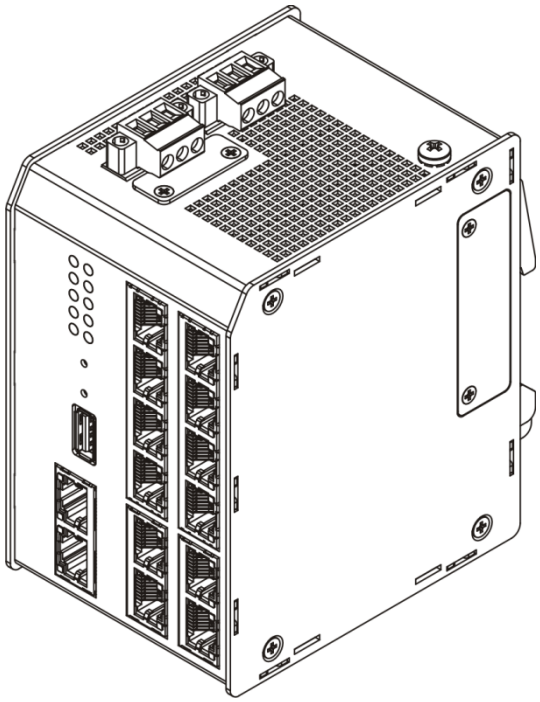
MICROSENS

Data Sheet

Profi Line Modular
Industrial Gigabit Ethernet Ring-Switch



made in Germany

Overview

The new Profi Line Modular switches, from MICROSENS, offer maximum performance and flexibility in smallest spaces. Robust, modular, expandable and designed for greatest reliability and shortest recovery times, the Profi Line Modular series has become the first-choice solution for Industrial Ethernet.

The hardware of the Profi Line Modular series is designed today for future functions, which are easy to activate with firmware upgrades. This is facilitated by the latest high-performance switching chipsets in combination with a powerful ARM processor. As an established, stable operating system, Linux offers a solid foundation for an intelligent, open and long-term reliable platform.

Highlights

- Highest Gigabit performance with smallest dimensions
- Industrial design for maximum reliability in harsh environments
- Modular expandable up to 25 ports (8 of them fiber)
- Optimised architecture for increased performance with parallel ring topology
- PoE+ (max. 30 W) integrated
- Modular SD-card for firmware and configuration
- Flexible firmware architecture for simple software upgrades
- Redundant power inputs

Specifications

Gigabit Ethernet Switch

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

Energy-Efficient Ethernet

- EEE according to IEEE 802.3az
- Reduced power consumption for each RJ-45 port up to 80% depending on the actual requirement

Network Management

- Supports all common management standards
- High Performance 800 MHz ARM CPU
- Linux operating system with fast system boot (approx. 20 seconds)
- Webmanager (HTTP/HTTPS)
- Telnet/SSH/Console, incl. standard-commands (ping 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 SD memory card for the configuration, CLI scripts, firmware

Power-over-Ethernet PoE/PoE+

- IEEE 802.3af PoE (max. 15 W/Port), power supply with typ. 48 VDC
- IEEE 802.3at PoE+ (max. 30 W/Port), power supply with typ. 54 VDC
- 8x 10/100/1000Base-T, PoE+ (PSE)
- 1x 10/100/1000Base-T, PoE+ (PD)
- Limitation of the total power consumption of the switch to max. 200 W (full power only with suitable installation conditions)

Connectors (Base-Switch)

Up-/Downlinks (Dual Media-Ports)

- 4x SFP-Slot 100/1000Base-X
- 4x 10/100/1000Base-T (RJ-45)

Local Ports

- 9x 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

RS-232 Console Port

- Serial terminal port for CLI access (outband management)

USB Extension Port

- For optional accessories

Alarm Contacts / I/O-Ports

- Potential free digital input/output ports
- 2x output (relay)
- 2x input (optocoupler)

Backplane Extension Bus

- Connection of extension modules

Mounting

- Integrated holder for DIN-rails (DIN EN 50022)

Feature overview network management

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 (Neighbor 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 send 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 send 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)

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)

Link Layer Discovery Protocol (LLDP)

Function	Advertising identity, capabilities, and neighbors 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 neighbor CDP enabled devices.
Voice VLAN	Support of Voice VLAN for configuration of connected Cisco VoIP-phone.

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 color 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

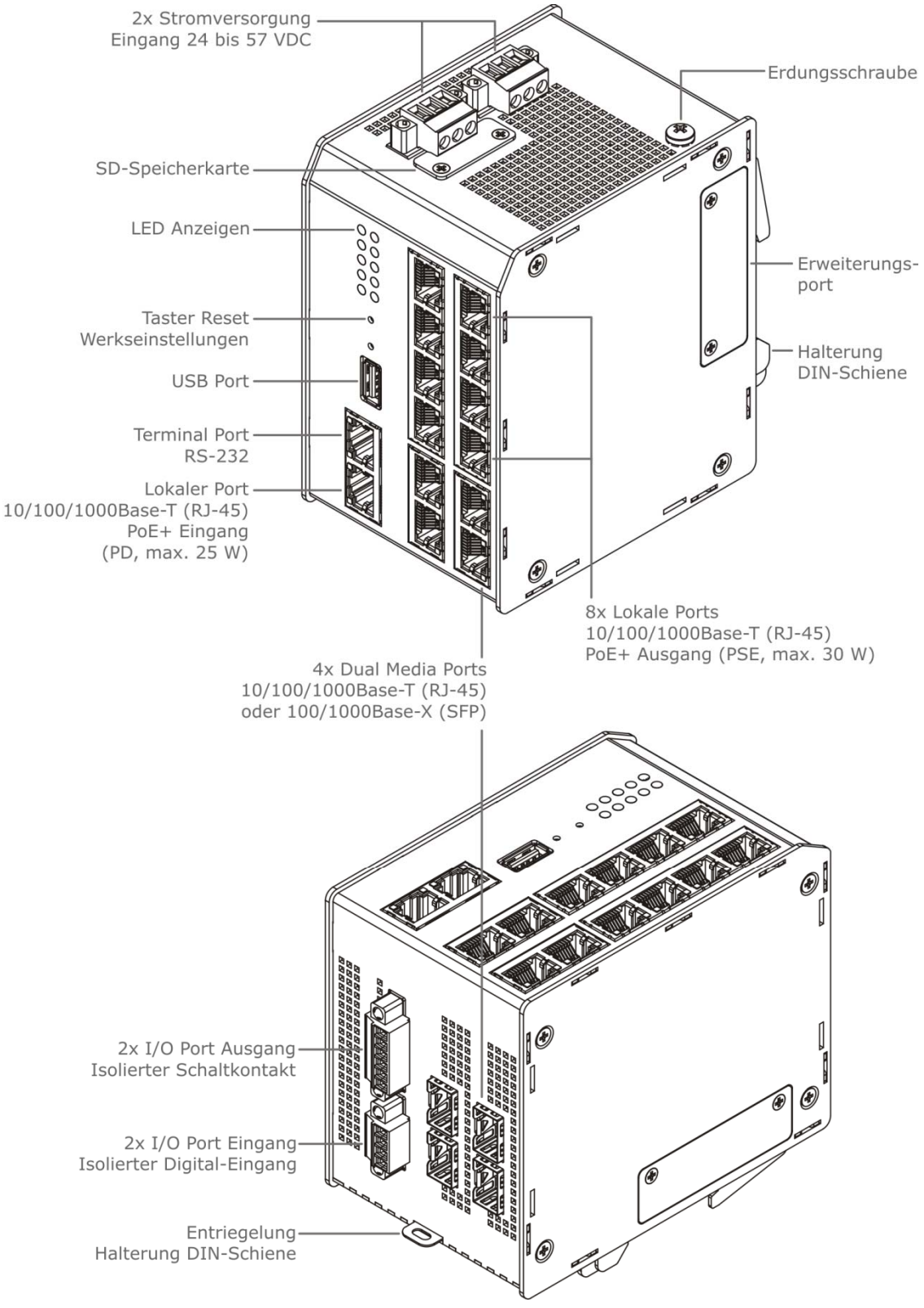
RFC Standards

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

Anschlüsse


2x Stromversorgung
Eingang 24 bis 57 VDC
Erdungsschraube
SD-Speicherkarte
LED Anzeigen
Erweiterungs-
port
Taster Reset
Werkseinstellungen
Halterung
DIN-Schiene
USB Port
Terminal Port
RS-232
Lokaler Port
10/100/1000Base-T (RJ-45)
PoE+ Eingang
(PD, max. 25 W)
8x Lokale Ports
10/100/1000Base-T (RJ-45)
PoE+ Ausgang (PSE, max. 30 W)
4x Dual Media Ports
10/100/1000Base-T (RJ-45)
oder 100/1000Base-X (SFP)
2x I/O Port Ausgang
Isolierter Schaltkontakt
2x I/O Port Eingang
Isolierter Digital-Eingang
Entriegelung
Halterung DIN-Schiene

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	13
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 0-4, max. 15 W / 30 W

Fiber Ports (SFP slots)

Number	4
Type	Gigabit Ethernet Dual Speed SFP 100/1000Base-X, support of SFP digital diagnostics function
Connector	LC (SFP transceiver)
Multimode (MS100200DX)	Multimode, 62.5/125µm (280 m) or 50/125 µm (550 m) 850nm wavelength -4..-9.5 dBm output power -18 dBm sensitivity 0 dBm saturation
Single Mode (MS100210DX)	Single Mode, 9/125 µm (10 km) 1310 nm wavelength -3..-9,5 dBm output power -20 dBm sensitivity -3 dBm saturation
Flow Control	Pause Frames (IEEE 802.3x), configurable

LED displays

Number	Device	10 LEDs
	Port	2 LEDs per port
LED-modes	*Dynamic*	Standard-mode
	Static	Standard without flash
	Quiet	Only ON- and Sys-LED
	Dark	all LEDs off
	L-show	permanent LED test

Port LEDs (integrated in RJ-45)

Ethernet	*green*	Link at port. Flashing at data traffic
	yellow	Port blocked (via protocol)
	red	Port Access Control rejected
	off	no link
PoE	*green*	PoE power active
	yellow	PoE not active
	red	PoE failure
	off	PoE deactivated

Device LEDs (central)

System 1	*active*	System activities (Firmware update)
	off	Normal operation
System 2	*off*	Normal operation
Power 1 / 2	*green*	Power supply 1/2 OK
	yellow	Input voltage too low/missing
Ring 1 / 2	*green*	Ring 1/2 normal
	yellow	Ring backup active
	red	Ring backup failure
	off	Ring deactivated
Signal in 1 / 2	*green*	activated, no signal
	red	S1/S2 activated, alarm
	off	inactive
Signal out 1 / 2	*green*	activated, no signal
	red	S1/S2 activated, alarm
	off	inactive

Control Panel

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

Technical Specifications (continued)

Power Supply

Input	24..57 VDC (54 VDC typ.)
Power Consumption	Typ. 9 W (only base module)
Connectors	2x 3 pin screw connector

Power Supply for PoE / PoE+ Operation

Input	44..57 VDC PoE: 48 VDC typ. PoE+: 54 VDC typ.
Power Consumption	max. 200 W (incl. PoE+)

Environmental Conditions

Temperature	Operation	-40..+75 °C
	Storage	-40..+85 °C
Humidity	10..90%, non condensing	

Mechanic Base Unit

Dimensions	120,5 x 77 x 100,5 mm (L x B x H, without connectors)
Weight	Approx. 990 g (without SFPs)

Standards

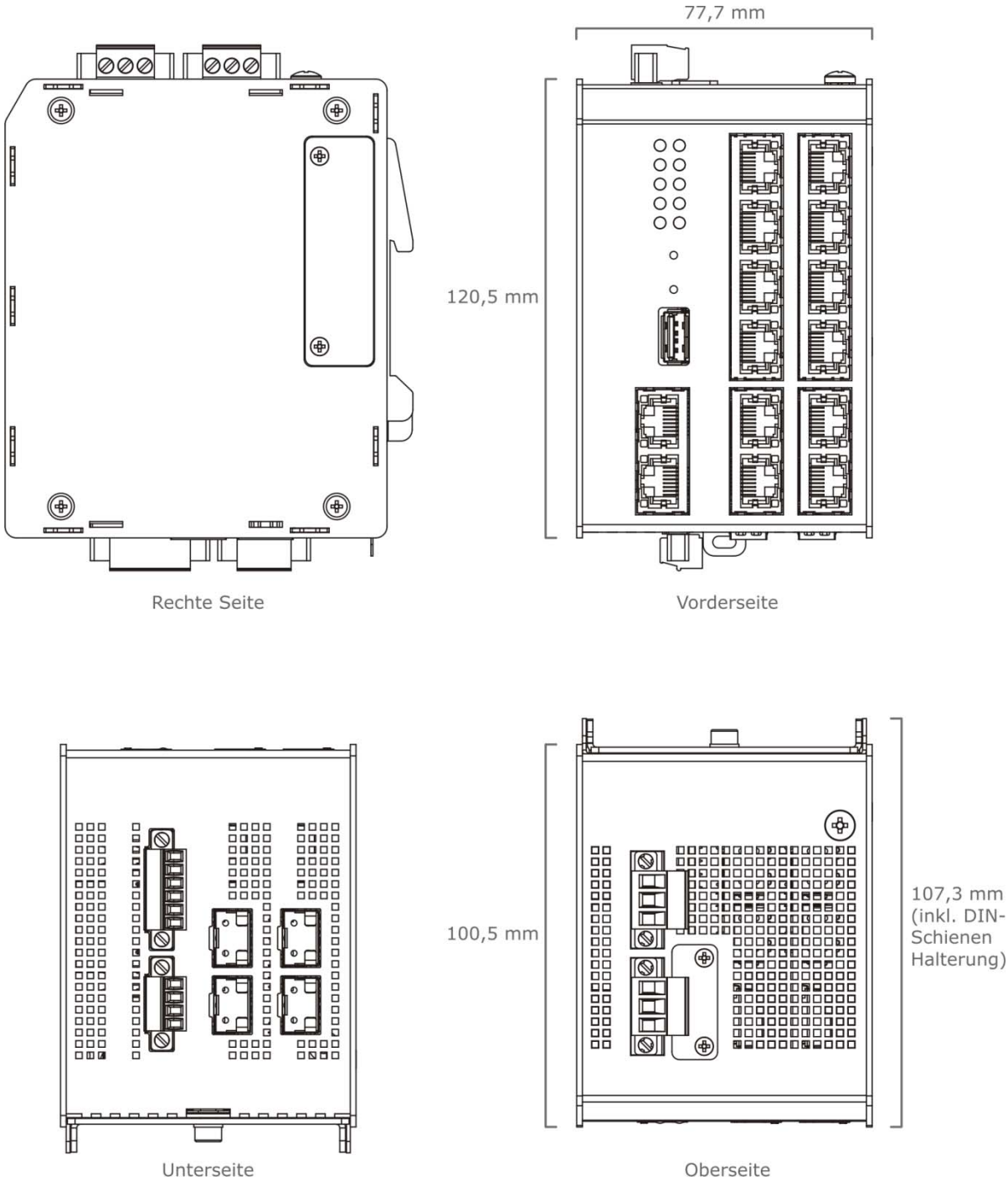
CE	2004/108/EC (EMV) 2006/95/EG (Low voltage)
Security	EN 60950-1:2011-01
Emitted interference	EN 55022:2011-12
Immunity	EN 55024:2011-09

Delivery / Contents

Standard Packaging

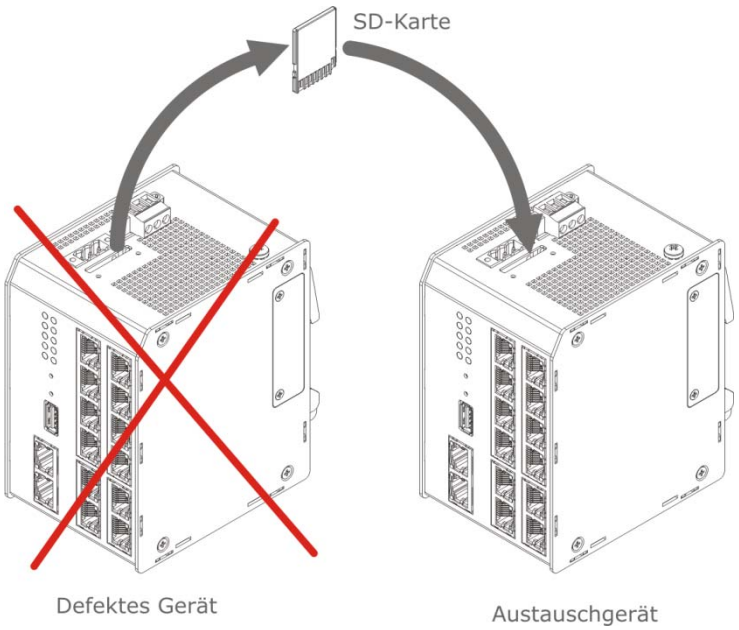
Package unit	1 pcs.
Weight	approx. 1.200 g
Contents	1x PLM-Switch base unit 1x SD memory card (separate article number) 2x power supply 2x I/O connector 1x Short manual 1x Set stickers with symbols

Dimensions



Height:	120.5 mm (Without connectors)
Width:	77.7 mm
Depth:	100.5 mm (107.3 mm incl. DIN-rail holder)

Memory Card



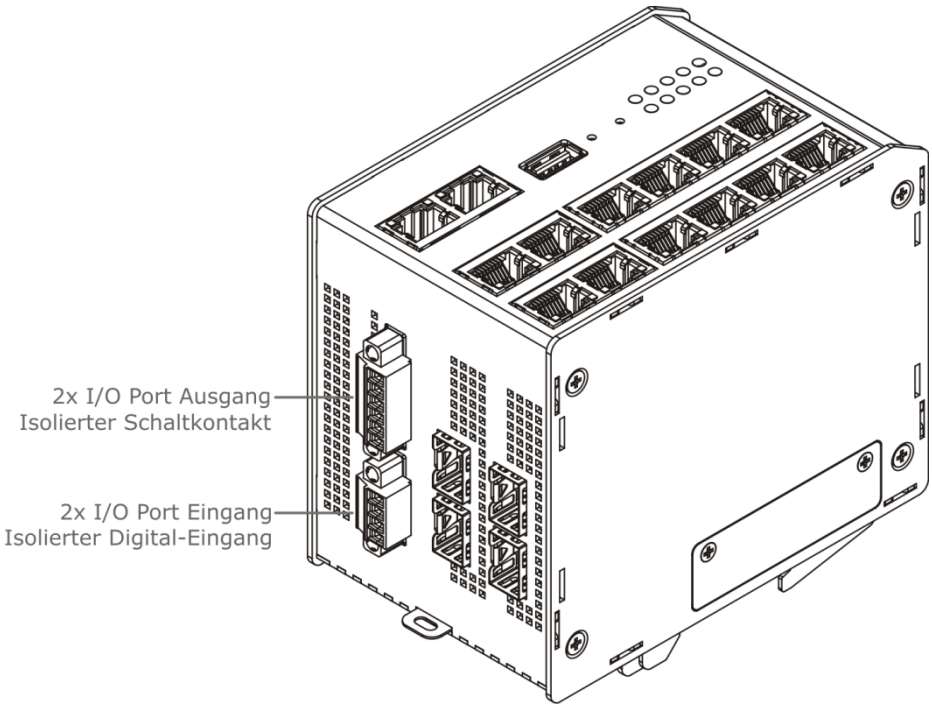
SD Memory Card

The SD 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 SD 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.

Alarm Contacts



Galvanic isolated contacts (2x)

The potential free output contacts (I/O out) allows to control external signalling devices to show the alarm and operation status.

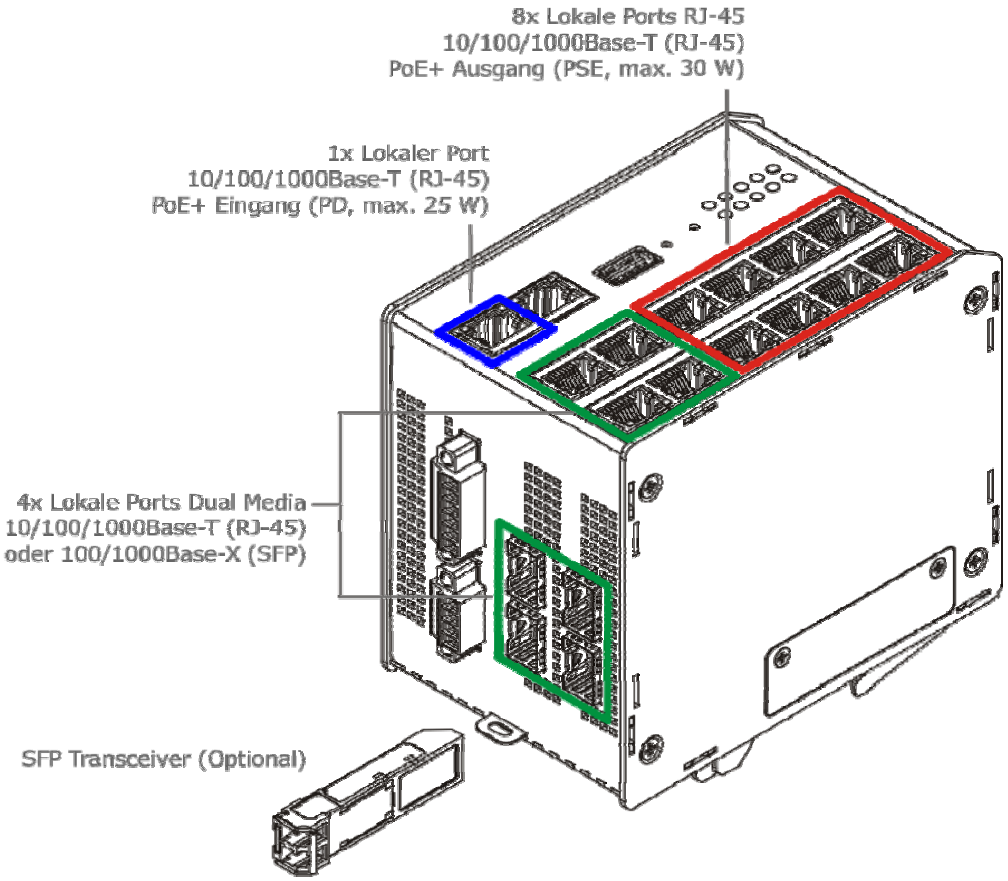
- Relay contact, maximum load 57 V/1 A
- Isolation voltage to the device 1,500 VDC
- Normally open or normally closed contact possible
- The signal status is indicated by an LED
- **Attention**: Not suitable for the direct connection of 230 V AC devices!

Galvanic isolated digital inputs (2x)

The potential free input contacts (I/O in) allow the direct monitoring of external systems, e.g. a rack or door monitoring system.

- 2x galvanic isolated, digital input
- Internal opto coupler, Input voltage 12 to 57 V DC
- Isolation voltage 1,500 VDC
- Status monitored via management

Gigabit Ethernet Ports



Gigabit Ethernet Ports (RJ-45)

All Gigabit Ethernet ports are for the connection of 10, 100 or 1000 Mbps segments via twisted pair cables with RJ-45 connectors.

The integrated auto negotiation and auto crossover functions automatically ensure the best connection method to the end devices.

1x Local Port, PD (RJ-45)

This port additional includes a PoE+ powered device (PD) input. Via this port the switch can be supplied with electrical power. The power which is not required by the switch itself can be supplied to the end devices via its PoE+ ports.

8x Local Ports, PSE (RJ-45)

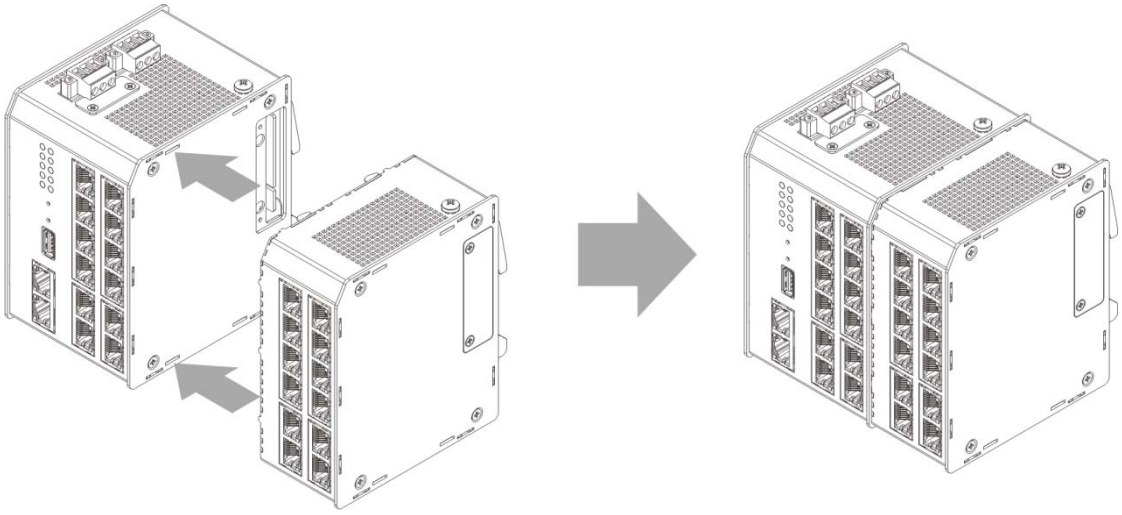
These ports additional include PoE+ Power Sourcing Equipment (PSE) functionality. With this the switch can supply the connected end devices with electrical power. This is often used for VoIP-telephones, IP-cameras and WLAN-Access Points

4x Dual Media Ports (RJ-45/SFP)

These ports can be optionally used with twisted pair or fiber cables. For the use of a fiber cable a suitable SFP must be plugged into the switch.

The selection of the used media (twisted pair or fiber) can be made by the management.

Expansion Modules



More ports if required

The modular design of the PLM Switch allows the dimensioning of the switch according to the requirements with up to 25 Gigabit Ethernet ports.

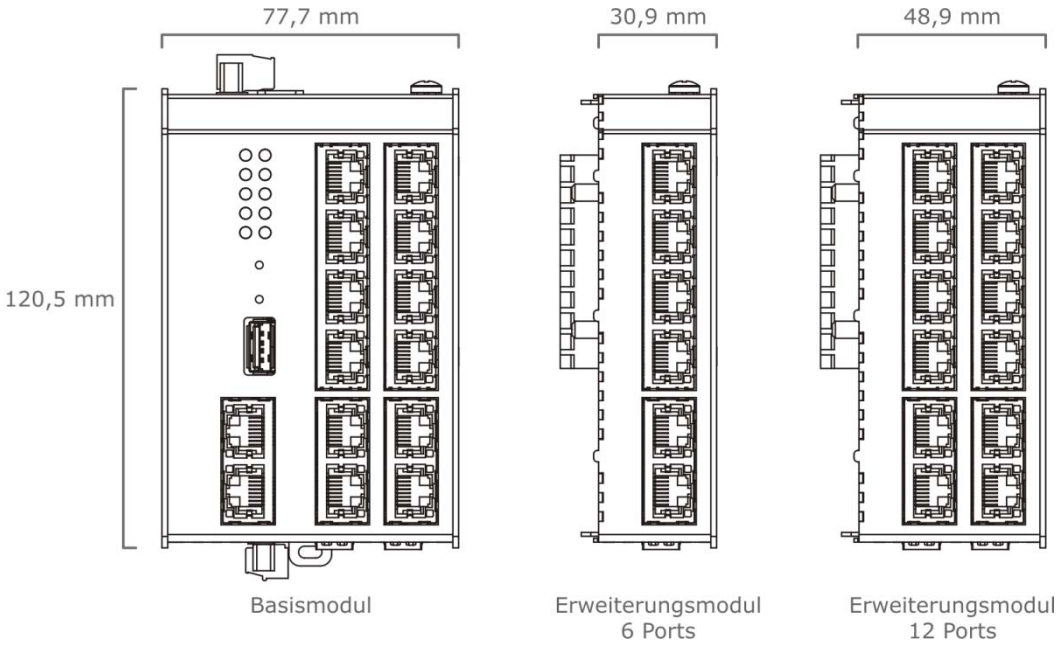
- Module expansion via smart and tool less connection via Extension bus
- **No** additional IP-Address (Stack)
- Fixed mechanical connection of the modules

The expansion concept is designed in the way that there is no demand for installing large backplanes.

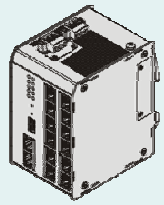
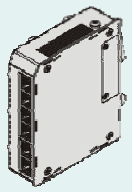
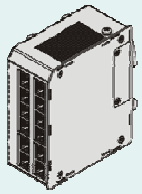
The expansion module is completely connected via the internal backplane to the base unit and does not require any additional external connections.

Furthermore there is no additional IP address required. The Expansion unit builds one device with the base unit.

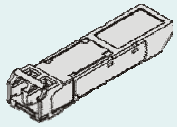
For the port extension it is possible to connect maximal one expansion unit (with 6 or 12 ports), further functional modules are possible.



Order Information

	Description	Article No.:
	**Profi Line Modular Base Switch**	
	Modular Industrial Gigabit Ethernet Base-Switch, 8x 10/100/1000Base-T PoE/PoE+ (PSE), 1x 10/100/1000Base-T PoE/PoE+ (PD), 4x Dual Media Ports: 100/1000Base-X SFP-Slot or 10/100/1000Base-T, Power supply input 24..57 VDC	**MS652119PM**
	**Profi Line Modular 6 Port Expansion Unit**	
	4x 10/100/1000Base-T PoE/PoE+ (PSE), 2x Dual Media Ports: 100/1000Base-X SFP-Slot or 10/100/1000Base-T	**MS652219M**
	**Profi Line Modular 12 Port Expansion Unit**	
	8x 10/100/1000Base-T PoE/PoE+ (PSE), 4x Dual Media Ports: 100/1000Base-X SFP-Slot or 10/100/1000Base-T	**MS652419M**
	**Memory Cards for Profi Line Modular Base Switch**	
	SD memory card 4 GB for MICROSENS PLM-Switches, Extended temperature range -25°C up to +85°C	**MS140890X-4GB**
	SD memory card 4 GB for MICROSENS PLM-Switches, Extended temperature range -25°C up to +85°C, **With own MAC address**	**MS140890X-4GB-M**
	SD memory card 4 GB for MICROSENS PLM-Switches, Extended temperature range -25°C up to +85°C, With individual switch configuration according to customer specifications	**MS140890X-4GB-C**
	SD memory card 4 GB for MICROSENS PLM-Switches, Extended temperature range -25°C up to +85°C, With individual switch configuration according to customer specifications and own MAC address	**MS140890X-4GB-MC**

Accessories

	Description	Article No.:
	**SFP Transceiver (Fast Ethernet & WDM on request)**	
	SFP Transceiver, Gigabit Ethernet, Digital Diagnostic 850 nm Multimode, 1000Base-SX, LC duplex Extended temperature range -25°C up to +85°C	**MS100200DX**
	SFP Transceiver, Gigabit Ethernet, Digital Diagnostic 1310 nm Monomode, 1000Base-LX, LC duplex Extended temperature range -25°C up to +85°C	**MS100210DX**
	Network Management	
NMP Professional	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	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**
	NMP Server – additional client access licenses for n clients	**MS200166-Cn**
	External Power Supplies for industrial use 24 VDC	
	DIN Rail Power Supply 24 Watt 24 VDC / 1.0 A, Wide input range 85-264 VAC, 85...375 VDC	**MS700420**
	DIN Rail Power Supply 60 Watt 24VDC / 2.5 A, Adjustment range 21..29VDC Wide input range 90-264VAC, 85..200VDC **for extended temperature range -40..+75°C**	**MS700482-24B**
	External Power Supplies fir 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**