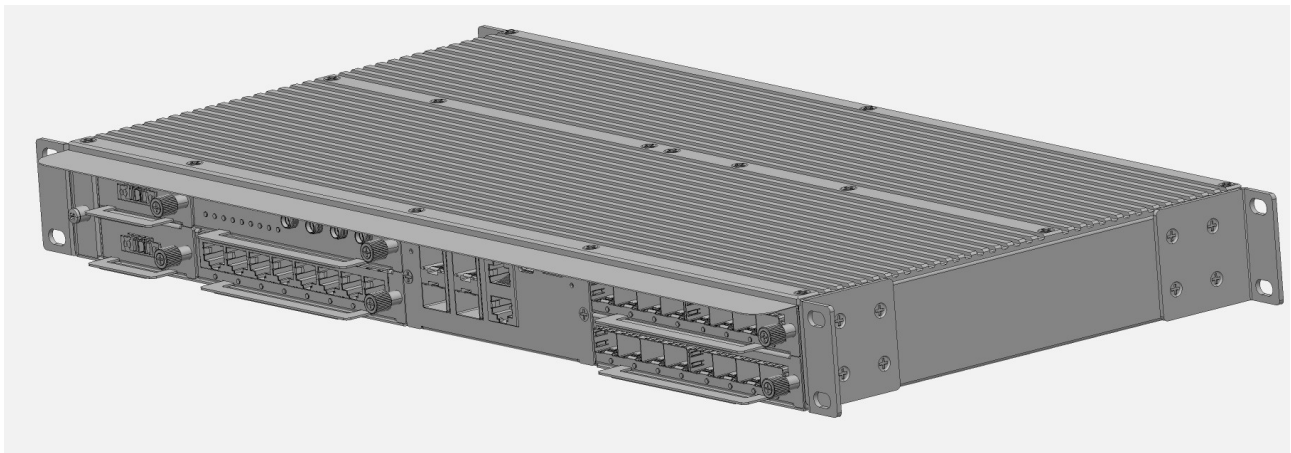


Data Sheet

Modular 28-Port Industrial 19" 10G Ethernet Switch
MS400890MX-BS/3 Series for Power Substation
Applications with Ring Function



4x 10G Uplinks (IEEE 802.3ae)

4x 1/10GBase-X for maximum performance in the network



IT Security

MICROSENS SECURE feature set for a high level of IT security



Modular, Fanless Design

For efficient and maintenance-friendly operation



Standardised Network Redundancy (ERPS acc. to G.8032v2)

Feature set for special redundancy topologies



Extended Temperature Operation

Range of ambient operation temperature from -40 up to +85 °C



Docker Virtualization Environment

Integrated Docker system for free programming of custom functions



Layer3

Layer3 feature set (incl. RIP, OSPF) for broad application diversity



Lossless Transmission Protocols

Includes HSR and PRP



Substation Certified

Certified according to IEC 61850-3



Clock Synchronization

Includes PTP (Precision Time Protocol) acc. to IEEE 1588v2

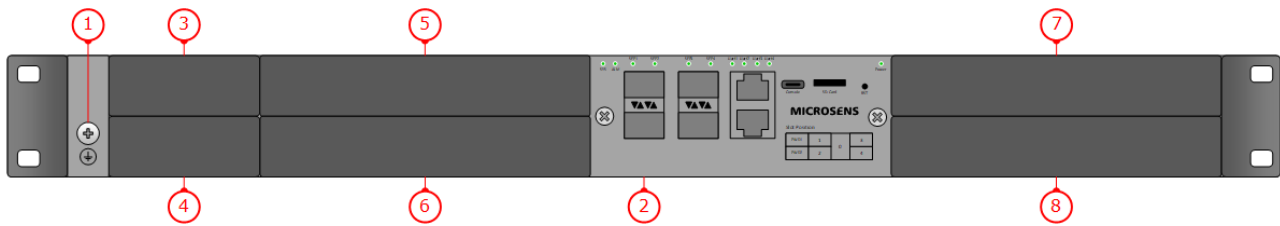


MICROSENS NMP integrated

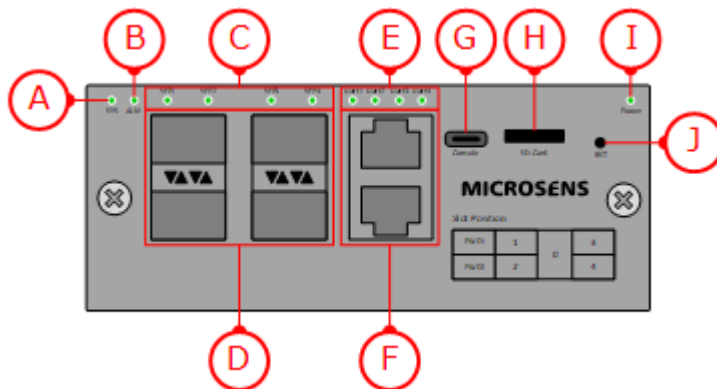
Integrated in MICROSENS NMP software for simple configuration and administration

Interfaces

Front Panel of Switch Chassis



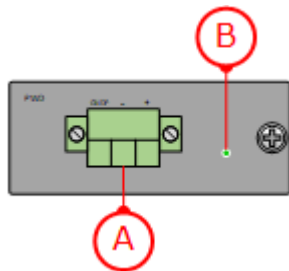
- ① Grounding Screw
- ② Main board (integrated into the Switch chassis)



- Ⓐ System LED.
Off - System not ready
On - System in operation
- Ⓑ Alarm LED
- Ⓒ 1/10G SFP+ Status LEDs
- Ⓓ 4x 1/10GBase-X SFP+ Slots
- Ⓔ UART (RS-485) Status LEDs
- Ⓕ RS-485 Interfaces
- Ⓖ Console Interface (USB-C)
- Ⓗ Industrial microSD Card Slot
- Ⓘ Power LED of Switch Chassis
- ⓵ Reset Button

3 Slot for Power Supply Units, to be equipped with

- 4
- Power Supply Unit
 - Blind Cover

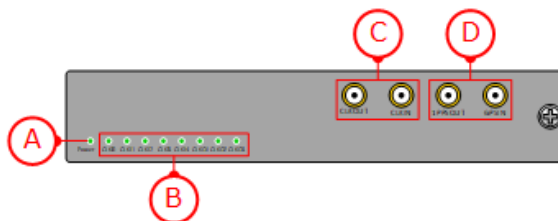


(A) Power Supply
(80...300 VDC or 90...264 VAC)

(B) Power Board LED

5 Slot1 (Slot for PTP Module), to be equipped with

- PTP Module
- Blind Cover



(A) Power LED of PTP Module

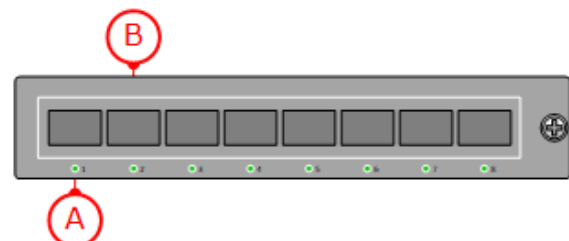
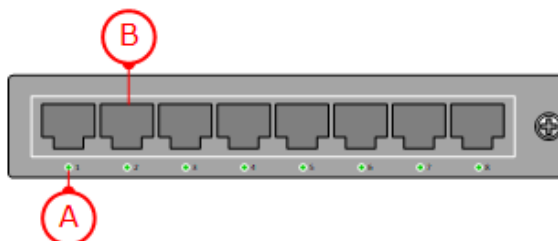
(B) Clock Status LEDs

(C) GPS SMA Interfaces

(D) Bits SMA Interfaces

6 Slot2, Slot3 and Slot4 respectively (Slots for a Switch Module), to be equipped with

- 7
- 8
- Twisted-pair Module (8x 10/100/1000Base-T RJ-45 Ports)
 - SFP Module (8x 100/1000Base-X SFP Slots)



(A) Port Status LED

(B) RJ-45 Port

- Blind Cover

(A) Port Status LED

(B) SFP Slot



Back Panel of Switch Chassis

- ① Power LED of Switch Chassis
- ② Alarm LED
- ③ System LED.
Off - System not ready
On - System in operation
- ④ 1/10G SFP+ Status LEDs
- ⑤ UART (RS-485) Status LEDs
- ⑥ PTP Status LEDs
- ⑦ Clock Lock Status LEDs
- ⑧ Port Status LEDs of Slot2
- ⑨ Port Status LEDs of Slot3
- ⑩ Port Status LEDs of Slot4

Firmware Features

Management

- Support of common management standards
- Software integration with MICROSENS NMP as central management solution for network and device configuration
- Firmware update via Web, FTP, FTPS, NMP
- Firmware Configuration upload/download
- Factory Default Reset
- System reboot
- System status and traffic statistics
- Optional industrial microSD memory card for configuration, CLI scripts, firmware

Provision of Inventory Information

- Factory and inventory data
- Custom defined device info

System

- Integrated thermal protection
- Energy Efficient Ethernet EEE (IEEE 802.3az)
- Alternative MAC address
- LED mode

SFP / SFP+

- SFP/SFP+ DDM (Digital Diagnostic Man.)

IP Routing / Layer3

- Static Routing
- RIP v1/v2
- OSPF v1/v2
- IDRP
- BGP-4
- Routing table settings and status

Switch / MAC

- MAC table
- MAC filter
- SNMP access
- MAC limit per port
- Configurable MAC aging time

IP Stack

- Dual stack (IPv4, IPv6)
- DHCP Option 66/67
- Ping, trace route
- Secondary IPv4 address
- Hostname
- DNS

Virtual LANs (VLANs)

- Port VLANs, tagged VLANs
- Up to 4094 VLANs
- VLAN filter
- Configurable port modes:
 - access, hybrid, trunk
- Stacked VLANs (Q-in-Q)
- Priority override
- Voice VLAN
- STP/RSTP VLAN
- Unauthorized VLAN
- Management VLAN
- Force Port default VID
- IEEE 802.1Q settings
- Private VLANs
- IP interface configuration per VLAN

Link Aggregation Control Protocol (LACP)

- Static Link Aggregation
- Dynamic Link Aggregation
- Load balancing and trunking

Firmware Features (continued)

Redundancy

- Spanning Tree (STP) according to IEEE 802.1D
- Rapid Spanning Tree (RSTP) according to IEEE 802.1w
- eRSTP™ (enhanced RSTP)
- Multiple Spanning Tree (MSTP) according to 802.1Q
- Per-VLAN Rapid Spanning Tree Plus (PVRST+)
- VRRP (Virtual Redundant Route Protocol)
- BPDU Guard
- Ethernet Ring Protection Switching (ERPS), G.8032 v2
- MICROSENS Redundant Ring Protocol
- High-availability Seamless Redundancy (IEC 62439-HSR)
- Parallel Redundancy Protocol (IEC 62439-PRP1)

Ethernet Port Features

- Cable tester
- Loop protection
- Port enable/disable
- Port alias
- Port roles: local, uplink
- Speed negotiation
- Jumbo frame support
- Port mirroring
- Half or full duplex
- Flow Control
- Port isolation

Link Layer Discovery Protocols (LLDP, CDP)

- LLDP operation
- LLDP-MED
- CDP operation
- CDP voice VLAN

Port Access Control

- IEEE 802.1X Authentication
- IEEE 802.1X Supplicant
- RADIUS MAC Authentication
- MAC locking
- MAC learning
- Limited number of MACs
- Learned MAC time out
- Dynamic VLAN
- Wake-on-LAN support
- Network edge authentication
- Authentication fail retry timer

Multicast (IGMP-/MLD-Snooping)

- IGMP snooping per VLAN
- MLD snooping per VLAN
- IGMP querier
- Static multicast router port
- PIM-SM (Protocol Independent Multicast)

DHCP

- DHCP snooping
- IP-MAC binding table
- DHCP filtering
- DHCP flooding detection
- DHCP relay agent incl. support of option 82
- Dynamic ARP inspection

Network Time Protocol (NTP)

- NTP client
- SNTP

Clock Synchronization

- Precision Time Protocol (IEEE 1588v2)
- Optional PTP module for external clock reference

Firmware Features (continued)

RMON Statistics

- RMON counters
- Port utilization

Command Line Interface (CLI)

- Context sensitive help
- Show config of device
- Show status of device
- Create snapshot
- Live syslog
- Telnet
- Secure Shell (SSH)
- Welcome message

Web Interface (WEB)

- User authentication
- http(s)
- Custom TLS certificates
- Animated device visualization
- Firmware update
- Online documentation
- SNMP MIB download
- Event display
- RESTful API
- Supported browsers:
 - Chrome, Mozilla Firefox, Microsoft Edge

Diagnostic Functions

- Ping, trace route
- Port mirroring
- Test event
- DNS_lookup
- LED test
- ARP cache

Access Control Lists (ACL)

- Access control lists (ACL)
- Dynamic ACL via RADIUS

Simple Network Management Protocol (SNMP)

- SNMPv1/v2c
- SNMPv1/v2c security
- SNMPv3
- SNMP Transport Security Model (TSM)
- Trap/Inform (SNMPv1/v2c/v3)
- Enterprise specific notifications
- Enterprise and standard MIBs

File Management

- File Transfer Protocol (FTP)
- Secure File Transfer Protocol (FTPS)
- FTP server support
- Secure firmware update
- Configuration export and import
- Compare configuration
- Temporary configuration
- Save configuration

Event Logging

- Syslog to CLI
- Local logfile
- Log filters
- Recent logs

Automation

- Docker virtualization environment for custom applications

Miscellaneous

- Broadcast storm control

Firmware Features (continued)

Login Access Protection

- Unlimited number of Users
- General access rights
- Disable insecure interfaces
- User permissions
- Public key encrypted passwords
- View model for SNMP V1, V2c
- Firewall with black and whitelist
- Authentication, Authorization
 - TACACS+
 - RADIUS

RFC Standards

RFC 768	UDP	RFC 1493	Bridge MIB
RFC 783	TFTP	RFC 1519	CIDR
RFC 791	IPv4	RFC 1573	IF MIB
RFC 792	ICMP	RFC 1591	DNS
RFC 793	TCP	RFC 1745	BGP-4/IDRP for IP-OSPF interaction
RFC 826	ARP	RFC 1812	Requirements for IPv4 Routers
RFC 894	IP over Ethernet	RFC 1901	SNMPv2
RFC 1058	RIPv1	RFC 1905	SNMPv2
RFC 1112	IGMPv1	RFC 1906	SNMPv2
RFC 1122	Host Requirements	RFC 1965	Autonomous system confederations for BGP
RFC 1142	OSI IS-IS Intra-domain Routing Protocol	RFC 1997	BGP Communities Attribute
RFC 1155	SNMPv1	RFC 2030	SNTP
RFC 1156	SNMPv1	RFC 2068	HTTP
RFC 1157	SNMP	RFC 2131	DHCP
RFC 1157	SNMPv1	RFC 2138	RADIUS Authentication
RFC 1158	MIBII	RFC 2139	RADIUS
RFC 1195	OSI IS-IS for Routing in TCP/IP and Dual Environments (TCP/IP Transport only)	RFC 2178	OSPFv2
RFC 1213	MIBII	RFC 2233	IF MIB
RFC 1256	IPv4 ICMP Router Discovery (IRDP)	RFC 2267	Network Ingress Filtering
		RFC 2283	Multiprotocol Extensions for BGP-4

RFC Standards (continued)

RFC 2338	VRRP	RFC 3315	DHCPv6
RFC 2453	RIPv2	RFC 3411	SNMPv3
RFC 2460	IPv6	RFC 3412	SNMPv3
RFC 2461	Neighbor Discovery for IPv6	RFC 3414	USM
RFC 2462	IPv6 Stateless Address Auto-Configuration	RFC 3415	VACM
RFC 2463	ICMPv6	RFC 3484	IPv6
RFC 2464	IPv6	RFC 3513	IPv6 Addressing Architecture
RFC 2574	USM	RFC 3579	RADIUS EAP Support for 802.1x
RFC 2575	VACM	RFC 3584	SNMPv3
RFC 2674	Q-Bridge MIB	RFC 4271	Border Gateway Protocol 4
RFC 2819	RMON MIB	RFC 4330	NTP
RFC 2863	IF MIB	RFC 4541	IGMP
RFC 2865	RADIUS	RFC 4601	PIM-SM
RFC 2866	Accounting	RFC 5176	Dynamic Authorization Extensions to RADIUS
RFC 2868	Tunnel Attributes	RFC 5424	SYSLOG

IEEE Standards

IEEE 802.1AB	Link Layer Discovery Protocol (LLDP)	IEEE 802.3az	Energy-Efficient Ethernet (EEE)
IEEE 802.1d	Spanning Tree Protocol (STP)	IEEE 802.3u	100Base-T/FX
IEEE 802.1p	Class of Service	IEEE 802.3x	Full duplex and flow control
IEEE 802.1Q	VLAN Tag	IEEE 802.3z	1000Base-X
IEEE 802.1s	Multiple Spanning Tree Protocol (MSTP)	IEEE 1588v2	Precision Time Protocol (PTP)
IEEE 802.1w	Rapid Spanning Tree Protocol (RSTP)	IEEE 1613	Environmental and testing requirements for communications networking devices in electric power substations
IEEE 802.1X	Port Based Network Access Control (PNAC)		
IEEE 802.3	10Base-T		
IEEE 802.3ab	1000Base-T		
IEEE 802.3ad	Link Aggregation Control Protocol (LACP)		
IEEE 802.3ad	Port trunk with LACP		
IEEE 802.3ae	10GBase-X		
IEEE 802.3ah	Ethernet in the first mile		

Technical Specifications

Switch

Type	10G Industrial Switch Layer 3, IEEE 802.3 compliant, fanless
Performance	Store-and-forward Full wire-speed, non-blocking on all ports
MAC Address	max. 16K addresses, automatic learning and aging
Jumbo Frames	max. 10KBytes
Backplane Capacity	60 Gbits/s
Switching Capacity	128 Gpps
Packet Buffer	12 Mbits
Flow Control	Pause frames (IEEE 802.3x), configurable

Mechanical

Dimensions	482.6 x 220 x 45 mm (w x d x h, incl. mounting brackets)
Weight	max. 4.9 kg (with all modules installed)
Protection Class	IP 41
Additional Protection	Conformal Coating
Mounting	19" Rack, 1U

Standards

CE	2014/30/EU (EMC Directive) 2011/65/EU (RoHS Directive)
Safety	EN 62368-1
Emitted Interference	EN 61000-6-4 EN 55032
Electromagnetic Compatibility	EN 61000-6-2 EN 55024
Power Substation	IEC 61850-3:2013 IEC 61000-6-5 Ed. 1.0:2015-08 IEEE 1613: 2009 (Class 2)

Environment Conditions

Temperature	Operation -40..+85 °C Storage -40..+85 °C NOTE: Maximum continuous operation temperature is up to +75 °C.
Humidity	10..90%, non condensing

Uplink Ports (SFP / SFP+ Slots)

Number	4x SFP/SFP+ slots
Type	Dual Speed SFP+ 1/10GBase-X, support of SFP+ digital diagnostics function
Connector	LC (SFP+ transceiver)

Console Interface

Number	1
Connector	USB-C

Control Panel

HW-Reset Button	Reset of the switch, new upload of the latest stored configuration (direct hardware function)
-----------------	---

Security

Secure storage of configuration data	SHA-256 encryption to make user passwords protected
Min. encryption key length	Assymetric: 1024 Bit Symmetric: 128 Bit
HASH algorithm	Equal or later than SHA 256
Not included encryption	DES, DSA, 3DES
Self-protection	Use of a built-in dedicated secure boot circuit

Technical Specifications (continued)

LED Display

Location	Front and rear side
-----------------	---------------------

Switch Module Slots

Switch Module Slots	3 slots on front side each of which can be: • either 8x 100/1000Base-X SFP Slots • or 8x 10/100/1000Base-T RJ-45 Ports
----------------------------	---

PTP Module Slot	1 slot on front side
------------------------	----------------------

Power Supply Slots	2 slots on front side
---------------------------	-----------------------

PTP / HSR Module (to be ordered separately)

MS400882MX-BS

Type	4x SMA interfaces
Accuracy	50 microseconds

The following are supported:

- IEEE 1588 V1 and V2
- Boundary Clock V1
- Boundary Clock V2
- End-to-End Transparent Clock Sync Two Step Operation
- End-to-End Transparent Clock Sync One Step Operation
- Peer-to-Peer Transparent Clock
- End-to-end Boundary clock
- Peer-to-peer boundary clock

Power Supply (to be ordered separately)

MS400890DC-BS/3

Input Voltage	80...300 VDC or 90...265 VAC
Power Consumption	max. 60 W
Connector Type	3-pin connector
Cable Diameter	2.5 mm ²

MS400890DC48-BS/3

Input Voltage	48 VDC
Power Consumption	max. 60 W
Connector Type	3-pin connector
Cable Diameter	2.5 mm ²

Switch Modules (to be ordered separately)

Fiber Ports Modules (*MS400883MX-BS*)

Number	8x SFP slots
Type	Dual Speed SFP 100/1000Base-X, support of SFP digital diagnostics function
Connector	LC (SFP transceiver)

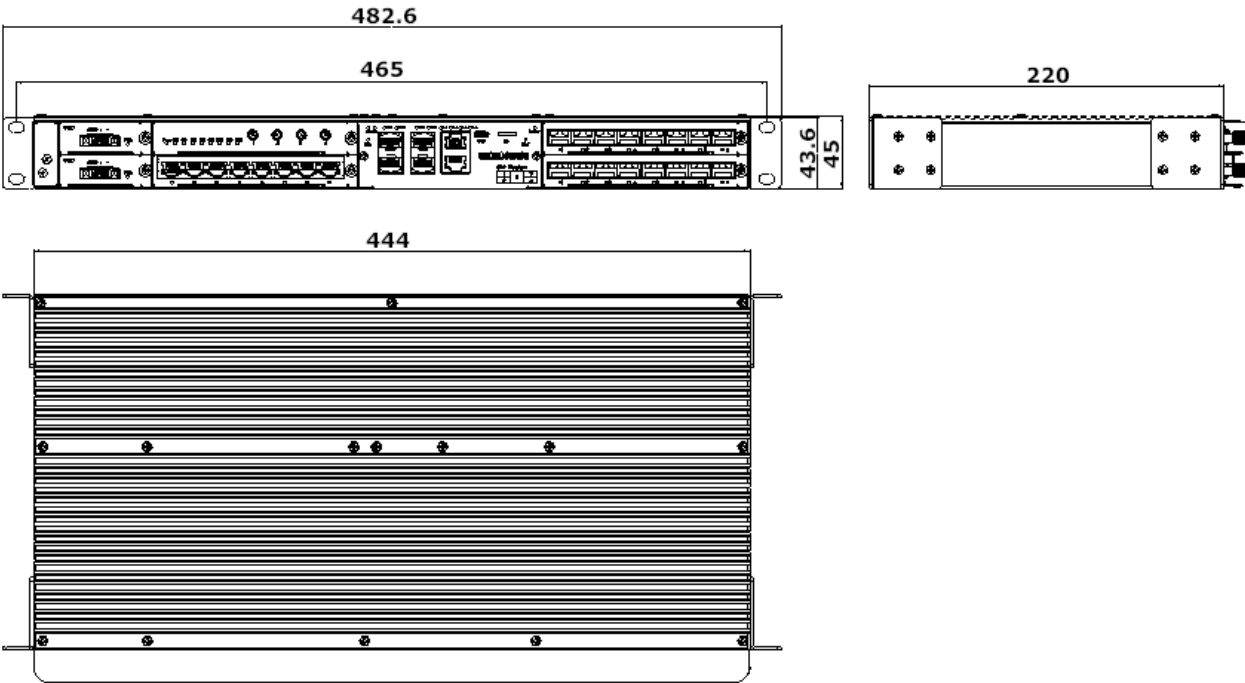
RJ-45 Ports Module (*MS400884MX-BS*)

Number	8 ports
Type	10/100/1000Base-T
Connector	RJ-45 port, shielded
Cable Type	Twisted-Pair cable, Category 5e, impedance 100 Ohm, length max. 100m
Pin Out	Auto MDI/MDI-X, Auto Polarity

Technical Specifications (continued)

Delivery / Contents		Documentation	
Standard Packaging		Quick Start Guide	Flyer, included in delivery; Download from microsens.de
Package unit	1 pcs.	User manual	Download from microsens.com
Contents	1x Switch Chassis 2x RS-485 / RJ-45 adapter 1x Quick Start Guide	CLI Reference manual	• Included in device firmware for local download • Download from microsens.com
Can be ordered separately	Switch Modules PTP Module Power Supply Modules	MIB-File	• Included in device firmware for local download • Download from microsens.com

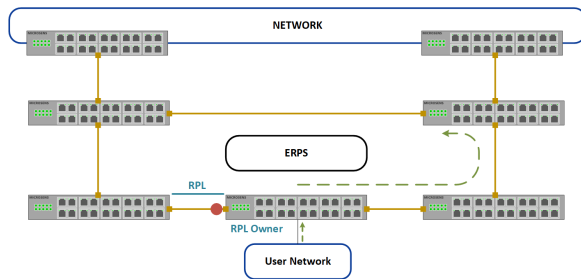
Dimensions



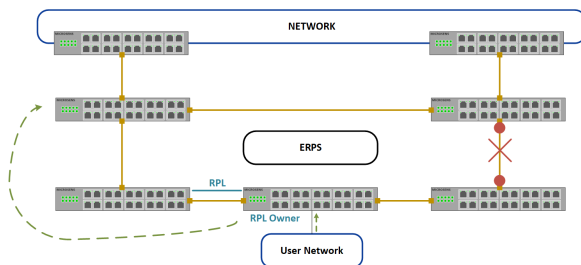
Ethernet Ring Protection Switching (ERPS acc. to G.8032v2)

Single Ring ERPS

- Basic Setup: One ring of Ethernet switches.
- How It Works:
A single link is blocked to prevent loops.



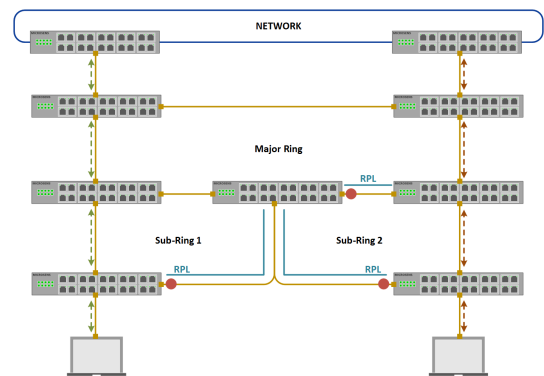
If a failure occurs, ERPS unblocks the backup path.



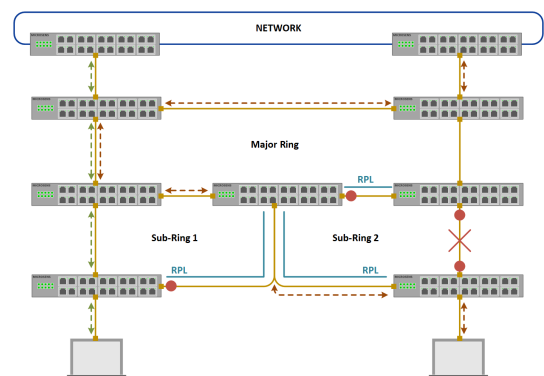
- Use Case: Smaller networks or setups where one ring is enough for redundancy.

Multi-Ring ERPS

- Advanced Setup: Multiple rings connected together.
- How It Works:
 - Different rings are linked through inter-connection nodes (specific switches that connect multiple rings).



- If a failure occurs in one ring, ERPS can reroute traffic through another ring.



- Use Case: Larger networks where traffic needs multiple backup paths for better reliability.

Ordering Information

	Description	Art.-No.
	Switch Main Chassis with Power Substation Cert. 3 module slots, 4x 1/10GBase-X SFP+, USB-C console port, micro SD card slot, 2x power supply slot	MS400890MX-BS/3
	Modules	
	PTP module for IEC 1588v2 time synchronisation for MS400890MX-BS/3	MS400882MX-BS
	8x 100/1000Base-X SFP module for MS400890MX-BS/2 and MS400890MX-BS/3	MS400883MX-BS
	8x 100/1000Base-T RJ-45 module for MS400890MX-BS/2 and MS400890MX-BS/3	MS400884MX-BS
	Power supply module for MS400890MX-BS/3 60W, Prim. 80...300 VDC / 90...265 VAC	MS400890DC-BS/3
	Power supply module for MS400890MX-BS/3 60W, Prim. 48 VDC	MS400890DC48-BS/3

Accessories

	Description	Art.-No.
	RS-485 cable RJ-45 to open ends 0.5 m	MS180285
	Blank cover to protect an empty module slot compatible with MS400890MX-BS/2 and MS400890MX-BS/3	MS400886
	Blank cover to protect an empty power supply module slot compatible with MS400890MX-BS/3	MS400887
	SFP / SFP+ Transceivers	
	LPC SFP+ 10G Transceiver SR Multimode 850nm, DDM, LC duplex, -40...+85°C	MS100700DX-V2
	LPC SFP+ 10G Transceiver LR SingleMode 1310nm, 10km, DDM, LC duplex, -40...+85°C	MS100702DX-V2
	SFP+ 10G WDM-Transceiver Bidi-LR SingleMode TX1270nm / RX1330nm, 10km, DDM, LC simplex, max. 0.67W, -40...+85°C	MS100702DXA-V2
	SFP+ 10G WDM-Transceiver Bidi-LR SingleMode TX1330nm / RX1270nm, 10km, DDM, LC simplex, max. 0.67W, -40...+85°C	MS100702DXB-V2
	SFP Gigabit Ethernet Transceiver 1,25GB 850nm VCSEL Multimode LC diagn -40...85°C	MS100200DX
	SFP Gigabit Ethernet Transceiver 1.25GB+ 1.062GB 1310nm SM LC diagnostic -40...85°C	MS100210DX

Accessories (continued)

SFP / SFP+ Transceivers (continued)		
	WDM SFP Gigabit Transceiver max.1,25GB Single Mode LC simplex 11dB/10km diagn. Tx: 1310nm, Rx: 1550nm -40..85°C	MS100221DXA
	WDM SFP Gigabit Transceiver max.1,25GB Single Mode LC simplex 11dB/10km diagn. Tx: 1550nm, Rx: 1310nm -40..85°C	MS100221DXB
Software for Management and Configuration of Networks		
	NMP Web+ Enterprise Base Installation, 1 x usage right for NMP Web+ Enterprise, incl. download and installation of updates, installation of server SW on max. 1 computer, electronic user manual included (.pdf)	MS200500
	NMP Web+ Professional Base Installation, 1 x usage right for NMP Web+ Professional, incl. download and installation of updates, installation of server SW on local computer, electronic user manual included (.pdf)	MS200501
	One year device license grants the right to administrate a MICROSENS device via NMP Web+ for one year	MS200509-01
	Two year device license grants the right to administrate a MICROSENS device via NMP Web+ for two years	MS200509-02
	Additional Software-Variants Additional variants of the device licenses are listed in the data sheet for NMP Web+; please refer to www.microsens.de	

Services

Description	Art.-No.
Warranty Extension following the 24-Month Manufacturer Warranty	
1 year warranty extension	MSGV01
2 year warranty extension	MSGV02
3 year warranty extension	MSGV03
Custom-made Pre-configuration	
Custom-made pre-configuration of a component	MSKonfig
Custom-made pre-configuration (configuration file already available)	MSKonfig-OK
Manufacturer Warranty is defined in General Terms and Conditions of Sale (§10) of MICROSENS GmbH & Co. KG	

Our [General Terms and Conditions of Sale \(GTCS\)](https://www.microsens.com/fileadmin/files/downloads/Impressum/MICROSENS_AVB_EN.pdf) apply to all orders (see https://www.microsens.com/fileadmin/files/downloads/Impressum/MICROSENS_AVB_EN.pdf).

Disclaimer

All information in this document is provided 'as is' and is subject to change without notice.

MICROSENS GmbH & Co. KG disclaims any liability for the correctness, completeness or quality of the information provided, fitness for a particular purpose or ensuing damage.

Any product names mentioned herein may be trademarks and/or registered trademarks of their respective owners.

©2025 MICROSENS GmbH & Co. KG, Kueferstr. 16, 59067 Hamm, Germany.

All rights reserved. This document in whole or in part may not be duplicated, reproduced, stored or retransmitted without prior written permission of MICROSENS GmbH & Co. KG.

Document ID: DAT-EN-MS400890MX-BS3-Switch-Main-Chassis-Power-Substation-Cert-3Module-Slots_v1.8

Date of Issue: 2025-03-05