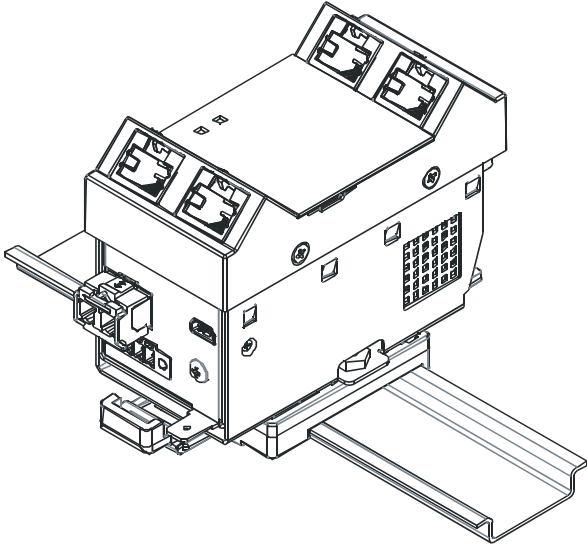# MICROSENS

Data Sheet
Ruggedized Gigabit Ethernet Micro Switch with extended temperature range

made in Germany

Overview

The ruggedized Micro Switch is part of the successful MICROSENS Fiber-To-The-Office (FTTO) series. This model comes with an extended temperature range (-25°C up to +85°C) and offers a mounted holder for 35 mm DIN-rails as option.

This model generally has a SFP uplink and is available in the following six versions:

Horizontal version with 1x SFP Uplink and RJ-45 Donwlink	Vertical version with 1x SFP Uplink and RJ-45 Donwlink (shown in picture above)
Horizontal version with 2x SFP Uplink	Vertical version with 2x SFP Uplink
Horizontal version with support of CSFP	Vertical version with support of CFSP

The very compact switches excel with extremely low space requirements and are used in switching cabinets without defined environmental conditions. The device is designed monolithic and therefore offers shortest installation work, paired with highest robustness and reliability.

The versions with 2 SFP uplinks are intended to be used in ring topologies. Their ring functionality is equivalent and therefore hundred per cent compatible with the MICROSENS industry switches of the Profi Line, Profi Line+ and Profi Line Modular series.

The whole configuration of the Micro Switch can be transferred to another system, just by changing the SD-Card. A fault-tolerant journaling file-system is used and the SD-Card is in accordance with industry standard. An encryption of the SD-Card is as option available.

Features

Gigabit Ethernet Switch

- Fanless Gigabit Ethernet Switch
- Low power consumption switch-chipset, Energy-Efficient Ethernet
- Layer-2+ store-and-forward, full wire-speed, non-blocking
- Max. 8.192 MAC-addresses, automatic Learning and aging
- Jumbo-Frames (max. 10,240 Bytes)

Energy-Efficient Ethernet

- EEE according to IEEE 802.3az
- Optimised power consumption for each RJ-45 port depending on the actual requirement
- 50% reduced power consumption

Network Management

- Supports all common management standards
- High Performance 800 MHz ARM CPU
- Linux operating system with fast system boot (approx. 30 seconds)
- Web Manager (HTTP/HTTPS)
- Telnet/SSH/Console, incl. standard-commands (ping, traceroute, etc.)
- SNMP v1/v2c/v3 with View-based Access Control Model (VACM) and User-based Security Model (USM)
- Central management platform (NMP Professional / NMP Server)
- IPv4/IPv6 Dual Stack
- Integrated CLI scripting for the automation of routine processes
- Firmware-, Script- and configuration files can be loaded, stored and executed direct from the switch
- Incremental firmware updates possible
- Modular MicroSD memory card for configuration, CLI scripts, firmware, encrypted data and MAC address (optional)

Power-over-Ethernet PoE+

- IEEE 802.3at PoE+ (max. 30 W/Port)
- 5x 10/100/1000Base-T, PoE+ (RJ-45)
- Limitation of the total power consumption of the switch to max. 80 W (full power only with suitable installation conditions)
- Ext. power supply with typ. 54 VDC

Connectors

Uplink
- 1x or 2x 1000Base-X SFP slot

Local / Downlink
- 4x or 5x 10/100/1000Base-T (RJ-45) Auto-Negotiation
- Auto MDI/MDI-X function for the use of uniform patch cables

Power Supply
- 3-pin screw pluggable connector for solid or litz wires
- Additional grounding (PE) with 6,3 mm flat-pin plug

Extension Port
- RS-232 Console port
- For optional accessories

Mounting

- Installed holder for DIN-rails (DIN EN 50022)
- Horizontal version fits in panels of switching cabinets
- Compatible to all popular installation systems due to circumferential installation face

Compatibility

- Compatibility to standard CISCO Switches approved

Network management - Feature overview

IP Stack

Dual Stack	Parallel handling of IPv4 and IPv6 protocol.
IPv4 Stack	Internet Protocol v4 handling with support of IPv4, ARP, DHCP, ICMP. RFC 791 (IPv4), RFC 826 (ARP), RFC 792 (ICMP), RFC 2131 (DHCP)
IPv6 Stack	Internet Protocol v6 handling with support of IPv6, DHCPv6, ICMPv6, NDP. RFC 2460/2464/3484/3513 (IPv6), RFC 2462 (Address Configuration), RFC 2463 (ICMPv6), RFC 2461 (Neighbour Discovery Protocol), RFC 3315 (DHCPv6)

Port Control

Administration	Port disable, Individual port alias
Ethernet Copper	Auto-Negotiation, speed, duplex mode, flow-control, Auto MDI/MDI-X
Ethernet Fiber/SFP	Speed, duplex mode, flow-control
Green IT	Latest chip technology supports Energy-Efficient Ethernet (EEE) according to IEEE Std. 802.3az.

Power-over-Ethernet (PoE)

Function	Sourcing of power to connected devices via standard network Twisted-Pair cable
802.3at mode	PoE+ voltage is turned on only after powered device (PD) is detected and classified on port. Output voltage and power is monitored. Port power is shut down if limits are exceeded.
802.3af mode	PoE voltage is turned on only after powered device (PD) is detected and classified on port. Output voltage and power is monitored. Port power is shut down if limits are exceeded.
Power Management	Power limit can be defined per port and per total device. Additionally the class of the powered device (PD) can be limited per port.
Standards	IEEE Std. 802.3af (Data Terminal Equipment Power via Media Dependent Interface), IEEE Std. 802.3at (Data Terminal Equipment Power via Media Dependent Interface).

Switch Functions

Port Monitor	Monitor port for the connection of a network protocol analyzer. Traffic of the port to be analyzed is copied to the monitor port.
RMON counters	17 Integrated counters for detailed traffic analysis and network trouble shooting.
MAC Table	Access to table of MAC addresses learned by the switch. Can be filtered per port, VLAN address type and entry type (dynamic/static).

Virtual LANs (VLANs)

Function	Logical structuring of physical networks by adding a Virtual LAN ID (VID) to each Ethernet packet. Incoming packets are filtered and forwarded according to their VID. Each port can be configured for Access, Hybrid or Trunk VLAN processing mode. Independent VLANs out of the full range of 1 to 4095 can be filtered per device.
Access Mode	For the connection of non-VLAN capable end devices (e.g. PCs). Outgoing packets are sent untagged. Incoming packets are tagged with the port default VLAN ID (PVID).
Trunk Mode	For the interconnection of VLAN capable switches. Outgoing packets are always sent tagged. Incoming packets are received tagged. Incoming packets without VLAN tag are tagged with the port default VLAN ID (PVID).
Hybrid Mode	For the connection of VLAN capable and non-VLAN capable devices on the same port (e.g. VoIP-phone (tagged) and PC (untagged)). Outgoing packets are sent tagged, except packets for the port default VLAN ID (PVID), which are untagged. Incoming packets are received untagged for the port default VLAN (PVID), all other packets are tagged.

Priority Override	VLAN priority code point of incoming packets can be overwritten with the VLAN specific priority defined in the VLAN filter.
Voice VLAN	VLAN ID used by LLDP/CDP to assign VLAN to connected VoIP-phone.
RSTP VLAN	VLAN ID used by Spanning Tree instance for BPDU tagging.
Unauthorized VLAN	VLAN ID assigned by Port Based Access Control to unauthorized ports (guest VLAN).
Management VLAN	VLAN ID used by the management agent (device internal port).
Standard	IEEE Std. 802.1D, IEEE Std. 802.1Q, IEEE Std. 802.1p

Quality of Service (QoS)

Priority Queues	4 priority queues per port.
Prioritization Scheme	Strict priority (higher priority always first) or weighted fair queuing (8:4:2:1 highest to lowest).
Layer1 Priority	Static priority queue can be assigned for each port.
Layer2 Priority	Incoming packets are forwarded according to the priority code point in their VLAN tag. The 8 VLAN priority code points can be individually mapped on the 4 priority queues.
Layer3 Priority	Incoming packets are forwarded according to the value of the DiffServ Codepoint (IPv4) / TrafficClass (IPv6) in their IP header. Maximum 64 code points are supported. For each code point the corresponding priority queue can be mapped.
Traffic shaping	5 ingress rate shaping buckets per port. Supports rate and priority based rate shaping
Standard	IEEE Std. 802.1p (VLAN priority code point), RFC 2474/3260 (IPv4 DiffServ/IPv6 Traffic Class)

Spanning Tree Protocol / Ring Protocol

Rapid Spanning Tree (RSTP)	Automatic detection of loops and redundant network paths. Single STP instance running in configurable VLAN. Rapid Spanning Tree Protocol (RSTP) backwards compatible to Spanning Tree standard (STP).
MSTP	Separate STP instances running in configurable VLAN groups.
PVST	RSTP per VLAN for one VLAN
MICROSENS Ring Protocol	MICROSENS Redundant Ring Protocol with ultra-fast recovery time <20 ms within MICROSENS Ring topologies.

Multicast Forwarding

IGMP Snooping	Snooping of Internet Group Management Protocol (IGMPv1/v2/v3) for IPv4. Automatic detection and forwarding of IPv4 multicast-streams. Unregistered packets can be flooded or blocked. Multicast routers can be detected by discovery or by query message.
Standard	RFC 4541 (IGMP)

Link Layer Discovery Protocol (LLDP)

Function	Advertising identity, capabilities, and neighbours on a connected network segment.
LLDP-MED	Media Endpoint Discovery for the auto-discovery of LAN policies.
Standard	IEEE Std. 802.1AB (LLDP), ANSI/TIA-1057 (LLDP-MED)

Cisco Discovery Protocol (CDP)

Function	CDP v1, v2 for automatic detection of capabilities of neighbour CDP enabled devices.
Voice VLAN	Support of Voice VLAN for configuration of connected Cisco VoIP-phone.

Real Time Clock (RTC)

Function	Internal device clock can be synchronized with external NTP server.
Protocol	Simple Network Time Protocol (NTP)
Standard	RFC 4330 (NTP)

Port Access Control

Function	Port-Based Network Access Control with dynamic port VLAN support and fallback to MAC based authentication methods. Network access is controlled at the port level. Supports IEEE Std. 802.1X Authentication, RADIUS MAC Authentication, MAC Locking and forced authorized/unauthorized mode.
Communication	EAPOL, RADIUS
Authentication Protocols	EAP-MD5, EAP-PEAP (inner protocol: MSCHAPv2), EAP-TLS, EAP-TTLS (inner protocols: EAP-MD5, EAP-TLS, PAP)
IEEE 802.1X Authentication	Multiple users can be authenticated using central RADIUS server based on username/password or certificate.
RADIUS MAC Authentication	Multiple users can be authenticated using central RADIUS server based on their MAC addresses.
MAC locking	Multiple users can be authenticated based on their MAC addresses. Authorized MAC addresses are stored permanently in the device. They can be configured manually or automatically by locking the first MAC addresses learned on the port.
Dynamic VLAN	RADIUS server can provide user specific VLAN ID using tunnel-attribute in accept message. Port VLAN is dynamically set accordingly. Unauthorized users may be placed in an unauthorized VLAN ('guest VLAN') or blocked completely.
IP Address Detection	The IP address of the connected user is detected via ARP snooping. User IP address information can be logged using RADIUS accounting function.
Standard	IEEE 802.1X-2004 (Port-Based Network Access Control).

User Login

Function	Implements user based and view based authentication and scope limiting. Supports unlimited number of user/groups and views (limited by system memory constrains only). Offers ultimate flexibility with precise access control.

Command Line Interface (CLI)

Function	Intuitive command-set with auto-complete and redo-buffer. Individual console prompt string, Console inactivity timeout. Supports full scripting and editing of script files. Supports colour displays. Permits offline configuration as well as management of an unlimited number of user configuration sets (limited by system memory constrains only).
Telnet	Telnet via TCP/IP port 23.
Secure Shell (SSH)	SSH via TCP/IP port 22. Authentication methods RSA, Diffie-Hellman Key Exchange. Encryption protocols 3DES-CBC, HMAC-SHA1.

Web Manager

Function	Integrated Web Manager with graphical user interface (GUI) for device configuration and administration using standard web browser.
Protocol	HTML v4.01,HTTP, HTTPS, Java Script
Browser compatibility	Firefox 4.x, IE 8.x, JavaScript support required.

Simple Network Management Protocol (SNMP)

SNMPv1/v2c	Simple Network Management Protocol v1, v2c (SNMPv1, v2c) to access device information stored in Management Information Base (MIB). Security provided by community strings for Set/Get commands and optionally by G6 login scheme.
Traps (SNMPv1/v2c)	Traps, Notifications sent to unlimited number of independently configurable receiver destinations (limited by system memory constrains only). Sending of message is triggered by internal device status change events. Event triggers can be configured individually per destination. Test function to trigger Trap/Notification for simplified configuration check (Web Manager and CLI only).
SNMPv3	Simple Network Management Protocol v3 (SNMPv3) for secure access to device information stored in Management Information Base (MIB). SNMPv3 supports data encryption, User-based Security Model (USM) and View-based Access Control Model (VACM).
Traps (SNMPv3)	Trap/Notification, InformRequest, Response sent to independently configurable receivers. Sending of message is triggered by internal device status change events. Informs provide secured messaging by requiring response message Event triggers can be configured individually per receiver.
MIBs	MIB-2, Enterprise-MIB (MICROSENS G6 MIB). File can be downloaded from the integrated Web Manager.
Standard	RFC 1155/1156/1157 (SNMPv1), RFC 1901/1905/1906 (SNMPv2), RFC 3411/3412/3584 (SNMPv3), RFC 2574/3414 (USM), RFC 2575/3415 (VACM)

RADIUS Client

Function	RADIUS client via UDP/IP ports 1812 (access), 1813 (accounting) for Remote Authentication Dial In User Service (RADIUS) server for authorizing user access and logging of user accounting information.
Redundancy	In case of a response timeout, the next RADIUS server is requested.
Standard	RFC 2865 (RADIUS), RFC 2866 (Accounting), RFC 2868 (Tunnel Attributes)

Files

Configuration	File transfers may be used to upgrade the software or to load configuration files. The unit supports TFTP, FTP, SFTP, HTTP, HTTPS transfer protocols. Additionally files may be loaded via DHCP directives.
Firmware Update	Software download can be complete or incremental. Individual modules may be upgraded, normally without influencing service. Flexible system permits customized upgrade files if required.

Syslog Client

Function	Syslog messages are triggered by system events and can be send to unlimited number of Syslog servers (limited by system memory constrains only).
Standard	RFC 5424

Event Manager

Function	Mapping of device status changes (Triggers) to actions e.g. sending out SNMP trap, Syslog message etc.
Customizable events	Event severity and alert level freely configurable. Event text strings may be customized via user interface with developer rights.
Traps and Syslog	Unlimited number of trap and/or Syslog receivers. Event may be filtered individually on a group level.

IEEE / RFC Standards

RFC Standards

RFC 791	IPv4
RFC 792	ICMP
RFC 826	ARP
RFC 1155	SNMPv1
RFC 1156	SNMPv1
RFC 1157	SNMPv1
RFC 1901	SNMPv2c
RFC 1905	SNMPv2
RFC 1906	SNMPv2
RFC 2131	DHCP
RFC 2460	IPv6
RFC 2461	IPv6 Neighbour Discovery
RFC 2462	IPv6 Auto Configuration
RFC 2463	ICMPv6
RFC 2464	IPv6
RFC 2474	IPv4 DiffServ
RFC 2574	USM
RFC 2575	VACM
RFC 2865	RADIUS
RFC 2866	Accounting
RFC 2868	Tunnel Attributes
RFC 3260	IPv6 DiffServ
RFC 3315	DHCPv6
RFC 3411	SNMPv3
RFC 3412	SNMPv3
RFC 3414	USM

RFC 3415	VACM
RFC 3484	IPv6
RFC 3513	IPv6
RFC 3584	SNMPv3
RFC 3810	MLD
RFC 4330	NTP
RFC 4541	IGMP Snooping
RFC 4604	MLD
RFC 5424	Syslog

IEEE Standards

802.1D-2004	(Rapid) Spanning Tree
802.1Q-2005	Multiple Spanning Tree
802.1p	QoS
802.1Q	VLAN
802.1X	Network Access Control
802.1AB	LLDP
802.3i	10Base-T
802.3u	100Base-TX
802.3x	Full duplex and flow control
802.3z	1000Base-X
802.3ab	1000Base-T
802.3af	Power-over-Ethernet
802.3at	Power-over-Ethernet (PoE+)
802.3az	Energy-Efficient Ethernet

Quality – Made in Germany

To guarantee constant high quality of the Micro Switch Generation 6 all models and versions are produced in Germany on site Hamm.

Concluding each device has to pass a full load performance test on all network-ports without any transmission error.

Additionally devices of each batch have to complete an extended (48h) burn-in-test, in which they are functionally tested at high load, so early failures could be detected before delivery.

Interfaces

Title block
integrated

Reset/System Button
hidden

LED Display
Switch/Port/PoE Status

Lokal Ports
*Energy Efficient Ethernet
PoE+ (max. 30 W)*

Uplink Port
SFP/fixed/RJ-45 (PD)

Power Supply
54VDC / 230VAC

Extension Port
Terminal & more

Downlink Port
*Energy Efficient Ethernet
PoE+ (max. 30 W)*

Memory card
Firmware/Configuration

Bevelled edge
Simplifies installation in narrow housings

Technical Specifications

Switch

Type	Gigabit Ethernet Switch Layer 2+, IEEE 802.3 compliant
Performance	Store-and-forward Full wire-speed, non-blocking on all ports
MAC addresses	8.192 addresses, automatic learning and aging
Jumbo Frames	max. 10.240 Bytes

Twisted-Pair Ports

Number	4 or 5
Type	Gigabit Ethernet, Triple Speed 10/100/1000Base-T
Connector	RJ-45 port, shielded
Cable type	Twisted-Pair cable, Category 5e, impedance 100 Ohm, length max. 100 m
Flow Control	Pause Frames (IEEE 802.3x), configurable
Pin out	Auto MDI/MDI-X, Auto Polarity
Power-over-Ethernet	Power Sourcing Equipment (PSE) IEEE 802.3af/at Class 0, max. 30 W Forced-mode (Legacy Devices)

Fiber Port

Type	SFP (Dual Speed) 100/1000Base-X, support of SFP digital diagnostics function
	Optional 2x SFP slot (then only 4x TP)
Connector	LC typ. (depending on SFP)
Flow Control	Pause Frames (IEEE 802.3x), configurable

Control Panel

Reset button	Reset of the switch, new upload of the latest stored configuration (direct hardware function)
System button	Request of the IP configuration for management, reset back to factory default settings

Displays

Type	14 LEDs, detachable	
Link	Twisted pair ports 1..4 and 6	
	green	Link at port. Flashing at data traffic
	oange	Port blocked (via protocol)
	red	Port Access Control rejected
PoE	Twisted pair ports 1..4 and 6	
	green	PoE supplying
	blue	PoE+ active
	orange	PoE Standby
	red	PoE failure
On (switch status)	*green*	ready for operation
	flashing	starting sequence
Sys	*blue*	Factory reset without IP reset in progress
	violet	Factory reset including IP reset in progress
	green	Process completed
	orange	Flashing while Firmware update in progress
LED-modes	*Dynamic*	Standard-mode
	Static	Standard without flash
	Quiet	Only ON- and Sys-LED
	Dark	all LEDs off
	L-show	permanent LED test

Power Supply (DC Voltage)

Input	44..57 VDC (54 VDC typ.)
Power Consumption	Typ. 4,5 W (without PoE) max.80 W (incl. PoE) (full power only with suitable installation conditions)
Connectors	3 pin screw connector, PE/-/+
Grounding (PE)	6,3 mm flat-pin plug

Environmental Conditions

Temperature	Operation	-25..+65 °C
	Storage	-25..+85 °C
Humidity	10..90%, non condensing	

Mechanical

Dimensions	90 x 78,2 x 53,7 mm (w x d x h, without connectors)
Mounting depth	34 mm
Weight	350 g

Technical Specifications (continued)

Standards

| CE	2004/108/EC (EMV)
	2006/95/EG (Low voltage)
Safety	EN 60950-1:2011-01
Emitted interference	EN 55022:2011-12
Immunity	EN 55024:2011-09

Reliability

MTBF	100.000 h
Method	MIL-HDBK-217F

Delivery / Contents

Standard Packaging

Package unit	1 pcs.
Dimensions	158 x 90 x 65 mm
Weight	400 g
Contents	1x Micro Switch
	1x Micro-SD memory card (separate article number)
	1x Ground cable (PE), 20 cm
	1x Power supply plug
	1x Short manual
	1x Set stickers with symbols
	1x DIN-rail holder (mounted)

Memory Card
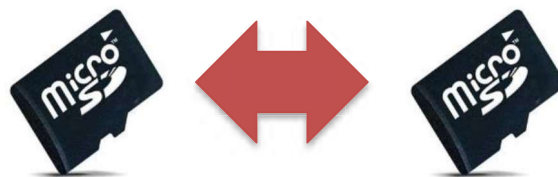
The MicroSD memory card is used for the permanent storage of configuration, script and firmware files. With this memory card it is possible to transfer a configuration to a new device in case of a device failure.

Optional it is possible to write an own MAC address to the MicroSD memory card. This MAC address has priority compared to the MAC address in the switch. This allows having an exact clone of the device by swapping the memory card.

- Change of memory card transfers the **complete** device status
- Firmware update by memory card exchange possible
- Fault tolerant journaling file system
- Industrial grade – long term stability
- Encrypted system as security option
- Only MICROSENS memory cards have to be used. Only with this the long term stability over the complete temperature range can be guaranteed.

Dimensions
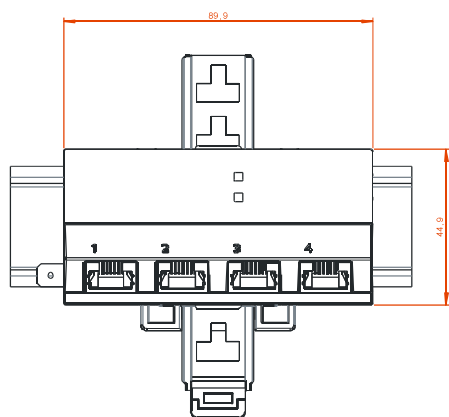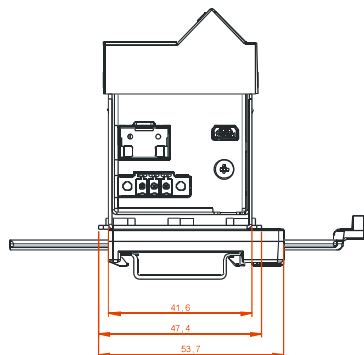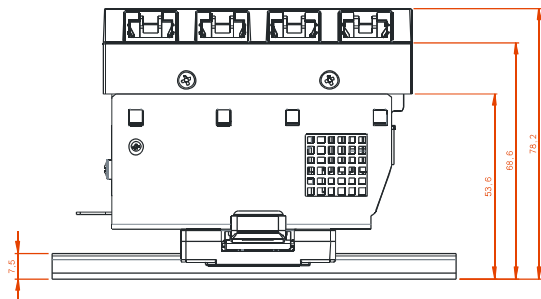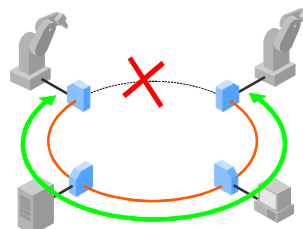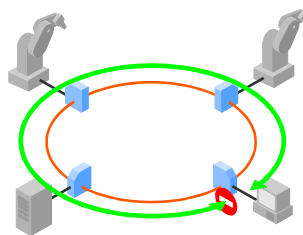
Horizontal Version

Vertical Version
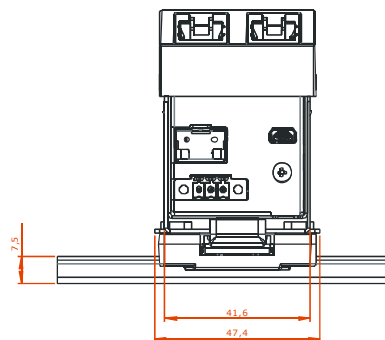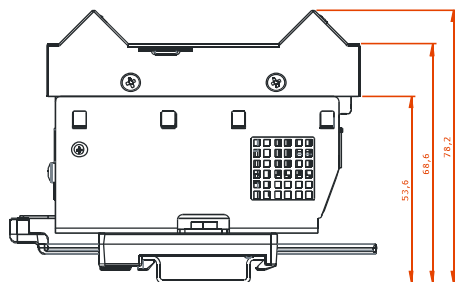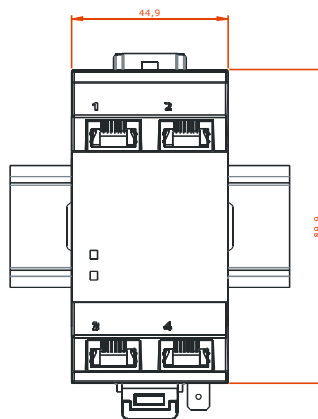
Ring-Topology (Dual Fiber-Uplink)

Normal operation

- All switches are configured for ring operation
- One switch is assigned as ring master
- Ring master cuts the ring logically
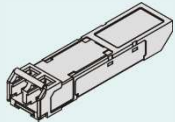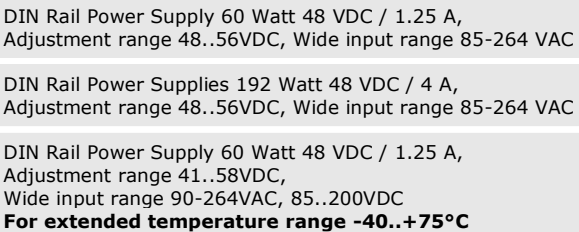
Ring error

- Switches signalize segment failure via ethernet (fiber-uplink)
- Master gets that information via ethernet and closes the logical cut
- Switches relearn the actual network topology (MAC-addresses)
- Network function is re-established in less than 50 ms

Order Information

Description	Article-No. Horizontal version	Article-No. Vertical version
Ruggedized Micro Switch G6, incl. mounted holder for DIN-rails		
1x SFP uplink (100/1000Base-X) 5x TP-Ports (10/100/1000Base-T) with PoE+	**MS440209PMXH-48G6+**	**MS440219PMXH-48G6+**
2x SFP uplink (100/1000Base-X) 4x TP-Ports (10/100/1000Base-T) with PoE+	**MS440207PMXH-48G6**	**MS440217PMXH-48G6**
Support of CSFP (Compact SFP) Uplink 1x 100/1000Base-X, Downlink 10/100/1000T or 2x Fiber-Uplink via 1000X simplex	**MS440208PMXH-48G6+**	**MS440218PMXH-48G6+**
Ruggedized Micro Switch G6, without holder for DIN-rails		
1x SFP uplink (100/1000Base-X) 5x TP-Ports (10/100/1000Base-T) with PoE+	**MS440209PMX-48G6+**	**MS440219PMX-48G6+**
2x SFP uplink (100/1000Base-X) 4x TP-Ports (10/100/1000Base-T) with PoE+	**MS440207PMX-48G6**	**MS440217PMX-48G6**
Support of CSFP (Compact SFP) Uplink 1x 100/1000Base-X, Downlink 10/100/1000T or 2x Fiber-Uplink via 1000X simplex	**MS440208PMX-48G6+**	**MS440218PMX-48G6+**
Memory cards for ruggedized G6 Micro Switch (extended temperature range -25 °C up to +85 °C)		
MicroSD Memory card 4 GB for MICROSENS G6-Switches,		**MS140894X-4G**
MicroSD Memory card 4 GB for MICROSENS G6-Switches, **With own MAC address**		**MS140894X-4G-M**
MicroSD Memory card 4 GB for MICROSENS G6-Switches, **With individual switch configuration according to customer specifications**		**MS140894X-4G-C**
MicroSD Memory card 4 GB for MICROSENS G6-Switches, **With individual switch configuration according to customer specifications and own MAC address**		**MS140894X-4G-MC**

Accessories

Description	Article No.
SFP Transceiver (extended temperature range -40 °C up to +85 °C)	
SFP Transceiver, Gigabit Ethernet, Digital Diagnostic 850 nm Multimode, 1000Base-SX, LC duplex	**MS100200DX**
SFP Transceiver, Gigabit Ethernet, Digital Diagnostic 1310 nm Single Mode, 1000Base-LX, LC duplex	**MS100210DX**
SFP Transceiver, Fast Ethernet, Digital Diagnostic 1310 nm Multimode, 100Base-FX, LC duplex	**MS100190DX**
SFP Transceiver, Fast Ethernet, Digital Diagnostic 1310 nm Single Mode, 100Base-FX, LC duplex	**MS100191DX**
CSFP (Compact SFP) Transceiver (extended temperature range -40 °C up to +85 °C)	
Compact SFP - 2 Channel WDM Transceiver Gigabit Ethernet, 2x Single Mode simplex LC, Tx:1310nm, Rx:1490nm, 10 dB Budget / 10km, Digital Diagnostic, -40..+85°C	**MS100650DXA**
Tx:1490nm, Rx:1310nm	**MS100650DXB**
Title Block Sheets	
Set of A4 sheets, each with 80 labels fitting for the Micro Switch G6 title block 10 sheets per set, suitable for laser printers, perforated	**MS140005**
Network Management	
NMP Professional – Network Management Platform Software incl. one year update license	**MS200160-1**
NMP Professional – additional update license for n years	**MS200161-n**
NMP Standard – Network Management Platform Software incl. one year update license	**MS200162-1**
NMP Standard – additional update license for n years	**MS200163-n**
NMP Server – Network Management Platform Software incl. one year update license and 5 clients	**MS200164-1**
NMP Server – additional update license for n years	**MS200165-n**
External Power Supplies for industrial use with PoE / PoE+ 44..57VDC	
DIN Rail Power Supply 60 Watt 48 VDC / 1.25 A, Adjustment range 48..56VDC, Wide input range 85-264 VAC	**MS700430**
DIN Rail Power Supplies 192 Watt 48 VDC / 4 A, Adjustment range 48..56VDC, Wide input range 85-264 VAC	**MS700467**
DIN Rail Power Supply 60 Watt 48 VDC / 1.25 A, Adjustment range 41..58VDC, Wide input range 90-264VAC, 85..200VDC **For extended temperature range -40..+75°C**	**MS700482-48B**