

# 45x45 Installation Switch for FTTO applications

# MICROSENS

## Introduction

Current versions of the 45x45 installation switch are usually employed in cable channels and floor boxes in FTTO (Fiber-to-the-office) environment.

The FTTH option allows the mounting on standard DIN Rails, therefore enabling the installation of the Fast Ethernet switch - with its optical fiber uplink - in distribution units in FTTH (Fiber-to-the-home) application.

The module management is either SNMP-, Telnet or web-based.

The optional PC-based management tool, the MICROSENS Device Manager, simplifies the integration into standard network management systems (NMS) and enables the configuration of the automatic configuration (autonegotiation) feature, the standard settings, individual ports, prioritisation mechanisms and port based VLANs.

The 45x45 installation switch does support PoLAN on all 4 ports (optional).

## Characteristics

- Fanless Fast Ethernet 10/100 Mbit/s installation switch
- Extreme compact size and tool-less mounting with snap-in technology
- Integrated SNMP agent for Network Management via Device Manager, Web, SNMP or TELNET-Interface
- 3,5 VA maximum power consumption
- Five ports: 1x Optical Fiber uplink 100 Mbit/s; 4x RJ-45 10/100 Mbit/s
- Twisted pair ports with full autonegotiation for 10/100 Mbit/s, half- or full-duplex operation
- Layer 2 non-blocking switch, store-and-forward, 1024 MAC addresses, 1 Mbit RAM, full-duplex frame according to IEEE 802.3x
- Remotely configurable half- or full-duplex 100Base-FX-Port
- Per port configuration via PC-based management-tool: 10/100 Mbit/s, half- or full-duplex operation and autonegotiation (on/off)
- Auto crossing functionality for all twisted pair ports
- 100 V AC ... 240 V AC integrated wide operating range power supply, non-connected TP-ports are disabled for power consumption reduction reasons
- Data prioritisation (Class of Service), port-based prioritisation (configurable via management-tool) and packet-based prioritisation according to IEEE802.1q (VLAN-Tag), IPTOS-Field (DiffServ.)

## System Elements

The installation switch is shown in fig. 1. The switch - including its installation socket - is mounted in the cable channel (please refer to the paragraph "Installation" as well).

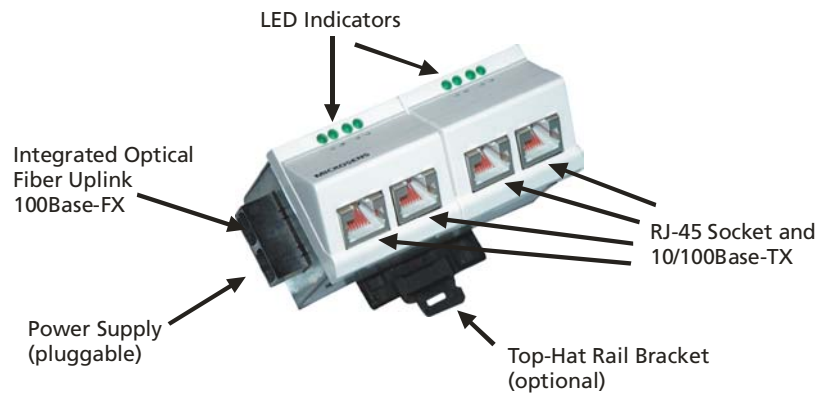


Fig. 1: Installation Switch Elements

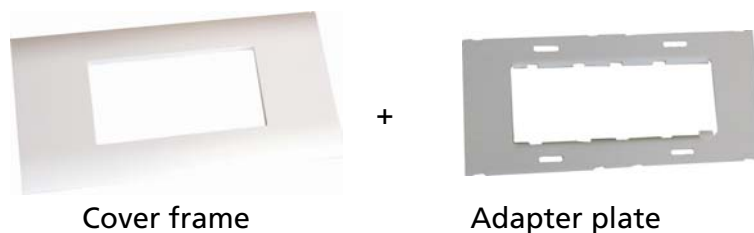
## Mounting / Accessories

The Installation-Switch supports with its tool-less snap-in mounting all cable-channel designs which conform to an international standard. Two principal chassis options are available:

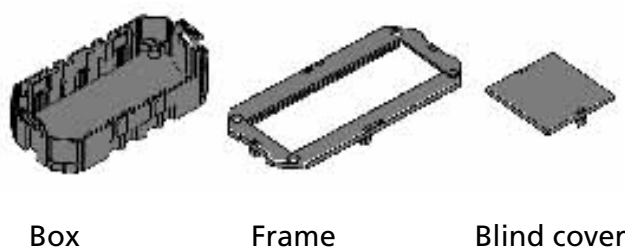
- Horizontal (MS45023x): for installation in horizontal cable channels or wall mounting
- Vertical (MS45024x): for installation in vertical locations as distribution columns or sub floor mounting

For the universal mounting optional accessories are available:

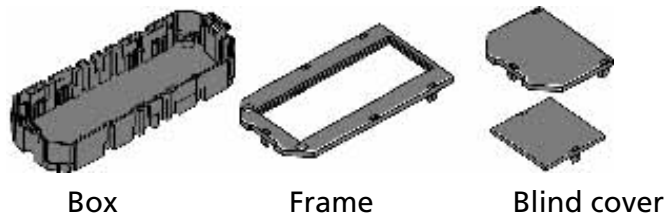
- Accessories for installation in standard E2-case of cable-channels below windows (MS140029, 2-part set):



- Accessories for installation in Ackermann-sub floor-tanks with 2-fold boxes: (MS140026, 3-part set):



- Accessories for installation in Ackermann-sub floor-tanks with 3-fold boxes: (MS140026, 4-part set):



- Accessories for wall mounting (MS140010, 2-part. Set white):



**Examples for mounting**



Fig. 2: horizontal mounting in cable trunk (MS450231M + MS140029)



Fig. 3: vertical mounting in sub floor box (MS450241M + MS140026)



Fig. 4: vertical mounting in cable trunk (MS450241M + MS140029)



Fig. 5: wall mounting (MS450231M + MS140010)

## Technical Specifications

<b>Type</b>	Fast Ethernet Installations Switch 45x45 4 Port 10/100Base-TX + 1 Port 100Base-FX According to IEEE 802.3u for installation in cable channels and sub floor boxes	
<b>Cable Type</b>	Shielded-Twisted-Pair Cable, 100Ω, Category 5 with RJ45 Plug	
<b>Max. Cable Length</b>	100 m (TP)	
<b>Optical Fiber Type</b>	Multimode Optical Fiber 50 or 62.5/125 μm, duplex, ST- or SC-Connector Optional: 9/125 μm Single mode Optical Fiber	
<b>Data Transmission Rate</b>	TP: 10/100 Mbit/s (Autonegotiation) FX: 100 Mbit/s (configurable Full Duplex Operation)	
<b>Wavelength</b>	1300 nm (Multimode/Single mode)	
<b>Optical Output Power</b>	-19 dBm (1300 nm Multimode) -15 dBm (1300 nm Single mode)	
<b>Sensitivity</b>	-30 dBm (1300 nm Multimode) -31 dBm (1300 nm Single mode)	
<b>Max. Transmission Distance</b>	Full duplex: 2 km (Multimode) 15 .. 40 km (Single mode, optional)	
<b>LED Indicators</b>	<i>PWR</i>	Power on
	<i>FX-Link</i>	On: Connected Flashing: Data Transmission in Process
	<i>FDX</i>	Off: Optical Fiber Connection Half Duplex Flashing: Collisions (Half Duplex Operation) On: Full Duplex
	per TP-Port 1..4: <i>LNK/ACT/SPD</i>	On: Connected Yellow: 10 Mbit/s / Green: 100 Mbit/s Flashing: Data Transmission in Process
<b>Power Supply</b>	230 V AC / 3.5 VA Integrated Mains Adaptor or 48 V DC supply for the PoLAN option	
<b>Operating Temperature</b>	0°C to 50°C	
<b>Storage Temperature</b>	-20°C to 85°C	
<b>Relative Humidity</b>	5% to 80%, non condensing	
<b>Management</b>	<ul style="list-style-type: none"> <li>- Status Information via Web-based Management http-Server (standard)</li> <li>- Monitoring/Configuration via SNMPv1 (optional)</li> <li>- Configuration via Telnet (optional)</li> <li>- Configuration via PC-based Management Tool (not supplied as standard)</li> </ul>	

## Dimensions

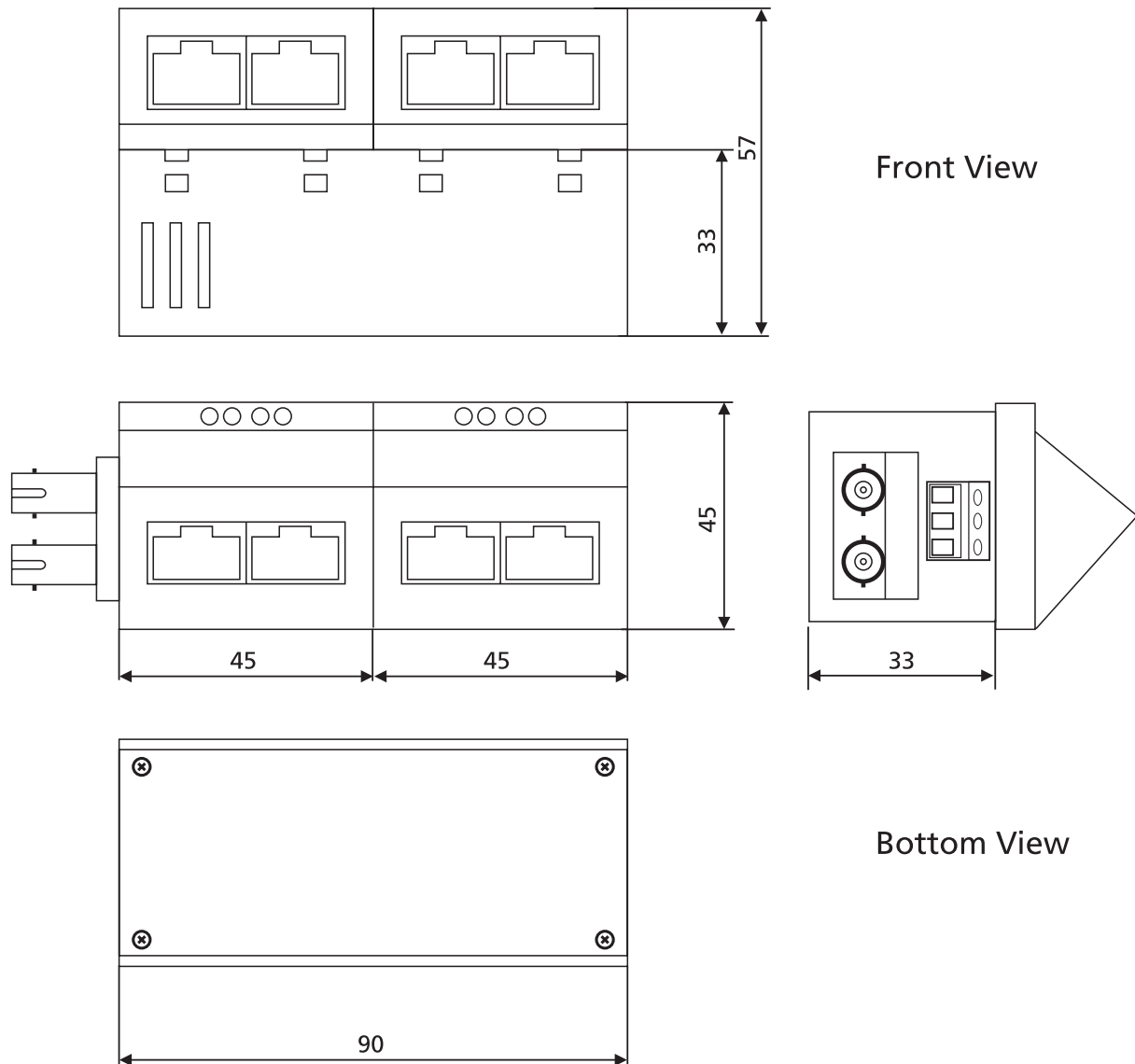


Fig. 6: Dimensions

### Installation Depth:

- maximum 33 mm for the cable channel

## Interfaces

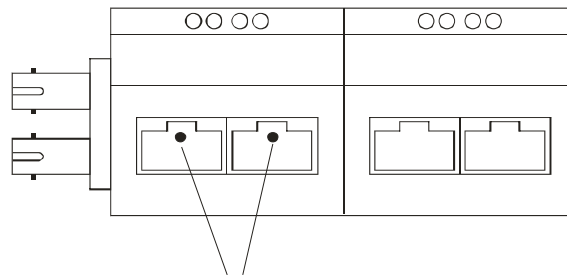
The twisted pair ports do not need any differentiation between crossover patch cables and 1:1 patch cables. The Auto Crossover feature allows the installation switch to identify the connection type and to adjust the interface automatically. In this way cascaded units as well as terminating units can be connected effortlessly.

Using the switch management the Auto Crossover feature can be disabled with individual ports being adjustable to either 1:1 or crossover operation.

## Switch Reset

During operation a manual reset of the installation switch is possible by pressing the Reset push button located in the second RJ-45 unit (please refer to figure 7 for the location). Operating the Reset push button erases the switch memory and re-initialises all connections.

Resetting the installation switch does not affect the optional network management. Information like the TCP/IP address, switch configuration etc. is stored in a non-volatile memory.



Reset Push Button under the RJ-45 socket

Fig 7: Location of the RESET Push Button

Pressing the Reset push button for approximately 5 seconds will issue a management agent IP-request in case of the installation switch is network management enabled. In this way a new or first-time IP-address can be allocated.

A second push button is located underneath the first RJ45 socket. Operating this push button will erase the installation switch configuration (VLAN etc.) and reset it to the factory default. Network management parameters like e. g. the TCP/IP address are not affected.

## Switch Management (optional)

Checking the status of the 45x45 installation switch is easy - any standardised internet browser can connect to the integrated http-server without any special configuration being required.

The agent does not need to be started at the same time like the installation switch, neither does the network management operation require any further equipment.

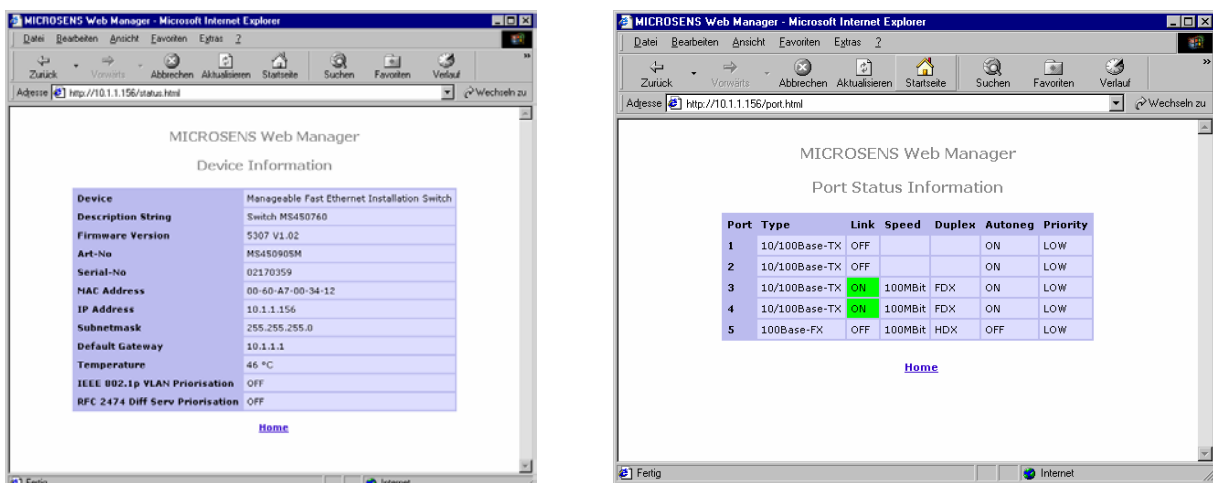


Fig. 8: Web-based Management Status Information Display

The PC-based management tool allows for the manual configuration of the individual installation switch interfaces (please refer to figure 9: MICROSENS Device Manager).

The initial TCP-IP parameters (IP-address, gateway etc.) are set via the same tool. Later on these parameters can be modified by means of the TCP/IP protocol.

All management information is provided within the network (Inband Management). With no special interface being required for this all four twisted pair ports are available to the user..

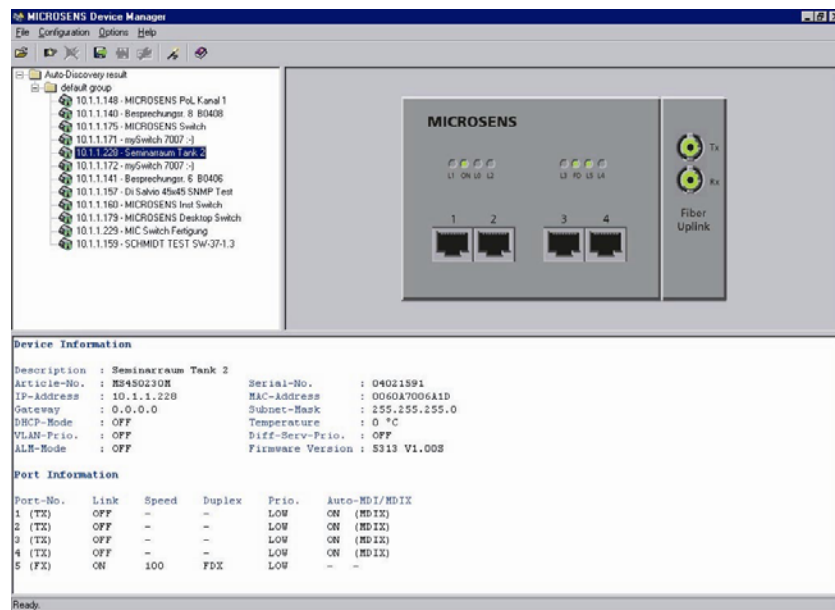


Fig. 9: MICROSENS Device Manager

With the Autonegotiation function being deactivated the twisted pair interfaces need to be configured manually. Relevant parameters are transmission speed (10/100 Mbit/s) and way of operation (Half or Full Duplex). Using the same management screen dedicated TP-ports can be taken into or out of operation.

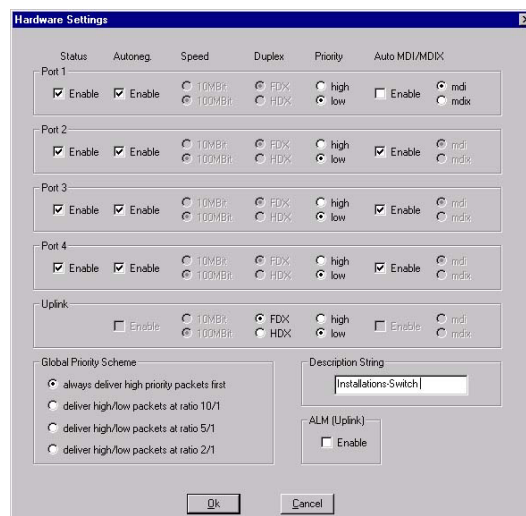


Fig. 10: Interface Configuration

## Data Prioritisation (Optional Management)

In order to allow for a prioritisation of the various data streams individual data packets are marked with a tag. This tag is recognized by each network element within the data path and therefore transmitted with a defined priority. Three different prioritisation methods are supported by the 45x45 installation switch:

- Based on layer 1:**  
 This option is available through the integrated management port configuration tool (IntServ). The user can activate a generic prioritisation of one port over the other ports of the installation switch. The configuration is carried out via the menu "Standard Settings" (please refer to figure 10).
- Based layer 2:**  
 Layer 2 based prioritisation is possible by setting a 3 bit VLAN tag according to IEEE 802.1p, which equates to eight prioritisation levels. Using the IEEE 802.1q configuration (please refer to figure 11) each level can be allocated to the Hi or Low queue.
- Based layer 3:**  
 The third method of prioritisation is based on the layer 3 Differentiated Service (DiffServ) feature. 6 bits of the Type of Service (ToS) field of the IP header - equivalent to 64 different classes of prioritisation - are utilised for this method. The allocation of the various classes of prioritisation to the Hi or Low queue is carried out via the DiffServ settings.

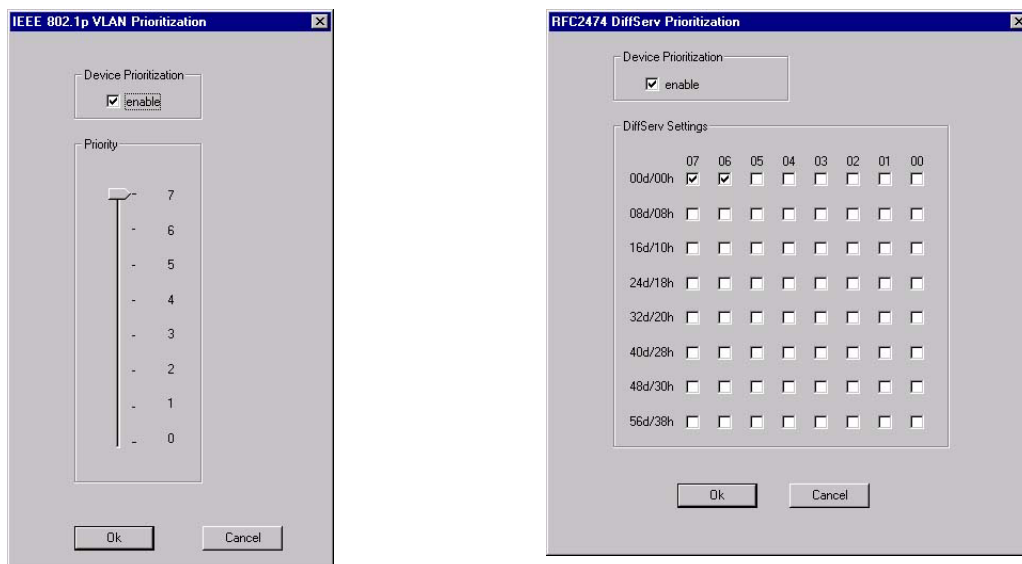


Fig. 11: Layer 2 / Layer 3 Prioritisation

Two data queues are employed for the data prioritisation process. Based on the configuration setting the switch will allocate the data to either of the two queues. In addition to this the user can set the service ratio between these queues (please refer to figure 10).



## VLANs (Optional Management)

By creating VLANs the user can segment local area networks independent of the physical topology.

The individual data packets and their allocation to a specific VLAN need to be identified. For doing so a 4 byte VLAN-tag containing a Virtual ID (VID) according to IEEE 802.3q has been defined. The VLAN-tag is attached to each data packet.

The installation switch analyses the VID. In case non-VLAN-tag capable data equipment is connected to the installation switch, the said VLAN-tag can be created. For doing so two different methods might be applied:

- **Tagging:**  
A VLAN-tag with configurable content (VID and layer 2 prioritisation) is attached to each data packet. If incoming data exhibit an already attached VLAN-tag the installation switch analyses this particular VLAN-tag, but will not overwrite it.
- **Trunking:**  
In this case data packets are filtered and not manipulated (no change of the VID), even if the VLAN-tag is absent. The data filtering is taking place on the basis of the allocated and approved VLANs. The installation switch can handle up to 16 out of the 4096 possible VLANs.

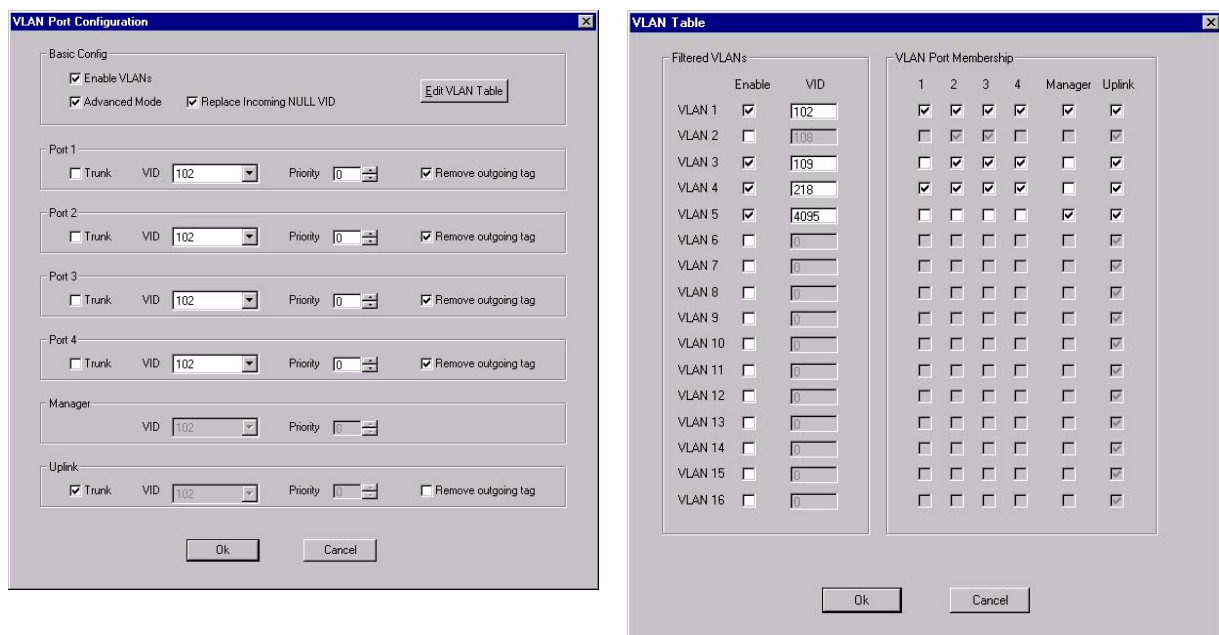


Fig. 12: VLAN-Settings

An individual VLAN might be allocated to the internal installation switch management port, thus adding further security to the system and allowing only the administrator of this particular VLAN to configure the installation switch. However, there is a **risk** to be taken into account: the access to the installation switch management agent is blocked if the VLAN configuration is set incorrectly, therefore - by activating the Reset push button - enforcing a complete installation switch configuration reset.

## Power-over-LAN (optional)

The new Installation switch supports the Power-over-LAN function and supplies the 48VDC to devices such as IP phones, wireless access points, Web cameras, access control systems via twisted-pair cables

The Power-over-LAN functionality according to the new IEEE802.3af standard is integrated into the installation switch. The standard defines the functions of both the Power Sourcing Equipment (PSE) and of the Powered Device (PD). A handshake protocol between PSE and PD negotiates the current supply where several levels are possible.

Each of the four 10/100-TX ports can supply the 48VDC in addition to the data. The power is supplied according to the IEEE 802.3af standard via the unused wires of the RJ45 socket (wire 4 and 5: positive line, wire 7 and 8: negative line).

The PoLAN installation switch controls the PoLAN DC supply with its microprocessor controlled Power Management as specified in the 802.3af standard. The installation switch with PoLAN function does have the 48VDC power input which is connected to the PSU within the cable-channel.

## Product Safety

**DANGER!** Optical components can emit invisible laser radiation.

**ATTENTION:** Infrared light as it is used for data transmission on optical fibers is not visible to the human eye, but nevertheless may cause severe damage.

In order to prevent any eye damage:

- Never look into the output of optical fibers or components - risk of severe eye damage!
- Apply protective caps to all unused optical ports.
- Do not start system operation prior to completing all wiring.

Active laser components employed in this system comply with laser safety class 1.

## Ordering Information

	Art.-No.	Description	Connectors	
Horizontal Installation	MS450230*	Ethernet Installations-Switch 45x45 1300nm Multimode ST, horizontal	4x RJ45 2x ST	10/100Base-TX 100Base-FX
	MS450231*	Ethernet Installations-Switch 45x45 1300m Multimode SC, horizontal	4x RJ45 2x SC	10/100Base-TX 100Base-FX
	MS450232*	Ethernet Installations-Switch 45x45 1300m Single mode ST, horizontal	4x RJ45 2x ST	10/100Base-TX 100Base-FX
	MS450233*	Ethernet Installations-Switch 45x45 1300m Single mode SC, horizontal	4x RJ45 2x SC	10/100Base-TX 100Base-FX
Vertical Installation	MS450240*	Ethernet Installations-Switch 45x45 1300nm Multimode ST, vertical	4x RJ45 2x ST	10/100Base-TX 100Base-FX
	MS450241*	Ethernet Installations-Switch 45x45 1300m Multimode SC, vertical	4x RJ45 2x SC	10/100Base-TX 100Base-FX
	MS450242*	Ethernet Installations-Switch 45x45 1300m Single mode ST, vertical	4x RJ45 2x ST	10/100Base-TX 100Base-FX
	MS450243*	Ethernet Installations-Switch 45x45 1300m Single mode SC, vertical	4x RJ45 2x SC	10/100Base-TX 100Base-FX

\*) Option "M" for manageable version (e.g.: MS450230M)  
Option „PM“ for manageable version with four PoLAN ports

**Accessories**

<b>Art.-No.</b>	<b>Description</b>
MS140010	Wall mount-set, 2 pcs., 45x45 white Wall box 3-times, Blind cover
MS140026	Mounting-set 45x45-System 2-fold Ackermann GB2 box, cover frame, blind plate (black)
MS140027	Mounting-set 45x45-System 3-fold Ackermann GB3 box, cover frame, blind plates (black)
MS140029	Universal mounting set for the installation in standard cable channels (mounting adapter + cover frame, white)
MS200150	Device Manager PC-Software V3.x MICROSENS Switch-Management (CD-ROM)
MS200220	Firmware SNMP-Management for manageable switches
MS200230	Firmware Telnet-Management for manageable switches

\*) Option "M" for manageable version (e.g.: MS450270M)

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