45x45 Installation Switch with 48 V DC input for PoE

MICROSENS

Introduction

Future proof Concept
The MICROSENS fiber to the office concept with the intelligent combination of fiber and twisted pair cabling offers a long term and future proof investment.

Easy Installation
Due to the tool-less snap-in mounting the installation of the switches is made very easy and fast. With this most compact system available on the market, the compatibility to the most common manufacturers of building installation systems is given.

Power-over-Ethernet (PoE)
With the implementation of the IEEE802.3af standard it is possible to supply end devices such as IP-telephones, Access Points and cameras direct with electrical from the installation switch. The switch is able to operate as Powered Device = PD.

Comprehensive Management
The integrated management offers the complete configuration, monitoring and administration of all devices in the network via a powerful software packet, the MICROSENS Device Manager. Additional features such as VLANs, Data prioritisation (QoS) and Power-over-Ethernet can be configured individually.
Using the firmware upgrade option it is possible to expand the functionality of the switch without any hardware changes (e.g. authentication, SNMP, Telnet, etc.).

Features

- **Switch**
  Fan less Fast Ethernet 10/100 Mbps installation switch according IEEE802.3
  Layer 2 non-blocking switch, wire speed forwarding, store-and-forward, ma. 1024 MAC addresses, auto learning and aging, 1 MB RAM, Full Duplex Frame according IEEE802.3x
- **Installation**
  Simple installation due to snap-in (without screws) into cable trunks and sub floor boxes, small dimensions
- **Power Supply**
  48 V DC power input (via external power supply) for switch and Power-over-Ethernet, max. power consumption of the switch 3.5 W (without PoE supply), PoE max. 60 W (4x 15 W per port)
- **Twisted-Pair Ports**
  4x 10/100Base-TX (RJ-45), auto negotiation for the detection of the speed 10/100 Mbps and half or full duplex, auto crossover for the automatic configuration of the pinout enabling implementation of homogeneous cabling
  Full Power-over-Ethernet function according IEEE802.3af on all ports
- **Fiber Port**
  1x 100Base-FX (SC or ST duplex), full or half duplex configurable via management, multimode or single mode interface
- **Management**
  Integrated management agent, port based configuration via PC based Management Tool for speed (10/100 Mbps), full/half duplex, auto negotiation, auto crossover and port Power-over-Ethernet
  Data prioritisation (Quality of Service): 4 priority levels, port based (hardware priority), Tag based (IEEE 802.1p/Q VLAN-Tag), IP TOS-field (DiffServ. Codepoints)
- **Firmware Options**
  SNMP, Telnet, RADIUS authentication, web based management

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).

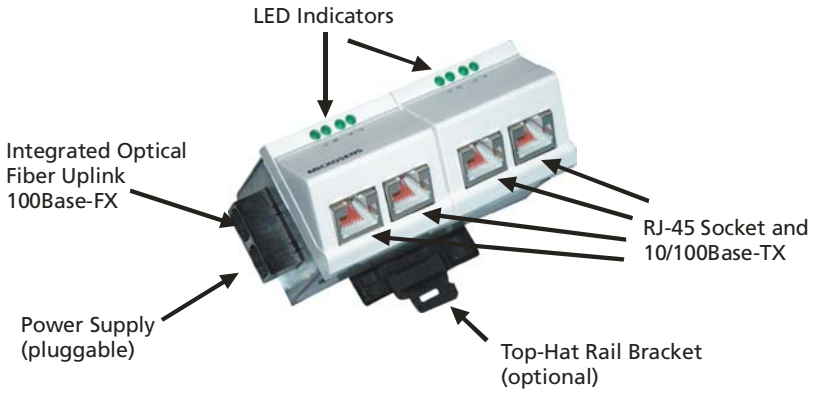


Fig. 1: Installation Switch Elements

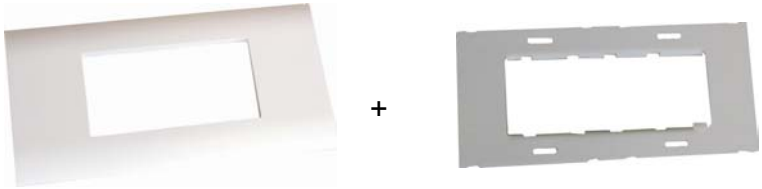
Mounting / Accessories

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):



Cover frame Adapter plate

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

Box Frame Blind cover

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

Box Frame Blind cover

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

3-fold box + Blind cover

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

Type	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
Cable Type	Shielded-Twisted-Pair Cable, 100Ω, Category 5 with RJ45 Plug
Max. Cable Length	100 m (TP)
Optical Fiber Type	Multimode Optical Fiber 50 or 62.5/125 µm, duplex, ST- or SC-Connector Optional: 9/125 µm Single mode Optical Fiber
Data Transmission Rate	TP: 10/100 Mbit/s (Autonegotiation) FX: 100 Mbit/s (configurable Full Duplex Operation)
Wavelength	1300 nm (Multimode/Single mode)
Optical Output Power	-19 dBm (1300 nm Multimode) -15 dBm (1300 nm Single mode)
Sensitivity	-30 dBm (1300 nm Multimode) -31 dBm (1300 nm Single mode)
Max. Transmission Distance	Full duplex: 2 km (Multimode) 15 .. 40 km (Single mode, optional)
LED Indicators	***ON*** Power, ready for operation ***FD*** Fiber port configured for full duplex mode (on); collision in half duplex mode (flashing) – according to the configuration ***L5*** Fiber connection correct (on); Data transmission on fiber port (flashing) ***L1-L4*** Twisted Pair connections correct (on); Data received on this port (flashing) **L0** Without function
Power Supply	48 V DC (44 – 55 V DC) max. 3.5 W for the switch plus 4x 15.4 W for the PoE end devices
Operating Temperature	0°C to 50°C
Storage Temperature	-20°C to 85°C
Relative Humidity	5% to 80%, non condensing
Management	- Status Information via Web-based Management http-Server (standard) - Monitoring/Configuration via SNMPv1 (optional) - Configuration via Telnet (optional) - Configuration via PC-based Management Tool (not supplied as standard)

Dimensions

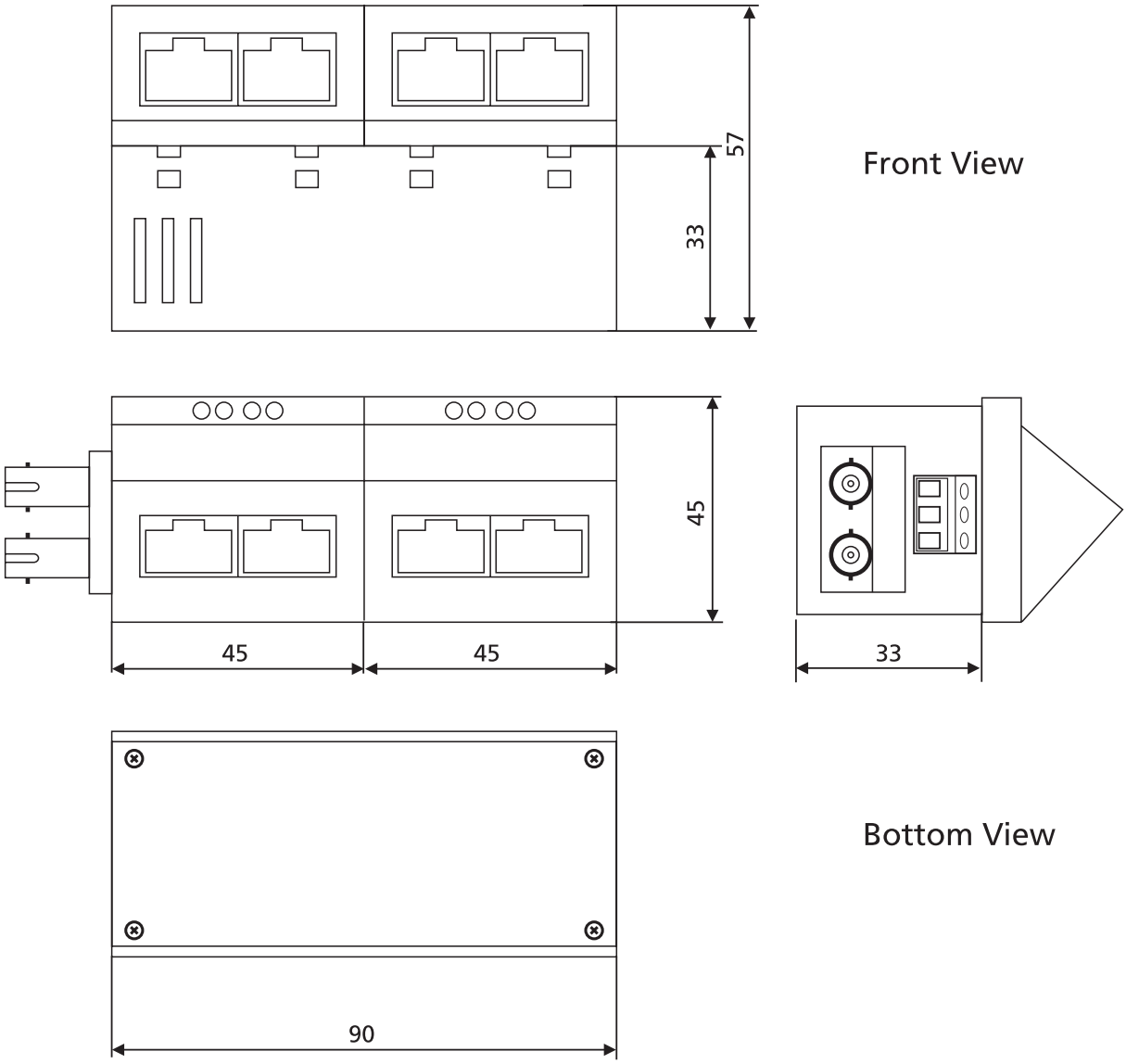


Fig. 6: Dimensions

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 effortless.

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.

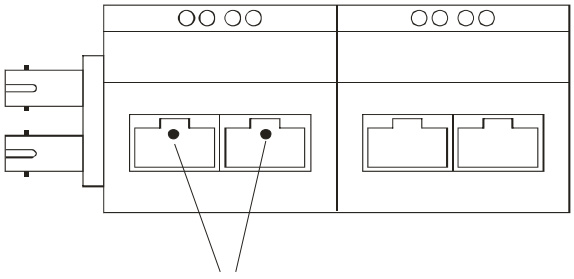


Fig 7: Location of the RESET Push Button

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

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.

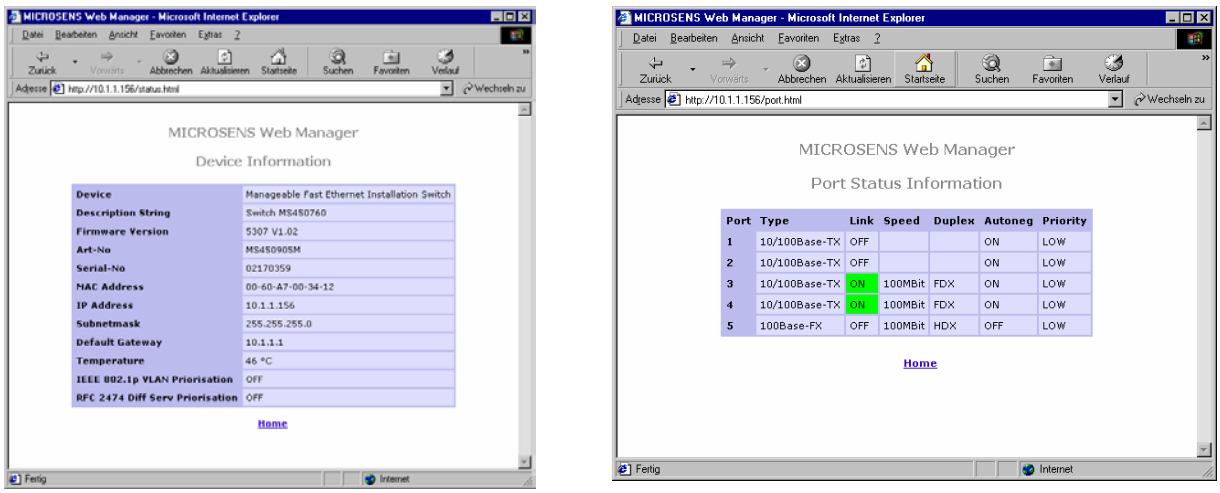


Fig. 8: Web-based Management Status Information Display

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..

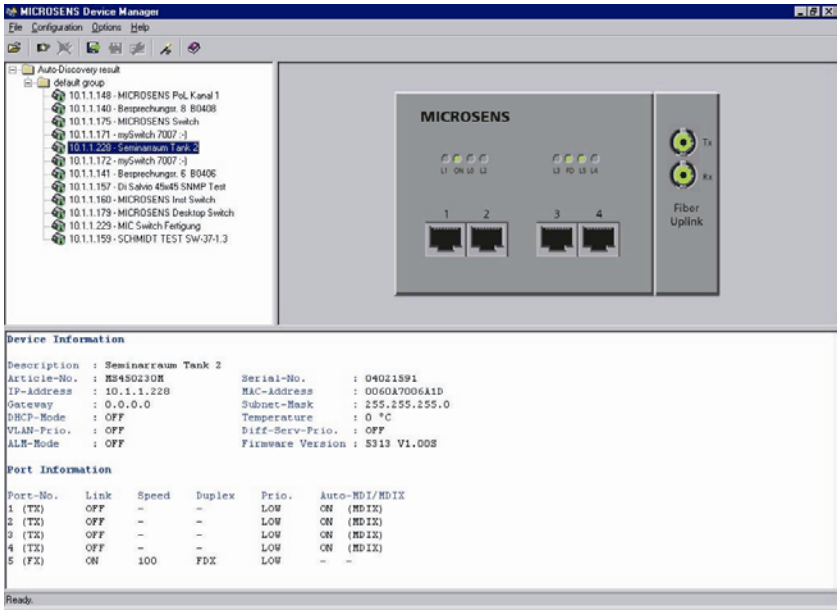


Fig. 9: MICROSENS Device Manager

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.

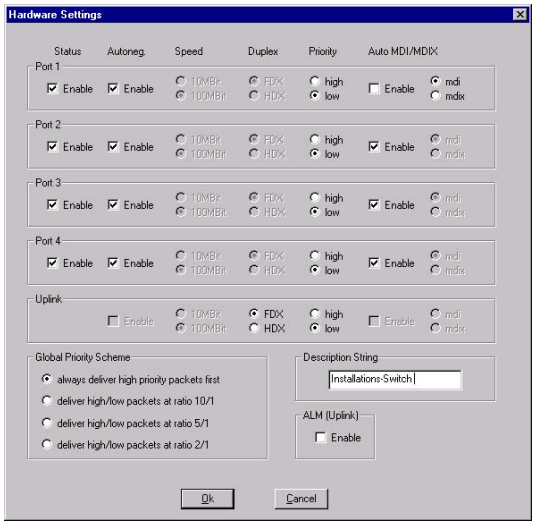


Fig. 10: Interface Configuration

Data Prioritisation

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.

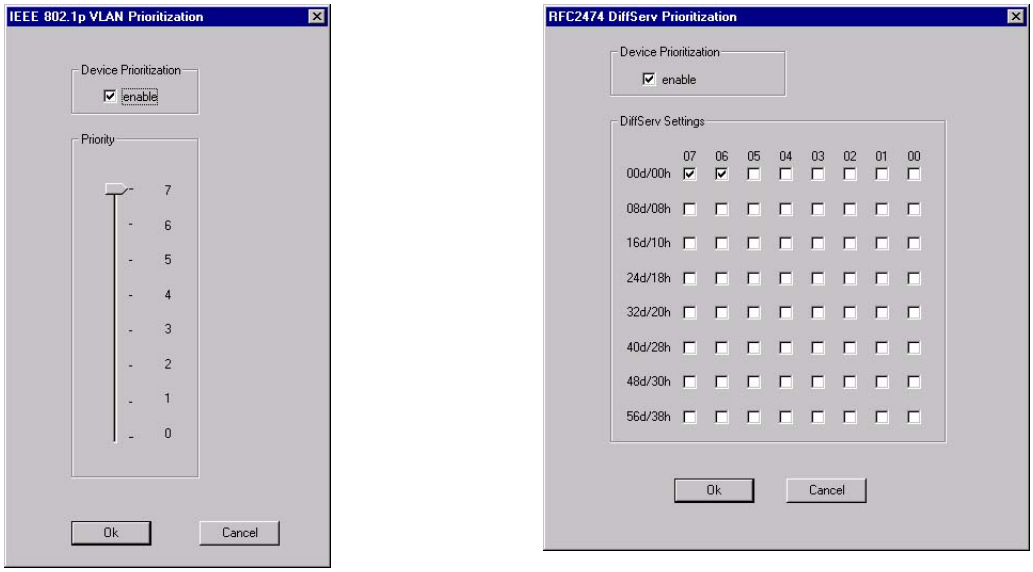


Fig. 11: Layer 2 / Layer 3 Prioritisation

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

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

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.

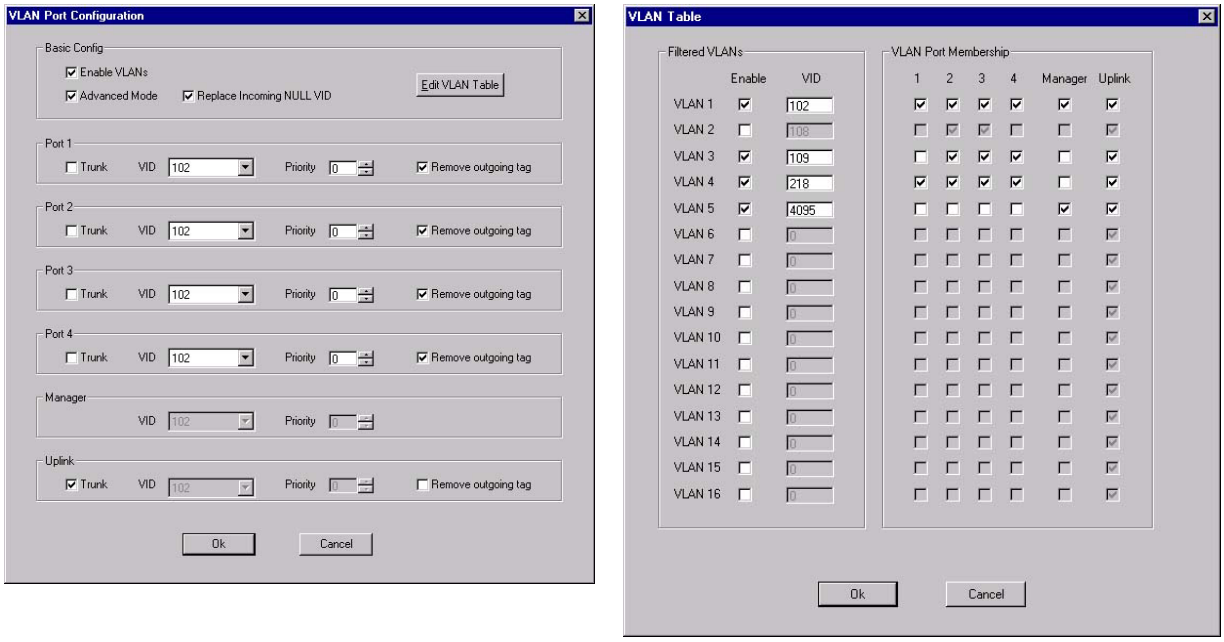


Fig. 12: VLAN-Settings

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-Ethernet

The new Installation switch supports the Power-over-Ethernet 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-Ethernet 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	MS450230PM-48	Ethernet Installations-Switch 45x45 1300nm Multimode ST, horizontal	4x RJ45 10/100Base-TX 2x ST 100Base-FX
	MS450231PM-48	Ethernet Installations-Switch 45x45 1300m Multimode SC, horizontal	4x RJ45 10/100Base-TX 2x SC 100Base-FX
	MS450232PM-48	Ethernet Installations-Switch 45x45 1300m Single mode ST, horizontal	4x RJ45 10/100Base-TX 2x ST 100Base-FX
	MS450233PM-48	Ethernet Installations-Switch 45x45 1300m Single mode SC, horizontal	4x RJ45 10/100Base-TX 2x SC 100Base-FX
Vertical Installation	MS450240PM-48	Ethernet Installations-Switch 45x45 1300nm Multimode ST, vertical	4x RJ45 10/100Base-TX 2x ST 100Base-FX
	MS450241PM-48	Ethernet Installations-Switch 45x45 1300m Multimode SC, vertical	4x RJ45 10/100Base-TX 2x SC 100Base-FX
	MS450242PM-48	Ethernet Installations-Switch 45x45 1300m Single mode ST, vertical	4x RJ45 10/100Base-TX 2x ST 100Base-FX
	MS450243PM-48	Ethernet Installations-Switch 45x45 1300m Single mode SC, vertical	4x RJ45 10/100Base-TX 2x SC 100Base-FX

Accessories

Art.-No.	Description
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