

Gigabit FTTO Switch 45x45 Design with PoE Option

MICROSENS

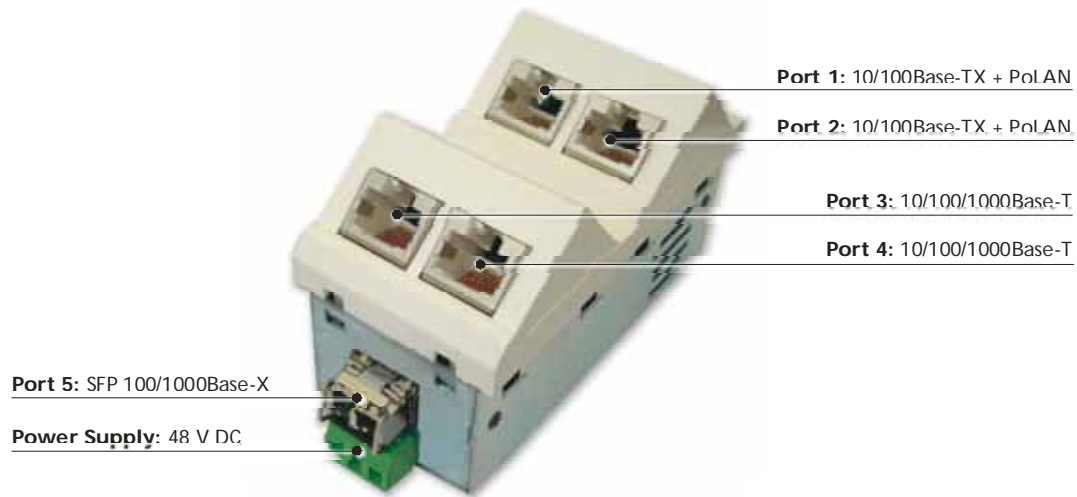


Fig. 1: FTTO Switch Elements

Introduction

Future Proof Concept

The MICROSENS Fiber To The Office concept with its intelligent combination of fiber and twisted-pair cabling offers a long term and therefore future proof investment into the building infrastructure.

Gigabit Performance

For the first time it is now possible to supply Gigabit speed to the end user using the Fiber To The Office concept. The full Gigabit speed is supported on the copper interfaces on the end user side and also on the fiber uplink.

The use of a 100 Mbit transceiver module on the fiber side enables a downwards compatibility to 100 Mbit networks. The upgrade to Gigabit speed is done by simply changing the optical module (SFP).

Power-over-Ethernet integrated

With the Power-over-Ethernet (PoE) standard IEEE802.3af it is possible to supply data and power to the connected end device over the twisted-pair cable. An additional power supply for the end device is not necessary.

Easy Installation

Due to the tool less snap-in installation the mounting of the switch is done easily and fast. This most compact system on the market ensures furthermore the compatibility to the most common installation systems of the world.

Comprehensive Management

The integrated management agent allows the complete configuration, monitoring and administration of all devices in the network with a powerful software packet, the MICROSENS Device Manager. Additional features such as VLAN, Data Prioritization (QoS) and Power-over-Ethernet can be assigned individually.

The firmware update enables to use additional features (e.g. Authentication, SNMP, Telnet, etc), without changing the hardware.

Features

- **Gigabit Switch**
Fan less Gigabit Ethernet 10/100/1000 Mbit/s FTTO Switch complying with IEEE 802.3 Layer-2 non blocking switch, wire speed forwarding, store and forward, max 4096 MAC-addresses, auto-learning and –aging, 1 MB RAM, Full Duplex Frame according to 802.3x
- **Easy Installation**
Quick and easy installation via “snap in” (tool less) in cable channels/ducts and floor tanks
- **Power Supply (is not included in delivery)**
48 V DC for the switch and PoE, unused ports can be disabled in order to save power, max. power consumption of the switch is 5W (without PoE powering), PoE power is max. 30W (15W per port)
- **Twisted-Pair Ports**
2x 10/100/1000Base-T (RJ-45)
Autonegotiation, half or full duplex mode, auto crossing (automatic matching to the pinout of the connected data cable)

2x 10/100Base-TX (RJ45)
Autonegotiation, half or full duplex mode, auto crossing (automatic matching to the pinout of the connected data cable)
Full PoE function according to IEEE 802.3af with max. 15.4 W per port.
- **Fiber Optic-Port**
1x 100/1000Base-X (pluggable SFP Module, LC duplex)
alternatively 1x 1000Base-X (fix Transceiver, SC duplex)
Optional Multimode or single mode fiber for optimized matching of an existing fiber infrastructure.
- **Management**
Integrated Management Agent, configuration via PC based Management tool for data rates /10/100/1000Mbps), full and half duplex, autonegotiation, autocrossing and port power.
Data prioritisation (QoS): 4 priority levels, port based (hardware priority), tag based (IEEE 802.1p/Q VLAN-tag), IP TOS-Field (diffServ. Codepoints).
Full VLAN-support according to IEEE 802.1Q, tagging/untagging per port selectable.
Firmware options: SNMP, Telnet, Radius authentication, HTTP (web based)

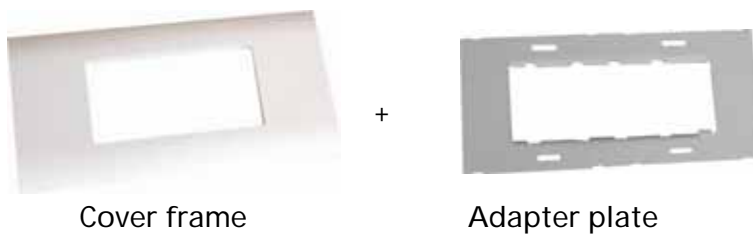
Mounting / Accessories

The FTTO 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:

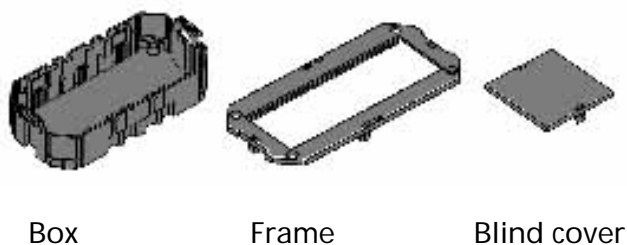
- Horizontal (MS45023x): for installation in horizontal cable channels or wall mounting
- Vertical (MS45024x): for installation in vertical locations as distribution columns or sub floor mounting

For the universal mounting optional accessories are available:

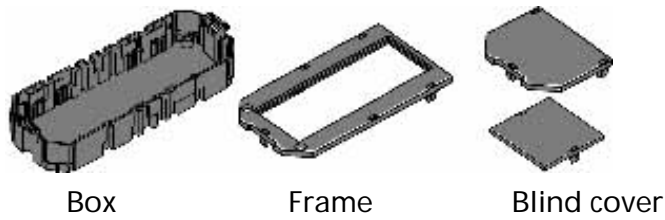
- Accessories for installation in standard E2-case of cable-channels below windows (MS140029, 2-part set):



- 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

Type	Gigabit Ethernet FTTO Switch 45x45 Port 1 + 2: 10/100Base-TX + PoE Port 3 +4: 10/100/1000Base-T Port 5: 1x SFP 100/1000Base-X 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, SFP Optional: 9/125 μm Single mode Optical Fiber
Data Transmission Rate	TP (Port 1 + 2: 10/100 Mbps (Autonegotiation) TP (Port 3 + 4: 10/100/1000 Mbps 1 x SFP (pluggable) FX: 1000 Mbps (configurable full duplex operation)
Wavelength	850 nm (multimode, MS450851PM-48 only)
Optical Output Power	-10 dBm (850 nm multimode, MS450851PM-48 only)
Sensitivity	-20 dBm (850 nm multimode, MS450851PM-48 only)
Max. Transmission Distance	Full duplex: 550 m (MS450851PM-48 only)
LED Indicators	<i>POWER</i> Green LED "on": Power on "off": No Power Supply Twisted Pair Ports: <i>Link/Activity</i> Green LED "on": Port connected Flashing: Data transmission in process "off": Port disconnected <i>PoE</i> Green LED "on": 48VDC activated at the port Flashing: Power fault at the port "off": No voltage at the port Optical Fiber Ports: <i>Link/Activity</i> Green LED "on": Port connected Flashing: Data transmission in process "off": Port disconnected
Power Supply	48 V DC (is not included in delivery)
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

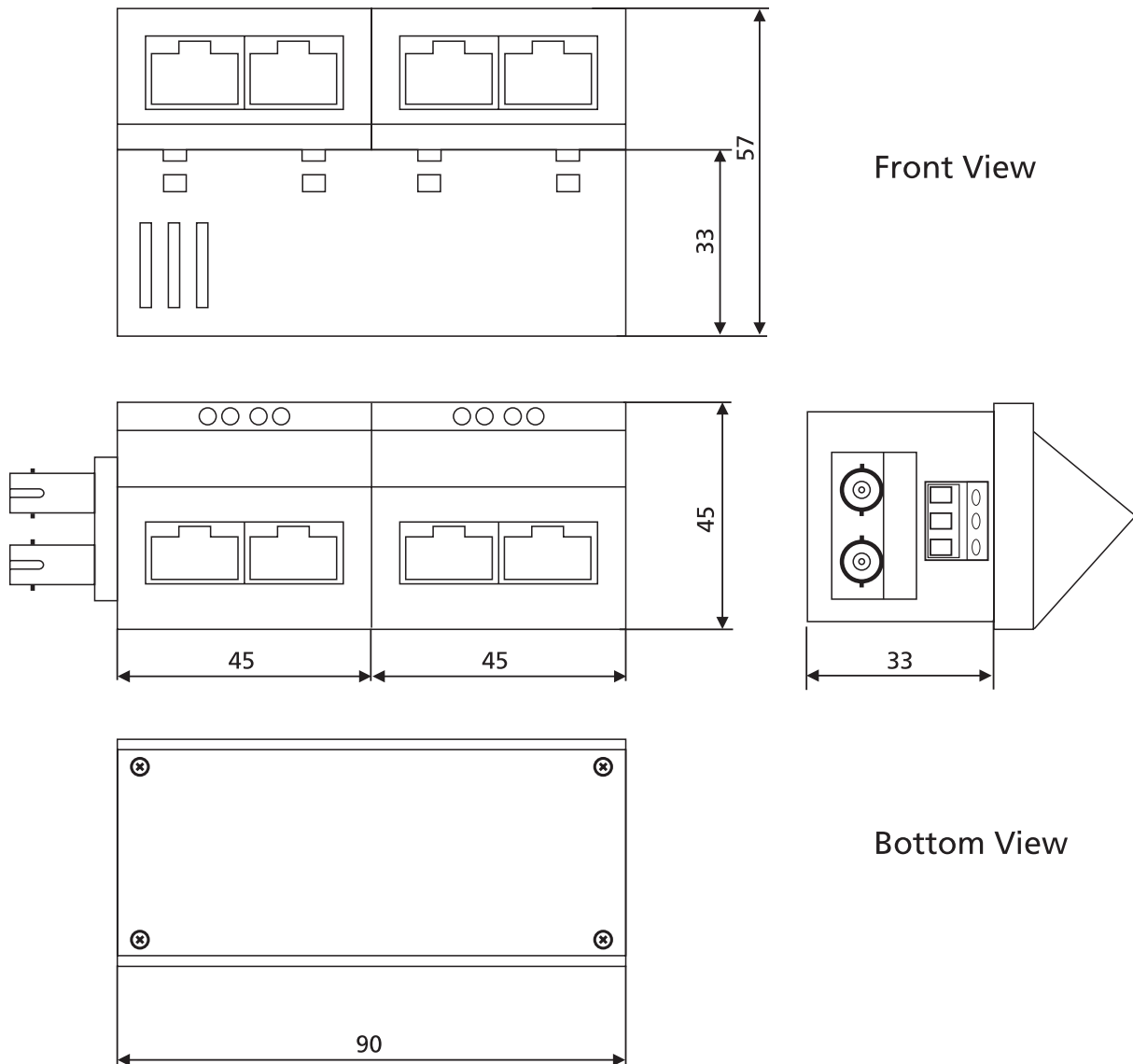


Fig. 6: Dimensions

Installation Depth:

- maximum 33 mm for the cable channel

Interfaces

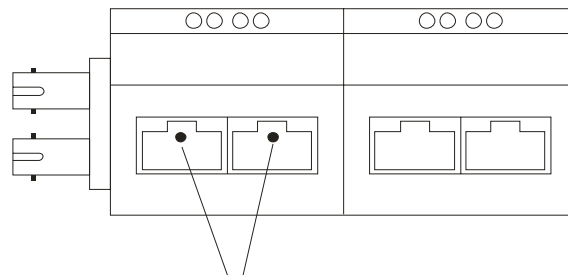
The twisted pair ports do not need any differentiation between crossover patch cables and 1:1 patch cables. The Auto Crossover feature allows the FTTO Switch to identify the connection type and to adjust the interface automatically. In this way cascaded units as well as terminating units can be connected 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 FTTO 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 FTTO 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 FTTO 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 FTTO 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 FTTO 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 FTTO Switch, neither does the network management operation require any further equipment.

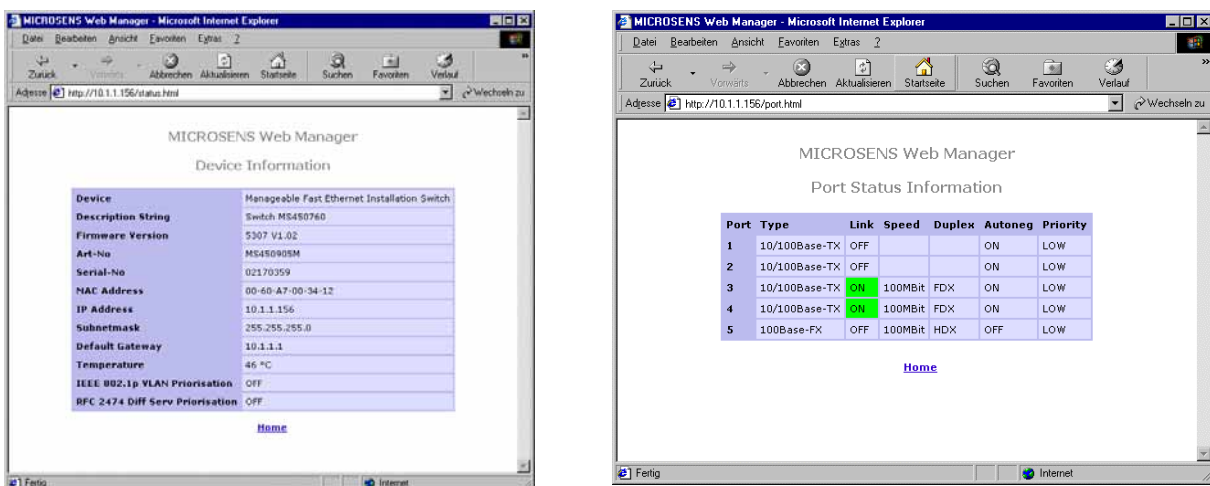


Fig. 8: Web-based Management Status Information Display

The PC-based management tool allows for the manual configuration of the individual FTTO 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..

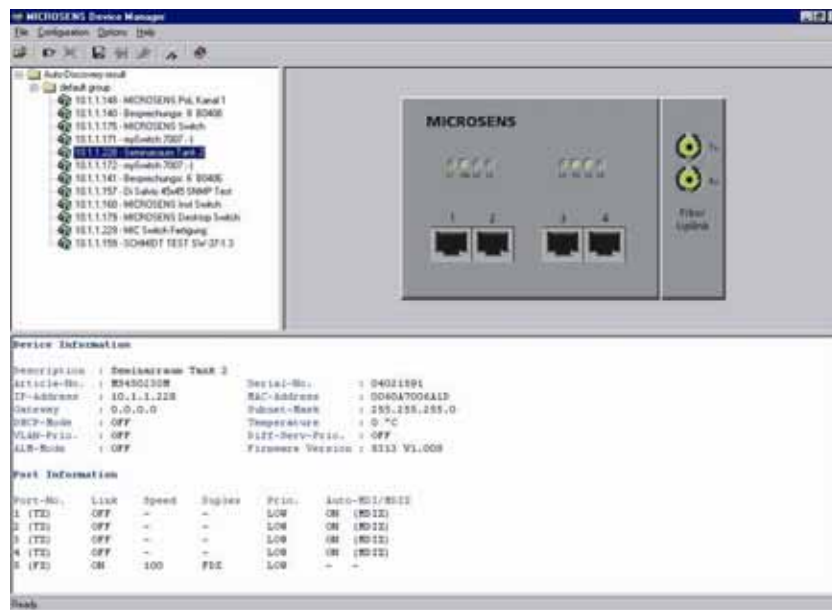


Fig. 9: MICROSENS Device Manager

With the Autonegotiation function being deactivated the twisted pair interfaces need to be configured manually. Relevant parameters are transmission speed (10/100 port 1 + 2 and 10/110/1000 Mbit/s port 3 + 4) 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 FTTO 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 FTTO 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.

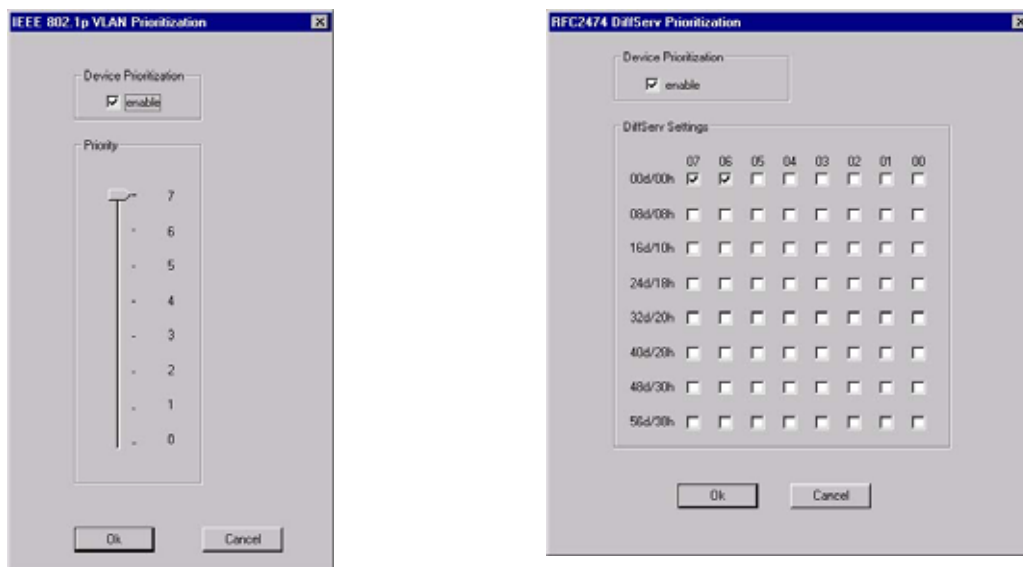


Fig. 11: Layer 2 / Layer 3 Prioritisation

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 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 FTTO Switch analyses the VID. In case non-VLAN-tag capable data equipment is connected to the FTTO 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 FTTO 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 FTTO Switch can handle up to 16 out of the 4096 possible VLANs.

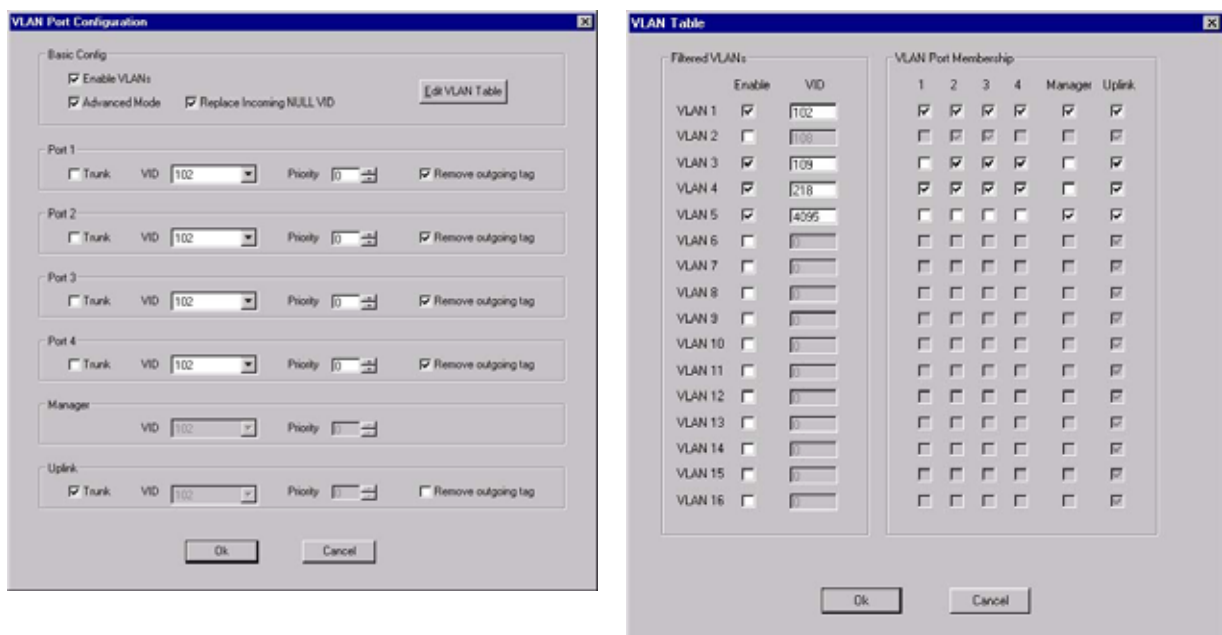


Fig. 12: VLAN-Settings

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

Power-over-Ethernet

The new FTTO 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 FTTO 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.

Port 1 and 2 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 PoE FTTO Switch controls the PoE DC supply with its microprocessor controlled Power Management as specified in the 802.3af standard.

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.

Order Information

Art.-No.	Description	Connectors
MS450851PM-48	Gigabit Ethernet FTTO Switch 45x45 2x10/100/1000T, 2x10/100TX, 1x 1000Base-SX, vertical Mounting, manageable, VLANs, QoS, 2x PoE Ports	2x RJ-45 (10/100Base-TX) 2x RJ-45 (10/100/1000Base-T) 1x SC 850nm Multimode
MS450859PM-48	Gigabit Ethernet FTTO Switch 45x45 2x10/100/1000T, 2x10/100TX, 1x SFP Transceiver Port (pluggable), vertical Mounting, manageable, VLANs, QoS, 2x PoE Ports	2x RJ-45 (10/100Base-TX) 2x RJ-45 (10/100/1000Base-T) 1x SFP (100/1000Base-X)

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

Technical Specifications are subject to be changed without prior notice. 2806 dh/fr/jr