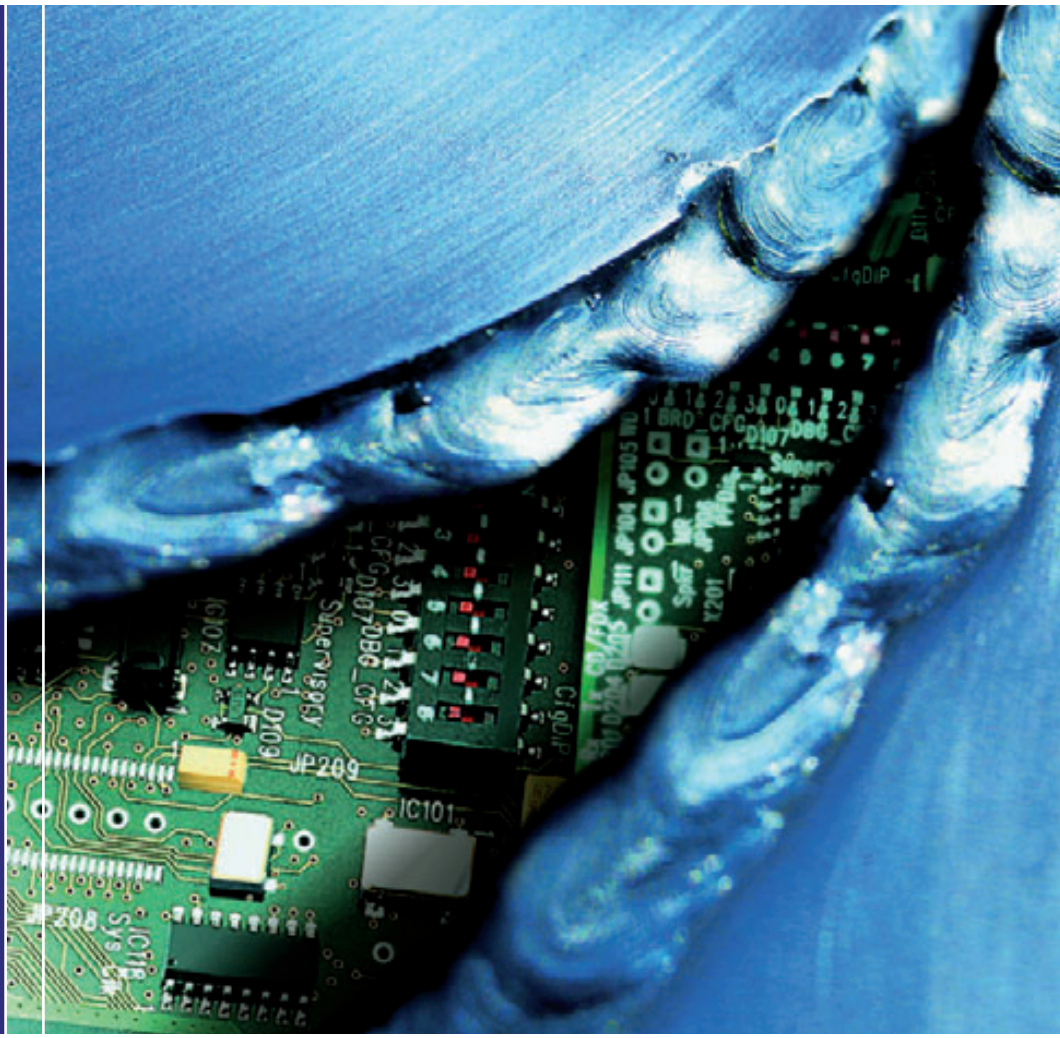
HIRSCHMANN

A BELDEN BRAND

Industrial Ethernet



Main Catalog 2008

Some errors can be really expensive.

What good are the greatest technical inventions if you are going to save on the smallest details later?

That man today is capable of great technical development is a sufficiently proven fact. Regardless of whether in production, process and traffic control technology or in building automation: from the packing industry and logistics through conveyor and robot technology, assembly machines and machine tools, presses and punching machines right up to machine and system control.

When it's a question of reliability, operating safety and availability, the slightest errors count. And these can be very expensive in the worst case. Because, especially in economically difficult times, a trouble-free automation contributes considerably to productivity and competitiveness – and protects jobs in the long term.

Therefore it is becoming increasingly important nowadays to ensure the greatest possible safety and reliability for even the smallest system components.

From the product quality through engineering and the associated service. Hirschmann™ offers a comprehensive package: with a high degree of intelligence, they not only set the latest technical standards but, with their high flexibility, ensure individual and absolutely reliable solutions at the heart of the automation – in computer and measuring technology. This minimizes risks in the system and a high system availability is built in from the start.

Safety at the press of button for us means leaving nothing to chance. Therefore every Hirschmann™ switch is rigorously tested before leaving the factory.

After all, constantly rising transmission speed with high clock frequencies demand appropriate designed high-performance switches which are not easily sidetracked. Just like our engineers who, with their long years of experience in the field of industrial automation and as the inventors of the banana plug, detect interface problems before they even occur and cause expensive faults.

The result is extremely reliable and efficient Industrial Ethernet solutions which ensure reliable data transfer even under the harshest ambient conditions.

In automation technology and mechanical engineering as well as in process and traffic automation, the shipping industry, offshore and in control rooms. The reliable and robust Industry Switches from Hirschmann™ will certainly increase the availability of your networks and guarantee your competitiveness.

Don't miss your connection: Hirschmann™ offers you flexible, highly available and future-safe network technology solutions in the usual high quality from simple switches through field bus systems to high-performance Ethernet components. Plus a comprehensive and highly qualified maintenance and service program – all under one roof.

The specialists from Hirschmann™ are always on hand to answer your questions and our worldwide distribution network guarantees you an optimum supply – so that you have not only the latest technology but also time on your side.

In this modern industrial age, one can no longer afford failures. Smaller interfaces such as Rail Switches or MICEs may be what decide standstill or progress, waste or competitiveness. It's a good idea to install future safety from the start with Hirschmann™ Industrial Ethernet components.

New standards in terms of individuality.

Flexible special solutions from Hirschmann™.

Regardless of which configuration you need, you will find the tailor-made product in the extensive Hirschmann™ standard and special solution program.

OpenRail

MICE

Hirschmann™ exhibits the same maximum flexibility in Industrial Ethernet components as in switches of the Rail and MICE series. With the OpenRail and MICE enhanced module program we offer tailor-made series individuality. According to the modular principle and with a whole range of possibilities: from the Entry Level Switch without any great management functions via the Managed Switches to the highly flexible, modularly built switches. The whole thing with the high security and fail safety level you are used to from Hirschmann™. We offer the most economical solution for every requirements – plus extra service.

Just a few mouse clicks away from the right product.

The electronic consultant asks for your individual requirements..

The Electronic Consultant is also available on the CD-ROM catalog.

The electronic consultant under **www.hirschmann.com/xpert/** takes you to our product recommendation in four fast, simple steps. It makes no difference whether it's a matter of connectors, Industrial Ethernet components or FiberINTERFACES. You select area of application, product category, criteria and requirements – and immediately receive our individual product recommendation.

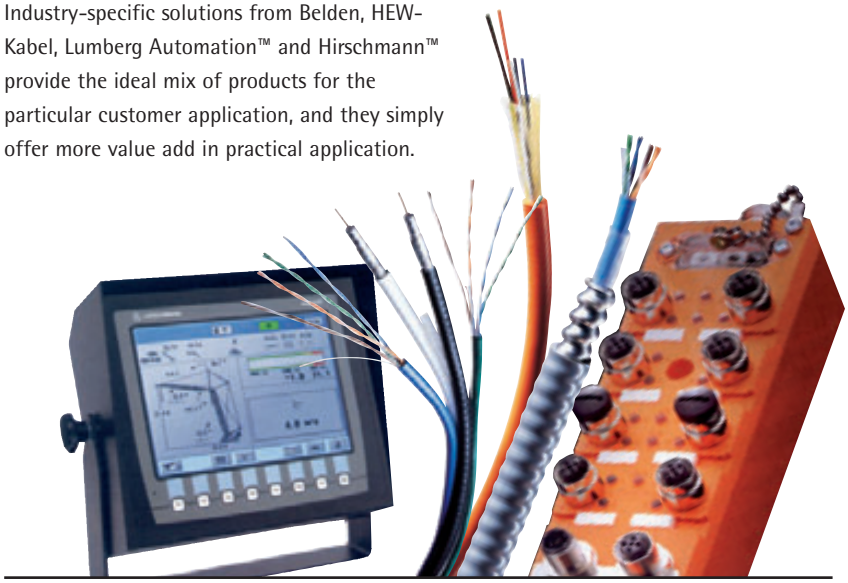
www.hirschmann.com/xpert

Closer To Your Needs.

The best connections – in all areas.

Belden, HEW-Kabel, Lumberg Automation™ and Hirschmann™ are four leading highly innovative brands which have joined forces to deliver the best products and total solutions for your applications. By combining our strenghts in the Industrial Ethernet, Industrial Connecting Solutions, Electronic Control Systems, Wire and Cable Systems and Cable Specialty business units, we have positioned ourselves to provide holistic solutions for the complete range of industrial automation applications. Our extensive and highly specialized product portfolio gives you the signal transmission tools you need at the infor mation, control and field level.

Industry-specific solutions from Belden, HEW-Kabel, Lumberg Automation™ and Hirschmann™ provide the ideal mix of products for the particular customer application, and they simply offer more value add in practical application.

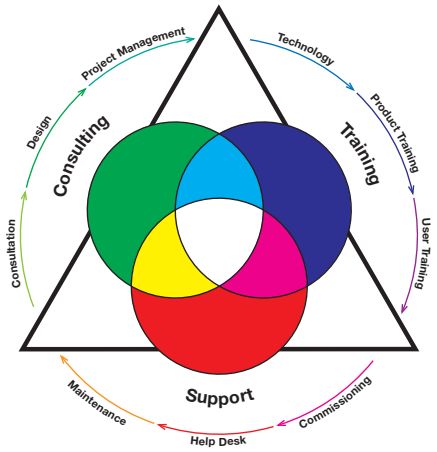


From the quality product to the top solution.

The Hirschmann™ Competence Center will help you.

In addition to prime connectors and network components, Hirschmann™ also offers the appropriate consulting, service, support and training know-how with the Competence Center to support you in the realization of your total solution without manufacturer dependence. Talk to us about your individual requirements.

www.hicomcenter.com



Under www.hicomcenter.com you will find our extensive maintenance and service offer which ranges from pre-sales consulting to after-sales support.

Connecting to the system.

We rarely bring out good products in isolation, instead they are issued as a part of a large family.

Company-wide universal networks suitable for industrial applications with high levels of accessibility – that is what the product families Rail, MICE and MACH 3000 have in common. Because they all support the Hirschmann™ redundancy concept HIPER-Ring. As a result, the reconfiguration of the network is done in only fractions of seconds.

RAIL TRANSCEIVERS AND HUBS FOR INDUSTRY PAGE 16

Rail Transceivers and Hubs

- The special industrial design without fans extends your range of applications.
- Plug-in connections and extensive status displays save time during commissioning.
- Rail products allow for data connections between individual components over distances up to 20 km.

No other Hirschmann™ product has proven itself better under the great demands of industrial automation technology than the sturdy and perfectly matched members of the Rail Family. Simply snap our standard products made especially for industrial applications with a 24-V power supply onto a DIN rail and you're ready to go. As a result, these products have provided exceptional performance for many years in numerous company-wide networks. Transceivers and hubs of the Rail Family also connect you to the Ethernet future of automation, as you adapt the network optimally to the needs of your system – whenever you want.


RT2 TX/FX


RH1-TP

RAIL SWITCHES UNMANAGED AND MANAGED PAGE 20

Rail Switches

- Excellent price per port ratio and feature set.
- High-operating reliability and zero compromise industrial suitability make Hirschmann™ the obvious choice.
- With autonegotiation, autopolarity, autocrossing and clear diagnosis displays, the commissioning of a managed Rail Switch can be achieved at exceptionally high speed.

Different requirements require different solutions: high port densities, high cascading depth or high operating temperatures? No problem for the world's most complete rail product portfolio! Hirschmann™ Rail Switches with or without management functionality and high-temperature ranges come ready to handle every requirement. The modular platform "OpenRail" enables individual customer-specific configuration of the products. Expect no less from an industrial switch.


SPIDER 8TX


RS20-1600M2M2


RS30-0802

COMPACT RAIL SWITCHES FOR HARSH ENVIRONMENTAL CONDITIONS

PAGE 82

RSR

- The rugged new rail switches offer maximum reliability in mission-critical applications
- Uplink Ports can be configured separately
- Wide input range (18 VDC up to 300 VAC/DC)

When the going gets tough for DIN rail switches (i. e. shock, vibration and temperatures fluctuating between – 40° C and + 85° C), the rugged new Hirschmann™ rail switches deliver the performance you need. Hirschmann rail switches are built to take the punishment in marine, rail, road and other transportation automation applications including fiberoptic rail networks, train station passenger information systems, conveyors and airport runway lights.

RSR

MODULARE INDUSTRIE-SWITCHES

PAGE 86

MICE

- Due to the modular construction and integration in the "OpenRail" concept, you can individually assemble functions and connections.
- Long-term accessibility and maximum flexibility mean a high level of investment protection.
- The label fields make commissioning easier and save time during service actions.

Modular Industrial Communication Equipment or MICE, provides total freedom in the network. Irrespective of whether you want to use the intelligent product family centrally in the control cabinet or in a decentralized manner in the distribution cabinet, MICE Switches and media modules are, quite simply, capable of handling every requirement in the Industrial Ethernet Network. The use of our extremely flexible MICE Family gives you a double benefit: you profit from the high accessibility of the network and simultaneously optimize inventory.

MS20

MS30

SECURITY SYSTEM FOR INDUSTRY

PAGE 126

EAGLE

Take cover:

- The Firewall and VPN system can be integrated in existing networks without changing the IP addresses.
- Communication can be protected as required with the scalable security functionality.
- Industrially compatible design with redundant 24-V power supply, DIN rail mounting and IP20, no fan.

Conscious or accidental data manipulation causes damages to company networks in millions every year. But there is a way to protect yourself: the state-of-the-art security system EAGLE mGuard guarantees protection of your data and availability of communication in your production networks with its Firewall and Virtual Private Network (VPN) technology.

EAGLE mGuard

EAGLE 20

WIRELESS ETHERNET AP/AC

PAGE 136

BAT

- WLAN with high performance up to 108Mbit/s for high performance indoor and outdoor connections.
- Networks are built up quickly and stably with the support of a suitable antenna portfolio.
- Redundancy in the power supply, the WLAN connection and the firmware management are examples of particularly high operating safety.
- Fast roaming, an integrated Firewall, WLAN encryption with IEEE 802.11i and authentication are keywords for maximum connection security.

Hirschmann™ takes the next step towards a wireless future and, with the BAT54 Family, offers everything you need for a safe WLAN communication in the industrial environment. Mobile applications are now supported with higher performance and maximum security. A stable hardware and efficient software join forces in a powerful package.

BAT54-Rail

BAT54-F

STANDARDIZED M12 TECHNOLOG

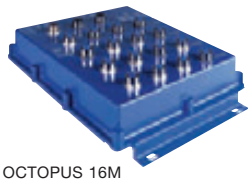
PAGE 150

OCTOPUS IP67 System

- In sensor and actuator applications, OCTOPUS takes over tasks which often used to be done by field buses.
- OCTOPUS can be implemented directly in the field without a protective housing to save space and costs.
- The 4-pin M12-D technology is recognized by the industry and relevant user organizations as a standard.

The onslaught of Industrial Ethernet at field level is unstoppable in many places – and with the IP67 technology on M12 basis, Hirschmann™ has set the points in the direction of future technology. We offer you the possibility to implement an open system for the first time on the factory floor.

OCTOPUS in protection type IP67 can stand a lot more – even directly on the machine.



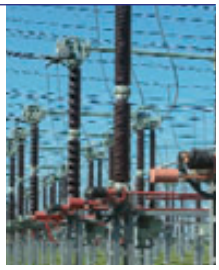
OCTOPUS 16M

MM3-4TX5

SWITCHES FOR HARSH ENVIRONMENTAL CONDITIONS

PAGE 164

MACH 1000



- Gigabit- and Fast-Ethernet switches
- High port density, up to 26 ports
- User-selectable port assignment
- Temperature range: - 40° C up to + 85° C

The ruggedized Hirschmann™ substation switches have been specially designed to handle demanding electrical power generation and distribution applications. The switches are ideal for new installations and retrofit of existing substations where ambient temperatures can be extremely high.

MACH1000

MODULAR INDUSTRIAL BACKBONE SWITCHES AND ROUTERS

PAGE 168

MACH 4000

- The redundancy concept encompasses the complete range, from the Gigabit-Backbone to the industrial devices.
- User specific security functions prevent communication by unknown devices.

Today, devices need to convince in a wide range of applications with high performance, very high flexibility and extraordinary intelligence. The redundancy concept is consistent from the Gigabit-Backbone to the machine for industry. The new MACH4000 Switches and routers in the backbone area, where many networks converge, enable a maximum transmission performance with up to 10Gigabit-Ethernet. This is not only demanded in factory and traffic automation but also increasingly on ships where the Ethernet will be the standard in future. of the high modularity of Hirschmann™ switches, you only pay for the hardware you really need.

MACH4002 48G+3X

MACH4002 24G+3X

INDUSTRIAL WORKGROUP SWITCHES

PAGE 186

MACH100/PowerLION

- Industrial Workgroup Switches. The quality that customers expect from Hirschmann™ – designed for control room and light industrial applications.
- Available with fixed port count or as modular workgroup switches

The high-quality modular workgroup switch links nodes via copper or fiber cable and connects them to the backbone. The switch supports seamless connectivity over a single medium, or it can function as a media converter. The feature set includes 8 port modules (Twisted Pair, SFP, Multimode and Singlemode).
With its extensive range of redundancy features, the MACH100 is the ideal interface between the industrial and office worlds, e. g. for control room installation in factory and process automation applications.

MACH100

PowerLION-24 TP

NETWORK MANAGEMENT

PAGE 196

Industrial HiVision

- The display of the network topology enables you to find errors and “bottlenecks”, for example, or to increase the network security.
- By specialization of the products in network monitoring (Industrial HiVision), device configuration (HiVision) and SCADA linking, the network management can be adapted to individual requirements.
- By linking the costs to the number of users (Industrial HiVision) the investment already pays off for smaller networks.

Exact knowledge of the network topology is essential to be able to monitor industrial networks reliably. The administrator has to know how and where which components and devices are connected in order to be able to manage complex networks with a single software and intervene or maintain if necessary.

Industrial HiVision projects your network with its hierarchical structure and topology – regardless of which manufacturer has provided the terminating equipment such as PLC controllers, I/O components or PCs. The user-friendly software therefore remains open for all programmable logic controllers and distributed I/O components up to the switch, router, etc. The network data can be fully integrated in SCADA systems via the OPC and ActiveX interfaces.

The new standard IEEE 802.1AB now enables device data to be exchanged in the network via the defined LLDP protocol (Link Layer Discovery Protocol). The switches adopt a key role – providing they support LLDP, which is the case with all Industrial Ethernet switches from Hirschmann™.

Industrial HiVision

PAGE 212

Transceiver and System Accessories

- Each and every accessory offers a reasonable solution in practice.
- All our accessories are perfectly adapted to each product family.
- Like all Hirschmann™ products, the system accessories satisfy the high demands of our clients with regards to quality, reliability and longevity.

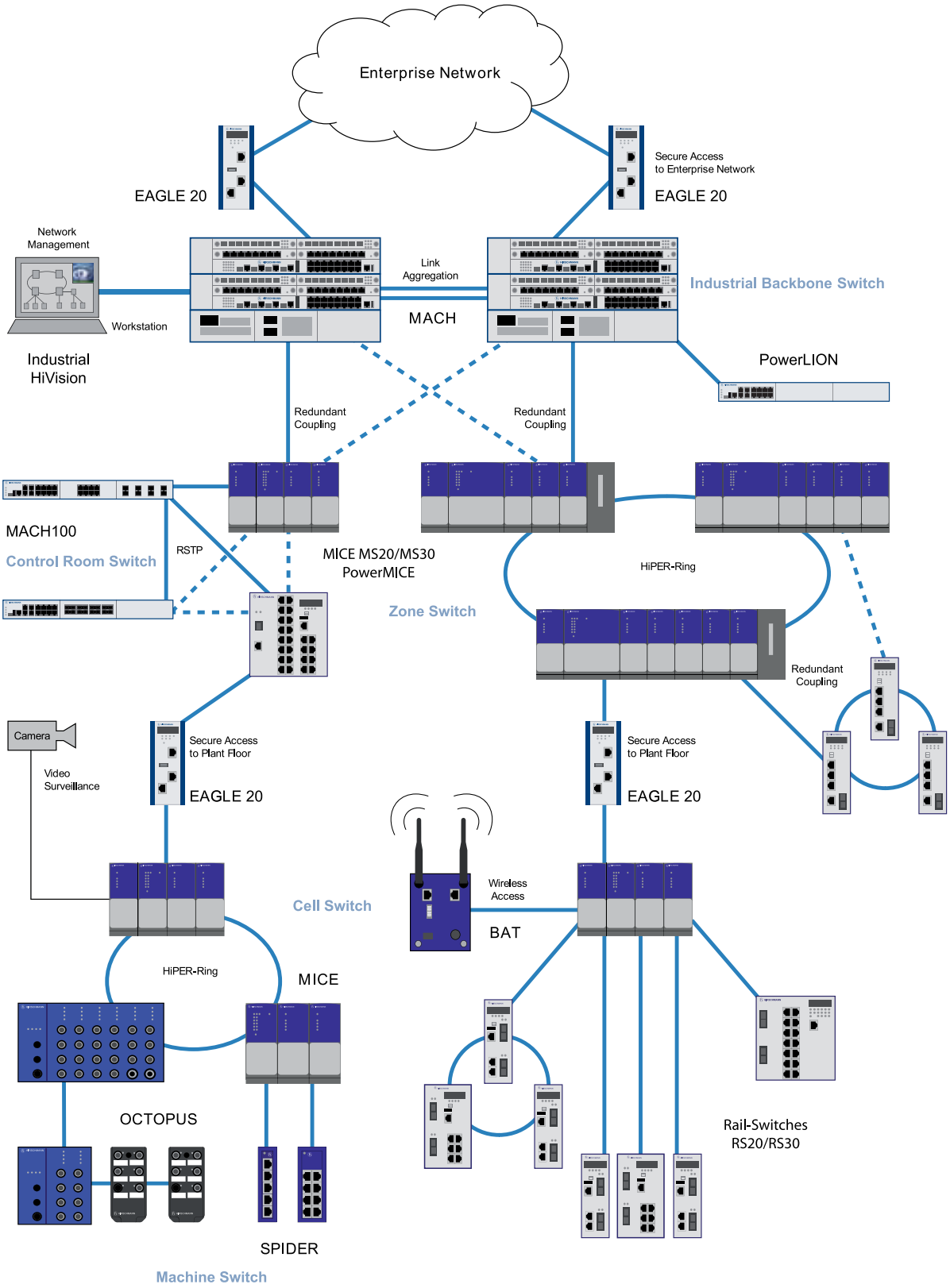
For convenience, functionality and the highest possible level of security for your equipment, it is the small things that make the biggest difference. That is why the right accessories really round off each product family.

Yet more good reasons for you to trust accessories exclusively from Hirschmann™.

RPS 80 EEC ACA 21-USB M-SFP Transceiver

Hirschmann™ Industrial Ethernet Solutions.

Product Portfolio



		 Transceiver, Hubs and Entry Level Switches **Rail-Family** Page 16-19	 Compact Industrial Switches **OpenRail-System** Page 20-81	 Modular Industrial Switches **OpenRail-System** Page 86-125	 Security System for Industry **EAGLEmGuard** Page 126-135
Functions	**Product families**				
	Transceivers	•			
	Hubs	•			
	Unmanaged Switches	•	•		
	Managed Switches		•	•	
	Modular Switches			•	
	Workgroup Switches				
	Routers			•	•
	Security (Firewall/VPN)				•
	Diagnosis and configuration software				
Product Characteristics	**Installation and Supply**				
	DIN Rail 35 mm	•	•	•	•
	19"-Rack				
	24V DC	•	•	•	•
	48V DC		•	•	•
	230V AC				
	Ambient conditions				
	Betriebstemperatur: 0 °C bis 50 °C				
	Betriebstemperatur: 0 °C bis > 50 °C	•	•	•	•
	Betriebstemperatur: -40 °C bis 70 °C	•	•	•	
	Betriebstemperatur: -40 °C bis 85 °C				
	Protection type: IP20/30	•	•	•	•
	Protection type: IP65/67				
	Port count (Hubs or Switches)				
	< 8	•	•	•	•
	8 bis 24		•	•	
	> 24		•	•	
	Standard				
	Ethernet (10 Mbit/s)	•	•	•	•
	Fast-Ethernet (100 Mbit/s)	•	•	•	•
	Gigabit-Ethernet (1000 Mbit/s)		•	•	
	10 Gigabit-Ethernet (10000 Mbit/s)				
	Redundancy				
	Ring structure (HIPER-Ring)		•	•	
	Redundant coupling		•	•	
	Spanning Tree/Rapid Spanning Tree		– / •	– / •	
	Link Aggregation		•	•	
	Service				
	Web-based Managem./SNMP Support		•	•	•
	Port mirroring		•	•	
	RMON		•	•	
	VLAN		•	•	
	IP-Multicast control (IGMP, GMRP)		•	•	
	Access control (Port Security)		•	•	•
	Password control		•	•	•
	Auto-configuration adapter		•	•	•
	Signal contact/Fault relais	•	•	•	•
	Approval				
	UL/CSA	•	•	•	•
	Germanischer Lloyd		•	•	•
Field of Application	**Machines** (Printing machines machine tools, generators, etc.)	•	•	•	•
	Installations (Manufa. cells, sewage treatment plants, windparks, etc.)	•	•	•	•
	Offices (Production planning, MIS, ERP, MES, etc.)				•
	Buildings (Produktion halls, adm. buildings, process control, etc.)		•	•	•
	Locations/Backbone (Factories, power stations etc.)			•	•
	Roads/Transport media (motorways,, metros, tunnels, pipelines, shipping, etc.)	•	•	•	•

Wireless
Ethernet AP/AC

BAT
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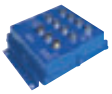

Standardized
M12 Technology

OCTOPUS IP67
Page 150-163

Modular industrial
Backbone Switch/Router

MACH4000
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Ruggedized Switches

RSR/MACH1000
Page 82-85/164-167

Industrial
Workgroup Switches

MACH100/PowerLION
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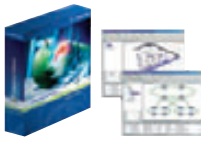

Network management

Industrial HiVision
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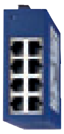
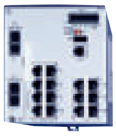
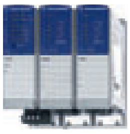
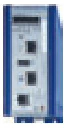
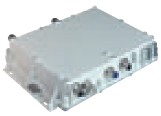
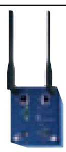
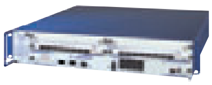
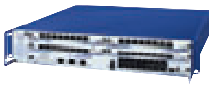



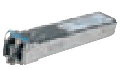
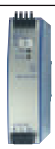







Always one step ahead.

All our experience goes into the Rail Transceivers and Hubs.

- **Rail Transceivers and Hubs allow an optimum adaptation of industrial networks to the requirements of a system at any time.**
- **Long distance connection of remote devices: Rail transceiver (100BASE-TX) with twisted pair and optical port.**
- **Smaller networks: Rail hub RH1-TP (10Mbit/s) with four twisted pair ports.**

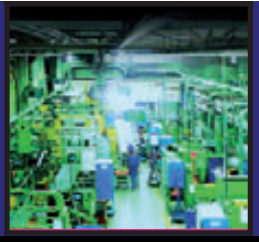
Individual devices may have to be connected to Ethernet at low costs over a distance of 20 kilometers. No problem for the rail transceivers from Hirschmann™ which are also way ahead in terms of convenience. Because, like all representatives of the Rail Family, rail transceivers can be snapped to the DIN rail in no time. An additional contact offers you the possibility of acquiring device status messages directly as process data.

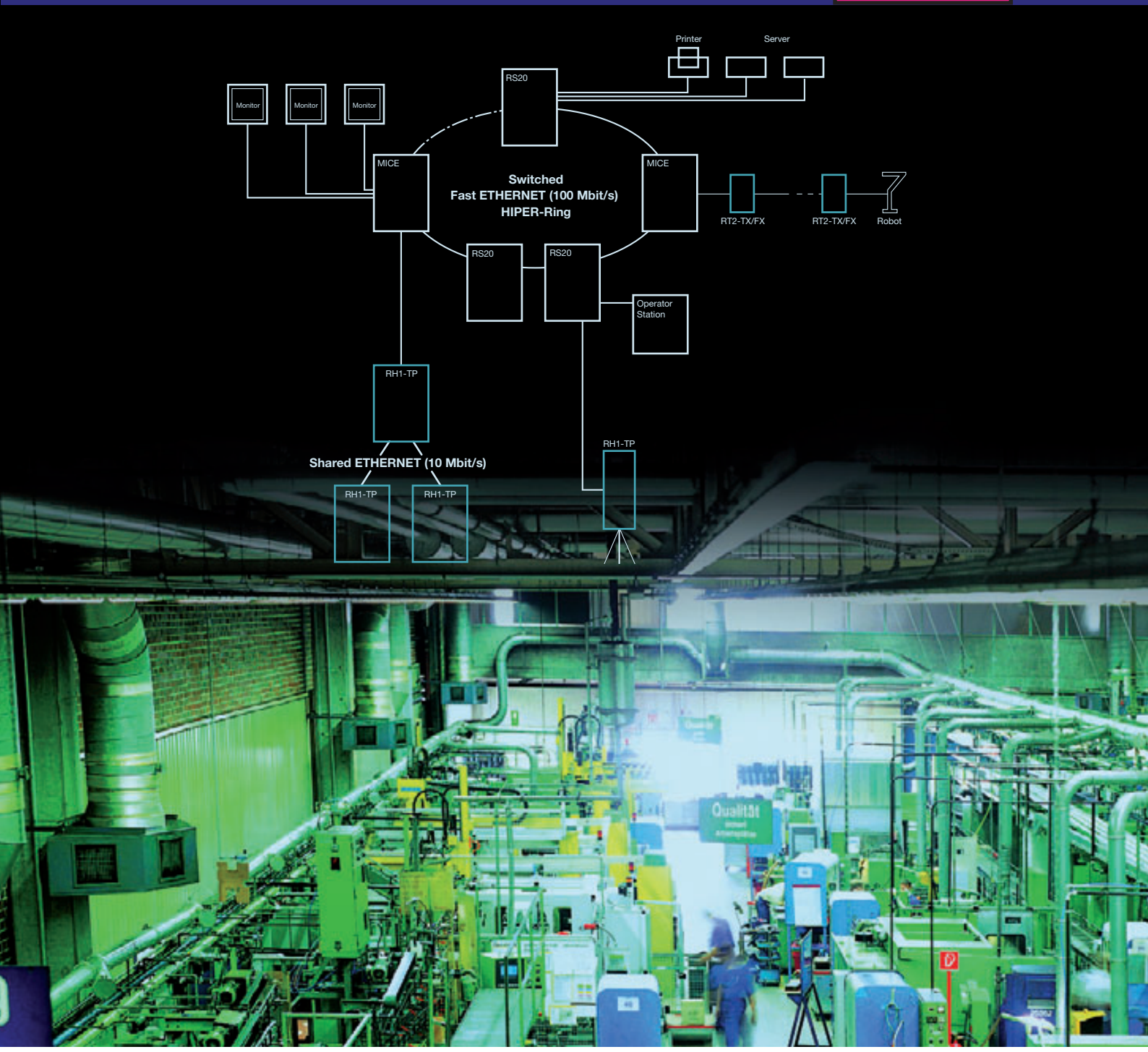
Rail transceivers and hubs from Hirschmann™ are specially designed for no-compromise use in industrial automation – and therefore all representatives of the Rail Family have something in common: the indestructible robustness and easily pluggable connections which save a lot of time in commissioning. To ensure you stay more than a little ahead in global competition.

RT2-TX/FX

RH1-TP

Accessories
for this family you can find on the following pages:
System Accessories Page 220





Hirschmann™ Competence Center

Because innovative Rail Switches also require an appropriate service program, the Hirschmann™ Competence Center also offers suitable consulting services in the network planning: **Network optimization check, risk reduction consulting, network technology evaluation and network baselining consulting**. Plus the following trainings: CP1d Rail Family in theory and practice, IRd overview of the Hirschmann™ Rail Family, CPUd Update Rail Family and CB1e Industrial Ethernet/basic technical principles. In addition, we provide support with certification testing, installation and configuration as well as our service hotline and later offer Advance Hardware Replacement and warranty extensions.

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Industrial Ethernet

Rail Family > **Rail Hubs**

Type	RH1-CX+ (NAVY)	RH1-TP
Order No.	943 701-002	943 639-002
		
	Industrial Ethernet Rail Hub, Ethernet (10 Mbit/s)	Industrial Ethernet Rail Hub, Ethernet (10 Mbit/s)
Product description		
Port type and quantity	1 x 10BASE2, CX cable, BNC socket, 1 x 10BASE-FL, MM cable, ST (BFOC) sockets, 2 x 10BASE-T, TP cable, RJ45 sockets	4 x 10BASE-T, TP cable, RJ45 sockets
More Interfaces		
Power supply/signaling contact	1 plug-in terminal block, 5-pin	1 plug-in terminal block, 5-pin
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 2300 m, 10 dB link budget at 850 nm, A = 3 dB/km, 3 dB reserve, B = 400 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 3100 m, 13 dB link budget at 850 nm, A = 3.2 dB/km, 3 dB reserve, B = 200 MHz x km	
Coaxial (CX)	0 -185 m	
Network size - cascadibility		
Propagation equivalent	port <-> port: 240 m	TP port <-> TP port: 190 m
Path variability value	port <-> port: 3BT	TP port <-> TP port: 4 BT
Path delay value		
Power requirements		
Operating voltage	24 V DC (-25% to +30%)	24 V DC (-25% to +30%)
Current consumption at 24 V DC	max. 300 mA	max. 130 mA
Service		
Diagnostics	LEDs (power, data, link status, error), signal contact/fault relais (24 V DC / 1 A)	LEDs (power, data, link status), signal contact/Fault relais (24 V DC / 1 A)
Redundancy		
Redundancy functions	redundant 24 V power supply	redundant 24 V power supply
Ambient conditions		
Operating temperature	0 °C to +60 °C	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%	10% to 95%
MTBF	78.1 years; MIL-HDBK 217F: Gb 25 °C	159.7 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	47 mm x 135 mm x 129 mm	40 mm x 125 mm x 80 mm
Mounting	DIN Rail 35 mm	DIN Rail 35 mm
Weight	340 g	530 g
Protection class	IP 20	IP 30
Mechanical stability		
IEC 60068-2-27 shock	15g, 11ms duration, 18 shocks	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity		
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A	EN 55022 Class A
Approvals		
Safety of industrial control equipment		cUL 508 (E175531)
Hazardous locations		cUL 1604 Class 1 Div 2 (E203960)
Safety of information technology equipment		cUL 60950 (E168643)
FM 3611 Class 1 Div 2		FM 3611 Class 1 Div 2 (3012523)
FM 3810		FM 3810 (3012523)
Germanischer Lloyd	Germanischer Lloyd (15 662 - 00 HH)	Germanischer Lloyd (15 662 - 00 HH)
Scope of delivery and accessories		
Scope of delivery	device, terminal block, operating manual	device, terminal block, operating manual
Accessories to order separately	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Industrial Ethernet

Rail Family > **Rail Transceiver**

Type	RT2-TX/FX	RT2-TX/FX-SM
Order No.	943 658-002	943 658-032
		
	Industrial Ethernet media converter, 100BASE-FX-Multimode and 100BASE-TX	Industrial Ethernet media converter 100BASE-FX-single mode and 100BASE-TX
Product description		
Port type and quantity	1 x 100BASE-FX, MM cables, SC sockets, 1 x 100BASE-TX, TP cable, RJ45 socket	1 x 100BASE-FX, SM cables, SC sockets, 1 x 100BASE-TX, TP cable, RJ45 socket
More Interfaces		
Power supply/signaling contact	1 plug-in terminal block, 5-pin	1 plug-in terminal block, 5-pin
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Network size - cascadibility		
Propagation equivalent		
Path variability value		
Path delay value	84 BT (Class 2 Repeater)	84 BT (Class 2 Repeater)
Power requirements		
Operating voltage	24 V DC (-25% to +30%)	24 V DC (-25% to +30%)
Current consumption at 24 V DC	max. 240 mA	max. 240 mA
Service		
Diagnostics	LEDs (power, data, link status), signal contact (24 V DC / 1 A)	LEDs (power, data, link status), signal contact (24 V DC / 1 A)
Redundancy		
Redundancy functions	redundant 24 V power supply	redundant 24 V power supply
Mechanical construction		
Dimensions (W x H x D)	47 mm x 135 mm x 111 mm	47 mm x 135 mm x 111 mm
Mounting	DIN Rail 35 mm	DIN Rail 35 mm
Weight	230 g	230 g
Protection class	IP 20	IP 20
Ambient conditions		
Operating temperature	0 °C to +60 °C	0 °C to +60 °C
Storage/transport temperature	-25 °C to +75 °C	-25 °C to +75 °C
Relative humidity (non-condensing)	10% to 95%	10% to 95%
MTBF	137 years; MIL-HDBK 217F: Gb 25 °C	137 years; MIL-HDBK 217F: Gb 25 °C
Mechanical stability		
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line	power line: 1 kV (line/earth), 0.5 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)	10 V (150 kHz - 80 MHz)
EMC emitted immunity		
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A	EN 55022 Class A
Approvals		
Safety of industrial control equipment	cUL 508 (E175531)	cUL 508 (E175531)
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Safety of information technology equipment	cUL 60950 (E168643)	cUL 60950 (E168643)
FM 3611 Class 1 Div 2		
ATEX 100a	EEx nL IIC T4	EEx nL IIC T4
Germanischer Lloyd	Germanischer Lloyd (15662-00HH)	
Scope of delivery and accessories		
Scope of delivery	device, terminal block, operating manual	device, terminal block, operating manual
Accessories to order separately	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

So good yet so, favorably priced.

Unmanaged and EEC Rail Switches are convincing in their variety and attractive price.

- **Rail Switches without manage ment function with favorable price per port ratio.**
- **EEC switches extend the appli- cation range with operatin temperatures of – 40° C up to + 70° C.**

- **SPIDER Switches with low weight, compact dimensions and easy handling for plug&play with autonegotiation, auto- crossing and autopolarity.**
- **Licensed for use in vehicles (e1).**
- **High industrial compatibility, DIN rail or wall mounting.**

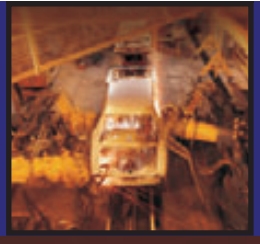
Our unmanaged Rail Switches are efficient all rounders which make much possible at a favorable port price: for example, the flexible planning and optimum adaptation to the geographic conditions of an automation solution or simple commissio- ning on site. And, because critical conditions should not be an issue, EEC rail switches as spe- cialists ensure an extended operating range with temperatures of – 40° C up to + 70° C. Without setting anything aside: fast DIN rail mounting, high net- work and system availability and redundant 24 V power supply, a signal contact for telediagnosis – it's all there. From simple applications to applica- tions with high port densities, with the Rail Family we have a switch tailor-made for all demands which is designed mission-critical from the start. This guarantees a reassuringly high operating reliability because not even electromagnetic inter- ference fields or mechanical stress can bother a real Hirschmann™ switch.

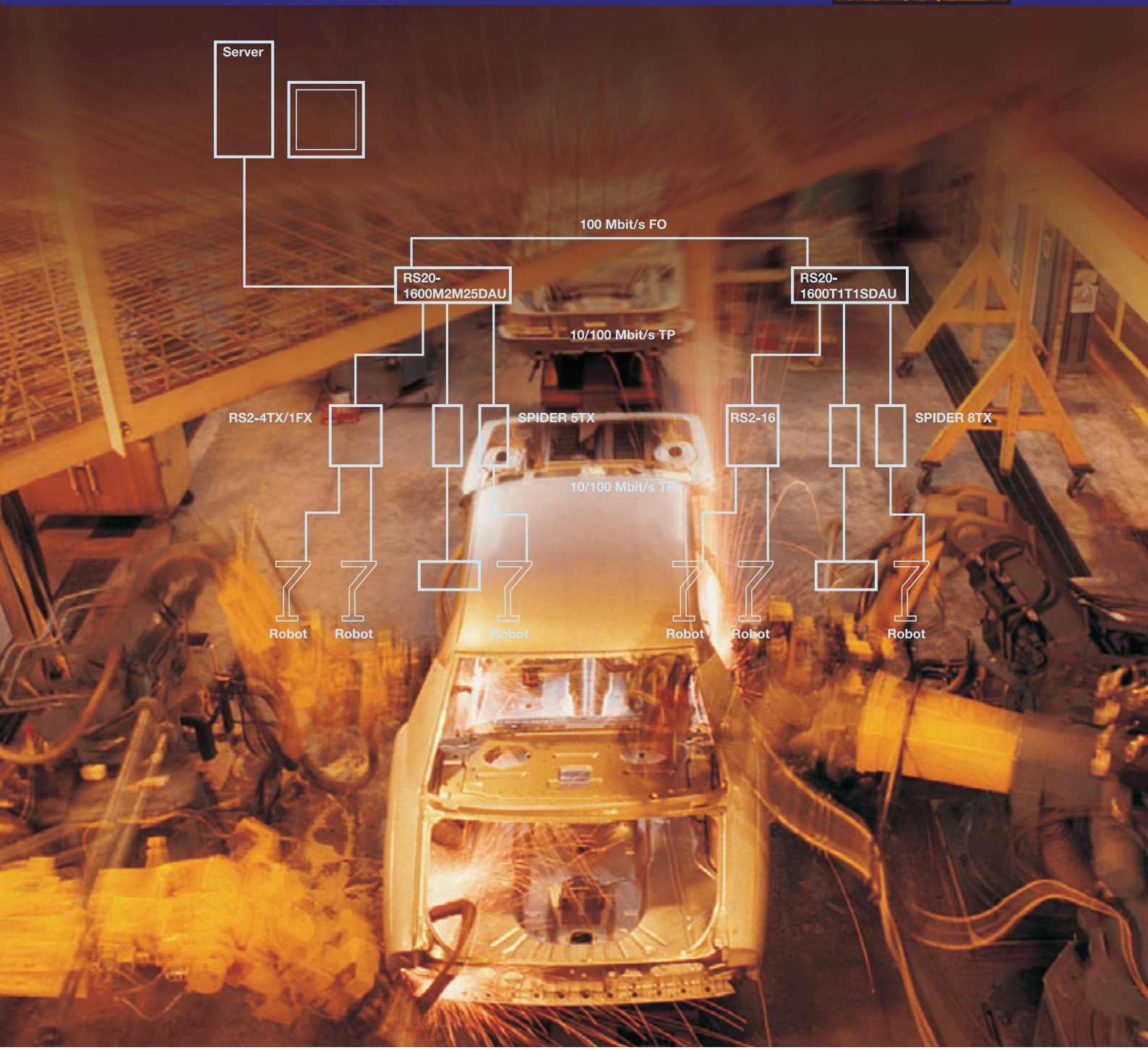
RS2-4TX EEC

RS2-TX

SPIDER 8TX

Accessories
for this family you can find on the following pages:
Transceiver Page 212
System Accessories Page 220





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Industrial Ethernet

Rail Family > **Unmanaged Rail-Switches**

Type	RS2-TX	RS2-3TX/2FX EEC
Order No.	943 686-003	943 771-001
		
	Unmanaged Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Unmanaged Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description Port type and quantity	8 x 10/100Base-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	3 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 2 x 100BASE-FX, MM cables, SC sockets
More Interfaces Power supply/signaling contact	1 plug-in terminal block, 5-pin	1 plug-in terminal block, 5-pin
Network size - length of cable Twisted pair (TP) Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm Single mode fiber (LH) 9/125 µm (long haul transceiver)	0 - 100 m	0 - 100 m 0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km 0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Network size - cascadibility Line - / star topology	any	any
Power requirements Operating voltage Current consumption at 24 V DC Power consumption	24 V DC (-25% to +30%) max. 290 mA max. 7,0 W at 24 V DC	24 V DC (-25% to +30%) max. 230 mA max. 5,9 at 24 V DC
Service Diagnostics	LEDs (power, link status, data, error), signal contact / fault relais (24 V DC / 1 A)	LEDs (power, link status, data, error), signal contact / fault relais (24 V DC / 1 A)
Redundancy Redundancy functions	redundant 24 V power supply	redundant 24 V power supply
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing) MTBF	0°C to +60°C -25 °C to +70 °C 10% to 95% 61 years; MIL-HDBK 217F: Gb 25 °C	-40 °C to +70 °C -40 °C to +85 °C 10% to 95% 43.4 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Dimensions (W x H x D) Mounting Weight Protection class	47 mm x 135 mm x 111 mm DIN Rail 35 mm 230 g IP20	47 mm x 135 mm x 111 mm DIN Rail 35 mm 320 g IP 20
Mechanical stability IEC 60068-2-27 shock IEC 60068-2-6 vibration	15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity EN 61000-4-2 electrostatic discharge (ESD) EN 61000-4-3 electromagnetic field EN 61000-4-4 fast transients (burst) EN 61000-4-5 surge voltage EN 61000-4-6 conducted immunity	6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)	6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity FCC CFR47 Part 15 EN 55022	FCC CFR47 Part 15 Class A EN 55022 Class A	FCC CFR47 Part 15 Class A EN 55022 Class A
Approvals Safety of industrial control equipment EMV regulations for assembly in vehicles Hazardous locations Employment in vehicles Safety of information technology equipment Germanischer Lloyd	cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) cUL 60950 (E168643) Germanischer Lloyd (15 662 - 00 HH)	cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) cUL 60950 (E168643) Germanischer Lloyd (15 662 - 00 HH)
Scope of delivery and accessories Scope of delivery Accessories to order separately	device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame	device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Industrial Ethernet

Rail Family > **Unmanaged Rail-Switches**

RS2-3TX/2FX-SM EEC	RS2-4TX EEC	RS2-4TX/1FX EEC
943 772-001	943 819-001	943 773-001
		
Unmanaged Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Unmanaged Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Unmanaged Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
3 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 2 x 100BASE-FX, SM cables, SC sockets	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 1 x 100BASE-FX, MM cable, SC sockets
1 plug-in terminal block, 5-pin	1 plug-in terminal block, 5-pin	1 plug-in terminal block, 5-pin
0 - 100 m 0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)	0 - 100 m	0 - 100 m 0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km 0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
any	any	any
24 V DC (-25% to +30%) max. 230 mA max. 5,9 W at 24 V DC	24 V DC power supply (-25% to +30%) max. 180 mA max 4,8 W at 24 V DC	24 V DC (-25% to +30%) max. 220 mA max. 5,4 W at 24 DC
LEDs (power, link status, data, error),signal contact / fault relais (24 V DC / 1 A)	LEDs (power, link status, data, error), signal contact / fault relais (24 V DC / 1 A)	LEDs (power, link status, data, error), signal contact / fault relais (24 V DC / 1 A)
fedundant 24 V power supply	redundant 24 V power supply	redundant 24 V power supply
-40 °C to +70 °C -40 °C to +85 °C 10% to 95% 47.2 years; MIL-HDBK 217F: Gb 25 °C	-40 °C to +70 °C -40 °C to +85 °C 10% to 95% 68.5 years; MIL-HDBK 217F: Gb 25 °C	-40 °C to +70 °C -40 °C to +85 °C 10% to 95% 51.4 years; MIL-HDBK 217F: Gb 25 °C
47 mm x 135 mm x 111 mm DIN Rail 35 mm 320 g IP 20	47 mm x 135 mm x 111 mm DIN Rail 35 mm 300 g IP 20	47 mm x 135 mm x 111 mm DIN Rail 35 mm 320 g IP 20
15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)	6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)	6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
FCC CFR47 Part 15 Class A EN 55022 Class A	FCC CFR47 Part 15 Class A EN 55022 Class A	FCC CFR47 Part 15 Class A EN 55022 Class A
cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) cUL 60950 (E168643) Germanischer Lloyd (15 662 - 00 HH)	cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) cUL 60950 (E168643) Germanischer Lloyd (15 662 - 00 HH)	cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) cUL 60950 (E168643) Germanischer Lloyd (15 662 - 00 HH)
device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame	device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame	device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Industrial Ethernet

Rail Family > **Unmanaged Rail-Switches**

Type	RS2-4TX/1FX-SM EEC	RS2-5TX
Order No.	943 774-001	943 732-003
		
	Unmanaged Industrial Ethernet Rail Switch Store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Unmanaged Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description Port type and quantity	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 1 x 100BASE-FX, SM cable, SC sockets	5 x 10/100Base-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
More Interfaces Power supply/signaling contact	1 plug-in terminal block, 5-pin	1 plug-in terminal block, 5-pin / no signal contact
Network size - length of cable Twisted pair (TP) Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm Single mode fiber (LH) 9/125 µm (long haul transceiver)	0 - 100 m 0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)	0 - 100 m
Network size - cascadibility Line - / star topology	any	any
Power requirements Operating voltage Current consumption at 24 V DC Power consumption	24 V DC (-25% to +30%) Max. 220 mA max 5,4 W at 24 V DC	24 V DC (-25% to +30%) max. 130 mA max. 2,6 W at 24 V DC
Service Diagnostics	LEDs (power, link status, data, error), signal contact / fault relais (24 V DC / 1 A)	LEDs (power, link status, data, error)
Redundancy Redundancy functions	redundant 24 V power supply	redundant 24 V power supply
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing) MTBF	-40 °C to +70 °C -40 °C to +85 °C 10% to 95% 54 years; MIL-HDBK 217F: Gb 25 °C	0 °C to +60 °C -25 °C to +70 °C 10% to 95% 116.3 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Dimensions (W x H x D) Mounting Weight Protection class	47 mm x 135 mm x 111 mm DIN Rail 35 mm 320 g IP 20	40 mm x 145 mm x 80 mm DIN Rail 35 mm 520 g IP 20
Mechanical stability IEC 60068-2-27 shock IEC 60068-2-6 vibration	15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	15 g, 11 ms duration, 18 shocks 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity EN 61000-4-2 electrostatic discharge (ESD) EN 61000-4-3 electromagnetic field EN 61000-4-4 fast transients (burst) EN 61000-4-5 surge voltage EN 61000-4-6 conducted immunity	6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)	4 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 1 kV (line/earth), 0.5 kV (line/line), 1 kV data line 10 V (150 kHz - 80 MHz)
EMC emitted immunity FCC CFR47 Part 15 EN 55022	FCC CFR47 Part 15 Class A EN 55022 Class A	FCC CFR47 Part 15 Class A EN 55022 Class A
Approvals Safety of industrial control equipment EMV regulations for assembly in vehicles Hazardous locations Employment in vehicles Safety of information technology equipment Germanischer Lloyd	cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) cUL 60950 (E168643) Germanischer Lloyd (15 662 - 00 HH)	cUL 508 (E175531) cUL 60950 (E168643)
Scope of delivery and accessories Scope of delivery Accessories to order separately	device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame	device, terminal block, operating manual rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

RS2-5TX/FX

943 732-103

Unmanaged Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)

4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 1 x 100BASE-FX, MM cable, MTRJ socket

1 plug-in terminal block, 5-pin / no signal contact

0 - 100 m
0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km

any

24 V DC (-25% to +30%)
max. 180 mA
max. 4,0 W at 24 V DC

LEDs (power, link status, data, error)

redundant 24 V power supply

0 °C to +60 °C
-25 °C to +70 °C
10% to 95%
74,4 years; MIL-HDBK 217F: Gb 25 °C

40 mm x 145 mm x 80 mm
DIN Rail 35 mm
520 g
IP 20

15 g, 11 ms duration, 18 shocks
3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.

4 kV contact discharge, 8 kV air discharge
10 V/m
2 kV power line, 1 kV data line
power line: 1 kV (line/earth), 0.5 kV (line/line), 1 kV data line
10 V (150 kHz - 80 MHz)

FCC CFR47 Part 15 Class A
EN 55022 Class A

cUL 508 (E175531)

cUL 60950 (E168643)

device, terminal block, operating manual
rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

OpenRail > Compact > Unmanaged Switches

Type	RS20-0800T1T1SDAUHH
Order No.	RS20-0800T1T1SDAUHH
	
	8 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	8 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 6 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	221 mA
Current consumption at 48 V DC	111 mA
Power output in Btu (IT) h	18.1
Ambient conditions	
Operating temperature	0° to +60°C
Service	
Diagnostics	LEDs (power, link status, data, error
Ambient conditions	
Storage/transport temperature	-40° to +70°C
Service	
Redundancy functions	redundant 24 V power supply
Ambient conditions	
Relative humidity (non-condensing)	10% to 95%
MTBF	63.3 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	74 x 131 x 111
Mounting	DIN Rail
Weight	410 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Switches > Versions

Type	RS20-0800M2M2SDAUHH	RS20-0800S2S2SDAUHH
Order No.	RS20-0800M2M2SDAUHH	RS20-0800S2S2SDAUHH
		
	8 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design	8 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 6 x standard 10/100 BASE TX, RJ45	8 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	321 mA	321 mA
Current consumption at 48 V DC	161 mA	161 mA
Power output in Btu (IT) h	26.3	26.3
Ambient conditions		
MTBF	53.4 years (MIL-HDBK-217F)	33.5 years (MIL-HDBK-217F)

Industrial Ethernet

OpenRail > Compact > Unmanaged Switches

Type	RS20-1600T1T1SDAUHH
Order No.	943 434-047
	
	16 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	16 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 14 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	392 mA
Current consumption at 48 V DC	196 mA
Power output in Btu (IT) h	32.1
Ambient conditions	
Operating temperature	0° to +60°C
Service	
Diagnostics	LEDs (power, link status, data, error
Ambient conditions	
Storage/transport temperature	-40° to +70°C
Service	
Redundancy functions	redundant 24 V power supply
Ambient conditions	
Relative humidity (non-condensing)	10% to 95%
MTBF	45.4 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	600 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Switches > Versions

Type	RS20-1600M2M2SDAUHH	RS20-1600S2S2SDAUHH
Order No.	943 434-048	943 434-053
		
	16 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design	16 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	16 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 14 x standard 10/100 BASE TX, RJ45	16 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 14 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	492 mA	492 mA
Current consumption at 48 V DC	246 mA	246 mA
Power output in Btu (IT) h	40.3	40.3
Ambient conditions		
MTBF	40.1 years (MIL-HDBK-217F)	27.8 years (MIL-HDBK-217F)

Industrial Ethernet

OpenRail > Compact > Unmanaged Switches

Type	RS20-2400T1T1SDAUHH
Order No.	RS20-2400T1T1SDAUHH
	
	24 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	24 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 22 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	563 mA
Current consumption at 48 V DC	282 mA
Power output in Btu (IT) h	46.1
Ambient conditions	
Operating temperature	0° to +60°C
Service	
Diagnostics	LEDs (power, link status, data, error
Ambient conditions	
Storage/transport temperature	-40° to +70°C
Service	
Redundancy functions	redundant 24 V power supply
Ambient conditions	
Relative humidity (non-condensing)	10% to 95%
MTBF	37.5 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	650 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Switches > Versions

Type	RS20-2400M2M2SDAUHH	RS20-2400S2S2SDAUHH
Order No.	RS20-2400M2M2SDAUHH	RS20-2400S2S2SDAUHH
		
	24 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design	24 port Fast Ethernet-switch, unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	24 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 22 x standard 10/100 BASE TX, RJ45	24 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 22 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	663 mA	663 mA
Current consumption at 48 V DC	332 mA	332 mA
Power output in Btu (IT) h	54.3	54.3
Ambient conditions		
MTBF	33.8 years (MIL-HDBK-217F)	24.6 years (MIL-HDBK-217F)

OpenRail > Compact > Unmanaged Switches

Type	RS30-0802T1T1SDAUHH
Order No.	RS30-0802T1T1SDAUHH
	
	10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	10 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 8 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	346 mA
Current consumption at 48 V DC	186 mA
Power output in Btu (IT) h	28.3
Ambient conditions	
Operating temperature	0° to +60°C
Service	
Diagnostics	LEDs (power, link status, data, error
Ambient conditions	
Storage/transport temperature	-40° to +70°C
Service	
Redundancy functions	redundant 24 V power supply
Ambient conditions	
Relative humidity (non-condensing)	10% to 95%
MTBF	52.6 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	74 x 131 x 111
Mounting	DIN Rail
Weight	410 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Switches > Versions

Type	RS30-0802O6O6SDAUHH
Order No.	RS30-0802O6O6SDAUHH
	
	10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	10 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 8 x standard 10/100 BASE TX, RJ45
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements	
Current consumption at 24 V DC	320 mA
Current consumption at 48 V DC	172 mA
Power output in Btu (IT) h	26.3

OpenRail > Compact > Unmanaged Switches

Type	RS30-1602T1T1SDAUHH
Order No.	RS30-1602T1T1SDAUHH
	
	18 port Gigabit/Fast Ethernet-switch (2 x GE, 16 x FE), unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	18 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 16 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	542 mA
Current consumption at 48 V DC	271 mA
Power output in Btu (IT) h	44.4
Ambient conditions	
Operating temperature	0° to +60°C
Service	
Diagnostics	LEDs (power, link status, data, error
Ambient conditions	
Storage/transport temperature	-40° to +70°C
Service	
Redundancy functions	redundant 24 V power supply
Ambient conditions	
Relative humidity (non-condensing)	10% to 95%
MTBF	39.6 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	600 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Switches > **Versions**

Type	RS30-1602O6O6SDAUHH
Order No.	RS30-1602O6O6SDAUHH
	
	18 port Gigabit/Fast Ethernet-switch (2 x GE, 16 x FE), unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	18 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 16 x standard 10/100 BASE TX, RJ45
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements	
Current consumption at 24 V DC	516 mA
Current consumption at 48 V DC	257 mA
Power output in Btu (IT) h	42.4

Industrial Ethernet

OpenRail > Compact > Unmanaged Switches

Type	RS30-2402T1T1SDAUHH
Order No.	RS30-2402T1T1SDAUHH
	
	26 port Gigabit/Fast Ethernet-switch (2 x GE, 24 x FE), unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	26 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 24 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	654 mA
Current consumption at 48 V DC	327 mA
Power output in Btu (IT) h	53.6
Ambient conditions	
Operating temperature	0° to +60°C
Service	
Diagnostics	LEDs (power, link status, data, error
Ambient conditions	
Storage/transport temperature	-40° to +70°C
Service	
Redundancy functions	redundant 24 V power supply
Ambient conditions	
Relative humidity (non-condensing)	10% to 95%
MTBF	33.5 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	650 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Switches > Versions

Type	RS30-2402O6O6SDAUHH
Order No.	RS30-2402O6O6SDAUHH
	
	26 port Gigabit/Fast Ethernet-switch (2 x GE, 24 x FE), unmanaged, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	26 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 24 x standard 10/100 BASE TX, RJ45
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements	
Current consumption at 24 V DC	628 mA
Current consumption at 48 V DC	313 mA
Power output in Btu (IT) h	51.6

Industrial Ethernet

Rail Family > Unmanaged Rail-Switches

Type	SPIDER 1TX/1FX
Order No.	943 890-001
	
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description	
Port type and quantity	1 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, MM cable, SC sockets
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 3-pin, no signal contact
Network size - length of cable	
Twisted pair (TP)	0 - 100m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB Link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	Any
Power requirements	
Operating voltage	9,6 V DC - 32 V DC
Current consumption at 24 V DC	Max. 130 mA
Power consumption	Max. 3,0 W 10,2 Btu (IT)/h at 24 V DC
Service	
Diagnostics	LEDs (power, link status, data, data rate)
Redundancy	
Redundancy functions	
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	128.1 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	25 mm x 114 mm x 79 mm
Mounting	DIN Rail 35 mm
Weight	105 g
Protection class	IP 30
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 4 kV data line
EN 61000-4-5 surge voltage	Power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	10 V (150 kHz - 80 kHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531)
EMV regulations for assembly in vehicles	
Hazardous locations	
Employment in vehicles	
Safety of information technology equipment	
Germanischer Lloyd	
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Industrial Ethernet

Unmanaged Rail-Switches > Versions

Type	SPIDER 1TX/1FX EEC	SPIDER 1TX/1FX-SM
Order No.	943 927-001	943 891-001
		
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description		
Port type and quantity	1 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, MM cable, SC sockets	1 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, SM cable, SC sockets
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB Link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	Max. 130 mA	Max. 130 mA
Power consumption	Max. 3,0 W 10,2 Btu (IT)/h at 24 V DC	Max. 3,0 W 10,2 Btu (IT)/h at 24 V DC
Ambient conditions		
Operating temperature	-40 °C to +70 °C	0 °C to +60 °C
MTBF	128.1 years; MIL-HDBK 217F: Gb 25 °C	101.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	25 mm x 114 mm x 79 mm	25 mm x 114 mm x 79 mm
Weight	105 g	105 g

Type	SPIDER 1TX/1FX-SM EEC	SPIDER 3TX-TAP
Order No.	943 928-001	943 899-001
		
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description		
Port type and quantity	1 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, SM cable, SC sockets	3 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)	
Power requirements		
Current consumption at 24 V DC	Max. 130 mA	Max. 100 mA
Power consumption	Max. 3,0 W 10,2 Btu (IT)/h at 24 V DC	Max. 2,2 W 7,5 Btu (IT)/h bei 24 V DC
Ambient conditions		
Operating temperature	-40 °C to +70 °C	0 °C to +60 °C
MTBF	101.5 years; MIL-HDBK 217F: Gb 25 °C	138.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	25 mm x 114 mm x 79 mm	25 mm x 114 mm x 79 mm
Weight	105 g	113 g

Industrial Ethernet

Unmanaged Rail-Switches > Versions

Type	SPIDER 4TX/1FX	SPIDER 4TX/1FX EEC
Order No.	943 221-001	943 221-101
		
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description		
Port type and quantity	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, MM cable, SC sockets	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, MM cable, SC sockets
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	Max. 150 mA	Max. 150 mA
Power consumption	Max. 3,9 W 13,3 Btu (IT)/h at 24 V DC	Max. 3,9 W 13,3 Btu (IT)/h at 24 V DC
Ambient conditions		
Operating temperature	0 °C to +60 °C	-40 °C to +70 °C
MTBF	112.0 years; MIL-HDBK 217F: Gb 25 °C	112.0 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	25 mm x 114 mm x 79 mm	25 mm x 114 mm x 79 mm
Weight	120 g	120 g

Type	SPIDER 4TX/1FX-SM EEC	SPIDER 4TX/1FX-ST EEC
Order No.	943 880-001	943 914-001
		
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description		
Port type and quantity	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, SM cable, SC sockets	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, MM cable, ST sockets
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm		0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB Link Budget at 1300 nm, A = 0,4 dB/km, 3 dB Reserve, D = 3,5 ps/(nm x km)	
Power requirements		
Current consumption at 24 V DC	Max. 150 mA	Max. 150 mA
Power consumption	Max. 3,9 W 13,3 Btu (IT)/h at 24 V DC	Max. 3,9 W 13,3 Btu (IT)/h at 24 V DC
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
MTBF	93,9 years; MIL-HDBK 217F: Gb 25 °C	112.0 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	25 mm x 114 mm x 79 mm	25 mm x 114 mm x 79 mm
Weight	120 g	120 g

Industrial Ethernet

Unmanaged Rail-Switches > Versions

Type	SPIDER 5TX	SPIDER 5TX EEC
Order No.	943 824-002	943 824-102
		
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description Port type and quantity	5 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	5 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable Twisted pair (TP)	0 - 100 m	0 - 100 m
Power requirements Current consumption at 24 V DC Power consumption	Max. 100 mA Max. 2,2 W 7,5 Btu (IT)/h at 24 V DC	Max. 100 mA Max. 2,2 W 7,5 Btu (IT)/h at 24 V DC
Ambient conditions Operating temperature MTBF	0 °C to +60 °C 123.7 years; MIL-HDBK 217F: Gb 25 °C	-40 °C to +70 °C 123.7 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Dimensions (W x H x D) Weight	25 mm x 114 mm x 79 mm 113 g	25 mm x 114 mm x 79 mm 113 g
Approvals EMV regulations for assembly in vehicles Employment in vehicles		approval according to motor vehicle directive 2005/83/EG (e1) E1

Type	SPIDER 8TX	SPIDER 8TX EEC
Order No.	943 376-001	943 376-201
		
	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)	Entry Level Industrial Ethernet Rail Switch, store and forward switching mode, Ethernet and Fast-Ethernet (10/100 Mbit/s)
Product description Port type and quantity	8 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	8 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable Twisted pair (TP)	0 - 100 m	0 - 100 m
Power requirements Current consumption at 24 V DC Power consumption	Max. 160 mA Max. 3,9 W 13,3 Btu (IT)/h at 24 V DC	Max. 160 mA Max. 3,9 W 13,3 Btu (IT)/h at 24 V DC
Ambient conditions Operating temperature MTBF	0 °C to +60 °C 105.7 years; MIL-HDBK 217F: Gb 25 °C	-40 °C bis +70 °C 105.7 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Dimensions (W x H x D) Weight	40 mm x 114 mm x 79 mm 177 g	40 mm x 114 mm x 79 mm 177 g

Rail Family > **Unmanaged Rail-Switches**

Type	SPIDER II 8TX
Order No.	943 957-001
	
	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description	
Port type and quantity	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 3-pin, no signaling contact
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	n/a
Multimode fiber (MM) 62.5/125 µm	n/a
Single mode fiber (SM) 9/125 µm	n/a
Single mode fiber (LH) 9/125 µm (long haul transceiver)	n/a
Network size - cascadibility	
Line - / star topology	Any
Power requirements	
Operating voltage	DC 9.6 V - 32 V
Current consumption at 24 V DC	max. 150 mA
Power consumption	max. 4.1 W; 14.0 Btu(IT)/h
Service	
Diagnostics	LEDs (power, link status, data, data rate)
Redundancy	
Redundancy functions	n/a
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	98.8 years, MIL-HDBK 217F: Gb 25°C
Mechanical construction	
Dimensions (W x H x D)	35 mm x 138mm x 121 mm
Mounting	DIN Rail 35 mm
Weight	246 g
Protection class	IP 30
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	3,5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 4 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (linie/earth), 1 kV (linie/line), 1 kV data line
EN 61000-4-6 conducted immunity	10 V (150 kHz - 80 kHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531) pending
EMV regulations for assembly in vehicles	n/a
Hazardous locations	n/a
Employment in vehicles	n/a
Safety of information technology equipment	n/a
Germanischer Lloyd	n/a
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power pupply RPS 30, RPS 80 EEC or RPS 120 EEC, 19" installation frame

Unmanaged Rail-Switches > Versions

Type	SPIDER II 8TX EEC	SPIDER II 8TX/1FX EEC
Order No.	943 958-001	943 958-111
		
	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description		
Port type and quantity	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 1 x 100BASE-FX, MM-cable, SC sockets
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	n/a	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	n/a	0 - 4000 m, 11 dB link budget bei 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	n/a	n/a
Single mode fiber (LH) 9/125 µm (long haul transceiver)	n/a	n/a
Power requirements		
Current consumption at 24 V DC	max. 235 mA	max. 235 mA
Power consumption	max. 5.8 W; 19.8 Btu(IT)/h	max. 6.3 W; 21.5 Btu(IT)/h
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-40 °C to +85 °C
MTBF	62.0 years MIL-HDBK 217F: Gb 25°C	65.8 years MIL-HDBK 217F: Gb 25°C
Mechanical construction		
Dimensions (W x H x D)	35 mm x 138mm x 121 mm	35 mm x 138mm x 121 mm
Weight	246 g	253 g

Type	SPIDER II 8TX/1FX-SM EEC	SPIDER II 8TX/1FX-ST EEC
Order No.	943 958-131	943 958-121
		
	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description		
Port type and quantity	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 1 x 100BASE-FX, SM-cable, SC sockets	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 1 x 100BASE-FX, MM-cable, ST sockets
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	n/a	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	n/a	0 - 4000 m, 11 dB link budget bei 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)	n/a
Single mode fiber (LH) 9/125 µm (long haul transceiver)	n/a	n/a
Power requirements		
Current consumption at 24 V DC	max. 275 mA	max. 275 mA
Power consumption	max. 7 W 23.9 Btu(IT)/h	max. 7 W 23.9 Btu(IT)/h
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-40 °C to +85 °C
MTBF	58.7 years MIL-HDBK 217F: Gb 25°C	58.7 years MIL-HDBK 217F: Gb 25°C
Mechanical construction		
Dimensions (W x H x D)	35 mm x 138mm x 121 mm	35 mm x 138mm x 121 mm
Weight	253 g	253 g

Type	SPIDER II 8TX/2FX EEC	SPIDER II 8TX/2FX-SM EEC
Order No.	943 958-211	943 958-231
		
	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description		
Port type and quantity	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 2 x 100BASE-FX, MM-cable, SC sockets	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 2 x 100BASE-FX, SM-cable, SC sockets
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	n/a
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget bei 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	n/a
Single mode fiber (SM) 9/125 µm	n/a	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	n/a	n/a
Power requirements		
Current consumption at 24 V DC	max. 330 mA	max. 330 mA
Power consumption	max. 8.4 W 28.7 Btu(IT)/h	max. 8.4 W 28.7 Btu(IT)/h
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-40 °C to +85 °C
MTBF	55.2 years MIL-HDBK 217F: Gb 25°C	55.7 years MIL-HDBK 217F: Gb 25°C
Mechanical construction		
Dimensions (W x H x D)	35 mm x 138mm x 121 mm	35 mm x 138mm x 121 mm
Weight	260 g	260 g

Type	SPIDER II 8TX/2FX-ST EEC	SPIDER II Giga 5T EEC
Order No.	943 958-221	943 962-002
		
	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, 10/100/1000 Mbit/s Ethernet (available from Jan. 2009)
Product description		
Port type and quantity	8 x 10/100BASE-TX, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity, 2 x 100BASE-FX, MM-cable, ST sockets	5 x 10/100/1000BASE-T, TP-cable, RJ45 sokkets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	n/a
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget bei 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	n/a
Single mode fiber (SM) 9/125 µm	n/a	n/a
Single mode fiber (LH) 9/125 µm (long haul transceiver)	n/a	n/a
Power requirements		
Current consumption at 24 V DC	max. 330 mA	max. 145 mA
Power consumption	max. 8.4 W 28.7 Btu(IT)/h	max. 3.6 W; 12.3 Btu(IT)/h
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-40 °C to +85 °C
MTBF	55.2 years MIL-HDBK 217F: Gb 25°C	n/a
Mechanical construction		
Dimensions (W x H x D)	35 mm x 138mm x 121 mm	35 mm x 138 mm x 121 mm
Weight	260 g	240 g

Type	SPIDER II Giga 5T/2S EEC
Order No.	943 963-002
	
	Entry Level Industrial Ethernet Rail-Switch, store and forward switching mode, 10/100/1000 Mbit/s Ethernet (available from Jan. 2009)
Product description	
Port type and quantity	5 x 10/100/1000BASE-T, 2 x GE-SFP Slots, TP-cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	0 - 550 m, 0 -7,5 dB link budget at 850 nm (with M-SFP-SX/LC)
Multimode fiber (MM) 62.5/125 µm	0 - 275 m, 0 -7,5 dB link budget at 850 nm (with M-SFP-SX/LC)
Single mode fiber (SM) 9/125 µm	0 - 20 km, 0 - 11 dB link budget at 1300 nm (with M-SFP-LX/LC)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	16 - 80 km, 6 - 22 dB link budget at 1550 nm (with M-SFP-LH/LC) 44 - 120 km, 15 - 32 dB link budget at 1550 nm (with M-SFP-LH+/LC)
Power requirements	
Current consumption at 24 V DC	max. 260 mA
Power consumption	max. 6.6 W 22.5 Btu(IT)/h
Ambient conditions	
Operating temperature	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C
MTBF	n/a
Mechanical construction	
Dimensions (W x H x D)	35 mm x 138mm x 121 mm
Weight	240 g

Welcome to high-level management.

Managed Rail Switches with unsurpassed feature sets.

- Because of the segmentation within our managed rail switches, exactly the right switch is available for every application.
- The “OpenRail” concept offers tailor-made products for every application.
- Networks with optimum price per port ratio: 4-, 8-, 9-, 16-, 17-, 24- and 25-port switches.
- Versions with additional 2 Gigabit Ethernet ports.
- Management functions support Web and SNMP-based tools.
- Selectable redundancy mechanisms: efficient, industrially compatible HIPER-Ring.

For some applications, a fast, industrially compatible, user-friendly switch has to be a lot smarter – for example, in medium-sized and large Fast-Ethernet and Gigabit-Ethernet applications or highly available networks with fast media redundancy function. Here, the managed 4-, 8-, 16- and 24-port Rail Switches from Hirschmann™ offer you high port densities. All the better when you also have a free choice of media. And the best thing is: the optimum price per port ratio. You benefit especially from the management function, for example, in a networking of management and control level in industry and process automation. Because there is obviously no substitute here for fail safety – and a high port density is a must. Managed rail switches also provide valuable services in railway traffic and stations, e.g. the compact RS30-2402T1T1SDAE. Finally, Ethernet data networks have to cover distances of more than 120 kilometers between the individual stations with long-haul connections and redundant structures by the HIPER-Ring.

RS20

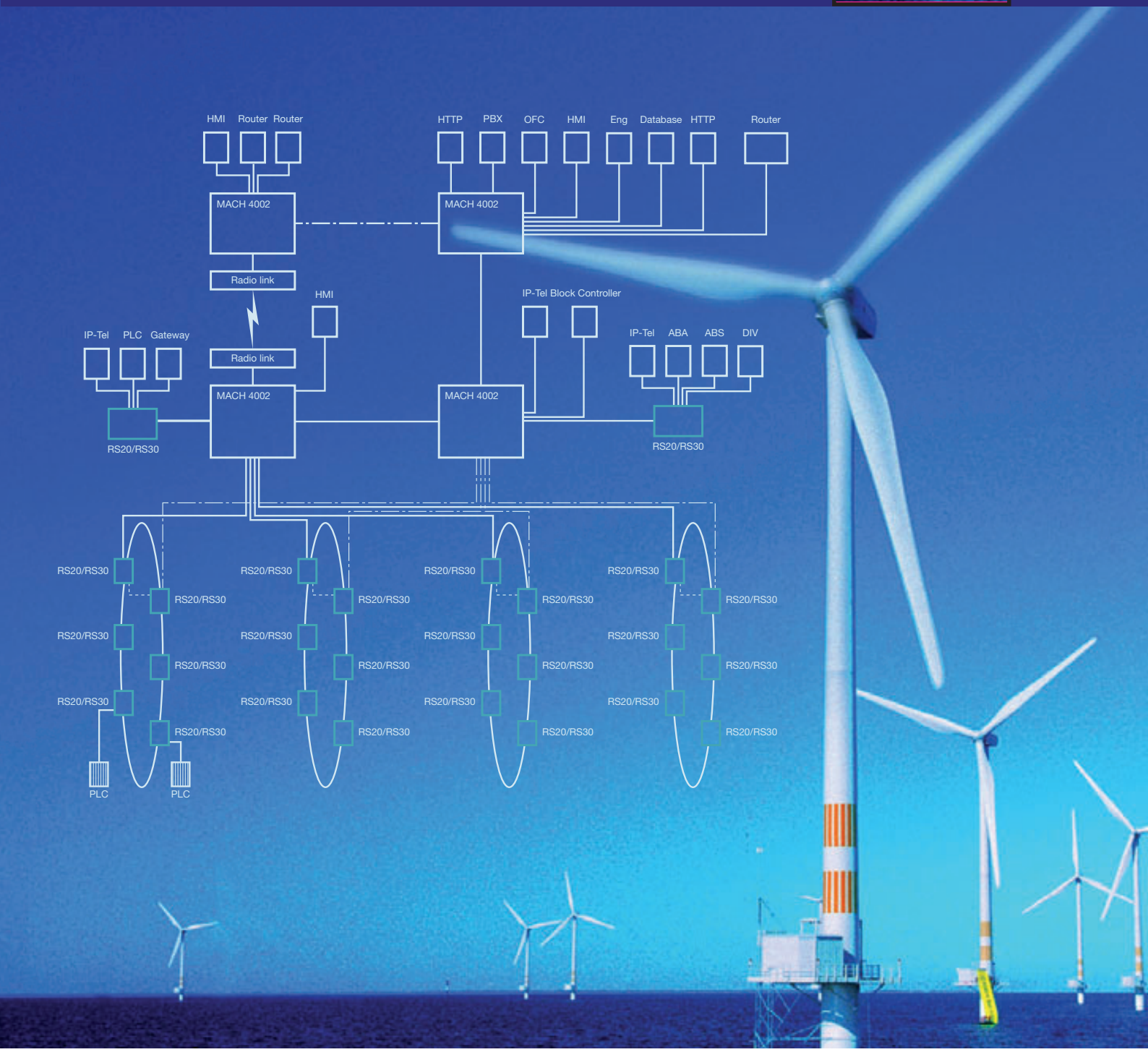
RS30

RS30

Accessories

for this family you can find on the following pages:

Transceiver Page 212
System Accessories Page 220



Hirschmann™ Competence Center

Because innovative Rail Switches also require an appropriate service program, the Hirschmann™ Competence Center also offers suitable consulting services in the network planning: **Network optimization check, risk reduction consulting, network technology evaluation and network baselining consulting**. Plus the following trainings: CP1d Rail Family in theory and practice, IRd overview of the Hirschmann™ Rail Family, CPUd Update Rail Family and CB1e Industrial Ethernet/basic technical principles. In addition, we provide support with certification testing, installation and configuration as well as our service hotline and later offer Advance Hardware Replacement and warranty extensions.

www.hicomcenter.com

OpenRail: A made-to-measure switch.

In practice there are very many different requirements for Industrial Ethernet: From the economical, small, integrated Ethernet solution up to complex Fast-Ethernet solutions with management functions, high availability, Gigabit capability and many more functions. Here most standard switches do not offer suitable features and thus cause unnecessary costs. Therefore tailor-made solutions are required, in other words, individually designed, configured switches that comply exactly with the customer's requirements.

With OpenRail Hirschmann™ has now started to offer Rail and MICE series switches manufactured to the customer's specifications and suitable for almost any application.These can have specific parameters set quickly and easily by a web configurator and can be ordered more than 1000 different versions. All this is available at the same price and delivery conditions as series products – and with the customary high Hirschmann™ quality.

Ordering with the OpenRail system

OpenRail – is an ordering system that can cope with any customer requirement and offers a simple, transparent ordering option. It doesn't matter which of the 1000 versions you or your customers opt for. Step by step you are asked for the parameters by means of which an order code with all the required information is generated. After we have received your order, your individual switches are manufactured in our specific customer requirement production unit. There is no simpler and more economical solution.

Use the Hirschmann™ Configurator system to configure your substation switch.

RS20-0800S2S4TDHBHH04.0.

Code	Field	Option	Description	Option	Description
RS20-	**Model**	RS20	Fast-Ethernet uplink-Ports	RS22	Fast-Ethernet uplink-Ports + 4 Ports PoE
		RS30	Gigabit-Ethernet	RS32	Gigabit-Ethernet uplink-Ports + 4 Ports PoE
		RS40	Full-Gigabit		
08	**Fast Ethernet ports**	04	00, 04, 08, 16, 24: number of 100 mbps ports	16	> 2 fiber Ports)
		[illegible]	(00 for RS40)	17	(RS20, RS30)
		08		24	(RS20, RS30)
		09	09, 17, 25: number of 100 mbps ports (RS20	25	(RS20, RS30)
00	**Gigabit Ethernet ports**	00	00, 02: number of 1000 mbps ports (00 – RS20	02	and 02 – RS40)
				03	03: number of 1000 mbps ports (RS40)
S2	**Uplink Port 1**	T1	1 x Twisted-Pair RJ45	08	1 x SFP-Slot GE
		M2	1 x Multimode SC	MM	2 x Multimode SC
		M4	1 x Multimode ST	NN	2 x Multimode ST
		S2	1 x Singlemode SC	VV	2 x Singlemode SC
		S4	1 x Singlemode ST	UU	2 x Singlemode ST
		L2	1 x Long Haul SC	OO	2 x SFP-Slot GE
		G2	1 x Long Haul+ SC	CC	2 x SFP Combo Port GE
S4	**Uplink Port 2**	T1	1 x Twisted-Pair RJ45	L2	1 x Long Haul SC
		M2	1 x Multimode SC	G2	1 x Long Haul+ SC
		M4	1 x Multimode ST	O8	1 x SFP-Slot GE
		S2	1 x Singlemode SC	ZZ	2 x SFP-Slot FE
		S4	1 x Singlemode ST	CC	2 x SFP Combo Port GE
T	**Temperature range**	S	0° C up to +60° C		
		T	−40° C up to +70° C		
		E	−40° C up to +70° C includes Conformal Coating		
D	**Power supply**	D	12/24/48 V DC (9,6–60 V) and 24 V AC (18–30 V)		
H	**Approvals**	A	cUL508 · cUL1604 · Class I Div2		
		H	cUL508 · cUL1604 · Class I Div2		
			GL: German Lloyd · IEC 61850-3: Substation		
			IEEE1613: Substation · EN 50121-4: Railway (along track)		
		B	cUL508 · cUL1604 · Class I Div2		
			GL: German Lloyd · IEC 61850-3: Substation		
			IEEE1613: Substation · EN 50121-4: Railway (along track)		
			ATEX100a, Zone2: Hazardous Location		
E	**Software-Version**	U	Unmanaged		
		B	Basic, diagnostic, HIPER-Ring		
		E	Enhanced, additional Filter and redundancy		
		P	Professional, additional security and advanced redundancy		
H	**Configuration**	H	Standard	P	PROFINET pre-setting
		X	Customer specific	E	EtherNet/IP pre-setting
H	**OEM-type**	H	Hirschmann		
		X	Customer specific		
04.0.	**Software release**	04.0.	Software Release		

Compulsory field | Optional

Enjoy our online tool to configure your substation switch at configurator.hirschmann.com. Avoid the hassle and the delay.

Industrial Ethernet

OpenRail System Compact > Switches Software Release 4.0

Type	RS20-0400T1T1SDAEHH04.0.
Order No.	943 434-007
	
	4 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	4 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 2 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	221 mA
Current consumption at 48 V DC	111 mA
Power output in Btu (IT) h	18.1
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	75.9 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	47 x 131 x 111
Mounting	DIN Rail
Weight	400 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Type	RS20-0400T1T1SDAPHH04.0.	RS20-0400T1T1SDABHH04.0.
Order No.	943 434-008	943 434-061
		
	4 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	4 port Fast Ethernet-switch, managed, Software Layer 2 Basic, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	4 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 2 x standard 10/100 BASE TX, RJ45	4 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 2 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Power requirements		
Current consumption at 24 V DC	221 mA	221 mA
Current consumption at 48 V DC	111 mA	111 mA
Power output in Btu (IT) h	18.1	18.1
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-File, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand Line Interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11)
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-Ring (no redundancy manager), MRP (IEC-ring functionality), redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, port priorisation(IEEE 802.1D/p), multicast IGMP snooping, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel
Realtime	SNTP server, realtime clock with energy buffer	SNTP Client
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	
Ambient conditions		
MTBF	66.4 years (MIL-HDBK-217F)	75.9 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0400M2T1SDAEHH04.0.	RS20-0400M2T1SDAPHH04.0.
Order No.	943 434-009	943 434-010
		
	4 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design	4 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	4 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 10/100BASE-TX, RJ45, 2 x standard 10/100 BASE TX, RJ45	4 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 10/100BASE-TX, RJ45, 2 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	271 mA	271 mA
Current consumption at 48 V DC	136 mA	136 mA
Power output in Btu (IT) h	22.2	22.2
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3 (no encryption)	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server	SNTP server, realtime clock with energy buffer
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions		
MTBF	68.3 years (MIL-HDBK-217F)	60.5 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0400M2M2SDAEHH04.0.	RS20-0400M2M2SDAPHH04.0.
Order No.	943 434-001	943 434-002
		
	4 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design	4 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	4 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 2 x standard 10/100 BASE TX, RJ45	4 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 2 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	321 mA	321 mA
Current consumption at 48 V DC	161 mA	161 mA
Power output in Btu (IT) h	26.3	26.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3 (no encryption)	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server	SNTP server, realtime clock with energy buffer
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)	Flow Control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions		
MTBF	62.1 years (MIL-HDBK-217F)	55.6 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0400M2M2SDABHH04.0.	RS20-0400S2S2SDAEHH04.0.
Order No.	943 434-062	943 434-013
		
	4 port Fast Ethernet-switch, managed, Software Layer 2 Basic, for DIN rail store-and-forward-switching, fanless design	4 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	4 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 2 x standard 10/100 BASE TX, RJ45	4 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 2 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	321 mA	321 mA
Current consumption at 48 V DC	161 mA	161 mA
Power output in Btu (IT) h	26.3	26.3
Software		
Diagnostics	LEDs, log-File, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand Line Interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11)	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	SNMP V3 (no encryption)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-Ring (no redundancy manager), MRP (IEC-ring functionality), redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, port priorisation(IEEE 802.1D/p), multicast IGMP snooping, fast aging	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP Client	SNTP server
Flow control		Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	62.1 years (MIL-HDBK-217F)	36.8 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0400S2S2SDAPHH04.0.	RS20-0400S2T1SDAEHH04.0.
Order No.	943 434-014	943 434-011
		
	4 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	4 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	4 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 2 x standard 10/100 BASE TX, RJ45	4 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 10/100BASE-TX, RJ45, 2 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)		0 - 100 m
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	321 mA	271 mA
Current consumption at 48 V DC	161 mA	136 mA
Power output in Btu (IT) h	26.3	22.2
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	34.4 years (MIL-HDBK-217F)	49.5 years (MIL-HDBK-217F)

OpenRail System Compact > Switches Software Release 4.0

Type	RS20-0800T1T1SDAEHH04.0.
Order No.	943 434-021
	
	8 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	8 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 6 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	221 mA
Current consumption at 48 V DC	111 mA
Power output in Btu (IT) h	18.1
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	63.3 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	74 x 131 x 111
Mounting	DIN Rail
Weight	410 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0800T1T1SDAPHH04.0.	RS20-0800M2T1SDAEHH04.0.
Order No.	943 434-022	RS20-0800M2T1SDAEHH04.0.
		
	8 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	8 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 6 x standard 10/100 BASE TX, RJ45	8 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 10/100BASE-TX, RJ45, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm		0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	221 mA	271 mA
Current consumption at 48 V DC	111 mA	136 mA
Power output in Btu (IT) h	18.1	22.2
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	56.6 years (MIL-HDBK-217F)	58 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0800M2M2SDAEHH04.0.	RS20-0800M2M2SDAPHH04.0.
Order No.	943 434-003	943 434-004
		
	8 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design	8 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 6 x standard 10/100 BASE TX, RJ45	8 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	321 mA	321 mA
Current consumption at 48 V DC	161 mA	161 mA
Power output in Btu (IT) h	26.3	26.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3 (no encryption)	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server	SNTP server, realtime clock with energy buffer
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions		
MTBF	53.4 years (MIL-HDBK-217F)	48.6 years (MIL-HDBK-217F)

Switches Software Release 4.0 > Versions

Type	RS20-0800M2M2SDABHH04.0.	RS20-0800S2S2SDAEHH04.0.
Order No.	RS20-0800M2M2SDABHH04.0.	943 434-019
		
	8 port Fast Ethernet-switch, managed, Software Layer 2 Basic, for DIN rail store-and-forward-switching, fanless design	8 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 6 x standard 10/100 BASE TX, RJ45	8 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	321 mA	321 mA
Current consumption at 48 V DC	161 mA	161 mA
Power output in Btu (IT) h	26.3	26.3
Software		
Diagnostics	LEDs, log-File, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand Line Interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11)	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	SNMP V3 (no encryption)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-Ring (no redundancy manager), MRP (IEC-ring functionality), redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, port priorisation(IEEE 802.1D/p), multicast IGMP snooping, fast aging	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP Client	SNTP server
Flow control		Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	53.4 years (MIL-HDBK-217F)	33.5 years (MIL-HDBK-217F)

Switches Software Release 4.0 > Versions

Type	RS20-0800S2S2SDAPHH04.0.	RS20-0800M4M4SDAEHH04.0.
Order No.	943 434-020	943 434-017
		
	8 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	8 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 6 x standard 10/100 BASE TX, RJ45	8 ports in total; 1. Uplink: 100BASE-FX, MM-ST; 2. Uplink: 100BASE-FX, MM-ST, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm		0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)	
Power requirements		
Current consumption at 24 V DC	321 mA	321 mA
Current consumption at 48 V DC	161 mA	161 mA
Power output in Btu (IT) h	26.3	26.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	31.6 years (MIL-HDBK-217F)	53.4 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-0800M4M4SDAPHH04.0.	RS20-0800T1T1SDABHH04.0.
Order No.	943 434-018	943 434-063
		
	8 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	8 port Fast Ethernet-switch, managed, Software Layer 2 Basic, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total; 1. Uplink: 100BASE-FX, MM-ST; 2. Uplink: 100BASE-FX, MM-ST, 6 x standard 10/100 BASE TX, RJ45	8 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)		0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Power requirements		
Current consumption at 24 V DC	321 mA	221 mA
Current consumption at 48 V DC	161 mA	111 mA
Power output in Btu (IT) h	26.3	18.1
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-File, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand Line Interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11)
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-Ring (no redundancy manager), MRP (IEC-ring functionality), redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, port priorisation(IEEE 802.1D/p), multicast IGMP snooping, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel
Realtime	SNTP server, realtime clock with energy buffer	SNTP Client
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	
Ambient conditions		
MTBF	48.6 years (MIL-HDBK-217F)	63.3 years (MIL-HDBK-217F)

OpenRail System Compact > Switches Software Release 4.0

Type	RS20-0900MMM2SDAEHH04.0.
Order No.	RS20-0900MMM2SDAEHH04.0.
	
	9 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	9 ports in total; 1. Uplink: 2 x 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 6 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	496 mA
Current consumption at 48 V DC	75 mA
Power output in Btu (IT) h	40.6
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	42.7 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	74 x 131 x 111
Mounting	DIN Rail
Weight	440 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Switches Software Release 4.0 > Versions

Type	RS20-0900VVM2SDAEHH04.0.
Order No.	RS20-0900VVM2SDAEHH04.0.
	
	9 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	9 ports in total; 1. Uplink: 2 x 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, MM-SC, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget bei 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Ambient conditions	
MTBF	29 years (MIL-HDBK-217F)

Industrial Ethernet

OpenRail System Compact > Switches Software Release 4.0

Type	RS20-1600T1T1SDAEHH04.0.
Order No.	943 434-023
	
	16 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	16 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 14 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	392 mA
Current consumption at 48 V DC	196 mA
Power output in Btu (IT) h	32.1
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	45.4 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	600 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Switches Software Release 4.0 > Versions

Type	RS20-1600T1T1SDAPHH04.0.	RS20-1600M2T1SDAEHH04.0.
Order No.	943 434-024	943 434-025
		
	16 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	16 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	16 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 14 x standard 10/100 BASE TX, RJ45	16 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 10/100BASE-TX, RJ45, 14 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm		0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	392 mA	442 mA
Current consumption at 48 V DC	196 mA	221 mA
Power output in Btu (IT) h	32.1	36.2
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	41.9 years (MIL-HDBK-217F)	42.6 years (MIL-HDBK-217F)

Switches Software Release 4.0 > Versions

Type	RS20-1600M2T1SDAPHH04.0.	RS20-1600M2M2SDAEHH04.0.
Order No.	943 434-026	943 434-005
		
	16 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	16 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	16 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 10/100BASE-TX, RJ45, 14 x standard 10/100 BASE TX, RJ45	16 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 14 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	442 mA	492 mA
Current consumption at 48 V DC	221 mA	246 mA
Power output in Btu (IT) h	36.2	40.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	39.4 years (MIL-HDBK-217F)	40.1 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-1600M2M2SDAPHH04.0.	RS20-1600S2S2SDAEHH04.0.
Order No.	943 434-006	943 434-027
		
	16 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	16 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	16 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 14 x standard 10/100 BASE TX, RJ45	16 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 14 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	492 mA	492 mA
Current consumption at 48 V DC	246 mA	246 mA
Power output in Btu (IT) h	40.3	40.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	37.3 years (MIL-HDBK-217F)	27.8 years (MIL-HDBK-217F)

Switches Software Release 4.0 > Versions

Type	RS20-1600S2S2SDAPHH04.0.
Order No.	943 434-028
	
	16 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	16 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 14 x standard 10/100 BASE TX, RJ45
Network size - length of cable	
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements	
Current consumption at 24 V DC	492 mA
Current consumption at 48 V DC	246 mA
Power output in Btu (IT) h	40.3
Software	
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	26.4 years (MIL-HDBK-217F)

Industrial Ethernet

OpenRail System Compact > Switches Software Release 4.0

Type	RS20-2400T1T1SDAEHH04.0.
Order No.	943 434-041
	
	24 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	24 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 22 x standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	563 mA
Current consumption at 48 V DC	282 mA
Power output in Btu (IT) h	46.1
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	37.5 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	650 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Switches Software Release 4.0 > Versions

Type	RS20-2400T1T1SDAPHH04.0.	RS20-2400M2M2SDAEHH04.0.
Order No.	943 434-042	943 434-043
		
	24 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	24 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	24 ports in total; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45, 22 x standard 10/100 BASE TX, RJ45	24 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 22 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	
Multimode fiber (MM) 50/125 µm		0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Current consumption at 24 V DC	563 mA	663 mA
Current consumption at 48 V DC	282 mA	332 mA
Power output in Btu (IT) h	46.1	54.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	35 years (MIL-HDBK-217F)	33.8 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-2400M2M2SDAPHH04.0.	RS20-2400S2S2SDAEHH04.0.
Order No.	943 434-044	943 434-045
		
	24 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	24 port Fast Ethernet-switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	24 ports in total; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC, 22 x standard 10/100 BASE TX, RJ45	24 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 22 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 d/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements		
Current consumption at 24 V DC	663 mA	663 mA
Current consumption at 48 V DC	332 mA	332 mA
Power output in Btu (IT) h	54.3	54.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	31.8 years (MIL-HDBK-217F)	24.6 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS20-2400S2S2SDAPHH04.0.
Order No.	943 434-046
	
	24 port Fast Ethernet-switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	24 ports in total; 1. Uplink: 100BASE-FX, SM-SC; 2. Uplink: 100BASE-FX, SM-SC, 22 x standard 10/100 BASE TX, RJ45
Network size - length of cable	
Single mode fiber (SM) 9/125 µm	0 - 32,5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3,5 ps/(nm x km)
Power requirements	
Current consumption at 24 V DC	663 mA
Current consumption at 48 V DC	332 mA
Power output in Btu (IT) h	54.3
Software	
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	23.5 years (MIL-HDBK-217F)

Industrial Ethernet

OpenRail System Compact > Switches Software Release 4.0

Type	RS30-0802T1T1SDAEHH04.0.
Order No.	943 434-029
	 10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	10 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 8 standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	346 mA
Current consumption at 48 V DC	186 mA
Power output in Btu (IT) h	28.3
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	52.6 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	74 x 131 x 111
Mounting	DIN Rail
Weight	410 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Switches Software Release 4.0 > Versions

Type	RS30-0802T1T1SDAPHH04.0.	RS30-0802O6O6SDAEHH04.0.
Order No.	943 434-030	943 434-031
		
	10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	10 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 8 standard 10/100 BASE TX, RJ45	10 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 8 standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	
Multimode fiber (MM) 50/125 µm		cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm		cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm		cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)		cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements		
Current consumption at 24 V DC	346 mA	320 mA
Current consumption at 48 V DC	186 mA	172 mA
Power output in Btu (IT) h	28.3	26.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	47.9 years (MIL-HDBK-217F)	52.6 years (MIL-HDBK-217F)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS30-0802O6O6SDAPHH04.0.	RS30-0802OOZZSDAEHH04.0.
Order No.	943 434-032	RS30-0802OOZZSDAEHH04.0.
		
	10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	10 port Gigabit/Fast Ethernet-switch (2 x GE, 8 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	10 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 8 standard 10/100 BASE TX, RJ45	10 ports in total, 2 Gigabit Ethernet ports; 1. Uplink: 2 x Gigabit/Fast Ethernet SFP slot; 2. Uplink: 2 x Fast Ethernet SFP slot, 6 x standard 10/100 BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC	cf. SFP LWL modul M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC	cf. SFP LWL modul M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC	cf. SFP LWL modul M-SFP-LH/LC and M-SFP-LH+/LC
Power requirements		
Current consumption at 24 V DC	320 mA	294 mA
Current consumption at 48 V DC	172 mA	158 mA
Power output in Btu (IT) h	26.3	24.3
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	47.9 years (MIL-HDBK-217F)	52.6 years (MIL-HDBK-217F)

OpenRail System Compact > Switches Software Release 4.0

Type	RS30-1602T1T1SDAEHH04.0.
Order No.	943 434-033
	
	18 port Gigabit/Fast Ethernet-switch (2 x GE, 16 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	18 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 16 standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	542 mA
Current consumption at 48 V DC	271 mA
Power output in Btu (IT) h	44.4
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	39.6 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	600 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	RS30-1602T1T1SDAPHH04.0.	RS30-1602O6O6SDAEHH04.0.
Order No.	943 434-034	943 434-035
		
	18 port Gigabit/Fast Ethernet-switch (2 x GE, 16 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	18 port Gigabit/Fast Ethernet-switch (2 x GE, 16 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-swit-ching, fanless design
Product description		
Port type and quantity	18 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 16 standard 10/100 BASE TX, RJ45	18 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 16 standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	
Multimode fiber (MM) 50/125 µm		cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm		cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm		cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)		cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements		
Current consumption at 24 V DC	542 mA	516 mA
Current consumption at 48 V DC	271 mA	257 mA
Power output in Btu (IT) h	44.4	42.4
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, dis-able learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-con-figuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: inte-grated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-con-figuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggre-gation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snoo-ping/querier), multicast detection unknown mul-ticast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snoo-ping/querier), multicast detection unknown mul-ticast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and dia-gnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, confi-guration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	36.9 years (MIL-HDBK-217F)	39.6 years (MIL-HDBK-217F)

Switches Software Release 4.0 > Versions

Type	RS30-1602O6O6SDAPHH04.0.
Order No.	943 434-036
	
	18 port Gigabit/Fast Ethernet-switch (2 x GE, 16 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	18 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 16 standard 10/100 BASE TX, RJ45
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements	
Current consumption at 24 V DC	516 mA
Current consumption at 48 V DC	257 mA
Power output in Btu (IT) h	42.4
Software	
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	36.9 years (MIL-HDBK-217F)

Industrial Ethernet

OpenRail System Compact > Switches Software Release 4.0

Type	RS30-2402T1T1SDAEHH04.0.
Order No.	943 434-037
	
	26 port Gigabit/Fast Ethernet-switch (2 x GE, 24 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	26 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 24 standard 10/100 BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	12/24/48 V DC (9,6-60) V and 24 V AC (18-30) V (redundant)
Current consumption at 24 V DC	654 mA
Current consumption at 48 V DC	327 mA
Power output in Btu (IT) h	53.6
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	33.5 years (MIL-HDBK-217F)
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	110 x 131 x 111
Mounting	DIN Rail
Weight	650 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-

Switches Software Release 4.0 > Versions

Type	RS30-2402T1T1SDAPHH04.0.	RS30-2402O6O6SDAEHH04.0.
Order No.	943 434-038	943 434-039
		
	26 port Gigabit/Fast Ethernet-switch (2 x GE, 24 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design	26 port Gigabit/Fast Ethernet-switch (2 x GE, 24 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description		
Port type and quantity	26 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: 10/1000BASE-TX, RJ45; 2. Uplink: 10/1000BASE-TX, RJ45, 24 standard 10/100 BASE TX, RJ45	26 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 24 standard 10/100 BASE TX, RJ45
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	
Multimode fiber (MM) 50/125 µm		cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm		cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm		cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)		cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements		
Current consumption at 24 V DC	654 mA	628 mA
Current consumption at 48 V DC	327 mA	313 mA
Power output in Btu (IT) h	53.6	51.6
Software		
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast limiter, fast aging
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer	SNTP server
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV)
Ambient conditions		
MTBF	31.5 years (MIL-HDBK-217F)	33.5 years (MIL-HDBK-217F)

Switches Software Release 4.0 > Versions

Type	RS30-2402O6O6SDAPHH04.0.
Order No.	943 434-040
	
	26 port Gigabit/Fast Ethernet-switch (2 x GE, 24 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	26 ports in total, 2 Gigabit Ethernet Ports; 1. Uplink: Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot, 24 standard 10/100 BASE TX, RJ45
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP module M-SFP-LH/LC and M-SFP-LX+/LC
Power requirements	
Current consumption at 24 V DC	628 mA
Current consumption at 48 V DC	313 mA
Power output in Btu (IT) h	51.6
Software	
Diagnostics	LEDs, log-file, syslog, signal contact, RMON, port mirroring, topology discovery 802.1AB, cable diagnostic (TX), disable learning
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), multicast detection unknown multicast, broadcast-, unicast-, multicast limiter, fast aging, GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	31.5 years (MIL-HDBK-217F)

Built to take the punishment:

The rugged new rail switches.

- Extremely high EMV immunity
- Shock and vibration protection
- Modular design for maximum versatility
- Extended temperature range: –40° C up to +85° C
- Compact design with metal housing
- Simple, user-friendly ring configuration

The new Hirschmann™ rail switches deliver excellent performance in substations and any other applications and environments where there is a need for extremely rugged DIN rail switches. The new Hirschmann™ family is the solution of choice whenever rugged design, long-term reliability and very good EMI immunity are required to withstand extreme operating conditions such as temperature, shock and vibration. The range of applications includes marine systems, transportation automation and extremely harsh industrial environments. The new rugged rail switches cover the entire spectrum from stand-alone solutions, with models ranging from the 8-port TX to the 10-port full fiber switch, to complete ruggedized solutions.

RSR

Accessories
for this family you can find on the following pages:
Transceiver Page 212
System Accessories Page 220

User configurable with the OpenRail system

RS20-0800S2M2T1UCCHPHH04.0.

Code	Field
RS20-	Model
08	Fast Ethernet ports
00	Ports Gigabit Ethernet
S2	Uplink Port 1
M2	Uplink Port 2
T1	Remaining ports
U	Temperature range
C	Voltage range 1
C	Voltage range 2
H	Approvals
P	Software version
H	Configuration
H	OEM-type
04.0.	Software release

Model

RS20	Rail-Switch Rugged Fast-Ethernet
RS30	Rail-Switch Rugged Gigabit-Ethernet Uplink ports

Fast Ethernet ports

06	6x 100 Mbps Ethernet	08	8x 100 Mbps Ethernet
07	7x 100 Mbps Ethernet	09	9x 100 Mbps Ethernet

Ports Gigabit Ethernet

00	0x 1000 Mbps Ethernet	03	3x 1000 Mbps Ethernet
02	2x 1000 Mbps Ethernet		

Uplink Port 1

CC	2x Combo Port Gigabit-Ethernet	O7	Combo Port Gigabit-Ethernet
OO	2x SFP-Slot Gigabit-Ethernet	O8	SFP-Slot Gigabit-Ethernet
TT	2x Twisted-Pair (TX)/RJ45	T1	Twisted-Pair (TX)/RJ45
MM	2x Multimode FX SC	M2	Multimode FX SC
JJ	2x Multimode FX MTRJ	M3	Multimode FX MTRJ
NN	2x Multimode FX ST	M4	Multimode FX ST
VV	2x Singlemode FX SC	S2	Singlemode FX SC
UU	2x Singlemode FX ST	S4	Singlemode FX ST
LL	2x Singlemode Long Haul FX SC	L2	Singlemode Long Haul FX SC
GG	2x Singlemode Long Haul+FX SC (200 km)	G2	Singlemode Long Haul+ FX SC (200 km)
ZZ	2x SFP-Slot (100 Mbps)	Z6	SFP-Slot (100 Mbps)

Uplink Port 2

ZZ	2x SFP-Slot (100 Mbps)	M4	Multimode FX ST
O7	Combo Port Gigabit-Ethernet	S2	Singlemode FX SC
O8	SFP-Slot Gigabit-Ethernet	S4	Singlemode FX ST
T1	Twisted-Pair (TX)/RJ45	L2	Singlemode Long Haul FX SC
M2	Multimode FX SC	G2	Singlemode Long Haul+ FX SC (200 km)
M3	Multimode FX MTRJ	Z6	SFP-Slot (100 Mbps)

Remaining ports

T1	Twisted-Pair (TX)/RJ45	Z6	SFP-Slot (100 Mbps)

Temperature range

S	Standard	0° C up to +60° C
U	Extended	−40° C up to +85° C
F	Extended	−40° C up to +85° C includes Conformal Coating

Voltage range 1

C	24/36/48 VDC	K	60/120/250 VDC and 110/230 VAC

Voltage range 2

9	Not assembled	K	60/120/250 VDC and 110/230 VAC
C	24/36/48 VDC		

Approvals

H	cUL508, GL, IEC 61850; IEEE 1613; EN 50121

Software version

P	Professional

Configuration

H	Hirschmann

OEM-type

H	Hirschmann

Software release

04.0	Software release	XX.X	newest Software Release

Compulsory field | Optional

Enjoy our online tool to configure your OpenRail switch at configurator.hirschmann.com. Avoid the hassle and the delay.

RSR > Switches Release 4.0

Type	RSR20-0800T1T1T1UK9HPHH04.0.
Order No.	RSR20-0800T1T1T1UK9HPHH04.0.
	
	8 port Fast Ethernet Switch, managed, Software Layer 2 Professional, for DIN rail, store-and-forward-switching, fanless design
Product description	
Port type and quantity	8 ports in total, 8 x FE; 1. Uplink: 10/100BASE-TX, RJ45; 2. Uplink: 10/100BASE-TX, RJ45; 6 x 10/100BASE TX, RJ45
More Interfaces	
Power supply/signaling contact	Power supply 1: 1 x plug-in terminal block 3-pin 1 x plug-in terminal block 2-pin;
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100m
Multimode fiber (MM) 50/125 µm	-
Multimode fiber (MM) 62.5/125 µm	-
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	> 100
Rekonfiguration time	< 10ms (10 switches), < 30ms (50 switches), < 40ms (100 switches), < 60ms (200 switches)
Power requirements	
Operating voltage	Power supply 1: 60/120/250 VDC (48-320)V and 110/230 VAC (90-265)V, Power supply 2: not assembled
Power output in Btu (IT) h	41 mA
Power consumption	10 W
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB, cable diagnostic
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port Security (IP und MAC), SNMP V3, SSH, Authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV), Prio (MAC/IP), Prio Mapping (TOS Layer2), Traffic Shaping (Unicast, Multicast, Broadcast) Ingress / Egress
Industrial Profiles	EtherNet/IP, PROFINET compatible, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Ambient conditions	
Operating temperature + Storage/transport temperature	-40° to +85°C
Relative humidity (non-condensing)	10% to 95%
Mechanical construction	
Dimensions (W x H x D)	120 x 137 x 115
Mounting	DIN Rail
Weight	appr. 1kg
Protection class	IP30
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms Dauer, 18 Schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13,2 Hz, 90 min.; 0,7g, 13,2 Hz - 100 Hz, 90 min.; 3,5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 Zyklen, 1 Oktave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	8 kV contact discharge, 15 kV air discharge
EN 61000-4-3 electromagnetic field	35 V/m (80 - 2700 MHz); 1kHz, 80% AM
EN 61000-4-4 fast transients (burst)	4 kV power line, 4 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line IEEE1613: power line 5kV (line/earth)
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (pending)
Hazardous locations	cUL 1604 Class1 Div 2 (pending)
Germanischer Lloyd	Germanischer Lloyd (pending)
Substation	IEC 61850-3, IEEE 1613
Railway norm	EN 50121-4
Transportation	NEMA TS2 (pending)

Switches Release 4.0 > Versions

Type	RSR20-0800M2M2T1UK9HPHH04.0.	RSR20-0900MMM2T1UK9HPHH04.0.
Order No.	RSR20-0800M2M2T1UK9HPHH04.0.	RSR20-0900MMM2T1UK9HPHH04.0.
		
	8 port Fast Ethernet Switch, managed, Software Layer 2 Professional, for DIN rail, store-and-forward-switching, fanless design	9 port Fast Ethernet Switch, managed, Software Layer 2 Professional, for DIN rail, store-and-forward-switching, fanless design
Product description		
Port type and quantity	8 ports in total, 8 x FE; 1. Uplink: 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC; 6 x 10/100BASE TX, RJ45	9 ports in total, 9 x FE; 1. Uplink: 2 x 100BASE-FX, MM-SC; 2. Uplink: 100BASE-FX, MM-SC; 6 x 10/100BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Single mode fiber (SM) 9/125 µm	-	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-	-
Power requirements		
Power output in Btu (IT) h	47.8 mA	38.5 mA
Power consumption	12 W	14 W

Type	RSR30-0603CCO7T1UK9HPHH04.0.	RSR30-0703OOO6T1UK9HPHH04.0.
Order No.	RSR30-0603CCO7T1UK9HPHH04.0.	RSR30-0703OOO6T1UK9HPHH04.0.
		
	9 port Gigabit/Fast Ethernet Switch, (3 x GE, 6 x FE), managed, Software Layer 2 Professional, for DIN rail, store-and-forward-switching, fanless design	10 port Gigabit/Fast Ethernet Switch, (3 x GE, 7 x FE), managed, Software Layer 2 Professional, for DIN rail, store-and-forward-switching, fanless design
Product description		
Port type and quantity	9 ports in total, 3 x GE, 6 x FE; 1. Uplink: 2 x Gigabit SFP-Combo Port; 2. Uplink: Gigabit SFP-Combo Port; 6 x 10/100BASE TX, RJ45	10 ports in total, 3 x GE, 7 x FE; 1. Uplink: 2 x Gigabit SFP-Slot; 2. Uplink: Gigabit SFP-Slot; 6 x 10/100BASE TX, RJ45
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	cf. SFP LWL-Modul M-SFP-SX/LC and M-SFP-LX/LC	cf. SFP LWL-Modul M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP LWL-Modul M-SFP-SX/LC and M-SFP-LX/LC	cf. SFP LWL-Modul M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP LWL-Modul M-SFP-LX/LC	cf. SFP LWL-Modul M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP LWL-Modul M-SFP-LH/LC and M-SFP-LH+/LC	cf. SFP LWL-Modul M-SFP-LH/LC and M-SFP-LH+/LC
Power requirements		
Power output in Btu (IT) h	51.2 mA	68.4 mA
Power consumption	15 W	20 W

Modular, gigabit, managed, flexible, economical.

The MICE, all of our expertise in one switch.

- Modular from the 8-port Fast-Ethernet Layer 2 switch to the Layer 3 and Gigabit-capable 28-port switch.
- Future-safe extensions such as routing and security.
- Maximum network redundancy with HIPER-Ring, RSTP, Dual Homing and Link Aggregation.
- Maximum flexibility by Gigabit-SFP fiberoptic modules.
- Extended temperature ranges from –40° C up to +70° C.
- Very easy commissioning by HiDiscovery, autoconfiguration, autocrossing, VLAN, RSTP, SNTP and much more.
- Power over Ethernet (PoE) and IEEE1588 real time modules.
- Supported standards: 10BASE-T/-FL, 100BASE-TX/-FX and 1000BASE-TX/-SX.
- Connections for twisted pair, multimode or single mode LWL, PoF, HCS, AUI and M12 connectors.
- Heat dissipation via integrated cooling units.

Industrially compatible, flexible, economical and future-safe – you should never expect less from your Ethernet switches today. But more would be overdoing things: you want to put together the functions and connections tailor-made to meet your individual application. No problem for the intelligent MICE module system! The modular structure pays off especially in the long term: MICE Switches and media modules offer you maximum flexibility and are therefore perfectly prepared for the growing network demands of the future. The MICE components are integrated in the "OpenRail" concept and therefore offer tailor-made solutions for all applications. The structure also guarantees long-term availability.

Large labeling fields and smart functions such as autoconfiguration and autocrossing make commissioning a lot easier.

And like all Industrial Ethernet products from the world market leader Hirschmann, the members of our MICE product family can be snapped onto the DIN rail at the drop of a hat, can be supplied redundantly and support the HIPER-Ring. Because only systems which run around the clock can guarantee your success.

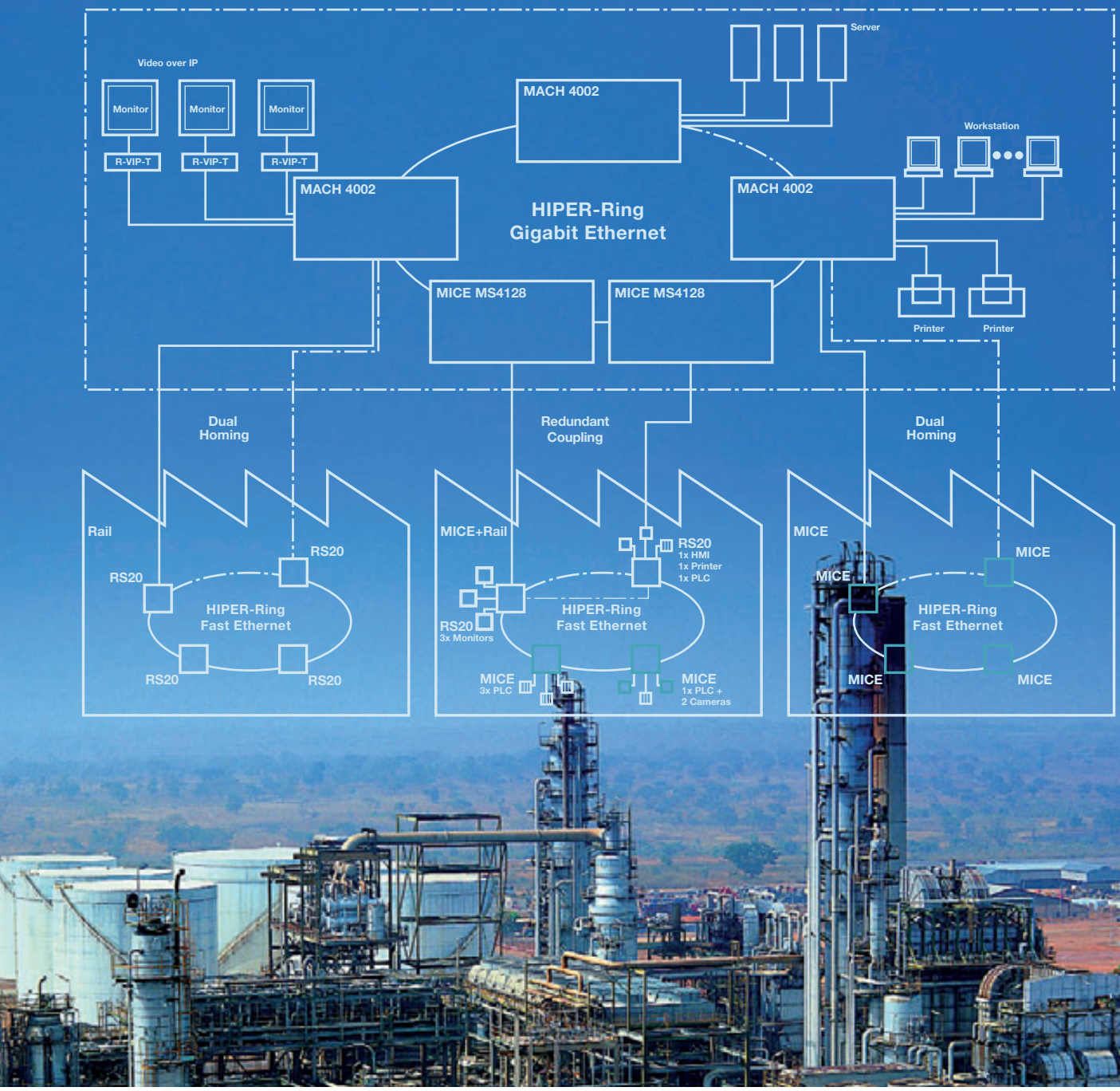
MS20

MS30

Accessories

for this family you can find on the following pages:

Transceiver Page 212
System Accessories Page 220



Hirschmann™ Competence Center

For MICE products too, the Hirschmann™ Competence Center offers the appropriate consulting services in the network planning: **Network optimization check, risk reduction consulting, network technology evaluation and network baselining consulting.**. Plus the following trainings: CP3d Industrial Backbone components in theory and practice, IMd Hirschmann™ in overview, CPUd Update Rail family and CB2d Industrial Ethernet II technology in detail. We also support you with certification testing, installation, configuration and pre-assembly as well as via our service hotline and later offer Advance Hardware Replacement and warranty extension.

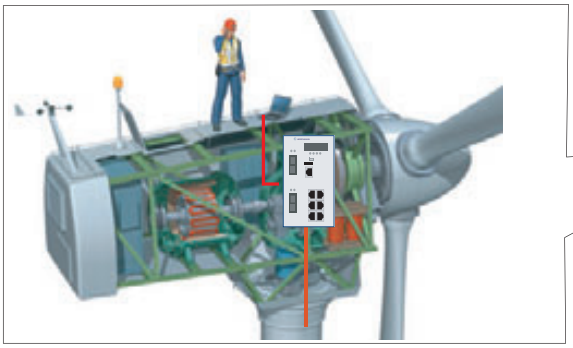
www.hicomcenter.com

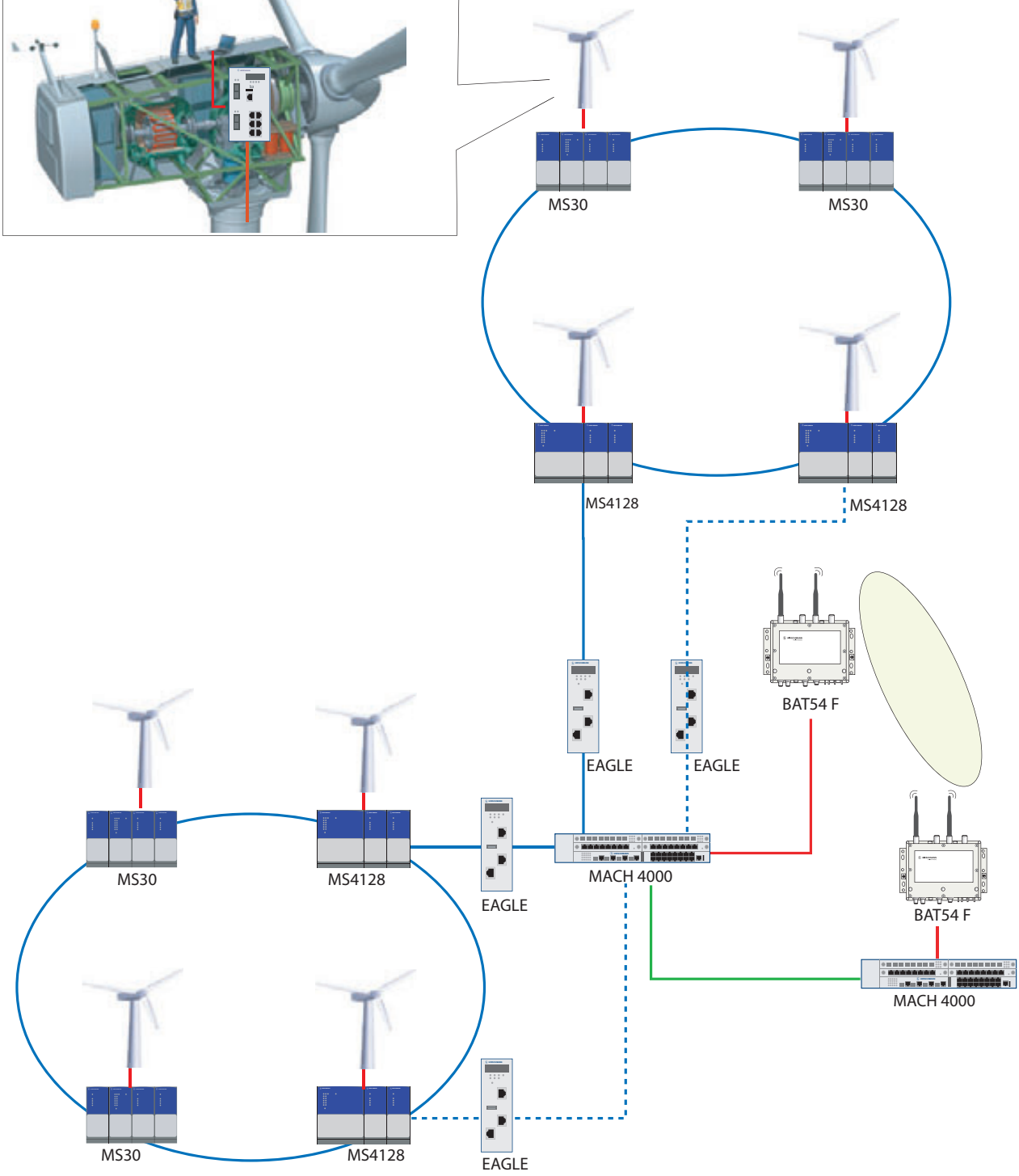
Industrial Ethernet

MICE > **Switches**

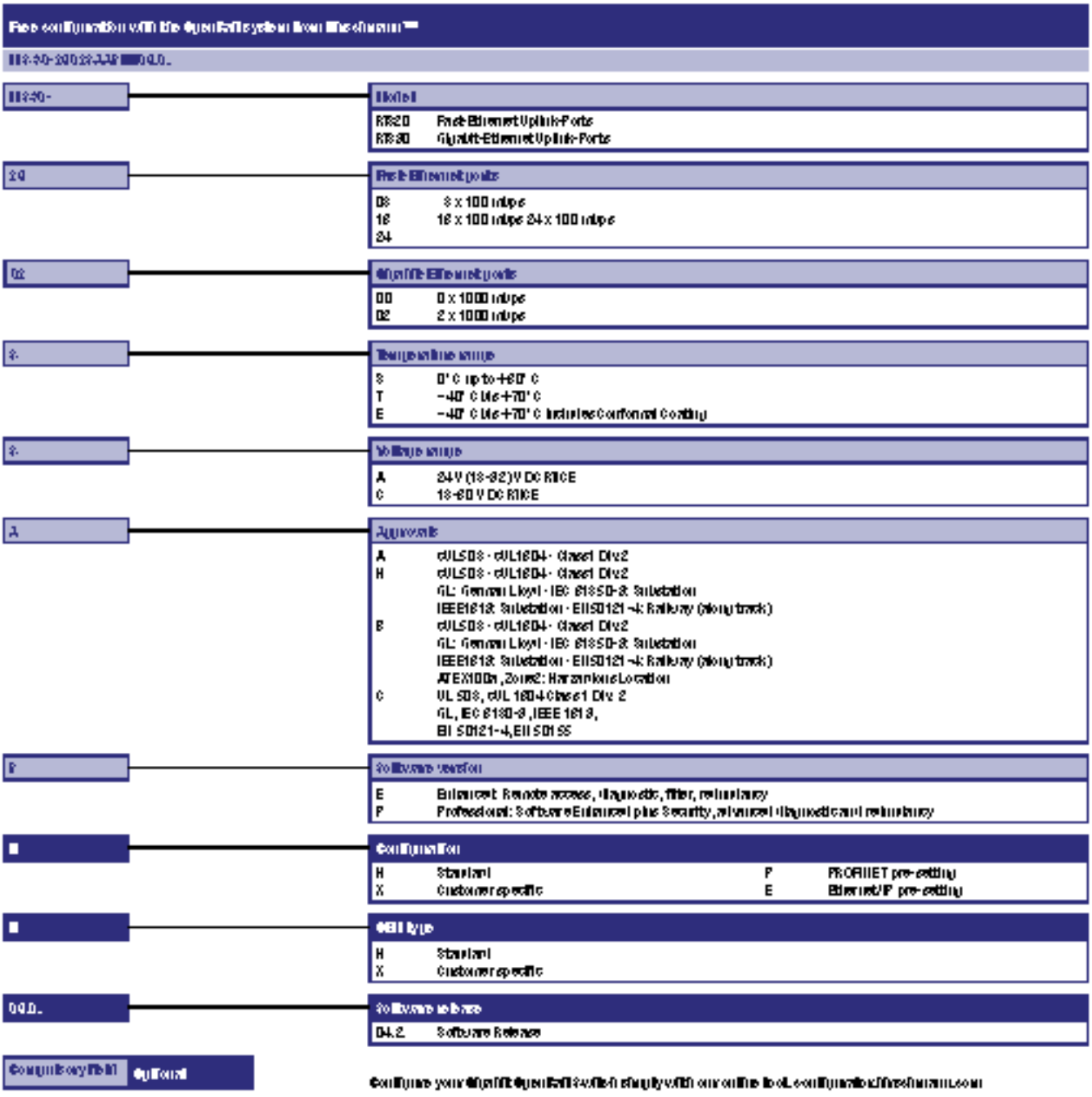
Type	MS4128-L2P
Order No.	943 009-101
	
	Power MICE, modular, managed Industrial Ethernet Switch, Layer 2 Switch with Software Professional. Ehternet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s) and Gigabit-Ethernet (1000 Mbit/s)
Product description	
Port type and quantity	up to 28 ports above media modules practicable, 4 X 1000 BASE-SX with SFP modules or 4 x 10/100/1000 BASE-TX and 24 Fast Ethernet (100 Mbit/s) ports (with MB-2T)
More Interfaces	
Power supply/signaling contact	2 plug-in terminal blocks, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 USB interface to connect auto-configuration adapter (ACA21-USB)
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 50 ms typ. at LWL)
Power requirements	
Operating voltage	24 V DC (-25% to +30%)
Current consumption at 24 V DC	630 mA (without media modules)
Power consumption	15 W (without media modules)
Service	
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), signal contact, syslog, logfile, RMON, port mirroring, Topology Discovery IEEE 802.1AB (LLDP)
Configuration	command line interface (CLI), TELNET, BootP, DHCP, DHCP Option 82, HiDiscovery, auto-configuration adapter (ACA21-USB)
Security	port-security (MAC- and IP-adresses), access control to agent (VLAN/IP) authentication 802.1x, SSH, SSL, SNMP V3
Other services	QoS 8 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), broadcastlimiter, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), TOS (Type of Service) Diff.-Serv (DSCP), TOS-Prio-Mapping, protocol based VLANs (IP, nonIP Traffic), Traffic Shaping
Prepared for	MSTP-802.1s
Routing	
Dynamic routing	
Multicast routing	
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP IEEE 802.1w (rapid spanning tree protocol), redundant network/ring coupling (master/receiver functionality), dual homing (master/receiver functionality), redundant 24 V power supply
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	24.2 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	315 mm x 134 mm x 140 mm
Mounting	DIN Rail
Weight	2,2 kg
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7 g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1 g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class 1 Div 2
Germanischer Lloyd	Germanischer Lloyd
Railway norm	EN50121-4
Scope of delivery and accessories	
Scope of delivery	device, 2 terminal blocks, operating manual
Accessories to order separately	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, HiVision network management, auto-configuration adapter (ACA21-USB), 19" installation frame, labels ML-MS2/MM, additional backplane MB-2T

Type	MS4128-L3E	MS4128-L3P
Order No.	943 009-201	943 009-301
		
	Power MICE, modular, managed Industrial Ethernet Switch, Layer 3 Switch with Software Enhanced. Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s) and Gigabit-Ethernet (1000 Mbit/s)	Power MICE, modular, managed Industrial Ethernet Switch, Layer 3 Switch with Software Professional. Ehternet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s) and Gigabit-Ethernet (1000 Mbit/s)
Service		
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2	RIP V1/2, OSPF
Multicast routing		Multicast routing DVMRP/PIM DM





10Gbi/s FX
1Gbit/s FX
100Mbit/s TP
54Mbit/s WLAN



Industrial Ethernet

OpenRail System > Modular > Switches Software Release 4.0

Type	MS20-0800SAAEHH04.0.
Order No.	MS20-0800SAAEHH04.0.
	
	8 Port Gigabit/Fast Ethernet switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	Fast ethernet ports in total: 8; Gigabit Ethernet Ports: 0
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32) V
Current consumption at 24 V DC	208 mA
Current consumption at 48 V DC	155 mA
Power output in Btu (IT) h	17.1
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (Statistic, history, alarme, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	54.7 years
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	125 x 133 x 100 (140 at 48 V module)
Mounting	DIN Rail
Weight	610 g (700 g at 48 V module)g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, network management HiVision, auto-configuration adapter (ACA21-USB), 19" installation frame

Switches Software Release 4.0 > Versions

Type	MS20-0800SAAPHH04.0.
Order No.	MS20-0800SAAPHH04.0.
	
	8 Port Gigabit/Fast Ethernet switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Software	
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (statistic, history, alarme, events), port mirroring, topology discovery 802.1AB, cable tester
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog konfiguration, from Release 4.1: integrated DHCP server
Security	Port security (IP und MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	49.6 years

Industrial Ethernet

OpenRail System > Modular > Switches Software Release 4.0

Type	MS20-1600SAAEHH04.0.
Order No.	MS20-1600SAAEHH04.0.
	
	16 Port Gigabit/Fast Ethernet switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	Fast ethernet ports in total: 16; Gigabit Ethernet Ports: 0
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32) V
Current consumption at 24 V DC	500 mA
Current consumption at 48 V DC	325 mA
Power output in Btu (IT) h	41
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (Statistic, history, alarme, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	36.5 years
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	202 x 133 x 100 (140 at 48 V module)
Mounting	DIN Rail
Weight	880 g (970 g at 48 V module)
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, network management HiVision, auto-configuration adapter (ACA21-USB), 19" installation frame

Switches Software Release 4.0 > Versions

Type	MS20-1600SAAPHH04.0.
Order No.	MS20-1600SAAPHH04.0.
	
	16 Port Gigabit/Fast Ethernet switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Software	
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (statistic, history, alarme, events), port mirroring, topology discovery 802.1AB, cable tester
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog konfiguration, from Release 4.1: integrated DHCP server
Security	Port security (IP und MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	34.2 years

Industrial Ethernet

OpenRail System > Modular > **Switches Software Release 4.0**

Type	MS20-2400SAAEHH04.0.
Order No.	MS20-2400SAAEHH04.0.
	
	24 Port Gigabit/Fast Ethernet switch, managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	Fast ethernet ports in total: 24; Gigabit Ethernet Ports: 0
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32) V
Current consumption at 24 V DC	500 mA
Current consumption at 48 V DC	325 mA
Power output in Btu (IT) h	0
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (Statistic, history, alarme, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	36.1 years
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	278 x 133 x 100 (140 at 48 V module)
Mounting	DIN Rail
Weight	1030 g (1120 g at 48 V module)
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, network management HiVision, auto-configuration adapter (ACA21-USB), 19" installation frame

Type	MS20-2400SAAPHH04.0.
Order No.	MS20-2400SAAPHH04.0.
	
	24 Port Gigabit/Fast Ethernet switch, managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Software	
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (statistic, history, alarme, events), port mirroring, topology discovery 802.1AB, cable tester
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog konfiguration, from Release 4.1: integrated DHCP server
Security	Port security (IP und MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	33.8 years

Industrial Ethernet

OpenRail System > Modular > **Switches Software Release 4.0**

Type	MS30-0802SAAEHH04.0.
Order No.	MS30-0802SAAEHH04.0.
	
	10 Port Gigabit/Fast Ethernet switch (2 x GE, 8 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	Fast ethernet ports in total: 8; Gigabit Ethernet Ports: 2
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32) V
Current consumption at 24 V DC	233 mA
Current consumption at 48 V DC	180 mA
Power output in Btu (IT) h	19.1
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (Statistic, history, alarme, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	46.1 years
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	163 x 133 x 100 (140 at 48 V module)
Mounting	DIN Rail
Weight	740 g (830 g at 48 V module)
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, network management HiVision, auto-configuration adapter (ACA21-USB), 19" installation frame

Type	MS30-0802SAAPHH04.0.
Order No.	MS30-0802SAAPHH04.0.
	
	10 Port Gigabit/Fast Ethernet switch (2 x GE, 8 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Software	
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (statistic, history, alarme, events), port mirroring, topology discovery 802.1AB, cable tester
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog konfiguration, from Release 4.1: integrated DHCP server
Security	Port security (IP und MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	42.4 years

OpenRail System > Modular > Switches Software Release 4.0

Type	MS30-1602SAAEHH04.0.
Order No.	MS30-1602SAAEHH04.0.
	
	18 Port Gigabit/Fast Ethernet switch (2 x GE, 16 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	Fast ethernet ports in total: 16; Gigabit Ethernet Ports: 2
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32) V
Current consumption at 24 V DC	525 mA
Current consumption at 48 V DC	350 mA
Power output in Btu (IT) h	43
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (Statistic, history, alarme, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	32.5 years
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	240 x 133 x 100 (140 at 48 V module)
Mounting	DIN Rail
Weight	1010 g (1100 g at 48 V module)
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, network management HiVision, auto-configuration adapter (ACA21-USB), 19" installation frame

Switches Software Release 4.0 > Versions

Type	MS30-1602SAAPHH04.0.
Order No.	MS30-1602SAAPHH04.0.
	
	18 Port Gigabit/Fast Ethernet switch (2 x GE, 16 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Software	
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (statistic, history, alarme, events), port mirroring, topology discovery 802.1AB, cable tester
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog konfiguration, from Release 4.1: integrated DHCP server
Security	Port security (IP und MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	30.6 years

Industrial Ethernet

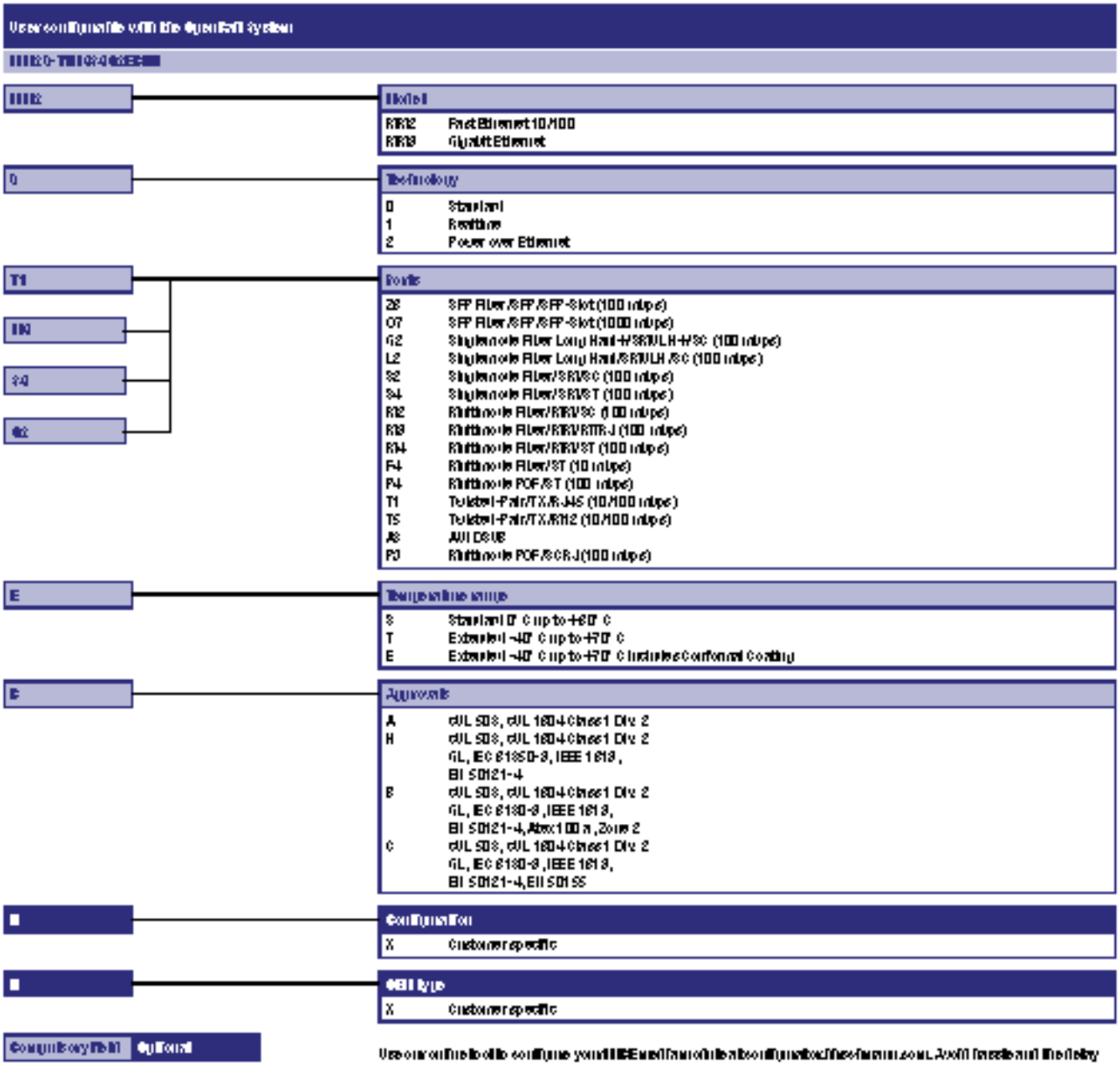
OpenRail System > Modular > **Switches Software Release 4.0**

Type	MS30-2402SAAEHH04.0.
Order No.	MS30-2402SAAEHH04.0.
	
	26 Port Gigabit/Fast Ethernet switch (2 x GE, 24 x FE), managed, Software Layer 2 Enhanced, for DIN rail store-and-forward-switching, fanless design
Product description	
Port type and quantity	Fast ethernet ports in total: 24; Gigabit Ethernet Ports: 2
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 4-pin
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	24 V DC (18-32) V
Current consumption at 24 V DC	525 mA
Current consumption at 48 V DC	350 mA
Power output in Btu (IT) h	0
Software	
Management	Serial interface, web-interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (Statistic, history, alarme, events), port mirroring, topology discovery 802.1AB
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog configuration
Security	Port security (IP and MAC), SNMP V3 (no encryption)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging
Industrial Profiles	EtherNet/IP and PROFINET compatibel, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV)
Presettings	Standard
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Relative humidity (non-condensing)	10% to 95%
MTBF	32.2 years
Protective paint on PCB	-
Mechanical construction	
Dimensions (W x H x D)	316 x 133 x 100 (140 at 48 V module)
Mounting	DIN Rail
Weight	1160 g (1250 g at 48 V module)
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2kV (line/earth), 1kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	-
Substation	-
Railway norm	-
Scope of delivery and accessories	
Scope of delivery	Device, terminal block, operating manual
Accessories to order separately	Rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, network management HiVision, auto-configuration adapter (ACA21-USB), 19" installation frame

Switches Software Release 4.0 > Versions

Type	MS30-2402SAAPHH04.0.
Order No.	MS30-2402SAAPHH04.0.
	
	26 Port Gigabit/Fast Ethernet switch (2 x GE, 24 x FE), managed, Software Layer 2 Professional, for DIN rail store-and-forward-switching, fanless design
Software	
Diagnostics	LEDs, log-File, syslog, signal contact, RMON (statistic, history, alarme, events), port mirroring, topology discovery 802.1AB, cable tester
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACA11, ACA21-USB), watchdog konfiguration, from Release 4.1: integrated DHCP server
Security	Port security (IP und MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply, redundant signal contact
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, PTP / IEEE 1588 support with media module, realtime clock with energy buffer
Flow control	Flow control 802.3x, port priority 802.1D/p, priority (TOS/DIFFSERV), prio (MAC/IP), prio mapping (TOS Layer2), traffic shaping (unicast, multicast, broadcast) ingress / egress
Ambient conditions	
MTBF	30.3 years

Type	MB-2T
Order No.	943 733-102
	 Expansion backplane with 2 slots for MS20/30-16 and MS4128 MICE switches
Product description Port type and quantity	 2 slots integrated on backplane (8 ports possible via media modules)
Network size - length of cable Twisted pair (TP) Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Power requirements Operating voltage Power consumption	 0 W
Service Diagnostics	
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing) MTBF	 0 °C bis +60 °C standart (optional -40°C to +70°C) -25 °C to +70 °C 10% to 95% 1146.1 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Dimensions (W x H x D) Mounting Weight Protection class	 79 mm x 134 mm x 22 mm DIN Rail 35 mm 150 g IP 20
Mechanical stability IEC 60068-2-27 shock IEC 60068-2-6 vibration	 15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity EN 61000-4-2 electrostatic discharge (ESD) EN 61000-4-3 electromagnetic field EN 61000-4-4 fast transients (burst) EN 61000-4-5 surge voltage EN 61000-4-6 conducted immunity	 6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line Power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity FCC CFR47 Part 15 EN 55022	 FCC CFR47 Part 15 Class A EN 55022 Class A
Approvals Safety of industrial control equipment Hazardous locations Safety of information technology equipment Germanischer Lloyd	 cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) optional
Number of labels Labels per DIN A 4 sheet	
Scope of delivery and accessories Scope of delivery Accessories to order separately	


Model
RKB2 Fast Ethernet 10/100
RKB3 Gigabit Ethernet
Technology
0 Standard
1 Redline
2 Power over Ethernet
Ports
28 SFP Fiber/SFP/SFP-Slot (100 mbps)
07 SFP Fiber/SFP/SFP-Slot (1000 mbps)
G2 Singlemode Fiber Long Haul+/SR/ULH+/SC (100 mbps)
L2 Singlemode Fiber Long Haul/SR/ULH/SC (100 mbps)
S2 Singlemode Fiber/SR/SC (100 mbps)
S4 Singlemode Fiber/SR/ST (100 mbps)
R2 Multimode Fiber/RR/SC (100 mbps)
R3 Multimode Fiber/RR/MTRJ (100 mbps)
R4 Multimode Fiber/RR/ST (100 mbps)
F4 Multimode Fiber/ST (10 mbps)
P4 Multimode POF/ST (100 mbps)
T1 Twisted-Pair/TX/RJ45 (10/100 mbps)
T5 Twisted-Pair/TX/RJ2 (10/100 mbps)
A5 AUI DSUB
P3 Multimode POF/SCRJ (100 mbps)
Temperature range
S Standard 0° C up to +60° C
T Extended -40° C up to +70° C
E Extended -40° C up to +70° C includes Conformal Coating
Approvals
A cUL 508, cUL 1604 Class1 Div 2
H cUL 508, cUL 1604 Class1 Div 2
GL, IEC 61850-3, IEEE 1613,
EN 50121-4
B cUL 508, cUL 1604 Class1 Div 2
GL, IEC 61850-3, IEEE 1613,
EN 50121-4, Atex100a, Zone 2
C cUL 508, cUL 1604 Class1 Div 2
GL, IEC 61850-3, IEEE 1613,
EN 50121-4, EN 50155
Configuration
X Customer specific
HW type
X Customer specific

MICE > Gigabit Ethernet Media Modules

Type	MM4-2TX/SFP
Order No.	943 622-001
	
	Media module for MICE Switch MS4128, MS30xx, 10/100/1000BASE-TX und 1000BASE-SX/LX
Product description	
Port type and quantity	2 x 1000BASE-fiber with SFP modules, or 2 x 10/100/1000BASE-TX, TP cable, RJ45-sockets, autocrossing, autoneg., autopolarity any combination TX or SFP, 1 SFP deactivates 1TX, up to 2 ports
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber HCS (MM) 200/230 µm	
Multimode fiber POF (MM) 980/1000 µm	
Multimode fiber (MM) 50/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	cf. SFP module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP FO module M-SFP-LH/LC and M-SFP-LH+/LC
Power requirements	
Operating voltage	power supply via the backplane of the MICE switch
Power consumption	2 W
PoE voltage	
Service	
Diagnostics	LEDs (power, link status, data, 1000 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Other services	
Ambient conditions	
Operating temperature	0 °C bis +60 °C standart (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C
Protective paint on PCB	optional
Relative humidity (non-condensing)	10% to 95%
MTBF	163 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	38 mm x 134 mm x 77 mm
Mounting	Backplane
Weight	160 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531)
Hazardous locations	cUL 1604 class1 div2
Germanischer Lloyd	optional
Railway norm	optional
Substation	optional
Scope of delivery and accessories	
Scope of delivery	module, operating manual
Accessories to order separately	ML-MS2/MM labels

Gigabit Ethernet Media Modules > Versions

Type	MM4-4TX/SFP
Order No.	943 010-001
	 Media module for MICE Switch MS4128, 10/100/1000BASE-TX und 1000BASE-SX/LX
Product description Port type and quantity	4 x 1000BASE-fiber with SFP modules, or 4 x 10/100/1000BASE-TX, TP cable, RJ45-sok-kets, autocrossing, autoneg., autopolarity, any combination TX or SFP, 1 SFP deactivates 1TX, up to 4 ports
Mechanical construction Dimensions (W x H x D) Weight	 38 mm x 134 mm x 118 mm 180 g
Mechanical stability IEC 60068-2-6 vibration	 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
Approvals Hazardous locations	 cUL 1604 Class 1 Div 2 (E203960)

MICE > **Ethernet / Fast-Ethernet Media Modules**

Type	MM22-T1T1T1T1SAHH
Order No.	MM22-T1T1T1T1SAHH
	
	Fast Ethernet media module for MICE Switches (MS...), supportive of Power over Ethernet, IEEE 802.3af
Product description	
Port type and quantity	Port 1: 10/100BASE-TX, RJ45, Port 2: 10/100BASE-TX, RJ45, Port 3: 10/100BASE-TX, RJ45, Port 4: 10/100BASE-TX, RJ45
Network size - length of cable	
Twisted pair (TP)	0 - 100m
Multimode fiber HCS (MM) 200/230 µm	-
Multimode fiber POF (MM) 980/1000 µm	-
Multimode fiber (MM) 50/125 µm	-
Multimode fiber (MM) 62.5/125 µm	-
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-
Power requirements	
Operating voltage	Power supply via the backplane of the MICE switch
Power consumption	0.8 W
PoE voltage	
Service	
Diagnostics	
Other services	
Ambient conditions	
Operating temperature	0° to +60°C
Storage/transport temperature	-40° to +70°C
Protective paint on PCB	-
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm
Mounting	Backplane
Weight	n/a
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13,2 Hz, 90 min.; 0,7g, 13,2 Hz - 100 Hz, 90 min.; 3,5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class1 Div 2 (pending)
Germanischer Lloyd	-
Railway norm	-
Substation	-
Scope of delivery and accessories	
Scope of delivery	Module, operating manual
Accessories to order separately	ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM20-Z6Z6Z6Z6SAHH	MM2-4TX1
Order No.	MM20-Z6Z6Z6Z6SAHH	943 722-101
		
	Fast Ethernet media module for MICE Switches (MS...)	Media module for MICE Switches (MS...), 10BASE-T and 100BASE-TX
Product description Port type and quantity	Port 1: Fast Ethernet SFP-Slot, Port 2: Fast Ethernet SFP-Slot, Port 3: Fast Ethernet SFP-Slot, Port 4: Fast Ethernet SFP-Slot	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable Twisted pair (TP) Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm Single mode fiber (LH) 9/125 µm (long haul transceiver)	- cf. SFP LWL-module M-Fast-SFP MM cf. SFP LWL-module M-Fast-SFP MM cf. SFP LWL-module M-Fast-SFP SM and M-Fast-SFP SM+ cf. SFP LWL-module M-Fast-SFP LH	0 -100 m
Power requirements Power consumption	4 W	0.8 W
Scope of delivery and accessories Accessories to order separately	ML-MS2/MM labels, 100Mbps SFPs cf. accessories	ML-MS2/MM labels

MICE > Ethernet / Fast-Ethernet Media Modules

Type	MM2-4TX1-EEC
Order No.	943 722-151
	 Media module for MICE Switches (MS...), 10BASE-T and 100BASE-TX
Product description	
Port type and quantity	4 x 10/100BASE-TX, TP cable, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable	
Twisted pair (TP) Multimode fiber HCS (MM) 200/230 µm Multimode fiber POF (MM) 980/1000 µm Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm Single mode fiber (LH) 9/125 µm (long haul transceiver)	0 -100 m
Power requirements	
Operating voltage Power consumption PoE voltage	power supply via the backplane of the MICE switch 0.8 W
Service	
Diagnostics Other services	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions	
Operating temperature Storage/transport temperature Protective paint on PCB Relative humidity (non-condensing) MTBF	-40 °C to +70 °C -40 °C to +70 °C optional 10% to 95% 432.8 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D) Mounting Weight Protection class	38 mm x 134 mm x 77 mm Backplane 170 g IP 20
Mechanical stability	
IEC 60068-2-27 shock IEC 60068-2-6 vibration	15 g, 11 ms duration, 18 shocks 1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD) EN 61000-4-3 electromagnetic field EN 61000-4-4 fast transients (burst) EN 61000-4-5 surge voltage EN 61000-4-6 conducted immunity	6 kV contact discharge, 8 kV air discharge 10 V/m (80 - 1000 MHz) 2 kV power line, 1 kV data line power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line 3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15 EN 55022	FCC CFR47 Part 15 Class A EN 55022 Class A
Approvals	
Safety of industrial control equipment Hazardous locations Germanischer Lloyd Railway norm Substation	cUL 508 (E175531) cUL 1604 Class 1 Div 2 (E203960) optional optional optional
Scope of delivery and accessories	
Scope of delivery Accessories to order separately	module, operating manual ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM2-4FXM3	MM2-2FXM2
Order No.	943 721-101	943 718-101
		
	Media module for MICE Switches (MS...), 100BASE-FX multi-mode F/O	Media module for MICE Switches (MS...), 100BASE-FX multi-mode F/O
Product description		
Port type and quantity	4 x 100BASE-FX, MM cable, MTRJ sockets	2 x 100BASE-FX, MM cable, SC sockets
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x m	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x m	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Power consumption	7 W	3,4 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	0 °C to +60 °C standard (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C	-40 °C bis +70 °C
Protective paint on PCB	optional	optional
MTBF	30.2 years; MIL-HDBK 217F: Gb 25 °C	83.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 77 mm	38 mm x 134 mm x 77 mm
Weight	170 g	170 g
Protection class	IP 20	IP 20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM2-2FXM3/2TX1	MM3-4FLM4
Order No.	943 720-101	943 760-101
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi-mode F/O	Media module for MICE Switches (MS...), 10BASE-FL multi-mode F/O
Product description		
Port type and quantity	2 x 100BASE-FX, MM cables, MTRJ sockets, 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	4 x 10BASE-FL, MM cables, ST (BFOC/) sokkets
Network size - length of cable		
Twisted pair (TP)	0 -100 m	
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 2300 m 10 dB link budget at 850 nm A = 3 dB/km, 3 dB reserve, B = 400 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 3100 m 13 dB link budget at 850 nm A = 3.2 dB/km, 3 dB reserve, B = 200 MHz x km
Power requirements		
Power consumption	3,4 W	7 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	0 °C to +60 °C
Storage/transport temperature	-40 °C to +70 °C	-25 °C to +70 °C
Protective paint on PCB	optional	
MTBF	48.7 years; MIL-HDBK 217F: Gb 25 °C	49.8 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 77 mm	38 mm x 134 mm x 118 mm
Weight	170 g	180 g
Protection class	IP 20	IP 20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13,2 Hz, 90 min.; 0,7g, 13,2 Hz - 100 Hz, 90 min.; 3,5 mm, 3 Hz - 9 Hz, 10 Zyklen, 1 Oktave/min.; 1g, 9 Hz - 150 Hz, 10 Zyklen, 1 Oktave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	Module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-2FXS2/2TX1	MM3-2FXS2/2TX1-EEC
Order No.	943 762-101	943 762-151
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O
Product description		
Port type and quantity	2 x 100BASE-FX, SM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	2 x 100BASE-FX, SM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 -100 m	0 -100 m
Single mode fiber (SM) 9/125 µm	0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)	0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Power requirements		
Power consumption	3,4 W	3,4 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB	optional	optional
MTBF	64.9 years; MIL-HDBK 217F: Gb 25 °C	64.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP 20	IP 20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-1FXL2/3TX1	MM3-4FXM2
Order No.	943 763-101	943 764-101
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O	Media module for MICE Switches (MS...), 100Base-FX multi-mode F/O
Product description		
Port type and quantity	1 x 100BASE-FX, SM cables, 1550 nm, SC sokkets 3 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	4 x 100Base-FX, MM cable, SC sockets
Network size - length of cable		
Twisted pair (TP)	0 -100 m	
Multimode fiber (MM) 50/125 µm		0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (LH) 9/125 µm (long haul transceiver)	24 -86.6 km 7 - 29 dB link budget at 1550 nm A = 0.3 dB/km, 3 dB reserve, D = 19 ps/(nm x km)	
Power requirements		
Power consumption	3.4 W	7 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	0 °C to +60 °C standard (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB	optional	optional
MTBF	76.6 years; MIL-HDBK 217F: Gb 25 °C	59.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP 20	IP 20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-1FXM2/3TX1	MM3-1FXS2/3TX1
Order No.	943 839-101	943 838-101
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi-mode F/O	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O
Product description		
Port type and quantity	1 x 100BASE-FX, MM cables, SC sockets 3 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	1 x 100BASE-FX, SM cables, SC sockets 3 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 -100 m	0 -100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Power requirements		
Power consumption	3,4 W	3,4 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	0 °C to +60 °C standard (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB	optional	optional
MTBF	88.2 years; MIL-HDBK 217F: Gb 25 °C	74.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP 20	IP 20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

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Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-1FXS2/1FXM2/2TX1	MM3-1FXS2/3TX1-EEC
Order No.	943 929-101	943 838-151
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi- single mode F/O	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O
Product description		
Port type and quantity	1 x 100BASE-FX, MM, 1 x 100BASE-FX, SM, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	1 x 100BASE-FX, SM cables, SC sockets 3 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 -100 m	0 -100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm	0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)	0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Power requirements		
Power consumption	3,4 W	3,4 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB	optional	optional
MTBF	88.2 years; MIL-HDBK 217F: Gb 25 °C	74.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP 20	IP 20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-4FXS2	MM3-2FXM4/2TX1
Order No.	943 836-101	943 837-101
		
	Media module for MICE Switches (MS...), 100BASE-FX single mode F/O	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi-mode F/O
Product description		
Port type and quantity	4 x 100BASE-FX, SM cables, SC sockets	2 x 100BASE-FX, MM cables, ST sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)		0 -100 m
Multimode fiber (MM) 50/125 µm		0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)	
Power requirements		
Power consumption	7 W	3,4 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C standard (optional -40°C to +70°C)	0 °C to +60 °C standard (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB	optional	optional
MTBF	59.5 years; MIL-HDBK 217F: Gb 25 °C	80.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP 20	IP20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

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Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-2FXM2/2TX1-EEC	MM3-4FXM4
Order No.	943 761-151	943 835-101
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi-mode F/O	Media module for MICE Switches (MS...), 100BASE-FX multi-mode F/O
Product description		
Port type and quantity	2 x 100BASE-FX, MM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	4 x 100BASE-FX, MM cables, ST sockets
Network size - length of cable		
Twisted pair (TP)	0 -100 m	
Multimode fiber (MM) 50/125 µm	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Power requirements		
Power consumption	3,4 W	7 W
Service		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, 100 Mbit/s, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	-40 °C to +70 °C	0 °C to +60 °C standard (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB	optional	optional
MTBF	79.9 years; MIL-HDBK 217F: Gb 25 °C	40 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP20	IP20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels

Industrial Ethernet

Ethernet / Fast-Ethernet Media Modules > Versions

Type	MM3-2AUI	MM3-4TX5
Order No.	943 840-101	943 841-101
		
	Media module for MICE Switches (MS...), 10 Mbit/s HDX in accordance AUI	Media module for MICE Switches (MS...), OCTOPUS-Switches 10/100BASE-TX
Product description		
Port type and quantity	2 x AUI SUB-D 15 poles, male	4 x 10/100BASE-TX, TP cables, M12 sockets (D code), auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	50 m	0 -100 m
Power requirements		
Power consumption	3,5 W	0,8 W
Service		
Diagnostics	SQE and DTE Power via Management LEDs (power, data, LED test)	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions		
Operating temperature	0 °C to +60 °C	0 °C to +60 °C standart (optional -40°C to +70°C)
Storage/transport temperature	-25 °C to +70 °C	-40 °C to +70 °C
Protective paint on PCB		optional
MTBF	70.7 years; MIL-HDBK 217F: Gb 25 °C	432.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm	38 mm x 134 mm x 118 mm
Weight	180 g	180 g
Protection class	IP20	IP20
Mechanical stability		
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity		
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	optional	cUL 1604 Class 1 Div 2 (E203960)
Scope of delivery and accessories		
Scope of delivery	module, operating manual	module, operating manual
Accessories to order separately	ML-MS2/MM labels	ML-MS2/MM labels, order no.: 943 767-101

MICE > Realtime Modules

Type	MM3-2FLM4/2TX1-RT
Order No.	943 117-004
	
	Media module for MICE Switches (MS...), 100BASE-TX und 10BASE-FL multi-mode F/O, support of PTP (IEEE1588)
Product description	
Port type and quantity	2 x 10BASE-FL, MM cables, ST (BFOC/) sockets 2 x 10/100BASE-TX, TP cables, RJ45-Buchsen, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable	
Twisted pair (TP)	
Multimode fiber HCS (MM) 200/230 µm	
Multimode fiber POF (MM) 980/1000 µm	
Multimode fiber (MM) 50/125 µm	0 - 2300 m 10 dB link budget at 850 nm A = 3 dB/km, 3 dB reserve, B = 400 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 3100 m 13 dB link budget at 850 nm A = 3.2 dB/km, 3 dB reserve, B = 200 MHz x km
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Power requirements	
Operating voltage	power supply via the backplane of the MICE switch
Power consumption	5 W
PoE voltage	
Service	
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Other services	support of PTP (IEEE1588) precision between 2 modules <80ns
Ambient conditions	
Operating temperature	0 °C bis +60 °C standart
Storage/transport temperature	-25 °C to +70 °C
Protective paint on PCB	optional
Relative humidity (non-condensing)	10% to 95%
MTBF	30,5 Jahre; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm
Mounting	Backplane
Weight	180 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531)
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)
Germanischer Lloyd	optional
Railway norm	optional
Substation	optional
Scope of delivery and accessories	
Scope of delivery	module, operating manual
Accessories to order separately	ML-MS2/MM labels

Industrial Ethernet

Realtime Modules > Versions

Type	MM3-2FXM2/2TX1-RT	MM3-2FXS2/2TX1-RT
Order No.	943 117-002	943 117-003
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi-mode F/O, support of PTP (IEEE1588)	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O, support of PTP (IEEE1588)
Product description		
Port type and quantity	2 x 100BASE-FX, MM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	2 x 100BASE-FX, SM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 -100 m	0 -100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Power requirements		
Power consumption	3.4 W	3.4 W
Ambient conditions		
Operating temperature	0 °C bis +60 °C standart (optional -40°C to +70°C)	0 °C bis +60 °C standart (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
MTBF	39,3 Jahre; MIL-HDBK 217F: Gb 25 °C	33,9 Jahre; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Protection class	IP20	IP 20
EMC interference immunity		
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL1604 Class 1 Div 2 (E203960)	cUL1604 Class 1 Div 2 (E203960)
Railway norm	optional	optional

Realtime Modules > Versions

Type	MM3-4TX1-RT	MM3-4TX1-RT-EEC
Order No.	943 117-001	943 955-001
		
	Media module for MICE Switches (MS...), 100BASE-TX, support of PTP (IEEE1588)	Media module for MICE Switches (MS...), 100BASE-TX, support of PTP (IEEE1588)
Product description		
Port type and quantity	4 x 10/100BASE-TX, TP cables, auto-crossing, auto-negotiation, auto-polarity	4 x 10/100BASE-TX, TP cables, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 -100 m	0 -100 m
Power requirements		
Power consumption	1 W	1 W
Ambient conditions		
Operating temperature	0 °C bis +60 °C standart (optional -40°C to +70°C)	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
MTBF	43,2 Jahre; MIL-HDBK 217F: Gb 25 °C	43,2 Jahre; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Protection class	IP20	IP20
EMC interference immunity		
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Railway norm	optional	EN50155, EN50121-4

Type	MM3-2FXM2/2TX1-RT-EEC	MM3-2FXS2/2TX1-RT-EEC
Order No.	943 955-002	943 955-003
		
	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX multi-mode F/O, support of PTP (IEEE1588)	Media module for MICE Switches (MS...), 100BASE-TX and 100BASE-FX single mode F/O, support of PTP (IEEE1588)
Product description		
Port type and quantity	2 x 100BASE-FX, MM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity	2 x 100BASE-FX, SM cables, SC sockets 2 x 10/100BASE-TX, TP cables, RJ45 sockets, auto-crossing, auto-negotiation, auto-polarity
Network size - length of cable		
Twisted pair (TP)	0 -100 m	0 -100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m 8 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m 11 dB link budget at 1300 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	
Single mode fiber (SM) 9/125 µm		0 -32.5 km 16 dB link budget at 1300 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Power requirements		
Power consumption	3.4 W	3.4 W
Ambient conditions		
Operating temperature	-40°C to +70°C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +70 °C	-40 °C to +70 °C
MTBF	39,3 Jahre; MIL-HDBK 217F: Gb 25 °C	33,9 Jahre; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Protection class	IP20	IP 20
EMC interference immunity		
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line	Power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)	cUL 1604 Class 1 Div 2 (E203960)
Railway norm	EN50155, EN50121-4	EN50155, EN50121-4

Industrial Ethernet

MICE > Ethernet / Fast-Ethernet POF media modules

Type	MM2-2FXP4
Order No.	943 842-101
	
	Media module for MICE Switches (MS...), 100BASE-FX multi-mode F/O, POF and HCS
Product description	
Port type and quantity	2 x 100BASE-FX, MM cables, ST sockets
Network size - length of cable	
Twisted pair (TP)	
Multimode fiber HCS (MM) 200/230 µm	0 - 140 m 9 dB link budget at 650 nm A = 10 dB/km, 3 dB reserve, B = 17 MHz x km
Multimode fiber POF (MM) 980/1000 µm	0 - 65 m 14 dB link budget at 650 nm A = 160 dB/km, 3 dB reserve, B = >10 MHz x km, low-NA-POF
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Power requirements	
Operating voltage	power supply via the backplane of the MICE switch
Power consumption	3,4 W
PoE voltage	
Service	
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, full duplex, ring port, LED test)
Other services	
Ambient conditions	
Operating temperature	0 °C bis +60 °C standart (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	15,5 Jahre; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	38 mm x 134 mm x 77 mm
Mounting	Backplane
Weight	193 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line,
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line),
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531)
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)
Germanischer Lloyd	optional
Substation	optional
Railway norm	optional
Scope of delivery and accessories	
Scope of delivery	module, operating manual
Accessories to order separately	ML-MS2/MM labels

Ethernet / Fast-Ethernet POF media modules > Versions

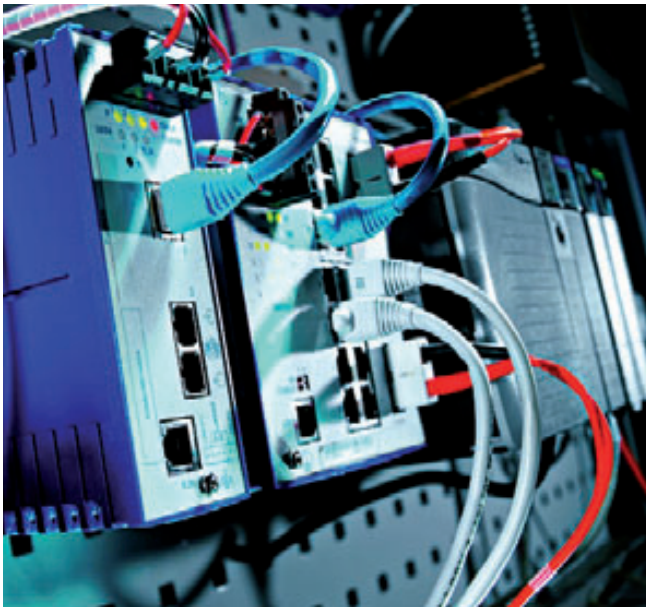
Type	MM3-4FXP4
Order No.	943 843-101
	
	Media module for MICE Switches (MS...), 100BASE-FX multi-mode F/O, POF and HCS
Product description	
Port type and quantity	4 x 100BASE-FX, MM cables, ST sockets
Ambient conditions	
MTBF	48,8 Jahre; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Weight	324 g
Approvals	
Hazardous locations	cUL1604 Class 1 Div 2 (E203960)

MICE > **Labelling sheet**

Type	ML-MS2/MM	ML-MS3
Order No.	943 767-001	943 768-001
		
	Labels for MICE switches (MS2...) and MICE media modules (MM)	Labels for MICE switches (MS3...)
Number of labels Labels per DIN A 4 sheet	per DIN A 4 sheet: 4 labels for 2000-series switches, 12 labels for 2000/3000-series media modules	per DIN A 4 sheet: 4 labels for 3000-series switches
Scope of delivery and accessories Scope of delivery	10 DIN A4 sheets with labels	10 DIN A4 sheets with labels

A closed society.

The industrial Firewall and VPN system EAGLE.



- High-performance industrial security router
- Simple integration into existing networks without interrupting production
- NAT (Network Address Translation), port forwarding and full 1:1 NAT functionality
- Simple commissioning: HiDiscovery support and support for the USB autoconfiguration adapter.
- Extensive diagnostic facilities: web-based management, status LEDs, signal contact, logging on SysLog server, integration in HiVision
- Support of redundancy scenarios: Firewall redundancy, redundant Ring Coupling and Dual Homing.
- Separation of subnets (router mode).

Security is crucial to a company's future today. Because there is a risk wherever process and production data flow into interdepartmental data acquisition systems or systems adjust each other in the automation network. Not only from hackers or willful intent but also accidentally. Even accidental actions such as programming errors can paralyze whole machines and production cells – with one mouse click.

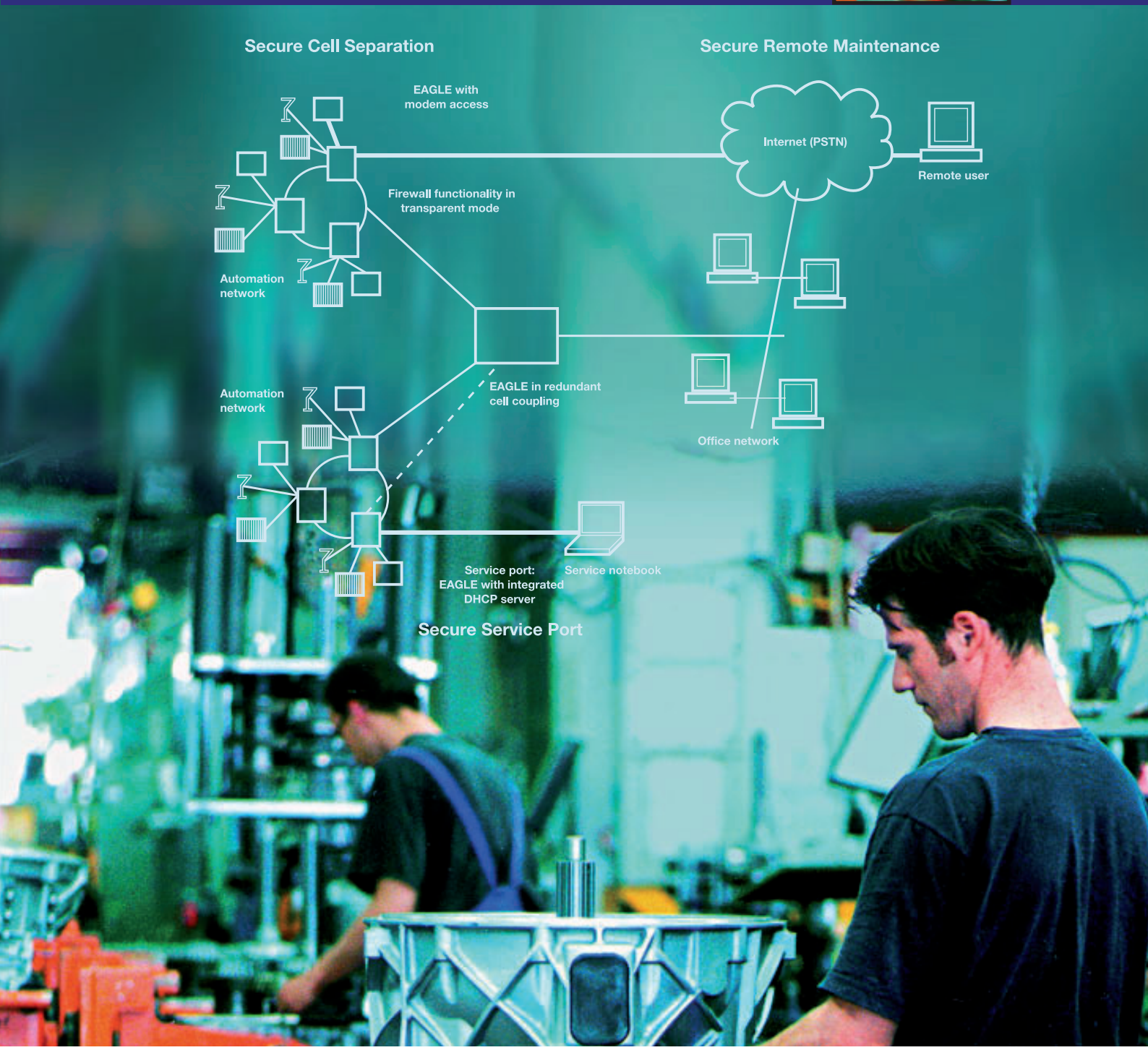
Good to know that a no-compromise state-of-the-art security system guarantees the confidentiality of your data and the availability of communication in your production network: with a distributed and scalable security architecture, the EAGLE system, now in its third generation, guarantees maximum protection of industrial cells and rules out accidental and unauthorized data manipulations.

As co-founder and member of United NetworX, a union of the leading manufacturers of hardware and software components for industrial applications, Hirschmann™ makes a major contribution with its products and services to increasing the security and reliability of data transmission worldwide.


EAGLE mGuard EAGLE 20

Accessories
for this family you can find on the following pages:
System Accessories Page 220

UNITED NETWORX



Hirschmann™ Competence Center

When it's a question of security in the industrial network reliable products are no longer enough. Therefore the Hirschmann™ Competence Center also offers extensive services all to do with network security. In the area of consulting with an industrial network security audit, security consulting, risk reduction consulting, external penetration test, internal security evaluation and, of course, network planning. In the area of training we offer the following programs: PSd Security with EAGLE, NESd Network Security, FIVd Firewall and VPN technology, HS1d hacker capabilities for system administrators, WSSd practical knowledge Network Security and WITF IT Forensics Workshop. In addition: EAGLE AntiVirus licenses, service contract for EAGLE VPN and support with the installation and configuration, via service hotline and then later Advance Hardware Replacement and warranty extensions.

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Industrial Ethernet

EAGLE System > EAGLE 20

Type	EAGLE 20 TX/TX
Order No.	943 987-001
	
	Industrial Firewall/VPN-Router (available from Jan. 2009)
Product description	
Modi	Router, Multi Client Transparent (MCT), PPPoE
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket (serial interface for device configuration)
USB interface	1 x USB socket (to connect auto-configuration adapter ACA21-USB)
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	n/a
Multimode fiber (MM) 62.5/125 µm	n/a
Single mode fiber (SM) 9/125 µm	n/a
Security	
Stateful inspection firewall	firewall rules (incoming/outgoing, modem access, management), IP masquerading, 1-to-1 NAT, DoS limiter, MAC filter, user firewall for external activation of FW rules
Multipoint VPN	IPSec, IKEv2, DES, 3DES, AES (-128, -192, -256), Pre-Shared Key, X.509v3 certificates, MD5, SHA-1, NAT-T, Firewall rules for every VPN connection, configuration assistent in the Web-interface, remote enable/disable of connections.
Power requirements	
Operating voltage	DC 9.6 to 60 V, AC 18 to 30 V
Current consumption at 24 V DC	max. 6.9 W
Service	
Management	Command Line Interface (CLI), Web-Interface, Auto-configuration adapter (ACA21-USB), DHCP, HiDiscovery, Industrial HiVision
Diagnostics	LEDs (power, link status, data, error, ACA, V.24), signal contact (DC 24 V / 1 A), logfile, syslog, configuration check
Protocols	serial, HTTPS, SSH, SNMP V1/V2/V3, LLDP
Other services	DHCP server/client, DHCP Relay/Option 82, DynDNS, firewall access via V.24 (PPP), SNTP, VLAN support (IEEE 802.3pQ), port forwarding
Redundancy	
Redundancy functions	use in redundant net-/ring coupling, firewall redundancy (Layer 4), redundnat 24 V power inputs
Ambient conditions	
Operating temperature	-40 °C to +60 °C
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	27.4 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	60 mm x 145 mm x 125 mm
Mounting	DIN Rail 35 mm
Weight	600 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharche
EN 61000-4-3 electromagnetic field	10 V/m (80 - 2000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (linie/earth), 1 kV (linie/line)
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (pending)
Germanischer Lloyd	Germanischer Lloyd (pending)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating instructions, CD-manual
Accessories to order separately	rail power supply RPS 30, RPS 80 EEC, RPS 120 EEC, terminal cable, network management Industrial HiVision, modem cable, auto-configuration adpater ACA21-USB, 19" installation frame

Industrial Ethernet

EAGLE 20 > Versions

Type	EAGLE 20 TX/SM	EAGLE 20 TX/MM
Order No.	943 987-003	943 987-002
		
	Industrial Firewall/VPN-Router (available from Jan. 2009)	Industrial Firewall/VPN-Router (available from Jan. 2009)
Product description Port type and quantity	Trusted port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted port: 1 x 100BASE-FX, SM-cable, SC-socket	Trusted port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted port: 1 x 100BASE-FX, MM-cable, SC-socket
Network size - length of cable Twisted pair (TP) Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm	 0 - 100 m n/a n/a 0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0.4 dB/km, 3 dB Reserve, D = 3.5 ps/(nm x km)	 0 - 100 m 0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km 0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km n/a
Power requirements Current consumption at 24 V DC	max. 8.1 W	max. 8.1 W
Ambient conditions MTBF	25.2 years; MIL-HDBK 217F: Gb 25 °C	26.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Weight	615 g	615 g

Type	EAGLE 20 MM/TX	EAGLE 20 MM/MM
Order No.	943 987-004	943 987-005
		
	Industrial Firewall/VPN-Router (available from Jan. 2009)	Industrial Firewall/VPN-Router (available from Jan. 2009)
Product description Port type and quantity	Trusted port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity	Trusted port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted port: 1 x 100BASE-FX, MM-cable, SC-socket
Network size - length of cable Twisted pair (TP) Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm	 0 - 100 m 0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km 0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km n/a	 n/a 0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km 0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km n/a
Power requirements Current consumption at 24 V DC	max. 8.1 W	max. 9.5 W
Ambient conditions MTBF	26.5 years; MIL-HDBK 217F: Gb 25 °C	25.7 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction Weight	615 g	630 g

EAGLE System > EAGLE mGuard Firewall

Type	EAGLE mGuard TX/TX
Order No.	943 011-311
	
	Industrial Firewall
Product description	
Modi	Router, Single Client Transparent (SCT) and Multi Client Transparent (MCT), PPPoE, PPTP
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1x USB socket
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	-
Multimode fiber (MM) 62.5/125 µm	-
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-
Security	
Stateful inspection firewall	firewall rules (incoming/outgoing, modem access, management), IP masquerading, 1-to-1 NAT, ARP limiter, MAC filter
Multipoint VPN	-
Antivirus protection	optional: ClamAV-Anti-Virus-Engine (HTTP, FTP, POP3, SMTP)
Power requirements	
Operating voltage	9.6 to 60V DC, 18V to 32V AC
Current consumption at 24 V DC	max. 300 mA
Service	
Diagnostics	LEDs (power, link status, data, error, ACA) signaling contact (24 V DC / 1 A), logfile
Management	Command Line Interface (CLI), Web-Interface, auto-configuration adapter (ACA21-USB), DHCP, HiDiscovery, Industrial HiVision
Protocols	serial, HTTPS, SSH, SNMP V1/V2/V3, LLDP
Other services	DHCP server/client, DHCP Relay/Option 82, DynDNS, firewall access via V.24 (PPP), NTP, VLAN support (IEEE 802.3pQ), port forwarding
Redundancy	
Redundancy functions	use in redundant net-/ringcoupling, dual homing, firewall redundancy (layer 4), redundant 24 V power supply
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-40 °C to +80 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	27.37 years (MIL-HDBK-217F)
Mechanical construction	
Dimensions (W x H x D)	47 mm x 131 mm x 111 mm
Mounting	DIN Rail 35 mm
Weight	340 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13,2 Hz, 90 min.; 0,7g, 13,2 Hz - 100 Hz, 90 min.; 3,5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharche
EN 61000-4-3 electromagnetic field	10 V/m (80 - 2000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (linie/earth), 1 kV (linie/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Germanischer Lloyd	Germanischer Lloyd
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating instructions, CD-manual
Accessories to order separately	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, modem cable, HiVision network management, auto-configuration adapter (ACA 21-USB), 19" installation frame

EAGLE mGuard Firewall > Versions

Type	EAGLE mGuard TX/MM SC	EAGLE mGuard TX/SM SC
Order No.	943 011-312	943 011-313
		
	Industrial Firewall	Industrial Firewall
Product description		
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 100BASE-FX, MM-cable, SC-socket	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 100BASE-FX, SM-cable, SC-socket
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	-
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	-
Single mode fiber (SM) 9/125 µm	-	0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-	-
Power requirements		
Current consumption at 24 V DC	max. 335 mA	max. 350 mA
Ambient conditions		
MTBF	26.54 years (MIL-HDBK-217F)	25.18 years (MIL-HDBK-217F)

Type	EAGLE mGuard TX/LH SC	EAGLE mGuard MM SC/TX
Order No.	943 011-314	943 011-315
		
	Industrial Firewall	Industrial Firewall
Product description		
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 100BASE-FX, SM-cable, 1550 nm, SC-sok-ket	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	-	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	-	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	24 - 86.6 km, 7 - 29 dB link budget at 1550 nm A = 0.3 dB/km, 3 dB reserve, D = 19 ps/(nm x km)	-
Power requirements		
Current consumption at 24 V DC	max. 350 mA	max. 350 mA
Ambient conditions		
MTBF	25.37 years	26.54 years (MIL-HDBK-217F)

EAGLE mGuard Firewall > Versions

Type	EAGLE mGuard MM SC/MM SC	EAGLE mGuard MM SC/SM SC
Order No.	943 011-316	943 011-317
		
	Industrial Firewall	Industrial Firewall
Product description		
Port type and quantity	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 100BASE-FX, MM-cable, SC-socket	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 100BASE-FX, SM-cable, SC-socket
Network size - length of cable		
Twisted pair (TP)	-	-
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-	0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-	-
Power requirements		
Current consumption at 24 V DC	max. 400 mA	max. 400 mA
Ambient conditions		
MTBF	25.76 years (MIL-HDBK-217F)	24.47 years

Type	EAGLE mGuard MM SC/LH SC
Order No.	943 011-318
	
	Industrial Firewall
Product description	
Port type and quantity	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 100BASE-FX, SM-cable, 1550 nm, SC-sok-ket
Network size - length of cable	
Twisted pair (TP)	-
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	24 - 86,6 km, 7 - 29 dB link budget at 1550 nm A = 0,3 dB/km, 3 dB reserve, D = 19 ps/(nm x km)
Power requirements	
Current consumption at 24 V DC	max. 400 mA
Ambient conditions	
MTBF	24.65 years

EAGLE System > EAGLE mGuard Firewall with VPN

Type	EAGLE mGuard VPN TX/TX
Order No.	943 011-301
	
	Industrial Firewall/VPN-Bundle
Product description	
Modi	Router, Single Client Transparent (SCT) and Multi Client Transparent (MCT), PPPoE, PPTP
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 6-pin
V.24 interface	1 x RJ11 socket
USB interface	1x USB socket
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	-
Multimode fiber (MM) 62.5/125 µm	-
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-
Security	
Stateful inspection firewall	firewallrules (incoming/outgoing, modem access, management), IP masquerading, 1-to-1 NAT, ARP limiter, MAC filter
Multipoint VPN	IPSec, L2TP, DES, 3DES, AES (-128, -192, -256), Pre-Shared Key, X.509v3 certificates, MD5, SHA-1, NAT-T, Firewall rules for every VPN connection
Antivirus protection	optional: ClamAV-Anti-Virus-Engine (HTTP, FTP, POP3, SMTP)
Power requirements	
Operating voltage	DC 9.6 to 60 V, AC 18 to 32 V
Current consumption at 24 V DC	max. 335 mA
Service	
Diagnostics	LEDs (power, link status, data, error, ACA) signaling contact (24 V DC / 1 A), logfile
Management	Command Line Interface (CLI), Web-Interface, auto-configuration adapter (ACA21-USB), DHCP, HiDiscovery, Industrial HiVision
Protocols	serial, HTTPS, SSH, SNMP V1/V2/V3, LLDP
Other services	DHCP server/client, DHCP Relay/Option 82, DynDNS, firewall access via V.24 (PPP), NTP, VLAN support (IEEE 802.3pQ), port forwarding
Redundancy	
Redundancy functions	use in redundant net-/ringcoupling, dual homing, firewall redundancy (layer 4), redundant 24 V power supply
Ambient conditions	
Operating temperature	0 °C to +60°C
Storage/transport temperature	-40 °C to +80 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	27.4 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	47 mm x 131 mm x 111 mm
Mounting	DIN Rail 35 mm
Weight	340 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13,2 Hz, 90 min.; 0,7g, 13,2 Hz - 100 Hz, 90 min.; 3,5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharche
EN 61000-4-3 electromagnetic field	10 V/m (80 - 2000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (linie/earth), 1 kV (linie/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 part 15 class A
EN 55022	EN 55022 class A
Approvals	
Safety of industrial control equipment	cUL 508
Germanischer Lloyd	Germanischer Lloyd
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating instructions, CD-manual
Accessories to order separately	rail power supply RPS 30, RPS 80 EEC or RPS 120 EEC, terminal cable, modem cable, HiVision network management, auto-configuration adapter (ACA 21-USB), 19" installation frame

EAGLE mGuard Firewall with VPN > Versions

Type	EAGLE mGuard VPN TX/MM SC	EAGLE mGuard VPN TX/SM SC
Order No.	943 011-302	943 011-303
		
	Industrial Firewall/VPN-Bundle	Industrial Firewall/VPN-Bundle
Product description		
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 100BASE-FX, MM-cable, SC-socket	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 100BASE-FX, SM-cable, SC-socket
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	-
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	-
Single mode fiber (SM) 9/125 µm	-	0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0,4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-	-
Power requirements		
Operating voltage	DC 9.6 to 60 V, AC 18 to 32 V	DC 9.6 to 60 V, AC 18 to 32 V
Ambient conditions		
MTBF	26.5 years; MIL-HDBK 217F: Gb 25 °C	25.2 years; MIL-HDBK 217F: Gb 25 °C

Type	EAGLE mGuard VPN TX/LH SC	EAGLE mGuard VPN MM SC/TX
Order No.	943 011-304	943 011-305
		
	Industrial Firewall/VPN-Bundle	Industrial Firewall/VPN-Bundle
Product description		
Port type and quantity	Trusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity Untrusted Port: 1 x 100BASE-FX, SM-cable, 1550 nm, SC-sok-ket	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 10/100BASE-TX, TP-cable, RJ45-socket, autocrossing, autonegotiation, autopolarity
Network size - length of cable		
Twisted pair (TP)	0 - 100 m	0 - 100 m
Multimode fiber (MM) 50/125 µm	-	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	-	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	24 - 86.6 km, 7 - 29 dB link budget at 1550 nm A = 0.3 dB/km, 3 dB reserve, D = 19 ps/(nm x km)	-
Power requirements		
Operating voltage	DC 9.6 to 60 V, AC 18 to 32 V	9.6 to 60V DC, 18V to 32V AC
Ambient conditions		
MTBF	25.4 years; MIL-HDBK 217F: Gb 25 °C	26.5 years; MIL-HDBK 217F: Gb 25 °C

EAGLE mGuard Firewall with VPN > Versions

Type	EAGLE mGuard VPN MM SC/MM SC	EAGLE mGuard VPN MM SC/SM SC
Order No.	943 011-306	943 011-307
		
	Industrial Firewall/VPN-Bundle	Industrial Firewall/VPN-Bundle
Product description		
Port type and quantity	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 100BASE-FX, MM-cable, SC-socket	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 100BASE-FX, SM-cable, SC-socket
Network size - length of cable		
Twisted pair (TP)	-	-
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	0 - 4000 m, 11 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-	0 - 32.5 km, 16 dB link budget at 1300 nm, A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-	-
Power requirements		
Operating voltage	DC 9.6 to 60 V, AC 18 to 32 V	DC 9.6 to 60 V, AC 18 to 32 V
Ambient conditions		
MTBF	25,8 years; MIL-HDBK 217F: Gb 25 °C	24.5 years; MIL-HDBK 217F: Gb 25 °C

Type	EAGLE mGuard VPN MM SC/LH SC
Order No.	943 011-308
	
	Industrial Firewall/VPN-Bundle
Product description	
Port type and quantity	Trusted Port: 1 x 100BASE-FX, MM-cable, SC-socket Untrusted Port: 1 x 100BASE-FX, SM-cable, 1550 nm, SC-sok-ket
Network size - length of cable	
Twisted pair (TP)	-
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB link budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB Link Budget bei 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	24 - 86.6 km, 7 - 29 dB link budget at 1550 nm A = 0.3 dB/km, 3 dB reserve, D = 19 ps/(nm x km)
Power requirements	
Operating voltage	DC 9.6 to 60 V, AC 18 V to 32 V
Ambient conditions	
MTBF	27.4 years; MIL-HDBK 217F: Gb 25 °C

Cables are out of a job.

**We are against slow connections in industry:
BAT 54/54M and BAT 54 Rail Wireless Ethernet AP/AC's.**

Future-safe radio technology:

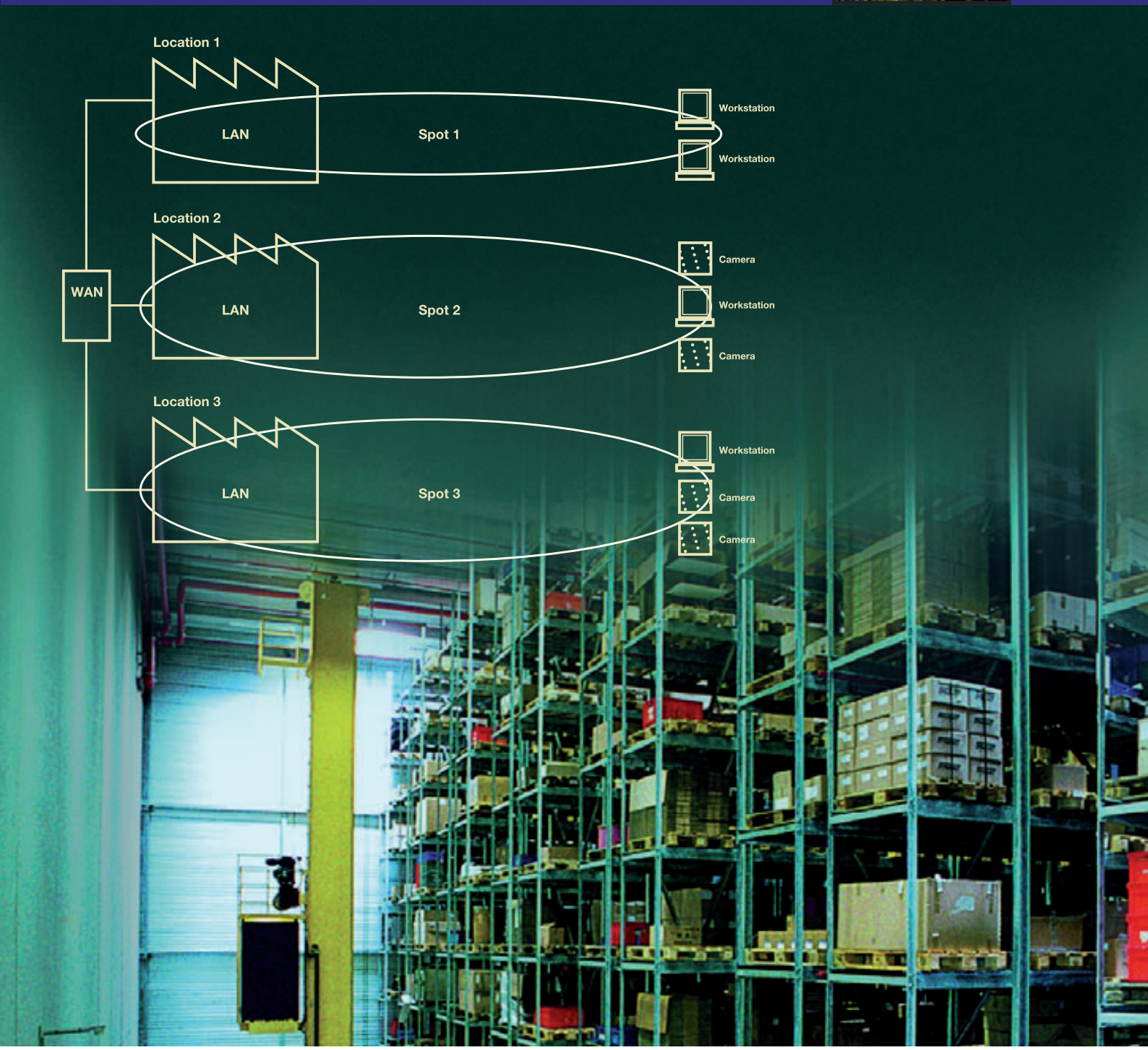
- Industrial Wireless LAN Access Points and Clients as well as industrial dualband ruggedized switches WLAN access points and clients with 2 independant WLAN modules for harsh environmental conditions.
- Simple system integration of proven standards IEE 802.11 a, b, g, h, i.
- Data rate up to max. 108Mbit/s.
- Secure encryption: IEEE 802.11i/WPA2 with passphrase or 802.1x and hardwareaccelerated AES, LEPS, Closed Network, WEP64, WEP128, WEP152.
- Industrially compatible versions for indoor and outdoor applications up to IP65.
- Power-over Ethernet power supply.

Good advice was expensive till now, when in vehicle testing, mobile service applications or in logistics, workplaces were located outside cable-bound networks. Breakages in connections, variations in transmission quality and the absence of standards were good arguments against the use of Wireless LAN in industry. Wireless technology was not even considered in remote monitoring of tanks and pump stations, as a "flexible control room" on site, or in semiconductor production, where even a little freedom of movement would be welcome as a supplement to the existing LAN systems. With its competence in the field of networks and antennas, Hirschmann™ offers you a secure as well as systematic solution: BAT Wireless Ethernet AP/AC is a reliable comprehensive package with proven technology, tested by us and installed for our customers at site. While we cannot be completely free of cables, we do offer you unprecedented mobility. Because Wireless LAN AP/AC technology will take your employees way beyond the point where cables have long bitten the dust.

BAT54-Rail

BAT54-F

Accessories
for this family you can find on the following pages:
System Accessories Page 220



Hirschmann™ Competence Center

When it's a question of the **installation**, the **operation** and **support** of industrial **WLAN networks** you are well looked after by the Hirschmann™ Competence Center. Our consulting services range from **Wireless Site Survey** through **Wireless** and **Mobile Computing Consulting** to **Network Design**. We offer the following trainings for this: Wireless LAN with BAT, WLAd Wireless LAN application principles, WLSd Wireless LAN security concepts and WLHd WLAN hacking. In addition, we support you with the installation and configuration via our service hotline and later with Advance Hardware Replacement and warranty extensions.

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Industrial Ethernet

Wireless LAN > Chassis

Type	BAT54-Rail
Order No.	943 926-001
	
	Dualband Industrial Wireless LAN Access Point/Client with two independent radio modules with IEEE 802.11a/b/g/h/i
Product description	
Port type and quantity	2 x WLAN interfaces, up to 8 SSIDs per WLAN interface, two LAN ports 10/100BASE-TX, autosensing, Power over Ethernet according to IEEE 802.3af
Radio technology	
Antenna connector	4 x RP-SMA jack antenna connectors
Range	Up to 20 km with external antenna (depending on type of antenna, frequency range and data rate)
Transmission rate	54 Mbps according to IEEE 802.11g (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbps, Automatic Rate Selection), compatible to IEEE 802.11b (11, 5,5, 2, 1 Mbps, Automatic Rate Selection), 802.11 b/g compatability mode or pure g or pure b selectable. 54 Mbps according to IEEE 802.11a/h (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbpss, Automatic Rate Selection), Super A/G with Turbo Mode (108 MBps), Bursting, Compression, fully compliant to ETSI requirements with TPC and DFS
Encryption	IEEE 802.11i / WPA2 with passphrase or 802.1x and hardware-accelerated AES, user authentication by 802.1x /EAP or LEPS, IEEE 802.1x supplicant in client mode, WPA/TKIP, WEP, access-control lists, WLAN port and protocol filter, RADIUS client and server, built-in firewall with QoS, port filter, protocol filter, IDS and DoS protection, PMK caching and preauthentication for fast roaming with IEEE 802.1x
Frequency band	2 x independent radio modules, each 2.4 GHz and 5 GHz: 2400-2483,5 MHz (ISM) and 5150-5850 MHz
Modulation	22M0F7D(DSSS/OFDM) @ 2.4 GHz 20M0G7D (OFDM) @ 5 GHz
Receiver sensitivity	2.4 GHz 802.11b: -87 dBm @ 11 Mbps, -94 dBm @ 1 Mbps; 2.4 GHz 802.11g: -87 dBm @ 6 Mbps, -70 dBm @ 54 Mbps; 5 GHz 802.11a/h: -87 dBm @ 6 Mbps, -67 dBm @ 54 Mbps
Radio topology	WLAN access point, bridge, router, point-to-point, client, client-bridge mode, fixed mesh with RSTP
Roaming	seamless handover between radio cells, IAPP support, IEEE 802.11d support, background scanning for rogue AP detection and fast roaming, support of IEEE 802.11e (WME), preauthentication and PMK caching with IEEE 802.1x
Radio Power	2.4 GHz 802.11b: +19 dBm @1 and 2 Mbps, +19 dBm @ 5.5 and 11 Mbps, 2,4 GHz 802.11g: +19 dBm @ 6 Mbps, +14 dBm @ 54 Mbps, 5 GHz 802.11a/h: +18 dBm @ 6 Mbps, +12 dBm @ 54 Mbps with TPC and DFS, Power Reduction in 1dB steps down to 0.5 dBm minimum
Power requirements	
Operating voltage	2 x DC 24 V; DC 12 V external power supply (230 V) 2 x Power over Ethernet according to IEEE802.3af; all power supllies redundant to each other
Current consumption at 24 V DC	417 mA
Current consumption	DC 12 V: 625 mA; DC 24 V: 417 mA; PoE (48 V DC): 167 mA
Service	
Diagnostics	Extensive LOG and TRACE options, PING and TRACEROUTE for checking connections, LANmonitor status display, internal logging buffer for SYSLOG and firewall events, monitor mode for Ethernet ports, WLANmonitor for WLAN network overview and Rogue AP detection
Management	SNMP management via SNMP V2, private MIB exportable by WEBconfig, MIB II; Remote configuration with Telnet/SSL, SSH, browser (HTTP/HTTPS), TFTP or SNMP, firmware upload via HTTP/HTTPS or TFTP; Support of up to 4094 VLAN IDs for WLAN connections, 256 simultaneously usable VLAN tags for 802.11 clients
Other services	Warning via e-mail, SNMP-Traps and SYSLOG; Remote management and configuration by modem support via LAN (DSL) or serial port
Ambient conditions	
Operation temperature	-20 °C to +50 °C
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	max. 95%
MTBF	43.3 years
Mechanical construction	
Dimensions (W x H x D)	80 mm x 100 mm x 135 mm
Mounting	for wall and Din Rail mounting
Approvals	
Safety of information technology equipment	EN 60950
Radio	EN 300328, EN 301893, notified in all countries of EU. For other notifications or certifications please refer to INET-Sales@hirschmann.de
Environmental	EN 61131 for operation in automation environment EMC approval for E1 certification (cars and vehicles) available
Scope of delivery and accessories	
Scope of delivery	device, CD, serial cable, Ethernet cable (3 m), 2 x 3-dBi-dipol - dualband antennas, 2 x 50 Ohm terminators, rail mount material
Accessories to order separately	external antennas for 802.11b/g and 802.11a/h operation; adapter cable and surge arrestor

Chassis > Versions

Type	BAT54-Rail - FCC	BAT54-Rail Client
Order No.	943 926-002	943 926-501
		
	Dualband Industrial Wireless LAN Access Point/Client with two independent radio modules with IEEE 802.11a/b/g/h/i. With FCC-approval for USA and Canada.	Dualband industrial Wireless LAN access point/client with one radio module with IEEE 802.11a/b/g/h/i
Product description		
Port type and quantity	2 x WLAN interfaces, up to 8 SSIDs per WLAN interface, two LAN ports 10/100BASE-TX, autosensing, Power over Ethernet according to IEEE 802.3af	1 x WLAN interface, one LAN port 10/100 BASE-TX, autosensing, Power over Ethernet according to IEEE 802.3af
Radio technology		
Antenna connector	4 x RP-SMA jack antenna connectors	2 x RP-SMA jack antenna connectors
Transmission rate	54 Mbps according to IEEE 802.11g (Fallback to 48, 36 , 24, 18, 12, 9, 6 Mbps, Automatic Rate Selection), compatible to IEEE 802.11b (11, 5,5, 2, 1 Mbps, Automatic Rate Selection), 802.11 b/g compatability mode or pure g or pure b selectable. 54 Mbps according to IEEE 802.11a/h (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbpss, Automatic Rate Selection), Super A/G with Turbo Mode (108 MBps), Bursting, Compression, fully compliant to ETSI requirements with TPC and DFS	54 Mbps according to IEEE 802.11g (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbps, Automatic Rate Selection), compatible to IEEE 802.11b (11, 5,5, 2, 1 Mbps, Automatic Rate Selection), 802.11 b/g compatability mode or pure g or pure b selectable. 54 Mbps according to IEEE 802.11a/h (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbpss, Automatic Rate Selection), Super A/G with Turbo Mode (108 MBps), Bursting, Compression, fully compliant to ETSI requirements with TPC and DFS
Encryption	IEEE 802.11i / WPA2 with passphrase or 802.1x and hardware-accelerated AES, user authentication by 802.1x /EAP or LEPS, IEEE 802.1x supplicant in client mode, WPA/TKIP, WEP, access-control lists, WLAN port and protocol filter, RADIUS client and server, built-in firewall with QoS, port filter, protocol filter, IDS and DoS protection, PMK caching and preauthentication for fast roaming with IEEE 802.1x	IEEE 802.11i / WPA2 with passphrase or 802.1x and hardware-accelerated AES, user authentication by 802.1x /EAP, IEEE 802.1x supplicant in client mode, WPA/TKIP, WEP, access-control lists, WLAN port and protocol filter, RADIUS client, built-in firewall with QoS, port filter, protocol filter, PMK caching and preauthentication for fast roaming with IEEE 802.1x
Frequency band	2 x independent radio modules, each 2.4 GHz and 5 GHz: 2400-2483,5 MHz (ISM) and 5150-5850 MHz	1 x radio module, 2.4 GHz and 5 GHz: 2400-2483.5 MHz (ISM) and 5170-5810 MHz
Radio topology	WLAN access point, bridge, router, point-to-point, client, client-bridge mode, fixed mesh with RSTP	WLAN access client-, client-bridge-modus, fixed mesh with RSTP
Roaming	Seamless handover between radio cells, IAPP support, IEEE 802.11d support, background scanning for rogue AP detection and fast roaming, support of IEEE 802.11e (WME), preauthentication and PMK caching with IEEE 802.1x	Soft Roaming, seamless handover between radio cells, IAPP support, IEEE 802.11d support, background scanning for rogue AP detection and fast roaming, support of IEEE 802.11e (WME), preauthentication and PMK caching with IEEE 802.1x
Power requirements		
Operating voltage	2 x DC 24 V; DC 12 V external power supply (230 V) 2 x Power over Ethernet according to IEEE802.3af; all power supllies redundant to each other	2 x DC 24 V; DC 12 V external power supply (230 V) 1 x Power over Ethernet according to IEEE802.3af; all power supllies redundant to each other
Service		
Other services	Warning via e-mail, SNMP-Traps and SYSLOG; Remote management and configuration by modem support via LAN (DSL) or serial port	Warning via e-mail, SNMP-Traps and SYSLOG; Remote management and configuration by modem support via LAN (DSL) or serial port
Ambient conditions		
Operation temperature	-20 °C to +50 °C	-20 °C to +50 °C
Approvals		
Radio	FCC IDENTIFIER: U99BAT54RAIL, IC Certification Number: 4019A-BAT54R; For other notifications or certifications please refer to INET-Sales@hirschmann.de	EN 300328, EN 301893, notified in all countries of EU. For other notifications or certifications please refer to INET-Sales@hirschmann.de
Scope of delivery and accessories		
Scope of delivery	Device, CD, serial cable, Ethernet cable (3 m), 2 x 3-dBi-Dipol - Dualband antennas, 2 x 50 Ohm terminators, Rail mount material	Device, CD, serial cable, Ethernet cable (3 m), 2 x 3-dBi-Dipol - Dualband antennas, 1 x 50 Ohm terminators, Rail mount material
Accessories to order separately	External antennas for 802.11b/g and 802.11a/h operation; adapter cable and surge arrestor	External antennas for 802.11b/g and 802.11a/h operation; adapter cable and surge arrestor

Chassis > Versions

Type	BAT54-Rail Client - FCC
Order No.	943 926-502
	
	Dualband industrial Wireless LAN access point/client with two independent radio modules with IEEE 802.11a/b/g/h/i. With FCC-approval for USA and Canada.
Product description	
Port type and quantity	1 x WLAN interface, up to 8 SSIDs, 1 x LAN port 10/100 BASE-TX, autosensing, Power over Ethernet according to IEEE 802.3af
Radio technology	
Antenna connector	2 x RP-SMA jack antenna connectors
Transmission rate	54 Mbps according to IEEE 802.11g (Fallback to 48, 36 , 24, 18, 12, 9, 6 Mbps, Automatic Rate Selection), compatible to IEEE 802.11b (11, 5,5, 2, 1 Mbps, Automatic Rate Selection), 802.11 b/g compatability mode or pure g or pure b selectable. 54 Mbps according to IEEE 802.11a/h (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbpss, Automatic Rate Selection), Super A/G with Turbo Mode (108 MBps), Bursting, Compression, fully compliant to ETSI requirements with TPC and DFS
Encryption	IEEE 802.11i / WPA2 with passphrase or 802.1x and hardware-accelerated AES, user authentication by 802.1x/EAP, IEEE 802.1x supplicant in client mode, WPA/TKIP, WEP, access-control lists, WLAN port and protocol filter, RADIUS client, built-in firewall with QoS, port filter, protocol filter, PMK caching and preauthentication for fast roaming with IEEE 802.1x
Frequency band	1 x radio module, 2.4 GHz and 5 GHz: 2400-2483.5 MHz (ISM) and 5170-5810 MHz
Radio topology	WLAN access client-, client-bridge-modus, fixed mesh with RSTP
Roaming	Soft Roaming, seamless handover between radio cells, IAPP support, IEEE 802.11d support, background scanning for rogue AP detection and fast roaming, support of IEEE 802.11e (WME), preauthentication and PMK caching with IEEE 802.1x
Power requirements	
Operating voltage	2 x DC 24 V; DC 12 V external power supply (230 V) 1 x Power over Ethernet according to IEEE802.3af; all power supllies redundant to each other
Service	
Other services	[Änderungsvorschlag]
Ambient conditions	
Operation temperature	-30 °C to +50 °C
Approvals	
Radio	FCC IDENTIFIER: U99BAT54RAIL IC certification number: 4019A-BAT54R For other notifications or certifications please refer to INET-Sales@hirschmann.de
Scope of delivery and accessories	
Scope of delivery	Device, CD, serial cable, Ethernet cable (3 m), 2 x 3-dBi-Dipol - Dualband antennas, Rail mount material, 1 x 50 Ohm terminator
Accessories to order separately	External antennas for 802.11b/g and 802.11a/h operation; adapter cable and surge arrestor

Industrial Ethernet

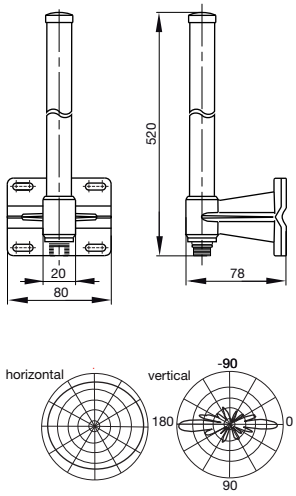
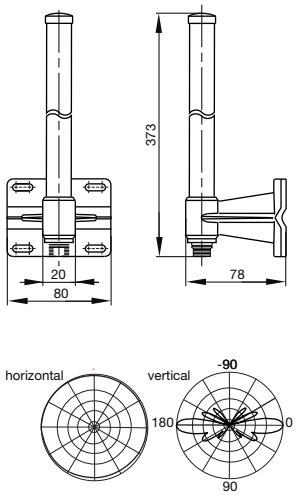
Wireless LAN > Chassis

Type	BAT54-F
Order No.	943 959-111
	
	Dualband Ruggedized Industrial Wireless LAN Access Point/Client with two independent radio modules with IEEE 802.11a/b/g/h/i for installation in harsh environment
Product description	
Port type and quantity	2 x WLAN interfaces, up to 8 SSIDs per WLAN interface, one LAN port 10/100BASE-TX, autosensing, Power over Ethernet according to IEEE 802.3af
Radio technology	
Antenna connector	4 x N-type jack antenna connectors
Range	Up to 20 km with external antenna (depending on type of antenna, frequency range and data rate)
Transmission rate	54 Mbps according to IEEE 802.11g (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbps, Automatic Rate Selection), compatible to IEEE 802.11b (11, 5,5, 2, 1 Mbps, Automatic Rate Selection), 802.11 b/g compatability mode or pure g or pure b selectable. 54 Mbps according to IEEE 802.11a/h (fallback to 48, 36 , 24, 18, 12, 9, 6 Mbpss, Automatic Rate Selection), Super A/G with Turbo Mode (108 MBps), Bursting, Compression, fully compliant to ETSI requirements with TPC and DFS
Encryption	IEEE 802.11i / WPA2 with passphrase or 802.1x and hardware-accelerated AES, user authentication by 802.1x /EAP or LEPS, IEEE 802.1x Supplicant in Client Mode, WPA/TKIP, WEP, access-control lists, WLAN port and protocol filter, RADIUS client and server, Built-in Firewall with QoS, port filter, protocol filter, IDS and DoS protection, PMK-Caching and Preauthentication for fast roaming with IEEE 802.1x
Frequency band	2 x independent radio modules, each 2.4 GHz and 5 GHz: 2400-2483,5 MHz (ISM) and 5170-5810 MHz
Modulation	22M0F7D(DSSS/OFDM) @ 2,4 GHz 20M0G7D (OFDM) @ 5 GHz
Receiver sensitivity	2.4 GHz 802.11b: -87 dBm @ 11 Mbit/s, -94 dBm @ 1 Mbit/s; 2.4 GHz 802.11g: -87 dBm @ 6 Mbit/s, -70 dBm @ 54 Mbit/s; 5 GHz 802.11a/h: -87 dBm @ 6 Mbit/s, -67 dBm @ 54 Mbit/s
Radio topology	WLAN Access Point, Bridge, Router, Point-to-Point, Client, Client-Bridge Mode, fixed mesh with RSTP
Roaming	Seamless handover between radio cells, IAPP support, IEEE 802.11d support, Background scanning for rogue AP detection and fast roaming, Support of IEEE 802.11e (WME), preauthentication and PMK caching with IEEE 802.1x
Radio Power	2.4 GHz 802.11b: +19dBm @1 and 2 Mbps, +19dBm @ 5.5 and 11 Mbps, 2,4 GHz 802.11g: +19 dBm @ 6 Mbps, +14 dBm @ 54 Mbps, 5 GHz 802.11a/h: +18 dBm @ 6 Mbps, +12 dBm @ 54 Mbps with TPC and DFS, Power Reduction in 1dB steps down to 0.5 dBm minimum
Power requirements	
Operating voltage	2 x DC 24 V; 1 x Power-over-Ethernet according to IEEE802.3af; all power supplies redundant to each other
Current consumption at 24 V DC	417 mA
Current consumption	DC 24 V: 417 mA; PoE (DC 48 V): 167 mA
Service	
Diagnostics	Extensive LOG and TRACE options, PING and TRACEROUTE for checking connections, LANmonitor status display, internal logging buffer for SYSLOG and firewall events, monitor mode for Ethernet ports, WLANmonitor for WLAN network overview and Rogue AP detection
Management	SNMP management via SNMP V2, private MIB exportable by WEBconfig, MIB II Remote configuration with Telnet/SSL, SSH, browser (HTTP/HTTPS), TFTP or SNMP, firmware upload via HTTP/HTTPS or TFTP Support of up to 4094 VLAN IDs for WLAN connections, 256 simultaneously usable VLAN tags for 802.11 clients
Other services	Warning via e-mail, SNMP-Traps and SYSLOG; Remote management and configuration by modem support via LAN (DSL) or serial port
Ambient conditions	
Operation temperature	-20 °C up to +55 °C
Storage/transport temperature	-40 °C up to +70 °C
Relative humidity (non-condensing)	max. 95%
MTBF	43.3 years
Mechanical construction	
Dimensions (W x H x D)	261 mm x 189 mm x 55 mm
Mounting	for wall and mast mounting
Approvals	
Safety of information technology equipment	EN 60950
Radio	EN 300328, EN 301893, notified in all countries of EU. For other notifications or certifications please refer to INET-Sales@hirschmann.de
Environmental	EN 61000-6-2 , EN 61131
Scope of delivery and accessories	
Scope of delivery	Device, CD, M12 connector, 2 x 50 Ohm terminators, mounting material
Accessories to order separately	External antennas for 802.11b/g and 802.11a/h operation adapter cable and surge arrestor, mast mount material

Chassis > Versions

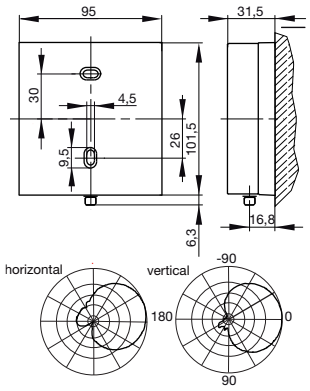
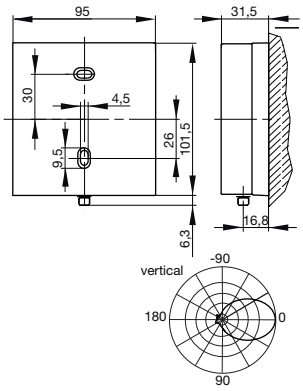
Type	BAT54-F FCC	BAT54-F X2
Order No.	943 959-011	943 959-101
		
	Dualband Ruggedized Industrial Wireless LAN Access Point/Client with two independent radio modules with IEEE 802.11a/b/g/h/i for installation in harsh environment, with FCC-approval for USA and Canada.	Dualband Ruggedized Industrial Wireless LAN Access Point/Client with two independent radio modules with IEEE 802.11a/b/g/h/i for installation in hazardous environment
Mechanical construction		
Dimensions (W x H x D)	261 mm x 189 mm x 55 mm	307 mm x 270 mm x 60 mm
Approvals		
Radio	EN 300328, EN 301893, Certifications for FCC and Singapore	EN 300328, EN 301893, notified in all countries of EU. For other notifications or certifications please refer to INET-Sales@hirschmann.de
Environmental	n/a	EN 61000-6-2 , EN 61131, IEC-60079 ZONE 2, GAS GROUP IIC, TEMPERATURE CLASS T4 for hazardous environment

Type	BAT54-F X2 FCC
Order No.	943 959-001
	
	Dualband Ruggedized Industrial Wireless LAN Access Point/Client with two independent radio modules with IEEE 802.11a/b/g/h/i for installation in hazardous environment, with FCC-approval for USA and Canada.
Mechanical construction	
Dimensions (W x H x D)	307 mm x 270 mm x 60 mm
Approvals	
Radio	EN 300328, EN 301893, Certifications for FCC and Singapore
Environmental	IEC-60079 ZONE 2, GAS GROUP IIC, TEMPERATURE CLASS T4 for hazardous environment

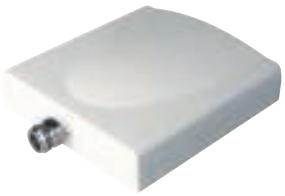
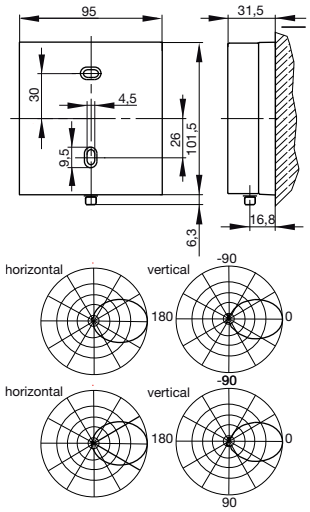
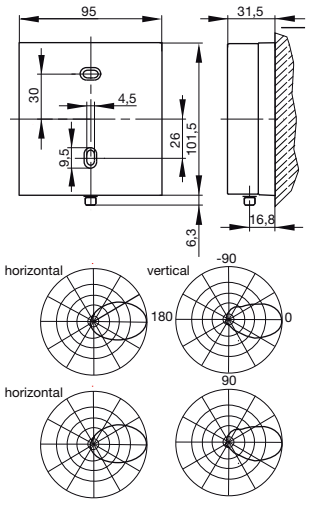
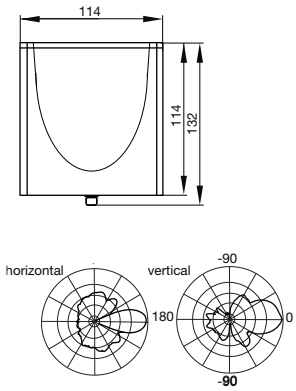
Type	BAT-ANT-8A	BAT-ANT-8G
Order No.	943 903-301	943 903-401
		
	omni-directional antenna for 5 GHz	omni-directional Antenna for 2.4 GHz
Product description		
Cable length	1 m	1 m
Cable specification	2 N male connectors; 1.0 dB at 5 GHz	2 N male connectors; 0.7 dB at 2.4 GHz
Colour	white	white
Radio technology		
Range		
Frequency band	5150 MHz - 5350 MHz 5350 MHz - 5875 MHz	2400 MHz - 2500 MHz
Polarisation	linear, vertical	linear, vertical
Elevation, Azimuth	15° / 360°	15° / 360°
VSWR	2.0: 1 Max.	2.0: 1 Max.
Gain	5 dBi at 5150 MHz - 5350 MHz, 8 dBi at 5350 MHz - 5875 MHz	8 dBi
Antenna connector	N female	N female
Drawing		
Ambient conditions		
Operating temperature	-40 °C to +80 °C	-40 °C to +80 °C
Storage/transport temperature	-40 °C to +80 °C	-40 °C to +80 °C
Wind load	216 km/h	216 km/h
Mechanical construction		
Dimensions (W x H x D)	78 mm x 80 mm x 373 mm	78 mm x 80 mm x 520 mm
Mounting	wall, mast	wall, mast
Protection class	IP65	IP65
Material	fiber glass	fiber glass
Weight	0.227 kg	0.34 kg
Scope of delivery and accessories		
Scope of delivery	antenna, cable 1 m, pigtail RP-SMA to N, installation material, sealing tape	antenna, cable 1 m, pigtail RP-SMA to N, installation material, sealing tape

Industrial Ethernet

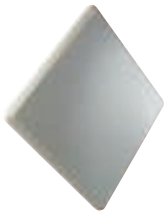
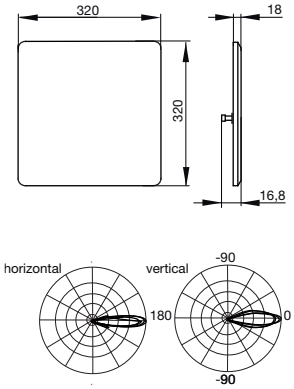
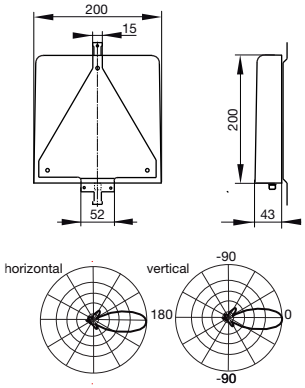
Accessories > **Antenna**

Type	BAT-ANT-TNC-B-D-085-01	BAT-ANT-TNC-B-D-085-02
Order No.	943 056-111	943 903-411
		
	circular polarized antenna for 2.4 GHz	directional antenna linear for 2.4 GHz
Product description		
Cable length	2 m	2 m
Cable specification	RP-SMA plug to TNC plug, 1.5 dB at 2.4 GHz	RP-SMA plug to TNC plug, 1.5 dB at 2.4 GHz
Colour	black	black
Radio technology		
Range		
Frequency band	2300 MHz - 2500 MHz	2300 MHz - 2500 MHz
Polarisation	circular, left or right	linear, vertical
Elevation, Azimuth	3 dB beam width 65°/70°	3 dB beam width 60° / 75°
VSWR	1.5	1.5
Gain	8.5 dBi	8.5 dBi
Antenna connector	TNC female	TNC female
Drawing		
Ambient conditions		
Operating temperature	-40 °C to +80 °C	-40 °C to +80 °C
Storage/transport temperature	-40 °C to +80 °C	-40 °C to +80 °C
Wind load	15 N at 160 km/h	15 N at 160 km/h
Mechanical construction		
Dimensions (W x H x D)	101 mm x 95 mm x 32 mm	101 mm x 95 mm x 32 mm
Mounting	wall, mast	wall, mast
Protection class	IP55	IP55
Material	ASA	ASA
Weight	0.11 kg	0.11 kg
Scope of delivery and accessories		
Scope of delivery	antenna, 2 m cable, mounting material	antenna, 2 m cable, mounting material

Accessories > **Antenna**

BAT-ANT-TNC-8b/g DS	BAT-ANT-TNC-10A DS	BAT-ANT-N-12A
943 903-310	943 903-330	943 903-320
		
directional diversity antenna linear for 2.4 GHz	directional diversity antenna linear for 5 GHz	directional antenna linear for 5 GHz
2 m RP-SMA plug to TNC plug, 1.5 dB at 2.4 GHz black	2 m RP-SMA plug to TNC plug, 2.0 dB at 5 GHz black	1 m 2 N male connectors; 1.0 dB at 5 GHz white
2300 MHz - 2500 MHz dual linear, +/- 45° slant 3 dB beam width 70° / 80° 1.5 8.5 dBi TNC female	5150 MHz - 5875 MHz dual linear, +/- 45° slant 3 dB beam width 60° / 60° 1.6 10 dBi TNC female	5150 MHz - 5350 MHz 5350 MHz - 5875 MHz linear, vertical 30° / 25° at 5150 MHz - 5350 MHz, 25° / 25° at 5350 MHz - 5875 MHz 2.0: 1 Max. 12 dBi at 5150 MHz - 5350 MHz, 14 dBi at 5350 MHz - 5875 MHz N female
		
-40 °C to +80 °C -40 °C to +80 °C 15 N at 160 km/h	-40 °C to +80 °C -40 °C to +80 °C 15 N at 160 km/h	-40 °C to +80 °C -40 °C to +80 °C 216 km/h
101 mm x 95 mm x 32 mm wall, mast IP55 ASA 0.11 kg	101 mm x 95 mm x 32 mm wall, mast IP55 ASA 0.11 kg	114 mm x 114 mm x 40 mm wall, mast IP65 ABS, UV resistant 0.107 kg
antenna, 2 x 2 m cable, installation material	antenna, 2 x 2 m cable, installation material	antenna, cable 1 m, pigtail RP-SMA to N, installation material, sealing tape

Accessories > **Antenna**

Type	BAT-ANT-N-23/9A	BAT-ANT-N-14G
Order No.	943 903-340	943 903 380
		
	directional Antenna linear for 5.8 GHz	drectional antenna for 2.4 GHz
Product description		
Cable length	1 m	1 m
Cable specification	2 N male connectors; 1.0 dB at 5 GHz	2 N male connectors; 1.0 dB at 2.4 GHz
Colour	white	Black
Radio technology		
Range		
Frequency band	5150 MHz - 5850 MHz	2300 MHz - 2500 MHz
Polarisation	linear	linear, vertical
Elevation, Azimuth	9° / 9°	30°
VSWR	2.0: 1 Max.	1.5
Gain	23 dBi	14 dBi
Antenna connector	N female	N female
Drawing		
Ambient conditions		
Operating temperature	-40 °C to +80 °C	-40 °C to +80 °C
Storage/transport temperature	-40 °C to +80 °C	-40 °C to +80 °C
Wind load	216 km/h	57 N at 160 km/h
Mechanical construction		
Dimensions (W x H x D)	320 mm x 320 mm x 18 mm	200 mm x 200 mm x 43 mm
Mounting	wall, mast	wall, mast
Protection class	IP65	IP55
Material	ABS, UV resistant	ASA
Weight	1.2 kg	0.5 kg
Scope of delivery and accessories		
Scope of delivery	antenna, cable 1 m, pigtail RP-SMA to N, installation material, sealing tape	antenna, cable 1m N to N, installation material

Accessories > **Antenna**

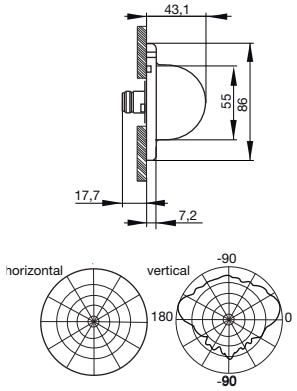
BAT-ANT-N-6ABG

943 903 421

vehicle omni antenna for 2.4 GHz and 5 GHz

2 m
N Plug to RP-SMA plug, 1.5 dB at 2.4 GHz, 2.0 dB at 5.4 GHz
black

2400 MHz - 6000 MHz
linear, vertical
360°
2
2.4 GHz: 6.0 dBi; 5 GHz: 8.0 dBi
N female



-40 °C to +80 °C
-40 °C to +80 °C
10 N at 160 km/h

Ø 86 mm x 43 mm
ceiling, cabinet
IP67, with sealing ring
ASA
0.3 kg

antenna, 2m cable; sealing ring

Type	BAT Surge Arrestor	BAT Surge Arrestor f-f
Order No.	943 903-370	943 903-371
		
	Surge arrestor N jack to N jack	Surge arrestor N jack to N jack; frequency range 2 GHz - 6 GHz; attenuation =< 0.2 dB

Type	BAT-CLB-7-N	BAT-CLB-7-TNC
Order No.	943 903-350	943 903-501
		
	Antenna cable 7m, N plug to N plug, ULA 400, Attenuation 2 dB at 2,4GHz, 3dB at 5GHz	Antenna cable 7m, TNC plug to N plug, ULA 400, attenuation 2 dB at 2.4GHz, 3dB at 5GHz

BAT Surge Arrestor m-f

943 903-372

Surge arrestor N jack to N jack; frequency range 2 GHz - 6 GHz; attenuation =< 0.2 dB

BAT-CLB-2-N

943 903-513

Antenna cable 7m, N plug to N plug, ULA 400, Attenuation 2 dB at 2,4GHz, 3dB at 5GHz

BAT-CLB-2-TNC

943 903-512

Antenna cable 7m, TNC plug to N plug, ULA 400, attenuation 2 dB at 2.4GHz, 3dB at 5GHz

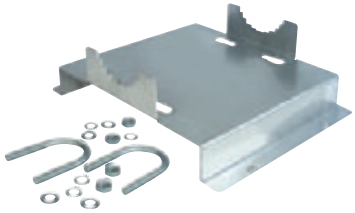
BAT-Pigtail

943 903-360

Adapter cable (N female/RP-SMA-Plug), attenuation 0.5 dB at 2.4GHz, 1dB at 5GHz

BAT54-F, Pole mounting set

943 966-001



adapter for pole mounting

The die is cast.

With the OCTOPUS IP67 system, Industrial Ethernet conquered the production arena.

MM3-4TX5

OCTOPUS 24M

OCTOPUS 5TX EEC

- **Complete OCTOPUS IP67 system from the switch to the connecting cable for very harsh ambient conditions.**
- **IP67 solution and standardized M12 technology for Industrial Ethernet (IEC 61076-2-101 Amendment 1).**
- **Quick connection by easy to assemble connector which adapts the system to all requirements.**
- **Recognized by the most important user organizations: ProfiNet, ODVA.**
- **Full management support incl. HIPER-Ring, SNMPv3 and LLDP.**

Sensors and actuators used to be the preferred fields of operation of the field bus systems. In future, however, a large number of application areas will find its way directly into the Ethernet network.
Good when you can rely on a partner like Hirschmann™ as an innovative system provider who is at home in both worlds: Industrial Ethernet and Industrial Connectors. Start with the OCTOPUS IP67 system now.

Because the standardized M12 technology also offers the certainty of using an open system for Ethernet applications at machine level. The self-assemblable connector convinces in speed, reliability and pure simplicity. And because Ethernet-based protocols already play a major role with the important automation manufacturers, the OCTOPUS IP67 system from Hirschmann™ will very quickly gain ground on the factory floor in future. Naturally, the OCTOPUS Switches are also first choice when it comes to using Ethernet under extreme conditions such as in trains or on ships.

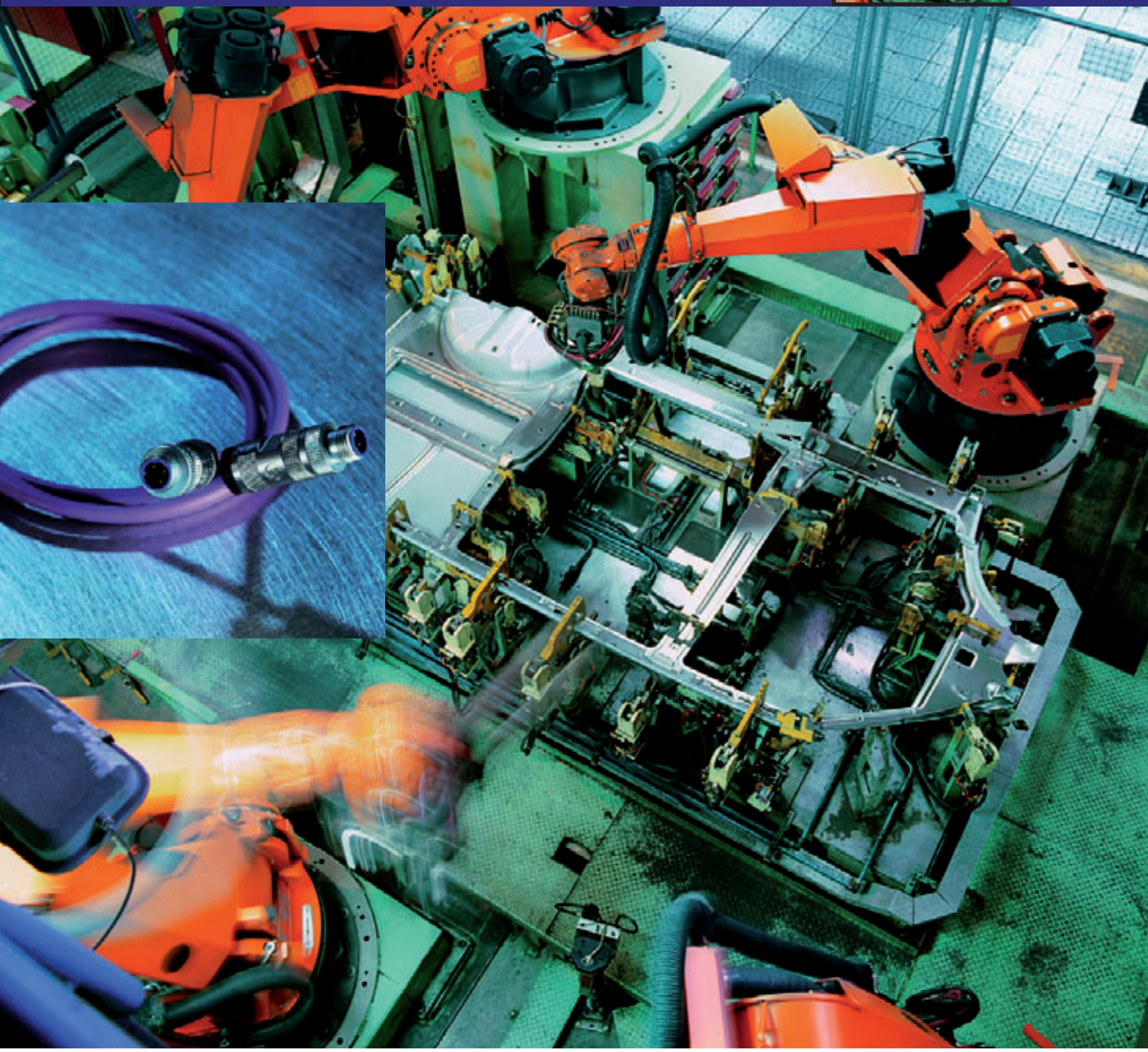
Accessories

for this family you can find on the following pages:

System Accessories Page 220

Note:

Please note that some recommended accessory parts only support a temperature range from –25°C up to +70°C and might limit the possible operating conditions for the entire system. Specially designed connector types with protection class IP67 and extended temperature range are available on request. Furthermore unsealed accessories like RJ45 adapters or terminal access cables are certainly not suitable inside IP67 areas.



Hirschmann™ Competence Center

Because the innovative OCTOPUS 8M also includes the appropriate service program, the Hirschmann™ Competence Center offers suitable consulting services in the network planning: **network optimization check, risk reduction consulting, network technology evaluation and network baselining consulting**. Plus the following trainings: CP1d OCTOPUS Family in theory and practice, Ird overview of the Hirschmann™ OCTOPUS Family, CPUd Update OCTOPUS Family and CB1e Industrial Ethernet/basic technical principles. In addition, we provide support with certification testing, installation and configuration as well as our service hotline and later offer Advance Hardware Replacement and warranty extensions.

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OCTOPUS IP67 > Switch

Type	OCTOPUS 8M
Order No.	943 931-001
	
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description	
Port type and quantity	8 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity
More Interfaces	
Power supply/signaling contact	1 x M12 5-pin connector, A coding
V.24 interface	1 x M12 4-pin socket, A coding
USB interface	1 x M12 5-pin socket, A coding
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	n/a
Multimode fiber (MM) 62.5/125 µm	n/a
Network size - cascadibility	
Line - / star topology	Any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	DC 9.6 to 60 V
Power consumption	max. 6.2 W
Current consumption at 24 V DC	200 mA
Service	
Management	Serial interface, Web interface, SNMP V1/V2/V3 (HiVision/Industrial HiVision)
Diagnostics	LEDs (power 1, power 2, link status, data, redundancy manager, error) cable tester, signalling contact, RMON (statistics, history, alarms, events), SysLog support, port mirroring
Configuration	Command Line Interface (CLI scripting), auto-configuration adapter (ACA21-M12), TELNET, BootP, DHCP Option 82, HiDiscovery
Security	Port security (MAC and IP address), SNMPv3, SSHv3, SNMP access settings (VLAN/IP), IEEE 802.1X authentication
Other services	4 QoS queues, user priority (IEEE 802.1D/p), VLAN (IEEE 802.1Q), unknown multicast filtering, multicast support (IGMP Snooping/Querier, GMRP), broadcast limiter per port, ingress and egress packet limiter, Flow Control IEEE 802.3x, LLDP (topology discovery IEEE 802.1AB), Link Aggregation (IEEE 802.3ad), buffered real-time clock, PTP support (Precision Time Protocol) (IEEE 1588 client for system clock only), SNTP support (Simple Network Time Protocol, client/server)
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP (Rapid Spanning Tree Protocol, IEEE 802.1w), redundant network/ring coupling, redundant power supply
Ambient conditions	
Operating temperature	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C
MTBF	27.6 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	184 mm x 189 mm x 70 mm
Mounting	Wall mounting
Weight	1310 g
Protection class	IP 67
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0,7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Germanischer Lloyd	GL
Employment in vehicles	E1
Electronic mechanisms on rail-mounted vehicles	n/a
Scope of delivery and accessories	
Scope of delivery	covers for sealing unused ports, M12-connector (ELWIKA 5012 PG7) for power connection, description and operating instructions
Accessories to order separately	Auto Configuration Adapter (ACA21-M12), order no. 943 931-001; modem cable (OCTOPUS Terminalkabel), order no. 943 902-001; field assembleable M12-connector (EM12S OCTOPUS), order no. 934 445-001; patchcords (EM12S 001Lxxxx OCTOPUS), order no. 934 578-xxx; crossing M12 to RJ45 (EF12RJ45 OCTOPUS), order no. 934 498-001

Switch > Versions

Type	OCTOPUS 8M Train	OCTOPUS 8M-6PoE
Order No.	943 983-001	943 967-101
		
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s), power soucing equipment according to IEEE 802.3af (inline power)
Product description		
Port type and quantity	8 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity	6 x 10/100 BASE-TX PoE (phantom power) and 2 x 10/100 BASE-TX , M12 D coding, 4-pole, TP cable, auto-crossing, auto-negotiation, auto-polarity
Power requirements		
Operating voltage	DC 9.6 to 60 V	DC 46 V to 58 V
Power consumption	max. 6.2 W	max. 110 W
Current consumption at 24 V DC	200 mA	n/a
Ambient conditions		
MTBF	27.6 years; MIL-HDBK 217F: Gb 25 °C	29.0 years; Telecordia SR-332: Gb 25 °C
EMC interference immunity		
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	20 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line	4 kV power line, 4 kV data line
Approvals		
Safety of industrial control equipment	n/a	cUL 508 pending
Germanischer Lloyd	n/a	n/a
Employment in vehicles	n/a	n/a
Electronic mechanisms on rail-mounted vehicles	EN 50155	n/a

Type	OCTOPUS 8M-8PoE
Order No.	943 967-001
	
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s), power soucing equipment according to IEEE 802.3af (inline power)
Product description	
Port type and quantity	8 x 10/100 BASE-TX PoE (phantom power), M12 D coding, 4-pole, TP cable, auto-crossing, auto-negotiation, auto-polarity
Power requirements	
Operating voltage	DC 46 V to 58 V
Power consumption	max. 142 W
Current consumption at 24 V DC	n/a
Ambient conditions	
MTBF	28.9 years; Telecordia SR-332: Gb 25 °C
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
Approvals	
Safety of industrial control equipment	cUL 508 pending
Germanischer Lloyd	GL pending
Employment in vehicles	n/a
Electronic mechanisms on rail-mounted vehicles	n/a

OCTOPUS IP67 > Switch

Type	OCTOPUS 16M
Order No.	943 912-001
	
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description	
Port type and quantity	16 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity
More Interfaces	
Power supply/signaling contact	1 x M12 5-pin connector, A coding
V.24 interface	1 x M12 4-pin socket, A coding
USB interface	1 x M12 5-pin socket, A coding
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	n/a
Multimode fiber (MM) 62.5/125 µm	n/a
Network size - cascadibility	
Line - / star topology	Any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	DC 9.6 to 60 V
Power consumption	max. 9.5 W
Current consumption at 24 V DC	380 mA
Service	
Management	Serial interface, Web interface, SNMP V1/V2/V3 (HiVision/Industrial HiVision)
Diagnostics	LEDs (power 1, power 2, link status, data, redundancy manager, error) cable tester, signalling contact, RMON (statistics, history, alarms, events), SysLog support, port mirroring
Configuration	Command Line Interface (CLI scripting), auto-configuration adapter (ACA21-M12), TELNET, BootP, DHCP Option 82, HiDiscovery
Security	Port security (MAC and IP address), SNMPv3, SSHv3, SNMP access settings (VLAN/IP), IEEE 802.1X authentication
Other services	4 QoS queues, user priority (IEEE 802.1D/p), VLAN (IEEE 802.1Q), unknown multicast filtering, multicast support (IGMP Snooping/Querier, GMRP), broadcast limiter per port, ingress and egress packet limiter, Flow Control IEEE 802.3x, LLDP (topology discovery IEEE 802.1AB), Link Aggregation (IEEE 802.3ad), buffered real-time clock, PTP support (Precision Time Protocol) (IEEE 1588 client for system clock only), SNTP support (Simple Network Time Protocol, client/server)
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP (Rapid Spanning Tree Protocol, IEEE 802.1w), redundant network/ring coupling, redundant power supply
Ambient conditions	
Operating temperature	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C
MTBF	27.6 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	261 mm x 189 mm x 70 mm
Mounting	Wall mounting
Weight	1920 g
Protection class	IP 67
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0,7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Germanischer Lloyd	GL
Employment in vehicles	E1
Electronic mechanisms on rail-mounted vehicles	n/a
Scope of delivery and accessories	
Scope of delivery	covers for sealing unused ports, M12-connector (ELWIKA 5012 PG7) for power connection, description and operating instructions
Accessories to order separately	Auto Configuration Adapter (ACA21-M12), order no. 943 931-001; modem cable (OCTOPUS Terminalkabel), order no. 943 902-001; field assembleable M12-connector (EM12S OCTOPUS), order no. 934 445-001; patchcords (EM12S 001Lxxxx OCTOPUS), order no. 934 578-xxx; crossing M12 to RJ45 (EF12RJ45 OCTOPUS), order no. 934 498-001

Industrial Ethernet

Switch > Versions

Type	OCTOPUS 16M Train	OCTOPUS 16M-2FX
Order No.	943 984-001	943 912-002
		
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 Professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description		
Port type and quantity	16 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity	14 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity 2 x 100Base-FX MM, microFX
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	n/a	0 - 5000 m, 8 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	n/a	0 - 4000 m, 11 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km
Power requirements		
Operating voltage	DC 9.6 to 60 V	DC 9.6 to 60 V
Power consumption	max. 9.5 W	max. 13.0 W
Current consumption at 24 V DC	380 mA	480 mA
Ambient conditions		
MTBF	17.8 years; MIL-HDBK 217F: Gb 25 °C	15.5 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Weight	1920 g	1950 g
EMC interference immunity		
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line	2 kV power line, 1 kV data line
Approvals		
Safety of industrial control equipment	n/a	cUL 508
Germanischer Lloyd	n/a	GL
Employment in vehicles	n/a	E1
Electronic mechanisms on rail-mounted vehicles	EN 50155	n/a

Industrial Ethernet

Switch > Versions

Type	OCTOPUS 16M-8PoE	OCTOPUS 16M-8PoE-2FX
Order No.	943 960-001	943 960-101
		
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s), power soucing equipment according to IEEE 802.3af (inline power)	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s), power soucing equipment according to IEEE 802.3af (inline power)
Product description		
Port type and quantity	8 x 10/100 BASE-TX PoE (phantom power) plus 8 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable, auto-crossing, auto-negotiation, auto-polarity	8 x 10/100 BASE-TX PoE (phantom power) plus 6 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable, auto-crossing, auto-negotiation, auto-polarity, 2 x 100Base-FX MM, microFX
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	n/a	0 - 5000 m, 8 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	n/a	0 - 4000 m, 11 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km
Power requirements		
Operating voltage	DC 46 V to 58 V	DC 46 V to 58 V
Power consumption	max. 146 W	max. 142 W
Current consumption at 24 V DC	n/a	n/a
Ambient conditions		
MTBF	22.2 years; Telecordia SR-332: Gb 25 °C	20.7 years; Telecordia SR-332: Gb 25 °C
Mechanical construction		
Weight	1920 g	1950 g
EMC interference immunity		
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	20 V/m (80 - 1000 MHz)	20 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	4 kV power line, 4 kV data line	4 kV power line, 4 kV data line
Approvals		
Safety of industrial control equipment	cUL 508 pending	cUL 508 pending
Germanischer Lloyd	n/a	n/a
Employment in vehicles	n/a	n/a
Electronic mechanisms on rail-mounted vehicles	n/a	n/a

OCTOPUS IP67 > Switch

Type	OCTOPUS 24M
Order No.	943 923-001
	
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description	
Port type and quantity	24 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity
More Interfaces	
Power supply/signaling contact	1 x M12 5-pin connector, A coding
V.24 interface	1 x M12 4-pin socket, A coding
USB interface	1 x M12 5-pin socket, A coding
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	n/a
Multimode fiber (MM) 62.5/125 µm	n/a
Network size - cascadibility	
Line - / star topology	Any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0.3 sec.)
Power requirements	
Operating voltage	DC 9.6 to 60 V
Power consumption	max. 13.5 W
Current consumption at 24 V DC	500 mA
Service	
Management	Serial interface, Web interface, SNMP V1/V2/V3 (HiVision/Industrial HiVision)
Diagnostics	LEDs (power 1, power 2, link status, data, redundancy manager, error) cable tester, signalling contact, RMON (statistics, history, alarms, events), SysLog support, port mirroring
Configuration	Command Line Interface (CLI scripting), auto-configuration adapter (ACA21-M12), TELNET, BootP, DHCP Option 82, HiDiscovery
Security	Port security (MAC and IP address), SNMPv3, SSHv3, SNMP access settings (VLAN/IP), IEEE 802.1X authentication
Other services	4 QoS queues, user priority (IEEE 802.1D/p), VLAN (IEEE 802.1Q), unknown multicast filtering, multicast support (IGMP Snooping/Querier, GMRP), broadcast limiter per port, ingress and egress packet limiter, Flow Control IEEE 802.3x, LLDP (topology discovery IEEE 802.1AB), Link Aggregation (IEEE 802.3ad), buffered real-time clock, PTP support (Precision Time Protocol) (IEEE 1588 client for system clock only), SNTP support (Simple Network Time Protocol, client/server)
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP (Rapid Spanning Tree Protocol, IEEE 802.1w), redundant network/ring coupling, redundant power supply
Ambient conditions	
Operating temperature	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C
MTBF	16.8 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	338 mm x 189 mm x 70 mm
Mounting	Wall mounting
Weight	2540 g
Protection class	IP 67
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0,7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508
Germanischer Lloyd	GL
Employment in vehicles	E1
Electronic mechanisms on rail-mounted vehicles	n/a
Scope of delivery and accessories	
Scope of delivery	covers for sealing unused ports, M12-connector (ELWIKA 5012 PG7) for power connection, description and operating instructions
Accessories to order separately	Auto Configuration Adapter (ACA21-M12), order no. 943 931-001; modem cable (OCTOPUS Terminalkabel), order no. 943 902-001; field assembleable M12-connector (EM12S OCTOPUS), order no. 934 445-001; patchcords (EM12S 001Lxxxx OCTOPUS), order no. 934 578-xxx; crossing M12 to RJ45 (EF12RJ45 OCTOPUS), order no. 934 498-001

Industrial Ethernet

Switch > Versions

Type	OCTOPUS 24M Train	OCTOPUS 24M-2FX
Order No.	943 985-001	943 923-002
		
	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)	Managed IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, software layer 2 professional, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description		
Port type and quantity	24 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity	22 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity 2 x 100Base-FX MM, microFX
Network size - length of cable		
Multimode fiber (MM) 50/125 µm		0 - 5000 m, 8 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 4000 m, 11 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km
Power requirements		
Power consumption	max. 13.5 W	max. 14.9 W
Current consumption at 24 V DC	500 mA	550 mA
Ambient conditions		
MTBF	16.8 years; MIL-HDBK 217F: Gb 25 °C	14.7 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Weight	2540 g	2570 g
Approvals		
Safety of industrial control equipment	n/a	cUL 508
Germanischer Lloyd	n/a	GL
Employment in vehicles	n/a	E1
Electronic mechanisms on rail-mounted vehicles	EN 50155	n/a

Industrial Ethernet

OCTOPUS IP67 > Switch

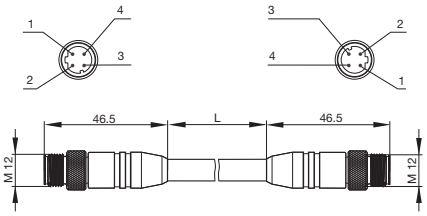
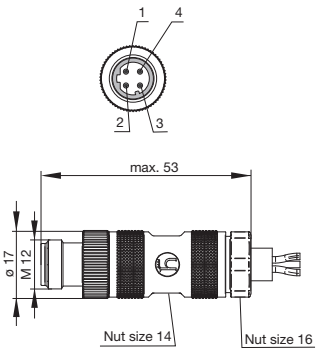
Type	OCTOPUS 5TX EEC
Order No.	943 892-001
	
	IP 67 switch in accordance with IEEE 802.3, store-and-forward-switching, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s)
Product description	
Port type and quantity	5 x 10/100 BASE-TX, M12 D coding, 4-pole, TP cable auto-crossing, auto-negotiation, auto-polarity
More Interfaces	
Power supply/signaling contact	1 x M12 5-pin connector, A coding / no signal contact (fault relais)
V.24 interface	n/a
USB interface	n/a
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	n/a
Multimode fiber (MM) 62.5/125 µm	n/a
Network size - cascadibility	
Line - / star topology	Any
Ring structure (HIPER-Ring) quantity switches	n/a
Power requirements	
Operating voltage	DC 9.6 to 32 V
Power consumption	max. 2.4 W
Current consumption at 24 V DC	max. 100 mA
Service	
Management	n/a
Diagnostics	LEDs (power, link status, data)
Configuration	n/a
Security	n/a
Other services	n/a
Redundancy	
Redundancy functions	n/a
Ambient conditions	
Operating temperature	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C
MTBF	135.6 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	60 mm x 126 mm x 31 mm
Mounting	Wall mounting
Weight	210 g
Protection class	IP 67
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 pending
Germanischer Lloyd	n/a
Employment in vehicles	E1 pending
Electronic mechanisms on rail-mounted vehicles	n/a
Scope of delivery and accessories	
Scope of delivery	2 x covers for sealing unused ports, M12-connector (ELWIKA 5012 PG7) for power connection, description and operating instructions
Accessories to order separately	n/a

OCTOPUS IP67 > **Media module**

Type	MM3-4TX5
Order No.	943 841-101
	
	Media module for MICE Switches (MS...), OCTOPUS-Switches 10/100BASE-TX
Product description	
Port type and quantity	4 x 10/100BASE-TX, TP cables, M12 sockets (D code), auto-crossing, auto-negotiation, auto-polarity
Availability	Q1, 2004
Network size - length of cable	
Twisted pair (TP)	0 -100 m
Power requirements	
Operating voltage	power supply via the backplane of the MICE switch
Power consumption	0,8 W
Service	
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full duplex, ring port, LED test)
Ambient conditions	
Operating temperature	0 °C to +60 °C standart (optional -40°C to +70°C)
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	432.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	38 mm x 134 mm x 118 mm
Mounting	Backplane
Weight	180 g
Protection class	IP20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531)
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)
Safety of information technology equipment	
Germanischer Lloyd	optional
Scope of delivery and accessories	
Scope of delivery	module, operating manual
Accessories to order separately	ML-MS2/MM labels, order no.: 943 767-101

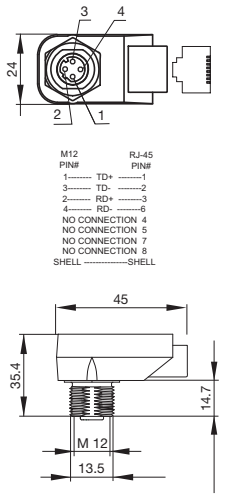
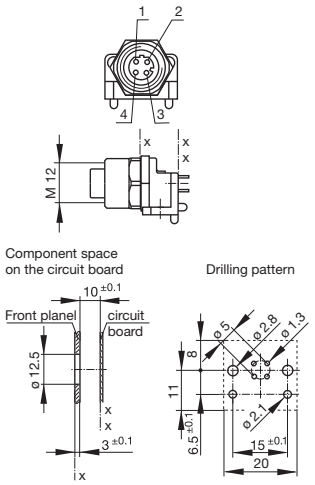
Industrial Ethernet

OCTOPUS IP67 > Connecting technology

Type	EM12S 001L0200 OCTOPUS	EM12S OCTOPUS
Order No.	934 578-001	934 445-001
		
	Industrial Ethernet patch cords with 2 x M12 connector “D”-coded according IEC 61076-2-101.	Field attachable Industrial Ethernet M12 connector “D”-coded according IEC 61076-2-101.
Product description		
Other standard types	cable length 5 m: order no. 934 578-002; cable length 10 m: order no. 934 578-003	
Type of contact	male	male
Number of contacts	4	4
Data rate	10BASE-T, 100BASE-TX	10BASE-T, 100BASE-TX
Cable gland		
Cable material	PUR	
Cable color		
Cable length	2 m	
Conductor size	AWG 22	AWG 24 - AWG 22
Cable specification	stranded wire	stranded wire/solid wire
Standard	IEC 61076-2-101	IEC 61076-2-101
Housing Color	metallic	metallic
Drawing		
Technical data		
Wire stranding		
Rated voltage	AC/DC 250 V	AC/DC 250 V
Rated current	4 A (Derating)	4 A (Derating)
Suitable cables		diameter 6.0 mm to 8.0 mm
Type of termination		IDC
Pin dimensions	1 mm	
Material		
Contact material	Cu Zn	Cu Zn
Contact surface material	Au	Au
Contact bearer material	PA	PA
Housing material	PUR	Cu Zn/Ni
Coupling nut material	Cu Zn/Ni	Zn
O-Ring		Vition
Environmental conditions		
Protection class (IEC 60529)	IP 67	IP 67
Pollution severity	3	3
Temperature range	-25 °C to +90 °C	-25 °C to +85 °C
Approvals		
UL	UL in pending	UL in pending
Packing unit		
Packaging unit	10	10
Scope of delivery and accessories		
Accessories to order separately	switch OCTOPUS 5TX EEC, order no. 943 892-001; media module MM3-4TX5 OCTOPUS, order no. 943 841-001; Bulkhead M12 to RJ45 EF12RJ45 OCTOPUS, order no. 934 498-001; M12 socket EF12M OCTOPUS, order no. 934 450-021; M12 socket EF12L OCTOPUS, order no. 934 451-021; M12 socket EF12LW OCTOPUS, order no. 934 451-521	switch OCTOPUS 5TX EEC, order no. 943 892-001; media module MM3-4TX5 OCTOPUS, order no. 943 841-001; Bulkhead M12 to RJ45 EF12RJ45 OCTOPUS, order no. 934 498-001; M12 socket EF12M OCTOPUS, order no. 934 450-021; M12 socket EF12L OCTOPUS, order no. 934 451-021; M12 socket EF12LW OCTOPUS, order no. 934 451-521

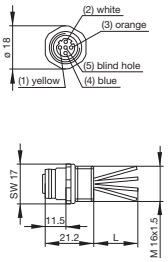
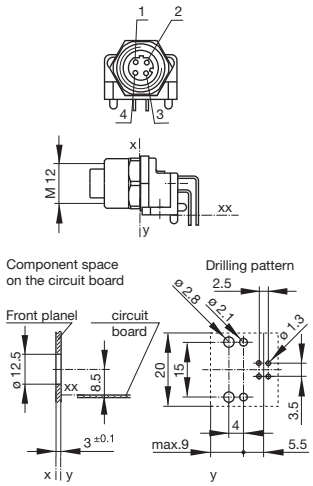
Industrial Ethernet

OCTOPUS IP67 > Connecting technology

Type	EF12RJ45 OCTOPUS	EF12L OCTOPUS
Order No.	934 498-001	934 451-021
		
	Bulkhead M12 connector “D”-coded according IEC 61076-2-101 Amendment 1 to RJ45.	Industrial Ethernet M12 socket, “D”-coded according IEC 61076-2-101 for combined front panels and circuit board installation
Product description		
Other standard types		
Type of contact		female
Number of contacts	4	4
Data rate	10BASE-T, 100BASE-TX	10BASE-T, 100BASE-TX
Cable gland		
Cable material		
Cable color		
Cable length		
Conductor size		
Cable specification		
Standard	IEC 61076-2-101 Amendment 1	IEC 61076-2-101
Housing Color	black	metallic
Drawing		
Technical data		
Wire stranding		
Rated voltage	DC 60 V	AC/DC 150 V
Rated current	1,5 A	4 A (Derating)
Suitable cables	diameter 15,2 mm / PG 9	
Type of termination		soldering, straight pins
Pin dimensions		
Material		
Contact material	Cu Zn	Cu Zn
Contact surface material	Au	Au
Contact bearer material	PA	PA
Housing material	Cu Zn/Ni	Cu Zn/Ni
Coupling nut material	Cu Zn/Ni	
O-Ring	Viton	Viton
Environmental conditions		
Protection class (IEC 60529)	IP 67 / IP65	IP 67 / IP65
Pollution severity	3	3
Temperature range	0 °C to +70 °C	-25 °C to +90 °C
Approvals		
UL	UL	UL
Packing unit		
Packaging unit	10	25
Scope of delivery and accessories		
Accessories to order separately	switch OCTOPUS 5TX EEC, order no. 943 892-001 media module MM3-4TX5 OCTOPUS, order no. 943 841-001; patchcords EM12S 001Lxxxx OCTOPUS, order no. 934 497-xxx M12 connector EM12S OCTOPUS; order no. 934 44540-001	protective cap M 12 VS, order no. 734 209-100 M12 connector EM12S OCTOPUS, order no. 934 445-001 patchcords EM12S 001Lxxxx OCTOPUS, order no. 934 497-xxx

Industrial Ethernet

OCTOPUS IP67 > Connecting technology

EF12M OCTOPUS	EF12LW OCTOPUS
934 450-021	934 451-521
	
Industrial Ethernet M12 socket, “D”-coded according IEC 61076-2-101 mounting thread with connection leads.	Industrial Ethernet M12 socket, “D”-coded according IEC 61076-2-101 for combined front panels and circuit board installation
female 4 10BASE-T, 100BASE-TX M16 x 1,5 PVC 0,08 m 0,34 0m2 / AWG 22 7 x 0,25 mm IEC 61076-2-101 metallic	female 4 10BASE-T, 100BASE-TX IEC 61076-2-101 metallic
	
4 Litzen je 0,34 mm2 AC/DC 250 V 4 A (Derating) connection leads, length max. 8 cm	250 V 4 A (Derating) soldering, angled pins
Cu Zn Au PA Cu Zn / Ni Viton	Cu Zn Au PA Cu Zn/Ni Vition
IP 67 / IP65 3 -25 °C to +90 °C	IP 67 / IP65 3 -25 °C to +90 °C
UL	UL
25	25
protective cap M 12 VS, order no. 734 209-100 fastening nut ELST M M16, order no. 735 413-002 M12 connector EM12S OCTOPUS, order no. 934 445-001 patchcords EM12S 001Lxxxx OCTOPUS, order no. 934 497-xxx	protective cap M 12 VS, order no. 734 209-100 M12 connector EM12S OCTOPUS, order no. 934 445-001 patchcords EM12S 001Lxxxx OCTOPUS, order no. 934 497-xxx

Welcome to the Hirschmann™ Power Zone

The new MACH1000 Substation Switches.

- Ruggedized Gigabit-Ethernet switches
- Total connectivity, uncompromising modular design
- Extended temperature range: –40° C up to +85° C
- Extremely high RFI/EMI immunity
- High port density, up to 26 ports
- High-performance switches in a compact 19" housing

In the future, more and more users will be looking for total solutions which go beyond the substation – to include power generation and distribution. These end-to-end solutions cover the entire spectrum from the power station and management station to the distribution grid. The new indestructible Hirschmann™ substation switches for Fast-Ethernet applications deliver excellent performance in a compact form factor. These switches offer high port density (up to 26 ports), excellent RFI/EMI shielding under extreme conditions and great flexibility. OpenRail design and the standardized OpenRail software platform provides true versatility. The switches are virtually indestructible and offer the same excellent quality which users have learned to expect from Hirschmann™. This well-engineered, ruggedized product family enables Hirschmann™ to supply innovative solutions for power station and substation applications. You need products with excellent noise immunity and a wide operating temperate range to maintain communications in the presence of strong electromagnetic fields.

Accessories

for this family you can find on the following pages:

Transceiver Page 212
System Accessories Page 220

Use the Hirschmann™ MACH1000 system to configure your industrial switch.

MAR1030-CCMMMMMMVVZZTTTTTTTTTTTTRRRRQQTCCHPHH04.0.

Code	Model	
MAR1030-	MAR1020	Fast-Ethernet
	MAR1030	Gigabit Ethernet
	MAR1022	FE with PoE
	MAR1032	GE with PoE
	MAR1120	FE ports at the back
	MAR1130	GE ports at the back
	MAR1122	FE PoE and ports at the back
	MAR1132	GE PoE and ports at the back

Code	Ports Gigabit Ethernet	
CC	99	Not present
	CC	2 ports Combo (10/100/1000BASE TX RJ45 plus FE/GE-SFP Slot)
	4O	4 ports SFP 1000 Mbps
	4T	4 ports 10/100/1000BASE TX RJ45
	OT	2 ports SFP 1000 Mbps + 2 ports 10/100/1000BASE TX RJ45

Code	Ports
MM	1 + 2
MM	3 + 4
MM	5 + 6
VV	7 + 8
ZZ	9 + 10
TT	11 + 12
TT	13 + 14
TT	15 + 16
TT	17 + 18
TT	19 + 20
TT	21 + 22
RR	23 + 24
RR	25 + 26
QQ	27 + 28

Fast-Ethernet media port type

1 + 2 - 3 + 4 - 5 + 6 - 7 + 8 - 9 + 10 - 11 + 12 - 13 + 14 - 15 + 16 - 17 + 18 - 19 + 20 - 21 + 22 - 23 + 24 - 25 + 26 - 27 + 28

99	Not present	
TT	2x Twisted Pair (TX)	10/100 Mbps RJ45
MM	2x Multimode	100 Mbps SC
JJ	2x Multimode	100 Mbps MTRJ
NN	2x Multimode	100 Mbps ST
VV	2x Singlemode	100 Mbps SC
UU	2x Singlemode	100 Mbps ST
LL	2x Singlemode LH	100 Mbps SC
GG	2x Singlemode LH+	100 Mbps SC
77	2x SFP Slot	100 Mbps SFP
RR	2x Twisted Pair (TX)	10/100 Mbps M12
FF	2x Multimode	10 Mbps ST

Code	Temperature range	
T	S	0 °C up to +60 °C
	T	−40 °C up to +85 °C
	E	−40 °C up to +85 °C includes Conformal Coating

Code	Power supply 1	
C	C	24/36/48 VDC
	G	110/250 VDC / 110/230 VAC
	L	24/36/48 VDC pin connector
	M	110/250 VDC / 110/230 VAC pin connector

Code	Power supply 2	
C	L	24/36/48 VDC pin connector
	M	110/250 VDC / 110/230 VAC pin connector

Code	Approvals	
H	H	cUL508 (pending), GL, IEC 61850-3, IEEE1613

Code	Software version	
P	P	Professional: Software security features, advanced diagnostic and redundancy

Code	Configuration	
H	H	Standard
	X	Customer specific

Code	OEM-Type	
H	H	Standard
	X	Customer specific

Code	Software release	
04.0.	04.0	Software release

Compulsory field	Optional

Enjoy our online tool to configure your industrial switch at: config.machine.hirschmann.com. Avoid the hassle and the delay.

MACH 1000 > Switches Software Release 4.0

Type	MAR1020-99TTTTTTTTTTTTTTTTTTTTTTTTTTUG9HPHH04.0.
Order No.	MAR1020-99TTTTTTTTTTTTTTTTTTTTTTTTTTUG9HPHH04.0.
	
	Fast Ethernet-Switch managed, Industrial Switch 19" rack mount fanless Desig
Product description	
Port type and quantity	Fast-Ethernet ports in total: 24; 24 x Twisted Pair (Tx) 10/100 Mbit RJ 45;
More Interfaces	
Power supply/signaling contact	Power supply 1: power supply 3-pin spring clip, signal contact 2-pin spring clip; Power supply 2: not assembled
V.24 interface	1 x RJ11 socket
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	
Multimode fiber (MM) 62.5/125 µm	
Single mode fiber (SM) 9/125 µm	
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	< 10ms (10 switches), < 30ms (50 switches), < 40ms (100 switches), < 60ms (200 switches)
Power requirements	
Operating voltage	Power supply 1: 77 - 300 VDC, 90 - 265 VA; Power supply 2: not assembled
Current consumption at 24 V DC	150mA (35W) max, if all ports are equipped with fiber
Current consumption at 230 V AC	150mA (35W) max, if all ports are equipped with fiber
Power output in Btu (IT) h	120 max
Software	
Management	Serial interface, Web interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log file, syslog, signal contact, RMON (statistic, history, alarme, event), portmirroring, topology discovery 802.1AB, cable diagnostic
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; from Release 4.1: integrated DHCP server
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), (Release 4.0: RSTP 802.1w, Release 4.1: RSTP 802.1D-2004), redundant network/ring coupling, dual homing, link aggregation, redundant 24 V power supply
Filter	QoS 4 classes, port priorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV), Prio (MAC/IP), Prio Mapping (TOS Layer2), Traffic Shaping (Unicast, Multicast, Broadcast) Ingress / Egress
Ambient conditions	
Operating temperature	S = 0° to +60°C; U = -40° to +85°C; F = -40° to +85°C
Storage/transport temperature	-40° to +85°C
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	445 x 44 x 310
Mounting	19" cabinet
Weight	max. 5,6 kg
Protection class	IP30
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 schocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13,2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	8 kV contact discharge, 15 kV air discharge
EN 61000-4-3 electromagnetic field	35 V/m (80 - 2700 MHz); 1kHz, 80% AM
EN 61000-4-4 fast transients (burst)	4 kV power line, 4 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line IEEE1613: power line 5kV (line/earth)
EN 61000-4-12 damped oscillatory wave	2,5 kV (line/earth), 1 kV (line/line) (1MHz)
EN 61000-4-16 mains frequency voltage	30V, 50Hz continous; 300V, 50Hz 1s
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (pending)
Hazardous locations	cUL 1604 Class1 Div 2 (pending)
Germanischer Lloyd	Germanischer Lloyd (in preparation)
Substation	IEC 61850-3, IEEE 1613, KEMA test report
Transportation	EN 50121-4, EN50155 (pending), NEMA TS (pending)

Industrial Ethernet

Switches Software Release 4.0 > Versions

Type	MAR1020-99MM...UG9HPHH04.0.	MAR1030-CCTT...UG9HPHH04.0.
Order No.	MAR1020-99 MMMMMMMMMMMMMMMMMMMMMM UG9HPHH04.0.	MAR1030-CCTTTTTTTTTTTTTTTTTTTTTTTT UG9HPHH04.0.
		
	Fast Ethernet-Switch managed, Industrial Switch 19" rack mount fanless Design	Fast Ethernet/Gigabit-Ethernet-Switch managed, Industrial Switch 19" rack mount fanless Design
Product description		
Port type and quantity	Fast-Ethernet ports in total: 24; 24 x Multimode 100 Mbit SC;	Gigabit-Ethernet ports in total:2; 2 x Combo ports (10/100/1000BASE-TX RJ 45 plus FE/GE-SFP-slot; Fast-Ethernet ports in total: 24; 24 x Twisted Pair (Tx) 10/100 Mbit RJ 45;
Network size - length of cable		
Twisted pair (TP)		0 - 100 m
Multimode fiber (MM) 50/125 µm	Fast-Ethernet ports: 0 - 5000 m, 8 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km	Gigabit-Ethernet ports: cf. SFP modules M-SFPxx
Multimode fiber (MM) 62.5/125 µm	Fast-Ethernet ports: 0 - 4000 m, 11 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km	Gigabit-Ethernet ports: cf. SFP modules M-SFPxx
Single mode fiber (SM) 9/125 µm		Gigabit-Ethernet ports: cf. SFP modules M-SFPxx
Single mode fiber (LH) 9/125 µm (long haul transceiver)		Gigabit-Ethernet ports: cf. SFP modules M-SFPxx

Type	MAR1030-CCMM...UG9HPHH04.0.
Order No.	MAR1030-CC MMMMMMMMMMMMMMMMMMMMMM UG9HPHH04.0.
	
	Fast Ethernet/Gigabit-Ethernet-Switch managed, Industrial Switch 19" rack mount fanless Desig
Product description	
Port type and quantity	Gigabit-Ethernet ports in total:2; 2 x Combo ports (10/100/1000BASE-TX RJ 45 plus FE/GE-SFP-slot; Fast-Ethernet ports in total: 24; 24 x Multimode 100 Mbit SC;
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	Gigabit-Ethernet ports: cf. SFP modules M-SFPxx; Fast-Ethernet ports: 0 - 5000 m, 8 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	Gigabit-Ethernet ports: cf. SFP modules M-SFPxx; Fast-Ethernet ports: 0 - 4000 m, 11 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	Gigabit-Ethernet ports: cf. SFP modules M-SFPxx
Single mode fiber (LH) 9/125 µm (long haul transceiver)	Gigabit-Ethernet ports: cf. SFP modules M-SFPxx

We do everything – except compromise.

The new MACH generation.

- High performance, modular industrial backbone switch and router.
- Now also with 10 Gigabit Ethernet.
- Extended temperature range from 0° C up to +50° C.
- Extremely low height in the 19" housing.
- GL marine approval.
- Fast ring redundancy (HIPER-Ring).

The new MACH4002 Gigabit Switches and Routers provide a maximum transmission performance in the backbone area where many networks converge. This is not only demanded in factory and traffic automation but also increasingly on ships where the Ethernet will be the standard in future. An extremely compact design of the switches is required in addition to flexibility, reliability and stability.

With its modular, cascadable system, the latest MACH generation in the industrial backbone area ensures a maximum performance: Up to 48GB ports and 3x 10GE ports speak for themselves – and for fast switching times in the Industrial Ethernet. Packed in a compact chassis which offers a high port density and modularity within a small space and with extended functions for industry such as HIPER-Ring, redundant coupling or shock and vibration resistance (GL approval).

MACH4002 48G+3X

MACH4002 24G+3X

Accessories

for this family you can find on the following pages:

Transceiver Page 212
System Accessories Page 220

Hirschmann™ Competence Center

Also for Gigabit Switches and Routers the Hirschmann™ Competence Center offers suitable consulting services in the network planning: **Network optimization check, risk reduction consulting, network technology evaluation and network baselining consulting. Plus the following trainings**: CP3d Industrial Backbone components in theory and practice, IMd in overview, CPUd Update and CB2d Industrial Ethernet II technology in detail. We also support you with certification testing, installation, configuration and pre-assembly as well as via our service hotline and later offer Advance Hardware Replacement and warranty extensions.

www.hicomcenter.com

MACH 4000 > Chassis

Type	MACH4002 24G-L2P
Order No.	943 916-101
	
	MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.
Product description	
Port type and quantity	up to 24 Gigabit-Ethernet ports, thereof up to 16 Gigabit-Ethernet ports via media modules practicable, 8 Gigabit combo ports SFP(100/1000MBit/s) or TP (10/100/1000Mbit/s) are integral installed
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1A at 240 V DC)
V.24 interface	1 x RJ11 socket, serial interface to the configuration of devices
USB interface	1USB interface to connect auto-configuration adapter (ACA21-USB)
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	ring recovery time < 50 ms typ. at LWL
Power requirements	
Operating voltage	power supply unit M4-S-xx or M4-Power Chassis with power supply unit please order separately
Power consumption	70 W (without media modules)
Service	
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), signal contact, syslog, logfile, RMON, port mirroring, Topology Discovery IEEE 802.1AB (LLDP)
Configuration	command line interface (CLI), TELNET, BootP, DHCP, DHCP Option 82, HiDiscovery, auto-configuration adapter (ACA21-USB)
Security	port-security (MAC- and IP-adresses), access control to agent (VLAN/IP) authentication 802.1x, SSH, SSL, SNMP V3
Other services	QoS 8 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), broadcastlimiter, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), TOS (Type of Service) Diff.-Serv (DSCP), TOS-Prio-Mapping, protocol based VLANs (IP, nonIP Traffic), Traffic Shaping
Prepared for	MSTP-802.1s
Routing	
Dynamic routing	
Multicast routing	
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP IEEE 802.1D/w (rapid spanning tree protocol), redundant network/ring coupling (master/slave functionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregation dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19" control cabinet
Weight	7.5 kg
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7 g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1 g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531) pending
Germanischer Lloyd	pending
Safety of information technology equipment	cUL 60950 (E168643) pending
Railway norm	EN 50121-4:2000, electromagnetic compatibility along the route (> 10m)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating manual, fan M4-AIR installed
Accessories to order separately	SFP transceiver (100/1000MBit/s), Power supply unit, auto-configuration adapter (ACA21-USB), network management with Industrial HiVision

Chassis > **Versions**

Type	MACH4002 24G-L3E	MACH4002 24G-L3P
Order No.	943 916-201	943 916-301
		
	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Enhanced.	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Professional.
Service		
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2	RIP V1/2, OSPF
Multicast routing		Multicast routing DVMRP/PIM DM

MACH 4000 > Chassis

Type	MACH4002-24G+3X-L2P
Order No.	943 915-101
	
	MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.
Product description	
Port type and quantity	up to 24 Gigabit-Ethernet and 3x 10Gigabit-Ethernet ports, thereof up to 16 Gigabit-Ethernet ports via media modules practicable, 3x 10Gigabit XFP sockets and 8 Gigabit TP (10/100/1000Mbit/s) ports are integral installed
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1A at 240 V DC)
V.24 interface	1 x RJ11 socket, serial interface to the configuration of devices
USB interface	1USB interface to connect auto-configuration adapter (ACA21-USB)
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	ring recovery time < 50 ms typ. at LWL
Power requirements	
Operating voltage	power supply unit M4-S-xx or M4-Power Chassis with power supply unit please order separately
Power consumption	70 W (without media modules)
Service	
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), signal contact, syslog, logfile, RMON, port mirroring, Topology Discovery IEEE 802.1AB (LLDP)
Configuration	command line interface (CLI), TELNET, BootP, DHCP, DHCP Option 82, HiDiscovery, auto-configuration adapter (ACA21-USB)
Security	port-security (MAC- and IP-adresses), access control to agent (VLAN/IP) authentication 802.1x, SSH, SSL, SNMP V3
Other services	QoS 8 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), broadcastlimiter, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), TOS (Type of Service) Diff.-Serv (DSCP), TOS-Prio-Mapping, protocol based VLANs (IP, nonIP Traffic), Traffic Shaping
Prepared for	MSTP-802.1s
Routing	
Dynamic routing	
Multicast routing	
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP IEEE 802.1D/w (rapid spanning tree protocol), redundant network/ring coupling (master/slave functionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregation dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19" control cabinet
Weight	7.5 kg
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7 g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1 g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531) pending
Germanischer Lloyd	pending
Safety of information technology equipment	cUL 60950 (E168643) pending
Railway norm	EN 50121-4:2000, electromagnetic compatibility along the route (> 10m)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating manual, fan M4-AIR installed
Accessories to order separately	SFP transceiver (100/1000MBit/s), Power supply unit, auto-configuration adapter (ACA21-USB), network management with Industrial HiVision

Chassis > **Versions**

Type	MACH4002-24G+3X-L3E	MACH4002-24G+3X-L3P
Order No.	943 915-201	943 915-301
		
	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Enhanced.	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Professional.
Service		
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2	RIP V1/2, OSPF
Multicast routing		Multicast routing DVMRP/PIM DM

MACH 4000 > Chassis

Type	MACH4002-48G-L2P
Order No.	943 911-101
	
	MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.
Product description	
Port type and quantity	up to 48 Gigabit-Ethernet ports, thereof up to 32 Gigabit-Ethernet ports via media modules practicable, 16 Gigabit TP (10/100/1000Mbit/s) therof 8 as combo SFP(100/1000MBit/s)/TP ports are integral installed
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1A at 240 V DC)
V.24 interface	1 x RJ11 socket, serial interface to the configuration of devices
USB interface	1USB interface to connect auto-configuration adapter (ACA21-USB)
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	ring recovery time < 50 ms typ. at LWL
Power requirements	
Operating voltage	power supply unit M4-S-xx or M4-Power Chassis with power supply unit please order separately
Power consumption	70 W (without media modules)
Service	
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), signal contact, syslog, logfile, RMON, port mirroring, Topology Discovery IEEE 802.1AB (LLDP)
Configuration	command line interface (CLI), TELNET, BootP, DHCP, DHCP Option 82, HiDiscovery, auto-configuration adapter (ACA21-USB)
Security	port-security (MAC- and IP-adresses), access control to agent (VLAN/IP) authentication 802.1x, SSH, SSL, SNMP V3
Other services	QoS 8 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), broadcastlimiter, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), TOS (Type of Service) Diff.-Serv (DSCP), TOS-Prio-Mapping, protocol based VLANs (IP, nonIP Traffic), Traffic Shaping
Prepared for	MSTP-802.1s
Routing	
Dynamic routing	
Multicast routing	
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP IEEE 802.1D/w (rapid spanning tree protocol), redundant network/ring coupling (master/slave functionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregation dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19" control cabinet
Weight	7.5 kg
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7 g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1 g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531) pending
Germanischer Lloyd	pending
Safety of information technology equipment	cUL 60950 (E168643) pending
Railway norm	EN 50121-4:2000, electromagnetic compatibility along the route (> 10m)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating manual, fan M4-AIR installed
Accessories to order separately	SFP transceiver (100/1000MBit/s), Power supply unit, auto-configuration adapter (ACA21-USB), network management with Industrial HiVision

Chassis > **Versions**

Type	MACH4002-48G-L3E	MACH4002-48G-L3P
Order No.	943 911-201	943 911-301
		
	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Enhanced.	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Professional.
Service		
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2	RIP V1/2, OSPF
Multicast routing		Multicast routing DVMRP/PIM DM

MACH 4000 > Chassis

Type	MACH4002 48G+3X-L2P
Order No.	943 878-101
	
	MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.
Product description	
Port type and quantity	up to 48 Gigabit-Ethernet and 3x 10Gigabit-Ethernet ports, thereof up to 16 Gigabit-Ethernet ports via media modules practicable, 3x 10Gigabit XFP sockets and 16 Gigabit TP (10/100/1000Mbit/s) ports are integral installed
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1A at 240 V DC)
V.24 interface	1 x RJ11 socket, serial interface to the configuration of devices
USB interface	1USB interface to connect auto-configuration adapter (ACA21-USB)
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	ring-recovery time < 50 ms typ. at LWL
Power requirements	
Operating voltage	power supply unit M4-S-xx or M4-Power Chassis with power supply unit please order separately
Power consumption	70 W (without media modules)
Service	
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), signal contact, syslog, logfile, RMON, port mirroring, Topology Discovery IEEE 802.1AB (LLDP)
Configuration	command line interface (CLI), TELNET, BootP, DHCP, DHCP Option 82, HiDiscovery, auto-configuration adapter (ACA21-USB)
Security	port-security (MAC- and IP-adresses), access control to agent (VLAN/IP) authentication 802.1x, SSH, SSL, SNMP V3
Other services	QoS 8 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), broadcastlimiter, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), TOS (Type of Service) Diff.-Serv (DSCP), TOS-Prio-Mapping, protocol based VLANs (IP, nonIP Traffic), Traffic Shaping
Prepared for	MSTP-802.1s
Routing	
Dynamic routing	
Multicast routing	
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP IEEE 802.1D/w (rapid spanning tree protocol), redundant network/ring coupling (master/slavefunctionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregation dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19” control cabinet
Weight	7.5 kg
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7 g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1 g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531) pending
Germanischer Lloyd	pending
Safety of information technology equipment	cUL 60950 (E168643) pending
Railway norm	EN 50121-4:2000, electromagnetic compatibility along the route (> 10m)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating manual, fan M4-AIR installed
Accessories to order separately	SFP transceiver (100/1000MBit/s), Power supply unit, auto-configuration adapter (ACA21-USB), network management with Industrial HiVision

Chassis > **Versions**

Type	MACH4002 48G+3X-L3E	MACH4002 48G+3X-L3P
Order No.	943 878-201	943 878-301
		
	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Enhanced.	MACH 4000, modularer, managed Industrial Backbone-Router, Layer 3 Switch mit Software Professional .
Service		
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2	RIP V1/2, OSPF
Multicast routing		Multicast routing DVMRP/PIM DM

Type	MACH4002 48+4G-L3E
Order No.	943 859-201
	
	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Enhanced.
Service	
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2

MACH 4000 > Chassis

Type	MACH4002 48+4G-L2P
Order No.	943 859-101
	
	MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.
Product description	
Port type and quantity	up to 48 Fast-Ethernet and 4 Gigabit-Ethernet ports, thereof up to 32 Fast-Ethernet ports via media modules practicable, 4 Gigabit Combo ports and 16 x 10/100Mbit/s Fast-Ethernet ports are integral installed
More Interfaces	
Power supply/signaling contact	1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1A at 240 V DC)
V.24 interface	1 x RJ11 socket, serial interface to the configuration of devices
USB interface	1USB interface to connect auto-configuration adapter (ACA21-USB)
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	ring recovery time < 50 ms typ. at LWL
Power requirements	
Operating voltage	power supply unit M4-S-xx or M4-Power Chassis with power supply unit please order separately
Power consumption	70 W (without media modules)
Service	
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), signal contact, syslog, logfile, RMON, port mirroring, Topology Discovery IEEE 802.1AB (LLDP)
Configuration	comand line interface (CLI), TELNET, BootP, DHCP, DHCP Option 82, HiDiscovery, auto-configuration adapter (ACA21-USB)
Security	port-security (MAC- and IP-adresses), access control to agent (VLAN/IP) authentication 802.1x, SSH, SSL, SNMP V3
Other services	QoS 8 classes, priorisation (IEEE 802.1D/p), VLAN (IEEE 802.1Q), multicast (IGMP snooping/querier), broadcastlimiter, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), TOS (Type of Service) Diff.-Serv (DSCP), TOS-Prio-Mapping, protocol based VLANs (IP, nonIP Traffic), Traffic Shaping
Prepared for	MSTP-802.1s
Routing	
Dynamic routing	
Multicast routing	
Redundancy	
Redundancy functions	HIPER-Ring (ring structure), RSTP IEEE 802.1D/w (rapid spanning tree protocol), redundant network/ring coupling (master/slave functionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregation dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	28.6 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19" control cabinet
Weight	7.5 kg
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7 g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1 g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1 kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531) pending
Germanischer Lloyd	pending
Safety of information technology equipment	cUL 60950 (E168643) pending
Railway norm	EN 50121-4:2000, electromagnetic compatibility along the route (> 10m)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating manual, fan M4-AIR installed
Accessories to order separately	SFP transceiver (100/1000MBit/s), Power supply unit, auto-configuration adapter (ACA21-USB), network management with Industrial HiVision

Chassis > **Versions**

Type	MACH4002 48+4G-L3P
Order No.	943 859-301
	
	MACH 4000, modular, managed Industrial Backbone-Router, Layer 3 Switch with Software Professional.
Service	
Routing	static routing, VRRP router redundancy; layer 3 - ACL, HiVRRP router redundancy < 500 ms
Dynamic routing	RIP V1/2, OSPF
Multicast routing	Multicast routing DVMRP/PIM DM

MACH 4000 > Media modules

Type	M4-FAST 8TP-RJ45-PoE	M4-8TP-RJ45
Order No.	943 873-001	943 863-001
		
	Media module for MACH 4000 10/100 BASE-TX mit power supply for terminals for IEEE 802.3af , Power over Ethernet (PoE) via data lines, max 100 W per MACH 4002	Media module for MACH 4000 10/100/1000 BASE-TX
Product description Port type and quantity	8 x 10/100 BASE-TX RJ45 sockets für TP cable, auto-crossing, auto-negotiation, auto-polarity	8 x 10/100/1000 Mbit/s RJ45 sockets für TP cable, auto-crossing, auto-negotiation, auto-polarity
Service Diagnostics	LEDs (power, link status, data, auto-negotiation, full duplex, ring port, LED test)	LEDs (power, link status, data, auto-negotiation, full duplex, ring port, LED test)
Technical data Operating voltage Operating temperature Power consumption	power supply via the backplane of the MACH 4000 switches 0 °C to +60 °C 2 W + max 100 W ext. user	power supply via the backplane of the MACH 4000 switches 0°C to +60°C 2 W

MACH 4000 > XFP 10Gigabit-Ethernet Transceiver for media module

Type	M-XFP ZR/LC	M-XFP ER/LC
Order No.	943 921-001	943 920-001
		
	XFP Fiberoptic 10Gigabit-Ethernet Transceiver	XFP Fiberoptic 10Gigabit-Ethernet Transceiver
Product description Port type and quantity	1 x 10GBASE with LC Connector	1 x 10GBASE with LC Connector
Network size - length of cable Multimode fiber (MM) 50/125 µm Single mode fiber (SM) 9/125 µm	 40 - 80 km	 10 - 40 km
Service Diagnostics	optical input- and output power, transceiver temperature	optical input- and output power, transceiver temperature
Technical data Operating voltage Operating temperature Power consumption	power supply via media module 0°C to +60°C 3 W	power supply via media module 0°C to +60°C 3 W

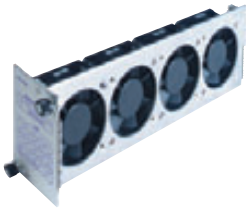
Industrial Ethernet

M4-GIGA 8-SFP	M4-FAST 8-SFP
943 879-001	943 864-001
	
Media module for MACH 4000 1000BASE-X with SFP sockets (nicht MACH4002-48+4G)	Media module for MACH 4000 10/100 BASE-FX with SFP sockets
8 x 100/1000 BASE-X using M-FAST SFP (100MBit/s) or M-SFP (1000MBit/s) transceiver	8 x 100 BASE-FX, with M-FAST SFP transceiver
LEDs (power, link status, data, full duplex, ring port, LED test)	LEDs (power, link status, data, full duplex, ring port, LED test)
power supply via the backplane of the MACH 4000 switches 0°C to +60°C 15 W	power supply via the backplane of the MACH 4000 switches 0°C to +60°C 15 W

M-XFP LR/LC	M-XFP SR/LC
943 919-001	943 917-001
	
XFP Fiberoptic 10Gigabit-Ethernet Transceiver	XFP Fiberoptic 10Gigabit-Ethernet Transceiver
1 x 10GBASE with LC Connector	1 x 10GBASE with LC Connector
2m - 10 km	33m or 300m (with modal bandwidth 2000[MHz x km] fibre)
optical input- and output power, transceiver temperature	optical input- and output power, transceiver temperature
power supply via media module 0°C to +60°C 3 W	power supply via media module 0°C to +60°C 3 W

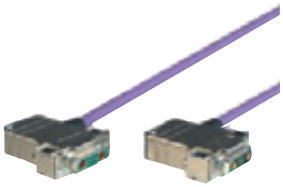
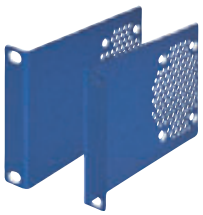
MACH 4000 > **Accessories**

Type	M4-S-AC/DC 300W	M4-S-24VDC 300W
Order No.	943 870-001	943 871-001
		
	Power supply for MACH 4002 switch chassis	Power supply for MACH 4002 chassis with two inputs for redundant power supply
Service		
Diagnostics	LEDs (P1) at basic device	LEDs (P1 und P2) at basic device
Mechanical construction		
Dimensions (W x H x D)		
Current consumption		
Activation current	typ. < 40 A at 265 V AC and cold start	
Technical data		
Operating voltage	100-240 V AC	24 V DC (19,2 V - 32 V)
Operating temperature	0°C to +60°C	0°C to +60°C
Input fequency	47-63 Hz	
Nominal power of voltage supply	350 W (230 V), 370 W (110 V)	380 W
Characteristics		
Power requirements		
Current consumption	1,8 A (230 V), 4,2 A (115V)	max. 21 A (24 V DC)
More Interfaces		
Voltage input	Non-heating appliance socket	plug-in terminal block
Scope of delivery and accessories		
Scope of delivery	device, manual	device, manual

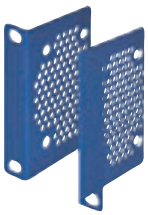
Type	M4-P-48VDC 300 W	M4-AIR
Order No.	943 877-001	943 869-001
		
	Power supply for M4-Power chassis with two inputs for redundant power supply	Fan module for MACH 4002 chassis, four redundant fans
Service		
Diagnostics	LEDs (P3 und P4) at basic device	LEDs (FAN) at basic device
Mechanical construction		
Dimensions (W x H x D)		
Current consumption		
Activation current		
Technical data		
Operating voltage	48 V DC (38 V - 72 V)	
Operating temperature	0°C to +60°C	0°C to +60°C
Input fequency		
Nominal power of voltage supply	350 W	
Characteristics		
Power requirements		
Current consumption	max. 10,1 A (48 V DC)	
More Interfaces		
Voltage input	plug-in terminal block	
Scope of delivery and accessories		
Scope of delivery	device, power-cable 1m (M4-POWER to Switch)	device

MACH 4000 > **Accessories**

M4-S-48VDC 300W	M4-P-AC/DC 300 W	M4-P-24VDC 300 W
943 872-001	943 875-001	943 876-001
		
Power supply for MACH 4002 chassis with two inputs for redundant power supply	Power supply for M4-Power chassis	Power supply for M4-Power chassis with two inputs for redundant power supply
LEDs (P1 und P2) at basic device	LEDs (P3) at basic device	LEDs (P3 und P4) at basic device
	typ. < 40 A at 265 V AC and cold start	
48 V DC (38,4 V - 60 V) 0°C to +60°C 350 W	100-240 V AC 0°C to +60°C 47-63 Hz 350 W (230 V), 370 W (110 V)	24 V DC (19,2 V - 32 V) 0°C to +60°C 380 W
max. 10,1 A (48 V DC)	max. 1,8 A (230 V), 4,2 A (110V)	max. 21 A (24 V DC)
plug-in terminal block	Non-heating appliance socket	plug-in terminal block
device, manual	device, power-cable 1m (M4-POWER to Switch)	device, power-cable 1m (M4-POWER to Switch)

M4-POWER	M4-POWERCABLE	M4-RACKMOUNT-50mm
943 874-001	943 922-001	943 951-001
		
M4-Power chassis for up to three power wupplies M4-P-xx for power supply redundancy	Spare power cable for use between M4-POWER chassis and MACH 4002 basic device, length 1m	Longer fixing brackets for assembling the MACH 4000 in a 19" rack, 50 mm deeper
480 mm x 88 mm x 435 mm		110 mm x 88 mm x 19 mm
see power supplies M4-P-AC/DC 300W, M4-P-24VDC 300 W, M4-P-48VDC 300W		
device, manual	Power cable 1m	5 pairs (10 items) fixing brackets, mounting instructions

MACH 4000 > **Accessories**

Type	M4-RACKMOUNT
Order No.	943 951-101
	 Spare fixing brackets for assembling the MACH 4000 in a 19" rack
Service Diagnostics	
Mechanical construction Dimensions (W x H x D)	60 mm x 88 mm x 19 mm
Current consumption Activation current	
Technical data Operating voltage Operating temperature Input fequency Nominal power of voltage supply Characteristics	
Power requirements Current consumption	
More Interfaces Voltage input	
Scope of delivery and accessories Scope of delivery	5 pairs (10 items) fixing brackets, mounting instructions

HIRSCHMANN
A BELDEN BRAND

When the going gets tough on the verge of the office world:

The genuine industrial-grade Workgroup Switches MACH100/PowerLION

- Industrial-grade switch with built-in media conversion
- Available with fixed port count or as modular workgroup switches
- High quality and durability
- Low initial investment compared to solutions that need additional media converters; low ongoing costs
- ACA support Security/ Authentication/VLAN, SpanningTree, etc.
- Fanless design
- Hot-swappable modules
- Hirschmann™ CLI and WEB interface
- Range of functions similar to L2P firmware: DHCP Option 82, HiDiscovery, HIPER-Ring, MRP RSTP, disable learning, SNTP; Industrial Profiles (EtherNet/IP, Profinet)
- Fully integrated in Industrial HiVision
- Temperature range: 0° C up to + 50° C

Price-conscious automation in environments closely tied to the office setup place enormous demands on hardware. Because large amounts of data have to be processed quickly, safely and flexibly – after all, data has a short expiry period. A workgroup switch must therefore meet the requirements of the office environment and above all have one thing in particular: maximum performance.

Hirschmann™ has expanded its product range with the Fast Ethernet workgroup switches of the MACH100 Family. These Switches support Profinet and EtherNet/IP protocols. This way workgroups can be net worked by copper cables and via fiber optics, and can be connected to the backbone. For this purpose 2 Gigabit Combo ports are available. The switches are offered in versions with 8 or 24 permanently installed Fast Ethernet ports, or as modular devices with 8 ports and slots for 2 additional 8 port media modules. The switches are designed for a temperature range from 0° C up to + 50° C and support a large range of management and redundancy modes, as well as several functions for configuration and diagnostics. Further features are fanless cooling as well as an optional power supply. As a result the devices of the MACH100 Family offer a high level of security and flexibility for Ethernet network design or upgrade in production-related areas.

As Hirschmann™ is a true "boardroom to factory floor" networking company, part of the product offering includes high quality, high performance switches without the industrial ratings. The PowerLION meets the needs of IT professionals. The full-featured management and high traffic performance makes the PowerLION compatible with larger office-grade brands while maintaining an economical price. .

MACH100

PowerLION-24 TP

Accessories

for this family you can find on the following pages:

Transceiver Page 212
System Accessories Page 220

Hirschmann™ Competence Center

Also in the Control Room the Hirschmann™ Competence Center ensures appropriate service and support for your industrial network. With **consulting offers** such as **network optimization check, network technology evaluation** or **network baselining consulting** and **trainings** such as **PEd-Control Room Switches** and **XXd PowerLION**. In addition, we support you with the installation and configuration, via our service hotline and later with Advance Hardware Replacement and warranty extensions.

www.hicomcenter.com

Type	MACH102-8TP
Order No.	943 969-001
	
	26 port Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch (fix installed: 2 x GE, 8 x FE; via Media Modules 16 x FE), managed, Software Layer 2 Professional, Store-and-Forward-Switching, fanless Design
Product description	
Port type and quantity	Up to 26 Ethernet ports, thereof up to 16 Fast-Ethernet ports via media modules realisable; 8x TP (10/100 BASE-TX, RJ45) Fast Ethernet ports and 2 Gigabit Combo ports fix installed
More Interfaces	
Power supply/signaling contact	1 x plug-in terminal block, 2-pin, output manual or automatic switchable (max. 1 A, 24 V DC bzw. 24 V AC)
V.24 interface	1 x RJ11 socket, serial interface for device configuration
USB interface	1 x to connect auto-configuration adapter ACA21-USB
Network size - length of cable	
Twisted pair (TP)	0 - 100m
Multimode fiber (MM) 50/125 µm	Fast Ethernet: cf. SFP LWL module M-FAST SFP-MM/LC; Gigabit Ethernet: cf. SFP LWL module M-SFP-SX/LC and M-SFP-LX/LC
Multimode fiber (MM) 62.5/125 µm	Fast Ethernet: cf. SFP LWL module M-FAST SFP-MM/LC; Gigabit Ethernet: cf. SFP LWL module M-SFP-SX/LC and M-SFP-LX/LC
Single mode fiber (SM) 9/125 µm	Fast Ethernet: cf. SFP LWL module M-FAST SFP-SM/LC and M-FAST SFP-SM+/LC; Gigabit Ethernet: cf. SFP LWL module M-SFP-LX/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	Fast Ethernet: cf. SFP LWL modul M-FAST SFP-LH/LC; Gigabit Ethernet: cf. SFP LWL modul M-SFP-LH/LC and M-SFP-LH+/LC
Network size - cascadibility	
Line - / star topology	any
Ring structure (HIPER-Ring) quantity switches	50 (reconfiguration time < 0,3 sec.)
Power requirements	
Operating voltage	100 - 240 VAC, 47 - 63 Hz
Power output in Btu (IT) h	41 (without media modules)
Rated current	0.4 - 0.2 A
Power consumption	12 W (without media modules)
Software	
Management	serial Interface, web interface, SNMP V1/V2, HiVision file transfer SW HTTP/TFTP
Diagnostics	LEDs, log-file, syslog, signal contact, RMON (statistic, history, alarms, events), port mirroring, topology discovery 802.1AB, cable diagnostic
Configuration	Comand line interface (CLI), TELNET, BootP, DHCP, DHCP option 82, HIDiscovery, auto-configuration adapter (ACD11, ACA21-USB), Watchdog configuration; integrated DHCP server
Security	Port security (IP and MAC), SNMP V3, SSH, authentication (802.1x)
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), RSTP 802.1D-2004, redundant network/ring coupling, dual homing, link aggregation
Filter	QoS 4 Klassen, Portpriorisierung (IEEE 802.1D/p), VLAN (IEEE 802.1Q), shared VLAN learning, Multicast (IGMP Snooping/Querier), Multicast Detection unknown Multicast, Broadcastlimiter, Fast Aging, Multicast GMRP IEEE 802.1D
Industrial Profiles	EtherNet/IP, PROFINET, configuration and diagnostic via automation software tools like e.g. STEP7, or Control Logix
Realtime	SNTP server, realtime clock with energy buffer
Flow control	Flow Control 802.3x, Port Priority 802.1D/p, Priority (TOS/DIFFSERV), Prio (MAC/IP), Prio Mapping (TOS Layer2), Traffic Shaping (Unicast, Multicast, Broadcast) Ingress / Egress
Ambient conditions	
Operating temperature	0° - +50°C
Storage/transport temperature	-20° - +85°C
Relative humidity (non-condensing)	10% to 95%
MTBF	15.67 years (MIL-HDBK-217F Gb 25°C) (without media modules)
Mechanical construction	
Dimensions (W x H x D)	448 x 310 x 44 (without fixing bracket)
Mounting	19" control cabinet
Weight	3.60 kg
Protection class	IP20
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 2700 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 4 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 4 kV data line
EN 61000-4-6 conducted immunity	10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC 47 CFR Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (pending)
Safety of information technology equipment	
Safety of information technology equipment	

Industrial Ethernet

Switches > **Versions**

Type	MACH102-8TP-FR	MACH102-8TP-F
Order No.	943 969-301	943 969-201
		
	10 port Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch (2 x GE, 8 x FE), managed, Software Layer 2 Professional, Store-and-Forward-Switching, fanless Design, redundant power supply	10 port Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch (2 x GE, 8 x FE), managed, Software Layer 2 Professional, Store-and-Forward-Switching, fanless Design
Product description Port type and quantity	10 ports in total; 8x (10/100 BASE-TX, RJ45) and 2 Gigabit Combo ports	10 ports in total; 8x (10/100 BASE-TX, RJ45) and 2 Gigabit Combo ports
Power requirements Power output in Btu (IT) h Power consumption	 44 13 W	 41 12 W
Software Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), RSTP 802.1D-2004, redundant network/ring coupling, dual homing, link aggregation, redundant 100 - 240 VAC power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), RSTP 802.1D-2004, redundant network/ring coupling, dual homing, link aggregation
Ambient conditions MTBF	18,06 years (MIL-HDBK-217F Gb 25°C)	15.67 years (MIL-HDBK-217F Gb 25°C)
Mechanical construction Weight	3.85 kg	3.60 kg

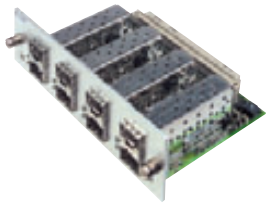
Type	MACH102-8TP-R	MACH102-24TP-F
Order No.	943 969-101	943 969-401
		
	26 port Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch (fix installed: 2 x GE, 8 x FE; via Media Modules 16 x FE), managed, Software Layer 2 Professional, Store-and-Forward-Switching, fanless Design, redundant power supply	26 port Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch (2 x GE, 24 x FE), managed, Software Layer 2 Professional, Store-and-Forward-Switching, fanless Design
Product description Port type and quantity	Up to 26 Ethernet ports, thereof up to 16 Fast-Ethernet ports via media modules realisable; 8x TP (10/100 BASE-TX, RJ45) Fast Ethernet ports and 2 Gigabit Combo ports fix installed	26 ports in total; 24x (10/100 BASE-TX, RJ45) and 2 Gigabit Combo ports
Power requirements Power output in Btu (IT) h Power consumption	 44 (without media modules) 13 W (without media modules)	 55 16 W
Software Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), RSTP 802.1D-2004, redundant network/ring coupling, dual homing, link aggregation, redundant 100 - 240 VAC power supply	HIPER-ring (ring structure), MRP (IEC-ring functionality), RSTP 802.1D-2004, redundant network/ring coupling, dual homing, link aggregation
Ambient conditions MTBF	18.06 years (MIL-HDBK-217F Gb 25°C) (without media modules)	13.26 years (MIL-HDBK-217F Gb 25°C)
Mechanical construction Weight	3.85 kg	3.85 kg

Industrial Ethernet

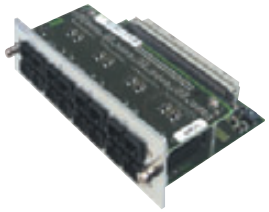
Switches > **Versions**

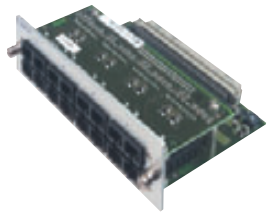
Type	MACH102-24TP-FR
Order No.	943 969-501
	
	26 port Fast Ethernet/Gigabit Ethernet Industrial Workgroup Switch (2 x GE, 24 x FE), managed, Software Layer 2 Professional, Store-and-Forward-Switching, fanless Design, redundant power supply
Product description	
Port type and quantity	26 ports in total; 24x (10/100 BASE-TX, RJ45) and 2 Gigabit Combo ports
Power requirements	
Power output in Btu (IT) h	58
Power consumption	17 W
Software	
Redundancy functions	HIPER-ring (ring structure), MRP (IEC-ring functionality), RSTP 802.1D-2004, redundant network/ring coupling, dual homing, link aggregation, redundant 100 - 240 VAC power supply
Ambient conditions	
MTBF	14.93 years (MIL-HDBK-217F Gb 25°C)
Mechanical construction	
Weight	4.10 kg

MACH100 > Media modules

Type	M1-8SFP
Order No.	943 970-301
	 Media module for modular, managed, Industrial Workgroup Switch MACH100 100 BASE-X with SFP slots
Network size - length of cable	
Twisted pair (TP)	0 - 100m
Multimode fiber (MM) 50/125 µm	cf. SFP LWL module M-FAST SFP-MM/LC
Multimode fiber (MM) 62.5/125 µm	cf. SFP LWL modul M-FAST SFP-MM/LC
Single mode fiber (SM) 9/125 µm	cf. SFP LWL-Modul M-FAST SFP-SM/LC and M-FAST SFP-SM+/LC
Single mode fiber (LH) 9/125 µm (long haul transceiver)	cf. SFP LWL modul M-FAST SFP-LH/LC
Power requirements	
Rated current	
Power consumption	11 W (incl. SFP module
Ambient conditions	
Operating temperature	0° - +50°C
Storage/transport temperature	-20° - +85°C
Relative humidity (non-condensing)	10% to 95%
MTBF	109.33 years (MIL-HDBK-217F Gb 25°C)
Mechanical construction	
Dimensions (W x H x D)	138 x 90 x 42
Mounting	Media Module
Weight	0.13 kg
Protection class	IP20
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	4 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 2700 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 4 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 4 kV data line
EN 61000-4-6 conducted immunity	10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC 47 CFR Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (pending)
Safety of information technology equipment	
Safety of information technology equipment	
Scope of delivery and accessories	
Scope of delivery	Media module, user manual

Media modules > Versions

Type	M1-8TP-RJ45	M1-8SM-SC
Order No.	943 970-001	943 970-201
		
	Media module for modular, managed, Industrial Workgroup Switch MACH100 10/100 BASE-TX	Media module for modular, managed, Industrial Workgroup Switch MACH100 100 BASE-FX Singlemode
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	-	-
Multimode fiber (MM) 62.5/125 µm	-	-
Single mode fiber (SM) 9/125 µm	-	0 - 32,5 km, 16 dB Link Budget at 1300 nm, A = 0,4 dB/km, 3 dB Reserve, D = 3,5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-	-
Power requirements		
Power consumption	2 W	10 W
Ambient conditions		
MTBF	169.95 years (MIL-HDBK-217F Gb 25°C)	72.54 years (MIL-HDBK-217F Gb 25°C)
Mechanical construction		
Weight	0.21 kg	0.18 kg

Type	M1-8MM-SC
Order No.	943 970-101
	
	Media module for modular, managed, Industrial Workgroup Switch MACH100 100 BASE-FX Multimode
Network size - length of cable	
Multimode fiber (MM) 50/125 µm	0 - 5000 m, 8 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 800 MHz x km
Multimode fiber (MM) 62.5/125 µm	0 - 4000 m, 11 dB Link Budget at 1300 nm, A = 1 dB/km, 3 dB Reserve, B = 500 MHz x km
Single mode fiber (SM) 9/125 µm	-
Single mode fiber (LH) 9/125 µm (long haul transceiver)	-
Power requirements	
Power consumption	10 W
Ambient conditions	
MTBF	68.94 years (MIL-HDBK-217F Gb 25°C)
Mechanical construction	
Weight	0.21 kg

LION Control Room Switch > Chassis

Type	PowerLION-24 TP
Order No.	943 886-001
	
	Gigabit Ethernet managed switch, store-and-forward forwarding scheme
Product description	
Port type and quantity	24 x 10/100/1000BASE-T ports (RJ-45 connectors), 4 of which are Gigabit Ethernet combo ports (RJ-45/SFP), with one optional 10GE uplink module, Layer 3
More Interfaces	
V.24 interface	outband management connection via V.24 (DB9 RS-232 console interface)
Network size - length of cable	
Twisted pair (TP)	0 - 100 m
Multimode fiber (MM) 50/125 µm	see media modules and transceivers
Multimode fiber (MM) 62.5/125 µm	see media modules and transceivers
Single mode fiber (SM) 9/125 µm	see media modules and transceivers
Network size - cascadibility	
Line - / star topology	any
Power requirements	
Operating voltage	min. 100 V, max. 240 V, input frequency: 47 to 63 Hz
Current consumption	max. 140 W
Service	
Management	SNMP v1 and SNMP v2 management functions, integration in HiVision; RMON (groups 1,2,3 and 9); web-based management; TELNET console interface; BOOTP and DHCP for IP address assignment; firmware upgraded by TFTP file transfer protocol through the Ethernet network; dual firmware images; configuration file upload/download by TFTP protocol; two or more Configuration files; sytem error log (syslog)
VLAN	IEEE 802.1Q; GVRP protocol for automatic VLAN registration and dynamic VLAN; management
Security	RADIUS client; TACACS+ client; HTTPs/SSL; Secure Shell (SSH, Secure Telnet); Access Control; IEEE 802.1x port based security
Quality of Service	L2/L3/L4Traffic ClassIPv4 routing; CoS by IEEE 802.1p 4 priority queues control; WRR for priority queues; Strict scheduling for priority queue; Rate Limiting; Random Early Detection (RED)
Other services	auto-sensing, auto-negotiation on all 10/100/1000BASE-T ports up to 16 kByte memory for MAC address entries flow control mechanism: backpressure for half duplex; full duplex mode port mirroring IGMP snooping broadcast storm control QoS: DiffServ, Traffic and Bandwidth Management, 8-level priority in switching stacking: stacks up to 10 units
Layer 3	IPv4 routing at wire speed; Static IP routes; RIP I and RIP II; OSPF routing; IP Multicast Routing: DVMRP, PIM-DM; IP Redundancy - VRRP
Redundancy	
Redundancy functions	IEEE 802.1D Spanning Tree Protocol IEEE 802.1w Rapid Spanning Tree IEEE 802.1s Multiple Spanning Tree link aggregation: - up to 8 ports in one trunk - up to 4 trunk groups - 802.3ad (LACP) - Ether-channel (static truck)
Ambient conditions	
Operating temperature	0 °C to +40 °C
Storage/transport temperature	-40 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	19.8 years
Mechanical construction	
Dimensions (W x H x D)	440 mm x 44 mm x 410 mm
Mounting	19" cabinet or table unit
Protection class	IP 20
Scope of delivery and accessories	
Scope of delivery	device, AC power cord, serial cable, mounting brackets, manual
Accessories to order separately	SFP transceivers: M-SFP-SX/LC (943 014-001), M-SFP-LX/LC (943 015-001), M-SFP-LH/LC (943 042-001) and M-SFP-LH+/LC (943 049-001) 10GE uplink: PowerLION-XM-10G (943 886-201), XENPAK-10G-LR (943 886-901) Stack cable: PowerLION-XM-C30 (943 886-401), PowerLION-XM-C130 (943 886-501)

Industrial Ethernet

LION Control Room Switch > Module

Type	PowerLION-XM-10G	PowerLION-XM-C30
Order No.	943 886-201	943 886-401
		
	10 Gigabit Ethernet uplink module for PowerLION	10 Gigabit Ethernet stacking cable for PowerLION, 30cm
Product description Port type and quantity	 1 X 10 GE, XENPAK Transceiver connector	
Network size - length of cable Single mode fiber (SM) 9/125 µm	 see 10 GE optical transceiver, XENPAK-10G-LR	
Power requirements Current consumption	 6 W	
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing)	 0 °C to +40 °C -40 °C to +70 °C 10% to 95%	 0 °C to +40 °C -40 °C to +70 °C 10% to 95%
Mechanical construction Dimensions (W x H x D) Mounting	 180 mm x 40 mm x 200 mm plug-in device	 30cm
Scope of delivery and accessories Scope of delivery	 module	 stacking cable, 30 cm

LION Control Room Switch > Fiberoptic Transceiver

Type	GBIC SX	GBIC LX
Order No.	943 411-100	943 411-200
		
	GBIC tranceiver for expansion module LION-GBIC 1000BASE-SX	GBIC tranceiver for expansion module LION-GBIC 1000BASE-LX
Product description Port type and quantity	 1 x 1000BASE-SX with duplex SC optical interface	 1 x 1000BASE-LX with duplex SC optical interface
Network size - length of cable Multimode fiber (MM) 50/125 µm Multimode fiber (MM) 62.5/125 µm Single mode fiber (SM) 9/125 µm	 500m 275m	 10km
Power requirements Operating voltage Power consumption	 via expansion module 5 W	 via expansion module 5 W
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing)	 0 °C to +50 °C -25 °C to +70 °C 10% to 95%	 0 °C to +50 °C -25 °C to +70 °C 10% to 95%
Mechanical construction Dimensions (W x H x D) Mounting Weight Protection class	 80 mm x 10 mm x 30 mm plug-in 40 g IP 20	 80 mm x 10 mm x 30 mm plug-in 40 g IP 20
EMC emitted immunity FCC CFR47 Part 15 EN 55022	 FCC CFR47 Part 15 Class A EN 55022 Class A	 FCC CFR47 Part 15 Class A EN 55022 Class A
Scope of delivery and accessories Scope of delivery Accessories to order separately	 transceiver	 transceiver expansion module, order number: 943 118-605

LION Control Room Switch > Module

PowerLION-XM-C130	XENPAK-10G-LR
943 886-501	943 886-901
	
10 Gigabit Ethernet stacking cable for PowerLION, 130cm	10 Gigabit Ethernet optical transceiver for PowerLION
	1 X 10GBASE-LR, SC Duplex
	10 km
	6 W
0 °C to +40 °C -40 °C to +70 °C 10% to 95%	0 °C to +70 °C -40 °C to +70 °C 10% to 95%
130cm	45 mm x 20 mm x 130 mm Transceiver for PowerLION-XM-10G uplink module
stacking cable, 130 cm	transceiver

A continous stream of information.

Network Management with HiVision: all at a glance, everything under control.

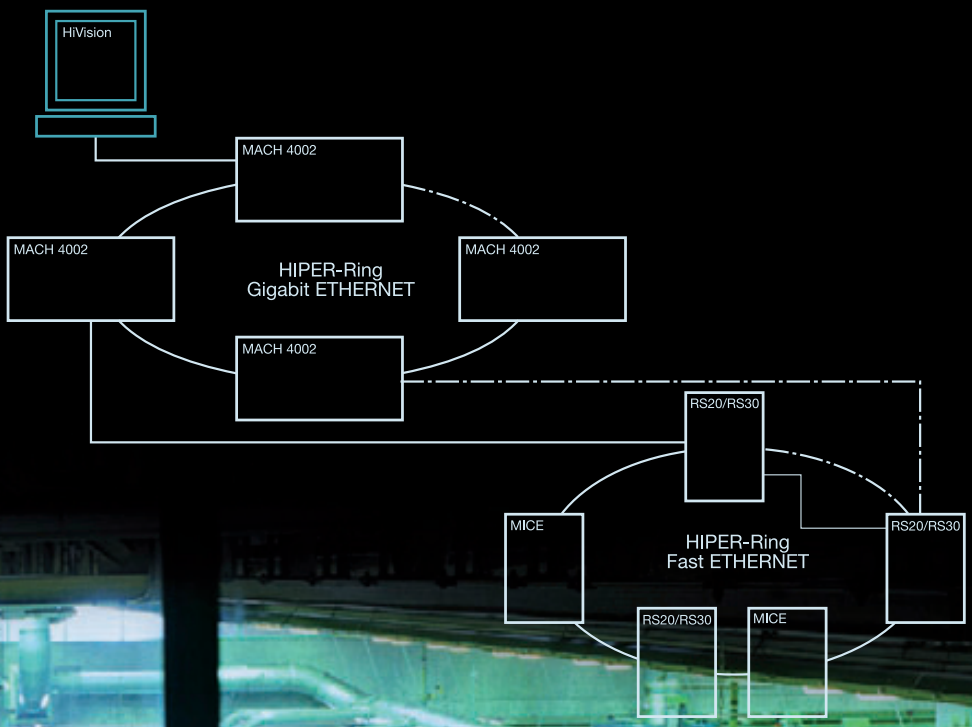
- Operator Edition Network Management with 25/50/100/250/500 nodes (IP addresses) for Windows and Linux.
- Monitoring of device status, link and connection status, power supply, fans etc.
- Graphical illustration for networks.
- OPC and ActiveX interface for linking to SCADA systems.
- Alarm and event logging with definition of event actions, e.g. information window, e-mail, SMS and any program start.
- Industrial HiVision can be used as a front end for device configuration with HiVision.

There are many reasons for a system failure in industrial networks: temperature fluctuations, cable breaks or interruptions in the power supply are just a few of the possible causes. The system breakdown costs time, money and nerves – wherever the functional capability of end devices and components of the infrastructure needs to be monitored quickly and reliably during operation. But the recipe for success in the future can be so simple: Industrial HiVision. Because, thanks to the intuitive user interface, this tells users the network status at a glance.

Industrial HiVision projects the network with its hierarchical structure and topology for devices of any manufacturers. This means that not only every source of error is discovered promptly – but the clever program also finds "bottlenecks", optimizes networks or applications and reduces the costs. In addition, you can also easily integrate and provide all states in your network in SCADA systems with Industrial HiVision via the OPC server and the graphic image of your network via an ActiveX component.

Industrial HiVision

HiVision



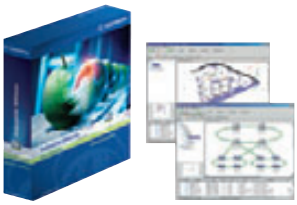
Hirschmann™ Competence Center

In the area of Network Management the Hirschmann™ Competence Center puts real professionals at your disposal. For example with **consulting services** in the **network planning** and the **network management consulting package** or with **trainings** such as **CP2d network management** with **HiVision, CPUd Update Rail Family** or **WSNMd practical knowledge network management**. In addition, we take over certification testing and support you with the installation and configuration as well as via our service hotline.

www.hicomcenter.com

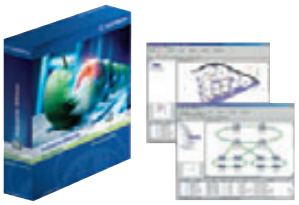
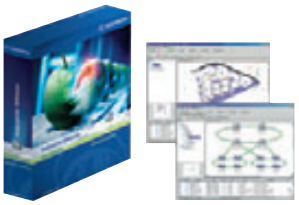
Industrial Ethernet

Network Management > Industrial HiVision

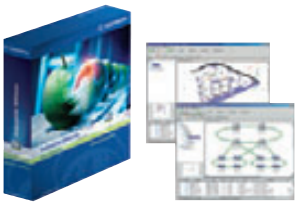
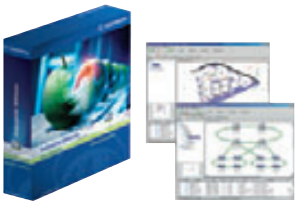
Type	Industrial HiVision - Operator Edition, 25 Nodes
Order No.	943 156-025
	
	Network management for monitoring of industrial networks with up to 25 nodes (IP-addresses).
Product description	
License	license provides supervision of up to 25 nodes (IP-addresses)
Node extension	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.
Diagnostics	
Topology recognition	Topology recognition is based on LLDP (Link Layer Discovery Protocol, IEEE802.1AB) provided by the switches, WLAN and end device discovery
Monitoring	map-representation, device state, link and connection state (cable break, utilization), powersupply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP address assignment
Modules and components	MACH, MICE, RS2, Foundry Networks FastIron Serie, EAGLE, RS20/30, MICE20/30, OCTOPUS 16/24, LION, GigaLION, BAT54 Rail, SNMP capable switches, any ICMP(Ping) capable device (PLC, decentral IO module, PCs, ...)
Event generation	polling and SNMPv1 trap support
Alarm and event actions	alarm and event logging, including alarm actions like message window, e-mail, SMS and program start
SCADA /Prozessvisualisation (from release 3.0)	
OPC Server	Map, device and connection states as well as device propertiescould be used inside SCADA systems via the OPC Data Access 2.0/3.0 interface
ActiveX Control	Map-representations could be reused inside SCADA systems via an ActiveX control
Protocols	
Supported protocols	HiDiscovery, ICMP (Ping), SNMPv1, SNMPv2c, SNMPv3, OPC DA 2.0/3.0
Configuration	
Configuration functions	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.
Dokumentation	
Dokumentation	documentation, export od maps and lists, inventory
Language Support	
Menus und dialogs	English, French, Spanish, Chinese, Japanese, Korean, German
Manual and helptexts	English, German
Software requirements	
Operating system	Windows 2000 / XP Linux (from kernel 2.2, glibc 2.0)
Browser	Internet Explorer 4.0 or higher, Java runtime environment 1.5.0 is also installed
Hardware requirements	
Processor	x86 compatible CPU, min. 1 GHz
RAM	512 MB, 1 GB (recommended)
Hard disk space	500 MB free
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) CD-ROM with multilingual product version, manual and form for licensing, additional software: Acrobat reader, HiVision
Product variants	
Version +N	full version - 25 nodes

Industrial Ethernet

Industrial HiVision > Versions

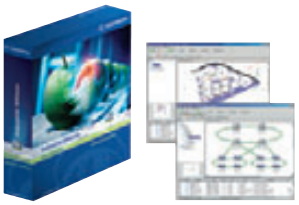
Type	Industrial HiVision - OE, 50 Nodes	Industrial HiVision - OE, 100 Nodes
Order No.	943 156-050	943 156-100
		
	Network management for monitoring of industrial networks with up to 50 nodes (IP-addresses).	Network management for monitoring of industrial networks with up to 100 nodes (IP-addresses).
Product description		
License	license provides supervision of up to 50 nodes (IP-addresses)	license provides supervision of up to 100 nodes (IP-addresses)
Node extension	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.
Diagnostics		
Topology recognition	Topology recognition is based on LLDP (Link Layer Discovery Protocol, IEEE802.1AB) provided by the switches, WLAN and end device discovery	Topology recognition is based on LLDP (Link Layer Discovery Protocol, IEEE802.1AB) provided by the switches,WLAN and end device discovery
Monitoring	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment
Modules and components	MACH, MICE, RS2, Foundry Networks FastIron Serie, EAGLE, RS20/30, MICE20/30, OCTOPUS 16/24, LION, GigaLION, BAT54 Rail SNMP capable switches, any ICMP(Ping) capable device (PLC, decentral IO module, PCs, ...)	MACH, MICE, RS2, Foundry Networks FastIron Serie, EAGLE, RS20/30, MICE20/30, OCTOPUS 16/24, LION, GigaLION, BAT54 Rail, SNMP capable switches, any ICMP(Ping) capable device (PLC, decentral IO module, PCs, ...)
Configuration		
Configuration functions	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.	configuration of IP parameter and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.
Dokumentation		
Dokumentation	documentationn, export of maps and lists, inventory	documentation, export of maps and lists, inventory
Scope of delivery and accessories		
Scope of delivery	printed manual (German and English) CD-ROM with multilingual product version, manual and form for licensing, additional software: Acrobat reader, HiVision	printed manual (German and English) CD-ROM with multilingual product version, manual and form for licensing, additional software: Acrobat reader, HiVision
Product variants		
Version +N	full version - 50 nodes	full version - 100 nodes

Industrial HiVision > Versions

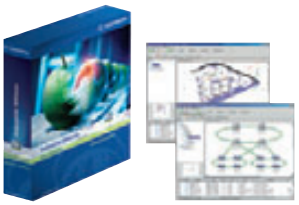
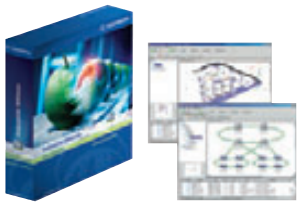
Type	Industrial HiVision - OE, 250 Nodes	Industrial HiVision - OE, 500 Nodes
Order No.	943 156-250	943 156 -500
		
	Network management for monitoring of industrial networks with up to 250 nodes (IP-addresses).	Network management for monitoring of industrial networks with up to 500 nodes (IP-addresses).
Product description		
License	license provides supervision of up to 250 nodes (IP-addresses)	license provides supervision of up to 500 nodes (IP-addresses)
Node extension	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.
Diagnostics		
Topology recognition	Topology recognition is based on LLDP (Link Layer Discovery Protocol, IEEE802.1AB) provided by the switches WLAN and end device discovery	Topology recognition is based on LLDP (Link Layer Discovery Protocol, IEEE802.1AB) provided by the switches, WLAN and end device discovery
Monitoring	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment
Modules and components	MACH, MICE, RS2, Foundry Networks FastIron Serie, EAGLE, RS20/30, MICE20/30, OCTOPUS 16/24, LION, GigaLION, BAT54 Rail SNMP capable switches, any ICMP(Ping) capable device (PLC, decentral IO module, PCs, ...)	MACH, MICE, RS2, Foundry Networks FastIron Serie, EAGLE, RS20/30, MICE20/30, OCTOPUS 16/24, LION, GigaLION, BAT54 Rail SNMP capable switches, any ICMP(Ping) capable device (PLC, decentral IO module, PCs, ...)
Configuration		
Configuration functions	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.
Dokumentation		
Dokumentation	documentation, export of maps and lists	documentation, export of maps and lists, inventory
Scope of delivery and accessories		
Scope of delivery	printed manual (German and English) CD-ROM with multilingual product version, manual and form for licensing, additional software: Acrobat reader, HiVision	printed manual (German and English) CD-ROM with multilingual product version, manual and form for licensing additional software: HiOPC, Acrobat reader, HiVision
Product variants		
Version +N	full version - 250 nodes	full version - 500 nodes

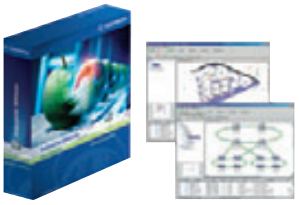
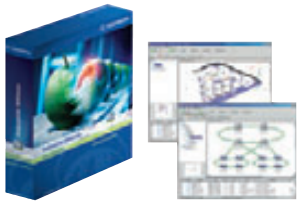
Industrial Ethernet

Network Management > Industrial HiVision

Type	Upgrade - Industrial HiVision - Operator Edition, 25 Nodes
Order No.	943 160-025
	 Network management for monitoring of industrial networks with up to 25 nodes (IP-addresses).
Product description	
License	license provides supervision of up to 25 nodes (IP-addresses). A full-license for 25 nodes is required for the upgrade.
Node extension	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.
Diagnostics	
Topology recognition	Topology recognition is based on LLDP (Link Layer Discovery Protocol, IEEE802.1AB) provided by the switches, WLAN and end device discovery
Monitoring	map-representation, device state, link and connection state (cable break, utilization), powersupply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment
Modules and components	MACH, MICE, RS2, Foundry Networks FastIron Serie, EAGLE, RS20/30, MICE20/30, OCTOPUS 16/24, LION, GigaLION, BAT54 Rail, SNMP capable switches, any ICMP(Ping) capable device (PLC, decentral IO module, PCs, ...)
Event generation	polling and SNMPv1 trap support
Alarm and event actions	alarm and event logging, including alarm actions like message window, e-mail, SMS and program start
SCADA /Prozessvisualisation (from release 3.0)	
OPC Server	Map, device and connection states as well as device propertiescould be used inside SCADA systems via the OPC Data Access 2.0/3.0 interface
ActiveX Control	Map-representations could be reused inside SCADA systems via an ActiveX control
Protocols	
Supported protocols	HiDiscovery, ICMP (Ping), SNMPv1, SNMPv2c, SNMPv3, OPC DA 2.0/3.0
Configuration	
Configuration functions	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.
Dokumentation	
Dokumentation	documentation, export of maps and lists, inventory
Language Support	
Menus und dialogs	English, French, Spanish, Chinese, Japanese, Korean, German
Manual and helptexts	English, German
Software requirements	
Operating system	Windows 2000 / XP Linux (from kernel 2.2, glibc 2.0)
Browser	Internet Explorer 4.0 or higher, Java runtime environment 1.5.0 is also installed
Hardware requirements	
Processor	x86 compatible CPU, min. 1 GHz
RAM	512 MB, 1 GB (recommended)
Hard disk space	500 MB free
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) CD-ROM with multilingual product version, manual and form for licensing additional software: Acrobat reader, HiVision
Product variants	
Version +N	upgrade version - 25 nodes

Industrial HiVision > Versions

Type	Upgrade - Operator Edition, 50 Nodes	Upgrade - Operator Edition, 100 Nodes
Order No.	943 160-050	943 160-100
		
	Network management for monitoring of industrial networks with up to 50 nodes (IP-addresses).	Network management for monitoring of industrial networks with up to 100 nodes (IP-addresses).
Product description		
License	license provides supervision of up to 50 nodes (IP-addresses). A full-license for 50 nodes is required for the upgrade.	license provides supervision of up to 100 nodes (IP-addresses). A full-license for 100 nodes is required for the upgrade.
Node extension	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.
Diagnostics		
Monitoring	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment
Configuration		
Configuration functions	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.	configuration of IP parameter and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.
Dokumentation		
Dokumentation	documentation, export of maps and lists, inventory	dokumentation, export of maps and lists, inventory
Product variants		
Version +N	upgrade version - 50 nodes	upgrade version - 100 nodes

Type	Upgrade - Operator Edition, 250 Nodes	Upgrade - Operator Edition, 500 Nodes
Order No.	943 160-250	943 160-500
		
	Network management for monitoring of industrial networks with up to 250 nodes (IP-addresses).	Network management for monitoring of industrial networks with up to 500 nodes (IP-addresses).
Product description		
License	license provides supervision of up to 250 nodes (IP-addresses). A full-license for 250 nodes is required for the upgrade.	license provides supervision of up to 500 nodes (IP-addresses). A full-license for 500 nodes is required for the upgrade.
Node extension	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.	to increase the amount of supervised nodes, licenses can be combined. Additional licenses on request.
Diagnostics		
Monitoring	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability	map-representation, device state, link and connection state (cable break, utilization), power-supply and fan state, ..., ICMP (Ping) and SNMP availability MAC/IP adress assignment
Configuration		
Configuration functions	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.	configuration of IP parameters and trap target. HiVision provides port, device and VLAN manager functionality. The prefered config tool can be configured individually for any device or device family.
Dokumentation		
Dokumentation	documentation, export of maps and lists, inventory	documentation, export of maps and lists, inventory
Product variants		
Version +N	upgrade version - 250 nodes	upgrade version - 500 nodes

Network Management > HiVision

Type	HiVision PC Based Industrial Line
Order No.	943 471-350
	
	Network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version, thereby easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	PowerMICE, MICE 20/30, RS 20/30/40, MICE, RS2, OCTOPUS M, EAGLE, BAT
Software requirements	
Operating system	Windows 2000 / 2003 Server / XP / Vista, Linux (with kernel 2.2 or higher, libc6.1)
Stand-alone / integrated HP OpenView - version	Stand-alone Windows and Linux Windows - HP OpenView 7.5
Minimum requirement for Hirschmann agents	RS20/30 release 1.1.1, MICE20/30 release 1.1.1, PowerMICE release. 1.0, Rail Switch RS2-../.. release 5.1, MICE release 2.0 MICE release 2.0, Rail Gateway RG2-1TX release 3.6.5
Browser	Internet Explorer 4.0 or higher, Java runtime environment is also installed
Supported SCADA systems	all OPC AE 1.0 clients (Alarm and Event) and OPC DA 2.0 clients (Data Access), e.g. OperateIT (ABB), PVSSII (ETM), iFix (Intellution), RS View (Rockwell), WinCC (Siemens), InTouch (Wonderware)
Hardware requirements	
Processor	x86 compatible CPU, recommended > 500 MHZ
RAM	Linux and Windows stand-alone: at least 64 MB, 128 MB (recommended) Windows - HP OpenView: at least 28 MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	full version

Industrial Ethernet

Network Management > HiVision

Type	HiVision PC Based Industrial Line-Update
Order No.	943 471-355
	
	Network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version, thereby easy integration in SCADA applicati-ons of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	PowerMICE, MICE 20/30, RS 20/30/40, MICE, RS2, OCTOPUS M, EAGLE, BAT
Software requirements	
Operating system	Windows 2000 / 2003 Server / XP / Vista, Linux (with kernel 2.2 or higher, libc6.1)
Stand-alone / integrated HP OpenView - version	Stand-alone Windows and Linux Windows - HP OpenView 7.5
Minimum requirement for Hirschmann agents	RS20/30 release 1.1.1, MICE20/30 release 1.1.1, PowerMICE release. 1.0, Rail Switch RS2-../.. release 5.1, MICE release 2.0 MICE release 2.0, Rail Gateway RG2-1TX release 3.6.5
Browser	Internet Explorer 4.0 or higher, Java runtime environment is also installed
Supported SCADA systems	all OPC AE 1.0 clients (Alarm and Event) and OPC DA 2.0 clients (Data Access), e.g. OperateIT (ABB), PVSSII (ETM), iFix (Intellution), RS View (Rockwell), WinCC (Siemens), InTouch (Wonderware)
Hardware requirements	
Processor	x86 compatible CPU, recommended > 500 MHZ
RAM	Linux and Windows stand-alone: at least 64 MB, 128 MB (recommended) Windows - HP OpenView: at least 28 MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	update

Network Management > HiVision

Type	HiVision PC Based Enterprise
Order No.	943 471-300
	
	network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version, thereby easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	MACH 4000, MACH 3000, MACH 1000, LION, PowerLION, GigaLION, SmartLION, Foundry Networks FastIron series
Software requirements	
Operating system	Windows 2000 / 2003 Server / XP / Vista, Linux (with kernel 2.2 or higher, libc6.1)
Stand-alone / integrated HP OpenView - version	Stand-alone Windows and Linux Windows - HP OpenView 7.5
Minimum requirement for Hirschmann agents	MACH 4000 release 1.1.1, MACH 3000 release 3.02
Browser	Internet Explorer 4.0 or higher, Java runtime environment is also installed
Supported SCADA systems	all OPC AE 1.0 clients (Alarm and Event) and OPC DA 2.0 clients (Data Access), e.g. OperateIT (ABB), PVSSII (ETM), iFix (Intellution), RS View (Rockwell), WinCC (Siemens), InTouch (Wonderware)
Hardware requirements	
Processor	x86 compatible CPU, recommended > 500 MHZ
RAM	Linux and Windows stand-alone: at least 64 MB, 128 MB (recommended) Windows - HP OpenView: at least 128 MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	full version

Network Management > **HiVision**

Type	HiVision PC Based Enterprise-Update
Order No.	943 471-305
	
	Network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version, thereby easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	MACH 4000, MACH 3000, MACH 1000, LION, PowerLION, GigaLION, SmartLION, Foundry Networks FastIron series
Software requirements	
Operating system	Windows 2000 / 2003 Server / XP / Vista, Linux (with kernel 2.2 or higher, libc6.1)
Stand-alone / integrated HP OpenView - version	Stand-alone Windows and Linux Windows - HP OpenView 7.5
Minimum requirement for Hirschmann agents	MACH 4000 release 1.1.1, MACH 3000 release 3.02
Browser	Internet Explorer 4.0 or higher, Java runtime environment is also installed
Supported SCADA systems	all OPC AE 1.0 clients (Alarm and Event) and OPC DA 2.0 clients (Data Access), e.g. OperateIT (ABB), PVSSII (ETM), iFix (Intellution), RS View (Rockwell), WinCC (Siemens), InTouch (Wonderware)
Hardware requirements	
Processor	x86 compatible CPU, recommended > 500 MHZ
RAM	Linux and Windows stand-alone: at least 64 MB, 128 MB (recommended) Windows - HP OpenView: at least 28 MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	update

Network Management > HiVision

Type	HiVision HPUX Industrial Line
Order No.	943 471-450
	
	network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version, thereby easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	PowerMICE, MICE 20/30, RS 20/30/40, MICE, RS2, OCTOPUS M, EAGLE, BAT
Software requirements	
Operating system	HPUX 11.11
Stand-alone / integrated HP OpenView - version	only integrated in HPUX 11.11 - HP OpenView 7.5
Minimum requirement for Hirschmann agents	RS20/30 release 1.1.1, MICE20/30 release 1.1.1, PowerMICE release. 1.0, Rail Switch RS2-../.. release 5.1, MICE release 2.0
Browser	e.g. Netscape 4.7 or higher java runtime environment on CD
Supported SCADA systems	OPC is not supported by HPUX
Hardware requirements	
Processor	HP UX workstation
RAM	at least 128MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	full version

Industrial Ethernet

Network Management > **HiVision**

Type	HiVision HPUX Industrial Line-Update
Order No.	943 471-455
	 network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version: easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	PowerMICE, MICE 20/30, RS 20/30/40, MICE, RS2, OCTOPUS M, EAGLE, BAT
Software requirements	
Operating system	HPUX 11.11
Stand-alone / integrated HP OpenView - version	only integrated in HPUX 11.11 - HP OpenView 7.5
Minimum requirement for Hirschmann agents	RS20/30 release 1.1.1, MICE20/30 release 1.1.1, PowerMICE Rel. 1.0, Rail Switch RS2-../.. release 5.1, MICE release 2.0
Browser	e.g. Netscape 4.7 or higher java runtime environment on CD
Supported SCADA systems	OPC is not supported by HPUX
Hardware requirements	
Processor	HP UX workstation
RAM	at least 128MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, HiOPC java runtime environment
Product variants	
Version +N	update

Network Management > HiVision

Type	HiVision HPUX Enterprise
Order No.	943 471-400
	
	Network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of product-specific modules. Users can build their own modules for unknown devices. additional support: ANS Competence Center value added products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON alarms and events - integrated SNMP MIB browser - easy configuration of MACH 3000 router redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address - integrated OPC Server HiControl in Windows Version: easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	MACH 4000, MACH 3000, MACH 1000, LION, PowerLION, GigaLION, SmartLION, Foundry Networks FastIron series
Software requirements	
Operating system	HPUX 11.11
Stand-alone / integrated HP OpenView - version	only integrated in HPUX 11.11 - HP OpenView 7.5
Minimum requirement for Hirschmann agents	MultiMIKE software release 1.5, FCMA software release 3.4, ETPS release 3.0, ETS 12/24 /12MM release 3.20, Advanced LAN Switch release 2.12, Gigabit LAN switch release 3.30, Gigabit routing switch release 3.2, HiWay workgroup switches FES-24TP Plus and GES-24TP/2SX release 2.0.0.2, GES-24TP Plus release 2.4.6, GES-24FX release 2.4.7.6, MACH 3000 release 3.02
Browser	e.g. Netscape 4.7 java runtime environment on CD
Supported SCADA systems	OPC is not supported by HPUX
Hardware requirements	
Processor	HP UX workstation
RAM	at least 128MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	full version

Type	HiVision HPUX Enterprise-Update
Order No.	943 471-405
	 Network management software license
Configuration	
Configuration functions	- autodiscovery of all ICMP and SNMP devices. - save devices in a devicelist - export of all tables to ASCII files - import of Product-Specific Modules. Users can build their own modules for unknown devices. additional support: Competence Center Value Added Products - multi-device-configuration: multiple configuration of devices, e.g. software update - multi-port-manager: multiple configuration of ports from different devices. - configuration of all Hirschmann components including network wide VLANs and user groups. - trap history for whole network and single devices. - satus propagation seperately configurable for device, card, port, power supplies, fans & chassis. - configuration of RMON Alarms and Events - integrated SNMP MIB Browser - easy Configuration of MACH 3000 Router Redundancy
Diagnostics	
Diagnostic functions	- monitoring of ICMP- and SNMP devices - detailled view of devices health - alarm and event protocol including definition of event-actions like messagebox, eMail, SMS or start of any program - configurable status configuration - multi-port-analyzer for network wide port diagnostic and utilization control - assignment of MAC-Address to IP-Address, to seek MAC - integrated OPC Server HiControl in Windows Version, thereby easy integration in SCADA applications of device status and the reason for status change - long-run monitoring with SNMP monitor include log function
Modules and supported components	
Modules and components	MACH 4000, MACH 3000, MACH 1000, LION, PowerLION, GigaLION, SmartLION, Foundry Networks FastIron series
Software requirements	
Operating system	HPUX 11.11
Stand-alone / integrated HP OpenView - version	only integrated in HPUX 11.11 - HP OpenView 7.5
Minimum requirement for Hirschmann agents	MACH 4000 release 1.1.1, MACH 3000 release 3.02
Browser	e.g. Netscape 4.7 or higher java runtime environment on CD
Supported SCADA systems	OPC is not supported by HPUX
Hardware requirements	
Processor	HP UX workstation
RAM	at least 128MB, 256 MB (recommended) HiVision requires approximately 50 MB free RAM. A further 200 kB of RAM are required for each detected agent. The network management unit also requires RAM for the operating system and any additional applications such as OpenView.
Hard disk space	80 MB free
Recommended resolution	1024 x 768
Network	Ethernet network with TCP/IP protocol stack
Scope of delivery and accessories	
Scope of delivery	printed manual (German and English) printed registration code for online licensing CD-ROM with multilingual product version online documentation, testversion industrial HiVision, java runtime environment
Product variants	
Version +N	update

MACH 4000 > SFP Fast-Ethernet Transceiver for media module

Type	M-FAST SFP-MM/LC	M-FAST SFP-SM/LC
Order No.	943 865-001	943 866-001
		
	SFP Fiberoptic Fast-Ethernet Transceiver	SFP Fiberoptic Fast-Ethernet Transceiver
Product description Port type and quantity	1 x 100 BASE-FX with LC connector	1 x 100 BASE-FX with LC connector
Network size - length of cable Multimode fiber (MM) 50/125 µm Single mode fiber (SM) 9/125 µm	5 km (4 km at 62,5/12,5µm)	25 km
Power requirements Operating voltage Power consumption	power supply via the switch 1 W	power supply via the switch 1 W
Service Diagnostics		optical input- and output power, transceiver temperature
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing)	0°C to +60°C -40°C to +85°C	0°C to +60°C -40°C to +85°C

Type	M-FAST SFP-SM/LC-EEC	M-FAST SFP-SM+/LC-EEC
Order No.	943-946-001	943-947-001
		
	SFP Fiberoptic Fast-Ethernet Transceiver	SFP Fiberoptic Fast-Ethernet Transceiver
Product description Port type and quantity	1 x 100 BASE-FX with LC connector	1 x 100 BASE-FX with LC connector
Network size - length of cable Multimode fiber (MM) 50/125 µm Single mode fiber (SM) 9/125 µm	25 km	25 - 65 km
Power requirements Operating voltage Power consumption	power supply via the switch 1 W	power supply via the switch 1 W
Service Diagnostics	optical input- and output power, transceiver temperature	optical input- and output power, transceiver temperature
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing)	-40 °C to +85 °C -40°C to +85°C	-40 °C to +85 °C -40°C to +85°C

MACH 4000 > SFP Fast-Ethernet Transceiver for media module

M-FAST SFP-SM+/LC	M-FAST SFP-LH/LC	M-FAST SFP-MM/LC- EEC
943 867-001	943 868-001	943-945-001
		
SFP Fiberoptic Fast-Ethernet Transceiver	SFP Fiberoptic Fast-Ethernet Transceiver	SFP Fiberoptic Fast-Ethernet Transceiver
1 x 100 BASE-FX with LC connector	1 x 100 BASE-FX with LC connector	1 x 100 BASE-FX with LC connector
25 - 65 km	40 - 100 km	5 km (4 km at 62,5/12,5µm)
power supply via the switch 1 W	power supply via the switch 1 W	power supply via the switch 1 W
optical input- and output power, transceiver temperature	optical input- and output power, transceiver temperature	
0°C to +60°C -40°C to +85°C	0°C to +60°C -40°C to +85°C	-40 °C to +85 °C -40°C to +85°C

M-FAST SFP-LH/LC-EEC
943-948-001

SFP Fiberoptic Fast-Ethernet Transceiver
1 x 100 BASE-FX with LC connector
40 - 100 km
power supply via the switch 1 W
optical input- and output power, transceiver temperature
-40 °C to +85 °C -40°C to +85°C

MACH 4000 > SFP Gigabit-Ethernet Transceiver for media module

Type	M-SFP-LX/LC
Order No.	943 015-001
	
	SFP Fiberoptic Gigabit Ethernet Transceiver for: MICE media modules, MM4-4TX/SFP and MM4-2TX/SFP, OpenRail RS30-Switches, MACH 4000, SmartLION and GigaLION.
Product description	
Port type and quantity	1 x 1000BASE-LX with LC connector
Network size - length of cable	
Twisted pair (TP)	
Multimode fiber (MM) 50/125 µm	0 - 550 m, 0 - 11 dB link budget at 1310 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km With f/o adapter in line with IEEE 802.3-2000 clause 38 (single-mode fiber offset-launch mode conditioning patch cord)
Multimode fiber (MM) 62.5/125 µm	0 - 550 m, 0 - 11 dB link budget at 1310 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km With f/o adapter in line with IEEE 802.3-2000 clause 38 (single-mode fiber offset-launch mode conditioning patch cord)
Single mode fiber (SM) 9/125 µm	0 m - 20 km, 0 - 11 dB link budget at 1310 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Single mode fiber (LH) 9/125 µm (long haul transceiver)	
Power requirements	
Operating voltage	power supply via the switch
Power consumption	1 W
Service	
Diagnostics	optical input and output power, transceiver temperature
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-40°C to +85°C
Relative humidity (non-condensing)	10% to 95%
MTBF	
Mechanical construction	
Dimensions (W x H x D)	20 mm x 18 mm x 50 mm
Mounting	SFP slot
Weight	40 g
Protection class	IP 20
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 mm, 2 Hz - 13.2 Hz, 90 min.; 0.7g, 13.2 Hz - 100 Hz, 90 min.; 3.5 mm, 3 Hz - 9 Hz, 10 cycles, 1 octave/min.; 1g, 9 Hz - 150 Hz, 10 cycles, 1 octave/min.
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m (80 - 1000 MHz)
EN 61000-4-4 fast transients (burst)	2 kV power line, 1 kV data line
EN 61000-4-5 surge voltage	power line: 2 kV (line/earth), 1 kV (line/line), 1kV data line
EN 61000-4-6 conducted immunity	3 V (10 kHz - 150 kHz), 10 V (150 kHz - 80 MHz)
EMC emitted immunity	
FCC CFR47 Part 15	FCC CFR47 Part 15 Class A
EN 55022	EN 55022 Class A
Approvals	
Safety of industrial control equipment	cUL 508 (E175531)
Hazardous locations	cUL 1604 Class 1 Div 2 (E203960)
Safety of information technology equipment	
Germanischer Lloyd	Germanischer Lloyd (43 109-02 HH)
Scope of delivery and accessories	
Scope of delivery	SFP module
Accessories to order separately	

SFP Gigabit-Ethernet Transceiver for media module > Versions

Type	M-SFP-LH/LC	M-SFP-LH+/LC
Order No.	943 042-001	943 049-001
		
	SFP Fiberoptic Gigabit Ethernet Transceiver for: MICE media modules, MM4-4TX/SFP and MM4-2TX/SFP, OpenRail RS30-Switches, MACH 4000, SmartLION and GigaLION.	SFP Fiberoptic Gigabit Ethernet Transceiver for: MICE media modules, MM4-4TX/SFP and MM4-2TX/SFP, OpenRail RS30-Switches, MACH 4002 48+4G, SmartLION and GigaLION.
Product description		
Port type and quantity	1 x 1000BASE-LX with LC connector	1 x 1000BASE-LX with LC connector
Network size - length of cable		
Single mode fiber (LH) 9/125 µm (long haul transceiver)	16 -80 km 6 - 22 dB link budget at 1550 nm A = 0.25 dB/km, 2 dB reserve, D = 19 ps/(nm x km)	44 - 120 km 13 - 32 dB link budget at 1550 nm A = 0.25 dB/km, 2 dB reserve, D = 19 ps/(nm x km)
Ambient conditions		
Operating temperature	0 °C to +60 °C	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C	-40°C to +85°C

Type	M-SFP-SX/LC	M-SFP-LX/LC EEC
Order No.	943 014-001	943 897-001
		
	SFP Fiberoptic Gigabit Ethernet Transceiver for: MICE media modules, MM4-4TX/SFP and MM4-2TX/SFP, OpenRail RS30-Switches, MACH 4000, SmartLION and GigaLION.	SFP Fiberoptic Gigabit Ethernet Transceiver, extended temperature range
Product description		
Port type and quantity	1 x 1000BASE-SX with LC connector	1 x 1000BASE-LX with LC connector
Network size - length of cable		
Multimode fiber (MM) 50/125 µm	0 - 550 m 0 - 7,5 dB link budget at 850 nm A = 3 dB/km, 3 dB reserve, B = 400 MHz x km	0 - 550 m, 0 - 11 dB link budget at 1310 nm A = 1 dB/km, 3 dB reserve, B = 800 MHz x km With f/o adapter in line with IEEE 802.3-2000 clause 38 (single-mode fiber offset-launch mode conditioning patch cord)
Multimode fiber (MM) 62.5/125 µm	0 - 275 m 0 - 7,5 dB link budget at 850 nm A = 3,2 dB/km, 3 dB reserve, B = 200 MHz x km	0 - 550 m, 0 - 11 dB link budget at 1310 nm A = 1 dB/km, 3 dB reserve, B = 500 MHz x km With f/o adapter in line with IEEE 802.3-2000 clause 38 (single-mode fiber offset-launch mode conditioning patch cord)
Single mode fiber (SM) 9/125 µm		0 m - 20 km, 0 - 11 dB link budget at 1310 nm A = 0.4 dB/km, 3 dB reserve, D = 3.5 ps/(nm x km)
Ambient conditions		
Operating temperature	0 °C to +60 °C	-40 °C to +85 °C
Storage/transport temperature	-40°C to +85°C	-40°C to +85°C

SFP Gigabit-Ethernet Transceiver for media module > Versions

Type	M-SFP-LH/LC EEC	M-SFP-SX/LC EEC
Order No.	943 898-001	943 896-001
		
	SFP Fiberoptic Gigabit Ethernet Transceiver for: MICE media modules, MM4-4TX/SFP and MM4-2TX/SFP, OpenRail RS30-Switches, MACH 4000, SmartLION and GigaLION.	SFP Fiberoptic Gigabit Ethernet Transceiver, extended temperature range
Product description		
Port type and quantity	1 x 1000BASE-LX with LC connector	1 x 1000BASE-SX with LC connector
Network size - length of cable		
Multimode fiber (MM) 50/125 µm		0 - 550 m 0 - 7,5 dB link budget at 850 nm A = 3 dB/km, 3 dB reserve, B = 400 MHz x km
Multimode fiber (MM) 62.5/125 µm		0 - 275 m 0 - 7,5 dB link budget at 850 nm A = 3,2 dB/km, 3 dB reserve, B = 200 MHz x km
Single mode fiber (LH) 9/125 µm (long haul transceiver)	16 -80 km 6 - 22 dB link budget at 1550 nm A = 0.25 dB/km, 2 dB reserve, D = 19 ps/(nm x km)	
Ambient conditions		
Operating temperature	-40 °C to +85 °C	-40 °C to +85 °C
Storage/transport temperature	-40°C to +85°C	-40°C to +85°C

Industrial Ethernet

System Accessories > **Power supply**

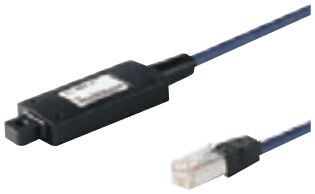
Type	RPS 30	RPS 80 EEC
Order No.	943 662-003	943 662-080
		
	24 V DC DIN rail power supply unit	24 V DC DIN rail power supply unit
More Interfaces		
Voltage input	1 terminal block, 3-pin	1 Bi-stable, quick-connect spring clamp terminals, 3-pin
Voltage output	1 terminal block, 5-pin	1 Bi-stable, quick-connect spring clamp terminals, 4-pin
Power requirements		
Operating voltage	230 V	230 V
Input data		
230 V	100 to 240 V AC; 47 to 63 Hz or 85 to 375 V DC	100-240 V AC (+/-15%); 50-60Hz or 110 to 300 V DC (-20/+25%)
Current consumption		
230 V	max. 0,35 A at 296 V AC	max. 1.8-1.0 A at 100-240 V AC max. 0.85 - 0.3 A at 110 - 300 V DC
Activation current	< 36 A at 240 V AC and cold start	< 13 A at 230 V AC
Output data		
Output voltage	24 V DC (-0,5%, +0,5%)	24 - 28 V DC (typ. 24.1 V) external adjustable
Output current		
230 V	1,3 A at 100 - 240 V AC	3,4-3,0 A continuous min 5,0-4,5 A for typ. 4 sec
Service		
Diagnostics	LED (power, DC ON)	LED (DC OK, Overload)
Redundancy		
Redundancy functions	Power supply units can be connected in parallel	Power supply units can be connected in parallel
Ambient conditions		
Operating temperature	-10 °C to +70 °C (from 60 °C derating)	-25 °C to +70 °C (ab 60 °C Derating)
Storage/transport temperature	-25 °C to +85 °C	-40 °C to +85 °C
Relative humidity (non-condensing)	max. 95% without condensation	5 to 95 %
MTBF	74.2 years; Siemensnorm SN 29500 : 40 °C	-
Mechanical construction		
Dimensions (W x H x D)	45 mm x 75 mm x 98 mm	32 mm x 124 mm x 102 mm
Mounting	DIN Rail 35 mm	DIN Rail 35 mm
Weight	230 g	440 g
Protection class	IP 20	IP 20
EMC interference immunity		
EN 50082-1	EN 61000-6-2 (includes EN 55024)	EN 61000-6-1
EN 50082-2	EN 61000-6-2 (includes EN 55024)	EN 61000-6-2 (includes EN 55024)
EMC emitted immunity		
EN 50081-1	EN 50081-1	EN 61000-3-2, 61000-3-3, 61000-6-3, 61000-6-4
EN 50081-2	EN 50081-2	
Approvals		
Safety of industrial control equipment	cUL 508 (E 198865)	cUL 508 (E 198865)
Safety of information technology equipment	cUL 60950 (E 137006)	cUL 60950 (E 137006)
Hazardous locations	UL 1604 Class 1 Div. 2 (E246877)	UL 1604 Class 1 Div. 2 (E246877)
Scope of delivery and accessories		
Scope of delivery	Rail power supply, Description and operating manual	Rail power supply, Description and operating manual

System Accessories > **Power supply**

Type	RPS 120 EEC	RPS60/48V EEC
Order No.	943 662-120	943 952-001
		
	24 V DC DIN rail power supply unit	48 V DC rail power supply unit
More Interfaces		
Voltage input	1 Bi-stable, quick-connect spring clamp terminals, 3-pin	1 Federkraft-Klemmblock, 4-polig
Voltage output	1 Bi-stable, quick-connect spring clamp terminals, 6-pin	1 Federkraft-Klemmblock, 4-polig
Power requirements		
Operating voltage	230 V	230 V
Input data		
230 V	100-240 V AC (-15/+10%); 50-60Hz or 110 to 300 V DC (+/-20%)	100 to 240 V AC; 50-60Hz or 85 to 264 V AC; 47-63Hz (DC 100 to 375V)
Current consumption		
230 V	max. 1,4-0,65 A at 100-240 V AC max. 1,2 - 0,45 A bei 120 - 300 V DC	Max. 0.7 A at 230 V max. 1.3 A at 100V
Activation current	< 15 A at 100 and 230 V AC	< 40 A at 264 V AC
Output data		
Output voltage	24-28 V DC (typ. 24,1 V); externally adjustable	47-52 V DC (typ. 48 V); externally adjustable
Output current		
230 V	min. 5 - 4,5 A continuous 7,5 - 6,7 A for typ. 4 sec	1,25 A static at 48 V nominal 1,88 A (150% of nominal load) for max. 2,5 seconds
Service		
Diagnostics	LED (DC OK, Overload)	LED (green)
Redundancy		
Redundancy functions	Power supply units can be connected in parallel	
Ambient conditions		
Operating temperature	-25 °C to +70 °C (ab 60 °C Derating)	-20 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-25 °C to +85 °C
Relative humidity (non-condensing)	5 to 95 %	max. 95 % without condensation
MTBF	-	
Mechanical construction		
Dimensions (W x H x D)	40 mm x 124 mm x 117 mm	44,8 mm x 75 mm x 104,5 mm
Mounting	DIN Rail 35 mm	DIN Rail 35 mm
Weight	620 g	245 g
Protection class	IP 20	IP 20
EMC interference immunity		
EN 50082-1	EN 61000-6-1	EN 61000-6-1
EN 50082-2	EN 61000-6-2 (includes EN 55024)	EN 61000-6-2
EMC emitted immunity		
EN 50081-1	EN 61000-3-2, 61000-3-3, 61000-6-3, 61000-6-4	61000-6-3, 61000-6-4, EN 55011, EN 55022 class A
EN 50081-2	-	hormonic input current, fulfills EN 61000-3-2
Approvals		
Safety of industrial control equipment	cUL 508 (E 198865)	UL 508
Safety of information technology equipment	cUL 60950 (E 137006)	cUL 60950
Hazardous locations	UL 1604 Class 1 Div. 2 (E246877)	Ex nA II T4 X
Scope of delivery and accessories		
Scope of delivery	Rail power supply, Description and operating manual	Rail power supply, ferrit with safety key, Description and operating manual

RPS90/48V LV	RPS90/48V HV
943 980-001	943 979-001
	
48 V DC rail power supply unit	48 V DC rail power supply unit
1 terminal block, 2-pin 1 terminal block, 4-pin	1 terminal block, 3-pin 1 terminal block, 4-pin
24 V DC	60 / 120 / 250 V DC (48-320 V) und 110 / 230 V AC
N/A	100-240 V AC; 50-60 Hz oder 85 bis 264 V AC; 47-63 Hz (DC 100-375 V)
24 V DC (4,2 A), 48 V DC (2,1 A) N/A	60 V DC (1.7 A), 250 V DC (0.4 A), 110 V AC (1.0 A), 230 V AC (0.5 A) N/A
48 - 54 V DC (typ. 48 V); externally adjustable	48 - 54 V DC (typ. 48 V); externally adjustable
1.25 A static at 48 V nominal 1.88 A (150% of nominal load) for max. 2.5 seconds	1.25 A static at 48 V nominal 1.88 A (150% of nominal load) for max. 2.5 seconds
LED (green)	LED (green)
redundant power supply	redundant power supply
-40 °C bis +70 °C -40 °C bis +85 °C max. 95 % without condensation N/A	-40 °C bis +70 °C -40 °C bis +85 °C max. 95 % without condensation N/A
60 mm x 137 mm x 115 mm DIN Rail 770 g IP 30	60 mm x 137 mm x 115 mm DIN Rail 740 g IP 20
EN 61000-6-1 EN 61000-6-2 (beinhaltet EN 55024), EN 61850-3, IEEE 1613, EN 50121-4, 50121-3-2, GL	EN 61000-6-1 EN 61000-6-2 (beinhaltet EN 55024), EN 61850-3, IEEE 1613, EN 50121-4, 50121-3-2, GL
61000-6-3 61000-6-4, EN 55011, EN 55022 Klasse A, GL, Netzrückwirkungen gemäß EN 61000-3-2	61000-6-3 61000-6-4, EN 55011, EN 55022 Klasse A, GL, Netzrückwirkungen gemäß EN 61000-3-2
cUL 508 (in Vorbereitung) cUL 60950 (in Vorbereitung) Ex nA II T4 X (in Vorbereitung)	cUL 508 (in Vorbereitung) cUL 60950 (in Vorbereitung)
Rail Power Supply, Description and operating manual, 1 x terminal block, 2-pin, 1 x terminal block, 4-pin	Rail Power Supply, Description and operating manual, 1 x terminal block, 3-pin, 1 x terminal block, 4-pin

System Accessories > Adapter cable

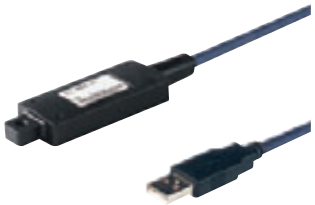
Type	ACA11
Order No.	943 751-001
	
	Auto-configuration adapter saves the configuration data of the connected switch. It enables managed switched to be easily comissioned and quickly replaced.
More Interfaces	
To the RS232 interface on the switch	RJ11 connector
To the RS232 interface on the PC or notebook	n/a
To the USB interface on the switch	n/a
Power requirements	
Operating voltage	via the RS232 interface on the switch
Service	
Diagnostics	writing to ACA, reading from ACA, writing/reading not OK; (display using LEDs on the switch)
Configuration	via the RS232 interface of the switch and via SNMP/Web
Ambient conditions	
Operating temperature	0 °C to +60 °C
Storage/transport temperature	-25 °C to +70 °C
Relative humidity (non-condensing)	10% to 95%
MTBF	370.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction	
Dimensions (W x H x D)	90 mm x 27 mm x 12 mm
Mounting	plug-in module
Weight	35 g
Protection class	IP 40
Cable length	31.5 cm
Mechanical stability	
IEC 60068-2-27 shock	15 g, 11 ms duration, 18 shocks
IEC 60068-2-6 vibration	1 g, 10 Hz - 150 Hz, 30 cycles
EMC interference immunity	
EN 61000-4-2 electrostatic discharge (ESD)	6 kV contact discharge, 8 kV air discharge
EN 61000-4-3 electromagnetic field	10 V/m
EMC emitted immunity	
EN 55022	EN 55022
Approvals	
Safety of industrial control equipment	cUL 508
Hazardous locations	cUL 1604 Class 1 Div 2
Germanischer Lloyd	Germanischer Lloyd (43 109-02 HH)
Employment in vehicles	n/a
Electronic mechanisms on rail-mounted vehicles	n/a
Scope of delivery and accessories	
Scope of delivery	device, operating manual

Adapter cable > Versions

Type	ACA11-EEC	ACA11-miniDIN EEC
Order No.	943 751-002	943 973-001
		
	Auto-configuration adapter with extended temperature range saves the configuration data of the connected switch. It enables managed switched to be easily comissioned and quickly replaced.	Auto-configuration adapter with extended temperature range saves the configuration data of the connected switch. It enables managed switched to be easily comissioned and quickly replaced.
More Interfaces		
To the RS232 interface on the switch	RJ11 connector	RJ11 connector
To the RS232 interface on the PC or notebook	n/a	n/a
To the USB interface on the switch	n/a	n/a
Power requirements		
Operating voltage	via the RS232 interface on the switch	via the RS232 interface on the switch
Service		
Configuration	via the RS232 interface of the switch and via SNMP/Web	via the RS232 interface of the switch and via SNMP/Web
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-40 °C to +85 °C
MTBF	370.9 years; MIL-HDBK 217F: Gb 25 °C	370.9 years; MIL-HDBK 217F: Gb 25 °C
Mechanical construction		
Weight	35 g	35 g
Protection class	IP 40	IP 40
Cable length	31.5 cm	31.5 cm
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2	cUL 1604 Class 1 Div 2
Germanischer Lloyd	Germanischer Lloyd (43 109-02 HH)	Germanischer Lloyd (43 109-02 HH)
Employment in vehicles	n/a	n/a
Electronic mechanisms on rail-mounted vehicles	n/a	n/a

Type	ACA11-M12 (EEC)	ACA21-USB
Order No.	943 972-001	943 271-001
		
	Auto-configuration adapter, with M12 connection, saves two different versions of configuration data and operating software from the connected switch. It enables managed switched to be easily comissioned and quickly replaced.	Auto-configuration adapter, with USB connection, saves two different versions of configuration data and operating software from the connected switch. It enables managed switched to be easily comissioned and quickly replaced.
More Interfaces		
To the RS232 interface on the switch	n/a	USB connection
To the RS232 interface on the PC or notebook	n/a	n/a
To the USB interface on the switch	M12 connection	USB connector
Power requirements		
Operating voltage	via the USB interface on the switch	via the USB interface on the switch
Service		
Configuration	via USB interface of the switch and via SNMP/Web	via USB interface of the switch and via SNMP/Web
Ambient conditions		
Operating temperature	-40 °C to +70 °C	0 °C to +60 °C
Storage/transport temperature	-40 °C to +85 °C	-25 °C to +70 °C
MTBF	359 years (MIL-HDBK-217F)	359 years (MIL-HDBK-217F)
Mechanical construction		
Weight	25 g	25 g
Protection class	IP 67	IP 20
Cable length	50 cm	20 cm
Approvals		
Hazardous locations	cUL 1604 Class1 Div 2	cUL 1604 Class 1 Div 2
Germanischer Lloyd	Germanischer Lloyd in preparation	Germanischer Lloyd
Employment in vehicles	E1 in preparation	n/a
Electronic mechanisms on rail-mounted vehicles	EN 50155 in preparation	n/a

Adapter cable > Versions

Type	ACA21-USB EEC	ACA21-M12
Order No.	943 271-002	943 913-001
		
	Auto-configuration adapter, with USB connection and extended temperature range, saves two different versions of configuration data and operating software from the connected switch. It enables managed switched to be easily comissioned and quickly replaced.	Auto-configuration adapter, with M12 connection, saves two different versions of configuration data and operating software from the connected switch. It enables managed switched to be easily comissioned and quickly replaced.
More Interfaces		
To the RS232 interface on the switch	USB connection	n/a
To the RS232 interface on the PC or notebook	n/a	n/a
To the USB interface on the switch	USB connector	M12 connection
Power requirements		
Operating voltage	via the USB interface on the switch	via the USB interface on the switch
Service		
Configuration	via USB interface of the switch and via SNMP/Web	via USB interface of the switch and via SNMP/Web
Ambient conditions		
Operating temperature	-40 °C to +70 °C	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C	-40 °C to +85 °C
MTBF	359 years (MIL-HDBK-217F)	359 years (MIL-HDBK-217F)
Mechanical construction		
Weight	25 g	25 g
Protection class	IP 20	IP 67
Cable length	20 cm	50 cm
Approvals		
Hazardous locations	cUL 1604 Class 1 Div 2	cUL 1604 Class1 Div 2
Germanischer Lloyd	Germanischer Lloyd	Germanischer Lloyd in preparation
Employment in vehicles	n/a	E1 in preparation
Electronic mechanisms on rail-mounted vehicles	n/a	EN 50155 in preparation

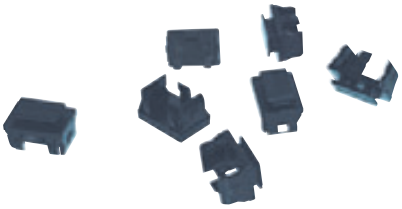
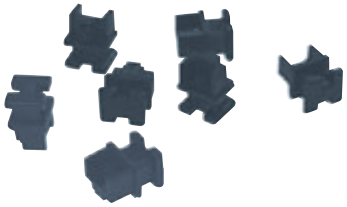
Type	ACA21-M12 EEC
Order No.	943 913-002
	
	Auto-configuration adapter, with M12 connection and extended temperature range, saves two different versions of configuration data and operating software from the connected switch. It enables managed switched to be easily comissioned and quickly replaced.
More Interfaces	
To the USB interface on the switch	M12 connection
Power requirements	
Operating voltage	via the USB interface on the switch
Service	
Configuration	via USB interface of the switch and via SNMP/Web
Ambient conditions	
Operating temperature	-40 °C to +70 °C
Storage/transport temperature	-40 °C to +85 °C
MTBF	359 years (MIL-HDBK-217F)
Mechanical construction	
Weight	25 g
Protection class	IP 67
Cable length	50 cm
Approvals	
Hazardous locations	cUL 1604 Class1 Div 2
Germanischer Lloyd	Germanischer Lloyd in preparation
Employment in vehicles	E1 in preparation
Electronic mechanisms on rail-mounted vehicles	EN 50155 in preparation

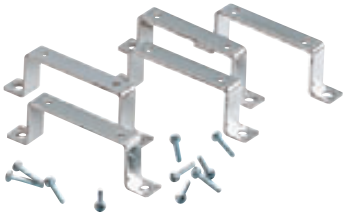
Type	Terminal Cable	Modem-Cable
Order No.	943 301-001	943 222-001
		
	Terminal cable for configuring managed rails, MICE and MACH switches via the RS232 interface of the switch in connection with terminal software.	Cable for connecting an analog-/ ISDN-modem to an Eagle system.
More Interfaces To the RS232 interface on the switch To the RS232 interface on the PC or notebook To the USB interface on the switch	 RJ11 connector Sub-D connector, 9-pin	 RJ11 connector Sub-D connector, 9-pin
Power requirements Operating voltage		
Service Diagnostics Configuration	 dialog window on the PC or notebook	
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing) MTBF	 0 °C to +60 °C -20 °C to +80 °C 10% to 95%	 0 °C to +60 °C -20 °C to +80 °C 10% to 95%
Mechanical construction Dimensions (W x H x D) Mounting Weight Protection class Cable length	 210 g 500 cm	 210 g 500 cm
Mechanical stability IEC 60068-2-27 shock IEC 60068-2-6 vibration		
EMC interference immunity EN 61000-4-2 electrostatic discharge (ESD) EN 61000-4-3 electromagnetic field		
EMC emitted immunity EN 55022		
Approvals Hazardous locations Germanischer Lloyd Safety of information technology equipment Safety of industrial control equipment		
Scope of delivery and accessories Scope of delivery	 cable	 Cable

System Accessories > **Adapter cable**

Type	OCTOPUS Terminal Cable	OCTOPUS M12-MiniPower Adaptor
Order No.	943 902-001	943 944-001
	 Terminal cable for configuring managed OCTOPUS switches via the RS232 interface of the switch in connection with terminal software.	
More Interfaces To the RS232 interface on the switch To the RS232 interface on the PC or notebook To the USB interface on the switch	 M12 A Coding 4-pin connector Sub-D connector, 9-pin	
Power requirements Operating voltage		
Service Diagnostics Configuration	 dialog window on the PC or notebook	
Ambient conditions Operating temperature Storage/transport temperature Relative humidity (non-condensing) MTBF	 0 °C to +60 °C -20 °C to +80 °C 10% to 95%	
Mechanical construction Dimensions (W x H x D) Mounting Weight Protection class Cable length	 130 g 2 m	 45 g 50 cm
Mechanical stability IEC 60068-2-27 shock IEC 60068-2-6 vibration		
EMC interference immunity EN 61000-4-2 electrostatic discharge (ESD) EN 61000-4-3 electromagnetic field		
EMC emitted immunity EN 55022		
Approvals Hazardous locations Germanischer Lloyd Safety of information technology equipment Safety of industrial control equipment		
Scope of delivery and accessories Scope of delivery	 cable	

System Accessories > **Mounting accessories**

Type	SFP Dust-Cover (25 pcs.)	RJ45 Dust-Cover (50 pcs.)
Order No.	943 942-001	943 936-001
	 SFP Dust-Cover	 RJ45 Dust-Cover
Mechanical construction		
Dimensions (W x H x D)	n/a	n/a
Mounting	n/a	n/a
Weight	n/a	n/a
Scope of delivery and accessories		
Scope of delivery	n/a	n/a

Type	Wall Mounting Device for Mini Transc.	19 Zoll DIN Rail Adapter.
Order No.	943 426-001	943 766-002
	 Wall mounting device for fastening the mini transceiver to the wall or cabinet	 Installation rack for 19" cabinet, 8 units wide and 4 units high
Mechanical construction		
Dimensions (W x H x D)	72 mm x 10 mm x 21 mm	481 mm (usable 435 mm) x 177 mm x 275 mm DIN Rail variable in height and depth adjustable (increment 10 mm)
Mounting	wall or cabinet	19" rack or cabinet
Weight	100 g	3 kg
Scope of delivery and accessories		
Scope of delivery	5 mounting device, each with 2 screws	19" Installation rack

Get to know the ropes more easily.

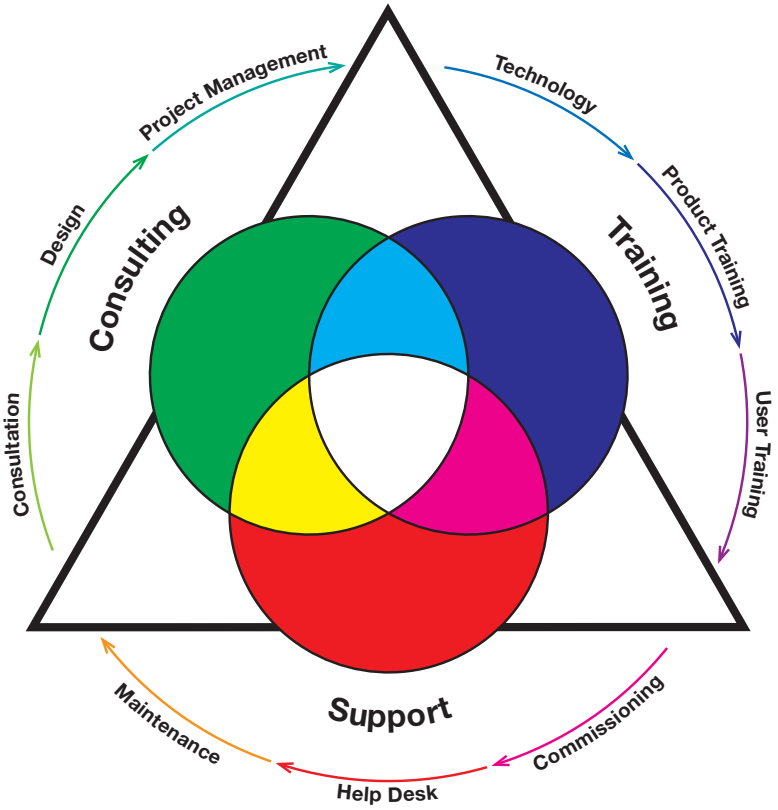
Hirschmann™ Competence Center: understanding technology is technology controlled.

Hirschmann™ demonstrates the advantages of long-term partnership: from the first consultancy, training and support – that is our individual service to our customers. And that is not by accident, since we have been known for innovative, practice-oriented and future-proof industrial solutions for over 75 years. However, good is not good enough: from the first consultancy discussion up to the last scheduled maintenance, we would like to do our best for you. You have our word on that and that of our partner companies in over 30 countries around the globe – 24 hours a day.

From planning consultancy to concrete network project planning, Hirschmann™ Consulting offers you exactly as much service as you want. Together with full technical documentation. During training, highly experienced network specialists pass on their knowledge to you: an explanation of the technology, product training and user training with certification – here you and your employees have everything. Finally, our highly dedicated support team takes over the task of keeping your network up-to-date in a technically optimum manner with commissioning, stand-by service and comprehensive maintenance concepts. So that you can concentrate on the essentials: the success of your company.

Our Competence Center offers you everything under one roof. One of our almost 100 Hirschmann™ Service and Logistics partners is located near you.

www.hicomcenter.com



Tailored All-Round Service

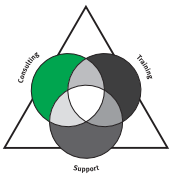
Comprehensive and Individual

Adopt a cost-effective complete solution for your nertwork. Along with its well-known product range, Hirschmann™ offers a comprehensive portfolio of services, and not just for Hirschmann™ products. Whether consulting, training or support – in the Hirschmann™ Competence Center you will receive service to suit your needs from a single source. Irrespective of the technology you use.

Our experts will support you from network design to the optimisation of all aspect of daily operation. The latest expertise, an international service network, and rapid access to external specialists guarantee you the best possible support. Secure your individual service package now!

What We Can Do for You – and How

	Your Optimal Network Solution	Know-How for Reliable Operation of Your Network	Protection Against Downtimes	Lasting Cost Control
Consulting Page 208	● Individual consultation, design, project management ● Network design and migration concepts ● Compatibility testing ● On-site wireless site survey	● Training plans ● Documentation ● Maintenance concepts ● Security concepts (Network Security)	● Integration of redundancy ● Spare parts store concept ● Emergency concepts	● Service planning ● Complete costing
Training Page 214	● Technology and product training courses for network designers ● Introduction courses for decision makers	● Individual user training courses ● Security Training ● Workshops	● Qualification / certification of your employees and external service providers	● Update training for technologies and products
Support Page 224	● Pre-configuration and pre-assembly of systems ● On-site commissioning ● Application tests	● Network monitoring and support by in-house experts or partners ● Network Security Audit ● Network Baselining	● 24 x 7 Support hotline ● On-site support ● Remote service ● Replacement hardware service	● Warranty extension ● Individual, product-related service packages



Consultation

Which network technology is the best for your applications? Which transmission media and products?

We will support you during system evaluation and technology selection, prepare migration concepts, and provide advice on the use of suitable management tools. Here the starting point is an analysis of your existing network.

The first step to the best solution

► The key issues

Functionality, availability and future-proofing are the yardsticks of every network. The design of the network structure is just as crucial here as the performance of the components selected - and their compatibility with the end devices used.

Comprehensive know-how is necessary to ensure an individual, optimised, homogeneous solution. Consultation that is really tailored to the needs of the user requires more than just an overview of technological and manufacturer limitations. Anyone who wants to define the way forward for the future must also have sound knowledge of the specific sector.

► Which advantages you should exploit

As a leading manufacturer, Hirschmann™ will provide you all resources from a single source: the latest specialist expertise, extensive experience in a very wide range of demanding industrial applications, and professional simulation and measuring systems, for an accurate analysis of compatibility and requirements.

Our experts will of course guarantee to provide you independent advice. The key aspect of all technological and product recommendations is therefore not the manufacturer, but simply their suitability for your network. It is our undertaking to develop the best possible solution for you. And we keep to this promise.

► What we do for you

Analysis of the existing situation and system assessment

- Analysis of the existing network structure and data traffic
- On-site or remote measurements
- Testing and evaluation of communication paths

Preparation of an optimal concept for the solution and technology

- Determination of requirements for migrations and procurement
- Definition of the redundancy requirements
- Product recommendations for network management and components (independent of manufacturer)
- Market research and recommendations for applications/peripherals
- Compatibility and comparison tests in the Hirschmann™ test laboratory
- Preparation of invitations for tenders and statements of work
- Cost analysis

Network security

- Determination of specific potential hazards
- Development of security concepts with firewalls and VPNs
- System auditing in accordance with BSI standard*

* BSI: Bundesamt für Sicherheit in der Informationstechnik (German Federal Office for Information Security)

► Hirschmann™ is active on your behalf here:

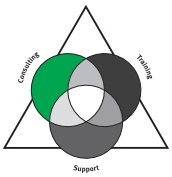
- BGNW
- EPSG
- IEC
- IEEE
- ODVA
- PNO
- VDE
- ZVEI
- As well as numerous manufacturer-independent organisations

CONSULTING

The success of a network design is a reflection of the competence of the designers. Whether designing from scratch or optimising: Hirschmann's™ know-how will guarantee that you always receive the best advice.

Our experts will ensure that the end result really meets your expectations. Through the provision of customised services, we are with you from the initial consultation to the final system.

Please download our complete Services Program catalogue from our web site **www.hirschmann.com**



Design

The correct configuration of a network or the optimisation of an existing network is more than a question of technology. We will therefore prepare you individual concepts for employee training and system maintenance, in addition to the actual network design.

In this way at an early stage you will receive a complete picture of all the necessary actions – and therefore also the real costs.

Complete concepts for new and existing networks

The key issues

The implementation of specific requirements in an equally specific network plan is a calculation with a large number of variables. How powerful and fault-tolerant must the network be? How flexible? And, if a network already exists: how can the current infrastructure and the existing components be optimally incorporated?

Crucial for the final design, whether cable-based or wireless, is not only its reliability today, but also its security of investment for tomorrow. Only a really well thought-out overall concept will ensure that the final network will accommodate both.

Which advantages you should exploit

The Hirschmann™ network planners will design a custom system solution that includes exactly the equipment and redundancy functions you need. In this way your network will be cost-effective from the start – and will remain so. Planning requires not only extensive practical experience, but also the very latest technological know-how.

Hirschmann™, as a manufacturer and a designer, is responsible for the functionality of your newly developed or optimised network solution. And for reliable operation you will receive an individual maintenance and service concept that will provide you with protection from downtime due to incorrect operation or technical faults.

What we do for you

Network design

- Planning of new networks exactly in accordance with the objectives
- Comparison of possible alternatives (independent of manufacturer)
- Selection of the active and passive components
- Selection of the ideal management tools
- Proof of concept testing

Wireless LANs

- Wireless site survey
- Definition of the antenna positions
- Selection of the optimal antenna types
- Cost analysis

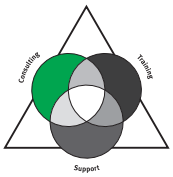
Migration

- Updating and expansion of existing networks
- Optimisation recommendations
- Preparation of migration concepts

Maintenance and service

- Preparation of a tailored, cost-effect maintenance concept (hardware warranty, supply of spare parts, network monitoring, help desk)
- Planning of the on-site spare parts stock
- Preparation of training plans for all relevant employees

Wireless Site Survey



The key issues

A corporate network must be reliable, predictable, and secure under all circumstances. The purpose of a site survey is to reduce the unpredictability associated with wireless networking. What is the optimum number of access points? Where should the access points be placed? Where are the potential sources of interference? What data throughput and reliability can be achieved? These questions are only a fraction of the parameters which must be considered.

But most important of all, how secure is the network? Signals leaking outside the building and incorrectly implemented security mechanisms can spell disaster for your network and your business.

Which advantages you should exploit

With decades of experience in industrial networking, Hirschmann™ is now focussing its expertise on the challenge of implementing wireless networks in hostile environments. As a manufacturer, our technicians have the latest technological knowledge, and are equipped with high-end professional survey tools.

But regardless of which manufacturer's equipment you intend to deploy, we will design a wireless network which is cost-effective, meets your business requirements, accommodates your unique environmental conditions, connects seamlessly to any existing network, and conforms to national regulations. An investment in a reliable wireless future.

Design

Although deploying wireless Ethernet in an industrial environment has some advantages over a traditional cabled network, there are additional factors which must be considered to ensure a successful implementation.

A wireless Ethernet network requires all the planning of a traditional network, plus a lot more. The first step to successful wireless deployment is a wireless site survey.

RF Range and Coverage

- Detect existing WLAN equipment
- Determine Access Point placement
- Recommend channel selection
- Measure signal strength, distance, and Signal to Noise Ratio
- Verify and eliminate obstacle-induced signal loss
- Select the correct antennas

Bandwidth Availability

- Establish data rate boundaries
- Verify data throughput
- Design load balancing
- Evaluate Client capacity

Topologies

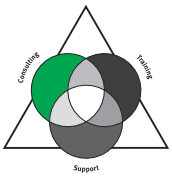
- Determine the suitability of Infrastructure or Ad-hoc mode
- Assess wireless bridging possibilities
- Verify Client Roaming
- Design redundancy methods

Security recommendations

- Propose encryption techniques
- Indicate authentication methods

Documentation

- Describe methodology
- Provide site diagrams with hardware placement, RF coverage, and data throughput
- Suggest hardware configuration



CONSULTING

The number of hacking and intrusion incidents on corporate networks is increasing every year. Whether through commercial espionage or purely malicious intent, disruption of the network and end devices, or theft of information, could have disastrous consequences for your company.

As modern networks become increasingly complex, with multiple connections to other networks, the number of vulnerabilities escalates. So how can you be certain that your network is secure?

Penetration tests: How vulnerable is your network?

The key issues

Believing is not the same as knowing. Even if you feel that your network is protected by a high level of security, it is better to know for sure. The best way is to have an emergency simulated by independent testers.

Penetration testing is a controlled network attack, with the objective of assessing a network's exploitable vulnerabilities and risks from an external hacker's perspective. Armed with information provided by this external security audit, a Network Administrator can take the necessary precautions to prevent network penetration before it is too late.

Which advantages you should exploit

Our expert "Ethical Hackers" can check whether and how your network is vulnerable. We do not rely solely on standard tools and port scanners. For in-depth testing, experienced personnel employ manual tests and self-developed tools, according to the desired level of testing. Because in reality you must defend yourself against attackers whose skill and determination can vary greatly. Unlike in the movies, hacking takes time. A one-day Penetration Test can discover if your network is safe from a casual hacker. To verify that your network is protected against determined commercial espionage takes longer. This is why we customise our Penetration Tests to fit your specific requirements.

What we do for you

Test duration

- Minimum duration: 1 day
- Customised duration depending on complexity of network and depth of testing

Notification

- Warning in advance
- No notification

Pre-test Shared Information

- Zero Knowledge Test
- White Box test

Aggressiveness

- Pure Penetration Tests
- Optional Denial of Service attacks

Attack Methods

- Standard tools
- Scripts
- Customised tools
- Self-developed tools
- Manual attack

Unrecognised attacks: Intrusion Detection System Evasion

External IP Addresses

- One IP address
- Multiple IP addresses
- DNS, Name Server Lookup (Nslookup), Newsgroups, Google, etc

Documentation

- Executive Summary (non-technical)
- Detailed report
- Secure delivery of all documentation

Post-test Actions

- Presentation – "Results and Way Forward"
- Post-rectification retesting

The confidence of professional implementation

The key issues

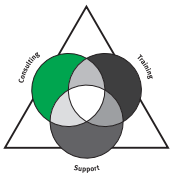
On the way to the optimal network solution, completion of the network plan is half the battle. However, just as important is the second half: professional project management that ensures the end result adheres exactly to the original design.

The implementation not only needs to be efficient and fast, but most importantly must not unnecessarily interfere with other business processes. The downtimes must be kept to a minimum during the modification or expansion of existing networks. Here careful planning is required.

Which advantages you should exploit

Hirschmann's™ decades of experience setting up networks optimised to specific sectors inspires the highest levels of confidence. As a manufacturer we ensure that your network provides all required functionality when complete. And as a project manager we offer you the necessary capacity for reliable implementation, on time.

This range of products and services from a single source saves you both time and costs. From the first meeting to the final acceptance of your network, you have only one point of contact: Hirschmann™. The same will also apply, if you wish, to commissioning and beyond.



Project Management

You can also count on specialist support from Hirschmann during the realisation of your network. Whether specific contributions to project design and co-ordination, with tests and technical documentation – or with the assumption of overall responsibility.

We will be there to help you. So that you can concentrate on your day-today business.

What we do for you

Logistics

- Preparation of a performance specification and schedule
- Pilot or test installations
- Material planning
- Project co-ordination

Project implementation and monitoring

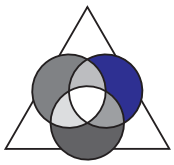
- Specialist control and support with special project planning tools
- Project execution as prime contractor
- Quality assurance
- Implementation/monitoring of commissioning

Acceptance

- Physical network
- System acceptance tests
- Complete network
- Network security

Documentation

- Description of the active and passive components
- Depiction of the physical and logical network structure



TRAINING

Training at Hirschmann™: practical seminars and workshops led by experienced specialists who have been trained in adult education.

Exploit the advantage of being able to access comprehensive, up to date expertise- in our public training courses or in a specific individual training course. On-site and in the language of your choice.

Specialist Know-how from a Single Source

► The Key Issues

In view of the new standards that continue to emerge, and ever-shorter development cycles, up to date expertise in the network technology area is more valuable than ever. However, it is not necessary for every person involved in the process of planning and commercially assessing a modern corporate network to understand every detail. Decision expertise, for instance, requires different knowledge compared with the specialist know-how of the experts.

A really good training program is therefore tailored to its users: with content to suit the target group. Content that conveys the necessary knowledge in a skilful, compact, and particular manner. From trainers, who have mastered the most modern training techniques.

► Which Advantages You Should Exploit

Whichever topics in the Hirschmann™ network technology training program interest you, you are certain to find them presented in an appropriate manner. As an introduction for new staff, as an indepth technology training, or as a workgroup with focussed practical exercises.

To address specific gaps in expertise or to train employees for your own network environment, our specialists offer individual training on-site or in one of the Hirschmann™ training centers. And so that your customers are also aware of your abilities, internationally recognized certifications from Hirschmann™ make your competence visible in the Industrial Ethernet market.

► What we do for you

Technology Training

- Introduction courses for beginners, sales personnel, and decision makers
- Technology training courses for network users and experts (product-indpendent)
- Security training courses
- Workshops for network users, administrators, and experts
- Certification training

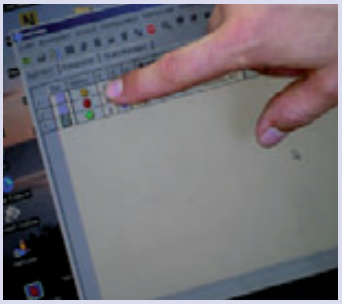
Product Training

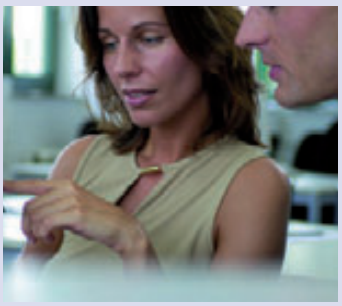
- Hirschmann™ network components in theory and practice
- Introduction courses for beginners, sales personnel, and decision makers
- Product training courses for network users and experts
- Workshops for network users, administrators, and experts
- Certification training

Customised Training

- Please tell us your specific requirements

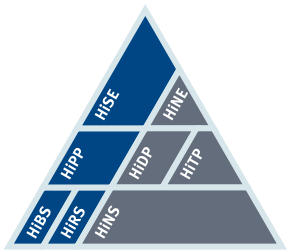
Ask us for the current training program!



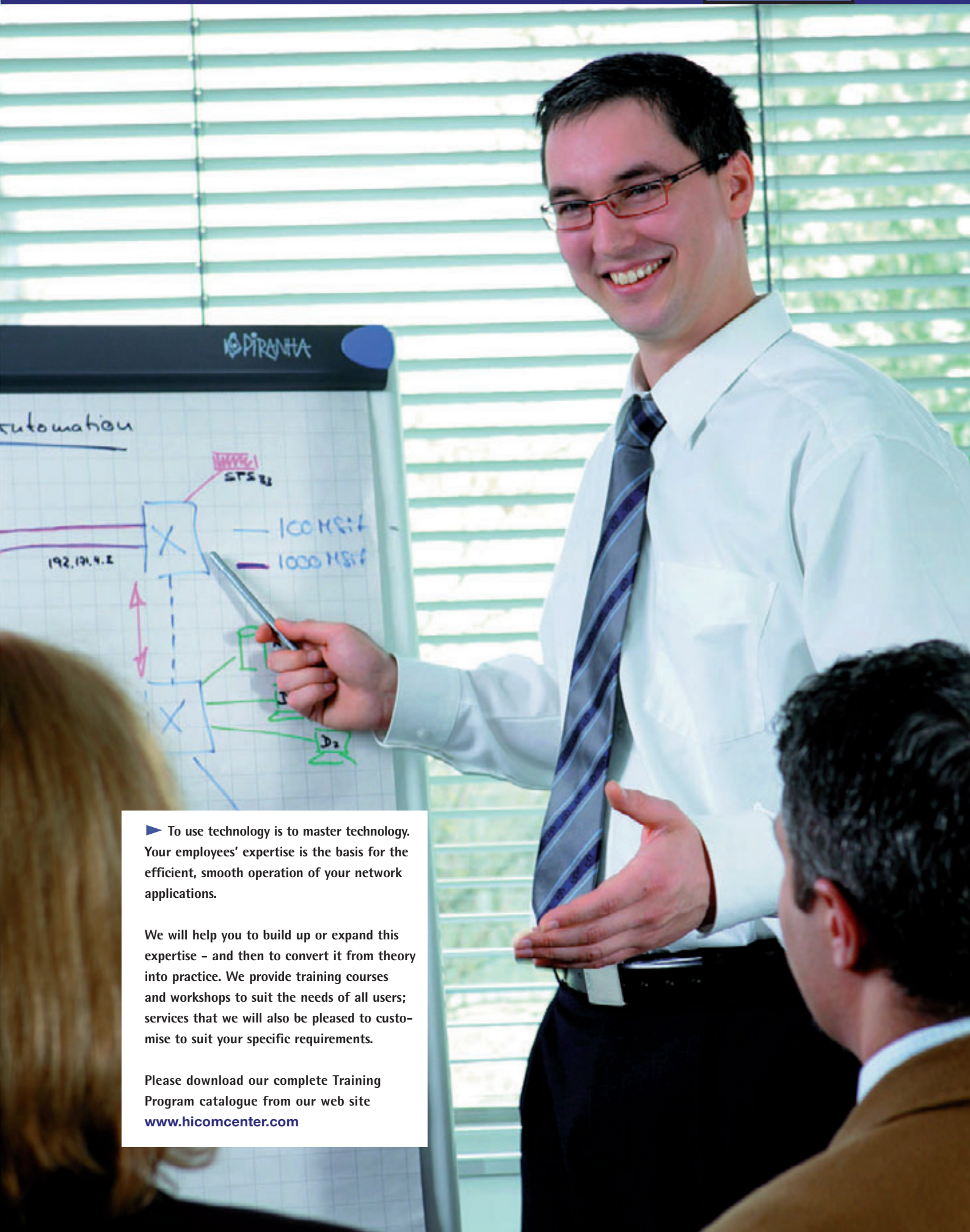


► Certification from Hirschmann™– Your Proof of Competence

- Visible technology and product expertise
- Three qualification levels for network designers and support staff



TRAINING



► To use technology is to master technology. Your employees' expertise is the basis for the efficient, smooth operation of your network applications.

We will help you to build up or expand this expertise – and then to convert it from theory into practice. We provide training courses and workshops to suit the needs of all users; services that we will also be pleased to customise to suit your specific requirements.

Please download our complete Training Program catalogue from our web site **www.hicomcenter.com**

PRODUCT TRAINING

The extensive range of Hirschmann switches enables a broad spectrum of applications for both large and small networks. Despite the simple installation procedure, these devices require expert selection, commissioning, and supervision, so that resilient functionality can be achieved under even the most extreme of industrial conditions.

Product Training Rail Family - Theory and Practice

► Target Group

System Engineers, Network Designers, and Support Technicians.

► Prerequisites

A basic understanding of Ethernet, for example "Industrial Networking I – the technical fundamentals" (CB1) is required.

If available, the participant should bring a laptop with Ethernet connection and an operating system CD. Administrator rights are required.

► Objectives

In a professional environment the participants receive in-depth knowledge about the OpenRail, MACH, and OCTOPUS Layer 2 functionality. This includes installation, commissioning, and supervision.

Following this one day course, the participants can make effective use of Industrial HiVision to supervise any size of Ethernet network.

Languages

CP1e English
CP1f French
CP1d German
CP1n Dutch
CP1p Portuguese
CP1s Spanish

Duration

2 Days
09:00 - 16:00

Price

1,100 Euro ex. VAT

Schedule / Location

See
www.hicomcenter.com

► Seminar Content

Introduction

- Overview of Hirschmann™ products
- The Platform Concept

Device Properties

- Form factor
- Temperature ranges
- Power supplies
- Certifications

Basic Settings

- Firmware management
- Configuration management

Switching

- Port configuration
- Multicast control
- VLANs

Redundancy

- HIPER Ring
- Rapid Spanning Tree
- Link Aggregation

RSR

Diagnostics

- Port Mirroring
- Device status
- Event log

Security

- Port Security
- Authentication

Advanced

- DHCP Relay
- Command Line Interface

Network Management with Industrial HiVision

Target Group

System Engineers, Network Designers, Network Administrators, and Support Technicians.

Prerequisites

Basic knowledge of Ethernet is required, ideally together with product experience from the "Rail Family" (CP1) and/or "Industrial Backbone" (CP3) courses.

If available, the participant should bring a laptop with Ethernet connection and an operating system CD. Administrator rights are required.

Objectives

The participants learn the functions of Industrial HiVision, and reinforce this knowledge with practical exercises.

Following this one day course, the participants can make effective use of Industrial HiVision to supervise any size of Ethernet network.

PRODUCT TRAINING

Industrial networks need to be monitored more effectively than office networks, because they are subjected to a higher level of stress from environmental conditions and temperature fluctuations. Network management systems such as Industrial HiVision are essential today.

In this situation it is most important to check the status of the end devices and network components whilst they are still operating, and to rectify faults before system failures occur.

Seminar Content

Introduction

- Structure of Industrial HiVision
- Remote GUI
- ActiveX control

Installation

- Basic configuration
- File structure
- Demo Ring
- Licensing

Network Supervision

- Device appearance and supervision
- Object properties
- Status configuration
- Folder structure

Network Topology

- Topology discovery
- Topology display

Integrated OPC Server

- OPC DA

Event Forwarding

- Popup window
- Email
- SMS
- External applications

Logging

Languages

CP2e English
CP2f French
CP2d German
CP2n Dutch
CP2p Portuguese
CP2s Spanish

Duration

1 Day
9:00 – 16:00

Price

600 € ex. VAT.

Schedule / Location

See
www.hicomcenter.com

PRODUCT TRAINING

The modular high performance Ethernet switches from the MACH and PowerMICE families are designed specifically for industrial applications: for installation in a control room, or as an office/plant floor gateway.

Although Industrial Ethernet is essentially the same as that used in the office environment, the demands are greater, particularly in the area of network resilience. The correct choice of device, together with a high level of technical competence, is therefore an important prerequisite.

Industrial Backbone Components: Theory and Practice

Target Group

System Engineers, Network Designers, and Support Technicians.

Prerequisites

A basic understanding of Ethernet and routing is required, for example "Industrial Networking II" (CB2). Product knowledge from the "Rail Family" (CP1) course is also recommended.

If available, the participant should bring a laptop with Ethernet connection and an operating system CD. Administrator rights are required.

Objectives

In a professional environment the participants receive in-depth knowledge about the MACH and PowerMICE Layer 3 functionality. This includes installation, commissioning, and supervision.

The training is part theory and part practice. The necessary knowledge about functions and deployment possibilities of the products are taught in individual theory blocks. Each block is followed by practical exercises, designed to familiarise the participants with the devices through first hand experience.

Languages

CP3e English
CP3f French
CP3d German
CP3n Dutch
CP3p Portuguese
CP3s Spanish

Duration

2 Days
9:00 – 16:00

Price

1,100 € ex. VAT.

Schedule / Location

See
www.hicomcenter.com

Seminar Content

Hardware Overview

- MACH4000
- PowerMICE

Firmware Segmentation Overview

- Layer 3 Enhanced
- Layer 3 Professional

Router Interfaces

- Port based
- VLAN based

Multicast Routing

- DVMRP
- PIM-DM

Unicast Routing

- Static routing
- RIP
- OSPF
- VRRP

Access Control Lists

- Filer rules
- Queue assignment

Your Individual Training Program

Target Group

Network users from all areas: Designers, Engineers, Technicians, Machine Operators, as well as management level decision makers.

Prerequisites

None: the training contents are customised to the specific knowledge requirements of the participants.

Objectives

Hirschmann's™ customised training offers you a multitude of benefits. Our experienced trainers can recognise and fill all your employees' knowledge gaps. This ensures maximum efficiency - and guarantees you an immediate return on your training investment.

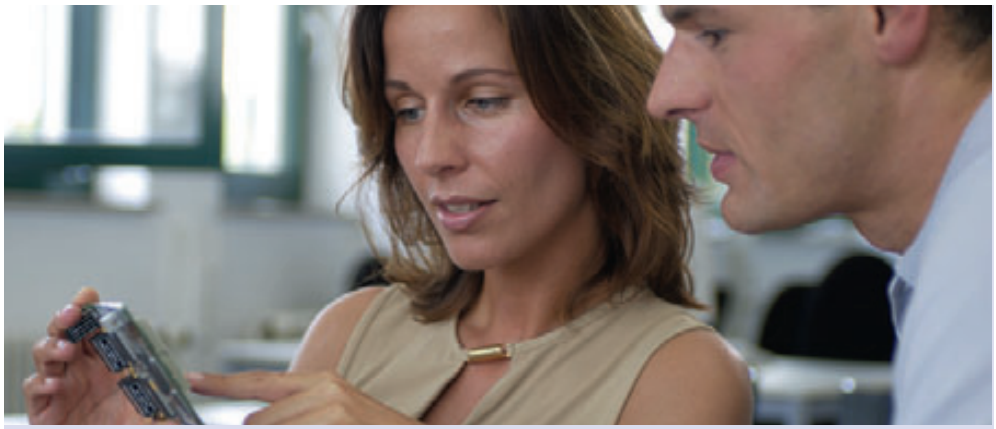
The Hirschmann™ Competence Center will be pleased to prepare an individual training program for you.

CUSTOMISED TRAINING

Would you like employees to be trained on your own network? Or maybe fill certain knowledge gaps?

The solution is customised training: either at the Hirschmann™ Training Centres, or on your own premises.

Tailored service, as you would expect from a real partner.



Seminar Content

Applications
Baselining
Commissioning
Ethernet Fundamentals
Fault Finding
Maintenance
Migration
Network Auditing
Network Management
Network Restructuring
Product Features
Protocols
Redundancy
Routing
Security
Standards
Wireless
etc.

Tell us your exact requirements!

Languages

- English
- German
- Other languages on request

Duration

As required

Price

On request

Schedule / Location

By individual arrangement.

Support Telephone:
+49-7127-14-1527

Info Service online:
www.hicomcenter.com

Das Hirschmann™ Trainingsprogramm

Technology in Detail

Industrial Networking I (CB1)*
2 Days
Industrial Networking II (CB2)*
2 Days
Network Design for Industrial Ethernet (CD)*
1 Day

Technology Workshop

Wireless LAN (WSWL)
2 Days

Products in Detail

Rail Family: Theory and Practice (CP1)*
2 Days
Network Management with Industrial HiVision (CP2)*
1 Day
Backbone Devices: Theory and Practice (DP3) *
2 Days
Network Security with EAGLE (WSS)
2 Days
WLAN Workshop with BAT54 Rail (WSB)
2 Days
Advanced Workshop with BAT54 Rail (WSWA)
1 Day
Update Rail / Backbone / HiVision (CPU) *
2 Days

Customised Training

Tell us your exact requirements.

- Training for your unique network environment
- Training targeted at knowledge gaps
- On-site training

* Recommended for certification

Course explanation

Introduction Courses
These courses are aimed specifically at sales personnel, people new to the topic, and anyone who must make a decisions about deploying a particular technology or product range. If you need information presented concisely, without delving into technical detail, these are the right courses for you.

Technology in Detail
These courses are designed for people who need in-depth knowledge about a technical subject, who need to extend their existing competence, or who need to fill knowledge gaps. The courses are product-independent, and expertise gained during these seminars can be applied to networks from any manufacturer.

Products in Detail
These courses are recommended for anyone who must design, commission, operate, or supervise a network containing Hirschmann™ products. Information is presented in detail, with a balance between product information and practical work.

Workshops
Our workshops are designed around the "Learning by Doing" principle. Formal presentations are kept to a minimum, and the participants are encouraged to gain experience by interacting with the products and technology.

Not sure if you or your employees need to attend a training course? Take an examination before registering. The results will highlight your strengths and weaknesses. At your request, we can design a customised training course based on the results, allowing you to focus your training resources exactly where they are required.

Registration

Hirschmann™ Automation and Control GmbH
F.A.O. Mr. Nils Bücker
Stuttgarter Strasse 45-51
D-72654 Neckartenzlingen
DEUTSCHLAND

Fax + 49-7127-14-1551

Hirschmann™ Competence Center
Service Telephone: **+49-7127-14-1527**
Info Service online: **www.hicomcenter.com**

Yes, I am interested in the Hirschmann™ training program

I would like to register for the following training courses:

Course abbreviation (e.g. **CB1)** Language (e.g. **e**)

Subject

Training date(s)

Training location

Price (excluding VAT)

Sender:

Name

Company

Position, Department

Street, Number

Post / Zip Code, City, Country

Telephone

Email

Date, Signature

I would like to know more about Hirschmann™ training:

☐ Please send me the training schedule.

☐ Please regularly send me the "InfoTrain" email newsletter, including special offers and other events.

☐ Please send me your "Mastering Industrial Ethernet-Training and Certification" brochure.

☐ Please contact us. We are interested in a customised training course on the subject of:

Please note:

- Your registration, by fax or post, must be received by the Hirschmann™ Competence Center no less than 14 days prior to the training date. You will receive a registration confirmation.
- Please complete a speparate registration form for each participant and training course.
- Subject to the General Trading Regulations for Hirschmann™ Training

CERTIFICATION

With a range of made-to measure certifications, Hirschmann™ offers network experts the opportunity to make their expertise visible to everyone. Show your employer, your customers, and your competitors, that you have mastered all the important technologies and products!

"For me personally the HiSE certification has great value, because it proves my understanding of Ethernet technology. For my employer it is good advertising and an excellent sales argument, and our customers feel confident doing business with us. So everyone benefits from this challenging certification."

Frank Rappold,
RW-electronic GbR, Neu-Ulm

The Hirschmann™ Certification Scheme

Unique Proof of Competence

Why a Certification?

The best form of protection against expensive downtime in a modern industrial network is the assurance of on-site specialists and external service providers qualified to quickly rectify faults, or to prevent them ever happening. Not every self-proclaimed "Expert" is up to the task.

A certification from Hirschmann™ is confirmation of genuine, up to the minute expertise.

Who can become certified?

Knowledge is in the heads of individuals. This is why we always certify people, and never companies. The Hirschmann™ certification exams are open to everyone.

Certification is especially recommend for network designers and administrators, who as employees or external sevice providers are responsible for the availability of industrial networks.

Which exams are required?

With the exception of the Engineer level, each certification requires the candidate to sit a multiple choice examination. These can be taken either on-line, or at a Hirschmann™ Competence Center location.

As the three qualification levels build upon each other, an Engineer must already have the corresponding Professional certification, and the Professional the relevant Specialist certification.

What types of certification are possible?

The Hirschmann™ Certification Scheme is divided into two distinct areas: general technology expertise, and specific product expertise, Three qualification levels are available.

The "Specialist" certificate proves solid basic knowledge, the "Professional" a deeper understaning, and the "Engineer" comprehensive expertise in the respective field. A complete overview is shown on the next page.

Do I have to attend the training courses?

No. The Hirschmann™ training program includes several seminars which are recommended as part of your preparation for specific exams (these can be recognised by the certification logo). However, attending a training course is not a prerequsite for taking an exam. The reverse is also true.

Knowledge acquistion and proof of knowledge are independent of each other. You only need to attend training if you do not already have the knowledge.

Do you want to know more?

Yo can find the exact qualification requirements, together with the prerequisites for each individual certification, in our „Mastering Industrial Ethernet" brochure. Request a copy now, or download it from: **www.hicomcenter.com**

CERTIFICATION

Certified Product Expertise

HiRS

Hirschmann Industrial Rail Specialist
For the Layer 2 functionality of Hirschman™ switches.

HiBS

Hirschmann Industrial Backbone Specialist
For the Layer 3 functionality of Hirschmann™ backbone products.

HiPP

Hirschmann Industrial Product Professional
For the Hirschmann™ network management platform Industrial HiVision.

HiSE

Hirschmann Industrial Systems Engineer
For comprehensive design and support of Industrial Ethernet applications containing Hirschmann™ products.

Certified Technology Expertise

HiNS

Hirschmann Industrial Network Specialist
For the operation and administration of switched networks, including fault management.

HiTP

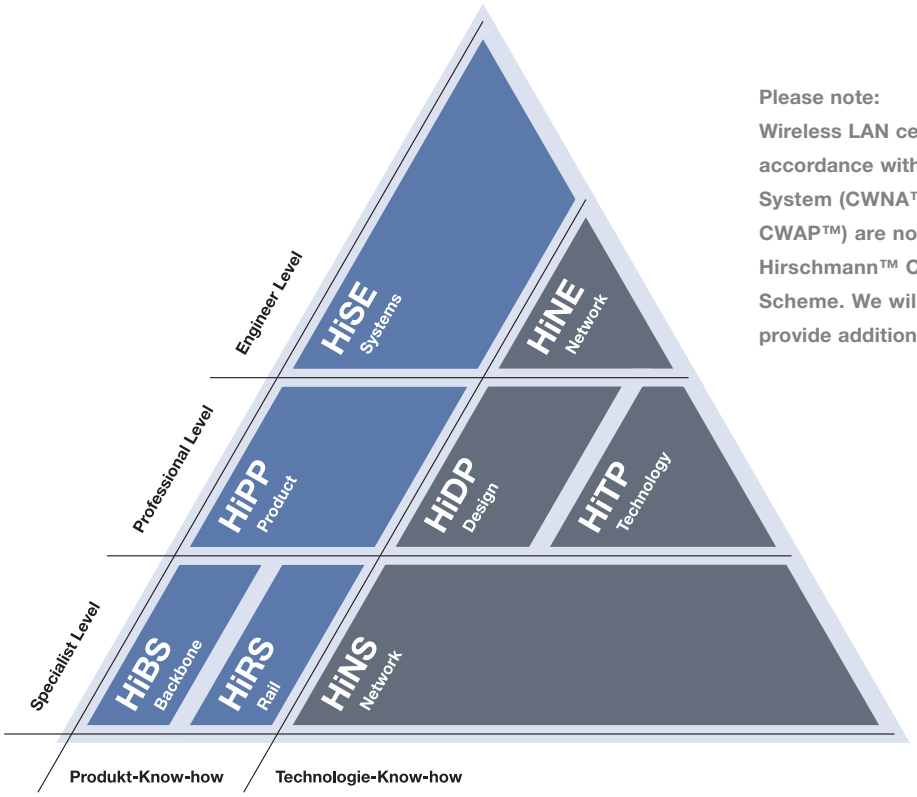
Hirschmann Industrial Technology Professional
For the operation and administration of routed, mission-critical networks including fault management and fieldbus transport.

HiDP

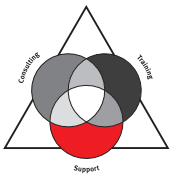
Hirschmann Industrial Design Professional
For the design and implementation of industrial networks, from cabling, through performance, to security.

HiNE

Hirschmann Industrial Network Engineer
For comprehensive support of complex networks: from design and implementation through to commissioning and maintenance.



Please note:
Wireless LAN certifications in accordance with the CWNP™ System (CWNA™, CWSP™, CWAP™) are not part of the Hirschmann™ Certification Scheme. We will be happy to provide additional information.



COMMISSIONING

The first step is generally the most difficult, but also the most important. When commissioning a network, everything should be done correctly, from professional quality preparation, to the final acceptance tests. The best way to avoid delays and their consequential expense is to exclude all possible sources of error right from the start.

The Hirschmann™ Support Team is available at any time to install and configure your network. Or select a Hirschmann™ Service Partner in your area. If you are supported by product experts, the first step becomes child's play.

Installation and configuration to suit your needs

The key issues

Efficient commissioning of a network requires not only the correct choice of components, but also expert knowledge from the installers. Regardless of whether you rely on specially trained staff or an outside expert, you cannot afford to compromise with the operation and resilience of an application. Only first-class installation and configuration will guarantee you faultless operation from day one.

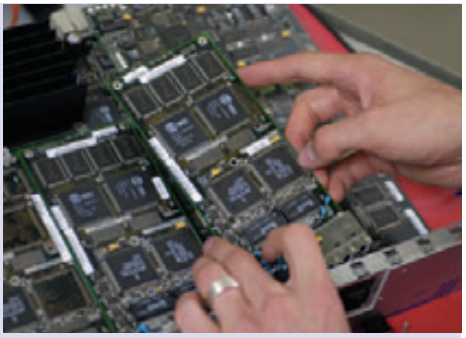
It is particularly important to avoid damage to components due to incorrect installation (e. g. ESD problems), as these will invalidate the warranty.

Which advantages you should exploit

Hirschmann™ offers you exactly the amount of expertise that you want. Our experienced experts will train your employees in their own environment, using your components - and then actively participate in the installation.

Or we can supply all components pre-assembled and configured to your requirements, meaning that your employees are not required to master configuration, programming, or network management applications themselves. This not only saves time, but also provides you with additional security. Each pre-assembled system is subjected to a thorough functionality test, eliminating faults and incompatibilities.

What we do for you



The Hirschmann™ Start Package

- Commissioning and startup phase under expert guidance
- Employee training in their own environment
- Customised support during on-site installation and configuration

Installation

- Complete assembly by the Hirschmann™ support team
- Pre-assembly of modular systems (e.g. MACH) under manufacturer conditions
- Avoidance of ESD damage
- Burn-in test on request
- Final system test including documentation

Configuration

- Implementation of IP addressing scheme
- Router configuration
- Configuration of multicast control
- VLAN configuration
- "Plug and Play" total solutions through pre-configuration of systems
- Implementation and activation of security functions
- Final system test
- Device configurations saved on a central server

Programming

- Product Specific Modules for HiVision
- Product Specific Tag databases for HiOPC

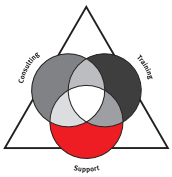
More expertise for your employees?

We offer customised technology and product training.

SUPPORT

Time is money. A lot of money, when a network is down. That's why our internal and external support specialists make sure that from day one your system is functioning perfectly – and stays that way. Through long term technical advice and if necessary, through short term troubleshooting. And if something must happen fast, our support desk is there for you. Up to 24 hours a day.

Please download our complete Services Program catalogue from our web site **www.hicomcenter.com**



HELP DESK

To bring your network back into operation with the minimum of delay, contact our skilled specialists at the Hirschmann™ support centre.

Here you can get the necessary telephone and email support, and can request replacement components - subject to contract - around the clock.

The Hirschmann™ Telephone Support Desk

The key issues

If during a failure you require immediate expert help, every minute counts. A network which must be operational 24 hours a day should ideally be covered by a trained specialist 24 hours a day.

However, no matter how valuable a reliable support service is, it must also be affordable. The use of external specialists can quickly pay for itself. A clear support quotation makes it simple to compare risks and costs. Especially if the required services are tailored exactly to your requirements.

Which advantages you should exploit

With the Hirschmann™ support desk you are on the safe side – in every respect. From the classic support desk to the 24x7 on-call service around the clock, you will receive exactly the support that you want. With competent support from our experts and with guaranteed reaction times.

You also benefit from complete control of your costs. Whether you opt to use our Ticket System, or take out an annual contract, you only pay the agreed flat rate. And in return we will deliver a solution to your problem - even if it requires comprehensive tests and detailed analysis. One call is enough.

The Hirschmann™ support levels

Hirschmann™ Support Desk:
Telephone +49 1805 14 1538
hac--support@hirschmann.de
(workdays 7.00 am –7.00 pm)

Your question or problem report
1st level support:
Product information and rectification of simple technical problems

Forwarding, if necessary
2nd level support:
Complex technical problem solutions including analysis and fault simulation

Forwarding, if necessary
3rd level support:
Exceptional problem solutions including simulation, measurements and programming

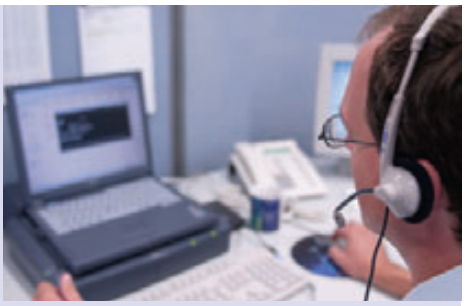
What we do for you

Support Desk Tickets

- Help desk support by telephone or e-mail
- Rapid, competent problem resolution via the Hirschmann support desk
- Where necessary, automatic forwarding to 2nd or 3rd level support
- Flat rate billing: 1st level support = 1 point, 2nd or 3rd level support = 4 points
- Low cost ticket packages
- No charge for hardware failures during warranty period and for technical questions
- Support hours: workdays 7.00 am – 7.00 pm

Extended Support

- Telephone support outside standard support hours
- Support availability according to your requirements
- Ideal safeguard during planned network changes

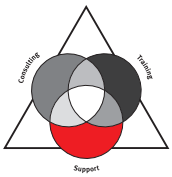


- Direct access to 2nd level support

24x7 Support

- Round the clock telephone support
- 365 days a year
- Highest level of support for mission critical networks
- Low cost annual flat rate

Support On Demand and In Demand



HELP DESK

The key issues

Not every network problem can be rectified internally – even with the aid of a support desk. For this reason it is good to know that external specialists can be rapidly on hand if necessary, to rectify elusive or complex malfunctions.

It is of course even better to avoid errors in the first place. This is true not only for faulty components, but also for possible configuration errors, as well as incompatibilities between different systems.

Which advantages you should exploit

Hirschmann™ offers you the best of both worlds: our own specialist, flexible support team, complemented by Hirschmann™ Sales Partners in your area. One call to our help desk is enough. Within hours a specialist with wide ranging, manufacturer-independent expertise will be on-site. Or within minutes on-line: providing fault diagnostics and rectification via our remote access service.

Of course, if required our experts will provide you with support over a longer period, or even permanently on-site. Which means that your network is in the best hands, delivering the performance you expect.

With the Hirschmann™ support desk you have access to a complete international service network. Our highly qualified employees and partners offer you comprehensive on-site support whenever you need it. As trouble-shooters or as external network support staff.

What we do for you

Trouble-Shooting

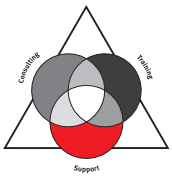
- Fault finding
- Hardware testing
- Network analysis
- Service report with complete documentation
- Provision of high-quality measuring equipment

Remote-Service

- Dial-in using secure ISDN or Internet connection
- Remote diagnosis of failures
- Remote configuration of manageable systems: IP addresses, SNMP, VLANs etc.
- Software updates
- Regular remote monitoring

Analysis and optimisation of the network performance

- Measurements at the physical layer
- Evaluation of protocol traces
- Weak spot analysis
- Structural and expansion recommendations
- Long-term on-site support by specialists
- Testing of the security implementation
- Tracing possible reductions in network performance caused by incorrectly applied security rules
- Worst case simulation



MAINTENANCE

The fastest solution for replacement hardware

Around one third of all network failures are due to faulty hardware components. Even if hardware redundancy mechanisms are deployed, the availability of replacement parts at any time is one of the most important considerations.

Avoid unnecessary downtimes: with the Hirschmann™ hardware replacement service. In an emergency, the rapid advance hardware replacement will save you time, costs, and nerves.

The key issues

The top priority during a hardware failure is continued network operation. Redundancy and a well-equipped spare parts stock on-site can form a first line of defence. But then the issue is to restore the initial "safety net" situation as quickly as possible.

In most cases it is not possible to wait until a device is sent for repair and returned, or replaced with a new component. Only if a replacement is delivered immediately can the risk of extended redundancy operation or a shortage of spare parts be avoided. A risk that you should not take – and do not need to take.

Which advantages you should exploit

The Hirschmann™ hardware replacement service provides you with optimal security. One call and the required hardware is on its way to you, even before you send your faulty component to our service centre.

This means you can restore your spare parts stock or return to normal operation within hours. Timely response is ensured by guaranteed delivery times, which can be defined individually for each component. You do not incur any unnecessary costs. On the contrary: a tailored spare parts support contract helps you limit your stockholding to the bare minimum.

A service that pays for itself:

Only a small annual fee is payable for the replacement hardware service. The fee is calculated as a percentage of the hardware price. In the case of a failure the delivery costs are included in this fee.

What we do for you

Same Day Device

- Guaranteed advance delivery of replacement hardware within a maximum of 8 hours
- Immediate shipment by courier (work days 8.00 am – 6.00 pm)
- Available for all components

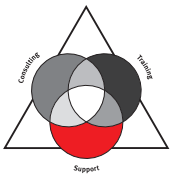
Next Business Day Service

- Guaranteed advance delivery of replacement hardware by the following working day
- Available for all components

Advance Hardware Replacement

- Advance delivery of replacement hardware
- Usual delivery time: 3 working days
- Available for all components

Guarantee “for life”



MAINTENANCE

The key issues

Network planning also involves cost planning. But how do you calculate the risk of a hardware failure after the 24 month guarantee has expired? How do you calculate the possible costs of repairs or replacement hardware? The best way is not even to try.

Anybody who demands clearly defined costs from the start does not need to worry about surprises later. An individually extended manufacturer's guarantee makes this a reality. And if in this way the total costs become not only calculable, but also affordable, so much the better.

Which advantages you should exploit

With the HiComCenter guarantee Hirschmann™ offers you extremely low-cost protection for all components. For a small additional charge based on the hardware price, you will receive a full five year guarantee on every product in the Industrial Ethernet, workgroup switch, MACH and FiberINTERFACES ranges.

As an alternative, during the first 24 months following purchase you have the option to extend the guarantee for your components by one, two or three years. We can offer you this service at a very reasonable price thanks to the high quality of Hirschmann™ products. Simply ask us!

On average the lifecycle of a network is five years. Take advantage of a full hardware guarantee for this entire period. Hirschmann™ offers you two attractive options for extending the warranty of your components beyond the statutory period.

What we do for you

5 year HiComCenter Warranty

- Full guarantee coverage beyond the statutory 2 year period
- Clearly defined long-tem costs for only a small additional charge
- Available for all new hardware

Warranty Extension

- Flexible extension of the guarantee period by 1 to 3 years
- Low cost annual fee
- Available for all hardware up until the expiry of the statutory 2 year guarantee

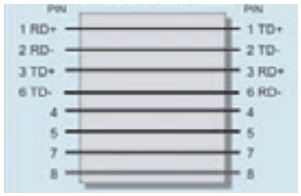
High certainty, low price:

100 % defined costs for up to 5 years will only cost you a few additional percent on the hardware price. Either as a one-off payment during purchase or later as an annual fee.

Industrial Ethernet Lexikon

1:1 wire cable

1:1 wire cables or straight-through cables are required for connecting Ethernet components over copper cable. In general 1:1 wire cables are required for connections between terminal devices such as SPS, HMI, etc. and network components such as hubs, switches, etc. The pin allocation for RJ45 plugs in 1:1 cables is as follows:



3DES

See DES.

10Base-2

Standard for data transmission of 10 Mbit/s Ethernet on thin coaxial cables (thin wire, cheapernet). Segment length max. 185 m.

10Base-5

Standard for data transmission of 10 Mbit/s Ethernet on coaxial cables (thick wire, yellow cable). Segment length max. 500 m.

10BASE-FL

Standard for data transmission of 10 Mbit/s Ethernet on fiber optic cables. Each connection is created with 2 fibers, in each case, one fiber for "Transmit Data" and another one for "Receive Data".

10BASE-T

Standard for data transmission of 10 Mbit/s Ethernet on unshielded twisted pair cables (category 3, 4 or 5). Each connection is created with 2 wire pairs, in each case with one wire pair for "Transmit Data" and another one for "Receive Data".

100BASE-FX

Standard for data transmission of 100 Mbit/s Ethernet on fiber optic cables. Each connection is created with 2 fibers, in each case, one fiber for "Transmit Data" and another one for "Receive Data".

100BASE-TX

Standard for data transmission of 100 Mbit/s Ethernet on twisted pair cables (category 5). Each connection is created with 2 wire pairs, in each case with one wire pair for "Transmit Data" and another one for "Receive Data".

1000BASE-LX

Standard for data transmission of 1000 Mbit/s Ethernet on fiber optic cables for a wavelength of 1300 nm. Each connection is created with 2 fibers, in each case, one fiber for "Transmit Data" and another one for "Receive Data".

1000BASE-SX

Standard for data transmission of 1000 Mbit/s Ethernet on fiber optic cables for a wavelength of 850 nm. Each connection is created with 2 fibers, in each case, one fiber for "Transmit Data" and another one for "Receive Data".

1000BASE-TX

Standard for data transmission of 1000 Mbit/s Ethernet on twisted pair cables (category 5e). Each connection is created with 4 wire pairs, in each case with all 4 pairs being used for "Transmit Data" and "Receive Data" simultaneously.

AC

Access **C**lient.
Radio based communication unit, which must announce itself at the Access Point (AP). Only after successful authentication, the access client can send data to the network or receive and/or request data from the network. (Wireless LAN).

ACK

Acknowledge.
A name for a positive acknowledgment of receipt. The ACK is a part of the communication protocols and responsible for the acknowledgment of receipt of the transmission.

ADSL

Asymmetric Digital Subscriber Line.
Interface to Wide Area Network.

AES

Advanced **E**ncryption **S**tandard.
Encryption standard with 128-, 192- and 256-Bit-keys. This symmetrical encryption standard was developed to replace the earlier DES standard.

Aging

Process for the updating of data, especially of address tables. An address is marked as "old" after the expiry of the certain period of time and the it is deleted at the time of the next pass if it is not detected at a port once again.

AP

Access **P**oint.
In wireless networks the access point is the bridge to the wired networks. It can be attached directly to ethernet, token ring or atm. The access point is connected with all nodes "access clients" and takes over the central functions like roaming or security. (Wireless LAN).

API

Application Programming Interface.

ARP

Address **R**esolution **P**rotocol.
A protocol that asks for the relevant MAC address on the basis of an IP address. Each device manages its own dynamic ARP table. If the MAC address of a participant to whom a message is to be sent is not present in the table, the device first sends an ARP request. This message is read by all stations. The device whose IP address is contained in the request sends an ARP reply with its MAC address. The participant making the request completes his ARP table with this MAC address and is then able to transmit the message.

ARS

Automatic **R**ate **S**election.
Independent choice of transmission rate by the Access Point (AP) as a function of the connecting quality (distance).

AUI

Attachment **U**nit **I**nterface.
Designation of an Ethernet interface with a 15-pole Sub-D plug connector.

Autocrossing

A function that enables automatic crossing of transmission and reception lines on twisted pair interfaces. Switches that support this function can be connected to each other over a 1:1 wire cable instead of a crossover cable.

Autonegotiation

A protocol in Fast Ethernet with which the participant devices agree a common transmission mode before the actual data transmission (100 Mbit/s or 10 Mbit/s, full duplex or half duplex).

Autopolarity

A function of devices with 10BASE-T or 100BASETX interface for automatic correction of wiring errors in twisted pair cables that lead to a polarity reversal of the data signals.

Autosensing

A function that enables a device to automatically detect the data rate (10 Mbit/s or 100 Mbit/s) and to transmit and receive at this data rate.

Auto MDI/MDI-X

See Autocrossing.

Backpressure

A function that simulates a collision in half duplex operation by generating a jam signal.

Bandbreiten-Längen-Produkt

A characteristic size for fiber optic cables. The bandwidth length product is a factor that decides the maximum length of multimode fibers.

BFOC

Bayonet **F**iber **O**ptic **C**onnector.
A widely used plug connector for fiber optic cables with bayonet locking. It is also called ST plug. The only plug connector that is standardized in Ethernet with a transmission speed of 10 Mbit/s. ST is a registered trademark of AT and T

BGNW

The BGNW (**B**enutzer**g**ruppe **N**etz**w**erke) is a German association of leading international users and manufacturers of network systems. It is a manufacturer- neutral and independent forum. The goal of this association is the advanced training and exchange of experience of the members, and the development of recommendations of networkplanning, networkinstallation and maintenance of networks.
More information: http://www.bgnw.de/

BGP

Border **G**ateway **P**rotocol.
Interdomain routing protocol in WAN.

Industrial Ethernet-Lexikon

BLP

See Bandwidth Length Product.

BNC

Bayonet **N**eill **C**oncelmann.

A widely used plug connector for connecting coaxial cables and transceivers as per 10BASE2; named after the developers.

BootP

Bootstrap **P**rotokoll.

A protocol that delivers a statically allocated IP address to a device connected to the Ethernet on the basis of its MAC address.

BPDU

Bridge Protocol Data Unit.

A control frame between bridges, used by Spanning Tree.

Bridge

A device that works on Layer 2 of the OSI reference model and connects 2 similar networks to each other. In this connection, data packets are transferred from one subnetwork to another subnetwork through the analysis of the MAC address.

Broadcast

Term for transmitting a message to a group of unspecified receivers.

Browser

Term for software that enables the viewing and processing of data in the Internet. The most well-known browsers are Microsoft Internet Explorer, Netscape, Mozilla and Opera.

BT

Bit **T**ime. Duration of a bit.

Burst

Term for a short-term increase in load that occurs suddenly.

CCK

Complentary **C**ode **K**eying.

CCK is used with the 11 Mbps version of the 802.11-LAN (802.11b) and can pack several bits into a symbol. Thus a higher data transmission rate is possible.

CENELEC

Comité Européen de Normalisation Elektrotechnique (European Committee for Electrotechnical Standardization). Responsible for the harmonization of electrotechnical standards in the European Union (e.g. EN 50173, ...).

CHAP

Challenge **H**andshake **A**uthentication. **P**rotocol.

PPP authentication method. Passwords are transmitted after being encoded with a random number. Compare with PAP.

Cheapernet

See 10BASE-2.

CLI

1. **C**ommand **L**ine **I**nterface.
2. **C**alling **L**ine **I**dendification.

Collision Domain

The CSMA/CD access process limits the runtime of a data package from one participant to another. Depending on the data rate, what results is a spatially limited network, the so-termed collision domain. The maximum diameter of collision domain is 5120 m at 10 Mbit/s (Ethernet) and 512 m at 100 Mbit/s (Fast Ethernet). The full duplex operation of a connection enables expansion over this limit value since it precludes collisions. The precondition for this is the use of bridges or switches.

Concentrator

See Hub.

COS

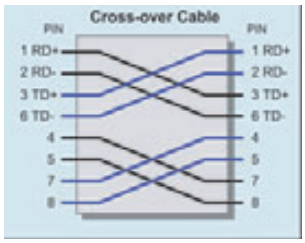
Class **o**f **S**ervice.

Connection Mirroring

A function that enables the copying of data transmission between 2 ports of a switch to other ports, in order to have the data analyzed by an analyzer.

Cross-over-Cable

For connecting Ethernet components over copper cable, what are required are either 1:1 wire cables, or crossover cables. Crossover cables are required for direct cabling of terminal devices such as SPS, HMI, etc. or network components such as hubs, switches, etc. to each other. If the devices support auto-crossing, one can also use 1:1 wire cables. Pin allocation of RJ45 plugs in a crossover cable:



CRC

Cyclic **R**edundancy **C**heck.

Term for algorithms that are used for error detection and correction of bit-oriented protocols.

CSA

www.csa.ca

Canadian **S**tandards **A**ssociation.

CSA-C22.2 No. 950

Canadian standard for the security of IT devices, including electrical office machines based on the IEC 950.

CSA-C22.2 No. 142

Canadian standard for the safety of industrial control equipment, based on UL 508.

CSA-C22.2 No. 213

Canadian standard for electrical operating equipment for explosion-endangered rooms of the Class I and II, Department 2, and Class III; based on UL 1604.

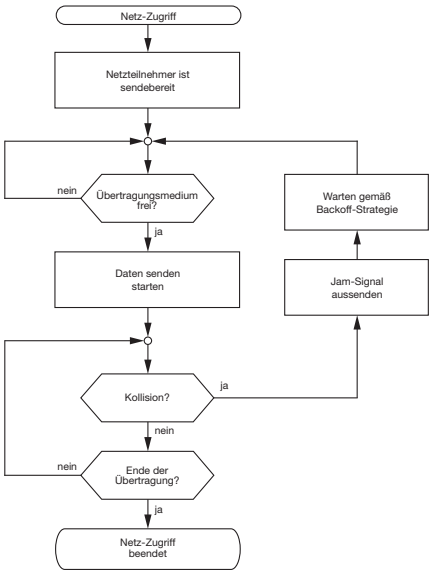
CSMA/CD

Carrier **S**ense **M**ultiple **A**ccess/**C**ollision **D**etection.

Access process in Ethernet as per IEEE 802.3. A station ready to transmit checks whether the transmission medium is free (carrier sense). It then starts transmitting while simultaneously checking whether other stations (multiple access) have also started to transmit data. If 2 or more stations transmit simultaneously, there is a collision. The stations stop transmission accordingly (collision detection) and attempt transmission later on. In the CSMA/CD process, the network expansion is determined by a maximum permissible runtime of data signals on the network that depend on the data rate.

cUL 508

US standard for the security of industrial control equipment.



cUL 1604

US standard for electrical operating equipment for explosion-endangered rooms of the Class I and II, Department 2, and Class III; based on UL 1604.

cUL 60950

US standard for the safety of IT equipments including electrical office machines; based on IEC 950.

Cut Through

Method of working of switches in which a data packet is immediately relayed further after detecting the target address. The delay time (latency time) is thereby small, but wrong packets are also transmitted onward. In this process, it is not possible to adjust the speed between the individual segments. The phenomenon is also called “On-the-Fly Switching”.

DA

Destination **A**ddress.

Target address within a data telegram.

DBPSK

Differential **B**inary **P**hase **S**hift **K**eying

DBPSK is a modulation procedure of which is used with the DSSS transmission method according to standard 802.11 for systems with 1 Mps.

Industrial Ethernet Lexikon

DCE

Data **C**ircuit-terminating **E**quipment.

Term for devices that are used for network termination and to which terminal equipments such as computers, control systems and printers are connected.

DES

Data **E**ncryption **S**tandard.

Symmetric encryption algorithm. For encryption and decryption the same secret key is used. Thus every station need to know this key in order to encrypt/decrypt . DES uses a 56 bit key. 3DES consists of three separate DES cryptographic operations, each performed with a different 56 bit key. The key length of 3DES is thus 168 bit.

Destination address

Used with Ethernet, IP, etc. The "address" to which a data packet is sent.

DeviceNet

DeviceNet incorporates CAN technology and provides a lowcost industrial network used to connect industrial devices such as limit switches, photoelectric cells, valve manifolds, motor starters, drives, and operator displays to PLCs and PCs.

DHCP

Dynamic **H**ost **C**onfiguration **P**rotocol.

A protocol that temporarily allocates an IP address to Ethernet participants from an established range of IP addresses.

Dispersion

Runtime differences in a LWL (fiber-optic cable). Through dispersion, a pulse transmitted in a fiber optic cable is extended. A distinction is made between mode, material and wave dispersion. Mode dispersion arises due to runtime difference between the individual modes. For this reason, this type of dispersion occurs only in multimode fiber optic cables. The material dispersion arises due to the wave length dependency of the refractive index. The fiber optic cable dispersion arises due to differing extension speeds in the energy transmitted in the core and in the jacket. This type of dispersion is of practical importance only for single mode fiber optic cables. The chromatic dispersion is a characteristic quantity for single mode fiber optic cables. It is the total of material and wave dispersion.

DNS

Domain **N**ame **S**ystem.

Term for a system which maps host names in plain text to IP addresses. The data source for the conversion are for example DNS servers or files with the designation "Hosts".

Domäne

Broadcast domain: Network area which can only be bordered by a router, and through which a Broadcast can freely travel.
Collision domain: Network area which is bordered by a switch or router, within which collisions can occur.

DQPSK

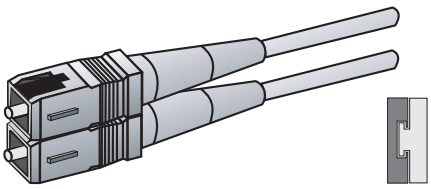
Differential **Q**uaternary **P**hase **S**hift **K**eying.

DDQPSK is a modulation procedure of which is used with the DSSS transmission method according to standard 802.11 for systems with 1 Mbit/s or 2 Mbit/s

DSC

Duplex **S**traight **C**onnector.

A widely used plug connector for fiber optic cables.
Also see SC.



DSL

Digital **S**ubscriber **L**ine.

Provides a technologie, in order to use the internet with 1,5 MBit/s (via copper lines).

DSSS

Direct **S**equence **S**pread **S**pectrum.

DSSS is a transmission method according to standard 802.11. The procedure changes the narrow-band by coding to a wide-band signal. In this way the entire frequency band can be used. Thus a higher data transmission rate as well as a lower susceptibility to interference is possible.

DTE

Data **T**erminal **E**quipment.
Term for terminal equipment such as computers, control systems and printers that are connected to a network. In German, they are also referred to as Datenendeinrichtung (DEE).

Dual Homing

A term that was coined in connection with FDDI networks. Dual Homing is a technology in which a device is connected to a network through 2 independent connecting points. One connecting point is for the primary connection, the other is a standby connection. If the primary connection fails, the standby connection is automatically activated. With this technology, it is also possible to connect network segments redundantly.

DVMRP

Distance **V**ector **M**ulticast **R**outing. **P**rotocol.
Internetwork gateway protocol, largely based on RIP, that implements a typical dense mode IP multicast schme. DVMRP uses IGMP to exchange routing datagrams with its neighbors.

DWDM

Dense **W**avelength **D**ivision **M**ultiplex.

Dynamic DNS

Assigns always the same name also if the IP-address of one client changes. See also DNS.

EANTC

European **A**dvanced **N**etworking **T**est **C**enter.

EGP

Exterior **G**ateway **P**rotocol
Classification of routing protocols for exchanging information between routers of independent networks.

EIA

www.eia.org
Electronic **I**ndustries **A**ssociation
Electronic Industries Association American industrial association of electrical industry active in the field of standardization. Standards of the EIA are designated with RS (related EIA standard). The well-known standards include the serial interfaces RS 232 C, RS 422 and RS 485.

EMC

Electro**m**agnetic **c**ompatibility.
In EMV, both the aspects of interference immunity as well as interference emission must be kept in mind. Electrical devices, installations and systems must have a specific immunity against normal interference effects that normally occur in the planned environment. In addition, devices should not emit any interference variables that may possibly disturb other devices in their environment.

EN

European **N**orm.
European standards relate to standards developed by CENELEC and CEN.

EN 61000-4-2

EMV Part 4: Measurement and Testing Processes, Main chapter 2: Testing interference immunity to the discharge of static electricity. Details in the catalog:
x kV Contact discharge / x kV Air discharge

EN 61000-4-3

EMV Part 4: Measurement and Testing Processes, Main chapter 3: Testing interference immunity to high-frequency electromagnetic fields.

EN 61000-4-4

EMV Part 4: Measurement and Testing Processes, Main chapter 4: Testing the Interference immunity to fast, short disturbance variables (Burst). Details in the catalog:
x kV DC Power lines / x kV Data lines

EN 61000-4-5

EMV Part 4: Measurement and Testing Processes, Main chapter 5: Testing interference immunity to surges.
Details in the catalog:
x kV Power supply asymmetrical (power supply)
x kV Data lines

EN 61000-6-2

Generic standard Part 6-2: Interference immunity in industry.

EN 50081-1

Generic Standard Interference Emission, Part 1: Residential, business and trade sectors as well as small businesses.

Industrial Ethernet Lexikon

EN 50081-2
Generic Standard Interference Emission, Part 2: Industry.

EN 50082-1
Generic Standard Interference Immunity, Part 1: Residential, business and trade sectors as well as small businesses.

EN 50082-2
Generic Standard Interference Immunity, Part 2: Industry – no longer valid since the 1.4.2002.

EN 55022
Product Group Standard Interference Emission for IT installations.

EN 55024
Product Group Standard Interference Immunity for IT installations.

EN 60950
Safety of IT installations including electrical office machines. European standard, based on the IEC 950.

EN 60825-1
Safety Of Laser Devices, Part 1: Classification of Installations, Requirements and User Guidelines.

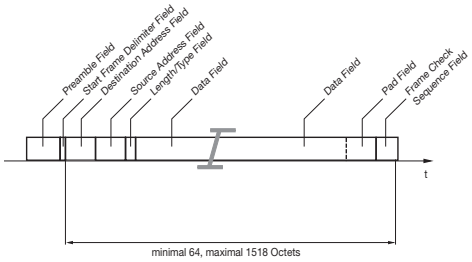
EN 61131-2
Product Group Standard
Stored-Program Control Systems, Part 2: Requirements and Tests for Operating Materials.

Encapsulation
See Tunnelling.

Ethernet
Term for a data network that has been standardized since 1985 by the IEEE 802.3. The standard specifies the functions and the construction of the Levels 1 and 2 in accordance with the OSI reference model. Ethernet is based on the access process CSMA/CD with a variable packet length of between 64 and 1518 bytes and transmission speeds of 10 Mbit/s (4 bytes TAG field optional). The concept of Ethernet is often used as a general designation without making any distinction between the different variations (Ethernet, Fast Ethernet, etc.). In addition, the protocols of the Levels 3 and 4 are often included.

EtherNet/IP
www.ab.com/networks
Ethernet/Industrial Protocol. A standard for Industrial Ethernet applications, based on TCP and UDP.

Ethernet-Paket
Term for an Ethernet data packet.
The packet size varies between 64 and 1522 bytes. It contains the destination and source address field (DA or SA) apart from the actual payload data, the TAG field as well as the length/type field.



ESD
Electro**s**tatic **D**ischarge.
Term for electrostatic discharges. Electrostatic discharges can cause short and irregular disturbances in electronic devices or they may destroy electronic components.

Ex
Independent designation of devices under DIN EN 50020 that can be used in accordance with the specifications even inside explosion-endangered areas.

Fast-Ethernet
Term for a fast data network that was standardized in 1995 by the IEEE 802.3. Based on a transmission speed of 100 Mbit/s with a variable packet length ranging from 64 to 1518 bytes (4 bytes TAG field optional).

FCC
www.fcc.gov
Federal **C**ommunications **C**ommission.
A US authority established in 1934, responsible for telecommunications. It administers the frequency spectrum and allocates it over local, regional and national levels.

FCC CFR47 Part 15
Federal **C**ommunications **C**ommission **C**ode of **F**ederal **R**egulations.
Standard for interference emission for IT installations.

FCS

Frame **C**heck **S**equence.

Term for a bit field for data security of payload data in bit-oriented protocols. The sender of a message determines a checksum according to an established algorithm, and this checksum is affixed to the end of the packet. In the receiver a checksum is also created according to the same algorithm, and this checksum is compared to the checksum received. With this process, errors in the data transmission can be detected.

FDB

Forwarding **D**ata **B**ase.

Forwarding Data Base. Address table of a switch for the decision at which port to transmit a frame. The table assigns MAC addresses to the port via which the respective device can be reached. The table is updated regularly (Aging).

FDX

See Full Duplex.

FDDI

Fiber **D**istributed **D**ata **I**nterface.

A standard for data networks, that covers the Layers 1 and 2 of the OSI reference model. FDDI is originally based on a double ring topology with fiber optic cables as the transmission medium.

Fiber optic

In contrast to electrical transmission cable technology in which twisted pair cables are used for data transmission, glass or plastic is used as a transmission medium for optical transmission technology. Fiber optic cables come in the form of multimode and single-mode fibers (monomode fibers).

Firewall

Term for protective measures that partitions off a LAN from another network, for example the Internet.

Flow Control

A function that in case of overload at an output port, dumps packets at the input port or signals connected devices to stop transmission. The signal to stop transmission is sent in half duplex operation by simulating a collision or, in full duplex, by sending special "Pause" packets.

FM 3611

US standard for electrical operating equipment for explosion-endangered rooms of the Classes I and II, Department 2, and Class III.

FM 3810

US standard for the Safety of Process Control Equipment.

Frame Relay

Modified version of the X.25 protocol used in WANs.

FTP

File **T**ransfer **P**rotocol.

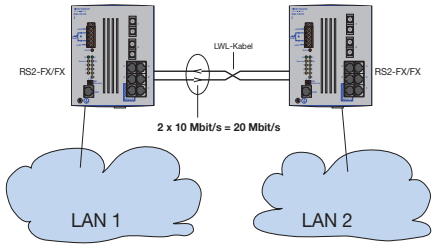
A protocol on Layer 5 of the OSI reference model for the transportation of files.

FTTD

Fiber **T**o **T**he **D**esk.

Full Duplex

A mode of operation in which a device can simultaneously transmit and receive data. If a transmission path is operated in full duplex in Ethernet, the CSMA/CD bus access process does not apply and network diameter then depends solely on the performance limits of the transmission and reception components used.



F/O

Fiber **O**ptics.

GARP

Generic **A**ttribute **R**egistration **P**rotocol.

Term for a protocol family that is used for exchanging parameters between switches and Layer 2 of the OSI reference model. At present there are the protocols GMRP and GVRP.

Gateway

A device that operates above the Layer 2 of the OSI reference model and converts protocols. At Layer 3, these devices are generally designated as routers.

Industrial Ethernet Lexikon

GBIC

Giga**b**it **i**nterface **c**onverter. See SFP.

Gbps

Giga**b**it **p**er **s**econd

Gigabit-Ethernet

Term for an extremely fast data network that has been standardized by the IEEE 802.3 in 1999. Based on a transmission speed of 1000 Mbit/s with a variable packet length of 64 to 1518 bytes (4 bytes TAG field optional).

GL

Germanischer **L**loyd.
A company for the classification of seagoing ships, established 1867 in Hamburg.

GMRP

GARP **M**ulticast **R**egistration **P**rotocol
A protocol standardized as per IEEE 802.1p that enables participants to log-on and log-off to/from multicast groups dynamically. Switches that support GMRP only switch multicasts to those ports at which participants of the respective multicast groups are registered.

GVRP

GARP **V**LAN **R**egistration **P**rotocol
A protocol that can use switches to exchange information on VLANs. If a VLAN is installed on a switch, the switch sends this information to all the other switches in the network. In addition, the port at which the information was received can also be made a participant of this VLAN.

Halbduplex

See Half Duplex.

Half Duplex

A mode of operation in which a device can either send or receive data at any given point in time. In half duplex, collision detection is active in Ethernet. Network expansion is limited by the runtime delay of the devices and transmission media.

HASH

Checksum, securing the integrity of information.

HCS

A name for a fiber optic cable, the optical core of which is made of silica glass and whose optical jacket is made of a special patented plastic layer (HCS is a registered trademark of Spectran Specialty Optics).

HDX

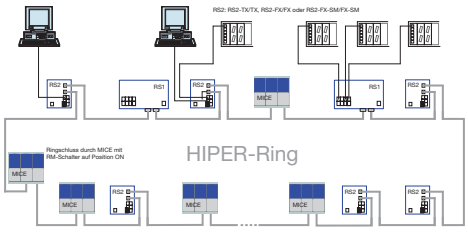
See Half Duplex.

Header

Term for that part of a data packet that is located before the payload data and contains data such as addresses, packet numbers, etc.

HIPER-Ring

Term for a redundancy process based on the construction of ring-shaped network structures. In rings of these types, network components that support the HIPER-Ring are connected to each other over their backbone or ring ports. A redundancy manager carries out monitoring of the ring and prevents circulating telegrams.



HiRRP

Hirschmann **i**ndustrial **R**outer **R**edundancy **P**rotocot.
Allows you switch two routers in parallel. If one of the routers fails, the remaining router completely takes over the tasks of the other one.

HMI

Human **M**achine **I**nterface.
Devices for operating and observing machines and equipment.

Hops

Term for the routers that a data packet may pass through on its way through a network. The number of hops within a connection does not indicate anything about the quality of the connection. Thus for example a connection with eight hops may be faster than a connection with five or six hops.

HSRP

Hot **S**tandby **R**outing **P**rotocol.

A protocol for controlling redundant routers.

HTML

Hyper**t**ext **M**arkup **L**anguage.

A format for displaying websites.

HTTP

Hyper**T**ext **T**ransfer **P**rotocol.

A protocol used by browsers and web-servers for transmitting websites.

HTTPS

Hyper**T**ext **T**ransfer **P**rotocol **S**ecure.

HTTP Secure. Paketwise encrypted HTTP communication.

Hub

A device that works on Layer 1 of the OSI reference model and that regenerates incoming signals before distributing the same to all the other ports. Synonym: star coupler or repeater.

ICMP

Internet **C**ontrol **M**essage **P**rotocol.

A protocol that is used to signal failures and errors during transmission of IP packets. An extremely well-known command of this protocol is the "ping" command.

ID

IDentifier

IDA

www.ida-group.org

Interface for **D**istributed **A**utomation

A standard in the field of Industrial Ethernet developed by a group of companies using TCP and UDP.

IE

Industrial **E**thernet.

Term for Ethernet in automation technology. The enhanced requirements concern the accessibility and the security of the network and the environmental conditions to which Ethernet components are exposed.

IEC

International **E**lectrotechnical **C**ommission.

A commission set up in 1906 for the standardization of electrical components and modules.

IEC 60068-2-6

Environmental tests Part 2: Fc test, sine-shaped vibrations.

IEC 60068-2-27

Environmental tests Part 2: Ea test, shock.

IEC 60068-2-32

Environmental tests Part 2: Ed test, free fall.

IEEE

www.ieee.org

Institute of **E**lectrical and **E**lectronics **E**ngineers.

An association of technicians and engineers having their headquarters in the USA that develops de facto standards, particularly in the field of data communication.

IEEE 802.3

A committee of the Institute of Electrical and Electronics Engineers, that lays down standards for LANs.

IETF

www.ietf.org

Internet **E**ngineering **T**ask **F**orce

A group that consists of several technical persons interested in the Internet, responsible for technical questions.

IFG

Inter **F**rame **G**ap.

A measure for the minimum distance between 2 data packets.

IGMP

Internet **G**roup **M**anagement **P**rotocol.

Term for a Layer 3 protocol that communicates the association of participants and routers to multicast groups to the adjacent routers.

IGMP Snooping

Internet **G**roup **M**anagement **P**rotocol Snooping.

A function in which switches investigate IGMP packets and allocate membership of a participant to a multicast group to the respective port. Thereby muliticasts can also be switched specifically to those segments in which the participants of a group are located.

IGP

Interior **G**ateway **P**rotocol.

Classification of routing protocols for exchanging information between routers within an independent network. The protocols used include IGRP, RIP and OSPF.

Industrial Ethernet Lexikon

IGRP

Interior **G**ateway **R**outing **P**rotocol.

Routing protocol developed by Cisco.

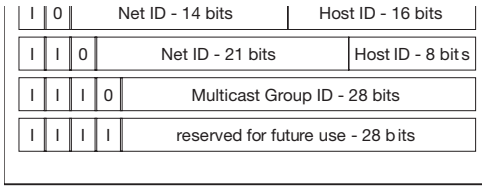
IP

Internet **P**rotocol.

A protocol on Layer 3 of the OSI reference model. It is used for the connectionless transportation of data over several networks. Each telegram is allocated a clear IP address. The telegrams may arrive at the receiving end in a sequence different to the one in which they were sent. TCP is responsible for assembly in the correct sequence.

IP-Adresse

The address of a participant on Layer 3 of the OSI reference model. In Version 4, an IP address consists of 4 bytes separated from each other by decimal points. These 4 bytes indicate the address for the network (Net ID) and the address area of the terminal devices (Host ID). The entire address range is classified into classes from A to E in accordance with the number of network addresses and host addresses, the number of host addresses becoming increasingly smaller from A to E. Since IP addresses must be unique on the Internet, the network addresses are managed by a central organization. The allocation of host addresses is done by the administrator of the respective local network. In order to split-up local networks into smaller subnetworks that are easier to manage, part of the host addresses is used. The network address is thereby increased with a subnetwork component. This extension is done using a subnetwork mask. The subnetwork mask marks all the bits of an IP address that identify the network and subnetwork. A device that wants to transmit, compares its IP address with the IP address of the receiver. If the addresses do not match within the framework of the network mask, it means that the receiver is in a different network. In such case the message is sent to a gateway or a router.



Klasse	Adressbereich
A	1.0.0.0 to 126.255.255.255
B	128.0.0.0 to 191.255.255.255
C	192.0.0.0 to 223.255.255.255
D	224.0.0.0 to 239.255.255.255
E	240.0.0.0 to 255.255.255.255

IPsec

Internet **P**rotocol **Sec**urity.

Standard, which uses encryption to verify the authenticity of the sender and ensure the confidentiality and integrity of the data in IP. Layer 3 VPNs connections are configured with IPSec (using 3DES for instance).

IPv4

Internet **P**rotocol **V**ersion **4**.

The IPv4 has an address length of 4 bytes. Also see IP.

IPv6

Internet **P**rotocol **V**ersion **6**.

The IPv6 has an address length of 16 bytes. In addition, it is also differentiated by the structure of the header and the division of the networks into address types rather than classes.

IPX

Internet **P**acket **Ex**change.

Term for a protocol by Novell that creates connections to Internet protocols.

ISDN

Integrated **S**ervices **D**igital **N**etwork.

WAN communication protocol.

ISO

www.iso.org

International **S**tandards **O**rganisation

An umbrella organization of national standardization committees that is also a member of the Deutsches Institut für Normung (DIN, German Standards Institute). More than 200 technical committees (TC) make up the various bodies of the ISO. The TCs may be subdivided if so required into subcommittees (SC). The SCs in turn may be split up into working groups (WG) and special task groups.

ISP

Internet **S**ervice **P**rovider.

IT

Information **T**echnology.

ITU-T

www.itu.int

International **T**elecommunications **U**nion-**T**elecommunication Standardization committee with its head office in Geneva.

Jabber

Term for an Ethernet packet with more than 1522 bytes.

Jitter

Term for the oscillation of signal edge in time.

kbps

kilo**b**it **p**er **s**econd (kbit/s)

L2TP

Layer **2** **T**unneling **P**rotocol.

Zum Aufbau eines VPNTunnels auf Schicht 2. Siehe auch IPsec.

LACP

Link **A**ggregation **C**ontrol **P**rotocol.

LAN

Local **A**rea **N**etwork.

Term for local network which is typically no bigger than 10 km in diameter.

Latency Time

Term for the time difference between the receipt and the relaying of data. As a rule, the latency time is measured between the last bit received and first bit sent out.

LAP

Link **A**ccess **P**rotocol.

LED

Light **E**mitting **D**iode.

An electronic component that emits light.

Link Aggregation

Term for a function that combines up to 4 ports with the same transmission speed to one virtual port. The result is redundancy in the case of failure of a connection. Also called trunking.

Long Haul

Term for optical transceivers with a very high link budget that is used in connection with single-mode fibers.

LSB

Last **S**ignificant **B**it.

Low-value bit within a bit sequence (Ethernet)

LWL

See Fiber Optic Cable.

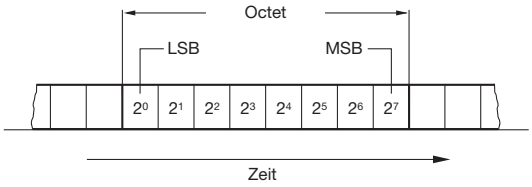
LX

Long **W**avelength (Gbit-Ethernet).

MAC

Media **A**ccess **C**ontrol.

Term for a sublayer of Layer 2 of the OSI reference model. It controls access to the transmission medium. In this sublayer, processes may be used in which either several equally authorized participants are competing for access (for example CSMA/CA or CSMA/CD) or in which no collisions occurs, for example such as token ring.



MAC-Adresse

The address of a participant on Layer 2 of the OSI reference model.

MAN

Metropolitan **A**rea **N**etwork

Term for a network within a city that connects various LANs to each other.

Industrial Ethernet Lexikon

MAP

Manufacturing **A**utomation **P**rotocol

A protocol developed in the early 1980s on the initiative of General Motors. However in view of its complexity, it was hardly used commercially.

MAU

Medium **A**ttachment **U**nit

A coupling module between an Ethernet terminal device and the transmission medium. As a rule the terminal device is connected to an AUI interface. Also see Transceiver.

Mbps

Mega**b**it **p**er **s**econd (Mbit/s)

MD5

Message **D**igest **5**

See also Hash-Algorithm.

MDI

Medium **D**ependent **I**nterface

Term for the physical (electrical, optical) and mechanical interface of a device for connection to the transmission medium.

MDI-X

MDI-Crossover

Term for a MDI interface with crossed connected signal lines.

MDI/MDI-X

See Autocrossing.

MIB

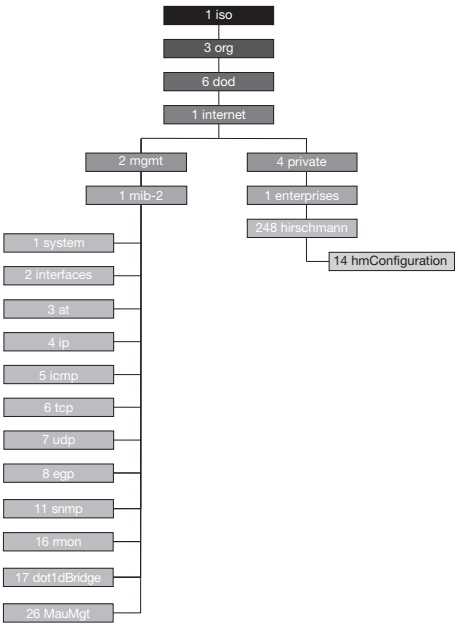
Management **I**nformation **B**ase

A database for objects and functions which help network management systems manage individual objects using Simple Network Management Protocolb (SNMP).

MII

Media **I**ndependent **I**nterface

Term for an interface as per the OSI reference model between the Physical Layer (1) and the Data Link Layer (2).



mini-GBIC

Mini gigabit interface converter, see also SFP.

Media Converter

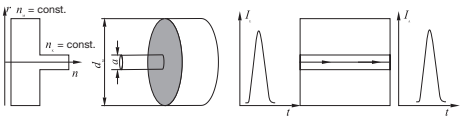
A device that operates on Layer 1 of the OSI reference model and converts signals between various media. For example optical signals into electrical signals.

MLPPP

Multi **L**ink **PPP**. See also PPP.

Monomode Fiber

See Single-mode Fiber and Fiber Optic Cable.



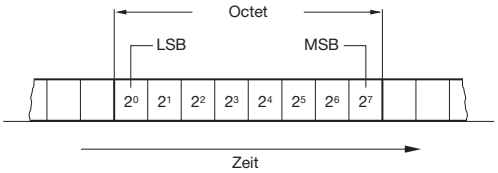
MPLS

Multi**p**rotocol **L**abel **S**witching. Layer-3-Protokoll.

MSB

Most **S**ignificant **B**it

The most significant bit within a bit sequence. (Ethernet)



MTBF

Mean **T**ime **B**etween **F**ailure.

Probability factor that indicates after how much time an error may be expected.

MTRJ

A widely used small sized plug connector for fiber optic cables.

MTTR

Max **T**ime **T**o **R**epair.

Multicast

Term for transmission of a message to a group of specific receivers. It is possible to contact this group using only one address.

Multicast Filtering

Term for processes that enable a switch to relay multicasts in a targeted manner.

Multimode Fiber

Multimode fibers are fiber optic cables that are distinguished through core diameters of comparable size. The typical core diameter for step-index fiber optic cables is 100 µm for glass fibers, 200 µm for PCS/HCS fibers and 980 µm for POF fibers. The graded index fibers on the other hand have a typical core diameter 50 or 62.5 µm. Because of this relatively large core diameter, the light in multimode fibers spreads over several paths and modes.

The distance that can be covered by a multimode fiber depends on several factors: the characteristics of the fiber, the link budgets and the attenuation due to plug connectors, splices and other components.

For example: A 62.5/125 µm fiber with an attenuation of 1 dB/km and a bandwidth of 500 MHz x km should transmit data packets over Fast Ethernet using light with a wavelength of 1300 nm. The link budget is 11 dB. A reserve of 3 dB should be taken into account. The attenuation of the plug connectors should be ignored.

Attenuation:

Lmax = (Link Budget Reserve)/fiber attenuation

Lmax = (11 dB-3 dB)/1 dB/km

Lmax = 8 km

Bandwidth length product

Lmax = Bandwidth/Signal bandwidth

Lmax = (500 km x MHz)/125 MHz

Lmax = 4 km

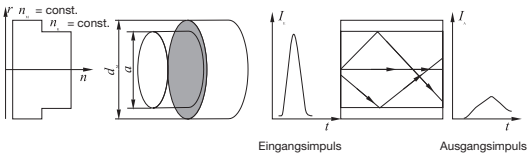
In this example, the maximum distance to be covered is 4 km.

Signal bandwidths:

Ethernet = 10 MHz, Fast Ethernet

= 125 MHz and Gigabit Ethernet

= 1.25 GHz



Multiplexer

Term for devices or function units that combine several channels of low capacity into one channel of high capacity.

Multiport

A bridge that connects not only 2 but several LANs together. In Ethernet LANs, multiport bridges are also designated as switches.

NAT

Network **A**ddress **T**ranslation.

Term for a protocol that is defined in RFC 1631 and RFC 1918.

NAT-T

NAT-Traversal.

If there is a NAT-Gateway inbetween two IPsec end points IPsec does not work, as the IP-addresses of the end points are also encrypted. NAT-T solves this problem. NAT-T is enable automatically during the handshake if required (and supported).

Industrial Ethernet Lexikon

NetBEUI

NetBIOS **E**xtended **U**ser **I**nterface.

Enhanced version of the NetBIOS protocol used by network operating systems such as LAN Manager, LAN Server, Windows for Workgroups, and Windows NT.

NEXT

Near **E**nd **C**ross **T**alk.

A form of crosstalk in which signals of participants that a relocated on the same side of a twisted pair cable get superimposed.

NIC

Network **I**nterface **C**ard.

Term for PC insertion cards that enable connection to an Ethernet network.

Network Nodes

Term for network elements such as hubs, switches and routers on which different data transmission paths run together.

Network Management

A general concept for the management, configuration and monitoring of network nodes and the devices connected the same. The tasks of a network management system may be subdivided into error management, configuration management, safety management and performance management. To do this, the network management agent communicates with the network management station using the network management protocol SNMP.

Netzmaske

The network mask marks all bits in an IP address for identifying the network and the subnetwork. Also see IP address.

IP-Adresse	10010101.11011010.00010011.01011010
Netzmaske	11111111.11111111.11111111.00000000
->Subnetz	10010101.11011010.00010011.00000000

Dezimale Darstellung

IP-Adresse	149.218.19.90
Netzmaske	255.255.255.0
->Subnetz	149.218.19.0

Verfügbarer Adressbereich

Teilnehmeradressen	149.218 .19.1 bis 149.218.19.254
Broadcast-Adresse	149.218.19.255

NMS

Network **M**anagement **S**ystem.

See Network Management.

Node

Term for a participant in a network.

NRZ

No **R**eturn to **Z**ero.

Term for a coding process in which the electrical signals do not go back to zero even when there is a sequence of several logical ones.

NRZI

No **R**eturn to **Z**ero, **I**nvert on Ones.

Term for a coding process with inverted NRZ signals.

NVRAM

Non-**V**olatile **RAM**.

RAM that retains its contents when a unit is powered off.

ODVA

ODVA (**O**pen **D**evice **V**endor **A**ssociation) is the organization that manages the DeviceNet and EtherNet/IP network technology and standards in addition to promoting their worldwide adoption in industrial automation.

OID

Object **Id**entification.

OLE

Object **L**ink and **E**mbedding.

Term for a central architecture principle in Windows.

On-the-Fly-Switching

Working method of switches, see Cut Through.

OPC

www.opcfoundation.org

OLE for **P**rocess **C**ontrol

Interface for Windows applications for data exchange concerning process data and status information.

OSI

Open **S**ystems **I**nterconnection.

An international standardization program that has been instituted by the ISO and the ITU. The objective is to lay down standards for data networks that ensure the compatibility of devices made by various manufacturers.

OSI-Referenzmodell

Also termed ISO/OSI reference model.

This model is divided into 7 Layers that describe the communication of open, distributed systems. The individual layers form a group, that are independent of each other, but each describes an area that is relevant for data transmission and processing. The layers are termed the Physical Layer (1), the Data Link Layer (2), Network Layer (3), the Transport Layer (4), the Session Layer (5), the Presentation Layer (6) and the Application Layer (7).

7	Application Layer		Gateway
6	Presentation Layer		
5	Session Layer		
4	Transport Layer		
3	Network Layer		Router
2	Data Link Layer	2b Logical Link Control	LLC Level Bridge
		2a Medium Access Control	MAC Level Bridge
1	Physical Layer		Sternkoppler, Repeater

OSPF

Open **S**hortest **P**ath **F**irst.

Term for a routing protocol. OSPF uses information given by the routers over the topology of the network in order to find the shortest path between the routers. The precondition for this is that each router creates a routing table in which the current topology of the network is fully displayed. Since each router immediately communicates changes in the topology to the adjacent routers, the routing tables in the routers get constantly updated. The advantage of OSPF over RIP consists in the speed and the better distribution of load.

OUI

Original **U**nique **I**dentifier.

Term for the first 3 bytes of the MAC address.

PAP

Password **A**uthentication **P**rotocol. PPP authentication method. Passwords are transmitted unencoded. PAP is based on user names.

Paket Size

See Ethernet-Paket.

Patch Field

Term for a patching distribution frame.

Patch Cable

Term for cables that are used for connecting Ethernet component within a room (19" rack, control cabinet, etc.). Patch cables are mostly used in connection with patch panels.

Parallel Detection

Part of the Autonegotiation function. This allows a device to configure itself correctly when attached to another device which does not support auto-negotiation. A port detects the line speed using FLP or NLP, and configures itself for 100 Mbps or 10 Mbps. For duplex mode, HDX is always used.

PCF

Term for a fiber optic cable, the optical core of which is made of silicon glass with an optical jacket consisting of a polymer layer.

PD

Powered **D**evice.

Defines the end device (like a IP telephone) in the draft IEEE P802.3af standard (DTE Power via MDI) which defines how to support power over twisted pair cabel over Ethernet.

PDU

Protocol **D**ata **U**nit.

Term for a data packet assembled on a layer of the OSI reference model that is relayed to the layer below it over a Service Access Point (SAP).

PHY

Physical sublayer.

Physical level/component (at layer 1b).

Ping

Packet **In**ternet **G**roper.

A program for testing connections between 2 IP addresses.

Private/Public Key

In asymmetrical encryption algorithms, two keys are used: a Private Key and a Public Key. The public key is made available by the future recipient of the data to those who will later send encrypted data to him/her. The recipient is the only one who has the private key. It is used to decrypt the received data.

PLC

Programmable **L**ogic **C**ontrol.

Stored-program control systems.

Industrial Ethernet Lexikon

POE
Power **o**ver **E**thernet.

POF
Plastic **O**ptical **F**iber.
Term for a fiber optic cable, the optical core and jacket of which is made of plastic. POF fibers have a typical core diameter of 0.98 mm.

POL
Power **o**ver **L**AN.

Port
General term for an interface to devices for transmission of data and control information in the transmission and reception direction.

Port Mirroring
A function that enables the copying of incoming and outgoing data at one port of a switch to another port, in order to be analyzed there with an analyzer for example.

Port Security
A function that offers protection against unauthorized access to the network. Switches that support this function offer the possibility of setting, for each port, the terminal device from which data can be transmitted or received. The checks are carried out on the basis of the MAC addresses of the devices connected. If the device is connected to a port, the MAC address of which is not registered, this port can be automatically switched off.

Port Trunking
See Link Aggregation.

PPP
Point-to-**P**oint-**P**rotocol.
A protocol of the TCP/IP family for serial data transfer over dial-up connections such as the telephone. This is used for connecting computers that are not permanently connected over LANs to the Internet.

PPPoE
Point-to-**P**oint-**P**rotocol **o**ver **E**thernet.

pps
packets **p**er **s**econd.
Measurement unit for the switching speed.

PPTP
Point-to-**P**oint **T**unneling **P**rotocol.

Prioritization
In a prioritized data transmission, data packets are switched on the basis of the defined criteria. The tagging of such packets is done at Layer 2 of the OSI reference models in the TAG field and at Layer 3 in the TOS field.

Private Key
Siehe Private/Public Key.

Private/Public Key
In asymmetrical encryption algorithms two keys are used: a Private Key and a Public Key. The public key is made available by the future recipient of the data to those who will later send encrypted data to him/her. The recipient is the only one who has the private key. It is used to decrypt the received data.

PROFInet
www.profibus.org
A concept that defines the communication from the field level to the conducting level with the integration of profibus and Ethernet as well as a model for company-wide engineering.

PSE
Power **S**ourcing **E**quipment.

PSU
Power **S**upply **U**nit.
See also PS.

PTP
Precision **T**ime **P**rotocol.
Protocol for time synchronisation acc. to IEEE 1588, with a precision of less than 1 µs.

Public Key
See also Private/Public Key

QoS
Quality **o**f **S**ervice.
Term for a range of factors that have an effect on the quality of a network. These factors include network breakdown times, delay times, stability of connections and many more. For QoS, there is a series of different definitions.

RADIUS

Remote **A**uthentication **D**ial **I**n **U**ser **S**ervice.

A RADIUS Server authenticates a client, who registers for access with a name and password. The password is transmitted encoded.

RAM

Random **A**ccess **M**emory.

Term for a volatile memory.

RARP

Reverse **A**ddress **R**esolution **P**rotocol.

A protocol that delivers statically allocated IP addresses to a MAC address.

RAS

Remote **A**ccess **S**ystem.

Redundancy Manager

Term for a switch or hub in a HIPER-Ring that monitors the ring and in case of an interruption in the ring structure, activates the connection that has been switched off upto that point. After the interruption has been removed, the redundancy manager again switches this connection off. The ring is thereby physically switched off, but from the point of view of communication, it is interrupted.

RFC xxx

Request **f**or **C**omments.

An abbreviation that was coined within the context of the Internet. It is closely linked to the publication of Internet standard.

RIP

Routing **I**nformation **P**rotocol.

A protocol for the cyclic exchange of routing tables between routers within independent networks per broadcast. RIP is one of the oldest, easiest and most widely used routing protocols. The successor of RIP is the more complex OSPF.

RJ45

A widely used plug connector in telephone technology and in LANs. It is also known as the Western plug with 8 poles.

RMON

Remote **M**onitoring. A protocol for network management. RMON defines new classes of data that relate to and can be recorded on the lower layers of the OSI reference model. The data are then transmitted to a network management station using Simple Network Management Protocol (SNMP).

RMON 2

Remote **M**onitoring. A protocol for network management. RMON 2 is an extension of RMON and extends to higher layers of the OSI reference model.

Router

A device that works at Layer 3 of the OSI reference model and connects different segments of the network to each other, or splits-up networks into subnetworks. A router transmits only data packets to other segments that are sent to its own MAC addresses. The router then sends the data packets onward on the basis of routing tables. In other words, the transmitting participant must know that the receiver is not located in the same network segment. The transmitting station obtains this information from the IP address of the recipient. Routing tables are either given as fixed tables or are given by the router itself using routing protocols.

Routing

A function of Layer 3 of the OSI reference model. A distinction is made between dynamic and static routing. In dynamic routing, routers calculate rules and parameters for path selection through the network. This information is written to routing tables and exchanged using routing protocols between routers. This ensures that the path selection is adapted to the current topology and load distribution of network. In dynamic routing, each telegram is individually routed. As a result, telegrams may arrive at the receiving end in a sequence different to the one in which they were sent. In static routing, the paths for data transmission between the transmitters and receivers is fixed and a specific bandwidth is reserved for each connection. As a result, data packets take the same path between two terminal devices. It is therefore not possible to respond automatically to changes in the topology or in the case of overloads of connections. Since all changes in the network structure are entered into the routers by hand, routers do not have to support any routing protocols in this process. While dynamic routing supports the transmission of data in an optimized manner, in static routing, the transmission of data, speech and video are equally supported.

Industrial Ethernet Lexikon

Routing-Protokoll

Term for protocols that routers use during dynamic routing in order to exchange information over connected networks amongst each other. This information is stored in routing tables in the routers.

RS 232 C

Recommended **S**tandard 232 C.

A widely used serial interface for data transmission with data rates of up to 20 kbit/s and over distances up to 15 m. This interface was standardized by the EIA in 1969 as standard no. 232 in Version C. It is also often referred to as RS 232.

RS 422

Recommended **S**tandard 422.

A serial interface for data transmission in full duplex operation. This interface was standardized in the 70s by the EIA as standard no. 422.

RS 485

Recommended **S**tandard 485.

A serial interface for data transmission in full duplex operation. This interface was standardized in the 70s by the EIA as standard no. 422.

RSVP

Resource re**S**er**V**ation **P**rotocol

A protocol that reserves resources for applications over the Internet. After a path has been established from the sender to the receiver, all the routers participating in this path are notified via RSVP that they should reserve specific resources for this connection.

RTCP

Realtime **T**ransport **C**ontrol **P**rotocol.

RTP

Real**t**ime **P**rotocol.

A protocol that supports real-time applications such as video conferencing on the Internet. In this protocol, additional information such as the nature of the payload data transmitted (speech, video, etc.) or the time of generation of the payload data is transmitted.

Rx

Abkürzung für Receiver

Term for the connection to a port at which data is received.

SA

Source **A**ddress.

Source address within a data telegram.

SAN

Storage **A**rea **N**etwork.

Network for connecting servers and storage sub-systems, such as disks, RAID and Tape Systems. Mostly based on Fibre Channel.

SAP

Service **A**ccess **P**oint.

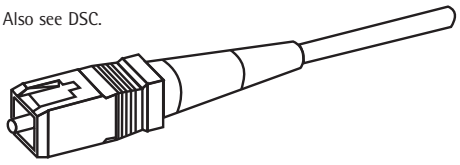
Term for the interface between two layers of the OSI reference model where a layer that is placed at a higher level makes use of services in the layer below.

SC

Straight **C**onnector.

A widely used plug connector for fiber optic cables.

Also see DSC.



SCADA

Supervisor **C**ontrol **A**nd **D**ata **A**cquisition.

Term for systems for control and visualization of processes. SCADA systems are based on Windows operating systems as a rule.

SDH

Synchronous **D**igital **H**ierarchy.

A European standard that defines several standards of transmission rates and transmission forms for optical fibers (fiber optic cable).

SFD

Start **F**rame **D**elimiter.

Part of an Ethernet telegram.

SFP

Small **f**orm-factor **p**luggable.

A transceiver for 1 Gbps networks that converts serial electric signals to serial optical signals and vice versa.

See also GBIC.

SHA-1

Secure **H**ash **A**lgorithm **1**

See also Hash.

Shared Network

Term for an Ethernet network in which participants share the available bandwidth. In these networks, the CSMA/CD process controls the access of the participants to the transmission medium.

Single-mode Fiber

A single-mode fiber is a fiber optic cable that is characterized by its extremely small core diameter (max. 10 µm). As a result, in this fiber, the light after the cutoff waveline can only get extended along one path – one mode. The distance that is to be covered by a single-mode fiber depends on several factors: the characteristic data of the fiber, the link budget as well as the attenuation to plug connectors, splices and other components.

Example:

A 9/125 µm fiber with an attenuation (A) of 0.3 dB/km should transmit a wavelength of 1550 nm of Fast Ethernet data packets. The link budget is 29 dB. A reserve of 3 dB is taken into account. The attenuation of the plug connector is to be ignored.

Attenuation:

Lmax = (Link Budget-Reserve)/Fiber attenuation

Lmax = (29 dB-3 dB) /0.3 dB/km

Lmax = 86.6 km

In this example, the maximum distance to be covered is 86.6 km.

Signal bandwidths:

Ethernet = 10 MHz

Fast Ethernet = 125 MHz and

Gigabit Ethernet = 1.25 GHz

SLA

Service **L**evel **A**greement.

SLIP

Serial **L**ine **I**nternet **P**rotocol.

A protocol for serial data transfer over dialup connections such as the telephone. It is used for connecting computers that are not networked permanently over LANs to the Internet. In comparison to the more recent PPP, SLIP has the disadvantage that erroneous data is not recognized.

SMON

Switch **Mon**itoring.

SMTP

Simple **M**ail **T**ransfer **P**rotocol.

Term for a protocol for sending e-mail messages.

SNAP

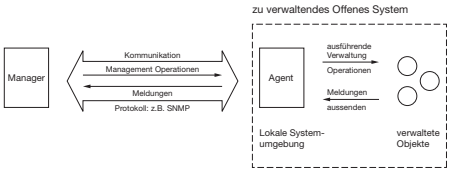
Sub**n**etwork **A**ccess **P**rotocol.

SNMP

Simple **N**etwork **M**anagement **P**rotocol

A protocol for network management. SNMP defines commands for the reading and writing of information, status and error messages as well as providing a structured model. This model consists of agents with their respective Management Information Base (MIB) and a Manager. The Manager is a program that runs on a network management station. Agents are mostly located within devices such as switches, routers and terminal devices that support the SNMP. The task of the agents consists in collecting and preparing data in the MIB. These data is requested at regular intervals by the Manager and displayed on the network management station. The devices are configured, for example, with the data that the Manager writes to the MIBs in question. In urgent cases, the agent can also send messages (traps) directly to the Manager.

Industrial Ethernet-Lexikon



SNTP

Simple **N**etwork **T**ime **P**rotocol. Protocol for time synchronisation, based on NTP, with a precision of 1 to 50 ms. For higher precision PTP (Precision Time Protocol acc. to IEEE 1588) is used.

SOHO

Small **O**ffice **H**ome **O**ffice.
Network solutions and access technol-ogies to the Internet for small offices and offices at home that are not directly connected to large company networks.

Spanning-Tree

Term for a protocol that is used in Ethernet networks for path determination. It is specified as standard IEEE 802.1 D. The spanning tree algorithm prevents the circulation of data packets in a LAN with several possible paths by switching-off individual connections or ports. In addition it determines the optimum path if there are several alternatives. If a path fails due to the fault or interruption, an alternative connection is searched for using the spanning tree protocol. The reconfiguration of a network of this type may takes 30-90 seconds.

SPS

Speicher**p**rogrammierbare **S**teuerung

SQE

Signal **Q**uality **E**rror.
Transmission sent by a transceiver back to the LAN controller (processor) to let the controller know whether the collision circuitry is functional. Also called heart-beat.

SSH

Secure **SH**ell.
Allows an encrypted communication via unsecured networks with authentication of the communicaton partners, integrity and confidentialy of the exchanged data.

Star Coupler.

See Hub.

ST

A widely used plug connector for fiber optic cable with bayonet locking. It is also known as BFOC plug. It is standardized as the only plug connector for Ethernet (10 Mbit/s). ST is a registered trademark of AT and T.

Store-and-Forward

A method of working for switches in which a data packets is first read-in completely and checked for errors before the switch relays the same. This process enables the connection of segments with differing transmission rates.

STP

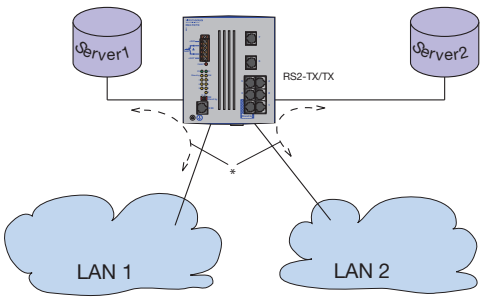
Shielded **T**wisted **P**air.
See Twisted Pair-Kabel.

Subnetmask

Network mask or subnet mask. The network mask marks all the bits of an IP address for the identification of the network and the subnetwork. Also see IP address.

Switch

A device that works on Layer 2 of the OSI reference model. In contrast to hubs, switches analyze the incoming data packets and only relay them to ports at which the receiver is registered. Exceptions from such targeted switching are multicasts and broadcasts that are sent to all ports. The transmission of data packages can be done at several ports simultaneously and in full duplex operation. Thus switches optimize the available bandwidth of the LAN. Recently, Layer 3 and Layer 4 switches have been brought out, that have additionally implemented the partial function of these layers.



* Übertragung **gleichzeitig** möglich

Switched Network

Term for an Ethernet network that is made up of switches.

Switching Hub

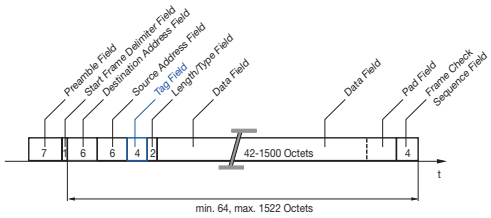
See Hub.

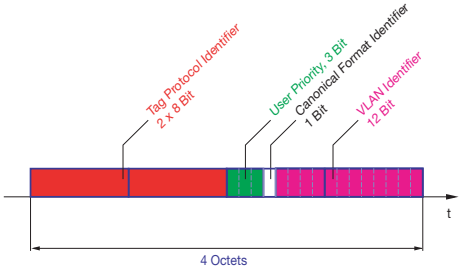
SX

Short Wavelenth (Gigabit-Ethernet).

TAG-Feld

An optional field in the Ethernet telegram that contains information about the priority and associated VLAN of the payload data.





TCO

Total **C**ost of **O**wnership.

TCP

Transport **C**ontrol **P**rotocol.

A connection-oriented protocol at Layer 4 of the OSI reference model. It enables a full duplex point-to-point connection and extends the Internet protocol below it by functions for data security and connection control.

TCP/IP

Transmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol.

Most widely used protocol family from layer 3 upwards.

Standardized by the IETF. Protocols included in this family are:

Layer 3: IP

Layer 4: TCP, UDP

Layer 5: TFTP, SMTP, FTP, ...

Layer 5 contains layers 5 to 7 of the OSI model.

Telnet

An emulation program based on TCP/IP that executes processes or uses programs on a different device. The system resources of the other device are used. This distinguishes Telnet from FTP for example, which only searches for file systems.

TFTP

Trivial **F**ile **T**ransfer **P**rotocol.

A protocol based on Layer 5 of the OSI reference model and uses UDP for fast and uncomplicated transmission of files. TFTP is considerably quicker than FTP.

Thick Wire

See 10BASE-5.

Thin Wire

See 10BASE-2.

TIA

Telecommunications **I**ndustry **A**ssociation.

Standardization body.

Topologie

A description of the type of line routing. The essential basic forms are line topology, tree topology, ring topology and star topology.

TOS

Type **O**f **S**ervice.

A field in the Internet protocol for prioritizing data.

TP

See **T**wisted **P**air Cable.

Transceiver

1. General term for a transmission/ reception component.

2. Term for media converter within the Rail family.

In addition there are plug-on transceivers for fiber optic cables, twisted pair and coax cables. These transceivers are provided with power supply over the 15-pole AUI interface by the terminal device connected.

Industrial Ethernet Lexikon

Transmission Rate

Term for the speed at which data is transmitted.
For Ethernet: 10, 100, 1000 and 10000 Mbit/s.

Trap

Term for the signaling of error signals to a network management station.

Trunking

See Link Aggregation.

TTL

Time **T**o **L**ive.
A field in the header of the Internet protocol that indicates for how long the packet is valid.

Tunnelling

Term for the packaging of data in data packets of another protocol that operates on the same Layer of the OSI reference model. This process is also termed encapsulation.

Twisted

Term for 2 wires that are isolated from each other but are twisted together. A distinction is made in this connection between Unscreened (UTP) and Screened Twisted Pair cables (STP).

Tx

Abbreviation for transmitter.
Term for the connection to a port to which data is sent.

UDP

User **D**atagram **P**rotocol
A connectionless protocol at Layer 4 of the OSI reference model. In contrast to the Transport Control Protocol (TCP), UDP does not have any functions for data security and connection control. As a result it is considerably faster and more suitable for real-time applications such as speech and video transmissions as well as for the transmission of short messages that can be repeated in case of error.

UL

www.ul.com
Underwriters **L**aboratories.
Independent institution in the USA that lays down and executes safety tests for products.

Unicast

Term for sending a message to a specific receiver.

UPS

Uninterruptable **P**ower **S**upply.
See USV.

URL

Universal **R**esource **L**ocator.
A standardized scheme for access to hypertext documents and other services through a browser.

USB

Universal **S**erial **B**us.
Term for a serial bus for connection of modems, mice, keyboards, printers and other peripheral devices. A maximum of 127 devices can be connected to the bus. The cable length between two devices must not exceed 5 m.

UTP

Unshielded **T**wisted **P**air.
See Twisted Pair Cable.

Vollduplex

See Full Duplex.

VLAN

Virtual **LAN**
Term for LANs that are logically configured independently of their real physical topology. A distinction is made between static and dynamic VLANs. In static VLANs, the ports of a switch are permanently allocated to one or more VLANs. A subnetwork is therefore made up of a list of port numbers. In the case of dynamic VLANs, the subnetworks are made up of MAC or IP addresses that are maintained in a database. The ports of the switches are automatically configured on the basis of this database. VLANs are intended for making groups of participants who can only communicate with each other in accordance with predefined rules. A further application of VLANs is the delimitation of broadcasts.

VPN

Virtual **P**rivate **N**etwork.

Virtual private networks are used in connection with public networks for secure data transmission, consequently the entire data traffic is transmitted in encoded form.

VRRP

Virtual **R**edundant **R**outer **P**rotocol.

A protocol for the control of redundant routers.

WAN

Wide **A**rea **N**etwork.

Term for private or public networks that frequently connect several LANs or MANs together.

WDM

Wavelength **D**ivision **M**ultiplex.

WEP

Wired **E**quivalent **P**rivacy.

WEP is a coding procedure in Wireless LANs according to 802.11 for the protection of the transferred data.

Web Interface

Term for the interface of a device that enables access to device data over browsers.

WFQ

Weighted **F**air **Q**ueuing.

A process with which queues in a switch are processed when the data is prioritized. This process ensures that all the queues are serviced on the basis of the bandwidths that are allocated to the queues.

WiFi

Wireless **Fi**delity.

WiFi is a certifying of Wireless LANs (WLAN) according to standard 802.11which is accomplished by the WECA (Wireless Ethernet Compatibility Alliance). With this certifying interoperability of the wireless LAN products are confirmed. http://www.wi fi.net

WLAN

Wireless **L**AN.

Wireless data transmission in local networks.

Acc. IEEE 802.11, .15, .16 (Bluetooth).

WWDM

With WWDM-system (Wide Wavelength Division Multiplex) networks with limited fiber can increase channel capacity of the fiber by between two locations. A optically multiplexes some single mode optical signals into one composite optical signal. Using the same fiber optic pair, multiple point-to-point applications can be satisfied. This greatly reduces the cost of intalling more fiber.

WWW

World **W**ide **W**eb.

Term for an application in the Internet that enables access to database information through hyperlinks. There are software programs called browsers to view and further process data.

X.25

Data Packet Control Protokoll, used for example by Datex-P.

XML

Extended Markup Language.

Yellow Cable

See 10BASE-5.

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