ACTIVE NETWORK COMPONENTS

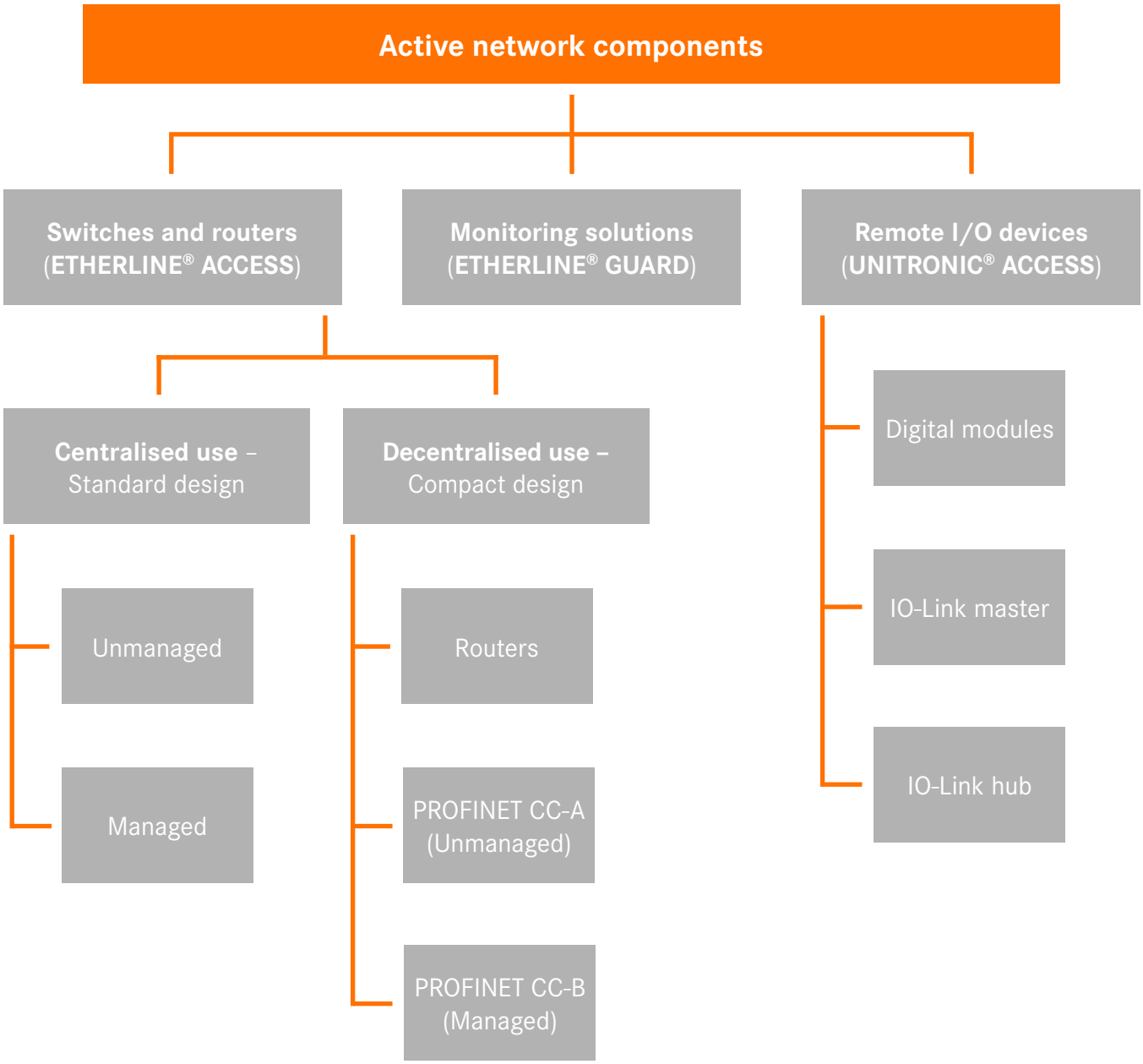
Industrial communication

LAPP

ACTIVE NETWORK COMPONENTS

Overview

An Ethernet network consists not only of computers and servers, but also of numerous passive and active network components. While the passive components such as cables and plug connectors are required for installation of the network structure, the active network components are responsible for distributing Ethernet in the network, i.e. actively processing signals or amplifying.



Switches and routers (ETHERLINE® ACCESS)

Industrial switches are devices for data transmission in communication networks. Whether for communication from control cabinet to control cabinet, for communication in the machine control cabinet or for communication from the main control cabinet to the office – switches perform their work reliably in many places. They must be fail-safe in order to avoid interruptions in production. They are also intended to guarantee a high quality of connection between the terminal devices, while simultaneously providing high-performance data transmission. The aim is end-to-end networking from the field and control level through to the corporate management level.

Unmanaged switches

Unmanaged switches ensure simple distribution of Ethernet data packages to any area. However, unmanaged switches do not allow the network to be "managed".

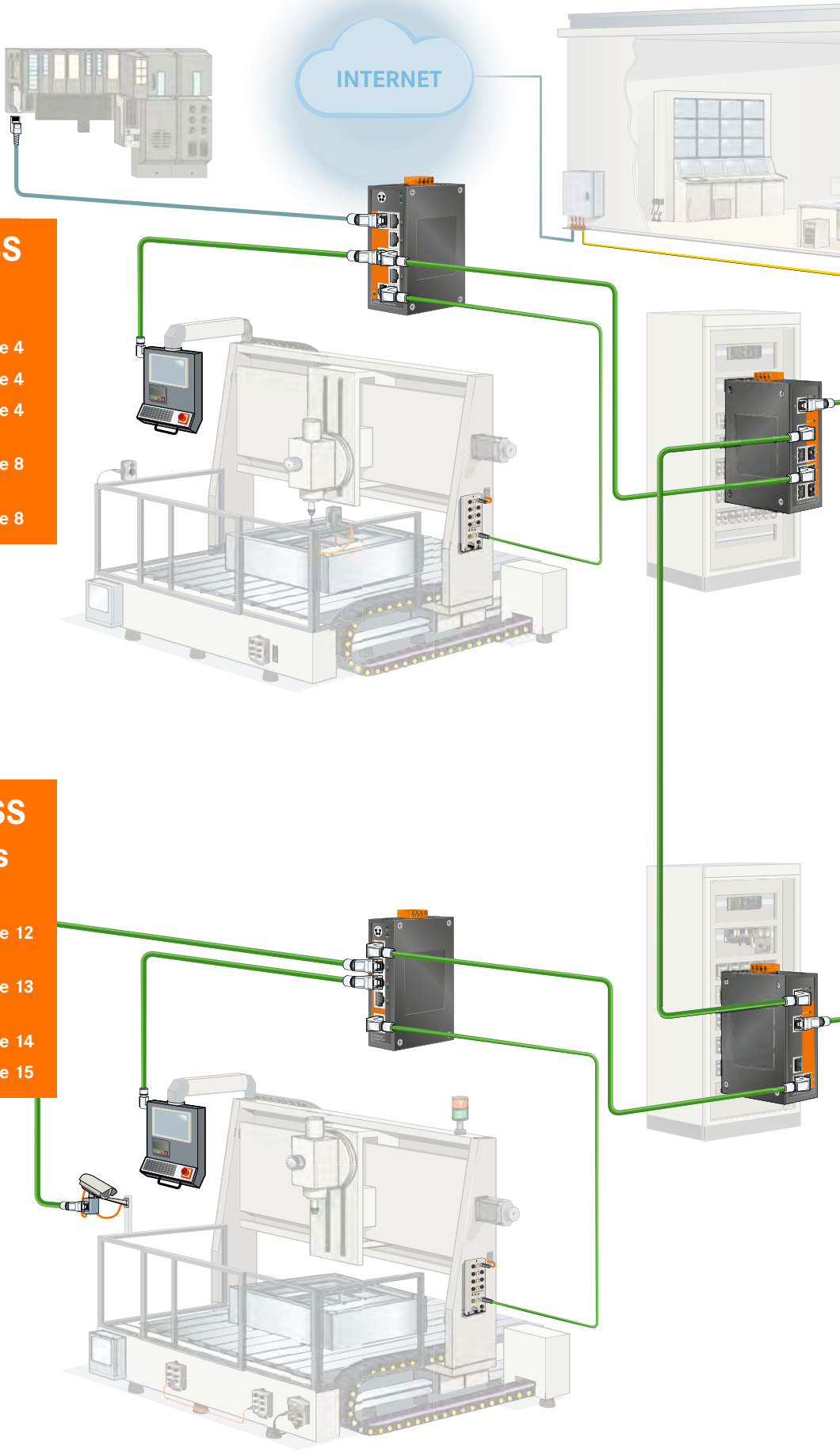
Advantages at a glance:
- Suitable for small, simple networks, e.g. for multiplying ports.
- Do not require configuration.
- Function according to the plug & play principle.

Managed switches

In addition to the actual functions of a switch, a managed switch also offers additional management functions. This provides the network with diagnostic and monitoring options as well as a higher level of network security - Industrial Security.

Advantages at a glance:
- Suitable for the professional setup of networks.
- Are configurable via web interface.
- Allow diagnosis and monitoring of the network.
- Offer industrial network security.

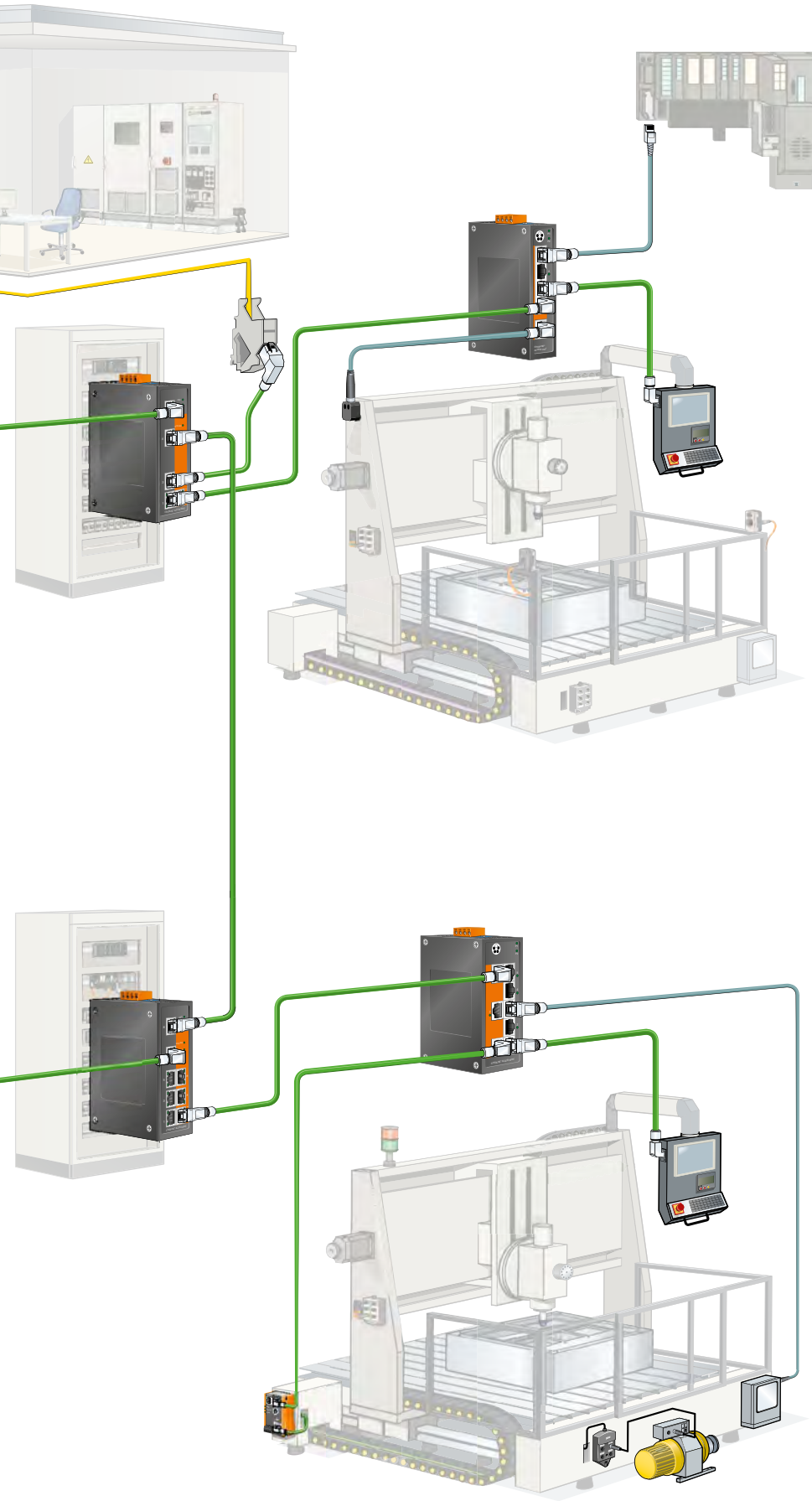
Industrial communication -



ETHERLINE® ACCESS Unmanaged

UNITRONIC® ACCESS Remote I/O devices

- Solutions for **SMART FACTORIES**



ETHERLINE® ACCESS Managed

- 6 and 8 ports page 5
- Copper (RJ45) and/or fibre optic page 5
- NAT router page 6
- 4, 8 or 16 ports, compact, with PROFINET CC-B page 9
- 8 ports, IP 67, with PROFINET CC-B page 9

ETHERLINE® GUARD - Condition Monitoring

LAN or WLAN based configuration page 11

Centralised use – Standard design

External components are controlled from the control cabinet.
The control cabinet
- protects the components from contact, dust, moisture and electromagnetic radiation.
- keeps everything organised and provides a good overview.

Switches for the central control cabinet can be installed directly on the top-hat rail.
They impress with their robust metal housing and do not require maintenance as they are fanless.

Unmanaged switches

ETHERLINE® ACCESS standard design

Features
- Up to 16 ports
- 10/100/1000 BaseT(X)
- UL certification
- Temperature range:
  -10 °C to +60 °C
  -40 °C to +75 °C (PoE)

Benefits
- Ready for use quickly with minimal installation effort.
- Uninterrupted data traffic thanks to redundant power supply
  (2 connections if one connection fails).
- "Broadcast Storm Protection" function prevents network overload.
- Jumbo frames dispatch for higher data throughput (Gigabit/PoE articles only).
- Power over Ethernet for simultaneous power supply and data transmission, e.g. for IP cameras, wireless access points (Power over Ethernet articles only).
- Low-noise and maintenance-free as it is operated without fans.

Applications
- For Ethernet networks.
- For use in control cabinets.
- For mounting on 35 mm top-hat rails.

Article number	Article designation	Type	RJ45 ports	Feature
21700123	ETHERLINE® ACCESS U05T-2GEN	Unmanaged	5	
21700124	ETHERLINE® ACCESS U08T-2GEN	Unmanaged	8	
21700120	ETHERLINE® ACCESS U16T	Unmanaged	16	
21700138	ETHERLINE® ACCESS U04TP01T	Unmanaged	5	Power over Ethernet
21700129	ETHERLINE® ACCESS U08GT	Unmanaged	8	Gigabit

Managed switches

ETHERLINE® ACCESS standard design

Features

- Standard design
- Up to 8 ports
- 10/100/1000 BaseT(X)
- UL certification
- Temperature range:
  -40 °C to +75 °C

Benefits

- With management functions for better control, monitoring and fault diagnosis of the network.
- Uninterrupted data traffic thanks to redundant power supply
  (2 connections if one connection fails).
- Uninterrupted data traffic thanks to ring redundancy (fast reconfiguration time < 20 ms if a device fails).
- Supported protocols: HTTP, Telnet, EtherNet/IP, Modbus/TCP, IPv6, and many more.
- Low-noise and maintenance-free as it is operated without fans.

Applications

- For Ethernet networks.
- Suitable for PROFINET networks ("Conformance Class B")
  (SFP articles only).
- For use in control cabinets.
- For mounting on 35 mm top-hat rails.

Article number	Article designation	Type	RJ45 ports	Feature
21700125	ETHERLINE® ACCESS M06T-2GEN	Managed	6	
21700126	ETHERLINE® ACCESS M08T-2GEN	Managed	8	
21700136	ETHERLINE® ACCESS M08T02SFP	Managed	8	2 SFP ports
21700137	ETHERLINE® ACCESS M08T02GSFP	Managed	8	2 SFP ports, Gigabit

Decentralised use – Compact design

Switches are no longer only installed in the classic control cabinet, far away from the machine environment. **The decentralisation of electronic components continues to progress.** Switches and routers are no longer installed in the central control cabinet; instead, their location is shifted **to the immediate vicinity of machines and systems. Above all, components for decentralised applications must be robust.**

Routers

NAT routers with firewall functions are used to isolate machines and production cells and thus offer protection against cyber attacks. They ensure communication between the company and machine network via NAT (Network Address Translation) and thus also protect it against unauthorised access.

Advantages at a glance:
- Machines can be easily integrated into existing networks via NAT routers.
- Simple communication can take place between machines with an identical network address range.
- The firewall function provides communication security in every direction.

Router: NAT/Firewall

ETHERLINE® ACCESS compact design

Features
- Layer 3 switch with routing function
- 3 LAN ports, 1 WAN port
- 10/100 BaseT(X)
- UL certification
- Temperature range: -40 °C to +75 °C
- Integrated firewall protects against unauthorised access to the production network.
- Allows the machine network and production network to communicate with the same IP address range (NAT function, Network Address Translation).

Benefits
- Extremely space-saving, compact design.
- Reduced installation effort in existing production networks.
- Very simple configuration via web interface.

Applications
- For Ethernet networks.
- For use in control cabinets.
- For mounting on 35 mm top-hat rails.

Article number	Article designation	Type	RJ45 ports
21700141	ETHERLINE® ACCESS NF04T	Managed	4

PROFINET | Conformance Classes

The possible applications within the PROFINET communication network are divided into four conformance classes, which define, for example, the device types that can be used (controller, device, supervisor), the transmission medium used and the type of communication.

Conformance Class	Transmission medium used	Typical possible uses	Examples of scope of function
CC-A	• Copper conductor • Fibre optic cables • Wireless	For infrastructure networks and building automation	• Cyclical real-time communication via RT • Acyclic communication via TCP/IP
CC-B	• Copper conductor • Fibre optic cables	For factory and process automation	• LLDP neighbourhood detection • Network diagnostics via SNMP • Redundant communication through two IO controllers
CC-C		For motion control applications	• Isochronous communication via IRT for clock synchronisation • Bandwidth reservation
CC-D		For various applications	• Scope of functions similar to CC-C, but actions are carried out using time-sensitive networking (TSN) standards

PROFINET CC-A (Unmanaged)

ETHERLINE® ACCESS compact design

Features
- Up to 16 ports
- 10/100Base-T(X)
- PROFINET CC-A
- UL certification
- Temperature range: -25 °C to +75 °C

Benefits
- Extremely space-saving, compact design.
- Ready for use quickly with minimal installation effort.
- Blocks the LLDP and PTCP functions and thus avoids endlessly circulating telegrams.

Applications
- For Ethernet networks.
- Suitable for PROFINET networks ("Conformance Class A").
- For use in the decentralised control cabinet.
- For mounting on 35 mm top-hat rails.

Article number	Article designation	Type	RJ45 ports
21700144	ETHERLINE® ACCESS UF05T	Unmanaged	5
21700145	ETHERLINE® ACCESS UF08T	Unmanaged	8
21700146	ETHERLINE® ACCESS UF16T	Unmanaged	16

ETHERLINE® ACCESS protection class IP 67

Features
- 8 slots for D-coded M12 plug connectors
- 10/100Base-T(X)
- PROFINET CC-A
- Temperature range: -40 °C to +75 °C

Benefits
- Extremely space-saving, compact design.
- Ready for use quickly with minimal installation effort.
- Particularly suitable for harsh environments thanks to protection class IP 67.
- High-performance thanks to generous 16K MAC address table and extensive 256 Kbyte packet buffer.
- Blocks the LLDP and PTCP functions.

Applications
- For Ethernet networks.
- Suitable for PROFINET networks ("Conformance Class A").
- For decentralised use at field level, outside of control cabinets.

Article number	Article designation	Type	RJ45 ports	Feature
21700148	ETHERLINE® ACCESS U08M12	Unmanaged	5	IP67

PROFINET CC-B (Managed)

ETHERLINE® ACCESS protection class IP 20

Features

- Up to 16 ports
- 10/100Base-T(X)
- UL certification
- Temperature range:
  -0 °C to +60 °C (PNF16T)
  -40 °C to +75 °C (PNF04T, PNF08T)

Benefits

- Extremely space-saving, compact design.
- With management functions for better control, monitoring and fault diagnosis of the network.
- Prioritising PROFINET telegrams with real-time data.
- Easy configuration and diagnosis via PROFINET or web interface.
- Supports MRP (client), LLDP, DCP, SNMP, allows port mirroring, diagnostic alarms and detailed network statistics.

Applications

- For PROFINET networks ("Conformance Class B").
- For use in the decentralised control cabinet.
- For mounting on 35 mm top-hat rails.

Article number	Article designation	Type	RJ45 ports
21700140	ETHERLINE® ACCESS PNF04T	Managed	4
21700142	ETHERLINE® ACCESS PNF08T	Managed	8
21700143	ETHERLINE® ACCESS PNF16T	Managed	16

ETHERLINE® ACCESS protection class IP 67

Features

- 8 slots for D-coded M12 connectors 10/100Base-T(X)
- Temperature range:
  -40 °C to +75 °C

Benefits

- Extremely space-saving, compact design.
- With management functions for better control, monitoring and fault diagnosis of the network.
- Particularly suitable for harsh environments thanks to protection class IP 67.
- Prioritising PROFINET telegrams with real-time data.
- Easy configuration and diagnosis via PROFINET or web interface.
- Supports MRP (client), LLDP, DCP and SNMP, allows port mirroring, diagnostic alarms and detailed network statistics.

Applications

- For PROFINET networks ("Conformance Class B").
- For decentralised use at field level, outside of control cabinets.

Article number	Article designation	Type	RJ45 ports	Feature
21700147	ETHERLINE® ACCESS PN08M12	Managed	8	IP 67

Monitoring solutions (ETHERLINE® GUARD)

Cable monitoring made by LAPP

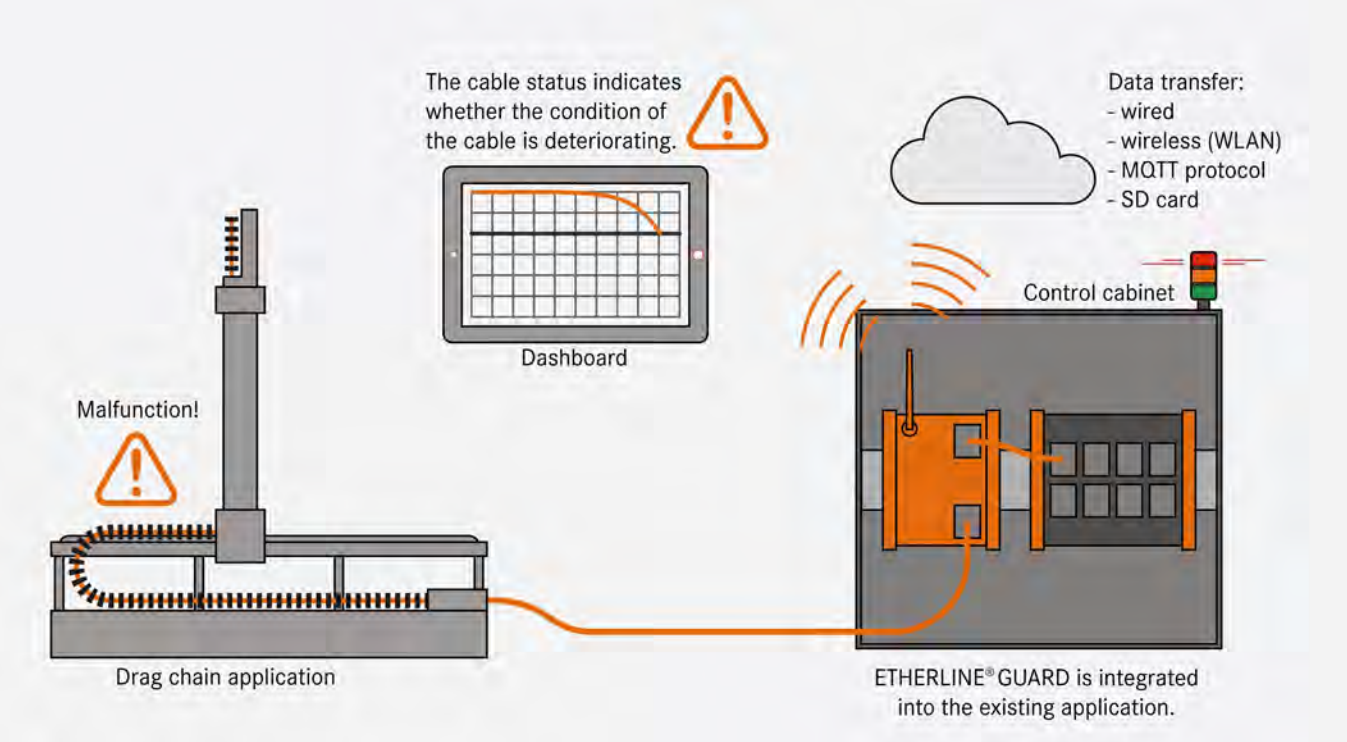
The stationary monitoring device for data lines

Although our cables usually last for many years, in situations with highly dynamic, demanding movements with high speeds and strong torsion, it is advantageous and cost-effective to monitor the connection systems in order to avoid unexpected downtimes which impair productivity. ETHERLINE® GUARD is the innovative solution from LAPP. It is a stationary monitoring device that evaluates the current performance of a data cable and specifies it as a percentage.

This is based on data determined from the physical properties and the related data transmission. The real-time status display enables the wear limit of a cable to be detected and the optimum replacement time to be planned in advance. LAPP recommends ETHERLINE® GUARD primarily for 100BASE-TX data cables (with 100 Mbit/s) in compliance with IEEE 802.3, but also for EtherCAT, EtherNET/IP and 2-pair PROFINET applications, such as the ETHERLINE® TORSION Cat. 5 or the ETHERLINE® PN Cat. 5 FD. These solutions are often used in cable chains or torsionally stressed cable guides, such as those found in robot arms.

Advantages at a glance:

- Increased availability thanks to predictable downtimes, thereby reducing maintenance costs.
- Simple setup thanks to automated parameterisation.
- Integration into the existing network.
- Reliable cloud communication using the MQTT protocol.



Monitoring device for condition monitoring

ETHERLINE® GUARD

Features

- For 2-pair Ethernet patch cable with RJ45 connection
- 10/100Base-T(X)
- Temperature range: -25 °C to +65 °C

Benefits

- For monitoring the service life of a data cable at risk of failure (e.g. function-critical data cable in dynamic applications).
- Increase plant availability through plannable machine downtimes. This reduces maintenance costs.
- Easy commissioning with automated parameterisation (“teach-in” in seconds).
- Space-saving due to unique compact design.
- Reliable IIoT communication thanks to the MQTT interface (for status/data evaluation, settings, WiFi configuration, update, etc.).

Applications

- For Ethernet networks.
- Also suitable for EtherCAT, EtherNet/IP and 2-pair PROFINET applications.
- For use in the (decentralised) control cabinet.
- For mounting on 35 mm top-hat rails.

Article number	Article designation	RJ45 ports	Feature
21700150	ETHERLINE® GUARD PM03T	3	Wired, LAN
21700151	ETHERLINE® GUARD PM02TWA	3	Wireless, WIFI

Remote I/O devices (UNITRONIC® ACCESS)

Remote I/O devices record the values and statuses of field devices such as sensors and actuators. This data is then transmitted to the higher-level control system. Remote I/O devices do not have to be installed in the immediate vicinity of the control system. They can be physically located elsewhere, typically in the direct vicinity of the field devices to be controlled. This reduces the amount of cabling required between the sensors and actuators in the field and the control system. Depending on the degree of protection, the remote I/O devices can also be used in very harsh environments.

Possible applications for remote I/O devices:

- Mechanical and plant engineering
- Intralogistics
- Food industry
- Automotive industry

Digital modules

Digital I/O modules (input/output modules) are used for digital input and output from the sensor to the controller (e.g. a programmable logic controller). They are used to record process signals from sensors and output control commands to actuators.

Advantages at a glance:

- Reduced wiring effort saves time and costs.
- Support for five of the most widely used Industrial Ethernet protocols reduces the variety of parts in the warehouse and simplifies maintenance.
- For decentralised use at field level, outside of control cabinets.

UNITRONIC® ACCESS MP08 DIO

Features

- 8 slots for A-coded M12 plug connectors
- PROFINET, EtherNet/IP, EtherCAT, Modbus, CC-Link IE
- Resistant to welding spatter
- IP 67 and IP 69K
- Temperature range: -40 °C to +70 °C
- IoT protocols (OPC UA, MQTT, REST API, CoAP)

Benefits

- Multiprotocol combines several Industrial Ethernet and IoT-based protocols in one. This reduces the number of different devices and increases flexibility.
- Multiprotocol enables a uniform and standardised system design and meets the requirements of international industries with just one device.
- Support for various Industrial Ethernet protocols reduces the variety of parts in the warehouse and simplifies maintenance.
- Digital signal transmission allows the use of unscreened standard cables.
- Particularly suitable for harsh environments thanks to protection class IP 67.
- Protection class IP 69K allows the use of high-pressure cleaners.

Applications

- For communication between decentralised sensors and actuators at field level and a programmable logic controller at control level.
- For decentralised use at field level, outside of control cabinets.
- For use with UNITRONIC® SENSOR M12 cables and ETHERLINE® M12 patch cables.
- Metal housing is resistant to welding spatter.
- For operating temperatures from -40 °C to +70 °C.

Article number	Article designation	Type	M12 ports
381166718	UNITRONIC® ACCESS MP08DIO08DIO	Digital module (multiprotocol)	8 (A-coded) 2 (D-coded) 2 (L-coded)

IO-Link master

An IO-Link master is a central element in an IO-Link system. It serves as an interface between the higher-level controller (e.g. a programmable logic controller) and the connected IO-Link devices, such as sensors or actuators.

Advantages at a glance:
- IO-Link technology allows extended diagnostics of sensors and actuators.
- Simplified commissioning and replacement of IO-Link devices thanks to automatic configuration and plug-and-play.
- Globally standardised IO-Link technology supports all common communication protocols.
- Multiprotocol combines several Industrial Ethernet and IoT-based protocols in one. This reduces the number of different devices and increases flexibility.

IO-Link master (multiprotocol)

UNITRONIC® ACCESS MP08 IOL

Features
- 8 slots for A-coded M12 plug connectors
- IO-Link, PROFINET, EtherNet/IP, EtherCAT, Modbus, CC-Link IE
- Resistant to welding spatter
- IP 67 and IP 69K
- Temperature range: -40 °C to +70 °C
- IoT protocols (OPC UA, MQTT, REST API, CoAP)

Benefits
- Multiprotocol combines several Industrial Ethernet and IoT-based protocols in one. This reduces the number of different devices and increases flexibility.
- Multiprotocol enables a uniform and standardised system design and meets the requirements of international industries with just one device.
- Support for various Industrial Ethernet protocols reduces the variety of parts in the warehouse and simplifies maintenance.
- IO-Link technology allows extended diagnostics of sensors and actuators through bidirectional communication, e.g. remote maintenance of devices.
- Globally standardised IO-Link technology supports all common communication protocols.
- Simplified commissioning and replacement of IO-Link devices thanks to automatic configuration and plug-and-play.
- Digital signal transmission allows the use of unscreened standard cables.
- Particularly suitable for harsh environments thanks to protection class IP 67.
- Protection class IP 69K allows the use of high-pressure cleaners.

Applications
- For data transmission of input and output signals as well as IO-Link signals from sensors and actuators in Industrial Ethernet or IoT protocols.
- For decentralised use at field level, outside of control cabinets.
- For use with UNITRONIC® SENSOR M12 cables and ETHERLINE® M12 patch cables.
- Metal housing is resistant to welding spatter.
- For operating temperatures from -40 °C to +70 °C.

Article number	Article designation	Type	M12 ports
381166717	UNITRONIC® ACCESS MP08IOLA08DIO	IO-Link master (multiprotocol)	8 (A-coded) 2 (D-coded) 2 (L-coded)

IO-Link master (single protocol)

UNITRONIC® ACCESS SP08 IOL

Features

- 8 slots for A-coded M12 plug connectors
- IO-Link, PROFINET, EtherNet/IP, EtherCAT, Modbus, CC-Link IE
- Resistant to welding spatter
- IP 67 and IP 69K
- Temperature range: -20 °C to +60 °C
- IoT protocols (OPC UA, MQTT, REST API, CoAP)

Benefits

- Supports the Industrial Ethernet protocols PROFINET, EtherNet/IP, EtherCAT, Modbus TCP and CC-link (article-dependent).
- IO-Link technology allows extended diagnostics of sensors and actuators through bidirectional communication, e.g. remote maintenance of devices.
- Globally standardised IO-Link technology supports all common communication protocols.
- Simplified commissioning and replacement of IO-Link devices thanks to automatic configuration and plug-and-play.
- Digital signal transmission allows the use of unscreened standard cables.
- Particularly suitable for harsh environments thanks to protection class IP 67.
- Protection class IP 69K allows the use of high-pressure cleaners.

Applications

- For data transmission of input and output signals as well as IO-Link signals from sensors and actuators to an Industrial Ethernet or IoT protocol.
- For decentralised use at field level, outside of control cabinets.
- For use with UNITRONIC® SENSOR M12 cables and ETHERLINE® M12 patch cables.
- Metal housing is resistant to welding spatter.
- For operating temperatures from -20 °C to +60 °C.

Article number	Article designation	Type	M12 ports
381166712	UNITRONIC® ACCESS PN08IOLA08DIO	IO-Link master (PROFINET)	8 (A-coded) 2 (D-coded) 2 (L-coded)
381166713	UNITRONIC® ACCESS EIP08IOLA08DIO	IO-Link master (EtherNet/IP)	
381166714	UNITRONIC® ACCESS EC08IOLA08DIO	IO-Link master (EtherCAT)	
381166715	UNITRONIC® ACCESS MTCP08IOLA08DIO	IO-Link master (Modbus)	
381166716	UNITRONIC® ACCESS CCL08IOLA08DIO	IO-Link master (CC-Link IE)	

IO-Link hub

An IO-Link hub is a device used in industrial automation systems to facilitate communication between digital (non-IO-Link) sensors, actuators and an IO-Link master. The hub acts as a node that collects the signals from several classic or digital sensors and actuators and forwards them to the master via a single IO-Link port.

Advantages at a glance:
- IO-Link technology allows extended diagnostics of sensors and actuators.
- Simplified commissioning and replacement of IO-Link devices thanks to automatic configuration and plug-and-play.
- Globally standardised IO-Link technology supports all common communication protocols.
- The power supply is provided via the IO-Link master and does not require separate cabling and power supply units, which saves costs.

UNITRONIC® ACCESS HUB08 IOL

Features
- 8 slots for A-coded M12 plug connectors
- IO-Link
- Resistant to welding spatter
- IP 67 and IP 69K
- Temperature range: -40 °C to +70 °C

Benefits
- IO-Link technology allows extended diagnostics of sensors and actuators through bidirectional communication, e.g. remote maintenance of devices.
- Simplified commissioning and replacement of IO-Link devices thanks to automatic configuration and plug-and-play.
- Globally standardised IO-Link technology supports all common communication protocols.
- The power supply is provided via the IO-Link master and does not require separate cabling and power supply units, which saves costs.
- Digital signal transmission allows the use of unscreened standard cables.
- Particularly suitable for harsh environments thanks to protection class IP 67.
- Protection class IP 69K allows the use of high-pressure cleaners.

Applications
- For connecting digital sensors and actuators to an IO-Link master.
- For decentralised use at field level, outside of control cabinets.
- For use with UNITRONIC® SENSOR M12 cables.
- Metal housing is resistant to welding spatter.
- For operating temperatures from -40 °C to +70 °C.

Article number	Article designation	Type	M12 ports
381166719	UNITRONIC® ACCESS IOL08DIO08DIO	IO-Link hub	8 (A-coded) 1 (A-coded, IO-Link)

LAPP PORTFOLIO

SWITCHES AND ROUTERS (**ETHERLINE® ACCESS**)

Centralised use - standard design (unmanaged)

Centralised use - standard design (managed)

Decentralised use - compact design (unmanaged)

Decentralised use - compact design (managed)

MONITORING SOLUTIONS (**ETHERLINE® GUARD**)

Condition monitoring

REMOTE I/O DEVICES (**UNITRONIC® ACCESS**)

Digital modules (multiprotocol)

IO-Link

IO-Link master (multiprotocol)

IO-Link master (single protocol)

Product illustrations: The photographs and graphics are not to scale and are not detailed images of the respective products.

ÖLFLEX®
Power and control cables

UNITRONIC®
Data communication systems

ETHERLINE®
Data communication systems
for Ethernet technology

HITRONIC®
Optical transmission systems

EPIC®
Industrial connectors

SKINTOP®
Cable glands

SILVYN®
Protective cable conduit systems
and cable carrier systems

FLEXIMARK®
Marking systems

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