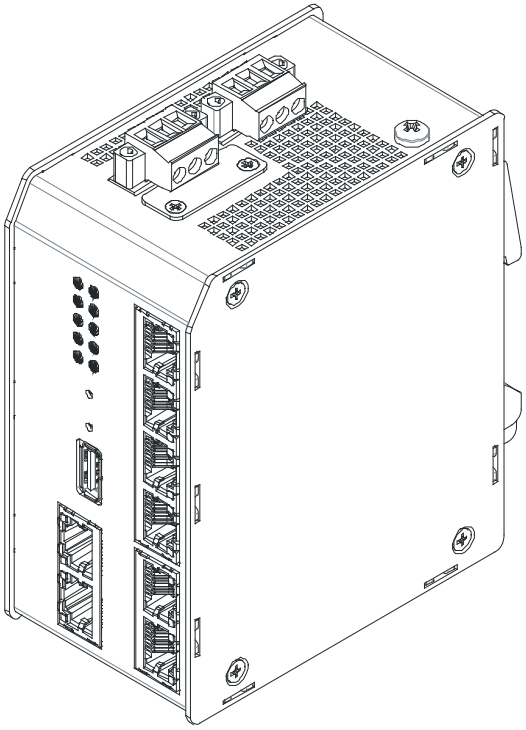
# Datasheet

## Profi Line+

## Industrial Gigabit Ethernet Ring-Switch



made in Germany

## Overview

The Industrial Ethernet Switch Profi Line+ of MICROSENS is a further development of the successful Profi Line series. With Gigabit Ethernet on all ports combined with the PoE+ functionality the switch offers highest performance. Designed for highest reliability and shortest recovery times this switch is the first choice for Industrial Ethernet.

The hardware of the Profi Line+ Switch 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
- Compact design with full Gigabit performance
- 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)
- Web Manager (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
- 4x 10/100/1000Base-T, PoE+ (PSE)
- 1x 10/100/1000Base-T, PoE+ (PD)
- Limitation of the total power consumption of the switch to max. 120 W (full power only with suitable installation conditions)

### Connectors

**Up-/Downlinks (Dual Media-Ports)**

- 2x SFP-Slot 100/1000Base-X
- 2x 10/100/1000Base-T (RJ-45)

**Local Ports**

- 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

**RS-232 Console Port**

- Serial terminal port for CLI access (outband management)
- RJ-45 connector

**USB Extension Port**

- For optional accessories

**Alarm Contacts / I/O-Ports**

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

### 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.<br>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.<br>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.<br>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

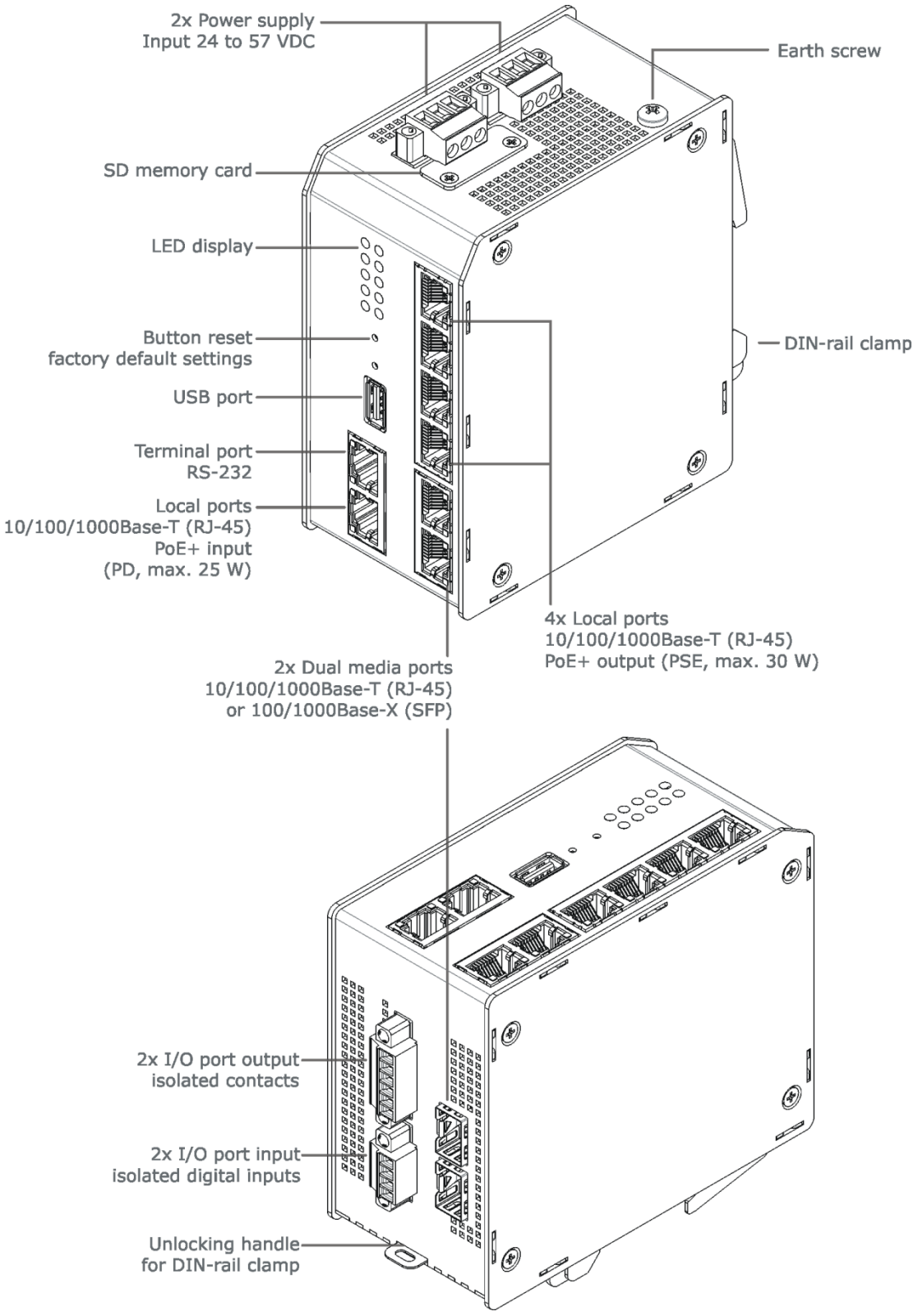
## RFC Standards

| | |
|---|---|
| **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 |

## Interfaces


2x Power supply
Input 24 to 57 VDC
Earth screw
SD memory card
LED display
Button reset
factory default settings
USB port
Terminal port
RS-232
Local ports
10/100/1000Base-T (RJ-45)
PoE+ input
(PD, max. 25 W)
DIN-rail clamp
4x Local ports
10/100/1000Base-T (RJ-45)
PoE+ output (PSE, max. 30 W)
2x Dual media ports
10/100/1000Base-T (RJ-45)
or 100/1000Base-X (SFP)
2x I/O port output
isolated contacts
2x I/O port input
isolated digital inputs
Unlocking handle
for DIN-rail clamp

# Technical Specifications

## Switch

| | |
|---|---|
| **Type** | Gigabit Ethernet Switch<br>Layer 2+, IEEE 802.3 compliant |
| **Performance** | Store-and-forward<br>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** | 7 |
| **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<br>Class 0-4, max. 15 W / 30 W |

## Fiber Ports (SFP slots)

| | |
|---|---|
| **Number** | 2 |
| **Type** | Gigabit Ethernet<br>Dual Speed SFP<br>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)<br>850nm wavelength<br>-4..-9.5 dBm output power<br>-18 dBm sensitivity<br>0 dBm saturation |
| **Single Mode (MS100210DX)** | Single Mode, 9/125 µm (10 km)<br>1310 nm wavelength<br>-3..-9,5 dBm output power<br>-20 dBm sensitivity<br>-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.<br>Flashing at data traffic |
| | yellow | Port blocked<br>(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<br>(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. 7 W |
| **Connectors** | 2x 3 pin screw connector |

## Power Supply for PoE / PoE+ Operation

| | |
|---|---|
| **Input** | 44..57 VDC<br>PoE: 48 VDC typ.<br>PoE+: 54 VDC typ. |
| **Power Consumption** | max. 130 W (incl. PoE+) |

## Environmental Conditions

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

## Mechanical

| | |
|---|---|
| **Dimensions** | 120.5 x 59.7 x 100.5 mm<br>(w x d x h, without connectors) |
| **Weight** | Approx. 790 g (without SFPs) |

## Standards

| | |
|---|---|
| **CE** | 2004/108/EC (EMV)<br>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. 1.000 g |
| **Contents** | 1x PL+ Switch<br>1x SD memory card<br>(separate article number)<br>2x power supply<br>2x I/O connector<br>1x Short manual<br>1x Set stickers with symbols |

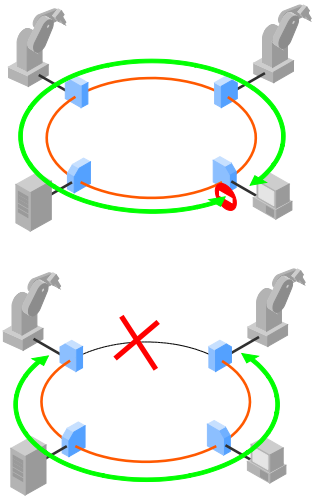
# Ring-Topology

## Normal operation

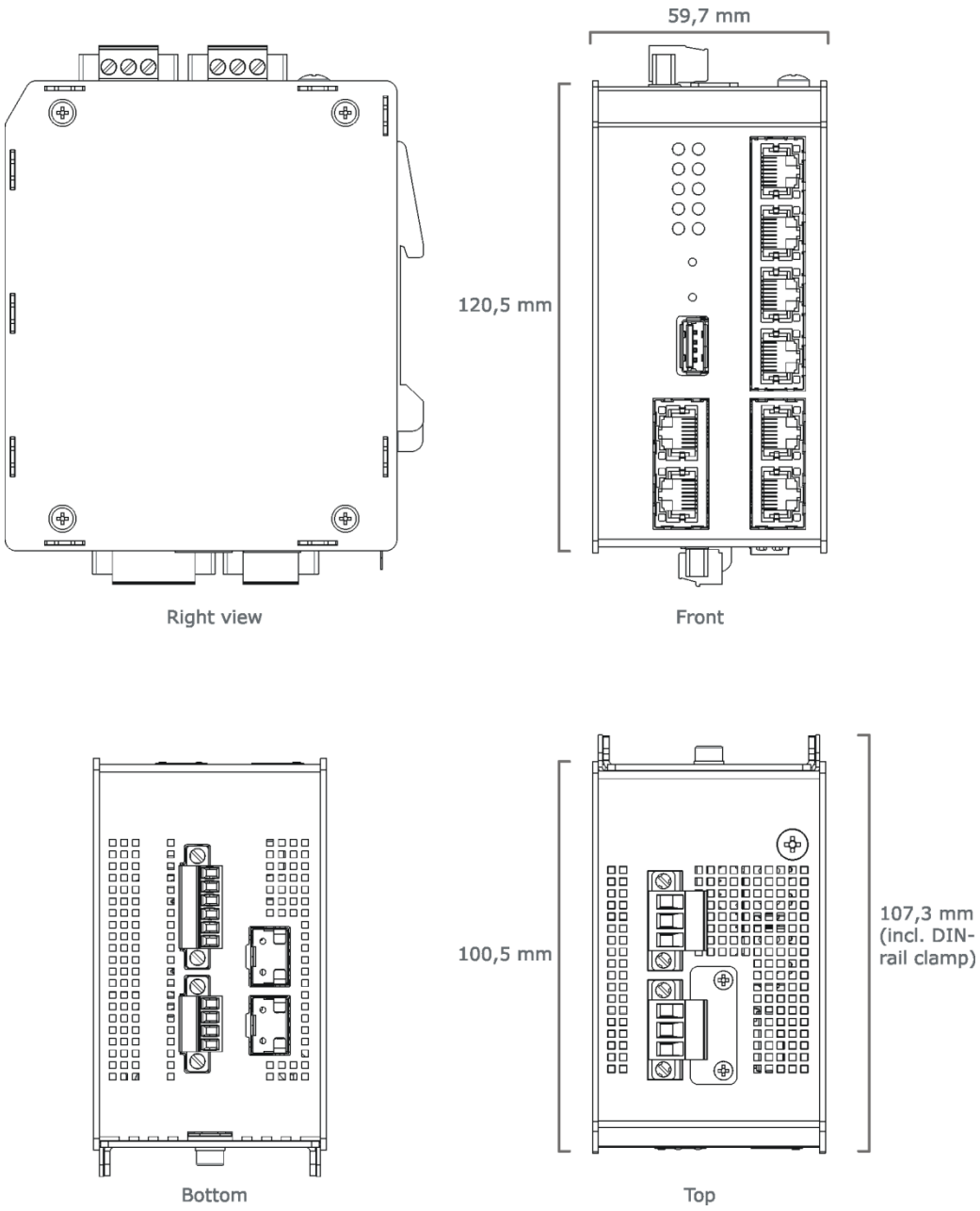
- All switches are configured for ring operation
- One switch is assigned as ring master
- Ring master cuts the ring logically

## 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

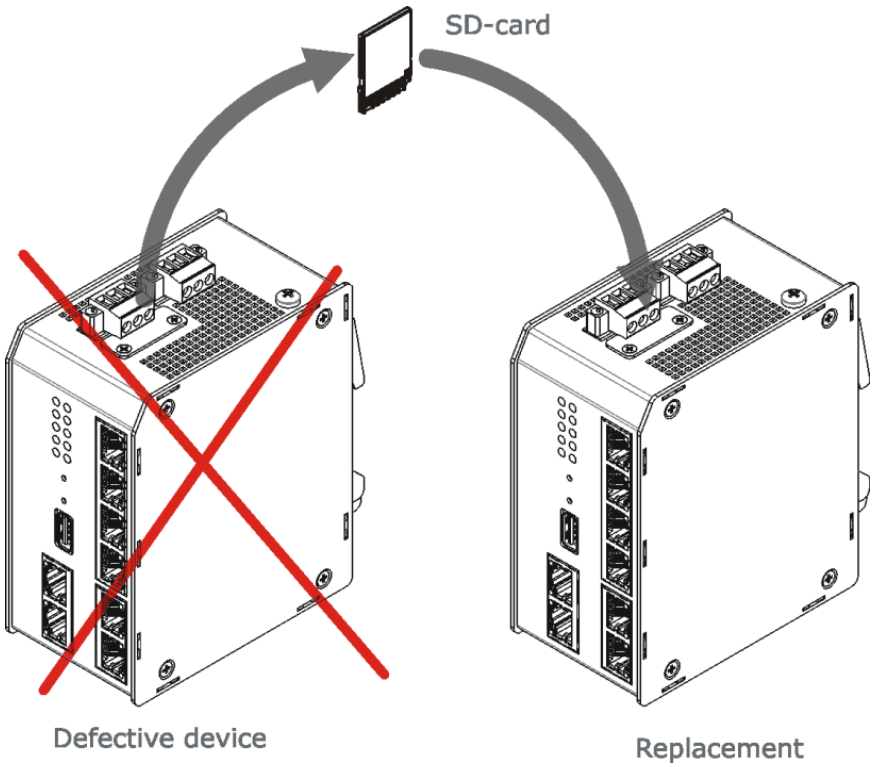


## Dimensions




| | |
|---|---|
| Height: | 120.5 mm (Without connectors) |
| Width: | 59.7 mm |
| Depth: | 100.5 mm (107.3 mm incl. DIN-rail holder) |

# Memory Card



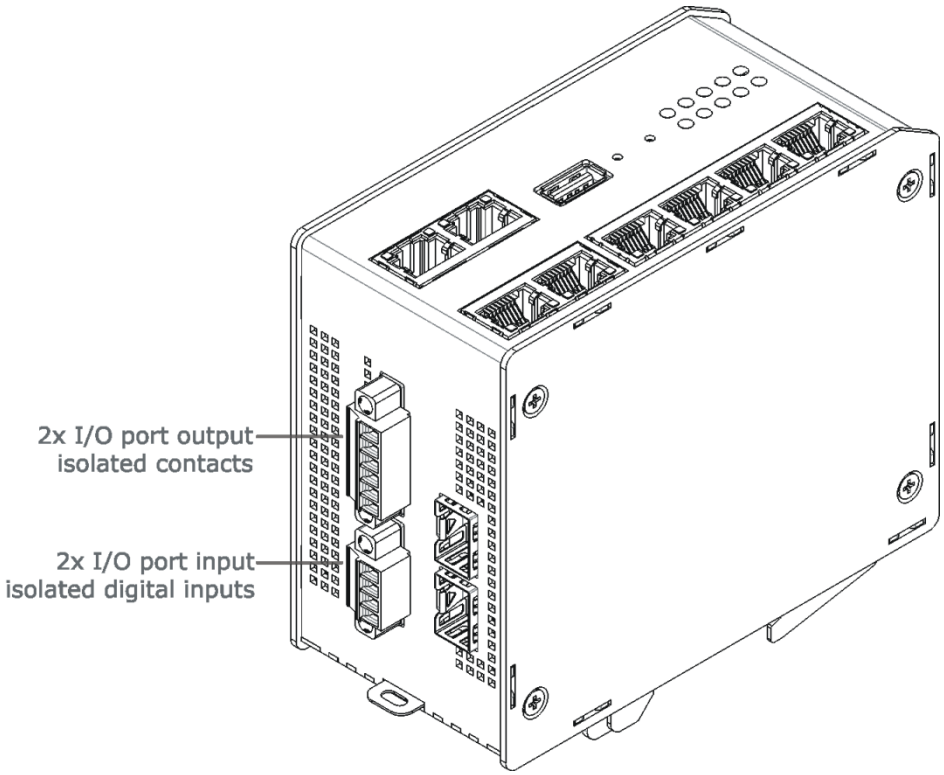

## SD Memory Card

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.

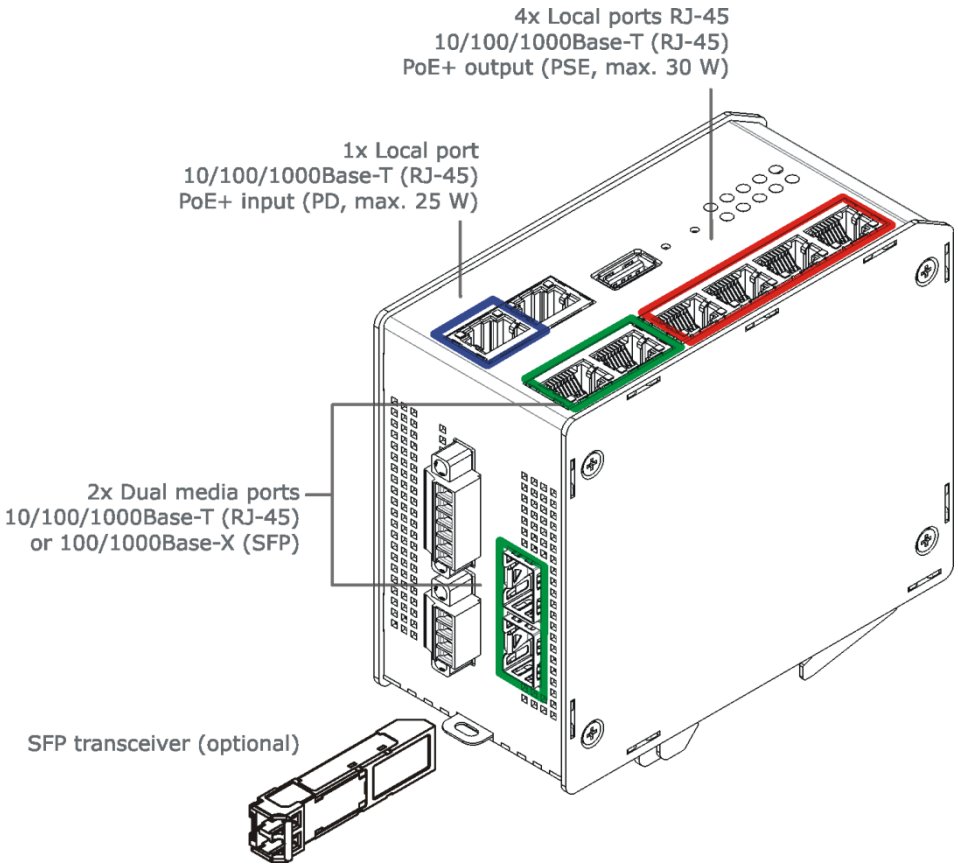
- Relay contact, maximum load 57 V/1 A
- Isolation voltage to the device 1,500 VDC
- Normally open or normally closed contact possible
- The signal status is indicated by a LED
- **Attention**: Not suitable for the direct connection of 230 V AC devices!

### 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 optocoupler, 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.

### 4x Local Ports, PSE (RJ-45)

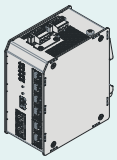
These ports additional include PoE+ Power Sourcing Equipment (PSE) functionality. With this the switch can supply the connected end devices with electrical power. This is often used for VoIP-telephones, IP-cameras and WLAN-Access Points

### 2x Dual Media Ports (RJ-45/SFP)

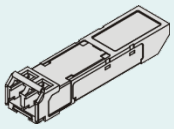
These ports can be optionally used with twisted pair or fiber cables. For the use of a fiber cable a suitable SFP must be plugged into the switch.

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

# Order Information

| | Description | Article No.: |
|---|---|---|
|  | **Profi Line+ Switch** | |
| | Industrial Gigabit Ethernet Switch,<br>5x 10/100/1000Base-T PoE/PoE+ (4x PSE / 1x PD),<br>2x Dual Media Ports: 100/1000Base-X SFP-Slot or<br>10/100/1000Base-T, Power supply input 24..57 VDC | **MS650919PM** |
|  | SD memory card 4 GB for MICROSENS PL+-Switches,<br>Extended temperature range -25°C up to +85°C | **MS140890X-4GB** |

# Accessories

| | Description | Article No.: |
|---|---|---|
| | **SFP Transceiver with extended temperature range -25°C up to +85°C<br>(Fast Ethernet & WDM on request)** | |
|  | SFP Transceiver, Gigabit Ethernet, Digital Diagnostic<br>850 nm Multimode, 1000Base-SX, LC duplex | **MS100200DX** |
| | SFP Transceiver, Gigabit Ethernet, Digital Diagnostic<br>1310 nm Single mode, 1000Base-LX, LC duplex | **MS100210DX** |
| | SFP Transceiver, Fast Ethernet, Digital Diagnostic<br>1310 nm Multimode, 100Base-FX, LC duplex | **MS100190DX** |
| | SFP Transceiver, Fast Ethernet, Digital Diagnostic<br>1310 nm Single mode, 100Base-FX, LC duplex | **MS100191DX** |
| | **Network Management** | |
| NMP Professional | NMP Professional – Network Management Platform<br>Software incl. one year update license | **MS200160-1** |
| | NMP Standard– Network Management Platform<br>Software incl. one year update license | **MS200162-1** |
| NMP Server | NMP Server – Network Management Platform<br>Software incl. one year update license and 5 clients | **MS200164-1** |
| | **External Power Supplies for industrial use 24 VDC** | |
| | DIN Rail Power Supply 24 Watt 24 VDC / 1.0 A,<br>Wide input range 85-264 VAC, 85...375 VDC | **MS700420** |
| | DIN Rail Power Supply 60 Watt 24VDC / 2.5 A,<br>Adjustment range 21..29VDC,<br>Wide input range 90-264VAC, 85..200VDC<br>**for extended temperature range -40..+75°C** | **MS700482-24B** |
| | **External Power Supplies for industrial use with PoE / PoE+ 44..57VDC** | |
| | DIN Rail Power Supply 60 Watt 48 VDC / 1.25 A,<br>Adjustment range 48..56VDC, Wide input range 85-264 VAC | **MS700430** |
| | DIN Rail Power Supplies 192 Watt 48 VDC / 4 A,<br>Adjustment range 48..56VDC, Wide input range 85-264 VAC | **MS700467** |
| | DIN Rail Power Supply 60 Watt 48 VDC / 1.25 A,<br>Adjustment range 41..58VDC,<br>Wide input range 90-264VAC, 85..200VDC<br>**For extended temperature range -40..+75°C** | **MS700482-48B** |