capable devices to be installed in remote stations in an easy and inexpensive way.

Product overview PoE modules

Features	Connection method	Temperature range	Power budget	Special features	PoE standard	Designation	Order no.
PoE injector							
	RJ45 / RJ45	0°C … +55°C	2 x 15 W	Electrical isolation in the power supply unit	IEEE 802.3 af	FL PSE 2TX	2891013
		0°C … +60°C	15/30 W	–	IEEE 802.3 af/at (PoE+)	INJ 1000	2703005
			60 W		Prepared for IEEE 802.3 bt (PoE++)	INJ 1010	2703007
		- 40°C … +75°C	15/30 W		IEEE 802.3 af/at (PoE+)	INJ 1000T	2703006
			60 W		Prepared for IEEE 802.3 bt (PoE++)	INJ 1010T	2703008
			15/30 W	Electrical isolation in the power supply unit	IEEE 802.3 af/at (PoE+)	INJ 1100T	2703009
			60 W		Prepared for IEEE 802.3 bt (PoE++)	INJ 1110T	2703010
	RJ45 / IDC		15/30 W	Electrical isolation in the power supply unit, surge protection and shield current diagnostics	IEEE 802.3 af/at (PoE+)	INJ 2102T	2703012
			60 W		Prepared for IEEE 802.3 bt (PoE++)	INJ 2112T	2703014
	RJ45 / Push-In		15/30 W		IEEE 802.3 af/at (PoE+)	INJ 2103T	1004065
			60 W		Prepared for IEEE 802.3 bt (PoE++)	INJ 2113T	1004066
	RJ45 / screw		15/30 W		IEEE 802.3 af/at (PoE+)	INJ 2101T	2703011
			60 W		Prepared for IEEE 802.3 bt (PoE++)	INJ 2111T	2703013

Features	Connection method	Transmission speed	Power budget	Special features	PoE standard	Designation	Order no.
PoE splitter							
Supply voltage: 24 V DC, extended temperature range: -40°C … +70°C							
	RJ45 / RJ45	10/100/1000 Mbps	30 W	–	IEEE 802.3 af/at (PoE+)	FL PD 1001 T GT	2891042
PoE media module							
	2 x RJ45	10/100 Mbps	15 W	–	IEEE 802.3af (PoE)	FL IF 2PSE-F	2832904

Features	Connection method	Transmission speed	Power budget	Special features	PoE standard	Designation	Order no.
Unmanaged PoE Switches							
Supply voltage: 18 … 57 V DC, extended temperature range: -40°C … +75°C							
	8 x M12 POE	10/100/1000 Mbps	30 W per port, max. 200 W	IP 67 18-32 V DC -40°C … + 70°C	IEEE 802.3 af/at (PoE+)	FL SWITCH 1708 M12 POE	2701883
	4 x RJ45 (PoE), 1 x RJ45	10/100 Mbps	30 W per port, max. 120 W	–		FL SWITCH 1001T-4POE	2891064
	2 x RJ45 (PoE), 2 x SFP	10/100/1000 Mbps	30 W per port, max. 60 W	52-57 V DC		FL SWITCH 1000T-2POE-GT-2SFP	1026765
	4 x RJ45 (PoE), 1 x RJ45	10/100/1000 Mbps	30 W per port, max. 120 W	–		FL SWITCH 1001T-4POE-GT	1026937
	4 x RJ45 (PoE), 1 x RJ45, 1 x SFP	10/100/1000 Mbps	30 W per port, max. 120 W	–		FL SWITCH 1001T-4POE-GT-SFP	1026932
	8 x RJ45 (PoE) 2 x SFP	10/100/1000 Mbps	30 W per port, max. 120 W	–		FL SWITCH 1000T-8POE-GT-2SFP	1026929
Managed PoE Switches							
Supply voltage: 52 … 57 V DC, extended temperature range: -40°C … +70°C							
	4 x RJ45 (PoE), 1 x SFP	10/100 Mbps (RJ45) 1000 Mbps (SFP)	60 W per port, max. 180 W	–	IEEE 802.3 af/at (PoE+) Prepared for IEEE 802.3 bt (PoE++)	FL SWITCH 4000T-4POE-SFP	1026924
	8 x RJ45 (PoE), 2 x SFP	10/100 Mbps (RJ45) 1000 Mbps (SFP)	60 W per port, max. 180 W	–		FL SWTICH 4000T-8POE-2SFP	1026923
	8 x RJ45 (PoE), 4 x RJ45 4 x SFP	10/100/1000 Mbps	60 W per port, max. 240 W	–		FL SWITCH 4004T-8POE-4SFP	1026922

Industrial Wireless

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

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

Your advantages

☑ Seamless and inexpensive integration into existing networks, thanks to flexible installation and configuration concepts

☑ Maximum reliability and availability with optimum properties for industrial applications

☑ Versatile use, thanks to Ethernet being used as the common communication standard – even for safety applications

Industrial Bluetooth

The Bluetooth- and WLAN-capable EPA modules combine a reliable wireless module with an integrated special antenna in a robust IP65 housing. This allows you to establish functionally safe communication via PROFIsafe or SafetyBridge Technology. Typical Bluetooth features: the protocol-transparent Ethernet communication and interruption-free parallel operation for WLAN networks.

ℹ Web code: #1558

Industrial WLAN

The new WLAN 1100 and WLAN 2100 wireless modules make it easy to install a fast and stable WLAN network on your machines. Featuring two integrated antennas and extreme robustness, the space-saving wireless modules have been carefully considered down to the last detail for applications in machine building.

The WLAN 5110 Access Point combines maximum reliability, data throughput, and range in a compact metal housing. The central cluster management makes the configuration and maintenance of larger WLAN networks considerably easier.

[i] Web code: #1532

Product overview Industrial Wireless

Features	Function	Frequency band	Data rate	Special features	Designation	Order no.
Ethernet port adapter						
Supply voltage: 9 V DC … 30 V DC, extended temperature range: -40°C … +65°C, IP65						
	Combined WLAN and Bluetooth wireless module	2.4 GHz and 5 GHz	Up to 65 Mbps	Internal antenna	FL EPA 2	1005955
				External antenna	FL EPA 2 RSMA	1005957
	Bluetooth wireless module	–	Up to 3 Mbps	Internal antenna	FL BT EPA 2	1005869
Compact wireless module: WLAN 1100						
Temperature range: 0°C … +60°C, WLAN Access Point and client with integrated antennas, IP54						
	WLAN access point and client	2.4 GHz and 5 GHz	Up to 300 Mbps	–	FL WLAN 1100	2702534
				USA and Canada only	FL WLAN 1101	2702538
Compact and robust wireless module: WLAN 2100						
Extended temperature range: -40°C … +60°C, WLAN Access Point and client with integrated antennas, IP65/66/67/68						
	WLAN access point and client	2.4/5 GHz	Up to 300 Mbps	–	FL WLAN 2100	2702535
				USA and Canada only	FL WLAN 2101	2702540
High-performance wireless module: WLAN 5110						
Extended temperature range: -40°C … +60°C, WLAN Access Point and client with RSMA connection for connecting external antennas, IP20						
	WLAN access point and client	2.4/5 GHz	Up to 300 Mbps	–	FL WLAN 5110	1043193
				USA and Canada only	FL WLAN 5111	1043201

Comparison: WLAN vs. Bluetooth

	Wireless standard	Frequency band	Range for line of sight*	Range for industrial hall*	Topology	Network structure
WLAN	IEEE 802.11	2.4 GHz, 5 GHz	< 1 km	< 100 m	Point-to-point, star, mesh	Mobile, roaming
Bluetooth	IEEE 802.15.1	2.4 GHz	< 250 m	< 100 m	Point-to-point, star (1:7)	Static

* Depends on the antenna and the ambient conditions

Product overview accessories

Features	Function	Frequency band	Data rate	Special features	Designation	Order no.
Control box sets						
	With omnidirectional antennas	–	–		FL RUGGED BOX OMNI-1	2701430
	With omnidirectional antennas and power supply unit	–	–	IP65, with DIN rail, F22 plugs, and screw connections	FL RUGGED BOX OMNI-2	2701439
	With directional antenna	–	–		FL RUGGED BOX DIR-1	2701440
	Without antenna accessories	–	–		FL RUGGED BOX	2701204

Features	Function	Frequency band	Gain	Special features	Connection	Designation	Order no.
Accessories							
	SD card	–	–	–	–	SD FLASH 2GB	2988162
	Omnidirectional antenna		2 dBi		RSMA (male) with 1.5 m cable	RAD-ISM-2400-ANT-OMNI-2-1-RSMA	2701362
	Omnidirectional antenna, vandalism proof	2.4 GHz	3 dBi	Min. P55, -40°C … +70°C, Including mounting bracket		RAD-ISM-2400-ANT-VAN-3-0-RSMA	2701358
	Omnidirectional antenna, salt water resistant		6 dBi		N (female)	RAD-ISM-2400-ANT-OMNI-6-0	2885919
	Directional antenna for panel, salt water resistant	2.4/5 GHz	9 dBi	IP67, -40°C … +70°C, ATEX/IECEx approval	N (female)	ANT-DIR-2459-01	2701186
	Antenna cable	0.3 … 6 GHz	–	2 m length	RSMA (male) > N (male)	RAD-PIG-RSMA/N-2	2903265

Additional accessories can be found on our website:

ℹ️ Web code: #0569

Data rate	Latency	Shortest update time	Coexistence with WLAN	Robustness with regard to failures	Typical application	Network size
Up to 300 Mbps		8 ms with PROFINET	Very good with good planning	Good	Ethernet, PROFINET, EtherNet/IP™	Can be extended freely
Up to 3 Mbps	1–2 ms	32 ms with PROFINET	Very good	Very good	PROFINET, Modbus/TCP	Not extendable

Industrial security

Protect your systems against unauthorized access by people or malware with the mGuard security product range from Phoenix Contact. Use industrial router/firewall solutions and industrial-level virus protection to secure your automation network.

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

[i] Web code: #1270

Protection of machines and production cells

Use mGuards to protect your machines and production cells against unauthorized access – regardless of whether access is from the local network or via the Internet. A wide range of security functions as well as central management software help to easily increase the security level of your production facilities.

High-performance firewall

The center port is a high-performance firewall that can also be used as a central peer for up to 3000 VPN tunnels.

Your advantages

☑ Can be integrated into a defense-in-depth concept in accordance with IEC 62443

☑ Can be retrofitted easily, thanks to stealth mode

☑ Central management software for global management of several thousand field devices

☑ Extremely secure, thanks to active CVE (Common Vulnerabilities and Exposures) management process

Product overview industrial security

Features	Port configuration	Port speed	VPN	Special features	Designation MGUARD…	Order no.
Basic security router for the DIN rail: mGuard RS2000						
1:1-NAT, NAT, port forwarding, standard routing, configurable firewall						
	2 x RJ45	10/100 Mbps	–	Improved EMC properties	RS2000 TX/TX-B	2702139
			Up to 2 parallel tunnels	–	RS2000 TX/TX VPN	2700642
				3G mobile phone interface	RS2000 3G VPN	2903441
				4G mobile phone interface	RS2000 4G VPN	2903588
	6 x RJ45			Integrated 5-port switch (unmanaged)	RS2005 TX VPN	2701875
High-performance security router for the DIN rail: mGuard RS4000						
Extended firewall functional scope (Deep Packet Inspection, user and conditional firewall, DMZ etc.), can be extended with licenses						
	2 x RJ45	10/100 Mbps	Optional	–	RS4000 TX/TX	2700634
			Up to 10 parallel tunnels (up to 250 as an option)	–	RS4000 TX/TX VPN	2200515
				3G mobile phone interface	RS4000 3G VPN	2903440
				4G mobile phone interface	RS4000 4G VPN	2903586
				Maritime approvals	RS4000 TX/TX VPN-M	2702465
			250 VPN tunnels	ATEX and IECEx, extended temperature range and scope of functions	RS4000 TX/TX-P	2702259
	6 x RJ45		Optional	Integrated 4-port Managed Switch and DMZ port, extended temperature range	RS4004 TX/DTX	2701876
			Up to 10 parallel tunnels (up to 250 as an option)		RS4004 TX/DTX VPN	2701877
	2 x RJ45 2 x SFP	10/100/1000 Mbps	–	–	GT/GT	2700197
			Up to 10 parallel tunnels (up to 250 as an option)	–	GT/GT VPN	2700198
Security router in PCI and PCIE format: mGuard PCI						
Extended firewall functional scope (Deep Packet Inspection, user and conditional firewall, DMZ etc.), can be extended with licenses						
	2 x RJ45	10/100 Mbps	Up to 10 parallel tunnels (up to 250 as an option)	1:1-NAT, NAT, port forwarding, standard routing, stealth mode, can be extended with licenses	PCI4000 VPN	2701275
			Up to 10 parallel tunnels (up to 250 as an option)		PCIE4000 VPN	2701278

Features	Port configuration	Port speed	VPN	Special features	Designation MGUARD…	Order no.
Security routers for mobile applications: mGuard smart and mGuard Secure Client						
Router with firewall functions						
	2 x RJ45	10/100 Mbps	None, optionally up to 250	USB, stealth mode, can be extended with licenses	SMART2	2700640
			Up to 10 parallel tunnels (up to 250 as an option)		SMART2 VPN	2700639
	–	–	1 tunnel	Software for installation on the computer	SECURE VPN CLIENT LIC	2702579
Security routers for desktop applications: mGuard delta						
Router with SD card slot, NAT/1:1 NAT and firewall with full scope of functions for maximum security						
	2 x RJ45	10/100 Mbps	None, optionally up to 250	Can be extended with licenses	Desktop device	2700967
			Up to 10 parallel tunnels (up to 250 as an option)			2700968
Security router for rack mounting: mGuard centerport						
High-performance firewall, central peer for up to 3000 VPN tunnels						
	4 x RJ45	10/100/1000 Mbps	None, optionally up to 3,000	Can be extended with licenses	CENTERPORT	2702547
			Up to 1,000 parallel tunnels, (up to 3,000 as an option)		CENTERPORT VPN-1000	2702820

Licenses for functional extension of mGuard RS4000		
Function description	**Designation**	**Order no.**
License for lifetime software update of mGuard field devices	LIC LIFETIME FW	2700184
License for lifetime software update of FL MGUARD CENTERPORT	LIC LFS CENTER	2702552
License for up to 10 additional VPN online connections	LIC VPN-10	2700194
License for up to 100 additional VPN online connections	LIC VPN-100	2702546
License for up to 250 additional VPN online connections	LIC VPN-250	2700193
License for activating the firewall/router redundancy function on an mGuard device pair	LIC FW RD	2701356
License for activating the firewall/router and VPN redundancy function on an mGuard device pair	LIC FW/VPN RD	2702193
License for activating the OPC inspector function on an mGuard	LIC OPC INSP	2702191
License for activating the Modbus inspector function on an mGuard	LIC MODBUS INSPECTOR	2702980
License for activating CIFS Integrity Monitoring (CIM) on an mGuard	LIC CIM	2701083

RSPSupply - 1-888-532-2706 - https://www.RSPSupply.com
See the product details here

Remote communication

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

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

[i] Web code: #0499

Remote maintenance via the public telephone network

DSL broadband routers and modems enable the high-speed connection of industrial Ethernet and RS-232 devices using proven ADSL transmission technology. Globally recognized standards and an extensive network expansion ensure availability around the world.

Remote maintenance via the Internet and mobile network

TC Cloud Clients and mGuards enable secure connection to the mGuard Secure Cloud. Communication is established via Internet or mobile network. While the TC Cloud Client can only be connected to the mGuard Secure Cloud, the mGuards also offer peer-independent VPN tunnels, NAT, and a firewall.

Remote maintenance: Global, direct access to controllers and Ethernet networks
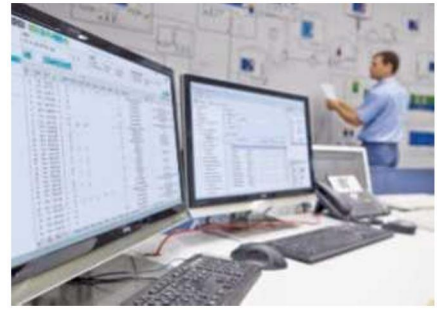
Remote control: Secure and continuous transmission of process data to the control center

Remote control via the mobile network

The TC ROUTER mobile routers from Phoenix Contact enable powerful data connections via 4G LTE networks with up to 150 Mbps. Even in harsh and demanding environments, they create a mobile broadband connection for highly flexible site networking wherever a cable-based Internet connection is not available.

Remote control via in-house cables

Connect extensive IP networks of up to 20 kilometers easily via existing two-wire cables with the Ethernet extender system. The innovative combination of unmanaged and managed extenders enables particularly cost-effective networking and central diagnostics of all devices and paths via IP.

Product overview remote maintenance

Features	Function	VPN tunnel	Firewall	Transmission medium	Special features	Designation	Order no.
Remote maintenance via the public telephone network							
	Modem	–	–	ADSL, Annex A/B/J	–	TC DSL ROUTER X400 A/B	2902709
	Router	●	●	ADSL, Annex A/B/J	Serial device server	TC DSL ROUTER X500 A/B	2902710
Remote maintenance via the mobile network: mGuard and TC Cloud Client							
	Cloud client	1 tunnel to mGuard Secure Cloud	–	4G LTE	Device configuration in mGuard Secure Cloud, simplified web interface	TC CLOUD CLIENT 1002-4G	2702886
			–	4G LTE Verizon, US		TC CLOUD CLIENT 1002-4G VZW	2702887
			–	4G LTE AT&T, US		TC CLOUD CLIENT 1002-4G ATT	2702888
	mGuard VPN router with integrated firewall	Up to 2 parallel tunnels	●	3G	2 SIM card slots	TC MGUARD RS2000 3G VPN	2903441
			●	4G LTE		TC MGUARD RS2000 4G VPN	2903588
		Up to 10 (250) parallel tunnels	Advanced	3G	Integrated WAN interface, expandable functional scope, 2 SIM card slots	TC MGUARD RS4000 3G VPN	2903440
			Advanced	4G LTE		TC MGUARD RS4000 4G VPN	2903586
Remote maintenance via the Internet: mGuard and TC Cloud Client							
	Cloud client	1 tunnel to mGuard Secure Cloud	–		–	TC CLOUD CLIENT 1002-TX/TX	2702885
	mGuard VPN router with integrated firewall	Up to 2 parallel tunnels	●		–	FL MGUARD RS2000 TX/TX VPN	2700642
			●		Integrated Unmanaged Switch	FL MGUARD RS2005 TX VPN	2701875
		Up to 10 (250) parallel tunnels	Advanced	Operator network	–	FL MGUARD RS4000 TX/TX VPN	2200515
			Advanced		Integrated Managed Switch	FL MGUARD RS4004 TX/DTX VPN	2701877
			Advanced		Flat design, gigabit-compatible	FL MGUARD GT/GT VPN	2700198
			●		PCI format	FL MGUARD PCI4000 VPN	2701275
			●		PCIE format	FL MGUARD PCIE4000 VPN	2701278
			●		Portable, software-independent	FL MGUARD SMART2 VPN	2700639
			●		Desktop device	FL MGUARD DELTA TX/TX VPN	2700968
		Up to 3000	●		19" design	FL MGUARD CENTERPORT	2702547
Remote maintenance via the Internet: mGuard Secure VPN Client							
Secure VPN connection for desktop, laptop and tablet computer		1 tunnel	–	Internet	For Windows 10, 8.x, and 7	MGUARD SECURE VPN CLIENT LIC	2702579

Product overview remote control

Features	Function	VPN tunnel	Firewall	Network, data rate	Special features	Designation TC ROUTER…	Order no.
Remote control via the mobile network: TC Router							
Temperature range: -40°C … +70°C, data rate up to 150 Mbps							
	High-speed mobile routers	–	●	3G	European version	2002T-3G	2702531
		–	●	4G LTE	European version	2002T-4G	2702530
		●	●	3G	European version	3002T-3G	2702529
		●	●	4G LTE	European version	3002T-4G	2702528
		●	●		For Verizon Wireless	3002T-4G VZW	2702532
		●	●		For AT&T	3002T-4G ATT	2702533

Features	Managed/ unmanaged	Ports	Local diagnostics	Topologies	Surge protection	Remote diagnostics	Designation TC EXTENDER…	Order no.
Remote control via in-house cables: Ethernet extender								
Any 2-wire cable up to 20 km, Plug and Play startup								
	Managed	2 x SHDSL 4x Ethernet	Display	Point-to-point, line, ring	SHDSL, integrated, can be replaced	Remote connection via IP	6004 ETH-2S	2702255
		1 x SHDSL 1 x Ethernet		Point-to-point			4001 ETH-1S	2702253
	Unmanaged	2 x SHDSL 1x Ethernet	LED	Point-to-point, line, ring	–	Stationary connection via USB	2001 ETH-1S	2702409
	Unmanaged	12 x SHDSL 6 x Ethernet			SHDSL, integrated, cannot be replaced		TC ETH EXTENDER S19	2702077

mGuard Secure Cloud

The TC Cloud Client and mGuard security appliances connect your machines to the mGuard Secure Cloud securely over the Internet.
The cloud connects service employees with their remote maintenance targets and offers a turnkey complete VPN solution for operators, machine builders and system manufacturers. Service personnel connect quickly and securely to machines, industrial PCs, and controllers via a simple web interface. In addition, secure remote maintenance can be performed at any location and any time without requiring specialist IT knowledge.
The mGuard Secure Cloud is available in EU countries as well as Norway and Switzerland. Different tariff conditions apply in North America.

RSPSupply - 1-888-532-2706 - https://www.RSPSupply.com
See the product details here

Protocol converters and interface converters

Device servers and gateways enable easy integration of legacy serial devices and buses into modern Ethernet networks. The most common industrial data transmission protocols are supported, with various combinations of serial transmission.

Depending on the application, choose between simple device servers for interface conversion or gateways and proxies with integrated protocol conversion.

Web code: #1559

Converting serial interfaces

You can integrate any serial protocols into your Ethernet network using the serial device servers and gateways. Serial data can either be transmitted transparently over Ethernet or converted to Modbus/TCP, PROFINET or EtherNet/IP™ using the gateways.

Your advantages

☑ Universal use in various applications

☑ Network integration of serial devices via virtual COM ports

☑ Cable replacement in serial point-to-point connections

☑ Integration of serial devices in modern Ethernet protocols

Converting HART protocol

The new HART gateways convert the digital HART protocol into Ethernet protocols, HART-IP, Modbus/TCP or PROFINET. This means you can easily parameterize and monitor HART field devices via Ethernet networks. Thanks to the modularity of the HART to Ethernet gateway, you can connect up to 40 HART devices.

Converting PROFIBUS and INTERBUS protocols

Use the gateways and proxies to smoothly integrate PROFIBUS and INTERBUS applications into a PROFINET network. Our gateways for PROFIsafe also enable controller-independent and comprehensive integration of functional safety.

PHOENIX CONTACT   **59**

Product overview protocol and interface converters

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

Secure data transmission

256-bit AES encryption for secure transfer of data over the Ethernet network. This prevents access from third parties.

Secure user authentication

Thanks to secure user authentication, access to the device configuration is enabled only for authorized users.

Native COM port driver

Thanks to virtual COM ports on your computer, you can transfer the available, non-Ethernet-capable user software for your serial end devices via Ethernet.

	Protocol	Ethernet interface	Serial interface (RS-232/422/485)	Special features	Designation	Order no.
Conversion of serial protocols to Ethernet protocols: Gateways						
		1 x RJ45	1 x D-SUB 9	ATEX, UL (Class I, Division 2)	FL COMSERVER UNI	2313452
					FL COMSERVER UNI-T	2904817
	Modbus/RTU to Modbus/TCP	1 x RJ45	1 x D-SUB 9	ATEX, IECEx, UL (Class I, Division 2)	GW MODBUS TCP/ RTU 1E/1DB9	2702764
			2 x D-SUB 9		GW MODBUS TCP/ RTU 1E/2DB9	2702765
		2 x RJ45			GW MODBUS TCP/ RTU 2E/2DB9	2702766
			4 x D-SUB 9		GW MODBUS TCP/ RTU 2E/4DB9	2702767
	RAW, ASCII to Modbus/TCP	1 x RJ45	1 x D-SUB 9		GW MODBUS TCP/ ASCII 1E/1DB9	2702768
			2 x D-SUB 9		GW MODBUS TCP/ ASCII 1E/2DB9	2702769
		2 x RJ45			GW MODBUS TCP/ ASCII 2E/2DB9	2702770
			4 x D-SUB 9		GW MODBUS TCP/ ASCII 2E/4DB9	2702771
	RAW, ASCII to PROFINET	1 x RJ45	1 x D-SUB 9		GW PN/ASCII 1E/1DB9	1021080
			2 x D-SUB 9		GW PN/ASCII 1E/2DB9	1021058
		2 x RJ45			GW PN/ASCII 2E/2DB9	1021056
			4 x D-SUB 9		GW PN/ASCII 2E/4DB9	1020882
	RAW, ASCII to EtherNet/IP™	1 x RJ45	1 x D-SUB 9		GW EIP/ASCII 1E/1DB9	2702772
			2 x D-SUB 9		GW EIP/ASCII 1E/2DB9	2702773
		2 x RJ45			GW EIP/ASCII 2E/2DB9	2702774
			4 x D-SUB 9		GW EIP/ASCII 2E/4DB9	2702776
	HART to Modbus/TCP, PROFINET, HART IP, FDT/DTM	1 x RJ45	–	Head station, supports five extension modules	GW PL ETH/ BASIC-BUS	2702321
		1 x RJ45	–		GW PL ETH/ UNI-BUS	2702233
		–	HART, 4-channel	Extension module	GW PL HART4-BUS	2702234
		–		Extension module with 250 Ω internal input resistance	GW PL HART4-R-BUS	2702879
			4-channel, digital inputs and outputs	Extension module	GW PL DIO4-BUS	2702237
		–	HART, 8-channel	Extension module with analog loop supply	GW PL HART8+AI-BUS	2702236
		–		Extension module	GW PL HART8-BUS	2702235
		–		Extension module with 250 Ω internal input resistance	GW PL HART8-R-BUS	2702880
	PROFIBUS to PROFINET	4 x RJ45 10/100 Mbps	1 x D-SUB 9 up to 12 Mbps	Conformance Class B	FL NP PND- 4TX PB	2985071
	INTERBUS to PROFINET	4 x RJ45 10/100 Mbps	1 x F-SMA 500 kbps / 2 Mbps (can be selected)		FL NP PND- 4TX IB-LK	2985929
	INTERBUS to PROFINET	4 x RJ45 10/100 Mbps	1 x D-SUB 9 500 kbps / 2 Mbps (can be selected)		FL NP PND- 4TX IB	2985974

Software

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

Benefit from easy configuration and setup of your network components with FL Network Manager and mGuard Device Manager software. With SNMP/OPC software you can ensure reliable communication between network management tools, automation hardware, and visualization software.

[i] Web code: #1560
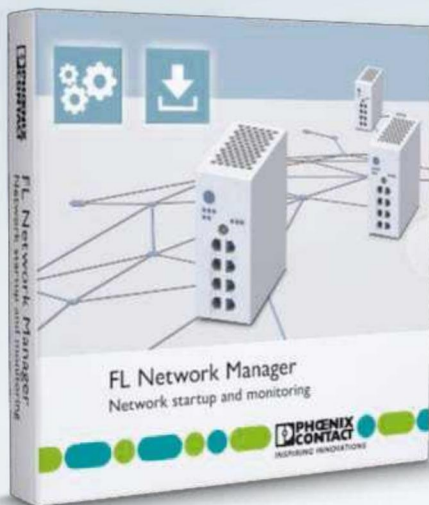
Your advantages

☑ Fast diagnostics through continuous query of the network devices

☑ Reduction of standstill times and downtimes, thanks to a short response time in the network

☑ Direct access to the individual web interfaces of the devices

☑ Error detection even for temporary errors in the network

Product overview software

	Description	Language	Basic	Order no.
Network configuration and startup: FL Network Manager				
	Start up your network quickly and easily with the FL Network Manager software. The software provides support in scanning an available network, in IP assignment and device configuration, in handling configuration data and in a firmware update.	English	SNMP	2702889
mGuard configuration and startup: mGuard Device Manager				
	The mGuard Device Manager provides support during the configuration, roll-out, and management of all mGuard devices. Centrally create and manage all safety-related mGuard settings and then transmit them to the desired devices.	English	–	2981974
Consistent communication with OPC and SNMP protocols: SNMP OPC server				
	For reliable communication between network management tools, automation hardware, and visualization software, the SNMP and OPC protocol types must be converted. The FL SNMP OPC server ensures data exchange between OPC-based visualization software and SNMP automation components.	German, English	SNMP	2701139
	An additional license for 100 more devices for the SNMP-OPC server			2701138

Network Manager

The use of Managed Switches or WLAN components always involves configuration effort. The Network Manager makes it easier to deal with an increasing number of manageable devices in a network, as network components can be monitored, configured and kept up to date with a tool. To also satisfy industrial Ethernet protocols EtherNet/IP™ and PROFINET, IP assignment is integrated via DHCP and DCP.
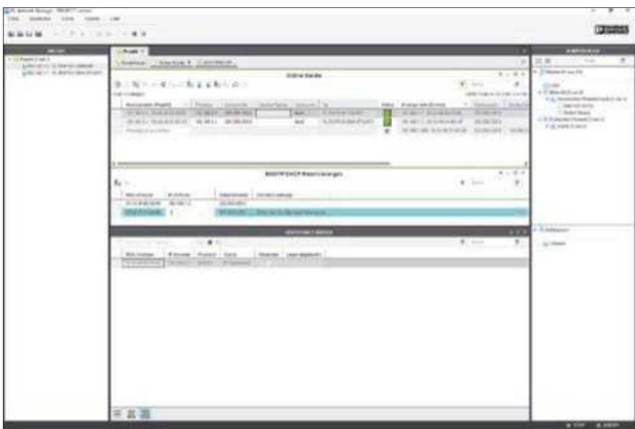
Startup support for mGuard Device Manager

The mGuard Device Manager is ideal for rolling out and managing large groups of mGuards that are configured identically. Widely distributed installations with thousands of systems can be implemented quickly and efficiently.
For easy initial startup of the software, support by means of remote access by a Phoenix Contact employee is included.

Surge protection

Uninterruptible production calls for the reliable transmission of all relevant data and signals. In addition to unauthorized access and malware, surge voltages caused by lightning strikes or switching operations also present a danger to your network. In particular where cabling extends beyond a building, it is primarily the devices that are connected to an Ethernet cable that are at risk.

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

ⓘ Web code: #0145

Your advantages

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

Product overview surge protection

Description	IEC test classif. EN type	Maximum continuous voltage	Nominal discharge current	Features	Designation	Order no.
DATATRAB adapter/DIN rail module						
Ethernet (10GBase-T) and PoE, token ring, CDDI, in accordance with Class Ea/Cat.6						
	B2/C1/C2/C3/D1	3.3 V DC	100 A/2 kA	–	DT-LAN-CAT.6+	2881007
DATATRAB 19" versions						
Ethernet (1000Base-T), token ring, CDDI, in accordance with Class D/Cat.5e, EN50173						
	C1/C2/C3	6 V DC	350 A/350 A	24 ports	D-LAN-19"-24	2838791
				16 ports	D-LAN-19"-16	2880147
				8 ports	D-LAN-19"-8	2880163
PLUGTRAB type 3 protective device						
Type 3 surge protection for 1-phase power supplies						
	III/T3	230 V AC	3 kA/3 kA	Connector, base element	PLT-SEC-T3-230-FM	2905229
		120 V AC			PLT-SEC-T3-120-FM	2905228

Microelectronics are at particular risk

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

The perfect fit

The DATATRAB series can be used as an adapter or DIN rail module.

Installation technology

In addition to the permissible active components, a high-performance network requires a robust installation. The Phoenix Contact installation technology offers you all required components for implementing industrial networks.

ⓘ Web code: #1561

Injectors

The compact stand-alone solution is available in various performance classes of up to 60 watts. In addition to the RJ45 socket, the PoE injectors feature alternative connection technologies for the field cable and integrated surge protection.

Patch panels

Ethernet patch panels allow quick and easy connection between your field and control cabinet cabling. In the covered wiring space, the IDC, Push-in or screw connection simplifies installation of the field cable. Optionally, these interface modules are also available with surge protection and shield current monitoring.

SFP modules

SFP (small form-factor pluggable) modules enable you to flexibly use the SFP ports of your Ethernet Switches. Whether you require single-mode or multimode transmission, Fast Ethernet or Gigabit, Phoenix Contact offers the right SFP modules for your application.
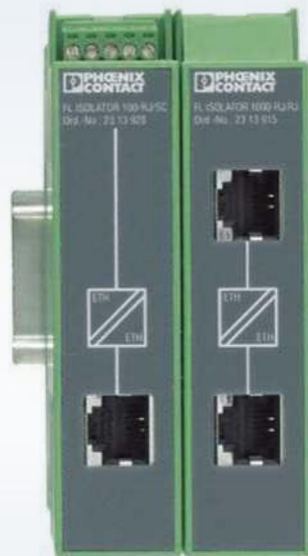
Network isolators

The FL ISOLATOR electrically isolates copper-based Ethernet devices with transmission speeds of up to 1 Gbps. The Ethernet isolator is simply installed before the network device to be protected. As such, high-voltage ranges in power distributions up to 4 kV can be disconnected securely from the data network and equipotential bonding currents prevented.

PRP redundancy modules

The PRP redundancy modules enable parallel network redundancy without switching time in case of failure and ensure high availability for your network. They are suitable for use under the harshest electromagnetic, electrostatic, and climatic ambient conditions in accordance with IEC 61850-3/IEEE 1613.

Product overview installation technology

	Connection method	Temperature range	Power budget	Special features	PoE standard	Designation	Order no.
PoE injector							
		0°C … +55°C	2 x 15 W	Electrical isolation in the power supply unit	IEEE 802.3 af	FL PSE 2TX	2891013
		0°C … +60°C	15/30 W	–	IEEE 802.3 af/at (PoE+)	INJ 1000	2703005
			60 W		Prepared for PoE bt (PoE ++)	INJ 1010	2703007
	RJ45 / RJ45		15/30 W		IEEE 802.3 af/at (PoE+)	INJ 1000-T	2703006
			60 W		Prepared for PoE bt (PoE ++)	INJ 1010-T	2703008
			15/30 W	Electrical isolation in the power supply unit	IEEE 802.3 af/at (PoE+)	INJ 1100-T	2703009
			60 W		Prepared for PoE bt (PoE ++)	INJ 1110-T	2703010
	RJ45 / IDC	-40°C … +75°C	15/30 W		IEEE 802.3 af/at (PoE+)	INJ 2102-T	2703012
			60 W		Prepared for PoE bt (PoE ++)	INJ 2112-T	2703014
	RJ45 / Push-in		15/30 W	Electrical isolation in the power supply unit, surge protection and shield current diagnostics	IEEE 802.3 af/at (PoE+)	INJ 2103-T	1004065
			60 W		Prepared for PoE bt (PoE ++)	INJ 2113-T	1004066
	RJ45 / screw		15/30 W		IEEE 802.3 af/at (PoE+)	INJ 2101-T	2703011
			60 W		Prepared for PoE bt (PoE ++)	INJ 2111-T	2703013

Electrical isolation

The high-quality isolation protects your installation from short circuits on the supply side.

Wide range input

The injectors feature a redundant feed-in, 18 … 57 V DC are possible.

Surge protection

The integrated surge protection reliable protects the connected network.

	Connection method	Description	Shielding	Cable shield connection	Surge protection	Designation	Order no.
Patch panels							
	RJ45/RJ45	Standard Ethernet patch panel, 8-pos., 10/100/1000 Mbps	Right on the DIN rail	Using an RJ45 socket	No	PP-RJ-RJ	2703015
	RJ45/screw			Toolless using shield contact spring		PP-RJ-SC	2703016
	RJ45/Push-In					PP-RJ-SCC	2703018
	RJ45/IDC					PP-RJ-IDC	2703019
	RJ45/RJ45	Function variant Ethernet patch panels 8-pos., 10/100/1000 Mbps With surge protection and shield current diagnostics		Using an RJ45 socket	Integrated	PP-RJ-RJ-F	2703020
	RJ45/screw			Toolless using shield contact spring		PP-RJ-SC-F	2703021
	RJ45/Push-In					PP-RJ-SCC-F	2703022
	RJ45/IDC					PP-RJ-IDC-F	2703023
	RJ45/screw	4-pos., 10/100 Mbps	Directly on the DIN rail	Clamp with screws	No	FL CAT5 TERMINAL BOX	2744610
	RJ45/screw	8-pos., 10/100/1000 Mbps	Either directly on DIN rail or via RC combination			FL-PP-RJ45-SC	2901643
	Spring-cage connection					FL-PP-RJ45-SCC	2901642
	LSA connection					FL-PP-RJ45-LSA	2901645
	RJ45/RJ45			Using an RJ45 socket		FL-PP-RJ45/RJ45	2901646
	RJ45/RJ45	Extended temperature range -40°C … +85°C, narrow overall width	Continuous shield			FL-PP-RJ45/RJ45-B	2904933
	Spring-cage connection	Cable sharing module with cable outlet facing the front	Either directly on DIN rail or via RC combination	Clamp with screws		FL-PP-RJ45-SCC/SC041	2903532
	Spring-cage connection	Cable sharing module with cable outlet facing upwards				FL-PP-RJ45-SCC/SC045	2904577
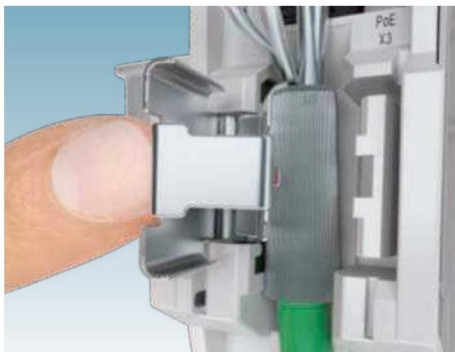
Toolless shield connection

Connect the cable shielding to the DIN rail without tools – with strain relief assured at the same time.

Shield current diagnostics

The reliable display of hazardous shield currents increases the safety of your installation.

Quick and easy installation

Installation takes 60% less time, thanks to patented cable connection technology.

Product overview installation technology

	Electrical isolation	Approvals	Connection technology	Transmission speed	Features	FL ISOLATOR designation	Order no.
Ethernet isolator							
	Up to 4 kV	EN 50155 - rolling stock, EN 50121 - rail	M12 / M12 D-coded	10/100 Mbps	Wall mounting	100-M12	2902985
	–	–	–	–	Adapter for DIN rail mounting	FL EPA RMS	2701133
	Up to 4 kV	EN 50155 - rolling stock EN 50121 - rail	RJ45 / RJ45	10/100/1000 Mbps	–	1000-RJ/RJ	2313915
				10/100 Mbps	–	100-RJ/RJ	2313931
	Up to 4 kV	EN 50155 - rolling stock EN 50121 - rail	RJ45/ screw terminal block	10/100 Mbps	–	100-RJ/SC	2313928
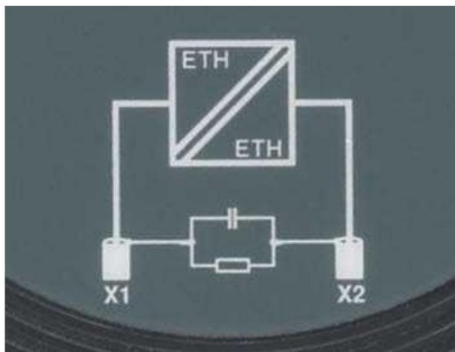
Protect the network device

Thanks to the high-quality isolation for up to 4 kV, you can protect your Ethernet devices and interfaces and increase the noise immunity.

Flexible mounting

Available either as a DIN rail module with RJ45 connection or for wall mounting with an M12 connection.

Permitted for railway applications

Thanks to vibration-resistant M12 connection technology, the railway requirements are fulfilled in accordance with EN 50155 and EN 50121.

	Port	Transmission speed	Transmission length	Wavelength	Special features	Designation FL SFP…	Order no.
Accessories: SFP modules							
	LC MM	100 Mbps	2 km	1310 nm	–	FX	2891081
	LC SM		40 km		–	FX SM	2891082
	LC SM (WDM)		20 km	1310/1550 nm	WDM module A	FE WDM20-A	2702437
				1550/1310 nm	WDM module B	FE WDM20-B	2702438
				1310/1550 nm, 1550/1310 nm	WDM module A and B	FE WDM20-SET	2702439
	LC MM	1000 Mbps	1 km	850 nm	–	SX	2891754
			2 km	1310 nm	–	SX2	2702397
	LC SM		10 km		–	LX10-B	1025401
			30 km		–	LX	2891767
			80 km	1550 nm	Long haul	RS	2989912
	LC SM (WDM)		10 km	1310/1550 nm	WDM module A	WDM10-A	2702440
				1550/1310 nm	WDM module B	WDM10-B	2702441
				1310/1550 nm, 1550/1310 nm	WDM module A and B	WDM10-SET	2702442
	RJ45		100 m	–	–	GT	2989420

	Function	Port configuration	Voltage range	Designation	Order no.
PRP redundancy modules in accordance with IEC 62439					
	PRP redundancy module	2 x RJ45 as redundancy ports 1 x RJ45 for end device	24 … 48 V DC	FL RED 2003E PRP	2701863
		2 x LC MM as redundancy ports 1 x RJ45 for end device		FL RED 2001E PRP 2LC	2701864

Maximum availability

PRP redundancy modules enable parallel network redundancy without switching time to ensure high network availability.

Ideal for the energy industry

The modules can be used in accordance with IEC 61850-3 and IEEE 1613 under the harshest ambient conditions.

No configuration required

Easy setup, thanks to color coding of the device ports and the assigned diagnostic LEDs.

Copper-based data cabling for networks and fieldbuses

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

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

i Web code: #0297

Fast assembly

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

Wide range of plugs

Wide range of connectors from RJ45 to USB, D-SUB to M12.

Flexible device connection

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

Your advantages

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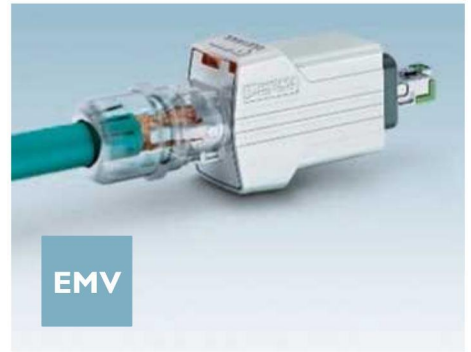☑ IDC, Push-in or pierce connection
☑ 360° shielding concepts
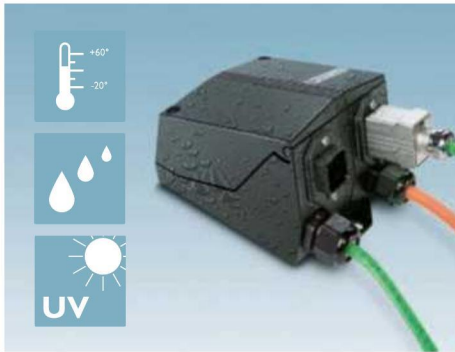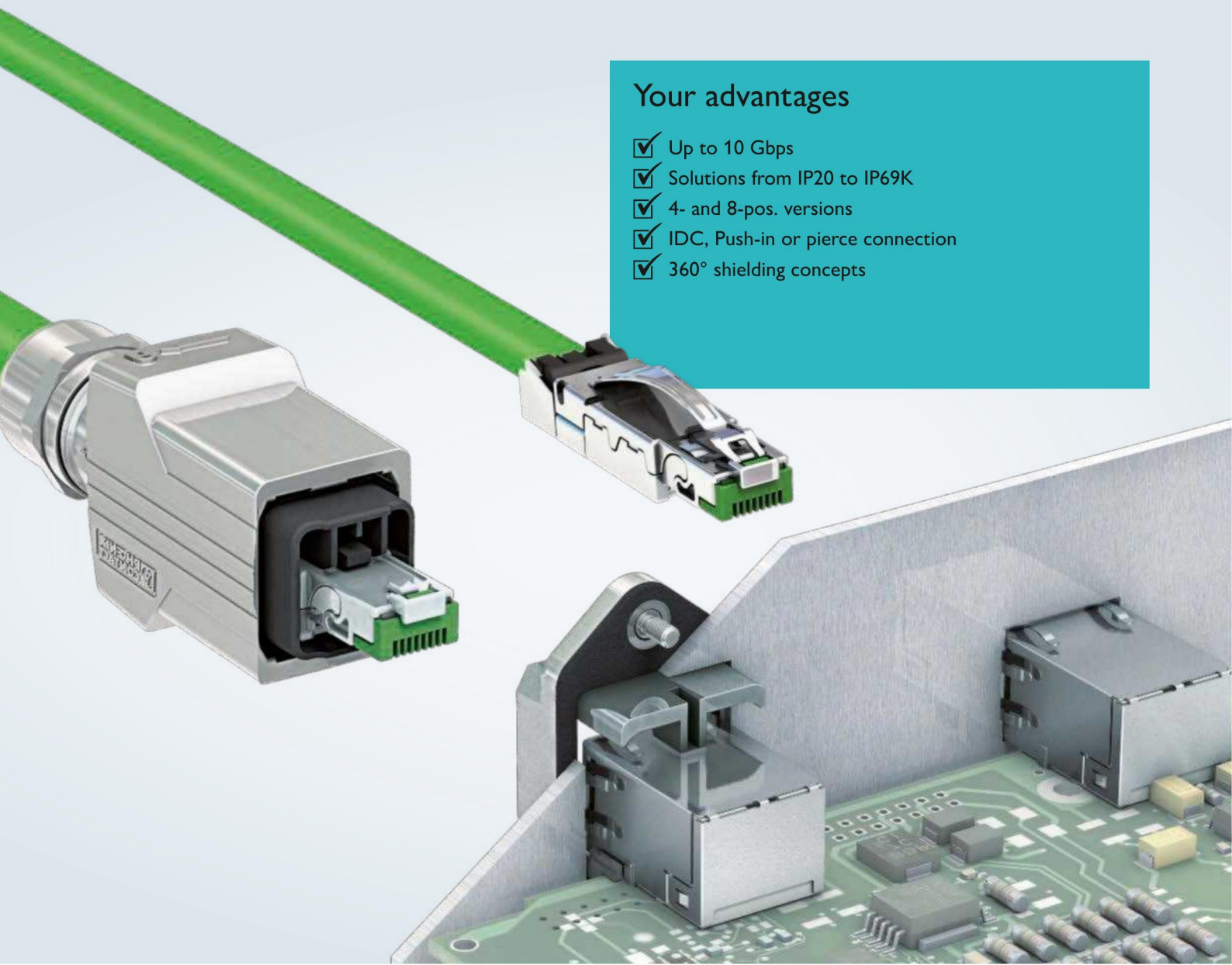
Reliable protection

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

Fast data transmission

Fast data transmission, thanks to data rates up to 10 Gbps and components that meet the CAT6$_A$ standard.

Special shielding concepts

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

RJ45, connectors and sockets, IP20

	Cable outlet	Ethernet	PROFINET	Material	AWG	Connection method	Data rate	Order no.
Connectors								
	Straight	●	–	Plastic, gray	24 … 27	Crimp connection	Up to 1 Gbps CAT5	1414382*
		●	–				Up to 10 Gbps CAT6$_A$	1414395*
		●	–	Plastic, green			Up to 1 Gbps CAT5	1414400*
		●	–				Up to 10 Gbps CAT6$_A$	1414402*
		●	–	Plastic, black	24 …26	IDC fast connection	Up to 10 Gbps CAT6$_A$	1419001
		●	–	Plastic, gray	23 …26		Up to 1 Gbps CAT5	1656725
		●	–	Plastic, black				1658008
		–	●	Plastic, gray	22		Up to 100 Mbps CAT5	1658435
		●	–	Zinc die-cast	26 … 24		Up to 1 Gbps CAT5	1421607
		●	●		23 … 22			1421126
	Bottom	●	–		26 … 24			1421877
		●	●		23 … 22			1421128
	Top	●	–		26 … 24			1421876
		●	●		23 … 22			1421127
Panel mounting frames								
	–	●	●	Plastic, gray	–	Square panel cutout	–	1689433
Socket inserts								
	Straight	●	●	Metal	26 … 22	Cable module	Up to 10 Gbps CAT6$_A$	1419021
	Straight	●	●		–	Coupler module	Up to 1 Gbps CAT5	1689064
	Straight	●	●		–		Up to 1 Gbps CAT6	1653155

* Tool 1653265 required

RJ45, distributors and modules, IP20

	Mounting type	Specification	Order no.
Modular distribution panel			
	19" mounting	Mounting frame, black	1407986
		Mounting frame, gray	1409140
		RJ45 module, 6 x RJ45 to 6 x RJ45, CAT6	1407995
		Dummy module for 19" mounting frame	1407988
		Patch bay with plastic brackets	1407994
		Patch bay with metal brackets, gray	1409283
Patch panel			
	19" mounting	Patch panel for Freenet modules 16 installation slots, unequipped	1652994
		Patch panel for socket inserts, adapter-free, 24 installation slots, unequipped, gray	1422978
		Patch panel for socket inserts, adapter-free, 24 installation slots, unequipped, black	1422979
	DIN rail mounting	Housing that integrates RJ45 and FO module inserts	1041740
Terminal box for Freenet modules			
	Surface mounting	Unequipped for 2 modules	1653003
		Unequipped for 6 modules	1653029
	Flush mounting	Unequipped for 2 modules	1653016
Socket inserts			
	Adapter-free	Cable module, up to 10 Gbps CAT6$_A$	1417274
	Freenet system	Cable module, up to 10 Gbps CAT6$_A$	1418984
	Freenet system	Cable module, up to 1 Gbps CAT5	1652936
	Freenet system	Coupler module up to 1 Gbps, CAT6	1419022

Power, push-pull locking (V14), IP65/67

	Material	Connection method	AWG	Specification	Order no.
Connectors					
	Zinc die-cast	Spring-cage connection	18 … 13	Cable diameter 6.5 mm … 9 mm	1421785
				Cable diameter 9 mm … 13 mm	1421783
Panel mounting frames					
	–	Spring-cage connection	18 … 13	Fixed coding	1405248
				Variable coding	1409036
				Fixed coding	1608249
				Variable coding	1408235
		For PCB modules		Unequipped	1608087
				Solder connection, angled	1657915
				Solder connection, straight	1609565
Y distributors					
	Metal housing	2 x push-pull / 1 x push-pull	–	5 x 2.5 mm² / 0.2 m cable length	1404799
		2 x push-pull 1 x 7/8" connector			1404812
H distributors					
	Metal housing	2 x push-pull / 2 x push-pull	–	–	1405387
Multi-ports					
	Aluminum die-cast	1 x power	18 … 13	–	1403681
		1 x power / 1 x power			1403684
		1 x power / 1 x RJ45	18 … 13 / 26 … 22		1403682
		2 x power / 2 x RJ45			1406395
		1 x power / 1 x SC-RJ	18 … 13		1404321
Terminal outlets					
	–	1 x power / 1 x RJ45	18 … 13 / 24 … 22	–	1404333
		1 x power / 1 x SC-RJ	18 … 13		1404346

* Tool 1653265 required

RJ45, push-pull locking (V14), IP65/67

	Cable outlet	Material	AWG	Connection method	Data rate	Specification	Order no.
Connectors							
	Straight	Zinc die-cast	26 … 24	IDC fast connection	Up to 1 Gbps CAT5	Push-pull (Version 14)	1422661
			23 … 22				1422664
	Angled bottom		26 … 24				1422662
			23 … 22				1422665
	Angled top		26 … 24				1422663
			23 … 22				1422667
	Straight		26 … 24				1403367
			26 … 24	Crimp connection	Up to 10 Gbps $CAT6_A$		1422108*
			23 … 22	IDC fast connection	Up to 100 Mbps CAT5		1403366
Panel mounting frames							
	Straight	Zinc die-cast	26 … 22	Square panel cutout	Assembled, $CAT6_A$, socket insert, cable connection		1413961
			–		Assembled, $CAT6_A$, socket insert, coupler module		1413962
	–		–		Unequipped, for PCB modules		1413963
	–		–	Round panel cutout	Unequipped, for Freenet modules		1405222
Socket inserts							
	Straight	Zinc die-cast	–	Cable module	Up to 1 Gbps CAT5	Freenet	1652936
			–		Up to 10 Gbps $CAT6_A$		1418984
			–	Coupler module	Up to 1 Gbps CAT6		1419022
	Angled		–	PCB module	Up to 10 Gbps $CAT6_A$	–	1420401
Couplings							
	Straight	Aluminum die-cast	–	1 x RJ45, 1 x RJ45	Up to 1 Gbps CAT5	Push-pull (Version 14)	1405183
Multi-ports							
	Straight	Aluminum die-cast	22 … 26	Cable module	Up to 10 Gbps $CAT6_A$	1 x RJ45	1403678
						1 x RJ45, 1 x power	1403682
			–	Coupler module	Up to 1 Gbps CAT5	1 x RJ45, 1 x RJ45	1403685
			–			2 x RJ45, 2 x power	1406395
Terminal outlets							
	Straight	Aluminum die-cast	22 … 26	Cable module	Up to 1 Gbps CAT5	2 x RJ45	1404281
						1 x RJ45, 1 x power	1404333

* Tool 1653265 required

RJ45, snap-in locking (V6), IP65/67

	Material	AWG	Connection method	Data rate	Features	Order no.
Connectors						
	Plastic, gray	23 … 26	IDC fast connection	Up to 1 Gbps CAT5	–	1656990
		24 … 27	Crimp connection		–	1414383*
				Up to 10 Gbps CAT6$_A$	–	1414406*
	Plastic, black	23 … 26	IDC fast connection	Up to 1 Gbps CAT5	–	1658493
		24 … 27	Crimp connection		–	1414408*
				Up to 10 Gbps CAT6$_A$	–	1414410*
Panel mounting frames						
	Plastic, gray	–	Round panel cutout	–	For Keystone modules	1689844
		–		–	For Freenet modules	1653744
	Plastic, black	–		–	For Keystone modules	1658053
		–		–	For Freenet modules	1658668
	Plastic, gray	–	Square panel cutout	–	For Keystone modules	1689080
		–		–	For PCB modules	1689446
	Plastic, black	–		–	For Keystone modules	1658642
		–		–	For PCB modules	1658655
Socket inserts						
	Metal	22 … 24	Cable module	Up to 1 Gbps CAT5	Freenet module	1652936
		22 … 26		Up to 10 Gbps CAT6$_A$		1418984
		–	Coupler module	Up to 1 Gbps CAT5	Keystone module	1689064
		–		Up to 1 Gbps CAT6		1653155
		–	PCB module	Up to 1 Gbps CAT6	Freenet module	1419022
		–			Straight, CAT6	1653090
		–		Up to 1 Gbps CAT5	Angled, CAT5	1688586
		–		Up to 1 Gbps CAT6	Angled, CAT6	1653087
Couplings						
	Plastic, gray	–	Coupling	Up to 1 Gbps CAT5	1 x RJ45/RJ45	1689268
	Plastic, black	–			1 x RJ45/RJ45	1658684
Terminal outlets						
	Aluminum die-cast	22 … 24	IDC fast connection	Up to 1 Gbps CAT5	2 x RJ45	1404278

RJ45, patch cables for PROFINET, up to 100 Mbps

	IP20 cables			IP65/67 cables			
	Open cable end	RJ45 connector, straight	RJ45 connector, angled	RJ45 connector, version 14, metal	RJ45 connector, version 14, plastic	M12 connector, straight	M12 connector, angled
IP20 cables, variable cable length							
RJ45 connector, straight	1411857	1411861	1411862	1411863	1411864	1408639	1408613
RJ45 connector, angled	1411858	1411862	1411865	–	–	1408638	1408612
IP65/67 cables, variable cable length							
RJ45 connector, version 14, metal	1411859	1411863	–	1411866	–	1408636	1408610
RJ45 connector, version 14, plastic	1411860	1411864	–	–	1411867	1408635	1408609
M12 connector, straight	1408640	1408639	1408638	1408636	1408635	1408634	1408608
M12 connector, angled	1408633	1408632	1408631	1408628	1408626	1408625	1408624
M12 socket, straight	1408623	1408622	1408621	1408619	1408618	1408617	1408616
M12 socket, angled	1408615	1408613	1408612	1408610	1408609	1408608	1408607
IP65/67 cables, limited cable length							
M12 flush-type socket, rear mounting	1 m, 1437779	0.5 m, 1404367	–	–	–	–	–
	2 m, 1437782	1 m, 1404368	–	–	–	–	–
	5 m, 1437795	5 m, 1404369	–	–	–	–	–

PROFINET cable, type 93B

The PROFINET type 93B cable is designed for flexible installation and is oil resistant up to a degree. It is suitable for outdoor use, as it is UV-resistant for 1200 seconds in accordance with UL 1581. Its transmission properties meet CAT5.

- Outer sheath material: PVC
- Minimum bending radius: 7 x D
- Tested at: +20°C … +25°C

	IP20 cables			IP65/67 cables			
	Open cable end	RJ45 connector	RJ45 connector, version 6	RJ45 connector, version 14, metal	RJ45 connector, version 14, plastic	M12 connector, straight	M12 connector, angled
IP20 cables, variable cable length							
RJ45 connector	1411838	1411842	1411843	1411844	1411845	1408681	1408674
IP65/67 cables, variable cable length							
RJ45 connector, version 6	1411839	1411843	1411846	–	–	1408679	1408671
RJ45 connector, version 14, metal	1411840	1411844	–	1411847	–	1408678	1408670
RJ45 connector, version 14, plastic	1411841	1411845	–	–	1411848	1408677	1408668
M12 connector, straight	1408682	1408681	1408679	1408678	1408677	1408676	1408667
M12 connector, angled	1408675	1408674	1408671	1408670	1408668	1408667	1408666
M12 socket, straight	1408665	1408664	1408662	1406661	1408660	1408659	1408658
M12 socket, angled	1408657	1408655	1408653	1408652	1408651	1408650	1408649
IP65/67 cables, limited cable length, 5 m							
M12 flush-type socket, rear mounting	1407877	1412082	1412231	1412503	1412590	–	–

Ethernet cable, type 94B

The Ethernet type 94B cable is designed for flexible installation.
The cable is resistant to oil and chemicals and is flame-retardant. Its
transmission properties meet CAT5.

- Outer sheath material: PUR
- Minimum bending radius: 5 x D

RJ45, patch cables for Ethernet, up to 10 Gbps

		IP20 cables		IP65/67 cables			
		Open cable end	RJ45 connector	RJ45 connector, version 6, plastic	RJ45 connector, version 14, metal	RJ45 connector, version 14, plastic	M12 connector, straight
IP65/67 cables, variable cable length							
	RJ45 connector, plastic	1411853	1411854	1414321	1411855	1411856	–
	RJ45 connector, version 6	1415639	1414321	1414322	–	–	–
	RJ45 connector, version 14, metal	1415637	1411855	–	1414323	–	–
	RJ45 connector, version 14, plastic	1415638	1411856	–	–	1414324	–
	M12 connector, straight	1408648	1408647	–	1408646	1408645	1408644
IP65/67 cables, limited cable length							
	M12 flush-type socket, rear mounting	1 m 1424148	–	–	–	–	–
		2 m 1424151	–	–	–	–	–
		5 m 1424164	–	–	–	–	–

Ethernet cable, type 94F

The Ethernet type 94F cable is designed for flexible installation. The cable is resistant to oil and chemicals and is flame-retardant. It is also halogen-free and its transmission properties meet CAT6$_A$.

- Outer sheath material: PUR
- Minimum bending radius: 10 x D

Assembled office patch cables, IP20

Outer sheath material: PUR
Outer diameter: 6.1 mm

Ethernet	CAT6$_A$, S/FTP shielding		
0.3 m	1413158	1421168	1421138
0.5 m	1413159	1421169	1421139
1 m	1413160	1421170	1421140
1.5 m	1413161	1421171	1421141
2 m	1413162	1421172	1421143
3 m	1413163	1421173	1421144
5 m	1413164	1421174	1421145
7.5 m	1413165	1421175	1421146
10 m	1413166	1421176	1421147

Accessories for office patch cables and sockets

Color coding	Security element	Color coding	Safe clip	Security frame	Dust protection cap
For easy visual color coding	Self-locking, against unintentional release, lockable	For easy visual color coding of the security elements	Self-locking, against unintentional release	For SFN switches and patch fields, including key	For RJ45 sockets
Black 2891194	Lockable element 2891424	Black 2891136	2891246	Green 2891615	2832991
Blue 2891291		Blue 2891233	–	Red 2891712	–
Brown 2891495	Key 2891521	Orange 2891330	–	White 2891819	–
Yellow 2891592	–	Yellow 2891437	–	Lock 2891220	–
Gray 2891699	–	Turquoise 2891534	–	Key 2891327	–
Green 2891796	–	Green 2891631	–	–	–
Red 2891893	–	Red 2891738	–	–	–
Violet 2891990	–	Violet 2891835	–	–	–

USB, patch cables and panel mounting frames

Assembled USB cables, type A

IP20, open cable end	Length	IP20	IP67
	1 m	1655771	1655742
	2 m	2655784	1655755
	5 m	1655797	1655768
IP20, USB plug type B			
	1 m	1654853	–
	2 m	1653935	1653896
	5 m	1653948	1653906
IP67, USB plug type B			
	2 m	1653919	1653870
	5 m	1653922	1653883
IP67, M12 Mini USB, SPEEDCON			
	1 m	1420168	–
	2 m	1420171	–
	4 m	1420184	–

IP65/67 panel mounting frames

Panel mounting frames, equipped	Plastic, gray, round panel cutout		Pin connector	Zinc die-cast, solder connection
With USB socket A/ socket B	1411904	–	–	–
With USB socket B/ socket A	1411905	–	–	–
Panel mounting frames, unequipped				
For Freenet modules	–	1653744	–	–
Freenet modules				
USB type A socket	–	–	1653854	–
USB type B socket	–	–	1653867	–
Panel-mount connectors				
M12 with mini USB B	–	–	–	1440711

IP65/67 M12 connectors

		IDC connection		Push-in connection	
Networks		Straight	Angled	Straight	Angled
Ethernet CAT5, 4-pos.	Pin	1411066	1553624	–	–
	Socket	1411069	1553637	–	–
Ethernet 8-pos.	Pin	1421679	1553653	–	–
	Socket	1421680	1553666	–	–
Ethernet CAT6A, 8-pos.	Pin	1411043	–	–	–
	Socket	1414586	–	–	–
PROFINET®	Pin	1411068	1554539	1424682	1424684
	Socket	1411071	1554542	1424683	1424685
VARAN	Pin	1429130	1429156	–	–
	Socket	1429143	1429169	–	–
Fieldbuses					
INTERBUS	Pin	–	–	1424674	1424676
	Socket	–	–	1424675	1424677
PROFIBUS®	Pin	1413931	–	1424678	1424679
	Socket	1413932	–	1424680	1424681
DeviceNet™	Pin	1422759	–	1424670	1424671
	Socket	1422760	–	1424672	1424673
CC-Link	Pin	–	–	1424699	–
	Socket	–	–	1424700	–

Crimp connection		Piercecon connection		Screw connection	
Straight	Angled	Straight	Angled	Straight	Angled
–	–	–	–	1521261	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
1422844	1422845	1417430	1417443	–	–
–	–	–	–	–	–
1422846	1422847	–	–	1521261	–
1422848	1422849	–	–	–	–
–	–	–	–	–	–
–	–	–	–	–	–
–	–	–	–	1507764	1430417
–	–	–	–	1507777	1430420
–	–	–	–	1507764	1430417
–	–	–	–	1507777	1430420
–	–	–	–	1508352	–
–	–	–	–	1508365	–
–	–	–	–	–	–
–	–	–	–	–	–

IP65/67 M12 device connectors

			Wave soldering		THR soldering	
Networks			**Pin**	**Socket**	**Pin**	**Socket**
Ethernet	CAT5, 4-pos.		1456514	1456527	1552214*	1551451*
	CAT5, 4-pos., cable type 93E	2 m	–	–	–	–
	CAT5, 8-pos.		1456530	1456543	1557578	1557549
	CAT5, 8-pos., cable type 94B	5 m	–	–	–	–
	CAT5, 8-pos., cable type 94C	2 m	–	–	–	–
	CAT6A, 8-pos.		–	1424177	–	1402457*
	CAT6A, 8-pos., cable type 94F	0.5 m	–	–	–	–
	CAT6A, 8-pos., cable type 94F	1 m	–	–	–	–
	CAT6A, 8-pos., cable type 94F	2 m	–	–	–	–
	CAT6A, 8-pos., cable type 94F	5 m	–	–	–	–
	CAT5, 8-pos., hybrid		–	1407503	–	1405225*
	CAT5, 8-pos., hybrid, cable type 94H	0.5 m	–	–	–	–
	CAT5, 8-pos., hybrid, cable type 94H	1 m	–	–	–	–
	CAT5, 8-pos., hybrid, cable type 94H	2 m	–	–	–	–
	CAT5, 8-pos., hybrid, cable type 94H	5 m	–	–	–	–
PROFINET	4-pos.		1456556	1456569	1552175	1542648
	4-pos., cable type 93B	0.5 m	–	–	–	–
	4-pos., cable type 93B	1 m	–	–	–	–
	4-pos., cable type 93B	2 m	–	–	–	–
	4-pos., cable type 93B	5 m	–	–	–	–
	4-pos., cable type 93C	2 m	–	–	–	–
	4-pos., cable type 93R	3 m	–	–	–	–
Sercos	4-pos.		1457979	1457966	–	–
	4-pos., cable type 93K		–	–	–	–
	4-pos., cable type 93K		–	–	–	–
	4-pos., cable type 93K		–	–	–	–
	4-pos., cable type 93K		–	–	–	–
EtherCAT	4-pos.		1456556	1456569	–	–
	4-pos., cable type 93K		–	–	–	–
	4-pos., cable type 93K		–	–	–	–
	4-pos., cable type 93K		–	–	–	–
	4-pos., cable type 93K		–	–	–	–
M12 for fieldbuses			**Pin**	**Socket**	**Pin**	**Socket**
PROFIBUS	5-pos.	0.5 m	1456475	1456488	–	–
INTERBUS	5-pos.	0.5 m	1456572	1456585	–	–
CANopen® EtherNet/IP™	5-pos.	0.5 m	1456491	1456501	–	–
CC-Link	4-pos.		1457856	1457869	–	–
FOUNDATION Fieldbus	4-pos.		1457872	1457885	–	–

SMD soldering		Bulkheads, M12 to RJ45					
Pin	Socket	Straight	Angled	Pin	Socket	Pin	Socket
1411956*	1411950*	–	–	–	–	1411592	1411585
–	–	–	–	–	1405866	–	–
–	–	1414396	1414393	–	–	–	–
–	–	–	–	–	1407877	–	–
–	–	–	–	–	1412820	–	–
–	1411964*	1404549	1404548	–	–	–	–
–	–	–	–	–	1424135	–	–
–	–	–	–	–	1424148	–	–
–	–	–	–	–	1424151	–	–
–	–	–	–	–	1424164	–	–
–	1411965*	–	–	–	–	–	1407618
–	–	–	–	–	1407504	–	–
–	–	–	–	–	1407505	–	–
–	–	–	–	–	1407506	–	–
–	–	–	–	–	1407507	–	–
–	–	1414398	1414397	–	–	–	–
–	–	–	–	1427805	1437766	–	–
–	–	–	–	1437818	1437779	–	–
–	–	–	–	1437821	1437782	–	–
–	–	–	–	1437834	1437795	–	–
–	–	–	–	–	1416209	–	–
–	–	–	–	–	1416263	–	–
–	–	–	–	–	–	–	–
–	–	–	–	1410158	1419154	–	–
–	–	–	–	1419159	1419155	–	–
–	–	–	–	1419160	1419156	–	–
–	–	–	–	1419161	1419157	–	–
–	–	–	–	–	–	–	–
–	–	–	–	1419138	1419134	–	–
–	–	–	–	1419139	1419135	–	–
–	–	–	–	1419140	1419136	–	–
–	–	–	–	1419141	1419137	–	–
Pin	Socket	Straight	Angled	Pin	Socket	Pin	Socket
–	–	–	–	1534342	1534384	–	–
–	–	–	–	1534504	1534546	–	–
–	–	–	–	1534423	1534465	–	–
–	–	–	–	–	–	–	–
–	–	–	–	–	–	1431432	1431429

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Assembled cables for Ethernet networks

	Cable structure	Conductor structure/signal line	Description	By the meter	100 m ring	Assembled
93E						
	2 x 2 x AWG 28	7 x 0.25 m	Ethernet cable for flexible use. The cable is halogen-free, oil resistant, and fulfills transmission properties in accordance with CAT5e.	1416415	1416305	–
94A						
	4 x 2 x AWG 24	Single-strand, twisted pair	Ethernet cable for fixed installation. The cable meets transmission properties in accordance with CAT5e.	1416415	1416305	–
94B						
	4 x 2 x AWG 28	7 x 0.25 mm	Ethernet cable for flexible installation. The cable is resistant to oil and chemicals and is flame-retardant. The cable meets transmission properties in accordance with CAT5e.	1417333	1416567	1416428
94D						
	4 x 2 x AWG 26	7 x 0.18 m, twisted pair	Ethernet cable for flexible installation. The cable is oil resistant up to a degree. It is UV-resistant in accordance with UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable meets transmission properties in accordance with CAT5e.	1416444	1416334	–
94E						
	4 x 2 x AWG 23	Single-strand, twisted pair	Ethernet cable for fixed installation. The cable is resistant to oil and chemicals and is flame-retardant. It is also halogen-free and its transmission properties meet CAT6$_A$.	1416460	1416334	–
94F						
	4 x 2 x AWG 26	7 x 0.16 mm, twisted pair	Ethernet cable for flexible installation. The cable is resistant to oil and chemicals and is flame-retardant. It is also halogen-free and its transmission properties meet CAT6$_A$.	1417359	1416347	1402609

Assembled cables for PROFINET networks

	Cable structure	Conductor structure/signal line	Description	By the meter	100 m ring	Assembled
93A						
	4 x AWG 22	Single-strand	PROFINET cable for fixed installation. The cable is flame-retardant and fulfills transmission properties in accordance with CAT5e.	1416486	1416392	–
93B						
	4 x AWG 22	7 x 0.25 mm	PROFINET cable for flexible installation. The cable is oil resistant up to a degree. It is UV-resistant in accordance with UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable's transmission properties meet CAT5e.	1417362	1416389	1416499
93C						
	4 x AWG 22	7 x 0.25 mm	PROFINET cable for use in drag chains. The cable is halogen-free and oil resistant. It is UV-resistant and therefore suitable for outdoor use. The cable's transmission properties meet CAT5e.	1417491	1416376	1416509
93R						
	4 x AWG 22	19 x 0.15 mm	PROFINET cable for robot applications. The cable is oil resistant up to a degree. It is UV-resistant in accordance with UL1581 Sec.1200 and therefore also suitable for outdoor use. The cable's transmission properties meet CAT5e.	1417388	1416363	1416512
937						
	4 x AWG 22	7 x 0.25 mm	PROFINET cable for railway applications. The cable is oil resistant. It meets fire safety standard BS6853. The cable's transmission properties meet CAT5e.	1402687	1416363	1402611

Fiber-optic-based data cabling for networks and fieldbuses

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

[i] Web code: #0298

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Wide choice of versions

Wide choice of versions from SC-RJ, LC, SC, F-SMA to ST, plus POF, PCF, and GOF fiber types.

Comprehensive range of cables

PCF

GOF

POF

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

Fast assembly

Fast assembly in the field using professional tools.

Your advantages

☑ Transmission speeds of up to 40 Gbps

☑ Solutions from IP20 to IP65/IP67 and IP68

☑ For all common fiber types

☑ Maximum protection against the effects of EMC and ESD

☑ The right fiber type can be selected for your application (POF, PCF, GOF multimode, GOF single mode)
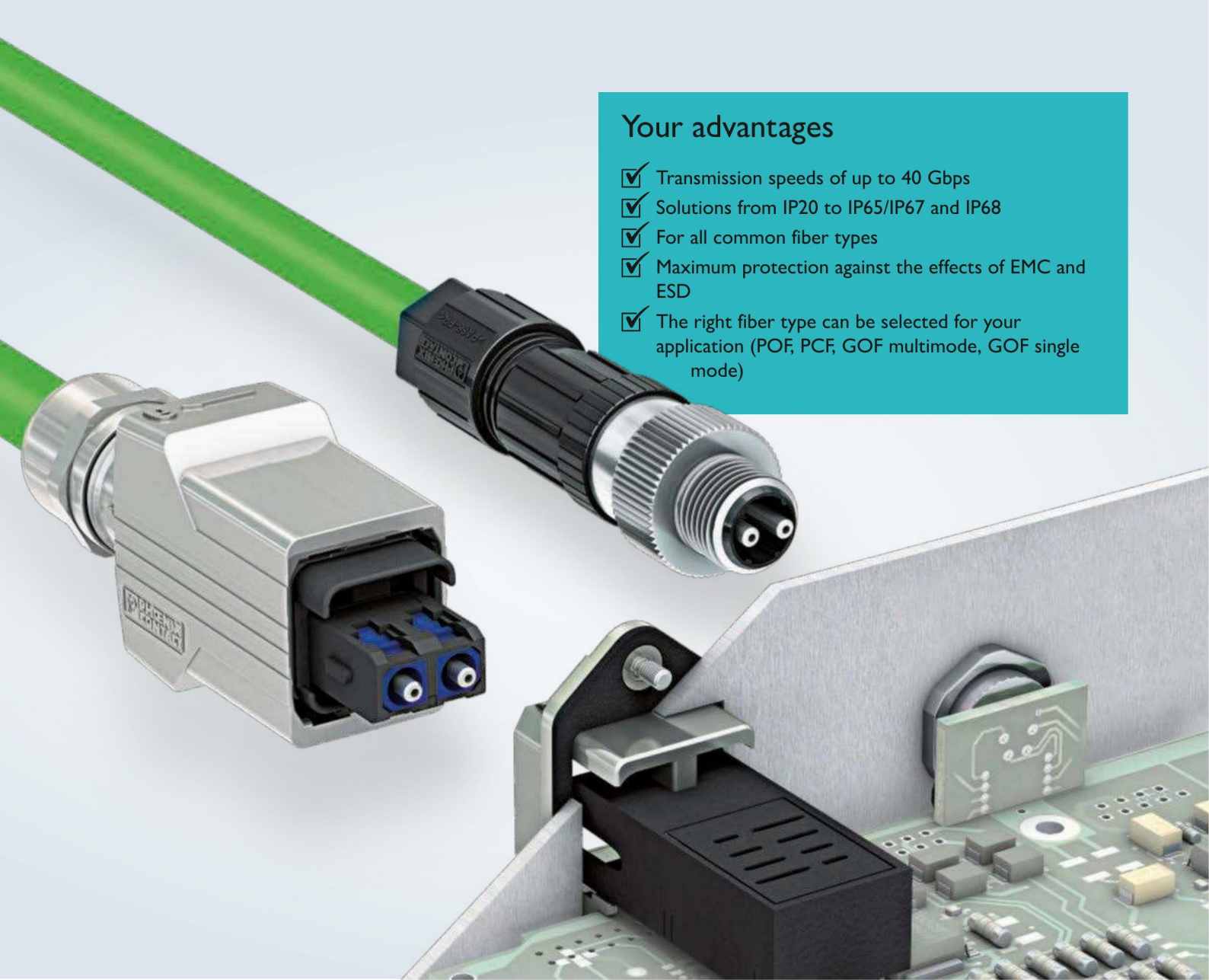
Reliable protection

Reliable protection against extreme temperatures, liquids, and UV light.
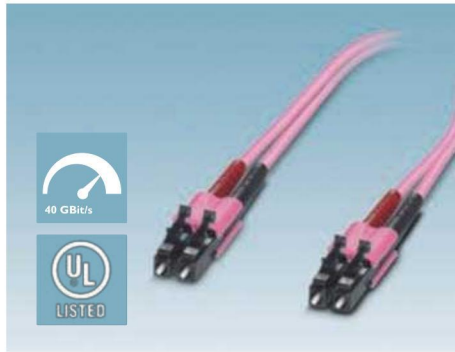
High-quality patch cable

High-quality UL-listed patch cable up to 40 Gbps.

Push-pull locking technology

Push-pull ADVANCE locking technology protects against unintentional pulling.

SC-RJ, V14, IP65/67

	Cable outlet	Material	Connection method	Data rate	Specification	Order no.
Connectors						
	Straight	Zinc die-cast	POF	Up to 100 Mbps	–	1407896
			PCF		–	1407897
	Angled bottom		POF		–	1407902
			PCF		–	1407904
	Angled, top		POF		–	1408028
			PCF		–	1408055
Panel mounting frames						
	–	Zinc die-cast	Round panel cutout	–	Assembled, with coupler module, for POF, PCF, and GOF	1405235
	–		Square panel cutout	–	Assembled, with coupler module, for POF, PCF, and GOF	1413964
	–			–	Unequipped, for AVAGO transceiver	1413981
Coupling						
	–	Zinc die-cast	–	–	1 x SC-RJ / 1 x SC-RJ	1405206
Multi-ports						
	–	Aluminum die-cast	–	–	1 x SC-RJ	1404319
	–		–	–	1 x SC-RJ / 1 x power	1404321
Terminal outlets						
	–	Aluminum die-cast	–	–	2 x SC-RJ	1404320
	–		–	–	1 x SC-RJ / 1 x power	1404346
Tool sets						
	–	–	–	–	For POF	1405246
	–	–	–	–	For PCF	1411051

SC-RJ, snap-in locking (V6), IP65/67

	Material	Connection method	Data rate	Specification	Order no.
Connectors					
	Plastic	POF	Up to 100 Mbps	–	1657009
		PCF			1657012
Panel mounting frames					
	Plastic, gray	Round panel cutout	–	Unequipped, for Freenet modules	1653744
				Unequipped, for AVAGO transceiver	1658545
	Plastic, black			Unequipped, for Freenet modules	1658668
Socket insert for panel mounting frames					
	Plastic	POF, PCF, and GOF	–	Freenet coupler module	1652978
Coupling					
	Plastic	–	–	1 x SC-RJ 1 x SC-RJ	1410050
Terminal outlets					
	Aluminum die-cast	–	–	2 x SC-RJ	1404317
Tool sets					
	–	–	–	For POF	1405246
				For PCF	2708876

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Fiber optics, connectors for assembly

	Function	Fiber type	Specification	Order no.
LC				
	Connector	GOF	Multimode	1411294
			Single mode PC	1411295
			Single mode APC	1412476
			Multimode	1411052
			Single mode PC	1411053
			Single mode APC	1412472
	Coupling		–	2700312
SC				
	Connector	GOF	Multimode	1411296
			Single mode PC	1411297
			Single mode APC	1412478
			Multimode	1411292
			Single mode PC	1411293
			Single mode APC	1412474
		PCF	SC, SC-RJ (Ø 2.2 mm)	2313779
	Coupling	GOF, PCF, POF	–	2901788
SC-RJ				
	Connector	GOF	Multimode	1411290
			Single mode PC	1411291
			Single mode APC	1412473
		PCF	SC, SC-RJ (Ø 2 … 3 mm)	1411304
			SC, SC-RJ (Ø 2.2 mm)	1404087
			SC-RJ (Ø 2.9 mm)	1654866
		POF	–	1654879
	Coupling	GOF, PCF, POF	–	1652978
F-SMA				
	Connector	PCF	F-SMA (Ø 2.9 mm)	2799487
		POF	–	2799720
	Coupling	GOF, PCF, POF	–	2799416
ST (B-FOC)				
	Connector	PCF	ST (Ø 2.2 mm)	2313782
			ST (Ø 2.9 mm)	2708481
	Coupling	GOF, PCF, POF	–	2799429
Tool sets				
	Tool set	GOF	Multimode and single mode	1411049
		PCF	SC, SC-RJ (Ø 2 … 3 mm)	1411051
			SC, SC-RJ (Ø 2.2 mm), SC-RJ (Ø 2.9 mm)	2708876
			ST (Ø 2.2 mm), ST (Ø 2.9 mm)	2708465
			F-SMA (Ø 2.9 mm)	2799526
		POF	SC-RJ	1405246
			F-SMA	2744131

Fiber optics, patch panels and socket inserts, IP20

	Mounting type	Material	Specification	Order no.
Patch panels				
	DIN rail mounting	Plastic, gray	Incl. coupler module, SC-RJ, for POF, PCF, and GOF	1658121
	19" mounting		16 installation slots, for Freenet modules, unequipped	1652994
Junction boxes for Freenet modules				
	Surface mounting	Plastic, white	Unequipped, for 2 modules	1653003
			Unequipped, for 6 modules	1653029
	Flush-mounted		Unequipped, for 2 modules	1653016
Socket inserts, Freenet modules				
	Coupler module	–	SC-RJ, for POF, PCF, and GOF	1654358
			LC duplex, multimode	2700312
			LC duplex, single mode	2700313

Fiber optics, splice boxes, IP20

Splice boxes								
	Mounting type	Material	Without pigtails	OM1 G62.5/125 µm	OM2 G50/125 µm	OM4 G50/125 µm	OS2 (PC) E9/125 µm	OS2 (APC) E9/125 µm
	DIN rail mounting	6 x LC duplex	1019710	–	1019713	1019712	1019711	–
		12 x LC duplex	1019705	–	1019709	1019708	1019707	–
		6 x SC duplex	1019686	–	1019700	1019698	1019692	–
		6 x ST duplex	1019681	1019684	1019683	–	1019682	–
		6 x LSH duplex	–	–	–	–	–	1019680
	19" mounting	12 x LC duplex	–	–	1418815	1418817	–	–
		24 x LC duplex	–	–	1418816	1418818	–	–

Fiber optics, fiberglass zip cords, multimode, IP20
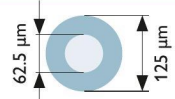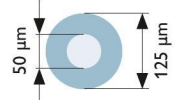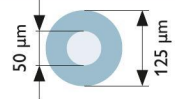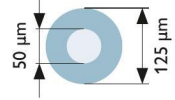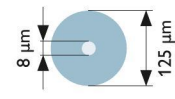
		Variable lengths 1 m ... 1,000 m				
F-SMA	**Fiber type**	**FSMA**	**SC-RJ**	**SC duplex**	**ST (B-FOC)**	**LC duplex**
	OM1	1409855	–	1406536	1406535	1413787
	OM2	–	–	–	–	–
	OM3	–	–	–	–	–
	OM4	–	–	–	–	–
SC-RJ						
	OM1	–	–	–	–	–
	OM2	–	1405703	1405700	1405710	1405694
	OM3	–	1405704	1405701	1405711	1405695
	OM4	–	1405705	1405702	–	1405696
SC duplex						
	OM1	1406536	–	1413790	1413791	1413789
	OM2	–	1405700	1405697	1405708	1405691
	OM3	–	1405701	1405698	1405709	1405692
	OM4	–	1405702	1405699	–	1405693
ST (B-FOC)						
	OM1	1406535	–	1413791	1413821	1413792
	OM2	–	1405710	1405708	1405712	1405706
	OM3	–	1405711	1405709	–	1405707
	OM4	–	–	–	–	–
ST (B-FOC)						
	OM1	1413787	–	1413789	1413792	1413788
	OM2	–	1405694	1405691	1405706	1405688
	OM3	–	1405695	1405692	1405707	1405689
	OM4	–	1405696	1405693	–	1405690

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Fiber optics, fiberglass zip cords, single mode, IP20

LC duplex	Cable length	Fixed lengths		
		LC duplex, OS2	SC duplex, OS2	ST (B-FOC), OS2
	1 m	2989187	2989190	2989242
	2 m	2989284	2989297	2989349
	5 m	2901826	2901827	2901828
SC duplex				
	1 m	2989190	2901829	2901832
	2 m	2989297	2901830	2901833
	5 m	2901827	2901831	2901834
ST (B-FOC)				
	1 m	2989242	2901832	2901836
	2 m	2989349	2901833	2901837
	5 m	2901828	2901834	2901838

Zipcord fiber classes

Multimode	Fiber design	Sheath color	Fiber category	Typical range	Typical wavelength
	62.5 µm / 125 µm	Orange	OM1	1000Base-SX: min. 350 m 1000Base-LX: min. 550 m	850 nm 1,300 nm
	50 µm / 125 µm	Orange	OM2	1000Base-SX: min. 525 m 1000Base-LX: min. 1,000 m	850 nm 1,300 nm
	50 µm / 125 µm	Aqua	OM3	1000Base-SX: min. 1,000 m 1000Base-LX: min. 550 m 10GBase-SX: min. 300 m	850 nm 1,300 nm
	50 µm / 125 µm	Heather violet	OM4	1000Base-SX: min. 1,040 m 1000Base-LX: min. 600 m 10GBase-SX: min. 550 m	850 nm 1,300 nm
Single mode					
	8 µm / 125 µm	Yellow	OS2	10GBase-LR: min. 10 km 10GBase-ER: min. 40 km	1,310 nm 1,550 nm

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