



HIRSCHMANN

A **BELDEN** BRAND

Description and operating instructions Industrial Ethernet IP67 Switch

OCTOPUS 5TX-EEC

Order No.

943 892-001

942 052-001



The Ethernet switch OCTOPUS 5TX-EEC has been especially designed for use in industrial environments. It supports Ethernet 10 MBit/s and Fast Ethernet 100 MBit/s.

The Ethernet switch modules support switched Ethernet networks in accordance with IEEE standard 802.3 (10BASE-T) or 802.3u (100BASE-TX) using copper technology.

The switch modules are fitted at the installation site using screws.

The OCTOPUS 5TX-EEC modules have five 10/100 Mbit/s twisted pair ports (10BASE-T/100BASE-TX, shielded M12 connectors).

It is possible to connect up to five DTEs (data terminal equipment) or other TP/TX network segments to these ports using twisted pair cabling.

The TP ports support auto negotiation, autopolarity and autocrossing.

The IP67 switch conforms with protection class IP67 (protection against shock and foreign particles: dust proof, water protection: protected against the effects at temporary immersion in water).

The device with the order number 942 052-001 additionally offers an IP-based Quality of Service function (QoS).



Hirschmann. Simply a good Connection.

The performance features described here are binding only if they have been expressly guaranteed in the contract. We have checked that the contents of the technical publication agree with the hardware and software described. However, it is not possible to rule out deviations completely, so we are unable to guarantee complete agreement. However, the details in the technical publication are checked regularly. Any corrections which prove necessary are contained in subsequent editions. We are grateful for suggestions for improvement.

We reserve the right to make technical modifications.

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Note

We would point out that the content of these operating instructions is not part of, nor is it intended to amend an earlier or existing agreement, permit or legal relationship. All obligations on Hirschmann arise from the respective purchasing agreement which also contains the full warranty conditions which have sole applicability. These contractual warranty conditions are neither extended nor restricted by comments in these operating instructions.

We would furthermore point out that for reasons of simplicity, these operating instructions cannot describe every conceivable problem associated with the use of this equipment. Should you require further information or should particular problems occur which are not treated in sufficient detail in the operating instructions, you can request the necessary information from your local Hirschmann sales partner or directly from the Hirschmann office (address: refer to chapter entitled „Notes on CE identification“).

Safety Instructions

This manual contains instructions which must be observed to ensure your own personal safety and to avoid damage to devices and machinery. The instructions are highlighted with a warning triangle and are shown as follows according to the degree of endangerment:

Danger! means that death, serious injury or considerable damage to property **will** result if the appropriate safety measures are not taken.

Warning! means that death, serious injury or considerable damage to property **can** result if the appropriate safety measures are not taken.

Caution! means that light injury or damage to property can result if the appropriate safety measures are not taken.

Note: is an important piece of information about the product, how to use the product, or the relevant section of the documentation to which particular attention is to be drawn.

Certified usage

Please observe the following:



Warning

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.

Safety Guidelines Power Supply



Warning!

The devices may only be connected to the supply voltage shown on the type plate.

The devices are designed for operation with a safety extra-low voltage. Thus, they may only be connected to the supply voltage connections with PELV circuits or alternatively SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1.

For the case where the module is operated with external power supply: Use only a safety extra-low voltage in accordance with IEC/EN 60950-1 to power the system.

First of all you connect the ground connection, before you establish the further connections. When you remove connections, you disconnect the ground connection last.

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 the plant for inspection.

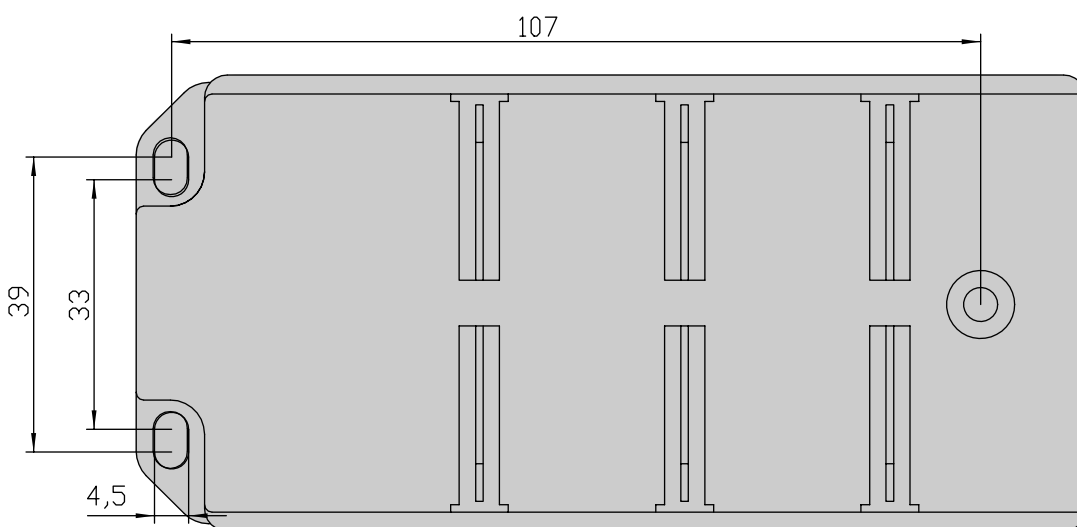


Fig. 1: Drilling template for assembling the OCTOPUS 5TX-EEC (dimensions in mm)

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.

Safety Guidelines Shielding Ground

Note: The shielding of the twisted pair wires which can be connected must be grounded on the plug housing.

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


Safety Guidelines Housing

 **Warning!**
Do not try to open the housing of the device.

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

Open type UL listed product – intended to be installed in a Type 1 or better enclosure.

Safety Guidelines Environment

 **Warning!**
The device may only be operated in the listed ambient temperature range.

The installation location is to be selected so as to ensure compliance with the climatic limits listed in the Technical Data.

Staff qualification requirements

Note: Qualified personnel, as understood in this manual and in 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!



Warning!

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.

Use only undamaged parts!

These products are only to be used in the manner indicated in this version of the "Description and Operating Instructions".

Particular attention is to be paid to all warnings and items of information relating to safety.



Warning!

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

Based specifications and standards:

The devices fulfil the following specifications and standards:

- EN 61000-6-2:2005 – Generic standards – Immunity for industrial environments
- EN 55032: Electromagnetic compatibility of multimedia equipment – Emission Requirements
- EN 60950-1:2006 – Safety of Information Technology Equipment (ITE)
- EN 61131-2:2007 – Programmable Controllers
- FCC 47 CFR Part 15:2009 – Code of Federal Regulations
- cUL 508:1998 – Underwriters Laboratories Inc. Safety for Industrial Control Equipment.

The device has a certification based on a specific standard only if the certification indicator appears on the housing.

CE Notes on CE identification

The devices comply with the regulations of the following European directive:

2014/30/EU (EMC)
Directive of the European Parliament and the council for standardizing the regulations of member states with regard to electromagnetic compatibility.

The EU declaration of conformity is kept available for the responsible authorities in accordance with the above-mentioned EU directives at:

Hirschmann
Automation and Control GmbH
Stuttgarter Straße 45-51
72654 Neckartenzlingen
Germany

www.hirschmann.com

The product can be used in the industrial sphere.

- Interference immunity:
EN 61000-6-2:2005
- Radio interference level:
EN 55032



Warning!

This is a Class A device. This equipment may cause radio interference if used in a residential area; in this case it is the operator's responsibility to take appropriate measures.

The precondition for compliance with EMC limit values is strict adherence to the construction guidelines specified in this description and operating instructions.

FCC Note:

This device complies with part 15 of 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.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



Recycling Note:

After its use, this product has to be processed as electronic scrap and disposed of according to the prevailing waste disposal regulations of your community, district, country and state.

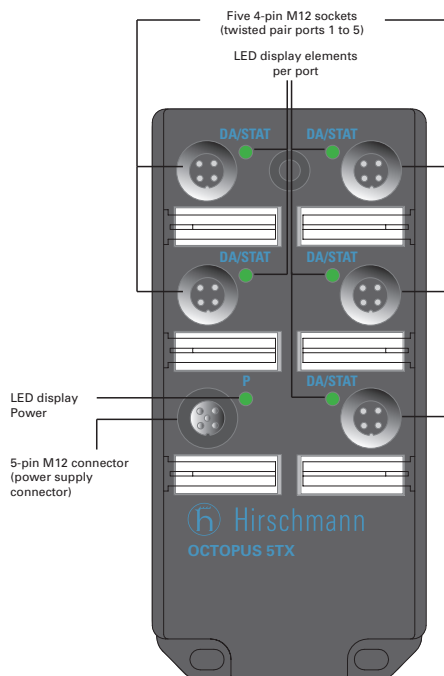


Fig. 2: Overview display elements and interfaces of the OCTOPUS 5TX-EEC

1. Functional description

The 10/100BASE-T(X) ports of an OCTOPUS 5TX-EEC represent a terminal connection for the connected LAN segment. You can connect single devices or complete network segments.

1.1 FRAME SWITCHING FUNCTIONS Store and Forward

All data received by the OCTOPUS 5TX-EEC from the system bus or at the ports are stored and checked for validity. Invalid and defective frames (> 1.522 byte or CRC error) as well as fragments (< 64 byte) are discarded. The OCTOPUS 5TX-EEC forwards the valid frames.

Multi address capability

An OCTOPUS 5TX-EEC learns all source addresses per port. Only packets with
 – unknown addresses
 – addresses learnt at this port
 – a multi/broadcast address
 in the destination address field are sent to this port.
 An OCTOPUS 5TX-EEC learns up to 1,000 addresses. This becomes necessary if more than one terminal device is connected to one or more ports. In this way several independent subnetworks can be connected to an OCTOPUS 5TX-EEC.

Learnt addresses

An OCTOPUS 5TX-EEC monitors the age of the learned addresses. The OCTOPUS 5TX-EEC deletes address entries from the address table which exceed a certain age (300 seconds).

Note: Restarting deletes the learned address entries.

Tagging (IEEE 802.1Q)

The IEEE 802.1 Q standard designates the VLAN tag to be included in a MAC data frame for the VLAN and prioritizing functions. The VLAN tag consists of 4 bytes (2 bytes tag protocol identifier TPID, 2 bytes tag control information TCI). It is inserted between the source address field and the

type field. Data packets with VLAN tag are transmitted unchanged by the OCTOPUS 5TX-EEC.

Quality of Service, IP-based (QoS)

Note: Exclusively the device with the order number 942 052-001 offers this function.

The device assigns IP packets according to a DSCP value to different traffic classes. This function is hard-coded. DSCP means DiffServ-Codepoint. This is a field in the IP header which marks the individual IP packets according to traffic classes.

The device supports 2 traffic classes: It assigns packets with DSCP values ranging from 0 to 23 to the traffic class 0 (low priority) and packets with values ranging from 24 to 63 to traffic class 1 (high priority). The device transmits the packets according to the Strict Priority rule: First, the device transmits all high priority-packets. When there are no high priority packets left, the device starts transmitting the packets with low priority.

1.2 SPECIFIC FUNCTIONS OF THE TP/TX INTERFACE

Link control

The OCTOPUS 5TX-EEC monitors the connected TP line segments for short-circuit or interrupt using regular link test pulses in accordance with IEEE standard 802.3 10BASE-T/100BASE-TX. The OCTOPUS 5TX-EEC does not transmit any data to a TP segment from which it does not receive a link test pulse.

Note: A non-occupied interface is assessed as a line interrupt. The TP line to terminal equipment which is switched off is likewise assessed as a line interrupt as the de-energised bus coupler cannot transmit link test pulses.

Auto polarity exchange

If the receive line pair is incorrectly connected (RD+ and RD- switched) polarity is automatically reversed.

Autonegotiation

Autonegotiation is a procedure in which the switch automatically selects the operating mode of its 10/100 RJ-45 ports. When a connection is set up for the first time, the switch detects the speed (10 or 100 Mbit/s) and the transmission mode of the connected network (half duplex or full duplex).

Autocrossing

The OCTOPUS 5TX-EEC detects the transmit and receive pairs (MDI, MDI-X). The OCTOPUS 5TX-EEC automatically configures its port for the correct transmit and receive pins. Consequently it does not matter whether you connect devices using a cross-over or straight cable.

1.3 FURTHER FUNCTIONS AND FEATURES

Reset

The OCTOPUS 5TX-EEC will be reset by the following action:

- input voltages fall below a threshold

After a reset the following action is carried through:

- initialization

1.4 DISPLAY ELEMENTS

Equipment status

These LEDs provide information about statuses which affect the function of the entire OCTOPUS 5TX-EEC.

P – Power

- lit green: – supply voltage present

Port Status

These LEDs display port-related information.

DA/STAT 1 to 5 – Data, Link status

- not lit: – no valid link
- lit green: – valid link
- flashes green: – receiving data

1.5 INTERFACES

10/100 Mbit/s connection (TP port)

M12 socket (4-pin)

Five 10/100 Mbit/s ports (4-pin shielded M12 socket with D coding) allow the connection of data terminal equipment or independent network segments conforming to the IEEE 802.3 100BASE-TX / 10BASE-T standard. These ports support auto negotiation and the auto polarity function.

The shielding of the twisted pair wires which can be connected must be grounded on the plug housing of the M12 connector.

– Pin configuration of the M12 socket:

- pin 1: TD+ Transmit Data +
- pin 2: RD+ Receive Data +
- pin 3: TD- Transmit Data -
- pin 4: RD- Receive Data -
- housing: shield

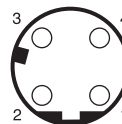


Fig. 3: Pin configuration of an TP/TX interface (M12 socket)

Power supply connector M12 connector (5-pin)

The power for the OCTOPUS 5TX-EEC is supplied via a 5-pin M12 connector (A coding). Typically, the supply voltage is +24 V DC. It is electrically isolated from the function ground.

– Pin assignment of the M12 connector:

- pin 1: input voltage +
- pin 2: not assigned
- pin 3: input voltage -
- pin 4: not assigned
- pin 5: function ground

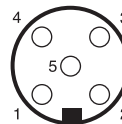


Fig. 4: Pin assignment of the M12 connector (power supply connector)



Warning!

The devices are designed for operation with a safety extra-low voltage. Thus, they may only be connected to the supply voltage connections with PELV circuits or alternatively SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1.

– **Voltage supply:** The supply voltage is electrically isolated from the housing.

Ground

The device is grounded via the fixing screws of the chassis or via the pin 5 of the power supply connector. We recommend the grounding via the fixing screws.

2. Configuration

2.1 CONNECTING DTE AND OTHER NETWORK SEGMENTS

It is possible to connect up to five data terminal equipment (DTE) or other network segments to the 10/100 Mbit/s ports of the OCTOPUS 5TX-EEC using twisted pair cabling (ref. Fig. 5).

2.2 PATCH CABLES

To operate the IP67 switch, use patch cables as shown in Figs. 5 and 6.

Notes:

- Use a shielded CAT5 cable.
- Use a shielded 4-pin M12 connector.
- Connect the cable shield to the connector housing.
- You only need one M12-M12 patch cable version.

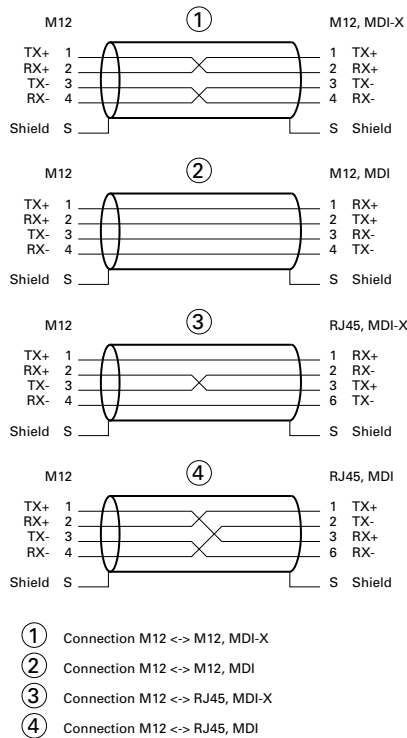


Fig. 6: Patch cables for operating the OCTOPUS 5TX-EEC

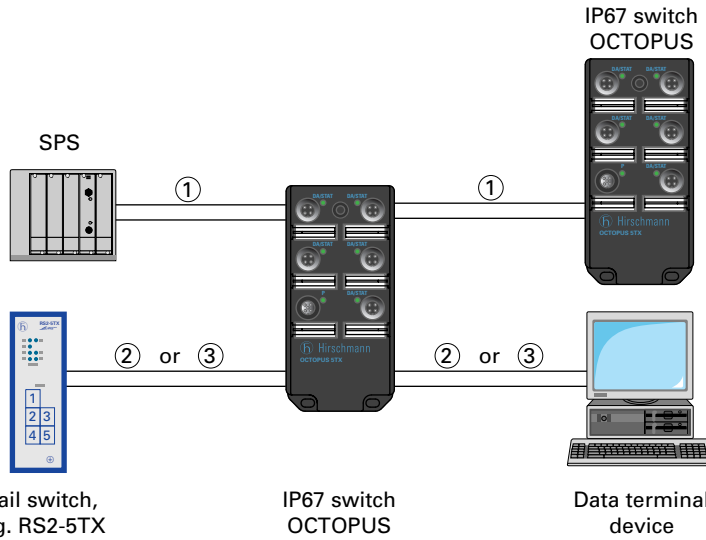


Fig. 5: Possible network configuration with the IP67 switch OCTOPUS 5TX-EEC

3. Assembly, startup procedure and dismantling

3.1 UNPACKING, CHECKING

- Check whether the package was delivered complete (see scope of delivery).
- Check the individual parts for transport damage.

Warning! Use only undamaged parts!

3.2 ASSEMBLY

The equipment is delivered in a ready-to-operate condition. 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.

The following sequence is the best for assembly:

- Prepare assembly at the installation site: drill holes at the installation site
- Mechanical assembly at the installation site
- Electrical connection with peripheral devices
- Connect the signal lines with the twisted pair ports

Assembly:

- Fit the module on a level surface with three M4x16 screws.
- Provide a low impedance ground connection via the clips at the screen plate, either by mounting directly on a conductive surface or by the additional connection of a ground wire to a fastening strap on the screen plate. Use toothed locking washers for a good electrical connection.

A drilling template at a scale of 1:1 for marking the drilling holes can be found on page 2, Fig. 1.

Connection:

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

Notes on wiring:

In keeping with the general installation regulations, ensure that the signal and power lines > 60 V are laid separately (cable duct, clamps). The signal and 24 V supply voltage lines should be laid off the module as straight as possible.

Notes on strain relief:

Provide sufficient strain relief and secure cable fastening for all connected wiring.

3.3 STARTUP PROCEDURE

- You start up the OCTOPUS 5TX-EEC by connecting the supply voltage via the 5-pin M12 connector.

4. Further support

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: www.beldensolutions.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.beldensolutions.com) at the end of the product sites in the FAQ category. The current training courses to technology and products can be found under www.hicomcenter.com.

5. Technical data

General data

Operating voltage	12 V DC to 24 V DC Safety extra-low voltage (SELV)
Rated voltage range DC	Relevant for North America: NEC Class 2 power source max. 5 A
Max. voltage range DC	min. 9.0 V DC to max. 32 V DC (Not applicable under UL regulations)
Buffer time	min. 10 ms at 20.4 V DC
Potential difference between input voltage and housing	Potential difference to input voltage, +24 V DC: 32 V DC Potential difference to input voltage, ground: -32 V DC
Current consumption at 24 V DC	2.4 W maximum; 8.2 Btu (IT)/h
Dimensions W x H x D	60 mm x 126 mm x 31 mm
Weight	210 g
Ambient temperature	Surrounding air - 40 °C to + 85 °C Note: Following UL508 requirements the ambient temperature is restricted to 60 °C.
Storage temperature	Surrounding air - 40 °C to + 85 °C
Atmospheric pressure	up to 2000 m (795 hPa, higher altitudes on demand)
Protection type	IP 67, according to EN 60529
Protection against shock and foreign particles	Full shock protection, impenetrable to dust
Water protection	Protected against water penetration, during submersion under specified pressure and time conditions
Interference proof	
Discharge of static electricity	
Contact discharge	EN 61000-4-2 Test level 2
Air discharge	EN 61000-4-2 Test level 3
Electromagnetic fields	EN 61000-4-3 Test level 3
Fast transients	EN 61000-4-4 Test level 3
Surge voltage symmetrical	EN 61000-4-5 Test level 2
Surge voltage asymmetrical	EN 61000-4-5 Test level 3
Cable-based RF faults	EN 61000-4-6 Test level 3
EMC emitted immunity	
EN 55032	Class A
FCC 47 CFR Part 15	Class A
Stability	
Vibration	IEC 60068-2-6 Test FC, testing level in line with EN 61131-2:2007
Shock	IEC 60068-2-27 Test Ea, testing level in line with EN 61131-2:2007
Certifications	
cUL 508 / CSA 22.2 No.14-M91	E175531

Network size

TP port 10BASE-T/100BASE-TX

Length of a twisted pair segment	100 m (328 ft) maximum
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Interfaces

5 TP ports	M12 sockets (4-pin, D coding), 10/100 MBit/s
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Displays

Equipment status	1 x green LED	P – power, supply voltage present
Port status	5 x green LEDs	DA/STAT – data, link status

Scope of delivery

IP67 Switch OCTOPUS 5TX-EEC incl.	covers for sealing unused ports labels, description and operating instructions
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Order number	
IP67 Switch OCTOPUS 5TX-EEC	943 892-001
IP67 Switch OCTOPUS 5TX-EEC with QoS	942 052-001

Accessories

Pocket Guide	280 710-851
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