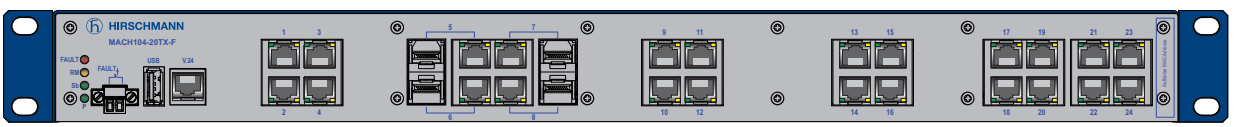
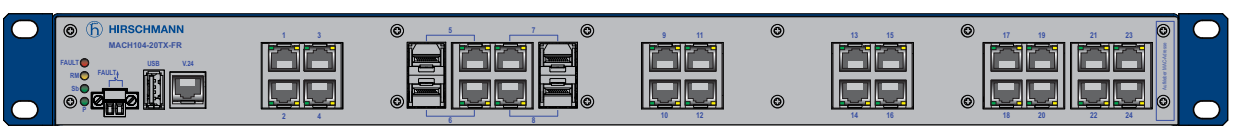
User Manual

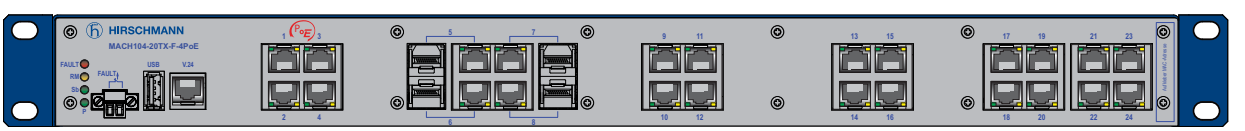
Installation
Industrial Ethernet Workgroup Switch
MACH104 Full Gigabit Family



MACH104-20TX-F...



MACH104-20TX-FR...



MACH104-20TX-F-4PoE...

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

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Contents

Safety instructions

General safety instructions

You operate this device with electricity. The proper and safe operation of this device depends on proper handling during transportation, proper storage and assembly, and conscientious operation and maintenance procedures. Improper use of this device is associated with the risk of personal injury or property damage.

- ☐ Read this documentation as well as the safety instructions and warnings before connecting any cables.
- ☐ Never start operation with damaged components.
- ☐ The device does not contain any service components. If the device is not functioning correctly, or if it is damaged, switch off the voltage supply and return the device to Hirschmann for inspection.

⚠ WARNING

UNCONTROLLED MACHINE ACTIONS

To avoid uncontrolled machine actions caused by data loss, configure all the data transmission devices individually.
Before you start any machine which is controlled via data transmission, be sure to complete the configuration of all data transmission devices.

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

Qualification requirements for personnel

- ☐ Only allow qualified personnel to work on the device.

Qualified personnel have the following characteristics:

- ▶ Qualified personnel are properly trained. Training as well as practical knowledge and experience make up their qualifications. This is the prerequisite for grounding and labeling circuits, devices, and systems in accordance with current standards in safety technology.
- ▶ Qualified personnel are aware of the dangers that exist in their work.
- ▶ Qualified personnel are familiar with appropriate measures against these hazards in order to reduce the risk for themselves and others.
- ▶ Qualified personnel receive training on a regular basis.

Certified usage

Use the device solely for the application cases described in the Hirschmann product information, including this manual.
Operate the device solely according to the technical specifications.
See “Technical data” on page 30.

National and international safety regulations

☐ Verify that the electrical installation meets local or nationally applicable safety regulations.

Grounding the device

The device is grounded via the operating voltage connections.

Working voltage

The operating voltage is electrically isolated from the housing.

☐ Connect solely an working voltage that corresponds to the type plate of your device.

☐ Internal fuses are triggered solely in the case of a detected error in the device. In case of damage or malfunction of the device, turn off the working voltage and return the device to the plant for inspection.

☐ Only switch on the device when the housing is closed.

☐ Only use connection cables that are permitted for the specified temperature range.

☐ Relevant for North America:
Only use copper wire/conductors of class 1, 60/75°C or 75°C.

☐ Make sure that the disconnecting device is easily accessible so that the MACH104 device can be disconnected from the mains voltage.
If you disconnect the device from the mains voltage using
- the plug in the socket
- an on/off switch
it must be easily accessible.

☐ This applies to the following device variants only:
▶ MACH104-20TX-FR...
Pull **both** non-heating plugs to disconnect the device from mains voltage.

Housing

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

☐ Never insert sharp objects (small screwdrivers, wires, etc.) into the inside of the device.

☐ Keep the ventilation slits free to ensure good air circulation.

☐ Make sure there is at least 3.94 inches (10 cm) of space in front of the ventilation slits of the housing.

☐ Mount the device horizontally or vertically as a desktop unit, in the control cabinets See figure 14 on page 25. or on the wall (see figure 15 on page 25).

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.

2006/95/EC
Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electrical equipment to be used within specific voltage ranges.

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
Germany
Tel.: +49 1805 141538

The product can be used in the industrial sector.
- Interference immunity: EN 61000-6-2
- Emitted interference: EN 55022

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.

LED or laser components

LED or LASER components according to IEC 60825-1 (2007):
CLASS 1 LASER PRODUCT
CLASS 1 LED PRODUCT

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.

Relevant for rack mounted installations according to UL 60950-1

- Elevated Operating Ambient – If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature of the device.
- Reduced Air Flow – Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Mechanical Loading – Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit Overloading – Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Earthing – Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips)

Recycling note

After usage, this device 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/DVD supplied:
- Installation user manual
- Basic Configuration user manual
- Redundancy Configuration user manual
- Reference manual for the graphical user interface
- Command Line Interface user manual

The Industrial HiVision network management software provides you with additional options for smooth configuration and monitoring:
- ActiveX control for SCADA integration
- Auto-topology discovery
- Browser interface
- Client/server structure
- Event handling
- Event log
- Simultaneous configuration of multiple devices
- Graphical user interface with network layout
- SNMP/OPC gateway

Legend

The symbols used in this manual have the following meanings:

▶	Listing
☐	Work step
■	Subheading

1 Description

1.1 General device description

The MACH104 family provides you with a range of device variants.

The MACH104 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 long-term reliability and flexibility.

The devices with software variant L2... allow you to set up switched industrial Ethernet networks that conform to the IEEE 802.3 standard.

The devices with software variant L2... allow you to set up switched and routed industrial Ethernet networks that conform to the IEEE 802.3 standard.

The following installation options are available:
- 19" switch cabinet
- Installing the device on a flat surface
- Mounting on a flat surface

The devices work without a fan.

You have the option of choosing various media to connect to the terminal devices and other network components:
- twisted pair cable
- multimode F/O
- singlemode F/O

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

There are convenient options for managing the device. Administer your devices via:
- a Web browser
- Telnet
- Network management software (e.g. Industrial HiVision)
- a V.24 interface (locally on the device)

The devices provide you with a large range of functions, which the manuals for the operating software inform you about. You will find these manuals as PDF files on the enclosed CD/DVD, or you can download them from the Internet on the Hirschmann product pages (www.hirschmann.com).
The Hirschmann network components help you ensure continuous communication across all levels of the company.

1.2 Description of the device variants

1.2.1 MACH104-20TX-F...: devices with 24 GB ports

- MACH104-20TX-F...
  - 4 Gigabit Ethernet combo ports
  - 20 Gigabit Ethernet ports

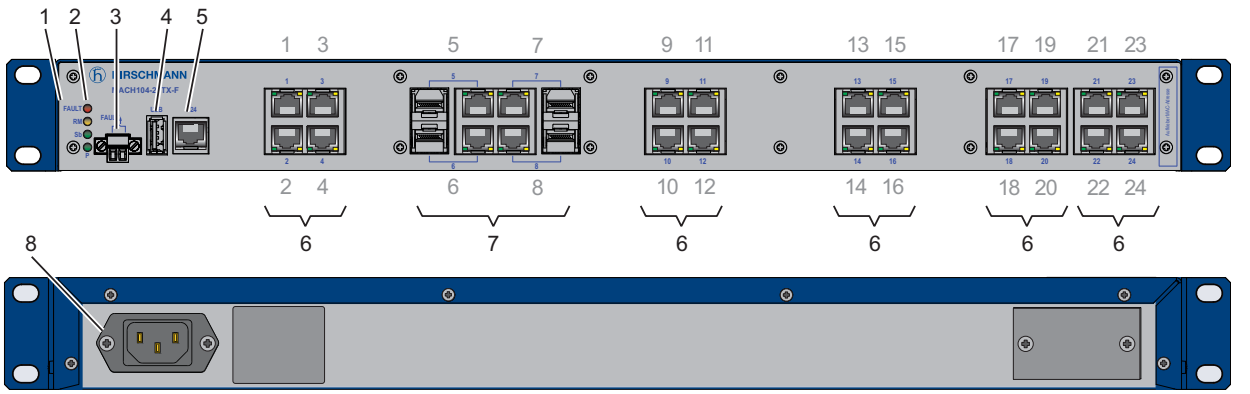


Figure 1: Overview of interfaces and display and control elements for the MACH104-20TX-F...
1 - MACH104-20TX-F... device
2- LED display elements
3 - Signal contact
4 - USB interface
5 - V.24 access for external management
6 - See the following table, column 1
7 - See the following table, column 2
8 - Connection for voltage supply (back of device)

4 × Gigabit Ethernet ports	4 × Gigabit Ethernet combo ports
10/100/1000 Mbit/s twisted pair, RJ45 connections	100/1000 Mbit/s F/O, SFP slots Alternative connections: 10/100/1000 Mbit/s twisted pair, RJ45 connections

1.2.2 MACH104-20TX-FR...: devices with 24 GB ports and redundant voltage supply

- MACH104-20TX-FR...
  - 4 Gigabit Ethernet combo ports
  - 20 Gigabit Ethernet ports
  - The power supply is connected redundantly.

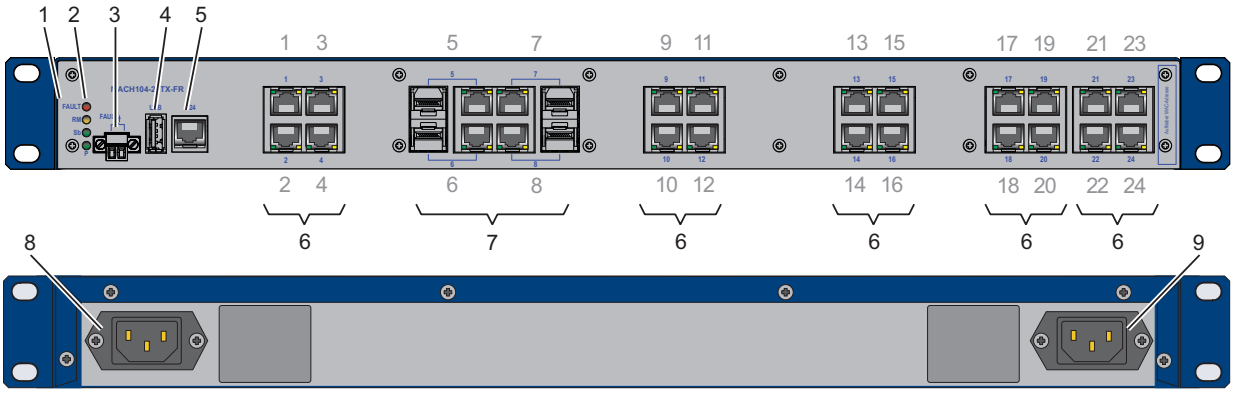


Figure 2: Overview of interfaces and display and control elements for the MACH104-20TX-FR...
1 - MACH104-20TX-FR... device
2 - LED display elements
3 - Signal contact
4 - USB interface
5 - V.24 access for external management
6 - See the following table, column 1
7 - See the following table, column 2
8 - P1: Connection for voltage supply (back of device)
9 - P2: Connection for redundant voltage supply (back of device)

4 × Gigabit Ethernet ports	4 × Gigabit Ethernet combo ports
10/100/1000 Mbit/s twisted pair, RJ45 connections	100/1000 Mbit/s F/O, SFP slots Alternative connections: 10/100/1000 Mbit/s twisted pair, RJ45 connections

1.2.3 MACH104-20TX-F-4PoE...: devices with 24 GB ports, 4 of which are PoE ports

- MACH104-20TX-F-4PoE...
  - 4 Gigabit Ethernet combo ports
  - 20 Gigabit Ethernet ports, 4 of which are PoE-capable
  - Integrated PoE voltage supply for 4 PoE ports

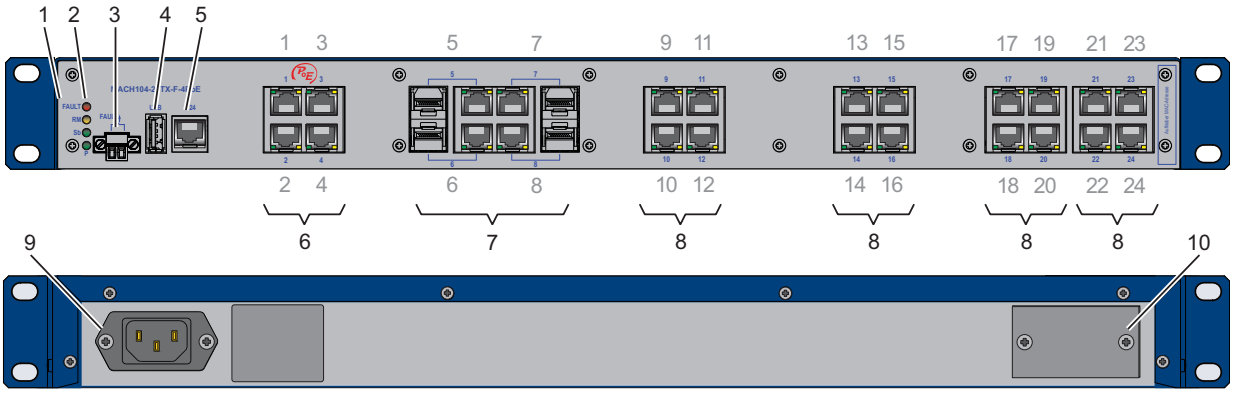


Figure 3: Overview of interfaces and display and control elements for the MACH104-20TX-F-4PoE...
1 - MACH104-20TX-F-4PoE... device
2 - LED display elements
3 - Signal contact
4 - USB interface
5 - V.24 access for external management
6 - See the following table, column 1
7 - See the following table, column 2
8 - See the following table, column 3
9 - Connection for voltage supply (back of device)
10 - Integrated PoE power unit (back of device)

4 × Gigabit Ethernet PoE ports	4 × Gigabit Ethernet combo ports	4 × Gigabit Ethernet ports
10/100/1000 Mbit/s twisted pair, RJ45 connections with PoE	100/1000 Mbit/s F/O, SFP slots Alternative connections: 10/100/1000 Mbit/s twisted pair, RJ45 connections	10/100/1000 Mbit/s twisted pair, RJ45 connections

1.3 Supply voltage

Note: Read the safety guidelines under “Working voltage” on page 6.

1.3.1 MACH104-20TX-F...

Supply voltage is connected via a non-heating appliance socket.

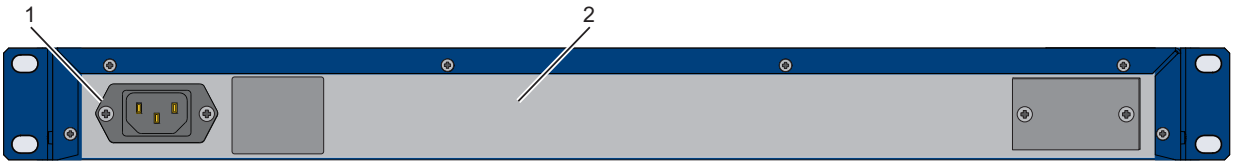


Figure 4: Connections of the MACH104-20TX-F... on the back of the device
1 - Voltage supply 100 - 240 V AC
2 - MACH104-20TX-F... device

1.3.2 MACH104-20TX-FR...

Supply voltage is connected via non-heating appliance sockets.
The supply voltage can be connected redundantly. Both inputs are uncoupled. There is no distributed load. With redundant supply, the standard voltage supply alone supplies the device. The redundant voltage supply automatially becomes active if the standard voltage supply fails. In the normal case, the redundant voltage supply works in stand-by mode.
The supply voltage is electrically isolated from the housing.

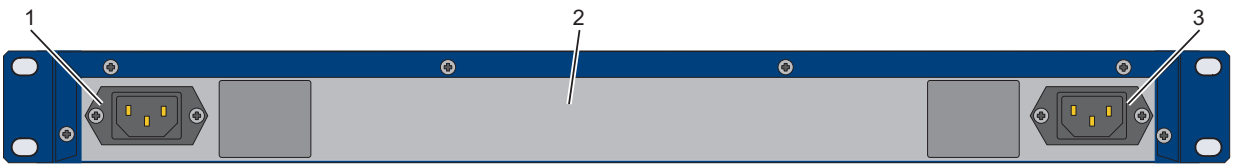


Figure 5: Connections of the MACH104-20TX-FR... on the back of the device
1 - Standard voltage supply 100 - 240 V AC
2 - MACH104-20TX-FR... device
3 - Redundant voltage supply 100 - 240 V AC

With non-redundant supply of the operating voltage, the device reports the loss of an operating voltage. You can prevent this message by applying the operating voltage via both inputs, or by changing the configuration in the Management.

1.3.3 MACH104-20TX-F-4PoE...

Supply voltage is connected via a non-heating appliance socket.

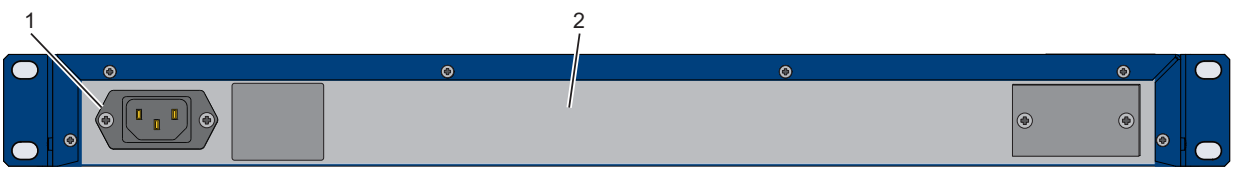


Figure 6: Connections of the MACH104-20TX-F-4PoE... on the back of the device
1 - Standard voltage supply 100 - 240 V AC
2 - MACH104-20TX-F-4PoE... device

1.4 Ethernet ports

You can connect terminal devices and other segments on the ports of the device via twisted pair cables or F/O cables.

1.4.1 10/100/1000 Mbit/s twisted pair port

This port is an RJ45 socket.
The 10/100/1000 Mbit/s twisted pair port offers you the ability to connect network components according to the IEEE 802.3 10BASE-T/100BASE-TX/1000BASE-T standard.
This port supports:

- 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

Note: Some of these ports also support Power over Ethernet (PoE).
See “PoE ports” on page 16.

Delivery state: autonegotiation active.
The socket housing is electrically connected with the front panel.
The pin assignment corresponds to MDI-X.

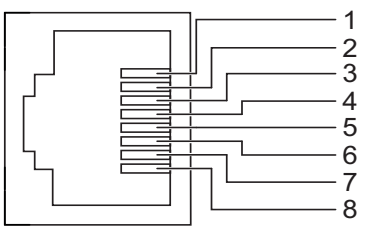
Figure	Pin	Function	Ports with PoE support: PoE voltage feed
	1	BI_DB+	Minus terminal of the working voltage
	2	BI_DB−	Minus terminal of the working voltage
	3	BI_DA+	Plus terminal of the working voltage
	4	BI_DD+	
	5	BI_DD−	
	6	BI_DA−	Plus terminal of the working voltage
	7	BI_DC+	
	8	BI_DC−	

Table 1: Pin assignment of a 1000 MBit/s TP interface in MDI-X mode, RJ45 socket - for PoE with the power supplied via the wire pairs transmitting the signal

1.4.2 100 Mbit/s F/O port

This port is an SFP slot.

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

Default setting: Full duplex

1.4.3 1000 Mbit/s F/O port

This port is an SFP slot.
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 active.

1.4.4 PoE ports

The MACH104-20TX-F-4PoE... device variants support Power over Ethernet (PoE) in accordance with IEEE 802.3af.

Ports	PoE support
1 to 4	Yes
5 to 20	No

Table 2: Twisted-pair ports and PoE support

The PoE ports allow the connection and remote supply of, for example, IP telephones (Voice over IP), webcams, sensors, printer servers and WLAN access points. With PoE, power is supplied to these terminal devices via the twisted-pair cable.

The following applies to PoE ports:
- Max. Powered Device (PD) class 0 (15.4 W)
- The PoE power is supplied via the wire pairs transmitting the signal (phantom voltage).
- The individual ports (joint PoE voltage) are not electrically insulated from each other.

1.4.5 Combo ports

You have the option to alternatively connect F/O (via SFP transceivers) or twisted pairs to a combo port.
When you are using an SFP transceiver, you get an optical interface. You thus deactivate the corresponding TP interface.

1.5 Display elements

After the working voltage is set up, the software starts and initializes itself. Afterwards, the device performs a self-test. During this process, various LEDs light up.
The process takes around 15 seconds.

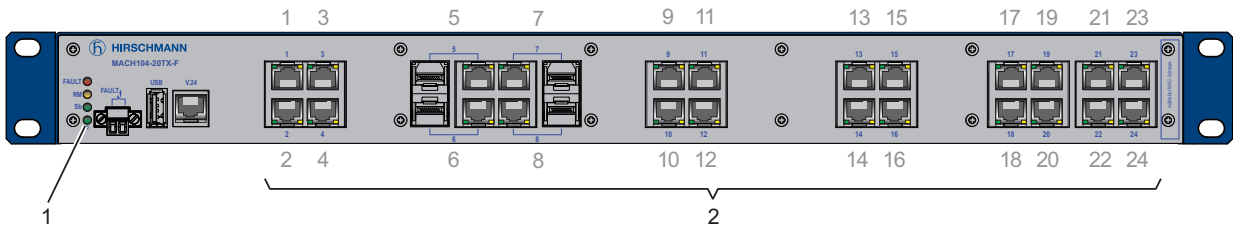


Figure 7: MACH104 Display elements
1 - Device status display elements
2 - Port status display elements

1.5.1 Device state

These LEDs provide information about conditions which affect the operation of the whole device.
The following table applies to the stated device variants only:

- MACH104-20TX-FR...

LED	Display	Color	Activity	Meaning
P	Working voltage	Green	Lights up	The working voltages 1 **and** 2 are on.
		Yellow	Lights up	The working voltages 1 **or** 2 are on.
			None	The supply voltages 1 **and** 2 are too low.

The following table applies to the stated device variants only:

- MACH104-20TX-F...
- MACH104-20TX-F-4PoE...

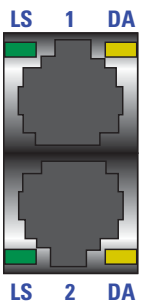
LED	Display	Color	Activity	Meaning
P	Working voltage	Green	Lights up	Operating voltage is on
			None	Operating voltage is too low

The following table applies to all device variants:

LED	Display	Color	Activity	Meaning
Sb	Stand-by		None	Stand-by mode not enabled
		Green	Lights up	Standby mode enabled
FAULT	Signal contact		None	The signal contact is closed - it is **not** reporting any detected errors.
		Red	Lights up	The signal contact is open - it is reporting a detected error.
RM	Ring Manager		None	The RM function is deactivated.
		Green	Lights up	The RM function is active. The redundant port is disabled.
			flashing	The device detects an incorrect configuration of the HIPER-Ring (e.g. the ring is not connected to the ring port).
		Yellow	Lights up	The RM function is active. The redundant port is enabled.
RM and Sb	ACA memory operation		Flashing alternately	Error in the memory operation
			flash synchronously – 2 x per period	Save a configuration file from the ACA to the device.
			flash synchronously – 1 x per period	Saving a configuration file from the device to the ACA.

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

1.5.2 Port state



These LEDs display port-related information.

LED	Display	Color	Activity	Meaning
LS	Link status		None	Device detects an invalid or missing link
		Green	Lights up	Device detects a valid link
			Flashes 1 time a period	Port is switched to stand-by
			Flashes 3 times a period	Port is switched off
DA	Data traffic	Yellow	Flashing	Device is transmitting and/or receiving data

1.6 Management interfaces

1.6.1 V.24 interface (external management)

The V.24 interface is an RJ11 socket.
The V.24 user interface is serial and allows you to connect the following devices directly:

- External management station (VT100 terminal or PC with appropriate terminal emulation). With this management station, the Command Line Interface (CLI) is available to you. Furthermore, the system monitor is available to you at the system start.
- An AutoConfiguration Adapter ACA 11

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.

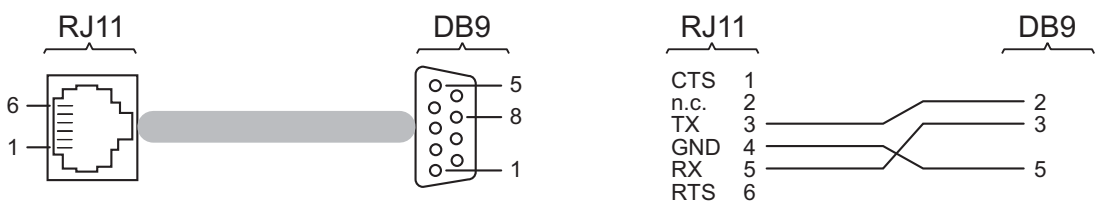


Figure 8: Pin assignment of the V.24 interface and the DB9 connector

Note: You will find the order number for the terminal cable, which is ordered separately, in the Technical Data section (see on page 30 “Technical data”).

1.6.2 USB interface

The USB socket provides an interface for the local connection of an Auto-Configuration Adapter. It is used for saving/loading the configuration and for loading the software.
See “Accessories” on page 34.

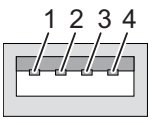
Figure	Pin	Operation
	1	VCC (VBus)
	2	− Data
	3	+ Data
	4	Ground (GND)

Table 3: Pin assignment of the USB interface

1.7 Signal contact

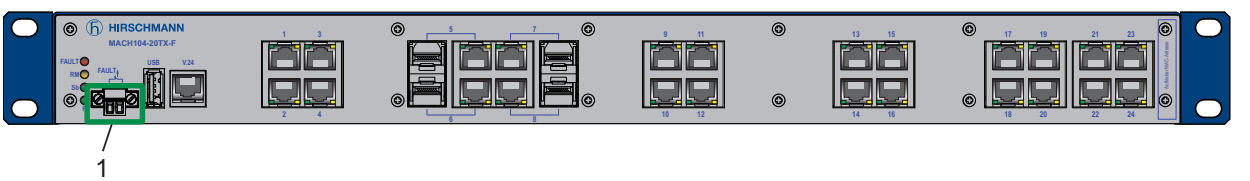


Figure 9: MACH104 device, front view
1 - Signal contact

The signal contact is a potential-free relay contact.
The device allows you to perform remote diagnosis via the signal contact. In the process, the device signals events such as a line interruption. When an event occurs, the device opens the relay contact and interrupts the closed circuit. The management setting specifies which events switch a contact. You can also use the management to switch the signal contact manually and thus control external devices.

2 Installation

On delivery, the device is ready for operation.
The following procedure has been proven to be successful for the assembly of the device:

- Unpacking and checking the content of the package
- Installing an SFP transceiver (optional)
- Wiring and assembling the signal contact
- Installing the device and grounding
- Operating the device
- Connecting data cables

Note: Read the safety guidelines under “Safety instructions” on page 5.

2.1 Unpacking and checking the content of the package

☐ Check whether the package includes all items named in section “Scope of delivery” on page 34.
☐ Check the individual parts for transport damage.

2.2 Installing an SFP transceiver (optional)

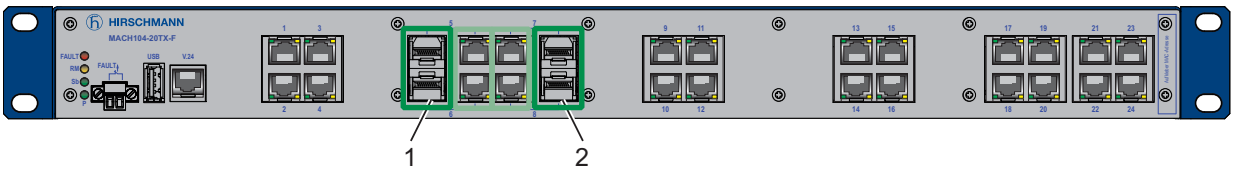


Figure 10: MACH104 device, front view
1 - Ports 5 + 6: Two SFP slots that are used as alternatives to the RJ45 ports
2 - Ports 7 + 8: Two SFP slots that are used as alternatives to the RJ45 ports

Note: Only use SFP transceivers Hirschmann which are suitable for this device. See “Accessories” on page 34.

☐ Before installing an SFP transceiver or XFP transceiver, first remove the protection cap of the transceiver.
☐ Push the SFP transceiver or XFP transceiver with the lock closed into the socket until you hear it latch in.

Figure 11: F/O SFP transceiver

2.3 Wiring and assembling the signal contact

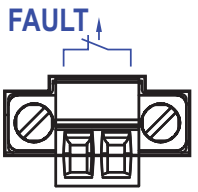


Figure 12: 2-pin terminal block

⚠ WARNING

ELECTRIC SHOCK
Never insert sharp objects (small screwdrivers, wires, etc.) into the connection terminals for the signal lines, and do not touch the terminals!

Non-adherence to these instructions can lead to death, serious physical injury or material damage.

For the signal contact to be connected, make sure the following requirements are met:
- ▶ The electrical wires are voltage-free.
- ▶ The connected voltage is limited by a current limitation device or a fuse. Observe the electrical threshold values for the signal contact. See “General technical data” on page 30.

☐ Remove the power connector from the device.
☐ Connect the signal contact wires with the connectors of the terminal block.
☐ Mount the terminal block for the signal contact on the front of the device using the screw locking. Check whether the terminal block is mounted correctly and screwed on.

Note: Relevant for North America:
The torque for tightening the terminal block for the signal contact on the device is 3 lb-in (0.34 Nm).

2.4 Installing the device and grounding

The device can be mounted on a flat surface, in a 19" standard switch cabinet, or on the wall.

2.4.1 Selecting the assembly location

Select the assembly location according to the safety guidelines (see on page 5 “Safety instructions”).
When selecting the assembly location, also make sure the following requirements are met:
☐ The assembly location can be accessed for maintenance and repair work.
☐ The LED display elements are clearly visible.
☐ Twisted-pair cables are at a sufficient distance from potential sources of electrical interference, such as power cables.
☐ The device has a separate power source with a ground connection. The power supply can be interrupted by means of a separate isolator or power switch. We recommend using overvoltage protection for all devices.

2.4.2 Mounting on a flat surface

Before operating the device on a flat surface, such as a table, fasten the housing feet supplied at a distance of 2 cm from the corners of the bottom of the device.

☐ If necessary, remove any dirt from the adhesive surfaces on the bottom of the device.

☐ Remove the protective foil from the adhesive surface of a housing foot and attach the housing foot.

2.4.3 Mounting in a switch cabinet

Note: Observe the instructions for installation in 19" control cabinets according to UL 60950-1.
See “Relevant for rack mounted installations according to UL 60950-1” on page 8.

Note: For more information on sliding/mounting rails and how to install them, please contact your switch cabinet manufacturer.

The devices are designed to be mounted in a 19" switch cabinet.

☐ Make sure there is sufficient ventilation. If necessary, provide a fan for the 19" switch cabinet. This will prevent the basic devices from overheating.

☐ Measure the depth of the 19" switch cabinet so as to allow the power supply cables to be fitted at the back and the data cables to be fitted at the front.

☐ Install the sliding/mounting rails in the 19" switch cabinet as instructed by the manufacturer, and make sure the device is resting on both rails.

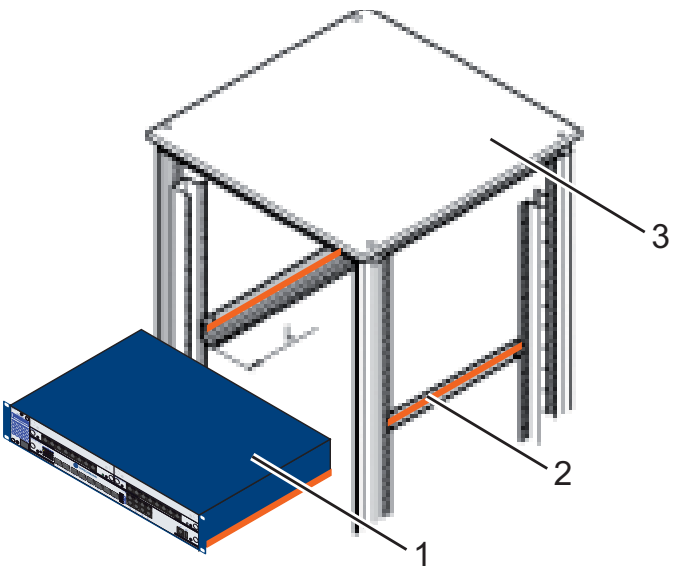


Figure 13: Assembly in a switch cabinet with sliding/mounting rails
1 - MACH104 device
2 - sliding/mounting rail
3 - 19“ switch cabinet

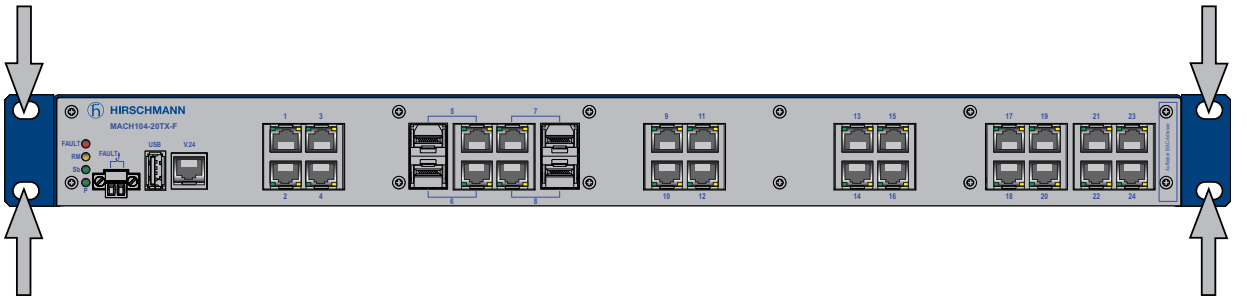


Figure 14: Mounting the MACH104 in the 19" cabinet

☐ Fasten the device by screwing the brackets to the switch cabinet.

Note: When operating the device in an environment with strong vibrations, you have the option to additionally fasten the back of the device to the switch cabinet using two brackets.
You can obtain additional brackets as accessories (see on page 34 “Accessories”).

2.4.4 Mounting on the wall

☐ Use the pre-mounted brackets included in the delivery.
See figure 15 on page 25.
☐ Additionally attach two brackets to the back of the device.
See figure 15 on page 25.
You can obtain additional brackets as accessories (see on page 34 “Accessories”).
☐ Fasten the device by screwing the brackets to the wall.

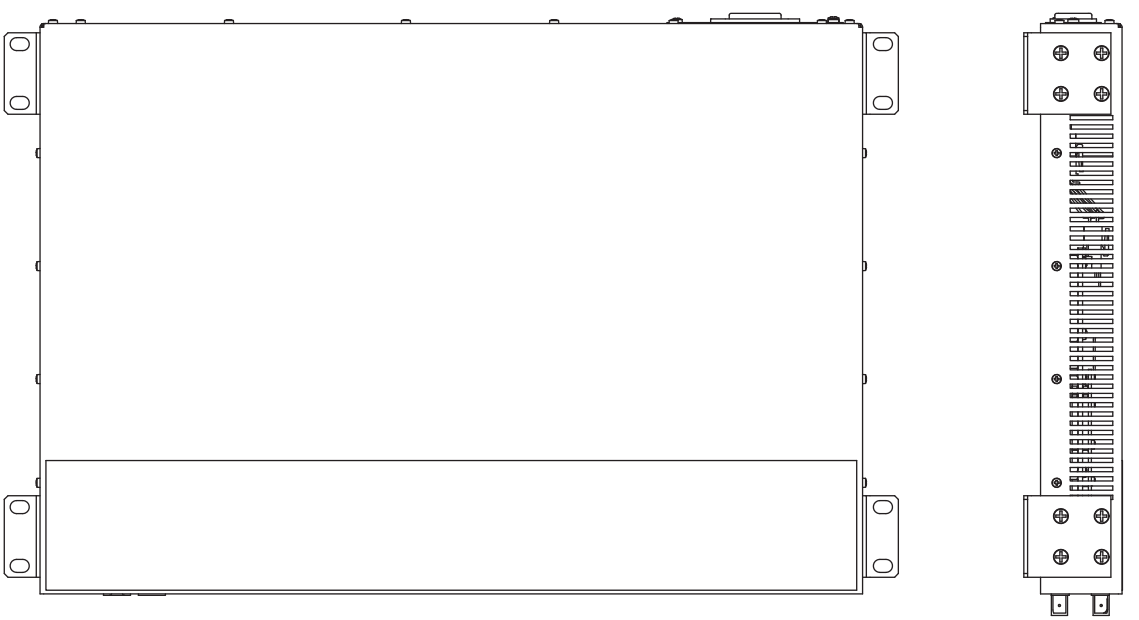


Figure 15: Vertical mounting on the wall

2.4.5 Grounding the device

The device is grounded via the operating voltage connections.

2.5 Operating the device

⚠ WARNING

ELECTRIC SHOCK

Connect solely an working voltage that corresponds to the type plate of your device.

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

Note: Read the safety guidelines under “Working voltage” on page 6.

By connecting the voltage supply via the voltage supply socket(s), you start the operation of the device.

2.6 Connecting data cables

Note: Verify that you connect solely optical ports with the same optical transmission properties with each other.

For further information see: “Ethernet ports” on page 15.

☐ Connect the data cable according to your requirements.

3 Basic set-up

Note: Two or more devices configured with the same IP address can cause unpredictable operation of your network.
Install and maintain a process that assigns a unique IP address to every device in the network.

When you install the device for the first time enter the IP parameters.

The device provides the following options for entering the IP parameters during the first installation:

- Configuration via DHCP (state on delivery)
- Entry via V.24 connection
- Entry with the aid of the HiDiscovery logs on the applications HiDiscovery or Industrial HiVision
- Configuration via BOOTP
- Configuration via DHCP (Option 82)
- AutoConfiguration Adapter

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

3.1 Default settings

- IP address: The device looks for the IP address using DHCP
- Management password:
  user, password: public (read only)
  admin, password: private (read and write)
- V.24 data rate: 9,600 Baud
- Ring redundancy: off
- Ethernet ports: link status is not evaluated (signal contact)
- Optical 100 Mbit/s ports: 100 Mbit/s full duplex
  All other ports: autonegotiation
- Redundancy manager switched off
  (DIP switch RM and Stand-by: ON)
- Stand-by coupling switched off
  (DIP switch RM and Stand-by: ON)
  Port 3 = control port, port 4 = coupling port for redundant ring coupling
- Rapid Spanning Tree: on

4 Maintenance and service

- ☐ When designing this device, Hirschmann largely avoided using wear parts. The parts subject to wear and tear are dimensioned to last longer than the lifetime of the product when it is operated normally. Operate this device according to the specifications (see on page 30 “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 are continually working on improving and developing their software. Check regularly whether there is an updated version of the software that provides you with additional benefits. You find information and software downloads on the Hirschmann product pages on the Internet (www.hirschmann.com).
- ☐ Depending on the degree of pollution in the operating environment, check at regular intervals that the ventilation slots in the device are not obstructed.

Note: You will find information about the complaints and returns procedures in the Internet under
http://www.beldensolutions.com/en/Service/Repairs/index.phtml .

5 Deinstallation

5.1 Removing the device

☐ Disconnect the data cables.
☐ Disable the working voltage.
☐ Disconnect the operating voltage.
☐ Remove the power connector from the device.

☐ To detach the device from the switch cabinet or the wall, remove the screws from the brackets on the device.

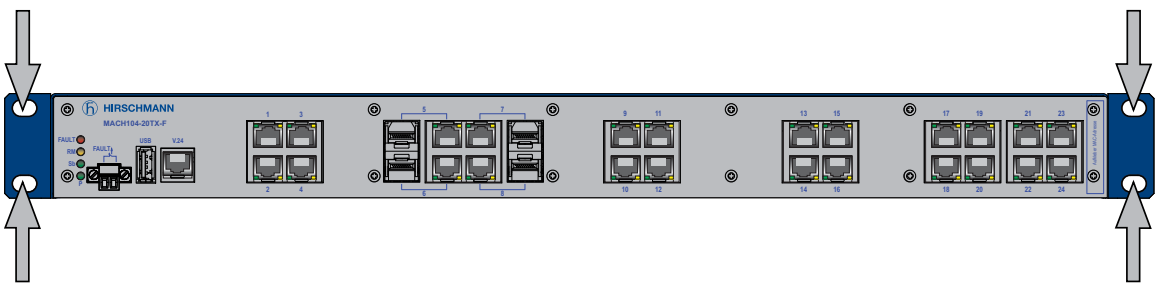


Figure 16: Disassembling the device

5.2 Removing the SFP transceivers

☐ Pull the SFP transceiver out of the socket by means of the opened lock.
☐ Close the socket with the protective cap.

Figure 17: Deinstalling an SFP transceiver

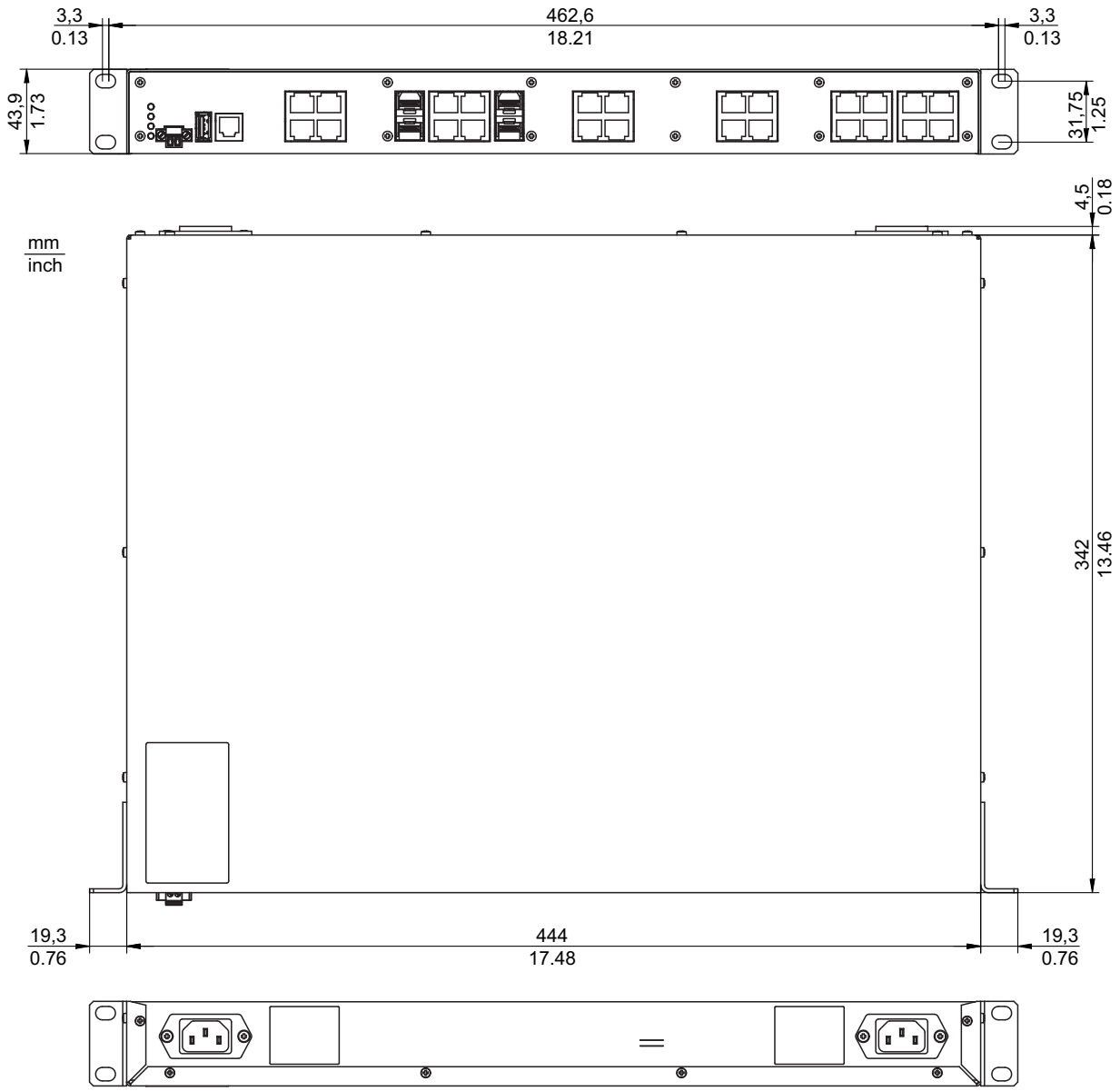
6 Technical data

General technical data

Dimensions	See “Dimension drawings” on page 31.	
Weight	MACH104-20TX-F...	4.2 kg
	MACH104-20TX-FR...	4.4 kg
	MACH104-20TX-F-4PoE...	4.6 kg
Operating voltage	Rated voltage range AC	100 V ... 240 V, 50 Hz ... 60 Hz
	Voltage range AC incl. maximum tolerances	90 V AC - 265 V AC, 47 Hz - 63 Hz
Current consumption	Rated current for devices without PoE	max. 0.3 A (240 V AC)
		max. 0.5 A (100 V AC)
	Rated current for devices with PoE	max. 0.9 A (240 V AC)
		max. 1.7 A (100 V AC)
Activation current		typ. <40 A at 265 V AC and cold start
PoE power	Maximum number of Powered Devices (PDs)	This applies to the following device variants only: MACH104-20TX-F-4PoE... 4 × Powered Device (PD) class 0 (15.4 W)
Power failure bypass		> 12 ms (115 V AC)
Overload current protection at input	Non-replaceable fuse	
Climatic conditions during operation	Ambient air temperature[a].	+32 °F ... +122 °F (0 °C ... +50 °C)
	Humidity	20 % ... 90 % (non-condensing)
	Air pressure	minimum 795 hPa (+9842 ft; +2000 m) maximum 1060 hPa (−1312 ft; −400 m)
Climatic conditions during storage	Ambient air temperature[b].	−4 °F ... +185 °F (−20 °C ...+85 °C)
	Humidity	10 % ... 95 % (non-condensing)
	Air pressure	minimum 700 hPa (+9842 ft; +3000 m) maximum 1060 hPa (−1312 ft; −400 m)
Signal contact	Switching current	max. 1 A, SELV
	Switching voltage	max. 60 V DC or max. 30 V AC, SELV
Pollution degree		2
Protection classes	Laser protection	Class 1 in compliance with IEC 60825-1
	Degree of protection	IP 30

a. Temperature of the ambient air at a distance of 2 inches (5 cm) from the device
b. Temperature of the ambient air at a distance of 2 inches (5 cm) from the device

Dimension drawings



EMC and immunity

EMC interference immunity		
IEC/EN 61000-4-2	Electrostatic discharge	
	Contact discharge	6 kV
	Air discharge	8 kV
IEC/EN 61000-4-3	Electromagnetic field	
	80 MHz ... 3000 MHz	20 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 / ground	2 kV
	Data line	4 kV

EMC interference immunity		
IEC/EN 61000-4-6	Conducted disturbances	
	150 kHz ... 80 MHz	10 V
EN 61000-4-9	Pulse magnetic fields	300 A/m

EMC interference emission		
EN 55022	Class A	Yes
FCC 47 CFR Part 15	Class A	Yes

Network range

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

10/100/1000 Mbit/s twisted pair port	
Length of a twisted pair segment	max. 100 m (for cat5e cable)

Product code M-FAST-SFP-...		Wave length	Fiber	System attenuation	Example for F/O line length [a]	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[b]	18 ps/(nm×km)

Table 4: 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 M-SFP-...		Wave length	Fiber	System attenuation	Example for F/O line length [a]	Fiber attenuation	BLP[b]/ 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[c]	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[d]	50/125 µm	0-10.5 dB	0-550 m	1.0 dB/km	800 MHz×km
-LX/LC...	MM	1310 nm [d]	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[e]	0.4 dB/km	3.5 ps/(nm×km)

Table 5: Fiber port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

Product code M-SFP-...		Wave length	Fiber	System attenua-tion	Example for F/O line length [a]	Fiber attenua-tion	BLP[b]/ dispersion
-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 5: Fiber port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

a. including 3 dB system reserve when compliance with the fiber data is observed
b. The bandwidth length product cannot be used to calculate the expansion.
c. Distances of up to 3 km reachable, 1000 MHz*km (1300 nm)
d. With F/O adapter compliant with IEEE 802.3-2002 clause 38 (single-mode fiber offset-launch mode conditioning patch cord)
e. 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 attenua-tion	Example for F/O line length [a]	Fiber attenua-tion	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 6: F/O port (bidirectional Gigabit Ethernet SFP Transceiver)

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

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

Order numbers

MACH104device	Order number
MACH104-20TX-F-L2P	942 003-001
MACH104-20TX-FR-L2P	942 003-101
MACH104-20TX-F-4PoE-L2P	942 003-201
MACH104-20TX-F-L3P	942 003-002
MACH104-20TX-FR-L3P	942 003-102
MACH104-20TX-F-4PoE-L3P	942 003-202

Power consumption/power output

MACH104device	Maximum power consumption	Maximum power output
MACH104-20TX-F...	35 W	119 Btu (IT)/h
MACH104-20TX-FR...	35 W	119 Btu (IT)/h
MACH104-20TX-F-4PoE..., when 4 x Class 0 Powered Device connected	110 W	170 Btu (IT)/h

Scope of delivery

Number	Article
1 ×	Device
1 ×	2-pin terminal block for signal contact
2 ×	Brackets with fastening screws (pre-mounted)
1 ×	Housing feet, stick-on
1 ×	Non-heating appliance cable (Euro model)
1 ×	Mounting instruction
1 ×	CD/DVD with manual

Accessories

Note: Please note that products recommended as accessories may have characteristics that do not fully correspond to those of the corresponding product. This may limit their possible usage range in the overall system.

Name	Order number
AutoConfiguration Adapter ACA 21-USB (EEC)	943 271-003
AutoConfiguration Adapter ACA 11	943 751-001
Terminal cable	943 301-001
2-pin terminal block (50 units)	943 845-010
Bracket for fastening the housing	943 943-001
Long bracket (+ 50 mm) for fastening the housing (additional)	943 943-101
Network management software Industrial HiVision	943 156-xxx
OPC Server software HiOPC	943 055-001

Gigabit Ethernet SFP transceiver	Order number
M-SFP-TX/RJ45	943 977-001

Note the following for the M-SFP-TX/RJ45 transceiver:

- Can be used with:
  - HiOS from software version 03.0.00
  - Classic Switch Software from software version 04.1.00
  - HiSecOS from software version 01.2.00

  Not for use with the following devices:
  - SPIDER II
  - MSP/MSM
  - EES
- Twisted pair ports that are implemented using this transceiver have increased link failure detection times compared to twisted pair ports that are directly available in the device.
- When using this SFP transceiver, expect increased switching times with the RSTP.
- Cannot be used in combo ports.

M-SFP-SX/LC	943 014-001
M-SFP-SX/LC EEC	943 896-001
M-SFP-MX/LC EEC	942 108-001
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

Fast Ethernet SFP transceiver	Order number
M-FAST SFP-TX/RJ45	942 098-001
M-FAST SFP-TX/RJ45 EEC	942 098-002

Note the following for the M-FAST SFP-TX... transceiver:

- Can be used with:
  - HiOS from software version 03.0.00
  - On the PRP ports of the RSP devices starting with software version 02.0.01
  - On the PRP ports of the EES devices starting with software version 02.0.02
  - Classic Switch Software from software version 08.0.00
  - HiSecOS ab Software-Version 01.2.00
- Twisted-pair ports realized through this transceiver have longer link failure detection times compared with twisted-pair ports provided by the device directly.
- When using these SFP transceivers, assume a higher switching time for RSTP.
- Not applicable for combo ports.

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

Bidirectional Gigabit Ethernet SFP transceiver	Order number
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

Bidirectional Gigabit Ethernet SFP transceiver	Order number
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

Underlying technical standards

Name	
CSA 22.2 No. 60950-1	Information Technology Equipment – Safety – Part 1: General Requirements
EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity for industrial environments
EN 55022	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
FCC 47 CFR Part 15	Code of Federal Regulations
EN 60950-1	Information technology equipment – Safety – Part 1: General requirements
IEEE 802.1D	MAC Bridges (switching function)
IEEE 802.1Q	Virtual LANs (VLANs, MRP, Spanning Tree)
IEEE 802.1w	Rapid Reconfiguration
IEEE 802.3	Ethernet
UL 60950-1	Safety for Information Technology Equipment

Table 7: List of norms and standards

The device generally fulfills the norms and standards named in their current versions.
The device has an approval based on a specific standard or de facto standard solely if the approval indicator appears on the housing.
If your device has a shipping approval according to Germanischer Lloyd, you find the approval mark printed on the device label. You will find out whether your device has other shipping approvals on the Hirschmann website under www.hirschmann.com in the product information.

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

in the America region at
- Tel.: +1 (717) 217-2270
- E-mail: inet-support.us@belden.com

in the Asia-Pacific region at
- Tel.: +65 6854 9860
- E-mail: inet-ap@belden.com

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