Data Sheet
Profi Line Modular
Industrial Gigabit Ethernet Ring-Switch

MICROSENS

Made
in
Germany

Overview

The Profi Line Modular switches from MICROSENS offer maximum performance and flexibility in compact design. Robust 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 for future functions which are easy to activate by applying firmware upgrades. This is facilitated through 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 (including 8 fiber ports)
- Optimised architecture for increased performance with ring topology
- PoE+ (max. 30W) integrated, (optional variant with max. 60W)
- Range of ambient operation temperature from -40 up to +75 °C
- Exchangeable SD-card for firmware and configuration included
- 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

- Support of common management standards
- High Performance 1000 MHz ARM CPU and Linux operating system with fast system boot
- 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 (MICROSENS NMP)
- IPv4/IPv6 Dual Stack
- Integrated CLI scripting for the automation of routine processes
- Firmware-, script- and configuration files can be loaded, stored and executed directly from the switch
- Incremental firmware updates
- Exchangeable SD memory card for configuration, CLI scripts, firmware

Compatibility

- Verified to standard CISCO Switches (IEEE 802.1X, QoS, VLAN, CDP, RSTP)

Mounting

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

Power-over-Ethernet PoE/PoE+

- 8x 10/100/1000Base-T, PoE/PoE+ (PSE, max. 30 W)
- 4x 10/100/1000Base-T, HiPoE (PSE)
- 1x 10/100/1000Base-T, PoE+ (PD, max. 25 W)
- 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
- Max. PoE Budget: 240 W (MS652119PM-V2, MS652129PM)
- The optional variant MS652159PM offers a PoE Budget of up to 480 W (Expansion Module required)
- Full power available under suitable installation conditions only

Connectors (Base-Switch)

Up-/Downlinks (Dual Media-Ports)
- 4x SFP-Slot 100/1000Base-X

or
- 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
- 2x 3-pin screw pluggable connector for solid or stranded wires (1 x 3-pin for 480 W PoE variant)

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)

Backplane Extension Bus
- Connection of extension modules

Feature overview network management

For the latest functional firmware features and supported IEEE / RFC standards, please refer to the document "Firmware Features G6" which can be downloaded from the download center of the particular device home pages at www.microsens.de

Interfaces
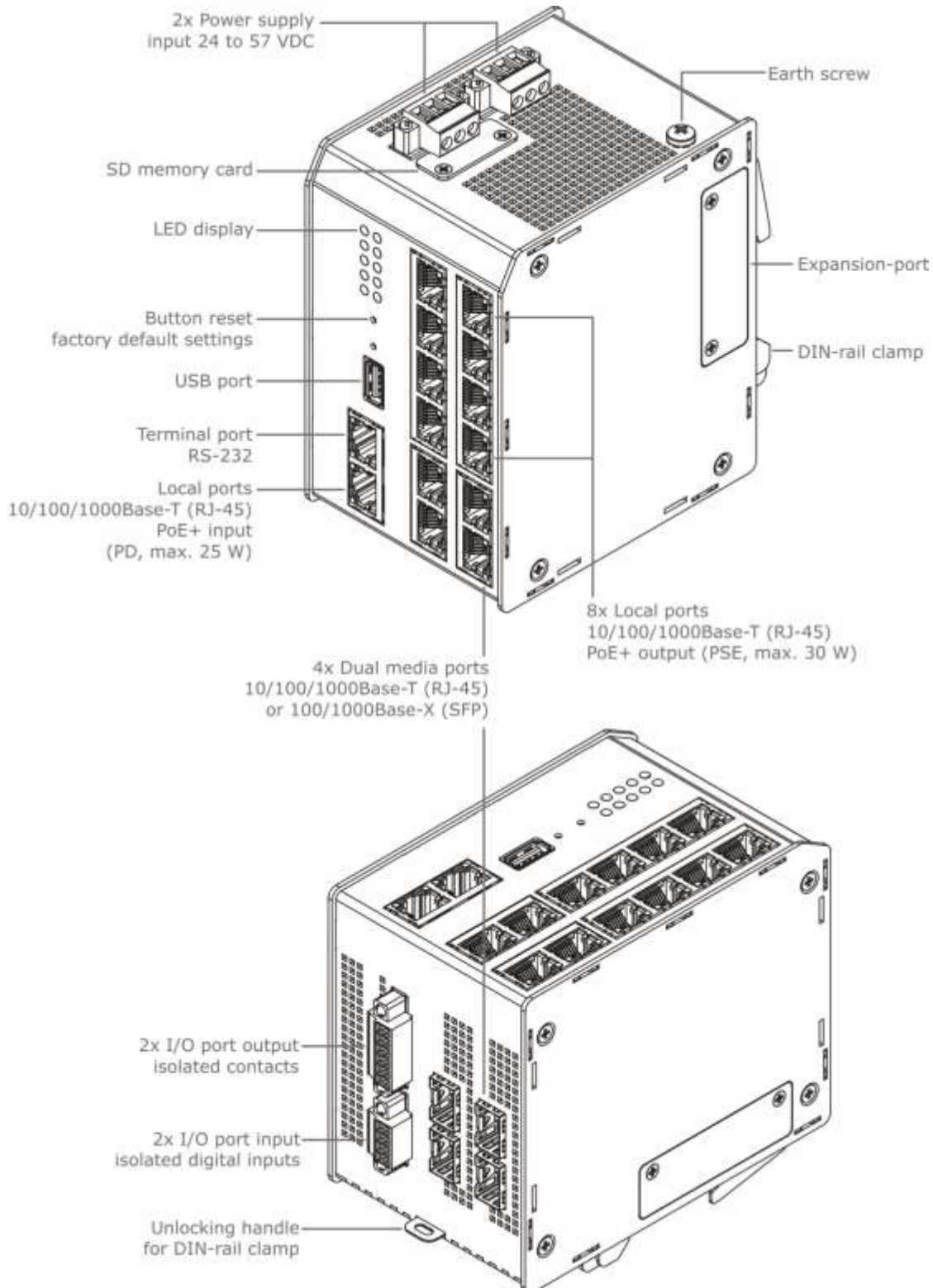
Technical Specifications

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	8 (MS652119PM-V2, MS652159PM) Power Sourcing Equipment (PSE) IEEE 802.3af/at Class 0-4, max. 15 W / 30 W 4 (MS652129PM) Power Sourcing Equipment (PSE) 60W

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 SFP (e.g. MS100200DX)	Multimode, 62.5/125µm (280m) or 50/125 µm (550 m) 850nm wavelength -4..-9.5 dBm output power -18 dBm sensitivity 0 dBm saturation
Single Mode FP (e.g. 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

M (Media)	**SFP-Port** (in use)	
	green	Link at port Flashing at data traffic
	yellow	Port blocked (via protocol)
	red	Port Access Control rejected
	off	no link

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.) min. 44 VDC for PoE operation
Power Consumption	Typical: 12 W, minimum: 9 W, maximum: 30 W
Connectors	2x 3 pin screw connector (MS652119PM-V2), (1x 3 pin for MS652159PM)

Power Supply for PoE / PoE+ (PSE) Operation

Input	44..57 VDC PoE: 48 VDC typ. PoE+: 54 VDC typ.
Power Consumption	max. 270 W (incl. PoE+) (MS652159PM: max. 510 W)
Max. PoE Budget	240 W (MS652119PM-V2, MS652129PM) 480 W (MS652159PM)
Grounding	Plus connector of power supply should be connected to ground (basic recommendation)

Mechanical (Base Unit)

Dimensions	120.5 mm x 77.7 mm x 100.5 mm (MS652119PM-V2, MS652129PM) 120.5 mm x 100 mm x 100.5 mm (MS652159PM) (L x B x H, without connectors)
Weight	Approx. 990g (without SFPs) (MS652119PM-V2, MS652129PM) Approx. 1323g (without SFPs) (MS652159PM)
Protection Class	IP 30

Environmental Conditions

Temperature	Operation	-40..+75 °C
	Storage	-40..+85 °C
Humidity	10..90%, non condensing	
MTBF time	400.000 h	

Standards

CE	2014/30/EU (EMC Directive) 2011/65/EU (RoHS Directive)
Safety	EN 62368-1
Emitted interference	EN 61000-6-3 EN 55032
Electromagnetic Compatibility	EN 61000-6-2 EN 55024

Delivery / Contents

Standard Packaging

|	
Package unit	1 pcs.
Contents	1x PLM-Switch base unit 1x SD memory card (inserted) 2x power supply connector 2x I/O connector 1x Quick Start Guide

Ring-Topology

Normal operation

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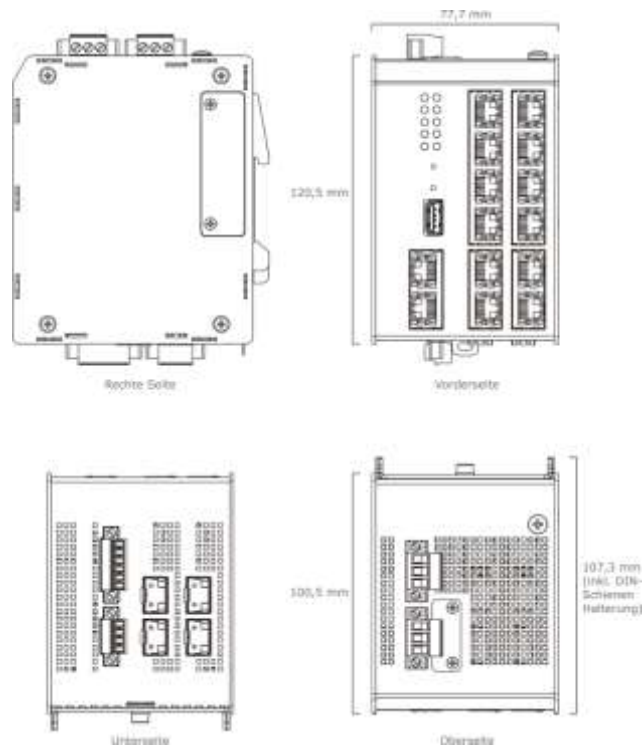- Ring master cuts the ring logically

Ring error

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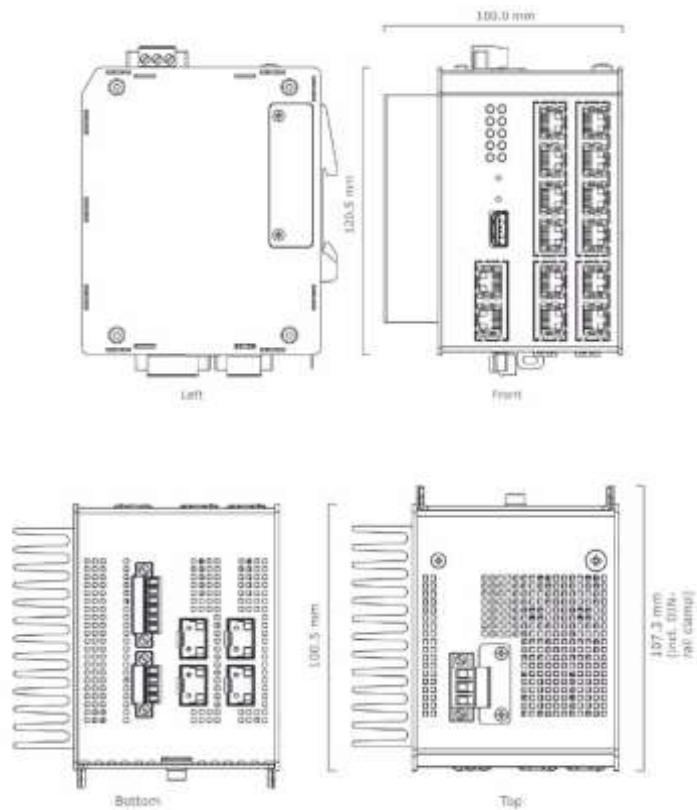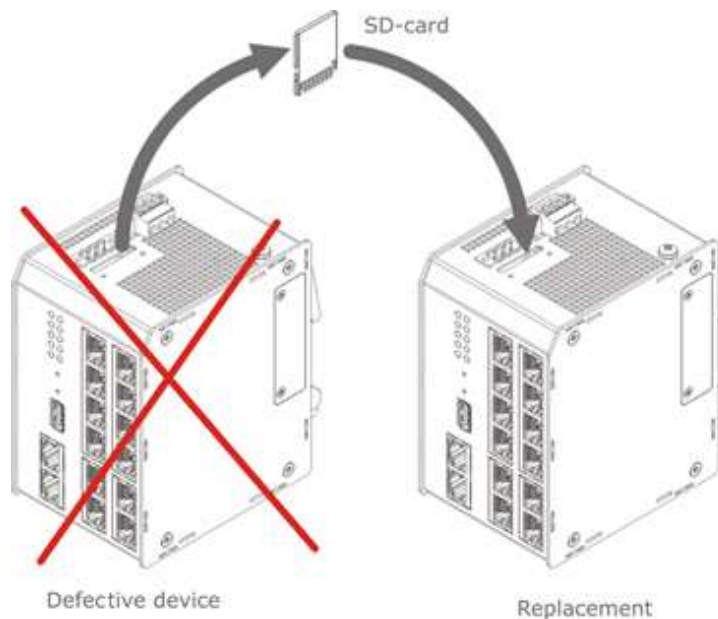- Network function is re-established in less than 50 ms
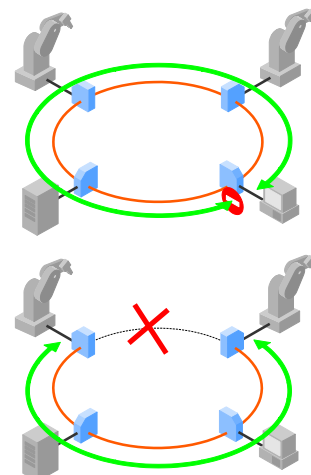
Dimensions

MS652119PM-V2 / MS652129PM:

MS652159PM:

Memory Card

SD Memory Card

The included 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.

Optionally it is possible to write an own MAC address to the SD memory card. This one has priority compared to the MAC address in the switch. This allows to provide an exact clone of the device by swapping the memory card.

- Change of memory card transfers the *complete* device status
- Fault tolerant journaling file system
- Industrial grade-long term stability
- Only MICROSENS memory cards have to be used. Only with these the long term stability over the complete temperature range can be ensured.

Alarm Contacts

2x I/O port output isolated contacts

2x I/O port input isolated digital inputs
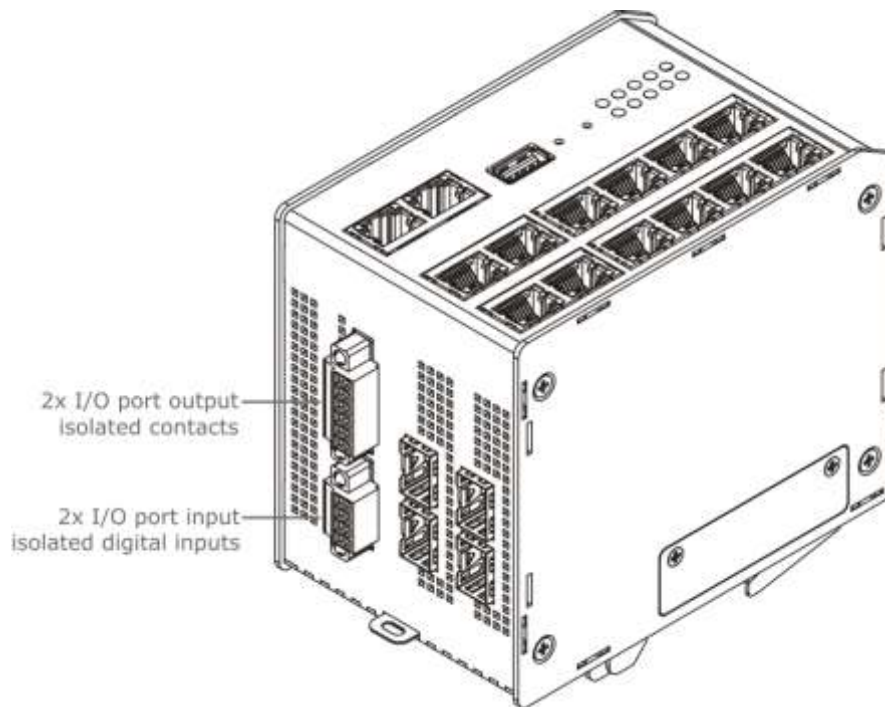
Galvanic isolated contacts (2x)

The potential free output contacts (I/O out) allow 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 1500 VDC

- Normally open (NO) and normally closed (NC) contact possible

- The signal status is indicated by an LED

- Attention: Not suitable for the direct connection of 230 VAC 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 voltages greater than 12 VDC require a serial resistor.
  Valid Voltage ranges:
  - 0 – 12 VDC: no serial resistor
  - up to 15 VDC: 300 Ω
  - up to 24 VDC: 1.2 kΩ
  - up to 36 VDC: 2.4 kΩ
  - up to 48 VDC: 3.6 kΩ
  - up to 57 VDC: 4,7 kΩ

- Isolation voltage 1500 VDC

- Status monitored via management

Gigabit Ethernet Ports
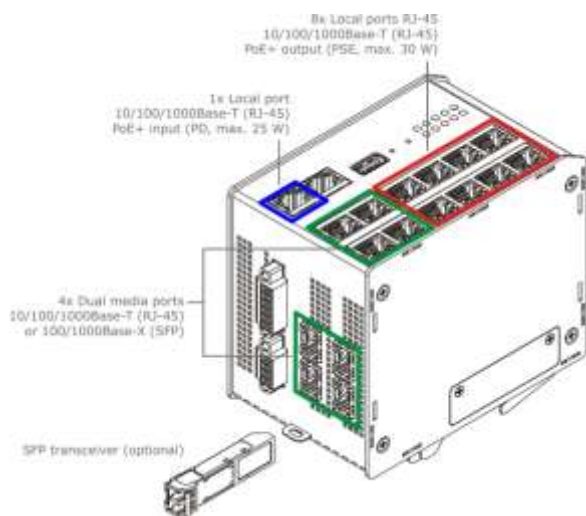
MS652119PM-V2 & MS652159PM: **MS652129PM:**
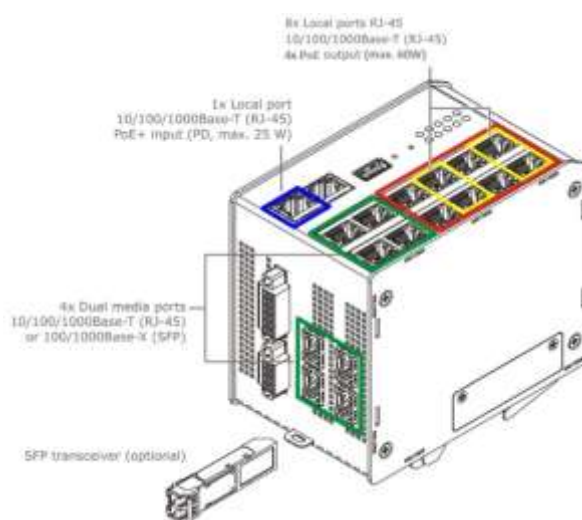
Gigabit Ethernet Ports (RJ-45)

All Gigabit Ethernet ports are made 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 technically preferred connection method to the end devices.

8x Local Ports, PSE (RJ-45)

Additionally, these ports include PoE+ Power Sourcing Equipment (PSE) functionality (*max. 30W:MS652119PM-V2 & MS652159PM*). Each of the PSE ports can supply up to 30 W of electrical power to a connected end device. This is often used for VoIP-telephones, IP-cameras and Wireless Access Points. On MS652129PM, four ports can provide up to 60 W of electrical power to a connected edge device.

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 desired or preferred media (twisted pair or fiber) can be made via management.

1x Local Port, PD (RJ-45)

This port 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.

With the *MS652129PM* up to 4 devices with higher PoE demands can be supplied with max. 60 W
(the other 4 out of 8 RJ-45 Ports will not provide any PoE).

Expansion Modules
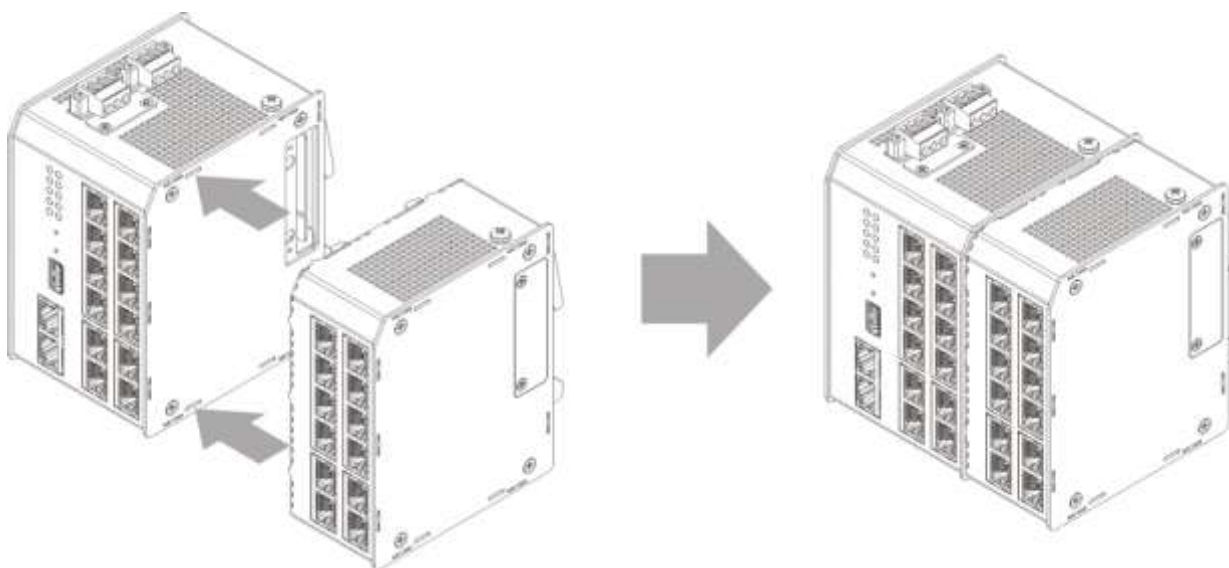
More ports if required

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

- Module expansion via smart and tool-less connection using the 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 one expansion unit (with 6 or 12 ports). This concept allows future introduction of additional functional modules.

6 Port Expansion Module

- 4x 10/100/1000Base-T PoE/PoE+ (PSE)
- 2x Dual Media Ports:
  - 100/1000Base-X SFP-Slot (beneath module case)

  or
  - 10/100/1000Base-T (module front)
- Available PoE Budget of combined Base Unit and Expansion Module:
  - 240 W (MS652119PM-V2)
  - 360 W (MS652159PM)

12 Port Expansion Module

- 8x 10/100/1000Base-T PoE/PoE+ (PSE),
  - 4x Dual Media Ports:
  - 100/1000Base-X SFP-Slot (beneath module case)

  or
  - 10/100/1000Base-T (module front)
- Available PoE Budget of combined Base Unit and Expansion Module:
  - 240 W (MS652119PM-V2)
  - 480 W (MS652159PM)

Connector Labelling and Dimensions in Comparison

Base unit
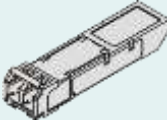
Expansion module
6 ports

Expansion module
12 ports
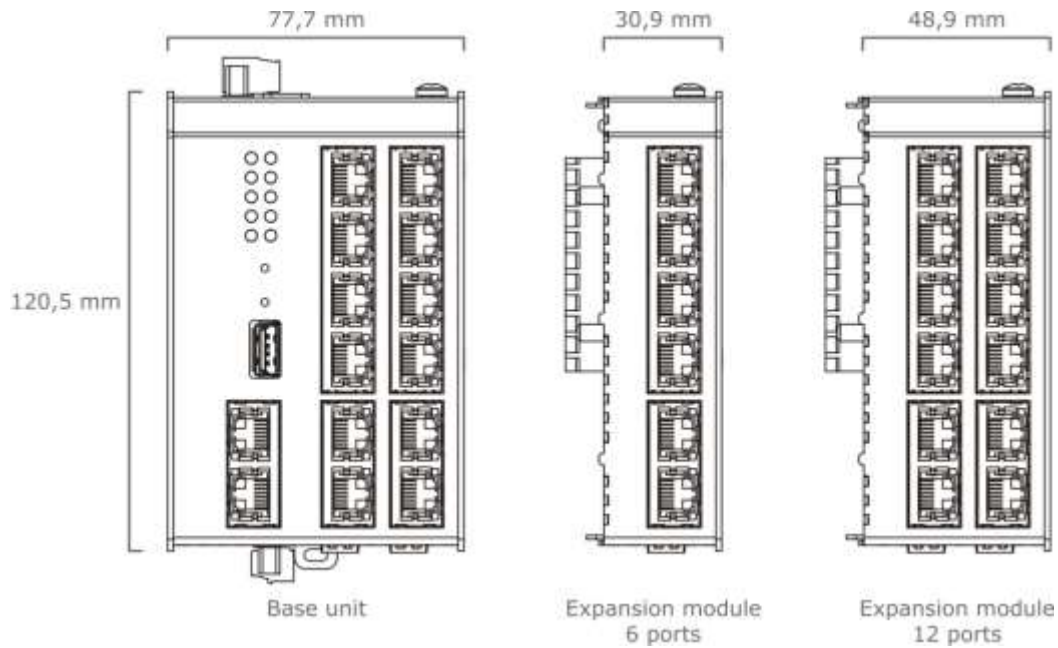
Please note:

- The depth of all cases is 100.5 mm (107.3 mm incl. DIN-rail holder)
- All connection ports for SFP Transceivers are located at the bottom of each case

Order Information

	Description	Article No.:
	Profi Line Modular Base Switch	
	Modular Industrial Gigabit Ethernet Base-Switch, 8x 10/100/1000Base-T PoE/PoE+ (PSE), 240 W PoE (PSE) Budget, 1x 10/100/1000Base-T PoE/PoE+ (PD), 4x Dual Media Ports: 100/1000Base-X SFP-Slot or 10/100/1000Base-T, SD Memory Card, Redundant power supply input: 2x 24..57 VDC	**MS652119PM-V2**
	13-Port GbE Industrial PLM Switch HI-PoE 4x 100/1000X SFP-Slots bzw. 10/100/1000T (Combo), 9x 10/100/1000T, 4x PoE 60W, 1x PD+, 2x 24..57VDC, DIN-Rail, managed, USB, SD-Card incl., 2x I/O, RS-232 Port (RJ-45) 13x RJ-45, 4x SFP Slots, 2x 3plg. 24..57VDC, 1x Konsole, 1x USB, 1x SD-Slot, 2x I/O, 1x Expansion Port	**MS652129PM**
	Modular Industrial Gigabit Ethernet Base-Switch, 8x 10/100/1000Base-T PoE/PoE+ (PSE), Up to 480 W PoE (PSE) Budget, 1x 10/100/1000Base-T PoE/PoE+ (PD), 4x Dual Media Ports: 100/1000Base-X SFP-Slot or 10/100/1000Base-T, SD Memory Card, Power supply input: 1x 24..57 VDC	**MS652159PM**
	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	**MS652219PM**
	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	**MS652419PM**

Accessories

	Description	Article No.:
	Additional Memory Cards for Profi Line Modular Base Switch	
	SD memory card for MICROSENS PLM-Switches, Extended temperature range -25°C up to +85°C	**MS140890X-4GB**
	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**

Accessories (continued)

	NMP 2.x Network Management*	
	NMP 2.x Enterprise Basic package incl. 1 x usage right for NMP Enterprise, 200 x usage rights f. NMP Enterprise Managed Objects, and SW Maintenance for 1 year (download of updates), installation of server SW on max. 1 computer, electronic user manual included	**MS200100**
	NMP 2.x Enterprise Basic package incl. 1 x usage right for NMP Enterprise, 1000 x usage rights f. NMP Enterprise Managed Objects, and SW Maintenance for 1 year (download of updates), installation of server SW on max. 1 computer, electronic user manual included	**MS200102**
	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**
	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**
(Model: MS700456)	DIN Rail Power Supply, 45..55 VDC / 2.5 A (120W), Wide input range 90..132/180..264 VAC Operating temperature range -35..+70°C	**MS700456**
	DIN Rail Power Supply 47..56 VDC / 5 A (240W) Wide input range 90..132/180..264 VAC **For extended temperature range -40..+70°C**	**MS700457**

Service

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 (§9) of MICROSENS GmbH & Co. KG.
*** Please refer to separate data sheets to obtain detailed information on the listed variants.