The new MACH 4000 Family.

Requirements and Solutions

The new MACH 4000 Gigabit switches and routers offer maximum transmission rates in the backbone area where many networks are linked. This is increasingly desired not only in factories and transportation automation, but also on ships, where ETHERNET will become the future standard. In addition to maximum flexibility and reliability, switches that are extremely compact in size are also required.

With its modular, stackable system, the latest MACH 4000 generation provides maximum performance in the industrial backbone: Up to 48 GE ports and 3 x 10GE ports speak for themselves and assure fast switching in the industrial ETHERNET. The new MACH 4000 family is available in various versions to meet all requirements: From 24 GE ports up to 48 GE ports or additionally with 3 x 10GE ports. All of this is packed into a compact chassis that offers a high port density and modularity in a minimum of space. Plus additional functions for industry, such as HIPER-Ring, redundant coupling, or shock and vibration resistance with GL approval.

Hirschmann Competence Center

In addition to the highest quality network components, Hirschmann offers through its Competence Center the appropriate consulting, service, support and training expertise to assist you in achieving your overall objective. Please contact us about your individual requirements.

www.hicomcenter.com

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Hirschmann Automation and Control GmbH

Industrial ETHERNET

FiberINTERFACES

Industrial Connectors

Electronic Control Systems

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Even more performance on board:

MACH 4000 with 10Gigabit ETHERNET.

- High-performance, modular backbone router
- Now also with 10Gigabit ETHERNET ports
- Extremely low height in a 19" chassis
- Additional approvals for industry
- Temperature range from 0°C to + 60°C
- Fast ring redundancy – HIPER-Ring

Smaller, more compact, more powerful.

Applications

On the one hand, Industrial ETHERNET is becoming increasingly important in factory and process automation, where optimum interaction among production areas via the HIPER-Ring protocol and redundant coupling is essential. And, on the other hand, also in transportation automation, such as on ships, in locks and waterways, in tunnels or for video monitoring. In short: in all transportation applications where ext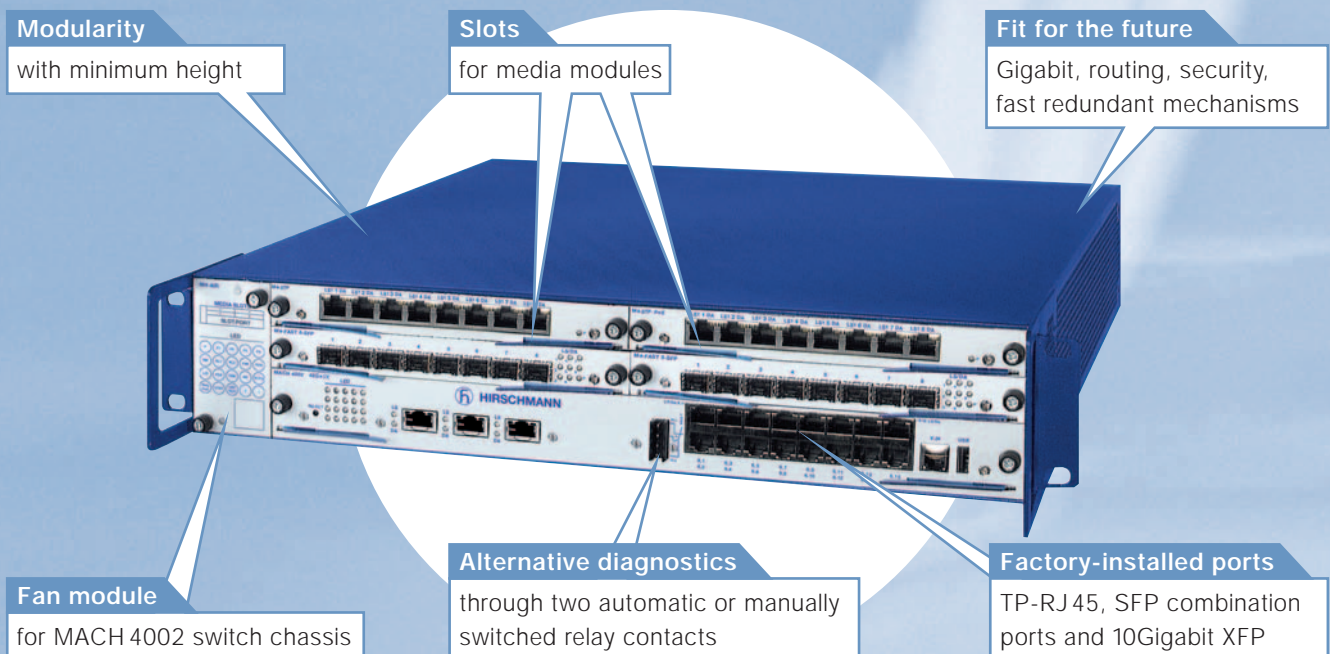remely fast switching is required for convergent networks, i.e. combinations of voice, data and video via HIPER-Ring. As robust backbone switches and routers, the new MACH 4000 family assures maximum performance, optimum reliability and cost-effective port prices in industrial networks. Perfectly packaged in a compact, industrial-grade chassis that can be expanded with a variety of media modules for specific requirements.
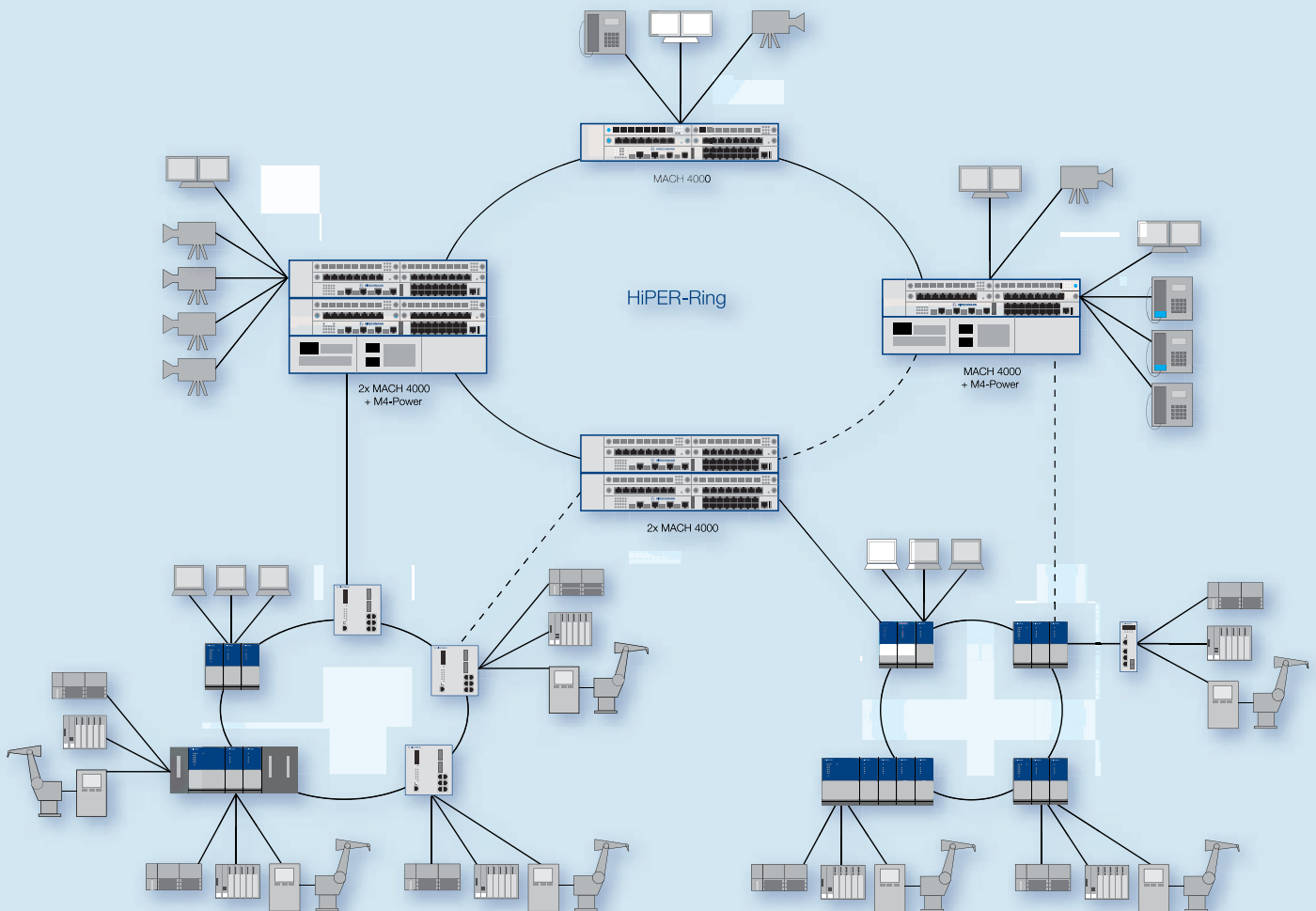
Product Features

The new MACH Gigabit switches and routers are available in various versions: either simply as a Layer 2 Switch (L2P), additionally with static routing (L3E) or in a dynamic routing version with multicast routing (L3P). Each with a choice of power supply and individually populated with the appropriate modules. Through appropriate cascading, the Gigabit ETHERNET successors of the MACH 3005 can be configured as compact systems with high port density.

- The combination of pre-installed and modular ports offers an excellent price/performance ratio.
- Each media module supports up to 8 ports
- Expandable by up to 4 media modules
- Extended temperature range from 0 up to + 60° C
- Plug & Play function
- Supports power sources with 100 up to 240 V AC, 120 up to 350 V DC, 24 V DC and 48 V DC
- HIPER-Ring protocol with redundant coupling
- Power supply redundancy through use of M4-POWER chassis

Modularity
with minimum height

Slots
for media modules

Fit for the future
Gigabit, routing, security, fast redundant mechanisms

Fan module
for MACH 4002 switch chassis

Alternative diagnostics
through two automatic or manually switched relay contacts

Factory-installed ports
TP-RJ 45, SFP combination ports and 10Gigabit XFP

MACH 4000 System

MACH 4000 Switch

Power Supply

Fan Module

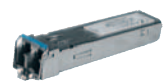**Gigabit ETHERNET SFP Fiber Optic Module**

TP Media Module

SFP Media Module

10Gigabit ETHERNET XFP Fiber Optic Module

Fast ETHERNET SFP Fiber Optic Module

Power Supply Chassis

Power Supply Module

Power Supply Module with two Inputs for redundant power source

Product Family MACH 4000

Product description

Description	MACH 4000, modular, managed Industrial Backbone-Switch, Layer 2 Switch with Software Professional.	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.

Type	MACH 4002-48 G + 3X-L2P	MACH 4002-48 G + 3X-L3E	MACH 4002-48 G + 3X-L3P
Port type and quantity	up to 48 Gigabit-ETHERNET and 3 x 10Gigabit-ETHERNET ports, thereof up to 32 Gigabit-ETHERNET ports above media modules practicable, 3 x 10Gigabit XFP sockets and 16 Gigabit TP (10/100/1000 Mbit/s) ports are integral installed		
Order No.	943 878-101	943 878-201	943 878-301

Type	MACH 4002-24G + 3X-L2P	MACH 4002-24G + 3X-L3E	MACH 4002-24G + 3X-L3P
Port type and quantity	up to 24 Gigabit-ETHERNET and 3 x 10Gigabit-ETHERNET ports, thereof up to 16 Gigabit-ETHERNET ports above media modules practicable, 3 x 10Gigabit XFP sockets and 8 Gigabit TP (10/100/1000 Mbit/s) ports are integral installed		
Order No.	943 915-101	943 915-201	943 915-301

Type	MACH 4002-48G-L2P	MACH 4002-48G-L3E	MACH 4002-48G-L3P
Port type and quantity	up to 48 Gigabit-ETHERNET ports, thereof up to 32 Gigabit-ETHERNET ports above media modules practicable, 16 Gigabit-ETHERNET ports TP (10/100/1000 Mbit/s) are integral installed therof 8 Gigabit as combo SFP (100/1000 Mbit/s) ports or TP (10/100/1000 Mbit/s) ports		
Order No.	943 911-101	943 911-201	943 911-301

Type	MACH 4002-24G-L2P	MACH 4002-24G-L3E	MACH 4002-24G-L3P
Port type and quantity	up to 24 Gigabit-ETHERNET ports, thereof up to 16 Gigabit-ETHERNET ports above media modules practicable, 8 Gigabit-ETHERNET combo ports SFP (100/1000 Mbit/s) or TP (10/100/1000 Mbit/s) are integral installed		
Order No.	943 916-101	943 916-201	943 916-301

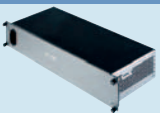| Type	MACH 4002-48 + 4G-L2P	MACH 4002-48 + 4G-L3E	MACH 4002-48 + 4G-L3P
Port type and quantity	up to 48 Fast-ETHERNET and 4 Gigabit-ETHERNET ports, thereof up to 32 Fast-ETHERNET ports above media modules practicable, 4 Gigabit-ETHERNET combo ports SFP (1000 Mbit/s) or TP (10/100/1000 Mbit/s) and 16 Fast-ETHERNET ports TP (10/100 Mbit/s) are integral installed		
Order No.	943 859-101	943 859-201	943 859-301

Software

Version	L2P – Layer 2 Professional	L3E – Layer 3 Enhanced	L3P – Layer 3 Professional
Management	serial interface, web interface, SNMP V1/V2/V3, HiVision, file transfer SW HTTP/TFTP		
Configuration	command line interface (CLI), V 24, TELNET, BootP, DHCP, HiDiscovery, auto-configuration adapter (ACA21-USB)		
Diagnostics	LEDs (power, link status, data, 100 Mbit/s, auto-negotiation, full-duplex, error, redundancy management, ring-port, LED-test), cable test, signal contact, syslog, logfile, RMON, port mirroring		
Security	authentication 802.1x, port-security (MAC- and IP-adresses), SNMP V3, ACL, SSH, SSL		
Other services	QoS 8 classes, port priorisation (IEEE 802.1D/p), VLAN (802.1Q), TOS (Type of Service) Diff.-Serv, TOS-Prio-Mapping, traffic shaping, flow control IEEE 802.3x, SNTP (Simple Network Time Protocol), protocol based VLANs (IP, nonIP Traffic), multicast (IGMP snooping/querier, GMRP), broadcast limiter, DHCP Option 82		
Redundancy functions	HIPER-Ring (ring structure), RSTP (rapid spanning tree protocol), redundant network/ring coupling (master/receiver functionality), redundant 24 V power supply by M4-Power basic device, redundant signal contact, link aggregaion dynamic and static (max. 7 trunks, 8 ports/trunk, LACP)		
Routing		static routing, layer 3 – ACL	static routing, layer 3 – ACL
Router redundancy		VRRP, HiRRPv2 (pending)	VRRP, HiRRPv2 (pending)
Dynamic routing		RIP V1/2	RIP V1/2, OSPF
Multicast routing			Multicast routing DVMRP/PIM DM

Datas and facts

More interfaces	
Signaling contact	1 plug-in terminal block, 4-pin, 2x egresses manual or automatic switchable (1 A at 24 V DC)
V.24 interface	1 x RJ11 socket, serial interface to the configuration of devices
USB interface	1 USB interface to connect auto-configuration adapter (ACA21-USB)
Network size – cascadibility	
Line-/star topology	any
Ring structure (HIPER-Ring)	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)
Redundancy	redundant 24 V power supply by M4-Power basic device
Ambient conditions	
Operating temperature	0° C up to + 60° C for MACH 4002-48+4G, else 0° C up to + 50° C
Storage/transport temperature	– 25° C up to + 70° C
Relative humidity (non-condensing)	10 % up to 90 %
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19" control cabinet
Protection class	IP 20
Approvals	
Safety of information technology equipment	cUL 60950 (E168643), EN 60950-1/A11: 2004 + Corrigendum: 2004 (pending)
Safety of industrial control equipment	cUL 508 (E175531) (pending)
Germanischer Lloyd	Germanischer Lloyd (GL) (pending)
Railway norm EN 50121-4: 2000	EN 50121-4: 2000, electromagnetic compatibility along the route (> 10 m)
Scope of delivery and accessories	
Scope of delivery	device, terminal block, operating manual, fan M4-AIR installed
Accessories to order separately	power supply unit, auto-configuration adapter ACA21-USB, Industrial HiVision network management

Power supplies

Product description			
Description	Plug-in power supply for MACH 4002 switch chassis	Power supply plug-in for MACH 4002 switch chassis with two inputs for redundant power supply	Power supply plug-in for MACH 4002 switch chassis with two inputs for redundant power supply
Type	**M4-S-AC/DC 300W**	**M4-S-24VDC 300W**	**M4-S-48VDC 300W**
Order No.	943 870-001	943 871-001	943 872-001
Technical data			
Voltage input	non-heating appliance socket	plug-in terminal block	plug-in terminal block
Operating voltage	100 – 240 V AC, 120 – 350 V DC	24 V DC (19 V – 32 V)	48 V DC (38 V – 60 V)
Input frequency	47 – 63 Hz		
Current consumption	1,8 A (230 V), 4,2 A (115 V)	max. 21 A (24 V DC)	max. 10 A (48 V DC)
Activation current	typ. < 40 A at 265 V AC and cold start		
Nominal power of voltage supply	350 W (230 V), 370 W (110 V)	380 W	350 W
Diagnostics	LEDs (P1) at switch chassis	LEDs (P1 and P2) at switch chassis	LEDs (P1 and P2) at switch chassis
Operating temperature	0° C up to + 60° C	0° C up to + 60° C	0° C up to + 60° C

Power supply chassis

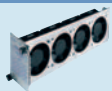| Product description	
Description	M4-POWER chassis for taking up to three power supply plug-in M4-P-xx enables the external and redundant power supply of MACH 4002 switch chassis
Type	**M4-POWER**
Order No.	943 874-001
Technical data	
Technical data	see Power supply plug-in M4-P-AC/DC 300 W, M4-P-24 V DC 300 W, M4-P-48 V DC 300 W
Mechanical construction	
Dimensions (W x H x D)	480 mm x 88 mm x 435 mm
Mounting	19" control cabinet
Protection class	IP 20

Plug-in power supplies

Product description			
Description	Power supply plug-in for M4-POWER chassis	Power supply plug-in for M4-POWER chassis with two inputs for redundant power supply	Power supply plug-in for M4-POWER chassis with two inputs for redundant power supply
Type	**M4-P-AC/DC 300 W**	**M4-P-24VDC 300 W**	**M4-P-48VDC 300 W**
Order No.	943 875-001	943 876-001	943 877-001
Technical data			
Voltage input	non-heating appliance socket	plug-in terminal block	plug-in terminal block
Operating voltage	100 – 240 V AC, 120 – 350 V DC	24 V DC (19 V – 32 V)	48 V DC (38 V – 72 V)
Input frequency	47 – 63 Hz		
Current consumption	1,8 A (230 V), 4,2 A (115 V)	21 A (24 V DC)	max. 10 A (48 V DC)
Activation current	typ. < 40 A at 265 V AC and cold start		
Nominal power of voltage supply	350 W (230 V), 370 W (110 V)	380 W	350 W
Diagnostics	LEDs (P3) at switch chassis	LEDs (P3 and P4) at switch chassis	LEDs (P3 and P4) at switch chassis
Operating temperature	0° C up to + 60° C	0° C up to + 60° C	0° C up to + 60° C

Fan

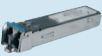| Product description	
Description	Plug-in fan for MACH 4002 switch chassis, four redundant single fans
Type	**M4-AIR**
Order No.	943 869-001
Technical Data	
Operating voltage	operating voltage via MACH4002 switch chassis
Diagnostics	LEDs (FAN) at basic device
Operating temperature	0° C up to + 60° C

Power supplies

Product description

Description				
	Media module for MACH 4000 10/100/1000 BASE-TX (1000 MBit/s not with MACH 4002-48+4G)	Media module for MACH 4000 10/100 BASE-TX with power supply for terminals for IEEE802.3af (PoE), max. 100 W per MACH 4002 (PoE via data lines)	Media module for MACH 4000 100 BASE-FX with SFP sockets	Media module for MACH 4000 1000 BASE-X with SFP sockets (not with MACH 4002-48+4G)
Type	M4-8TP-RJ45	M4-FAST 8TP-RJ45-PoE	M4-FAST 8-SFP	M4-GIGA 8-SFP
Order No.	943 863-001	943 873-001	943 864-001	943 879-001

Technical data

Port type and quantity	8 x 10/100/1000 BASE-TX RJ 45 sockets for TP cable, auto-crossing, auto-negotiation, auto-polarity	8 x 10/100 BASE-TX RJ 45 sockets for TP cable, auto-crossing, auto-negotiation, auto-polarity	8 x 100 BASE-FX, with M-FAST SFP transceiver	8 x 100/1000 BASE-X, 100 MBit/s using M-FAST SFP transceiver, 1000 MBits/s using M-SFP transceiver
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)	LEDs (power, link status, data, full duplex, ring port, LED test)	LEDs (power, link status, data, full duplex, ring port, LED test)
Operating voltage	power supply via the backplane of the MACH 4000 switch	power supply via the backplane of the MACH 4000 switch	power supply via the backplane of the MACH 4000 switch	power supply via the backplane of the MACH 4000 switch
Power consumption	2 W	2 W + max. 100 W ext. user	15 W	15 W
Operating voltage	0° C up to + 60° C	0° C up to + 60° C	0° C up to + 60° C	0° C up to + 60° C

SFP fiber optic Fast-ETHERNET transceiver

Product description

Description				
	SFP fiber optic Fast-ETHERNET transceiver	SFP fiber optic Fast-ETHERNET transceiver	SFP fiber optic Fast-ETHERNET transceiver	SFP fiber optic Fast-ETHERNET transceiver
Type	M-FAST SFP-LH/LC	M-FAST SFP-SM+/LC	M-FAST SFP-SM/LC	M-FAST SFP-MM/LC
Order No.	943 868-001	943 867-001	943 866-001	943 865-001

Network size – length of cable

Multimode fiber (MM) 50/125 µm (62.5/125 µm)				5 km (4 km at 62.5/125 µm)
Single mode fiber (SM) 9/125 µm	60 – 120 km	24 – 72 km	20 km	

Technical data

Port type and quantity	1 x 100 BASE-FX with LC-Connector
Diagnostics	optical input- and output power, transceiver temperature (diagnostic not for M-FAST SFP-MM/LC)
Operating voltage	power supply via media module
Power consumption	1 W
Operating temperature	0° C up to + 60° C

SFP fiber optic Gigabit-ETHERNET transceiver

Product description

Description				
	SFP fiber optic Gigabit-ETHERNET transceiver	SFP fiber optic Gigabit-ETHERNET transceiver	SFP fiber optic Gigabit-ETHERNET transceiver	SFP fiber optic Gigabit-ETHERNET transceiver
Type	M-SFP-LH+/LC	M-SFP-LH/LC	M-SFP-LX/LC	M-SFP-SX/LC
Order No.	943 049-001	943 042-001	943 015-001	943 014-001

Network size – length of cable

Multimode fiber (MM) 50/125 µm (62,5/125µm)				550 m (275 m)
Single mode fiber (SM) 9/125 µm	60 – 120 km	24 – 72 km	20 km	

Technical data

Port type and quantity	1 x 1000 BASE-SX with LC-Connector
Diagnostics	optical input- and output power, transceiver temperature
Operating voltage	power supply via media module
Power consumption	1 W
Operating temperature	0° C up to + 60° C

XFP fiber optic 10Gigabit-ETHERNET transceiver

Product description

Description				
	XFP fiber optic 10Gigabit-ETHERNET transceiver	XFP fiber optic 10Gigabit-ETHERNET transceiver	XFP fiber optic 10Gigabit-ETHERNET transceiver	XFP fiber optic 10Gigabit-ETHERNET transceiver
Type	M-XFP-ZR/LC	M-XFP-ER/LC	M-XFP-LR/LC	M-XFP-SR/LC
Order No.	943 921-001	943 920-001	943 919-001	943 917-001

Network size – length of cable

Multimode fiber (MM) 50/125 µm (62.5/125µm)				300 m* (33 m)
Single mode fiber (SM) 9/125 µm	40 – 80 km	10 – 40 km	2 km	

Technical data

Port type and quantity	1 x 10 GBASE-SX with LC-Connector
Diagnostics	optical input- and output power, transceiver temperature
Operating voltage	power supply via media module
Power consumption	3 W
Operating temperature	0° C up to + 60° C

* modal bandwidth 2000 [MHz x km]