



**HIRSCHMANN**

A **BELDEN** BRAND

# User Manual

## Installation Industrial Ethernet Switch PowerMICE



039654005010414000

The naming of copyrighted trademarks in this manual, even when not specially indicated, should not be taken to mean that these names may be considered as free in the sense of the trademark and tradename protection law and hence that they may be freely used by anyone.

© 2014 Hirschmann Automation and Control GmbH

Manuals and software are protected by copyright. All rights reserved. The copying, reproduction, translation, conversion into any electronic medium or machine scannable form is not permitted, either in whole or in part. An exception is the preparation of a backup copy of the software for your own use. For devices with embedded software, the end-user license agreement on the enclosed CD applies.

The performance features described here are binding only if they have been expressly agreed when the contract was made. This document was produced by Hirschmann Automation and Control GmbH according to the best of the company's knowledge. Hirschmann reserves the right to change the contents of this document without prior notice. Hirschmann can give no guarantee in respect of the correctness or accuracy of the information in this document.

Hirschmann can accept no responsibility for damages, resulting from the use of the network components or the associated operating software. In addition, we refer to the conditions of use specified in the license contract.

You can get the latest version of this manual on the Internet at the Hirschmann product site ([www.hirschmann.com](http://www.hirschmann.com)).

Printed in Germany  
Hirschmann Automation and Control GmbH  
Stuttgarter Str. 45-51  
72654 Neckartenzlingen  
Germany  
Tel.: +49 1805 141538

# Contents

<b>Safety instructions</b>	<b>5</b>
<b>About this Manual</b>	<b>13</b>
<b>Legend</b>	<b>13</b>
<b>1 Device description</b>	<b>14</b>
1.1 Description of the modules	15
1.1.1 PowerMICE basic module MS4128	16
1.1.2 Media modules	18
1.1.3 MB-2T expansion module	22
1.1.4 SFP modules	23
<b>2 Assembly and start-up</b>	<b>24</b>
2.1 Overview of installation	24
2.2 Installing the device	25
2.2.1 Unpacking and checking	25
2.2.2 Installing the media modules	25
2.2.3 Filling out and attaching labels	25
2.2.4 Installing the SFP modules	26
2.2.5 Adjusting DIP switch settings on basic module	27
2.2.6 Adjusting the DIP switch settings on the MM20-A8A89999SAHH media module	28
2.2.7 Connecting the MM22-T1T1T1T1 PoE media module	28
2.2.8 Connecting the terminal blocks for supply voltage and signal contact	30
2.2.9 Installing the terminal blocks; start-up procedure	31
2.2.10 Installing the device on the DIN rail, grounding	31
2.2.11 Connecting the data lines	32
2.2.12 Installing the MB-2T expansion module	35
2.2.13 Defining the meaning of the display LEDs	36
2.3 Display elements	36
2.4 Basic set-up	40
2.5 Maintenance	42
2.6 Disassembly	43
<b>3 Technical data</b>	<b>44</b>
<b>A Further Support</b>	<b>57</b>



# Safety instructions

This documentation contains instructions which must be observed to ensure your own personal safety and to avoid damage to devices and machinery.

## ■ Important Information

**Notice:** Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



## **DANGER**

**DANGER** indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.



## **WARNING**

**WARNING** indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.



## **CAUTION**

**CAUTION** indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

**Note:** A note contains important information on the product, on how to manage the product, or on the respective section of the documentation to which your special attention is being drawn.

## ■ **Certified usage**


The device may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by the manufacturer. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

## ■ **Supply voltage**

For safety reasons the devices have been designed to operate at low voltages. Thus, they may only be connected to the supply voltage connections and to the signal contact with SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1.

The supply voltage is electrically isolated from the housing.

**Note:** Only the PoE media module MM22-T1T1T1T1 has an external power supply.

- Use undamaged parts.
- Relevant for North America:  
The device may only be connected to a supply voltage of class 2 that fulfills the requirements of the National Electrical Code, Table 11(b). If the voltage is being supplied redundantly (two different voltage sources), the combined supply voltages must fulfill the requirements of the National Electrical Code, Table 11(b).
- Relevant for North America: For use in Class 2 circuits.  
Only use copper wire/conductors of class 1, 75 °C (167 °F).
- For using the device in areas with a risk of gas explosion according to directive 94/9/EC (ATEX):
  - ▶ Make sure that the device carries the following device label:  
 II 3G (... followed by additional specifications).
  - ▶ Observe the clause "Special Conditions for Safe Use ..." on the following pages.



Page 1/2

**Special Conditions for Safe Use under Directive 94/9/EC, ATEX**

Applied Standards: EN 60079-0: 2009, EN 60079-15: 2010

**Ordinary Location, Non-Hazardous Area, Non-Explosive Atmosphere**



**Zone 2, IIC Explosive Atmosphere**



**WARNING!**

The USB connection and the V.24 Interface connection are for temporary connection only, for maintenance use. Do not use, connect or disconnect unless the area is known to be non-hazardous. Connection or disconnection in an explosive atmosphere could result in an explosion!

Power Supply range P1, P2 (redundant)

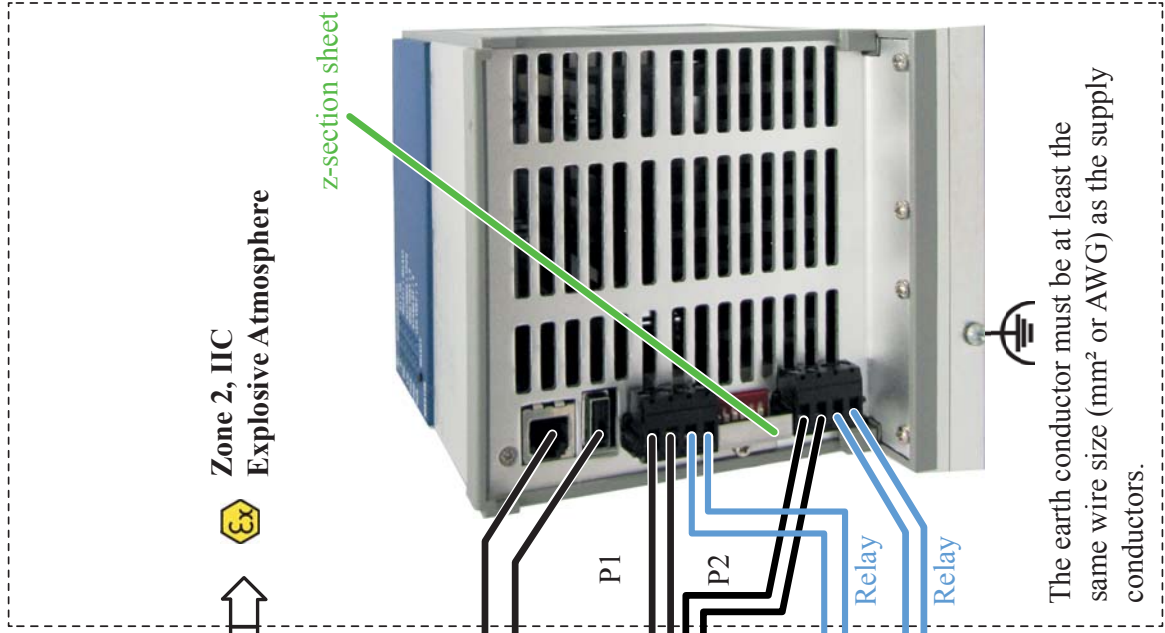
18 – 32 VDC  
4.5 – 2.5 A

Relay contacts:

The relays are “Sealed Devices”.

**THE RELAY TERMINALS ARE DEPENDENT UPON THE FOLLOWING PARAMETERS - max. values:**

$U_{in}$	$I_{in}$
30 V	90 mA



The earth conductor must be at least the same wire size (mm<sup>2</sup> or AWG) as the supply conductors.



Page 2/2

**Special Conditions for Safe Use  
under Directive 94/9/EC, ATEX**

The Use in Hazardous Locations with explosive atmospheres is only allowed for MS4128-xxxx or HS600x model no's. which are individually labelled

“ II 3G” and “Ex nA IIC T4 Gc”

Ambient temperature range “Ta: 0°C ... + 60°C” ; Temperature Code “T4” .

The modules shall be installed in a suitable IP54 enclosure - with tool removable cover - in accordance with EN 60079-15, taking into account the environmental conditions under which the equipment will be used.

The power supply plugs P1 and P2 have to be secured by the supplied z-section sheet and M2.5 screw inclusive tooth washer.

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

When the temperature under rated conditions exceeds 70 °C at the cable or conduit entry point, or 80 °C at the branching point of the conductors, the temperature specification of the selected cable shall be in compliance with the actual measured temperature values.

**DO NOT OPEN WHEN ENERGIZED.**

Manufactured in 72654 Neckartenzlingen, Germany,  
by Hirschmann Automation and Control GmbH

DOM: ww/yyyy (Date Of Manufacture: w - week, y - year – Refer to the device label.)



## ■ **Shielded ground**

The shielded ground wire of the twisted pairs lines is connected to the front panel as a conductor.

- Beware of possible short circuits when connecting a cable section with conductive shield braiding.

## ■ **Housing**



### **WARNING**

#### **ELECTRIC SHOCK**

Never insert any pointed objects (small screwdrivers, wires, etc.) into the product!

Never insert sharp objects (small screwdrivers, wires, etc.) into the connection terminals for the supply voltage or the signal contact, and do not touch the terminals!

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**



### **CAUTION**

#### **EQUIPMENT OVERHEATING**

When installing the device, make sure any ventilation slots remain free. Maintain a clearance of at least 10 cm (3.94 in).

**Failure to follow these instructions can result in injury or equipment damage.**

Only technicians authorized by the manufacturer are permitted to open the housing.

The lower panel of the device is grounded by means of the DIN rail and optionally by means of the separate ground screw.

- The switch basic module forms an inseparable unity. By removing the display and connecting parts, you risk the damage of the switch basic module.
- Make sure that the electrical installation meets local or nationally applicable safety regulations.
- The ventilation slots must not be covered to promote free air circulation.
- The clearance between the ventilation slots of the housing and other objects must be at least 10 cm (3.94 in).
- The device has to be mounted in an upright position (see fig. 13).
- If installed in a living area or office environment, the device must be operated exclusively in switch cabinets with fire protection characteristics in accordance with EN 60950-1.

## ■ Environment

The device may only be operated at the specified surrounding air temperature (temperature of the surrounding air at a distance of up to 5 cm (1.97 in) from the device) and relative air humidity specified in the technical data.

- Install the device in a location where the climatic threshold values specified in the technical data will be observed.
- Use the device only in an environment within the pollution degree specified in the technical data.

## ■ Qualification requirements for personnel

Qualified personnel as understood in this manual and the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been:

- ▶ trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards;
- ▶ trained or directed in the care and use of appropriate safety equipment in accordance with the current standards of safety engineering;
- ▶ trained in providing first aid.

## ■ General safety instructions

Electricity is used to operate this equipment. Comply with every detail of the safety requirements specified in the operating instructions regarding the voltages to apply.

See “[Supply voltage](#)” on page 6.

Non-observance of these safety instructions can therefore cause material damage and/or injuries.

- Only appropriately qualified personnel should work on this device or in its vicinity. Qualified personnel must be thoroughly familiar with the warnings and maintenance procedures in accordance with this operating manual.
- The proper and safe operation of this device depends on proper handling during transport, proper storage and assembly, and conscientious operation and maintenance procedures.
- Never start operating the device with damaged components.
- Only use the devices in accordance with this manual. In particular, observe the warnings and safety-related information.
- Any work that may be required on the electrical installation may only be carried out by personnel trained for this purpose.

**Note:** LED or LASER components in compliance with IEC 60825-1 (2007):

CLASS 1 LASER PRODUCT

CLASS 1 LED PRODUCT

**Note:** Follow the safety instructions for the media modules. You will find these instructions in the “Description and Operating Instructions” document supplied with the media module.

#### ■ **National and international safety regulations**

- Make sure that the electrical installation meets local or nationally applicable safety regulations.

#### ■ **CE marking**

The labeled devices comply with the regulations contained in the following European directive(s):

2011/65/EU (RoHS)

Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

2004/108/EC (EMC)

Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electromagnetic compatibility.

In accordance with the above-named EU directive(s), the EU conformity declaration will be at the disposal of the relevant authorities at the following address:

Hirschmann Automation and Control GmbH  
Stuttgarter Str. 45-51  
72654 Neckartenzlingen  
Tel.: +49 1805 141538

The product can be used in the industrial sector.

- ▶ Interference immunity: EN 61000-6-2:2005
- ▶ Emitted interference: EN 55022:2010

**Warning!** This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.

**Note:** The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC threshold values.

### ■ **FCC note**

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions : (1) This device may not cause harmful interference; (2) this device must accept any interference received, including interference that may cause undesired operation.

Appropriate testing has established that this device fulfills the requirements of a class A digital device in line with part 15 of the FCC regulations.

These requirements are designed to provide sufficient protection against interference when the device is being used in a business environment.

The device creates and uses high frequencies and can also radiate high frequencies, and if it is not installed and used in accordance with this operating manual, it can cause radio transmission interference. The use of this device in a living area can also cause interference, and in this case the user is obliged to cover the costs of removing the interference.

### ■ **Recycling note**

After usage, this product must be disposed of properly as electronic waste, in accordance with the current disposal regulations of your county, state and country.

# About this Manual

The “Installation” user manual contains a device description, safety instructions, a description of the display, and the other information that you need to install the device.

The following manuals are available as PDF files on the CD-ROM supplied:

- ▶ Installation user manual
- ▶ Basic Configuration user manual
- ▶ Redundancy Configuration user manual
- ▶ Router Configuration user manual
- ▶ Graphical User Interface reference manual
- ▶ Command Line Interface user manual

The Industrial HiVision Network Management Software provides you with additional options for smooth configuration and monitoring:

- ▶ Simultaneous configuration of multiple devices
- ▶ Graphic interface with network layout
- ▶ Auto-topology discovery
- ▶ Event log
- ▶ Event handling
- ▶ Client/server structure
- ▶ Browser interface
- ▶ ActiveX control for SCADA integration
- ▶ SNMP/OPC gateway.

## Legend

The symbols used in this manual have the following meanings:

▶	Listing
□	Work step
■	Subheading

# 1 Device description

The PowerMICE devices consist of a switch with media modules that can be plugged into it. The devices have 4 slots for 10/100 Mbit/s media modules and 1 slot for 1 Gigabit module. The slot for the Gigabit module supports 2 Gigabit ports. The expansion module provides you with 2 additional slots for 10/100 Mbit/s media modules. Each media module provides you with 2 to 4 ports for connecting network segments.

The PowerMICE devices are designed for the special requirements of industrial automation. They meet the relevant industry standards, provide very high operational reliability, even under extreme conditions, and also provide long-term reliability and flexibility.

The devices work without a fan.

The voltage is supplied redundantly.

The following installation options are available:

- ▶ simply snapping them onto a DIN rail

You can choose various media to connect terminal devices and other infrastructure components:

- ▶ twisted pair cable
- ▶ multimode F/O
- ▶ singlemode F/O

The twisted pair ports support:

- ▶ Autocrossing
- ▶ Autonegotiation
- ▶ Autopolarity

The following software variants are available:

- ▶ MICE MS4128-L2P: Layer 2 Professional
- ▶ MICE MS4128-L3E: Layer 3 Enhanced
- ▶ MICE MS4128-L3P: Layer 3 Professional

There are convenient options for managing the device. Administer your devices via:

- ▶ a Web browser
- ▶ Telnet
- ▶ management software (e.g. Industrial HiVision)
- ▶ a V.24 interface (locally on the device)

The ring redundancy concept allows the network to be reconfigured quickly after a failure.

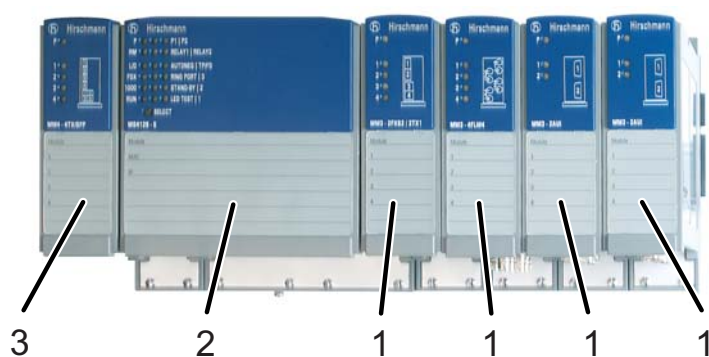
Product configuration data can be provided by:

- ▶ diagnosis displays
- ▶ displaying the operating parameters
- ▶ large label areas

The clear division of the diagnosis displays and the connection level allows you to view the LEDs easily.

The devices provide you with a large range of functions. Information pertaining to these functions is found in the relevant operating software manuals. These manuals are available as PDF files on the CD ROM provided, or you can download them from the Internet on the Hirschmann product pages ([www.hirschmann.com](http://www.hirschmann.com)).

The Hirschmann network components help you ensure continuous communication across all levels of the company network.



*Figure 1: Basic module with media modules attached*  
1 – Slots for one 10/100 Mbit/s media module  
2 – Basic module  
3 – Slot for the Gigabit media module

## **1.1 Description of the modules**

The industrial ETHERNET series PowerMICE (Modular Industrial Communication Equipment) consists of a basic switch module and the media modules. These devices can be managed. A basic module contains all the functions of this industrial Switch, with the exception of the interfaces to the LAN that is connected. Pluggable media modules provide these interfaces. They differ with regard to the number of interfaces and the media type for connecting segments. An expansion module enables you to add 2 slots for media modules to the basic module.

For the sake of simplicity, the basic switch module with various plugged in media modules will be referred to as PowerMICE in this document.

### 1.1.1 PowerMICE basic module MS4128

The basic module of the PowerMICE contains all the function units, such as: switch function, management function, redundancy function, display control, voltage connection, management connection, adjustable controls, slots for media modules.

Family	Designed for:
PowerMICE	larger numbers of ports
	larger bandwidth requirement
	Selectable via media modules: Number of 100/1000 Mbit/s ports

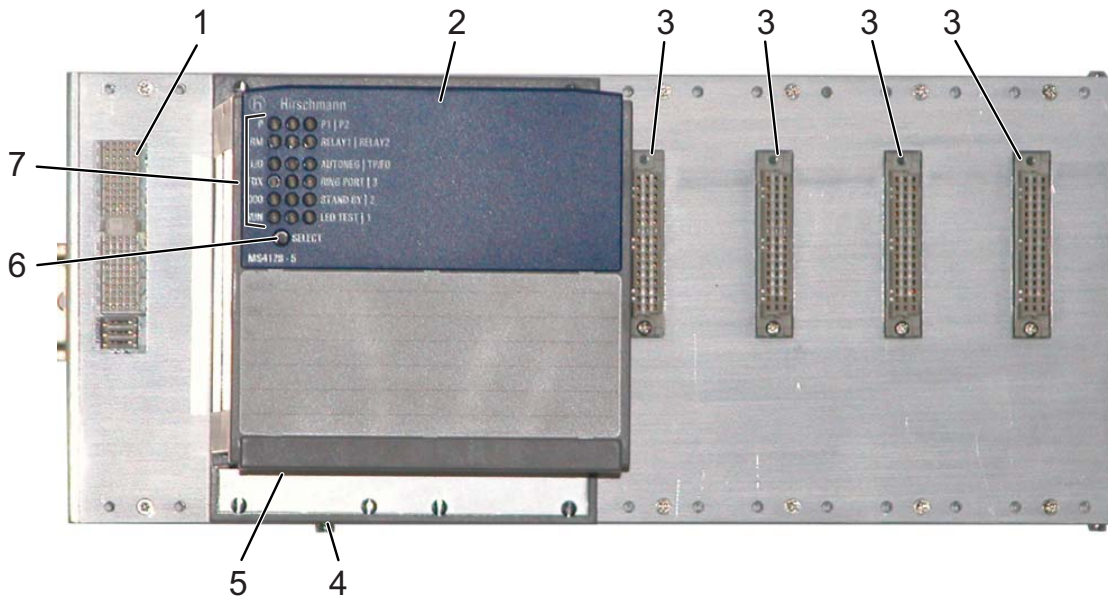
The basic module provides:

- ▶ 4 slots for 10/100 Mbit/s media modules
- ▶ 1 slot for 1 Gbit/s media modules

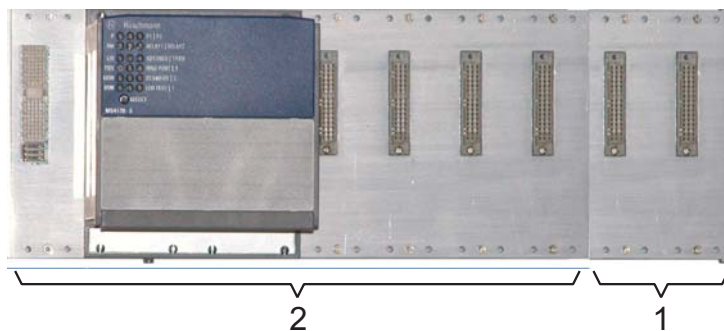
With the expansion module you add 2 more slots for 10/100 Mbit/s media modules. With its 4-port media modules, the basic module allows you to connect up to:

- ▶ 16 network segments or
- ▶ 24 network segments when using an expansion module and additionally
- ▶ 4 Gigabit network segments when using a 4-port Gigabit media module.





**Figure 2: Front of the basic module**  
 1 – Slot for SFP module MM4...  
 2 – Basic module  
 3 – Slot for media modules MM2... or MM3... with 2 to 4 ports each  
 4 – Ground screw  
 5 – Connections on the bottom of the basic module  
 6 – Button for setting the display status  
 7 – LEDs for device status and display status



**Figure 3: Basic module with expansion module**  
 1 – Expansion module MB-2T  
 2 – Basic module

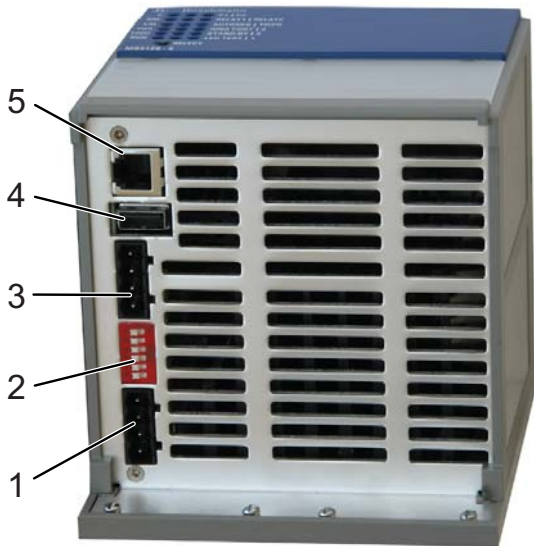


Figure 4: Connections on the bottom of the basic module

- 1 – Terminal block (Power 2)
- 2 – DIP switch
- 3 – Terminal block (Power 1)
- 4 – USB port
- 5 – V.24 port

### 1.1.2 Media modules

The media modules form the interface from the device to the LAN.

The media modules can be used in the basic module.

An expansion module enables you to add 2 slots for media modules to the basic module.

They differ with regard to the number of interfaces and the media type. The different interfaces of the media modules provide you with the following interface-specific functions:

- ▶ Specific functions of TP/TX interface
  - ▶ Link Control
  - ▶ Auto Polarity Exchange
  - ▶ Autonegotiation
  - ▶ Autocrossing (device may be connected with a crossed-over or an uncrossed cable)
- ▶ Specific functions of F/O interface
  - ▶ Link Down monitoring
- ▶ Transceiver-specific (AUI-specific) functions
  - ▶ Collision recognition
  - ▶ Collision test (SQE)
  - ▶ Protection from permanent network connection (Jabber Control)
  - ▶ DTE Power Monitor

Depending on the basic module setting, the LEDs display, among other things, the data reception and the connection status.

## ■ MM2 media modules

MM2 media modules Module type	TP ports 10/ 100 Mbit/s	F/O port multi-mode 10 Mbit/s	F/O port multi-mode 100 Mbit/s	F/O port single- mode 1300 nm, 100 Mbit/s	F/O port single- mode 1550 nm, 100 Mbit/s
MM2 - 4TX1 (- EEC)	4, RJ45	–	–	–	–
MM2 - 2FLM4	–	2, ST	–	–	–
MM2 - 4FXM3	–	–	4, MTRJ	–	–
MM2 - 2FXM3 / 2TX1	2, RJ45	–	2, MTRJ	–	–
MM2 - 2FXM2	–	–	2, DSC	–	–
MM2 - 2FXS2	–	–	–	2, DSC	–

Table 1: Media connections per MM2 media modules (number and type)

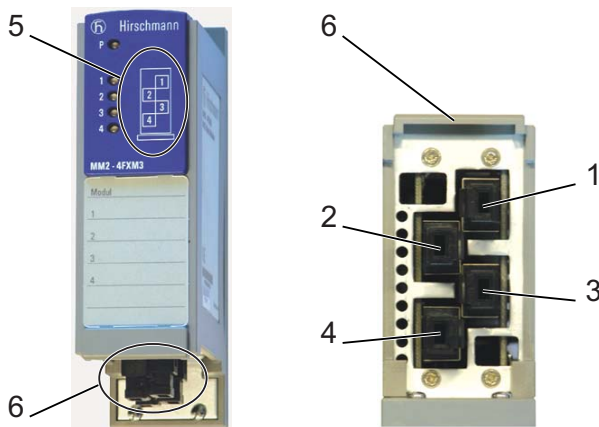


Figure 5: Port assignment

- 1 - Port 1
- 2 - Port 2
- 3 - Port 3
- 4 - Port 4
- 5 - Illustration of the port numbers
- 6 - Bottom side of the device

## ■ MM3 media modules

MM3 media modules Module type	TP ports 10/ 100 Mbit/s	F/O port multi-mode 10 Mbit/s	F/O port multi-mode 100 Mbit/s	F/O port single- mode 1300 nm, 100 Mbit/s	F/O port single- mode 1550 nm, 100 Mbit/s
MM3-4TX5	4, M12	–	–	–	–
MM3-4FLM4	–	4, ST	–	–	–
MM3-1FXM2/3TX1	3, RJ45	–	1, DSC	–	–
MM3-2FXM2/2TX1(-EEC)	2, RJ45	–	2, DSC	–	–
MM3-2FXM4/2TX1	2, RJ45	–	2, ST	–	–
MM3-4FXM2	–	–	4, DSC	–	–
MM3-4FXM4	–	–	4, ST	–	–
MM3-1FXS2/3TX1(-EEC)	3, RJ45	–	–	1, DSC	–
MM3-2FXS2/2TX1	2, RJ45	–	–	2, DSC	–
MM3-4FXS2	–	–	–	4, DSC	–
MM3-1FXL2/3TX1	3, RJ45	–	–	–	1, DSC

Table 2: Media connections per MM3 media modules (number and type)

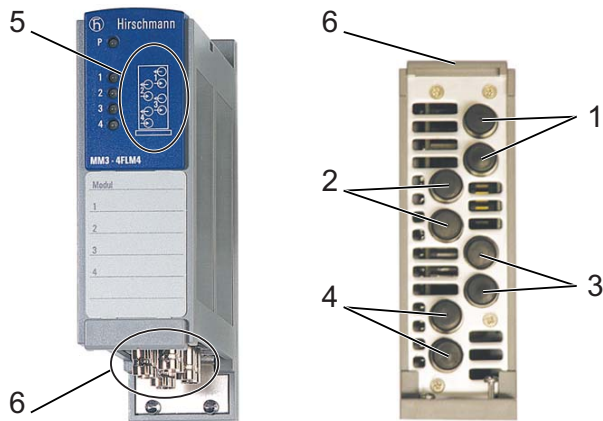


Figure 6: Port assignment

- 1 - Port 1
- 2 - Port 2
- 3 - Port 3
- 4 - Port 4
- 5 - Illustration of the port numbers
- 6 - Bottom side of the device

## ■ MM22-T1T1T1T1 PoE media module

The MM22-T1T1T1T1 PoE media module (deeper module design) supports Power over ETHERNET (PoE) according to IEEE 802.3af. It allows the connection and remote supply of IP telephones (Voice over IP), webcams, sensors, printer servers and WLAN access points via 10BASE-T/100BASE-TX, for example. With PoE, these terminal devices are powered by the twisted-pair cable.

The MM22-T1T1T1T1 media module has four 10BASE-T/100BASE-TX ports (RJ45 connections) for connecting network segments or PoE terminal devices (PD, Powered Device) up to class 0 (or respectively class 3).

The current is supplied on the free line pair (spare pairs); the individual ports are not electrically insulated from each other.

The following conditions are met in accordance with IEEE 802.3af:

- ▶ Endpoint PSE
- ▶ Alternative B.

## ■ MM4 media modules

The 4-port MM4-4TX/SFP media module has 4 TP interfaces and 4 sockets for SFP modules from Hirschmann.

The 2-port MM4-2TX/SFP media module has 2 TP interfaces and 2 sockets for SFP modules from Hirschmann.

The Gigabit slot of the PowerMICE (slot on the left side next to the switch basic module) supports two Gigabit ports.

When you use an SFP module, you get an optical interface. You thus deactivate the corresponding TP interface.

**Note:** Only use SFP modules from Hirschmann ([see page 54 “Accessories”](#)).

MM4 media modules Module type	TP ports 10/100/1000	SFP ports as alternatives to TP ports
MM4 - 2TX/SFP	2, RJ45	2
MM4 - 4TX/SFP	4, RJ45	4

Table 3: Media connections per MM4 media module (number and type)

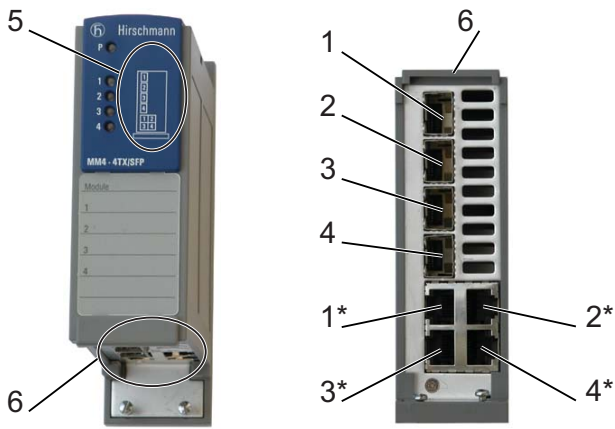


Figure 7: Port assignment

- 1 - Port 1 (twisted pair)
- 2 - Port 2 (twisted pair)
- 3 - Port 3 (twisted pair)
- 4 - Port 4 (twisted pair)
- 1\* - Port 1\* (SFP slot, can be used as alternative to port 1)
- 2\* - Port 2\* (SFP slot, can be used as alternative to port 2)
- 3\* - Port 3\* (SFP slot, can be used as alternative to port 3)
- 4\* - Port 4\* (SFP slot, can be used as alternative to port 4)
- 5 - Representation of port numbers
- 6 - Bottom of device

### 1.1.3 MB-2T expansion module

The MB-2T expansion module allows you to add 2 slots for media modules to the basic module.

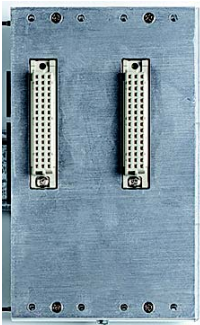


Figure 8: MB-2T expansion module

#### **1.1.4 SFP modules**

SFP modules are optical transceivers (Fast ETHERNET and Gigabit ETHERNET SFP modules - see [page 54 "Accessories"](#)). SFP stands for Small Form-factor Pluggable and is also often referred to as mini-GBIC (GigaBit Interface Converter).

The SFP modules are plugged into the SFP slots of the Fast ETHERNET media module MM20-Z6Z6Z6Z6 or the Gigabit ETHERNET media modules MM4-4TX/SFP and MM4-2TX/SFP in order to have an F/O port.

Module MM20-Z6Z6Z6Z6 has 4 SFP slots for connecting SFP modules (100 Mbit/s).

Modules MM4-4TX/SFP and MM4-2TX/SFP have, respectively, 4 and 2 TP interfaces and 4 and 2 slots for connecting SFP modules (1000 Mbit/s).

By inserting the SFP module you deactivate the corresponding TP interface.

## 2 Assembly and start-up

Before installing and starting up the device, note the safety instructions (see [page 5](#) onwards).

### 2.1 Overview of installation

Two or more devices configured with the same IP address can cause unpredictable operation of your network.



#### **WARNING**

##### **UNINTENTIONAL OPERATION IN DEVICE**

Install and maintain a process that assigns a unique IP address to every device in the network.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

The devices have been developed for practical application in a harsh industrial environment.  
On delivery, the device is ready for operation.

The following steps should be performed to install and configure a Switch:

- ▶ [Unpacking and checking](#)
- ▶ [Installing the media modules](#)
- ▶ [Filling out and attaching labels](#)
- ▶ [Installing the SFP modules](#)
- ▶ [Adjusting DIP switch settings on basic module](#)
- ▶ [Adjusting the DIP switch settings on the MM20-A8A89999SAHH media module](#)
- ▶ [Connecting the MM22-T1T1T1T1 PoE media module](#)
- ▶ [Connecting the terminal blocks for supply voltage and signal contact](#)
- ▶ [Installing the terminal blocks; start-up procedure](#)
- ▶ [Installing the device on the DIN rail, grounding](#)
- ▶ [Connecting the data lines](#)
- ▶ [Installing the MB-2T expansion module](#)



## 2.2 Installing the device

### 2.2.1 Unpacking and checking

- Check that the contents of the package are complete (see page 53 “Scope of delivery”).
- Check the individual parts for transport damage.

### 2.2.2 Installing the media modules

On delivery, the device is ready for operation.  
You can install and remove media modules during running operation.

- To attach a media module, first remove the protective cap on the plug.
- Plug the media module onto the plug.
- Fasten the 4 screws at the corners of the media module.
- Fit the media modules in sequence from left to right.
- Check whether the switch default settings match your requirements.

### 2.2.3 Filling out and attaching labels

The labels included in the delivery help you to organize your network installation clearly.

The large label areas enable you to designate the modules and uniquely assign the devices to be connected. You can print them, write on them and replace them at any time.



Figure 9: Attaching the labels



Figure 10: Label areas

- 1 – Labeling the media modules: name of the module
- 2 – Labeling the media modules: port assignment of module for each port
- 3 – Labeling the basic module: additional entries if required
- 4 – Labeling the basic module: IP address of the device
- 5 – Labeling the basic module: MAC address of the device
- 6 – Labeling the basic module: name of the module

- Attach the labels included in the delivery to the basic module and the media modules as required.

## 2.2.4 Installing the SFP modules

- To attach an SFP module, first remove the protective cap over the socket.
- Push the SFP module with the lock closed into the socket until it latches audibly in place.

**Note:** Only use SFP modules from Hirschmann ([see page 54 “Accessories”](#)).



Figure 11: Installing an SFP module

## 2.2.5 Adjusting DIP switch settings on basic module

The 6-pin DIP switch on the bottom panel of the basic module provides you with the following options:

DIP switch	Function	Default setting
RM (Redundancy Manager)	Switch the RM (Redundancy Manager) function on and off when the HIPER-Ring function is activated (see "User Manual - Redundancy Configuration").	OFF position (RM function deactivated)
Ring port	Select the port for the HIPER-Ring. The changes to the switch setting are taken over after the restart. In the ON position, ports 1 and 2 in module 2 form the connection for the HIPER-Ring.	OFF position (ports 1 and 2 in module 1 form the connection for the HIPER-Ring).
Stand-by	With the redundant coupling of rings, you assign the redundancy function to the PowerMICE in the redundant line (see "User Manual - Redundancy Configuration").	OFF position (normal operation)
HIPER-Ring <sup>a</sup>	Switch the HIPER-Ring functions on and off. When the function is switched off, you can use the Ring ports as normal ports. In the ON position, RSTP (Rapid Spanning Tree) is globally deactivated.	OFF position
Software configuration / DIP configuration	Give the software configuration precedence over the DIP switch position. In this case, the other switch positions are meaningless.	OFF position (software configuration has precedence)
Service	Switch the device to the service mode.	OFF position (normal operation)

a. Control port: module 1, port 3; coupling port: module 1, port 4

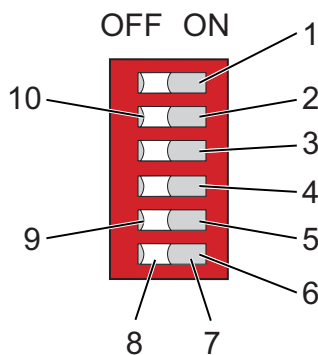


Figure 12: 6-pin DIP switch on basic module

- 1 – Switch 1, position ON, function: Redundancy Manager (RM)
- 2 – Switch 2, position ON, function: module 2, port 1 and port 2
- 3 – Switch 3, position ON, function: stand-by
- 4 – Switch 4, position ON, function: HIPER-Ring
- 5 – Switch 5, position ON, function: DIP configuration

- 6 – Switch 6, position ON, function: service mode
- 7 – Switch position ON
- 8 – Switch position OFF
- 9 – Switch 5, position OFF, function: software configuration
- 10 – Switch 2, position OFF, function: module 1, port 1 and port 2

- Before starting operation of the device, check whether the default settings of the DIP switch correspond to your requirements.

### **2.2.6 Adjusting the DIP switch settings on the MM20-A8A89999SAHH media module**

With the 3-pin DIP switch in the bottom panel of the MM20-A8A89999SAHH media module, you enter settings for the SQE test function and for monitoring the DTE voltage.

**Note:** Before starting operation, check whether the device in question operates the transceiver with or without an SQE test.

- Before starting operation of the device, check whether the default settings of the DIP switch correspond to your requirements.

### **2.2.7 Connecting the MM22-T1T1T1T1 PoE media module**

The MM22-T1T1T1T1 PoE media module with PoE voltage (48 V DC safety extra-low voltage) is supplied with power via an external power supply unit. The PoE voltage is fed into the 3-pin terminal block of the PoE media module. The twisted-pair cables at ports 1 to 4 are supplied with PoE voltage via the spare pairs (pins 4 & 5 and 7 & 8 of the RJ45 sockets).


**Note:** Only use the Hirschmann RPS60/48V EEC power supply unit to supply the PoE voltage.

- Make sure that the external power supply unit you use to provide the PoE voltage fulfills the following basic prerequisites:
  - ▶ Insulation requirements according to IEEE 802.3af (insulation resistance 48 V output to “rest of the world” 2250 V DC for 1 min.).
  - ▶ Output power < 100 W.
  - ▶ Current limitation < 2 A.
  - ▶ The power supply unit and the PoE media module form a limited power source according to IEC60950-1.
  - ▶ The external PoE power supply unit must be able to provide the power for the connected PDs.

Power supply unit RPS60/48V EEC fulfills these requirements.

**Note:** The RPS60/48V EEC power supply unit does not fulfill the requirements according to Germanischer Lloyd, criterion EMC1, relating to conducted emissions on the 230 V AC side. If this requirement must be fulfilled, connect a corresponding power supply unit that fulfills both this requirement **and** the basic requirements.

- Connect the PoE voltage to the 3-pin terminal block included in the scope of delivery, as shown in the following diagram.  
Make sure the following requirements are met:
  - ▶ Supply line length < 3 m.
  - ▶ Supply line cross section is suitable for 1.5 A.

Figure	Pin	Assignment
	1	+ 48 V
	2	—
	3	0 V

*Table 4: Pin assignment of the 3-pin terminal block*

- Mount the terminal block for the PoE supply voltage on the bottom of the PoE module using the snap lock. Make sure it latches securely in place.

**Note:** Use 4-pair twisted pair cables to connect the terminal devices. Only connect terminal devices that conform to IEEE 802.3af.

## 2.2.8 Connecting the terminal blocks for supply voltage and signal contact

The supply voltage and the signal contacts are connected via a 4-pin terminal block and a redundant 4-pin terminal block. Secure the terminal blocks by the supplied z-section sheet and M2.5 screw inclusive tooth washer.

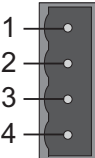
Figure	Pin	Assignment	Rated voltage range DC
	1	+ 24 V	18.0 V to 32.0 V
	2	0 V	
	3	Signal contact	
	4	Signal contact	

Table 5: Pin assignment of the 4-pin terminal block

### ■ Supply voltage

Redundant power supplies can be used. Both inputs are uncoupled. There is no distributed load. With redundant supply, the power supply unit supplies the device only with the higher output voltage. The supply voltage is electrically isolated from the housing.

**Note:** With non-redundant supply of the mains voltage, the device reports a power failure. You can prevent this message by applying the supply voltage via both inputs, or by changing the configuration in the Management.

### ■ Signal contact

- ▶ The signal contact monitors proper functioning of the device, thus enabling remote diagnostics. You can specify the type of function monitoring in the Management.
- ▶ You can also use the switch Web page to switch the signal contact manually and thus control external devices.

A break in contact is used to report the following conditions via the potential-free signal contact (relay contact, closed circuit):

- ▶ The detected inoperability of at least one of the two voltage supplies (voltage supply 1 or 2 is below the threshold value).
- ▶ A continuous malfunction in the device (internal supply voltage).
- ▶ The defective link status of at least one port with active link monitoring. In the delivery state, link status monitoring is deactivated.
- ▶ An error during the self-test.
- ▶ Incorrect configuration of the HIPER-Ring or ring coupling.
- ▶ The temperature threshold has been exceeded or has not been reached.

- ▶ Failure of the redundancy.
- ▶ The removal of the AutoConfiguration Adapter.

The following condition is also reported in RM mode:

- ▶ Ring redundancy guaranteed. By default, there is no ring redundancy monitoring
- Pull the terminal block off the device and connect the voltage supply lines and the signal lines.

### 2.2.9 Installing the terminal blocks; start-up procedure

- Mount the terminal blocks for the voltage supply and the signal contact on the bottom of the device using the snap locks. Make sure the snap lock latches securely in place.

By connecting the voltage supply via the terminal blocks, you start the operation of the device.

### 2.2.10 Installing the device on the DIN rail, grounding

- Mount the device on a 35 mm DIN rail in accordance with DIN EN 60175.
- Attach the upper snap-in guide of the device into the DIN rail and press the device down against the DIN rail until it snaps into place.

**Note:** The shielding ground of the industrial connectable twisted pair lines is connected to the lower panel as a conductor.

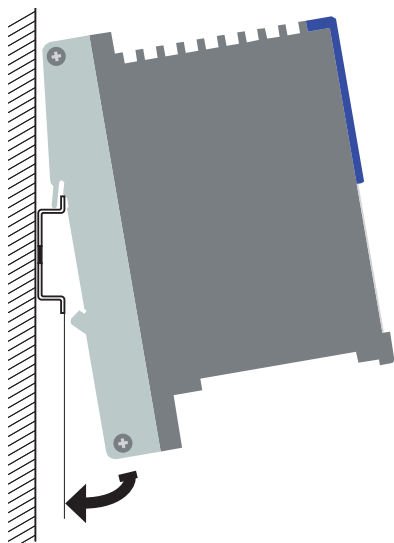


Figure 13: Assembly

#### ■ Grounding

The lower panel of the device housing is grounded by means of the DIN rail and optionally by means of the separate ground screw (see fig. 2).

## 2.2.11 Connecting the data lines

Connect the ports of the media modules plugged into the basic module as required in order to set up your industrial ETHERNET or expand your existing network.

Install the data lines according to your requirements.

### ■ 10/100 Mbit/s twisted pair connection

These connections are RJ45 sockets or M12 sockets.

10/100 Mbit/s TP ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 10BASE-T/100BASE-TX standard.

These ports support:

- ▶ Autonegotiation
- ▶ Autopolarity
- ▶ Autocrossing (if autonegotiation is activated)
- ▶ 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- ▶ 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode

Delivery state: autonegotiation activated

The socket housing is electrically connected to the bottom panel.

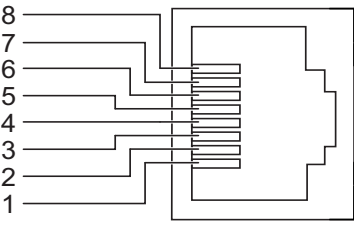
Figure	Pin	Function
	1+2	One line pair: receiver path
	3+6	One line pair: sender path
	4,5,7,8	Not used

Table 6: Pin assignment of a TP/TX interface in MDI-X mode, RJ45 socket

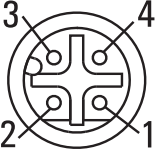
Figure	Pin	Function
	1	TD+ Transmit Data +
	2	RD+ Receive Data +
	3	TD- Transmit Data -
	4	RD- Receive Data -
		Housing: shield

Table 7: Pin assignment of a TP/TX interface (M12 socket)



## ■ 10/100 Mbit/s twisted pair connection on MM22-T1T1T1T1 PoE media module

These connections are RJ45 sockets.

10/100 Mbit/s TP PoE ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 10BASE-T/100BASE-TX and IEEE 802.3af (Power over Ethernet) standards.

These ports support:

- ▶ Autonegotiation
- ▶ Autopolarity
- ▶ Autocrossing (if autonegotiation is activated)
- ▶ 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- ▶ 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode
- ▶ Power over Ethernet (PoE)

Delivery state: autonegotiation activated

The socket housing is electrically connected to the front panel.

The PoE voltage is fed in via pins 4&5 and 7&8 (spare pairs).

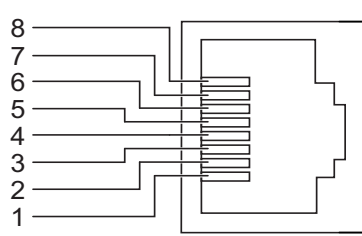
Figure	Pin	Function
	1	RD+ Receive Data +
	2	RD- Receive Data -
	3	TD+ Transmit Data +
	4	V+ Plus terminal of the supply voltage
	5	V+ Plus terminal of the supply voltage
	6	TD- Transmit Data -
	7	V- Minus terminal of the supply voltage
	8	V- Minus terminal of the supply voltage

Table 8: Pin assignment of the TP/TX interface for PoE for supply via the free line pairs (spare pairs), RJ45 plug

## ■ 10/100/1000 Mbit/s twisted pair connection

These connections are RJ45 sockets.

10/100/1000 Mbit/s TP ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 10BASE-T/100BASE-TX/1000BASE-T standard.

These ports support:

- ▶ Autonegotiation
- ▶ Autopolarity
- ▶ Autocrossing (if autonegotiation is activated)
- ▶ 1000 Mbit/s full duplex
- ▶ 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- ▶ 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode

Delivery state: autonegotiation activated

The socket housing is electrically connected to the front panel.

The pin assignment corresponds to MDI-X.

Figure	Pin	Function
	1	BI_DB +
	2	BI_DB -
	3	BI_DA +
	4	BI_DD +
	5	BI_DD -
	6	BI_DA -
	7	BI_DC +
	8	BI_DC -

Table 9: Pin assignment of a 1000 Mbit/s TP interface, RJ45 socket

### ■ 100 Mbit/s F/O connection

These ports are DSC connectors, ST connectors or MTRJ connectors. 100 Mbit/s F/O ports enable the connection of terminal devices or independent network segments in compliance with the IEEE 802.3 100BASE-FX standard.

These ports support:

- ▶ Full or half duplex mode

Delivery state: full duplex FDX

**Note:** Make sure that the LH ports are only connected with LH ports, SM ports are only connected with SM ports, and MM ports only with MM ports.

### ■ 1000 Mbit/s F/O connection

These ports are SFP slots.

1000 Mbit/s F/O ports enable the connection of terminal devices or independent network segments according to the IEEE 802.3 1000BASE-SX/1000BASE-LX standard.

These ports support:

- ▶ Autonegotiation
- ▶ Full duplex mode

Delivery state: autonegotiation activated

**Note:** Make sure that the LH ports are only connected with LH ports, SX ports are only connected with SX ports, and LX ports only with LX ports.

### ■ AUI connection

AUI ports (Attachment Unit Interface) enable you to connect a terminal device via an AUI cable in accordance with IEEE 802.3-2002. These ports support:

- ▶ SQE test
- ▶ DTEPower-Monitor

Delivery condition: Both functions not enabled. The housing of the Sub-D plug is electrically isolated from the lower panel of the device.

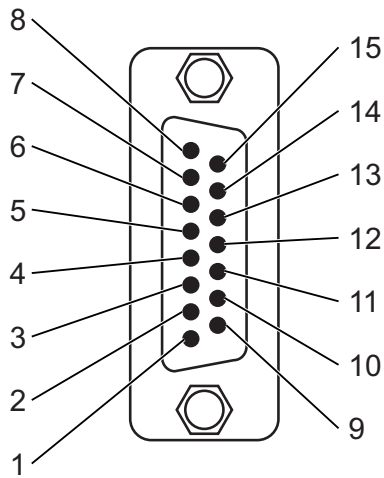


Figure 14: Pin assignment of an AUI interface

- 1 - Pin 1: Shielding CI
- 2 - Pin 2: Output CI-A
- 3 - Pin 3: Input DO-A
- 4 - Pin 4: Shielding DI
- 5 - Pin 5: Output DI-A
- 6 - Pin 6: GND
- 7 - Pin 7: not connected
- 8 - Pin 8: Shielding CO
- 9 - Pin 9: Output CI-B
- 10 - Pin 10: Input DO-B
- 11 - Pin 11: Shielding DO
- 12 - Pin 12: Output DI-B
- 13 - Pin 13: Voltage 12 V
- 14 - Pin 14: Shielding 12 V
- 15 - Pin 15: not connected

### 2.2.12 Installing the MB-2T expansion module

The MB-2T expansion module enables you to add 2 slots for media modules to the basic module. You can install the expansion module while the device is operating.

- On the right side of the basic module, loosen the screws at the top and bottom (1-3 revolutions).
- Take off the side panel.
- If you have not already done so, mount the basic module on the DIN rail.
- Push the expansion module on the DIN rail to the basic module until the modules are plugged together.
- Tighten the screws on the top and bottom of the basic module again.

### 2.2.13 Defining the meaning of the display LEDs

You use the “SELECT” button on the basic module to define the meaning of the LEDs of the media modules. You press the button to switch to the next display meaning. The display status LEDs of the basic module show the current meaning of the port LEDs of the media modules.



Figure 15: “SELECT” button on the basic module  
1 – “SELECT” button  
2 – Display LEDs

## 2.3 Display elements

After establishing the operating voltage, the software starts and initializes itself. Afterwards, the device performs a self-test. During this process, various LEDs light up. The process lasts around 60 seconds.

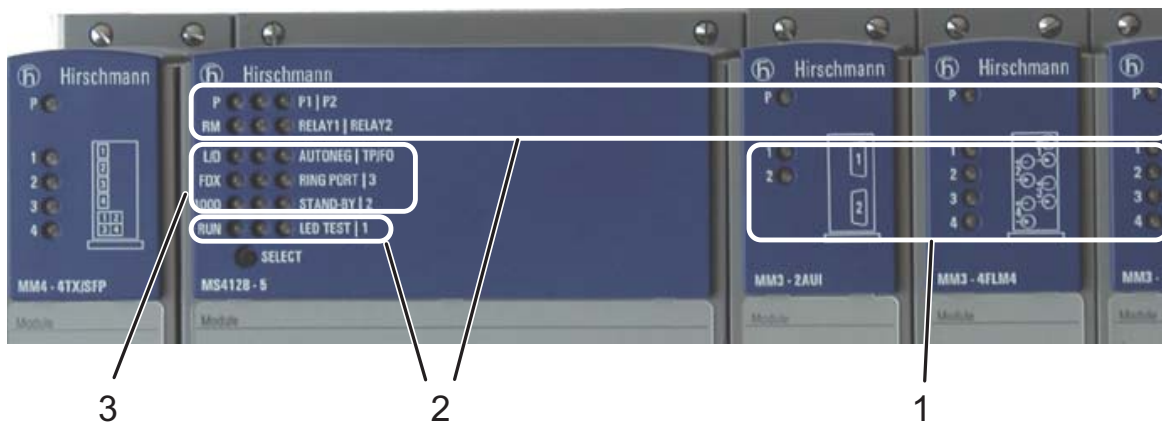


Figure 16: Display elements  
1 - Port status  
2 – Device status  
3 – Display status

## ■ Device status

These LEDs provide information about conditions which affect the operation of the whole device.

<b>P – Power (green LED)</b>	
Glowing green	Internal supply voltage present.
Not glowing	Internal supply voltage is too low.
<b>P1 – Power 1 (green LED)</b>	
Glowing green	Supply voltage 1 is present.
Not glowing	Supply voltage 1 is less than 18 V.
<b>P2 – Power 2 (green LED)</b>	
Glowing green	Supply voltage 2 is present.
Not glowing	Supply voltage 2 is less than 18 V.
<b>RM – Redundancy Manager (green/yellow LED)</b>	
Glowing green	RM function active, redundant port disabled.
Glowing yellow	RM function active, redundant port enabled.
Not glowing	RM function not enabled.
Flashing green	Incorrect configuration of the HIPER-Ring (e.g. the ring is not connected to the ring port).
<b>RUN – BOOT/RUN (green LED)</b>	
Glowing green	System is ready for operation.
Flashing green	System is booting.
Not glowing	System is in reset mode.
<b>RL1 – Relay 1, signal contact (red/yellow LED)</b>	
Glowing red	Signal contact 1 is open, i.e. it is reporting an error.
Glowing yellow	Signal contact 1 is open, the "Manual Setting" is active.
Not glowing	Signal contact 1 is closed, i.e. it is not reporting an error.
<b>RL2 – Relay 2, signal contact (red/yellow LED)</b>	
Glowing red	Signal contact 2 is open, i.e. it is reporting an error.
Glowing yellow	Signal contact 2 is open, the "Manual Setting" is active.
Not glowing	Signal contact 2 is closed, i.e. it is not reporting an error.
<b>RUN, 1 – display saving processes of the AutoConfiguration Adapter (ACA)</b>	
Flashing alternately	Error during saving process.
LED's flash synchronously 2× a second	Loading configuration from the ACA.
LED's flash synchronously 1× a second	Saving the configuration in the ACA.

If the manual adjustment is active on the signal contact, then the error display is independent of the setting of the signal contact.

## ■ Display status

Every media module has one LED per port. The meaning of this port status LED depends on the setting on the basic module. You define the display meaning with the “SELECT” button on the basic module.

- Press the button for approx. 2 seconds to change the meaning of the display. If the button is not pressed for approx. 20 seconds, the display status changes back to “L/D”.

### **L/D - data, link status (green LED)**

Glowing green	The port LEDs of the media modules display the connection status.
---------------	---

### **FDX - full duplex (green LED)**

Glowing green	The port LEDs of the media modules display the half-duplex or full-duplex connection status.
---------------	--

### **1000 - 10/100/1000 Mbit/s (green LED)**

Glowing green	The port LEDs of the media modules display the set transmission speed.
---------------	--

### **AUTONEG - Autonegotiation (green LED)**

Glowing green	The port LEDs of the media modules display the port configuration type.
---------------	---

### **RING PORT - Ring port (green LED)**

Glowing green	The port LEDs of the media modules display the HIPER-Ring assignment.
---------------	---

### **STAND-BY - Stand-by (green LED)**

Glowing green	The port LEDs of the media modules display the assignment to a redundant coupling of network segments.
---------------	--

### **LED TEST - LED test (green LED)**

Glowing green	The status, display status and port status LED test is active. The “P1/P2” LEDs glow green. The “RM” status LED flashes green/yellow. The “RELAY1/RELAY2” status LEDs flash yellow/red. The display status LEDs flash green. The port status LEDs of the media modules flash green/yellow.
---------------	---

### **TP/FO - twisted pair / fiber optic (green LED)**

Glowing green	The port LEDs of the media modules display the media type.
---------------	--

### **All display status LEDs (green LEDs)**

Flashing in sequence	Initialization phase after restart
----------------------	------------------------------------

### **2 - PoE status (green/yellow LED)**

Glowing green	The port LEDs of the media modules display the Power over Ethernet status.
---------------	--

Not glowing	- No PoE port or PoE deactivated (PoE status “disabled”) - PoE status “error”
-------------	--

### **3 (green LEDs)**

Service LED
-------------

## ■ Port status

These LED's display port-related information. You set the content of the information with the button on the basic module ([see on page 38 “Display status”](#)).

<b>1 to 4 – data, link status (green/yellow LED)</b>	
Not glowing	For MM20-A8A89999SAHH (AUI): No valid connection. No DTE voltage at the port.
Glowing green	For MM20-A8A89999SAHH (AUI): Valid connection. DTE voltage present at the port.
Flashing green (1× a period)	Port is switched to stand-by (Port 1).
Flashing green (3× a period)	Port is switched off.
Flashing yellow	Data reception.
<b>1 to 4 – FDX (green/yellow LED)</b>	
Not glowing	Half-duplex is active.
Glowing green	Full-duplex is active.
<b>1 to 4 – 1000 (green/yellow LED)</b>	
Not glowing	10 Mbit/s is active.
Glowing green	100 Mbit/s is active.
Glowing yellow	1000 Mbit/s is active.
<b>1 to 4 – AUTONEG (green/yellow LED)</b>	
Glowing green	Autonegotiation is active.
<b>1 to 4 – RING PORT (green/yellow LED)</b>	
Glowing green	This port is assigned to the HIPER-Ring.
<b>1 to 4 – STAND-BY (green/yellow LED)</b>	
Glowing green	Connection port for the data line.
Glowing yellow	Connection port for the control line.
Flashing green/yellow	No stand-by partner available.
<b>TP/FO – twisted pair / fiber optic (green/yellow LED)</b>	
Glowing green	The port LEDs of the media modules display the twisted pair ports.
Glowing yellow	The port LEDs of the media modules display the F/O ports.
<b>PoE status (green/yellow LED)</b>	
Not glowing	No PoE port or PoE disabled; PoE status "fault".
Glowing yellow	PoE port searching for terminal device (PD); PoE status "searching".
Glowing green	PoE port supplying terminal device (PD); PoE status "Delivering Power".
<b>1 to 4 – LED TEST (green/yellow LED)</b>	
Not glowing	LED defective.
Flashing green/yellow	LED test is active.

## 2.4 Basic set-up

The IP parameters must be entered when the device is installed for the first time. The device provides 6 options for configuring IP addresses:

- ▶ Entry via V.24 connection
- ▶ Entry using the HiDiscovery protocol via the application HiDiscovery or Industrial HiVision
- ▶ Configuration via BOOTP
- ▶ Configuration via DHCP
- ▶ Configuration via DHCP Option 82
- ▶ Auto Configuration Adapter

Further information on the basic settings of the device can be found in the “Basic Configuration” user manual on the CD ROM.

### ■ Default settings

- ▶ IP address: The device looks for the IP address using DHCP
- ▶ Password for management:
  - Login: user; password: public (read only)
  - Login: admin; password: private (read and write)
- ▶ V.24 data rate: 9,600 Baud
- ▶ Ring redundancy: deactivated
- ▶ Ethernet ports: link status is not evaluated (signal contact)
- ▶ Optical 100 Mbit/s ports: 100 Mbit/s, full duplex  
All other ports: autonegotiation
- ▶ Ring manager disabled
- ▶ Stand-by coupling: disabled
- ▶ The configuration is controlled via the software

### ■ USB interface

The USB socket has an interface for the local connection of an AutoConfiguration Adapter ACA 21-USB. It is used for saving/loading the configuration and for updating the software.

Contact number	Signal name
1	VCC
2	- Data
3	+ Data
4	Ground

### ■ V.24 interface (external management)

The V.24 interface is an RJ11 socket.



At the V.24 connection, a serial interface is provided for the local connection of an external management station (VT100 terminal or PC with corresponding terminal emulation) or an AutoConfiguration Adapter ACA 11. This enables you to set up a connection to the Command Line Interface (CLI) and to the system monitor.

VT 100 terminal settings	
Speed	9,600 Baud
Data	8 bit
Stopbit	1 bit
Handshake	off
Parity	none

The socket housing is electrically connected to the front panel of the device.

The V.24 interface is not electrically isolated from the supply voltage.

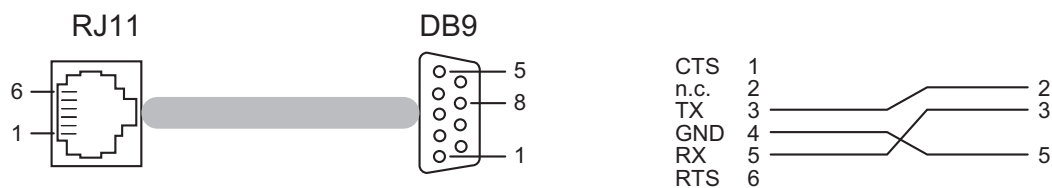


Figure 17: Pin assignment of the V.24 interface and the DB9 connector

**Note:** You will find the order number for the terminal cable, which is supplied separately, in the Technical Data chapter ([see page 54](#)).

You will find a description of the V.24 interface in the “Basic Configuration User Manual” on the CD-ROM.

## 2.5 Maintenance

- ▶ When designing this device, Hirschmann was largely able to forego using parts that are subject to wear and tear. The parts subject to wear are designed to last longer than the lifetime of the product when it is operated properly. Operate this device according to the specifications (see [“Technical data”](#)).
- ▶ Relays are subject to natural wear. This wear depends on the frequency of the switching operations. Check the resistance of the closed relay contacts and the switching function depending on the frequency of the switching operations.
- ▶ Hirschmann is continually working to improve and develop our software. You should regularly check whether there is a new version of the software that provides you with additional benefits. You will find software information and downloads on the product pages of the Hirschmann website.
- ▶ Depending on the degree of pollution in the operating environment, check at regular intervals that the ventilation slots in the device are not obstructed.

## 2.6 Disassembly

### ■ Disassembling the device

- To remove the device from the hat rail, press the device downwards and pull it out from under the hat rail.

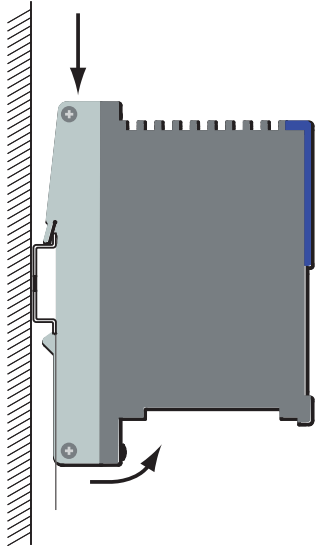


Figure 18: Disassembly

### ■ Disassembling the SFP modules

- Pull the module out of the socket by means of the opened lock.
- Close the socket with the protective cap.



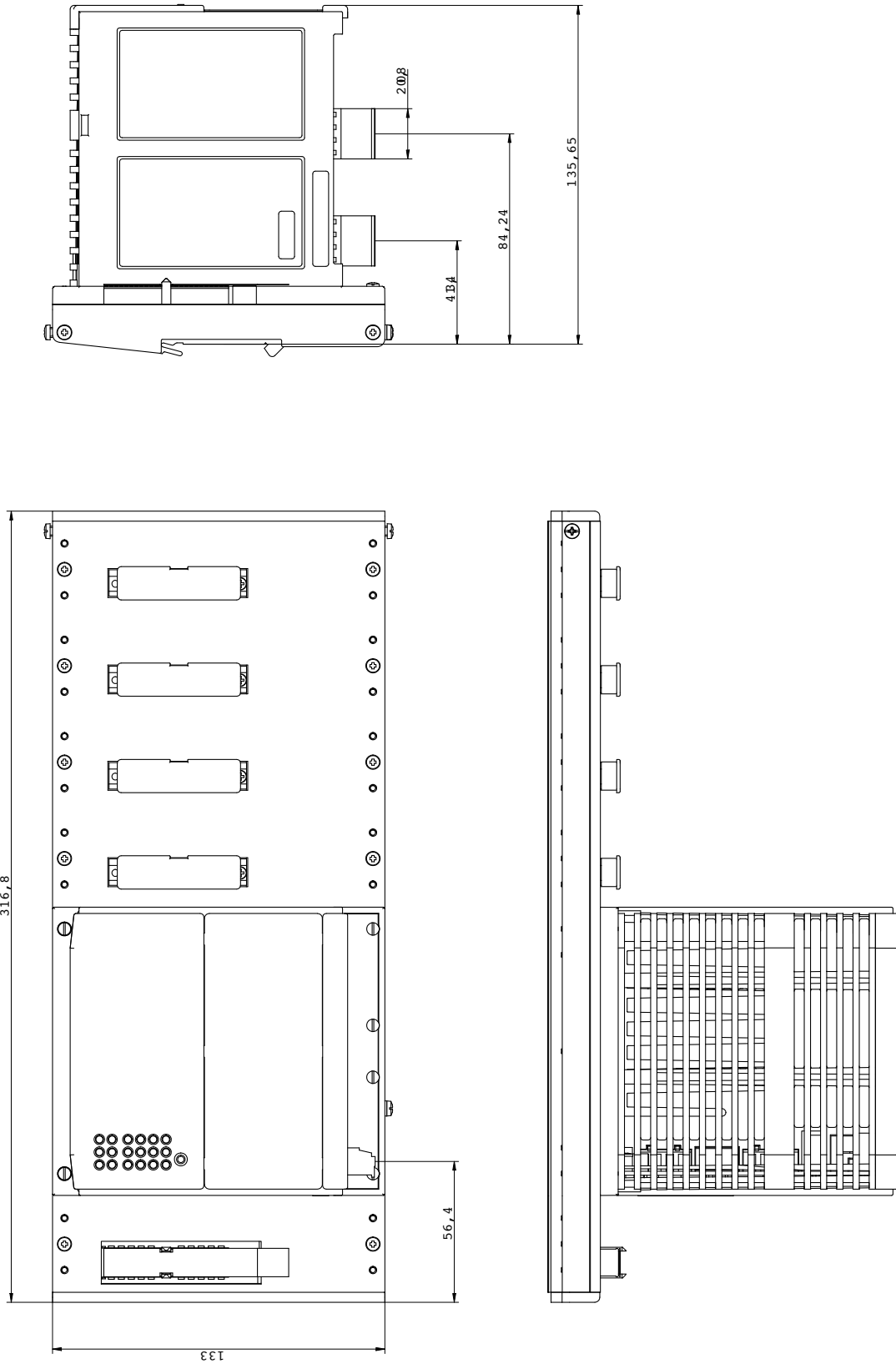
Figure 19: Deinstalling an SFP module

### 3 Technical data

#### ■ General technical data

Dimensions W x D x H	MS4128	317 mm x 134 mm x 140 mm
Weight	MS4128	2.0 kg
Power supply	Operating voltage	24 V DC -25% +33% safety extra-low voltage (SELV/PELV) redundant inputs disconnected. Relevant for North America: Nec Class 2 power source max. 5A.
Overload current protection at input		Non-replaceable fuse
Insulation voltage between operating voltage connections and housing		800 V DC Protective elements limit the insulation voltage to 45 V DC (1 mA).
Signal contact	Switching current	max. 1 A, SELV
	Switching voltage	max. 60 V DC or max. 30 V AC, SELV
Environment	Storage temperature	Ambient air: -40 °C to +70 °C
	Humidity	10 % to 95 % (non-condensing)
	Atmospheric pressure	Up to 2000 m (795 hPa), higher altitudes on request
Operating temperature	<a href="#">See "Power consumption/power output, temperature range and order numbers" on page 49.</a>	
	<b>Note:</b> For the extended temperature range, use suitable modules and transceivers. You will identify these components by the "EEC" name extension or the open variant product code "E" (position 15).	
Pollution degree		2
Protection classes	Laser protection	Class 1 according to EN 60825-1 (2001)
	Level of protection	IP20

## ■ Dimension drawing



## ■ EMC and immunity

<b>EMC compliance – IEC/EN 61000-6-2:2005 EMI TYPE tests, test acc. to:</b>		
IEC/EN 61000-4-2	Electrostatic discharge	
	Contact discharge	6 kV
	Air discharge	8 kV
IEC/EN 61000-4-3	Electromagnetic field	
	80 - 3,000 MHz	10 V/m
IEC/EN 61000-4-4	Fast transients (burst)	
	Power line	2 kV
	Data line	4 kV
IEC/EN 61000-4-5	Voltage surges	
	Power line, line / line	1 kV
	Power line, line / earth	2 kV
	Data line	2 kV
IEC/EN 61000-4-6	Line-conducted interference voltages	
	150 kHz - 80 MHz	10 V
EN 61000-4-9	Impulse-shaped magnetic fields	300 A/m
<b>EMC emitted interference</b>		
EN 55022	Class A	Yes
FCC 47 CFR Part 15	Class A	Yes
German Lloyd	Classification + Construction Guidelines VI-7-3 Part 1 Ed.2001	Yes
<b>Stability</b>		
Vibration	IEC 60068-2-6 Test FC test level according to IEC 61131-2	Yes
	Germanischer Lloyd Guidelines for the Performance of Type Tests Part 1	Yes
Shock	IEC 60068-2-27 Test Ea test level according to IEC 61131-2	Yes

## ■ Network range

**Note:** The line lengths specified for the transceivers apply for the respective fiber data (fiber attenuation and BLP/dispersion).

Product code M-SFP-...	Wave length	Fiber	System attenuation	Example for F/O line length <sup>a</sup>	Fiber attenuation	BLP <sup>b</sup> /dispersion
-SX/LC...	MM 850 nm	50/125 μm	0-7.5 dB	0-550 m	3.0 dB/km	400 MHz·km
-SX/LC...	MM 850 nm	62.5/125 μm	0-7.5 dB	0-275 m	3.2 dB/km	200 MHz·km
-MX/LC	MM 1310 nm	50/125 μm	0-8 dB	2 km <sup>c</sup>	1.0 dB/km	500 MHz·km
-MX/LC	MM 1310 nm	62.5/125 μm	0-8 dB	1 km	1.0 dB/km	500 MHz·km
-LX/LC...	MM 1310 nm <sup>d</sup>	50/125 μm	0-10.5 dB	0-550 m	1.0 dB/km	800 MHz·km
-LX/LC...	MM 1310 nm <sup>d</sup>	62.5/125 μm	0-10.5 dB	0-550 m	1.0 dB/km	500 MHz·km
-LX/LC...	SM 1310 nm	9/125 μm	0-10.5 dB	0-20 km <sup>e</sup>	0.4 dB/km	3.5 ps/(nm·km)
-LX+/LC...	SM 1310 nm	9/125 μm	5-20 dB	14-42 km	0.4 dB/km	3.5 ps/(nm·km)
-LH/LC...	LH 1550 nm	9/125 μm	5-22 dB	23-80 km	0.25 dB/km	19 ps/(nm·km)
-LH+/LC	LH 1550 nm	9/125 μm	15-30 dB	71-108 km	0.25 dB/km	19 ps/(nm·km)
-LH+/LC	LH 1550 nm	9/125 μm	15-30 dB	71-128 km	0.21 dB/km (typically)	19 ps/(nm·km)

Table 10: Fiber port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

- including 3 dB system reserve when compliance with the fiber data is observed
- The bandwidth length product cannot be used to calculate the expansion.
- Distances of up to 3 km reachable, 1000 MHz·km (1300 nm)
- With F/O adapter compliant with IEEE 802.3-2002 clause 38 (single-mode fiber offset-launch mode conditioning patch cord)
- including 2.5 dB system reserve when compliance with the fiber data is observed

Product code M-SFP-BIDI...	Wave length TX	Wave length RX	Fiber	System attenuation	Example for F/O line length <sup>a</sup>	Fiber attenuation	Dispersion
Type A LX/LC EEC	SM 1310 nm	1550 nm	9/125 μm	0-11 dB	0-20 km	0.4 dB/km	3.5 ps/(nm·km)
Type B LX/LC EEC	SM 1550 nm	1310 nm	9/125 μm	0-11 dB	0-20 km	0.25 dB/ km	19 ps/(nm·km)
Type A LH/LC EEC	LH 1490 nm	1590 nm	9/125 μm	5-24 dB	23-80 km	0.25 dB/ km	19 ps/(nm·km)
Type B LH/LC EEC	LH 1590 nm	1490 nm	9/125 μm	5-24 dB	23-80 km	0.25 dB/ km	19 ps/(nm·km)

Table 11: F/O port (bidirectional Gigabit Ethernet SFP Transceiver)

- including 3 dB system reserve when compliance with the fiber data is observed

Product code M-FAST-SFP-...	Wave length	Fiber	System attenuation	Example for F/O line length <sup>a</sup>	Fiber attenuation	BLP/dispersion
-MM/LC...	MM 1310 nm	50/125 μm	0-8 dB	0-5 km	1.0 dB/km	800 MHz*km
-MM/LC...	MM 1310 nm	62.5/125 μm	0-11 dB	0-4 km	1.0 dB/km	500 MHz*km
-SM/LC...	SM 1310 nm	9/125 μm	0-13 dB	0-25 km	0.4 dB/km	3.5 ps/(nm*km)
-SM+/LC...	SM 1310 nm	9/125 μm	10-29 dB	25-65 km	0.4 dB/km	3.5 ps/(nm*km)
-LH/LC...	SM 1550 nm	9/125 μm	10-29 dB	47-104 km	0.25 dB/km	19 ps/(nm*km)
-LH/LC...	SM 1550 nm	9/125 μm	10-29 dB	55-140 km	0.18 dB/km <sup>b</sup>	18 ps/(nm*km)

Table 12: Fiber port 100BASE-FX (SFP fiber optic Fast Ethernet Transceiver)

- a. including 3 dB system reserve when compliance with the fiber data is observed  
b. with ultra-low-loss optical fiber

Product code	Wave length	Fiber	System attenuation	Example for F/O line length <sup>a</sup>	Fiber attenuation	BLP/dispersion
-F4	MM 820 nm	50/125 μm	0-9.5 dB	0-2.1 km	3.0 dB/km	400 MHz*km
-F4	MM 820 nm	62.5/125 μm	0-12.5 dB	0-3.0 km	3.2 dB/km	200 MHz*km

Table 13: F/O port 10BASE-FL

- a. including 3 dB system reserve when compliance with the fiber data is observed

Product code	Wave length	Fiber	System attenuation	Example for F/O line length <sup>a</sup>	Fiber attenuation	BLP/dispersion
-M2, -M4	MM 1300 nm	50/125 μm	0-8 dB	0-5 km	1.0 dB/km	800 MHz*km
-M2, -M4	MM 1300 nm	62.5/125 μm	0-11 dB	0-4 km	1.0 dB/km	500 MHz*km
-S2	SM 1300 nm	9/125 μm	0-16 dB	0-30 km	0.4 dB/km	3.5 ps/(nm*km)
-L2	LH 1550 nm	9/125 μm	7-29 dB	24-86 km	0.3 dB/km	19 ps/(nm*km)
-P9	MM POF 650 nm	980/1000 μm	0-14.0 dB	0-55 m	200 dB/km	10 MHz*km
-G2	LH+ 1550 nm	9/125 μm	14-47 dB	67-176 km	0.25 dB/km	19 ps/(nm*km)

Table 14: F/O port 100BASE-FX

- a. including 3 dB system reserve when compliance with the fiber data is observed

MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul



TP port	
Length of a twisted pair segment	max. 100 m/328 ft (for cat5e cable)

Table 15: TP port 10BASE-T / 100BASE-TX / 1000BASE-T

AU port	
Length of an AUI cable	max. 50 m

Table 16: AUI port

## ■ Power consumption/power output, temperature range and order numbers

**Note:** For the extended temperature range, use suitable modules and transceivers. You will identify these components by the “EEC” name extension or the open variant product code “E” (postion 15).

Basic module	Power consumption	Power output	Operating temperature (ambient air temperature)	Order number
MS4128-L2P	16.0 W	54.7 Btu (IT)/h	0 °C to +60 °C	943 009-102
MS4128-L3E	16.0 W	54.7 Btu (IT)/h	0 °C to +60 °C	943 009-202
MS4128-L3P	16.0 W	54.7 Btu (IT)/h	0 °C to +60 °C	943 009-302
MS4128-L2P ATEX	16.0 W	54.7 Btu (IT)/h	0 °C to +60 °C	943 009-101
MS4128-L3E ATEX	16.0 W	54.7 Btu (IT)/h	0 °C to +60 °C	943 009-201
MS4128-L3P ATEX	16.0 W	54.7 Btu (IT)/h	0 °C to +60 °C	943 009-301
MS4128-L2P EEC	16.0 W	54.7 Btu (IT)/h	-30 °C to +60 °C	943 009-103
MS4128-L3E EEC	16.0 W	54.7 Btu (IT)/h	-30 °C to +60 °C	943 009-203
MS4128-L3P EEC	16.0 W	54.7 Btu (IT)/h	-30 °C to +60 °C	943 009-303

Table 17: Basic module: power, temperature, order numbers

Module	Power consumption	Power output	Operating temperature (ambient air temperature)	Order number
<b>MM2 media modules:</b>				
MM2-4TX1	0.8 W	2.8 Btu (IT)/h	0 °C to +60 °C	943 722-101
MM2-4TX1-EEC	0.8 W	2.8 Btu (IT)/h	-40 °C to +70 °C	943 722-051
MM2-4FXM3	7.0 W	23.9 Btu (IT)/h	0 °C to +60 °C	943 721-101
MM2-2FXM3/2TX1	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 720-101
MM2-2FXM2	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 718-101
MM2-2FXS2	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 719-101
<b>MM3 media modules:</b>				
MM3-4FLM4	5.0 W	17.1 Btu (IT)/h	0 °C to +60 °C	943 760-101
MM3-4TX5	0.8 W	2.8 Btu (IT)/h	0 °C to +60 °C	943 841-101
MM3-1FXM2/3TX1	2.2 W	7.5 Btu (IT)/h	0 °C to +60 °C	943 839-101
MM3-1FXM2/3TX1-EEC	2.2 W	7.5 Btu (IT)/h	-40 °C to +70 °C	943 839-051
MM3-2FXM2/2TX1	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 761-101
MM3-2FXM2/2TX1-EEC	3.4 W	11.6 Btu (IT)/h	-40 °C to +70 °C	943 761-151
MM3-2FXM4/TX1	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 837-101
MM3-4FXM2	7.0 W	23.9 Btu (IT)/h	0 °C to +60 °C	943 764-101
MM3-4FXM4	7.0 W	23.9 Btu (IT)/h	0 °C to +60 °C	943 835-101
MM3-1FXS2/3TX1	2.2 W	7.5 Btu (IT)/h	0 °C to +60 °C	943 838-101
MM3-2FXS2/2TX1	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 762-101
MM3-4FXS2	7.0 W	23.9 Btu (IT)/h	0 °C to +60 °C	943 836-101
MM3-1FXL2/3TX1	3.4 W	11.6 Btu (IT)/h	0 °C to +60 °C	943 763-101
<b>MM4 media modules:</b>				
MM4-4TX/SFP	9.0 W	30.8 Btu (IT)/h	0 °C to +60 °C	943 010-101
MM4-2TX/SFP	5.8 W	19.8 Btu (IT)/h	0 °C to +60 °C	943 622-101
<b>Open variant media modules:</b>				
MM20-... 4 TX-/0 FX ports	0.8 W	2.8 Btu (IT)/h	See table 19	See table 19
MM20-... 3 TX-/1 FX ports	2.3 W	7.9 Btu (IT)/h	- " -	- " -
MM20-... 2 TX-/2 FX ports	3.8 W	13.0 Btu (IT)/h	- " -	- " -
MM20-... 0 TX-/2 FX ports	3.8 W	13.0 Btu (IT)/h	- " -	- " -
MM20-... 1 TX-/3 FX ports	5.3 W	18.1 Btu (IT)/h	- " -	- " -
MM20-... 0 TX-/4 FX ports	6.8 W	23.2 Btu (IT)/h	- " -	- " -
MM20-A8A89999...	3.4 W	11.6 Btu (IT)/h	- " -	- " -
MM20-F4F4F4F4...	5.0 W	17.1 Btu (IT)/h	- " -	- " -
MM20-Z6Z6Z6Z6...	8.0 W	27.3 Btu (IT)/h	- " -	- " -
MM20-P9P9P9P9SAHH	8.0 W	27.3 Btu (IT)/h	0 °C to +60 °C	- " -
MM20-P9P9T1T1SAHH	5.2 W	17.8 Btu (IT)/h	0 °C to +60 °C	- " -
MM22-T1T1T1T1...			- " -	- " -
- internal operating voltage	0.8 W	2.8 Btu (IT)/h		
- external PoE voltage				
- no PD	1.3 W	4.3 Btu (IT)/h		
- 4 x Class0-PD	2 W + PDs	6.9 Btu (IT)/h		
MM23-T1T1T1T1...	4.5 W	15.4 Btu (IT)/h	0 °C to +60 °C	- " -
MM23-M2M2T1T1...	6.0 W	20.5 Btu (IT)/h	0 °C to +60 °C	- " -

Table 18: Other modules: power, temperature, order numbers

Module	Power consumption	Power output	Operating temperature (ambient air temperature)	Order number
MM23-S2S2T1T1...	5.5 W	18.8 Btu (IT)/h	0 °C to +60 °C	- " -
MM23-F4F4T1T1...	5.5 W	18.8 Btu (IT)/h	0 °C to +60 °C	- " -
MM30-O7O7O7O7...	9.0 W	30.8 Btu (IT)/h	See table 19	- " -
MM30-O7O79999...	5.8 W	19.8 Btu (IT)/h	- " -	- " -
MM33-O7O79999...	7.5 W	25.6 Btu (IT)/h	0 °C to +60 °C	- " -
<b>Expansion module:</b>				
MB-2T	0 W	0 Btu (IT)/h	0 °C to +60 °C	943 733-102

Table 18: Other modules: power, temperature, order numbers

### ■ Open variant product code

As an alternative to the order number (see in [table 18](#), last column) you can use the product code. This gives you a wider range of variants when selecting the media module that is specially tailored to your requirements. The product code of your media module is made from combining the desired product characteristics in accordance with the following table. The short designation is in "Ident." column.

Example: Product code MM30-O7O7O7O7SA = media module 1000 Mbit/s with four Gigabit Ethernet combo ports (four SFP ports or alternatively TP ports RJ45). This example corresponds to the MM4-4TX/SFP module with the order number 943 010-001.

Item	Characteristic feature	Ident.	Property
1 to 4	Product	MM20	Media module 10/100 Mbit/s (standard)
		MM22	Media module 10/100 Mbit/s (Power over Ethernet)
		MM23	Media module 10/100 Mbit/s (PTP version 2)
		MM30	Media module 1000 Mbit/s (standard)
		MM33	Media module 1000 Mbit/s (PTP version 2)
5	- (hyphen)	-	
6 to 7	1st port (medium/connector)	T1	Twisted pair (TX) / RJ45
		T5	Twisted pair (TX) / M12
		M2	Multi-mode FX DSC (100 Mbit/s)
		M3	Multi-mode FX MTRJ (100 Mbit/s)
		M4	Multi-mode FX ST (100 Mbit/s)
		S2	Single-mode FX DSC (100 Mbit/s)
		S4	Single-mode FX ST (100 Mbit/s)
		L2	Single-mode Long Haul FX DSC (100 Mbit/s)
		G2	Single-mode Long Haul FX DSC 200km (only 100 Mbit/s)
		F4	Multi-mode FL ST (10 Mbit/s)
		P9	POF FX SCRJ (100 Mbit/s)
		O7	Combo port Gigabit Ethernet (SFP 1000 Mbit/s)
		A8	AUI Sub-D
Z6	Fiber optic / SFPslot (100 Mbit/s)		
8 to 9	2nd port (medium/connector)	...	See items 6 to 7
10 to 11	3rd port (medium/connector)	...	See items 6 to 7
		99	Empty
12 to 13	4th port (medium/connector)	...	See items 6 to 7
		99	Empty
14	Temperature range	S	Standard: operation 0 °C to +60 °C; storage -40 °C to +70 °C
		T	Extended: operation -40 °C to +70 °C; storage -40 °C to +85 °C
		E	Extended: operation -40 °C to +70 °C; storage -40 °C to +85 °C, with Conformal Coating
15	Certifications	A	CE, UL 508, ISA 12.12.01
		H	A plus GL, IEC 61850, IEEE 1613 Substation, EN 50121-4 Railway (along track)
		B	H plus ATEX100a

Table 19: Combination possibilities of the MM20/MM30 media module variants

## ■ Interfaces

PowerMICE MS4128	V.24 port: external management, 2 terminal blocks, each 1 x signal contact, max. 1 A, 24 V each 1 x voltage supply USB: ACA 21-USB
MM2 media modules	see table under “ <a href="#">MM2 media modules</a> ” on <a href="#">page 19</a>
MM3 media modules	see table under “ <a href="#">MM3 media modules</a> ” on <a href="#">page 20</a>
MM4 media modules	see table under “ <a href="#">MM4 media modules</a> ” on <a href="#">page 21</a>

## ■ Scope of delivery

Device	Scope of delivery
PowerMICE MS4128	MS4128 device 2 terminal blocks for supply voltage and signal contact 1 z-section sheet 1 M2.5 screw inclusive tooth washer CD ROM with user manual ML-MS2/MM labels Description and operating instructions

## ■ Accessories

<b>Gigabit Ethernet SFP transceiver</b>	<b>Order number</b>
M-SFP-SX/LC	943 014-001
M-SFP-SX/LC EEC	943 896-001
M-SFP-MX/LC	942 035-001
M-SFP-LX/LC	943 015-001
M-SFP-LX/LC EEC	943 897-001
M-SFP-LX+/LC	942 023-001
M-SFP-LX+/ LC EEC	942 024-001
M-SFP-LH/LC	943 042-001
M-SFP-LH/LC EEC	943 898-001
M-SFP-LH+/LC	943 049-001
<b>Bidirectional Gigabit Ethernet SFP transceiver</b>	<b>Order number</b>
M-SFP-BIDI Type A LX/LC EEC	943 974-001
M-SFP-BIDI Type B LX/LC EEC	943 974-002
M-SFP-BIDI Type A LH/LC EEC	943 975-001
M-SFP-BIDI Type B LH/LC EEC	943 975-002
M-SFP-BIDI Bundle LX/LC EEC (type A + B)	943 974-101
M-SFP-BIDI Bundle LH/LC EEC (type A + B)	943 975-101
<b>Fast-Ethernet SFP transceiver</b>	<b>Order number</b>
M-FAST SFP-MM/LC	943 865-001
M-FAST SFP-MM/LC EEC	943 945-001
M-FAST SFP-SM/LC	943 866-001
M-FAST SFP-SM/LC EEC	943 946-001
M-FAST SFP-SM+/LC	943 867-001
M-FAST SFP-SM+/LC EEC	943 947-001
M-FAST SFP-LH/LC	943 868-001
M-FAST SFP-LH/LC EEC	943 948-001
<b>Other accessories</b>	<b>Order number</b>
AutoConfiguration Adapter ACA 21-USB EEC	943 271-002
Terminal cable	943 301-001
2 terminal blocks for supply voltage and signal contact	942 130-001
1 z-section sheet	
1 M2.5 screw inclusive tooth washer	
Rail Power Supply RPS 30	943 662-003
Rail Power Supply RPS 80 EEC	943 662-080
Rail Power Supply RPS 120 EEC	943 662-120
ML-MS2/MM labels	943 767-001
ML-MS3 labels	943 768-001
Industrial HiVision Network Management software	943 156-xxx
OPC server software HiOPC	943 055-001

## ■ Underlying norms and standards

Designation	
EN 61000-6-2	Generic norm – immunity in industrial environments
EN 55022	IT equipment – radio interference characteristics
EN 61131-2	Programmable logic controllers
EN 50121-4	Railway applications - EMC - emitted interference and interference immunity for signal and telecommunication systems
FCC 47 CFR Part 15	Code of Federal Regulations
German Lloyd	Classification and Construction Guidelines VI-7-3 Part 1 Ed.2003
cUL 508	Safety for Industrial Control Equipment
EN 60079-0	Explosive atmospheres – Part 0: Equipment – General requirements
EN 60079-15	Explosive atmospheres – Part 15: Equipment protection by type of protection „n“
KR	Korean Register of Shipping

*Table 20: List of norms and standards*

The device has a certification based on a specific standard only if the certification indicator appears on the housing.  
 However, with the exception of Germanischer Lloyd, ship certifications are only included in the product information under [www.hirschmann.com](http://www.hirschmann.com).





# A Further Support

## ■ Technical Questions

For technical questions, please contact any Hirschmann dealer in your area or Hirschmann directly.

You will find the addresses of our partners on the Internet at

<http://www.hirschmann.com>

Contact our support at

<https://hirschmann-support.belden.eu.com>

You can contact us

in the EMEA region at

▶ Tel.: +49 (0)1805 14-1538

▶ E-mail: [hac.support@belden.com](mailto:hac.support@belden.com)

in the America region at

▶ Tel.: +1 (717) 217-2270

▶ E-mail: [inet-support.us@belden.com](mailto:inet-support.us@belden.com)

in the Asia-Pacific region at

▶ Tel.: +65 6854 9860

▶ E-mail: [inet-ap@belden.com](mailto:inet-ap@belden.com)

## ■ Hirschmann Competence Center

The Hirschmann Competence Center is ahead of its competitors:

▶ Consulting incorporates comprehensive technical advice, from system evaluation through network planning to project planning.

▶ Training offers you an introduction to the basics, product briefing and user training with certification.

The current technology and product training courses can be found at <http://www.hicomcenter.com>

▶ Support ranges from the first installation through the standby service to maintenance concepts.

With the Hirschmann Competence Center, you have decided against making any compromises. Our client-customized package leaves you free to choose the service components you want to use.

Internet:

<http://www.hicomcenter.com>



**HIRSCHMANN**

---

A **BELDEN** BRAND