



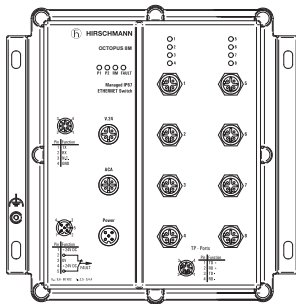
HIRSCHMANN

User Manual

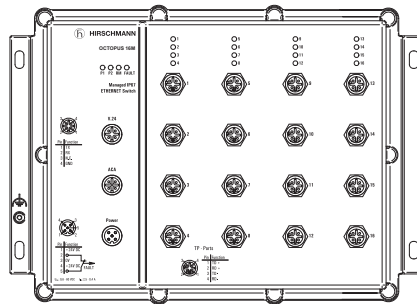
Installation

IP67 Switch

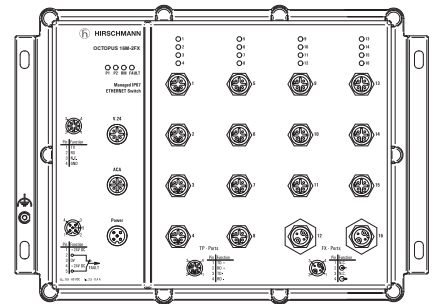
OCTOPUS 8M, OCTOPUS 16M(-2FX), OCTOPUS 24M(-2FX)



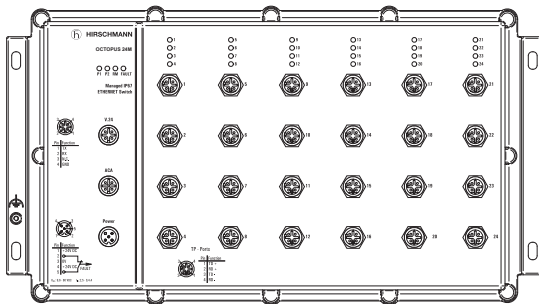
OCTOPUS 8M



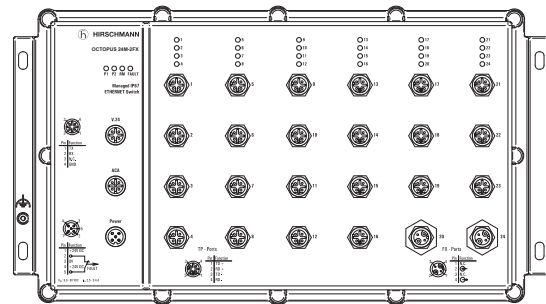
OCTOPUS 16M



OCTOPUS 16M-2FX



OCTOPUS 24M



OCTOPUS 24M-2FX



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Safety instructions

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

■ **Certified usage**

Please observe the following: 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 Hirschmann. 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**

The devices are designed for operation with a safety extra-low voltage. Thus, they may only be connected to the supply voltage connections and to the signal contact with PELV circuits or alternatively SELV circuits with the voltage restrictions in accordance with IEC/EN 60950. The supply voltage is electrically isolated from the housing.

Use only undamaged parts!

Relevant for North America:

The subject unit is to be supplied by a Class 2 power source complying with the requirements of the National Electrical Code, table 11(b). If power is redundant supplied (two individual power sources) the power sources together should comply with the requirements of the National Electrical Code, table 11 (b).

Relevant for North America:

Use 60/75°C or 75°C copper(CU)wire only.

Relevant for North America

for devices certified for hazardous locations:

Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods [Article 501-4(b) of the National Electrical Code, NFPA 70] and in accordance with the authority having jurisdiction.

■ **Shielding ground**

The shielding ground of the connectable twisted pairs lines is connected to the chassis as a conductor.

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

■ **Housing**

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

The device is grounded via the separated ground screw. It is located on the left under the front panel.

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

■ **Environment**

The device may only be operated in the listed maximum surrounding air temperature range at the listed relative air humidity range (non-condensing).

- The installation location is to be selected so as to ensure compliance with the climatic limits listed in the Technical Data.
- To be used in a Pollution Degree listed 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**

This device is electrically operated. Adhere strictly to the safety requirements relating to voltages applied to the device as described in the operating instructions!

Failure to observe the information given in the warnings could result in serious injury and/or major damage.

- Only personnel that have received appropriate training should operate this device or work in its immediate vicinity. The personnel must be fully familiar with all of the warnings and maintenance measures in these operating instructions.
- Correct transport, storage, and assembly as well as careful operation and maintenance are essential in ensuring safe and reliable operation of this device.
- Only use undamaged parts!
- These products are only to be used in the manner indicated in this version of the manual.

- Any work that may have to be performed on the electrical installation should be performed by fully qualified technicians only.

Warning! (OCTOPUS 16M-2FX, OCTOPUS 24M-2FX)

LED- or LASER components according to IEC 60825-1 (2001):
CLASS 1 LASER PRODUCT.
LIGHT EMITTING DIODE - CLASS 1 LED PRODUCT.

■ **National and international safety regulations**

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

■ **Note on the CE marking**

The devices comply with the regulations contained in the following European directives:

89/336/EEC

Directive of the council for standardizing the regulations of member states on electromagnetic compatibility (changed by RL 91/263/EEC, 92/31/EEC and 93/68/EEC).

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

Hirschmann Automation and Control GmbH
Stuttgarter Straße 45-51
D-72654 Neckartenzlingen
Germany
Phone ++49 7127 14 1480

The product can be used in living areas (living area, place of business, small business) and in industrial areas.

- ▶ Interference immunity: EN 61000-6-2:2001
- ▶ Emitted interference: EN 55022:1998 + A1 2000 Class A

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.

The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC value limits.

■ **FCC note**

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 where the device is being used in a business environment. The device creates and uses high frequencies and can radiate same, 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 / country.

About this manual

The following manuals are included as PDF files on the enclosed CD ROM:

- ▶ User manual „Installation“
- ▶ User manual „Basic configuration“
- ▶ User manual „Redundancy configuration“
- ▶ Reference manual „Web-based Interface“ and
- ▶ Reference manual „Command Line Interface“

If you use Network Management Software HiVision you have further opportunities to:

- ▶ have an event logbook.
- ▶ configure the „System Location“ and „System Name“.
- ▶ configure the network address range and SNMP parameters.
- ▶ save the configuration on the Switch.
- ▶ simultaneous configuration of several Switches.
- ▶ configure the relevant ports to be displayed red if there is no link state.

Legend

The commendations used in this manual have the following meanings:

-
- ▶ Listing
 - Work step
 - **Subheading**
-

1 Device description

The OCTOPUS 8M/16M/24M 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 operate without fans and have a redundant voltage supply.

The HIPER-Ring redundancy concept enables you to quickly carry out a reconfiguration, and also a simple configuration with only one additional connection.

It can be easily managed via a Web browser, via Telnet, with a management software product (such as *HiVision*) or locally on the switch (V.24 interface).

The OCTOPUS 8M/16M/24M allows you to construct switched industrial ETHERNET networks that conform to the IEEE 802.3 and 802.3u standards using copper wires or optical fibers in a bus or ring topology. You can connect terminal devices and other infrastructure components via twisted pair cables and multi-mode optical fibers. The twisted pair ports support autocrossing, autonegotiation and autopolarity.

Depending on the software you choose, the devices provide you with a large range of functions:

- ▶ Redundancy functions
(Rapid Spanning Tree, Redundant Ring Structure, HIPER-Ring, Redundant Coupling, Link Aggregation, Redundant Power Supply)
- ▶ Protection from unauthorized access
- ▶ Synchronized system time in the network
- ▶ Network load control
- ▶ Function diagnosis
- ▶ Diagnostics (hardware self-testing)
- ▶ Reset
- ▶ Priority
- ▶ VLAN
- ▶ Topology recognition
- ▶ Web-based interface
- ▶ Command Line Interface - CLI
- ▶ SNMP
- ▶ 802.1x port authentication
- ▶ Real Time Clock

The addition, to the OCTOPUS 8M/16M/24M range, of the RS20/RS30 Open Rail range, the MICE range of switches, the MACH range of backbone switches, the BAT wireless transmission system, the EAGLE security system, and products for the LION control room, provides continuous communication across all levels of the company.

2 Assembly and startup procedure

The device has been developed for practical application in a harsh industrial environment. Accordingly, the installation process has been kept simple. On delivery, the device is ready for operation.

The following procedure is appropriate for assembly:

- ▶ Unpacking and checking
- ▶ Connecting the connector for supply voltage and signal contact
- ▶ Fitting the device, grounding
- ▶ Fitting the connector for the power supply, startup procedure
- ▶ Connecting the data lines

2.1 Device installation

2.1.1 Unpacking and checking

- Check whether the package was delivered complete
see [“Scope of delivery” on page 23](#).
- Check the individual parts for transport damage.

2.1.2 Connecting the connector for supply voltage and signal contact

The supply voltage and the signal contacts are connected via a 5-pole M12 circular connector (A coding, e.g. ELWIK A 5012 PG7 from Hirschmann included in scope of delivery).

■ Supply voltage

The supply voltage can be connected redundantly. Both inputs are uncoupled. With redundant supply, the transformer supplies the device alone with the higher output voltage. The supply voltage is electrically isolated from the housing.

Pin assignment of the device connector

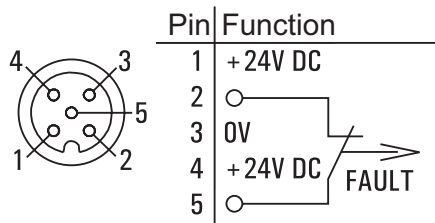


Fig. 1: Connection of the supply voltage

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 over the two inputs or by changing the configuration via management.

■ Signal contact

- ▶ The signal contact "FAULT", pin assignment of the connector ["Connection of the supply voltage" on page 11](#), 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 Management to switch the signal contact manually and thus control external devices.

A break in contact is reported via the potential-free signal contact (relay contact, closed circuit):

- ▶ The failure of at least one of the two supply voltages (supply voltage 1 or 2 < 9,6 V).
- ▶ A continuous malfunction in the device (internal voltage supply).
- ▶ The defective link status of at least one port. With the device, the indication of link status can be masked by the management for each port. Link status is not monitored in the delivery condition.
- ▶ The loss of Redundancy guarantee.
- ▶ Error during self-test.

The following conditions are reported in stand-by mode:

- ▶ Control cable disrupted
- ▶ Control cable short circuited
- ▶ Partner device is in stand-by mode

The following conditions are reported in normal mode:

- ▶ Control cable short circuited
- ▶ Partner device is in normal mode

The following condition is reported in RM mode additionally:

- ▶ Ring redundancy guaranteed. Ring redundancy is not monitored in the delivery condition.

- Connect the power supply and signal lines.

2.1.3 Fitting the device, grounding

To protect the exposed contacts of the components still to be installed from dirt, the individual system components must be connected in a dry and clean area.

Ports which are not assigned are to be closed with the covering caps contained in the scope of delivery.

Note: Connectors are not electrical isolating devices. Therefore, first plug the connector to the power supply plug and then switch on the power supply.

- Prepare assembly at the installation site drill holes at the installation site.
- Mechanical assembly at the installation site with M5 screws.

Note: The protection class IP67 is only achieved when bolted together. Empty slots must be sealed with the protective caps supplied.

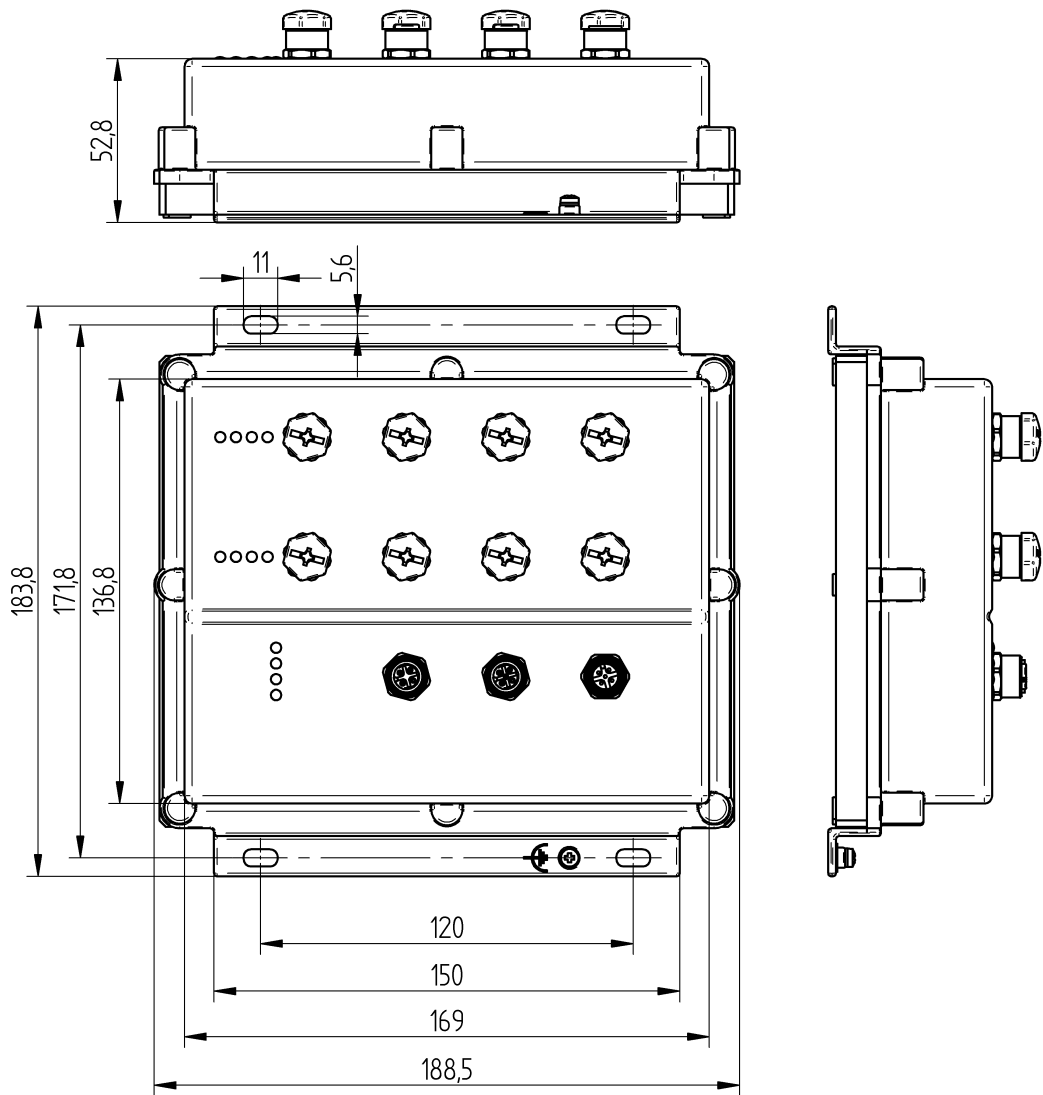


Fig. 2: Dimensions OCTOPUS 8M

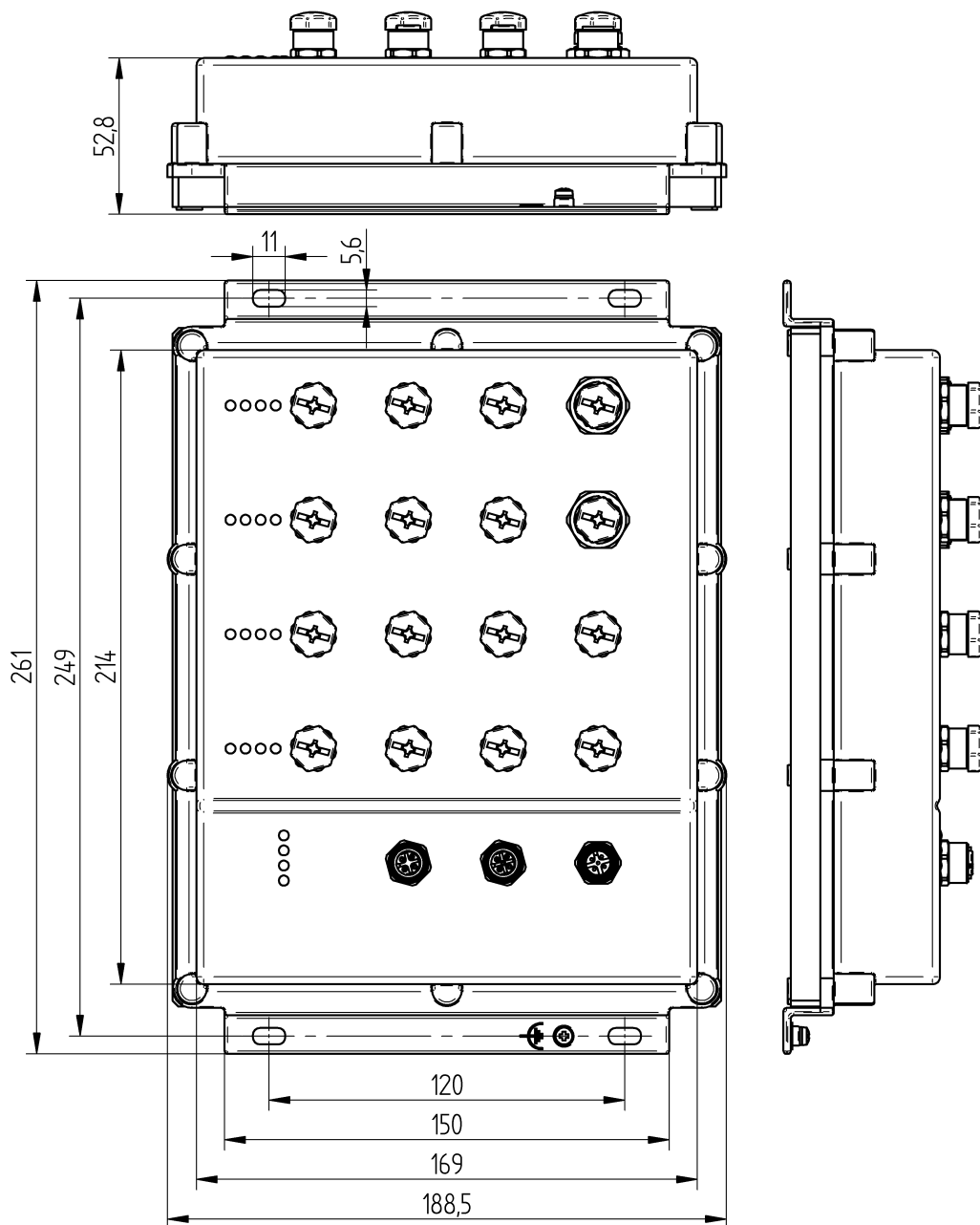


Fig. 3: Dimensions OCTOPUS 16M-2FX

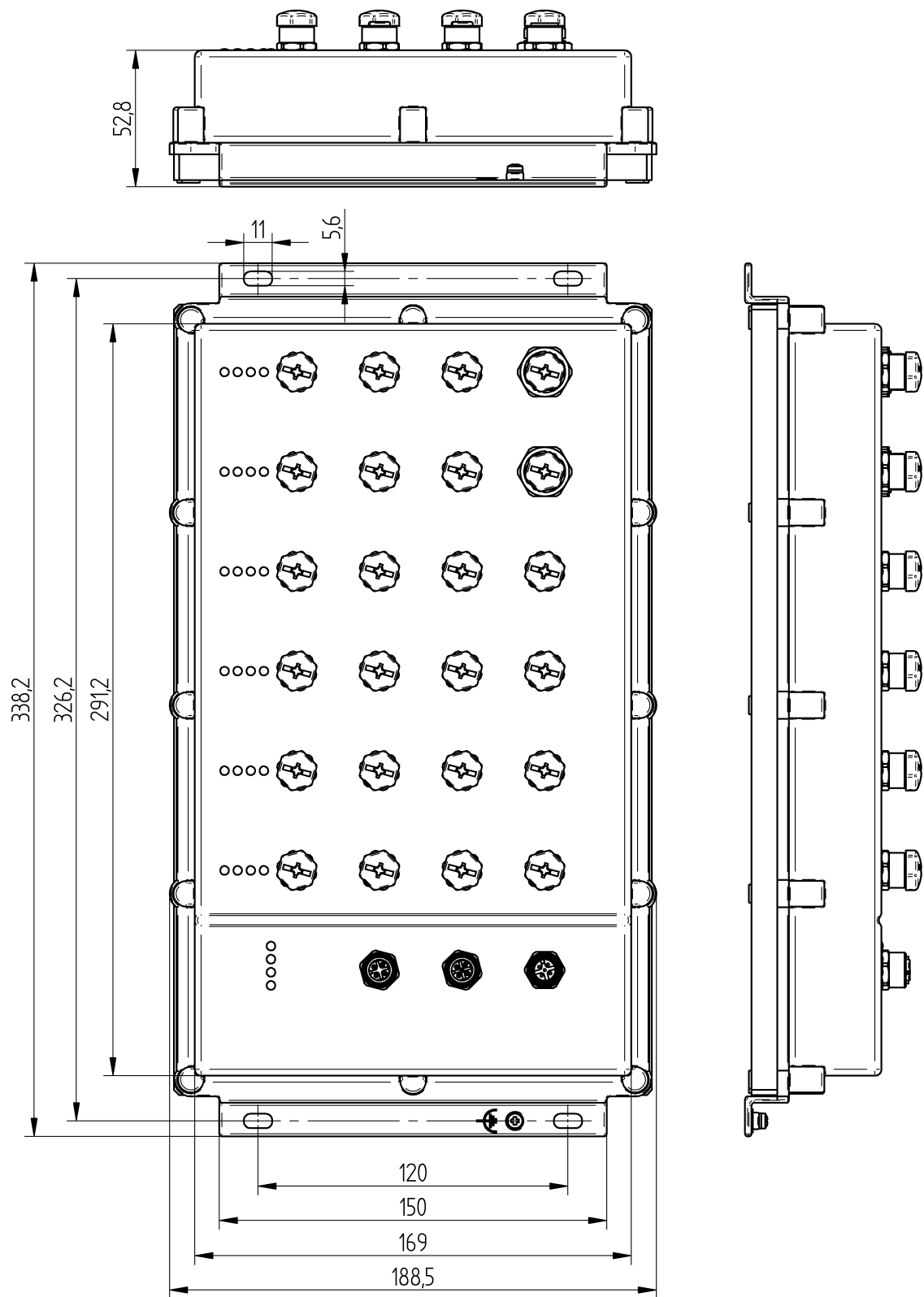


Fig. 4: Dimensions OCTOPUS 24M-2FX

■ Ground

The chassis is grounded via a separate ground nut (M3).

- Use toothed locking washers for a good electrical connection.

Note: The shielding ground of the connectable twisted pair lines is connected to the chassis as a conductor.

2.1.4 Connecting the power supply, startup procedure

- Mount the connector for the supply voltage and the signal contact on the front of the device.

By connecting the supply voltage at the connector, you start the operation of the device.

2.1.5 Connecting the data lines

You can connect terminal devices and other segments at the ports of the device via twisted pair cables.

■ 10/100 Mbit/s twisted pair connection

10/100 Mbit/s ports enable the connection of terminal devices or independent network segments in compliance with the IEEE 802.3 100BASE-TX / 10BASE-T standards. These ports support:

- ▶ autonegotiation
- ▶ autopolarity
- ▶ autocrossing (when autonegotiation is switched on)
- ▶ 100 Mbit/s half duplex mode, 100 Mbit/s full duplex mode
- ▶ 10 Mbit/s half duplex mode, 10 Mbit/s full duplex mode

State on delivery: autonegotiation is activated with exception of the HIPER-Ring ports: 100 Mbit/s full duplex.

The socket housings are electrically connected to the chassis.

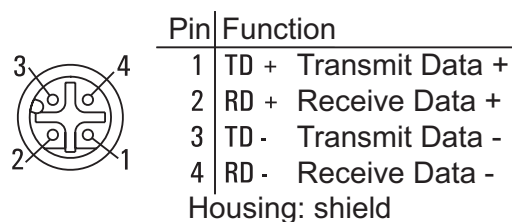


Fig. 5: Pin assignment of a TP/TX interface (M12 socket)

- Connect the data lines according to your requirements.
- Use a shielded CAT5 cable.
- Use a shielded 4-pin M12 connector.
- Connect the cable shield to the connector housing.

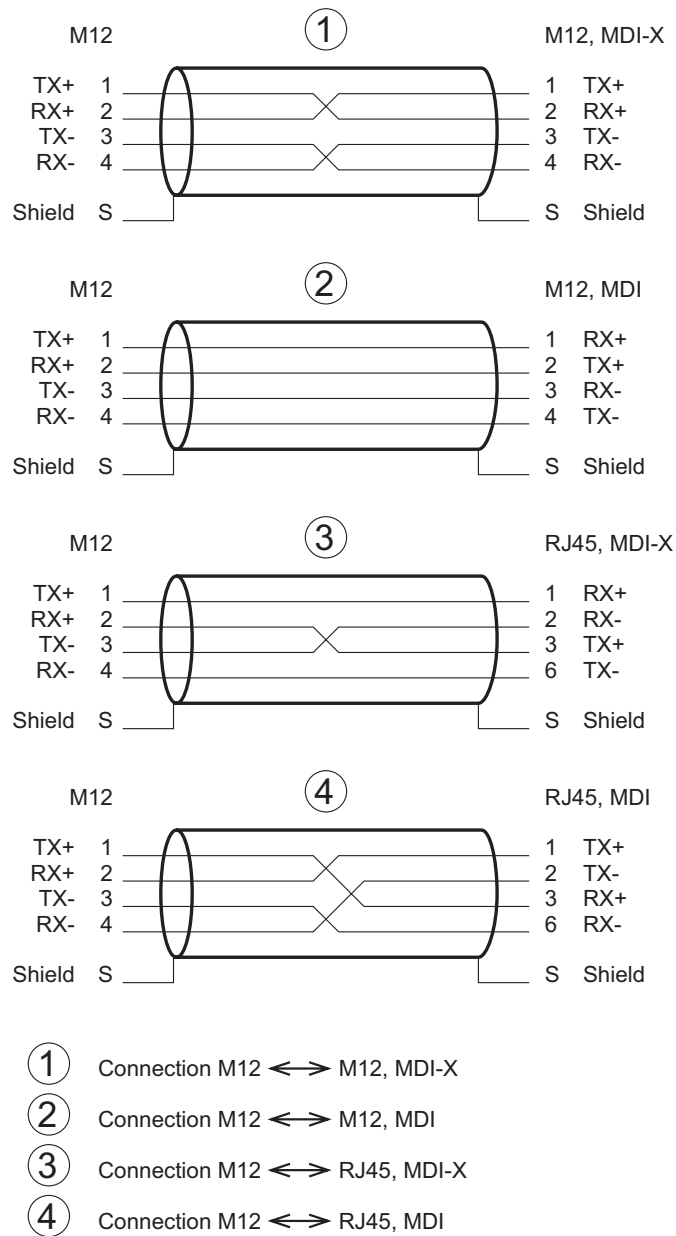


Fig. 6: Patch cables for operating the OCTOPUS

■ **100 Mbit/s F/O connection (MicroFX)**

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 duplex mode

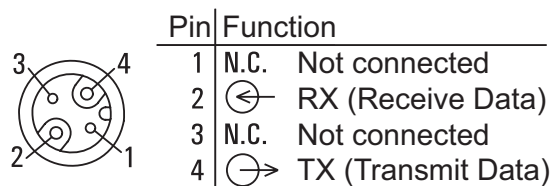
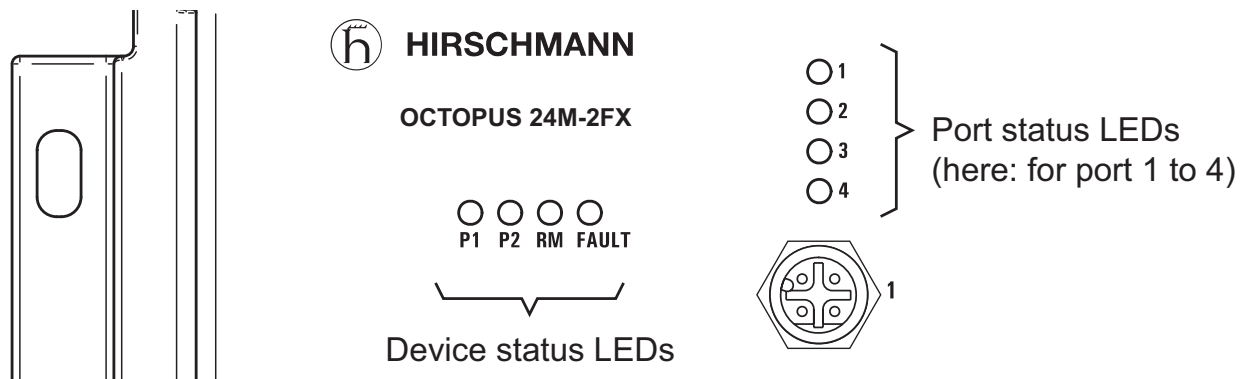


Fig. 7: Pin assignment of a MicroFX socket

2.2 Displays

After applying the operating voltage, the software starts and initializes itself. The device then performs a selftest. The process lasts approximately 60 seconds.



■ Device status

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

P1- Power (green/yellow LED)	Meaning
lit green	the supply voltage P1 is on
not lit	supply voltage is too low
P2- Power (green/yellow LED)	Meaning
lit green	the supply voltage P2 is on
not lit	supply voltage is too low
FAULT – Error ¹⁾	Meaning
lit red	the signal contact is open, i.e. it reports an error
not lit	the signal contact is closed, i.e. it does not report an error
RM - Redundancy Manager (green/yellow LED)	Meaning
lit green	RM function active, redundant port not active
lit yellow	RM function active, redundant port active
not lit	RM function not active
flashes green	Incorrect configuration of HIPER-Ring (e.g. ring not connected to ring port)

¹⁾ If the manual adjustment is active on the signal contact, then the error display is independent of the signal contact setting.

■ **Port status**

A green/yellow LEDs on the specific ports display port-related information.

LS/DA (Link status/Data, green/yellow LED),	Meaning
not lit	no data reception at the specific port, no connection
lit green	valid connection
flashes green (1 time per second)	port is switched to stand-by
flashes green (3 times per second)	port is disabled
flashes yellow	data reception at the specific port

2.3 Carrying out basic settings

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

- ▶ Entry via the V.24 connection.
- ▶ Entry by HiDiscovery protocol
- ▶ Configuration via BOOTP
- ▶ Configuration via DHCP
- ▶ Configuration via DHCP Option 82
- ▶ The AutoConfiguration Adapter

■ **State of delivery**

- ▶ IP address: The device looks for the IP address using DHCP
- ▶ Password for management:
user, password: public (read only)
admin, password: private (read and write)
- ▶ V.24 data rate: 9.600 baud
- ▶ Ring redundancy: on
Ring ports on 100 Mbit/s full duplex
- ▶ Optical 100 Mbit/s ports: 100 Mbit/s full duplex
All other ports: autonegotiation
- ▶ Ethernet ports: Link status is not evaluated (signal contact)
- ▶ Redundancy manager switched off

■ **USB interface (ACA-M12-USB)**

The USB socket offers an interface for the local connection of an Auto-Configuration Adapter ACA 21-USB. It is a device for saving/loading the configuration and for loading the software.

■ V.24 interface (external management)

A serial interface is provided on the V.24 interface for the local connection of an external management station (VT100 terminal or PC with appropriate terminal emulation). This makes it possible to establish a connection to the Command Line Interface CLI and to the system monitor.

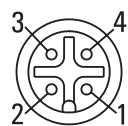
VT 100 terminal settings

Speed	9.600 baud
Data	8 bit
Stopbit	1 bit
Handshake	off
Parity	none

The socket housing is electrically connected to the device.
The V.24 interface is electrically connected to the supply voltage.

Pin assignment of the V.24 interface

Pin	Function
1	TX Transmit Data
2	RX Receive Data
3	N.C. Not connected
4	GND Ground (0V)



Terminal cable

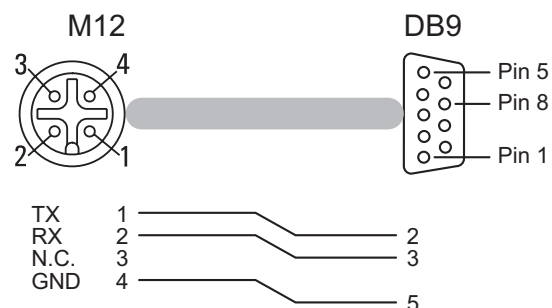


Fig. 8: Pin assignment of the V24 interface (M12 socket)

Note: You will find the order number for the terminal cable, which is ordered separately, in the chapter [“Technical data” on page 21](#).

You will find a detailed description of the configuration in the “Basic Configuration User Manual” on the CD-ROM.

3 Technical data

General data

Dimensions W x H x D	OCTOPUS 8M	143 mm x 170 mm x 70 mm 52.4 inch x 67.0 inch x 27.6 inch
	OCTOPUS 16M(-2FX)	189 mm x 261 mm x 70 mm 74.4 inch x 102.8 inch x 27.6 inch
	OCTOPUS 24M(-2FX)	189 mm x 338 mm x 70 mm 74.4 inch x 133.1 inch x 27.6 inch
Weight	OCTOPUS-8M	1.5 kg, 3.3lb
	OCTOPUS 16M(-2FX)	2.0 kg, 4.4 lb
	OCTOPUS 24M(-2FX)	2.5 kg, 5.5 lb
Voltage supply	Operating voltage	safety extra-low voltage (SELV/PELV), redundant inputs decoupled. Relevant for North America: Nec Class 2 power source 5 A maximum.
	OCTOPUS 8M	9.6 to 60 V DC
	OCTOPUS 16M(-2FX)	9.6 to 60 V DC
	OCTOPUS 24M(-2FX)	9.6 to 60 V DC
Overload current protection at input		non-changeable fuse
Isolation voltage between operating voltage and housing		800 V
Signal contact		1 A maximum, 24 V DC or 24 V AC
Surrounding	Storage temperature	Surrounding air: -40 °C to +85 °C, -40 °F to +185 °F
	Humidity	0% to 95% (non condensing)
	Atmospheric pressure	up to 2.000 m (795 hPa), higher altitudes on demand
Operating temperature	OCTOPUS 8M	-40 °C to +70 °C, -40 °F to +158 °F
	OCTOPUS 16M(-2FX)	-40 °C to +70 °C, -40 °F to +158 °F
	OCTOPUS 24M(-2FX)	-40 °C to +70 °C, -40 °F to +158 °F
Pollution degree		2
Protection types	Protection type	IP 67

EMV and stability

EMV interference proof		
EN 61000-4-2	Discharge of static electricity Contact discharge: test level 3 Air discharge: test level 3	8 kV 15 kV
EN 61000-4-3	Electromagnetic fields Test level 3 (80 - 2000 MHz)	20 V/m
EN 61000-4-4	Fast transients (burst), test level 3, x - Power line - Data line	4 kV 4 kV
EN 61000-4-5	Surge voltage - Power line, line/line: test level 2 - Power line, line/earth: test level 3 - Data line: test level 3	1 kV 2 kV 4 kV
EN 61000-4-6	Cable-based RF faults, test level 3 10 kHz - 150 kHz 150 kHz - 80 MHz	3 V 10 V
EN 61000-4-9	Impulse-shaped magnetic fields; test level 4	300 A/m

EMV emitted immunity		
EN 55022	Class A	Yes
FCC 47 CFR Part 15	Class A	Yes
Germanischer Lloyd	Rules for Classification and Construction VI-7-3 Part 1, Ed. 2001	Yes

Stability		
Vibration	IEC 60068-2-6 Test FC, testing level in line with IEC 61131-2	Yes
	Germanischer Lloyd Guidelines for the Performance of Type Tests Part 1	Yes
	IEC 870-2-2 Table 3 Normal Installation in line with EN 61850-3	Yes
Shock	EN 61373, category 1, class A (broadband noise), installation in line with EN 50155	Yes
	IEC 60068-2-27 Test Ea, test level in line with IEC 61131-2	Yes
	IEC 870-2-2 Table 3 Normal Installation in line with EN 61850-3	Yes
	EN 61373, category 1, class A (broadband noise), installation in line with EN 50155	Yes

Network size

Length of a twisted pair segment	
100 m approx.	cat5e cable with 100BASE-TX

Table 1: TP port 10BASE-T / 100BASE-TX

Connector	Wave length	Fiber	System attenuation	Expansion	Fiber data
MicroFX	MM 1300 nm	50/125 μ m	0-8 dB	0-5 km	1.0 dB/km, 800 MHz*km
MircoFX	MM 1300 nm	62.5/125 μ m	0-11 dB	0-4 km	1.0 dB/km, 500 MHz*km

Table 2: F/O port 100BASE-FX

Power consumption/power output

Name	Power consumption	Power output
OCTOPUS 8M	6.2 W	21.1 Btu (IT)/h
OCTOPUS 16M	9.5 W	32.4 Btu (IT)/h
OCTOPUS 16M-2FX	13.0 W	44.4 Btu (IT)/h
OCTOPUS 24M	13.5 W	46.0 Btu (IT)/h
OCTOPUS 24M-2FX	14.9 W	50.9 Btu (IT)/h

Scope of delivery

Device	Scope of delivery
OCTOPUS 8M, OCTOPUS 16M, OCTOPUS 16M-2FX, OCTOPUS 24M or OCTOPUS 24M-2FX	OCTOPUS 8M, OCTOPUS 16M(-2FX) or OCTOPUS 24M(-2FX) device Cable socket ELWIK A 5012 PG7 for supply voltage and indicator contact 9 (on the 8M model), 17 (on the 16M model) or 25 (on the 24M model) protective caps to protect unused ports. Manual Installation and CD-ROM

Order numbers/product name

Device	Order numbers
OCTOPUS 8M	943 931-001
OCTOPUS 16M	943 912-001
OCTOPUS 16M-2FX	943 912-002
OCTOPUS 24M	943 923-001
OCTOPUS 24M-2FX	943 923-002

Accessories

Name	Order no.
Manual Basics Industrial ETHERNET and TCP/IP	280 720-834
AutoConfiguration Adapter ACA-M12-USB	943 913-001
Terminal access cable	943 902-001
Cable socket ELWIK A 5012 PG7 (5-pole M12 socket for voltage supply and signal contact)	933 175-100
M12 connector "D" coded	934 445-001
Connecting cable with M12 connector "D" coded	934 497-00x
Transition M12 "D" coded to RJ45	934 498-001
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

Name	Order no.
Netzmanagement Software Industrial HiVision	943 156-xxx
Network management software HiVision	943 471-100
OPC server software HiOPC	943 055-001

Based specifications and standards

EN 61000-6-2:2001	Generic standards – Immunity for industrial environments
EN 55022:1998 + A1 2000 + A2-2003	Information technology equipment – Radio disturbance characteristics
EN 60950:2001	Safety of Information Technology Equipment (ITE)
EN 61131-2:2000	Programmable Controllers
FCC 47 CFR Part 15:2003	Code of Federal Regulations
Germanischer Lloyd	Rules for Classification and Construction VI - 7 - 3 Part 1, Ed. 2001
cUL 508:1998	Safety for Industrial Control Equipment
E1	Application in vehicles
EN 50155	Railway applications - Electronic equipment used on rolling stock

*Table 3: List of based specifications and standards
Certified devices are marked with a certification identifier.*

IEEE 802.1 D	Switching, GARP, GMRP, Spanning Tree
IEEE 802.1 D-1998	Media access control (MAC) bridges (includes IEEE 802.1p Priority and Dynamic Multicast Filtering, GARP, GMRP)
IEEE 802.1 Q	Tagging
IEEE 802.1 Q-1998	Virtual Bridged Local Area Networks (VLAN Tagging, GVRP)
IEEE 802.1 w.2001	Rapid Reconfiguration
IEEE 802.3-2002	Ethernet

Table 4: List of IEEE standards

Certifications

Standard	MS20 / MS30
cUL 508 / CSA C22.2 No.142	pending
Germanischer Lloyd	pending
E1	pending

Table 5: Certifications, actual state see www.hirschmann.com

4 Further support

■ Technical questions and training courses

In the event of technical queries, please talk to the Hirschmann contract partner responsible for looking after your account or directly to the Hirschmann office. You can find the addresses of our contract partners on the Internet:

<http://www.hirschmann.com>

Our support line is also at your disposal:

- ▶ Tel. +49(1805) 14-1538
- ▶ Fax +49(7127) 14-1551

Answers to Frequently Asked Questions can be found on the Hirschmann internet site www.hirschmann-ac.com/faq

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