

Data Sheet

Gigabit Ethernet Medical Micro Switch G6 (6-Port) with FO Uplink Port(s)

For medical equipment
according to
IEC/EN 60601



■ Made
■ in
■ Germany

Features

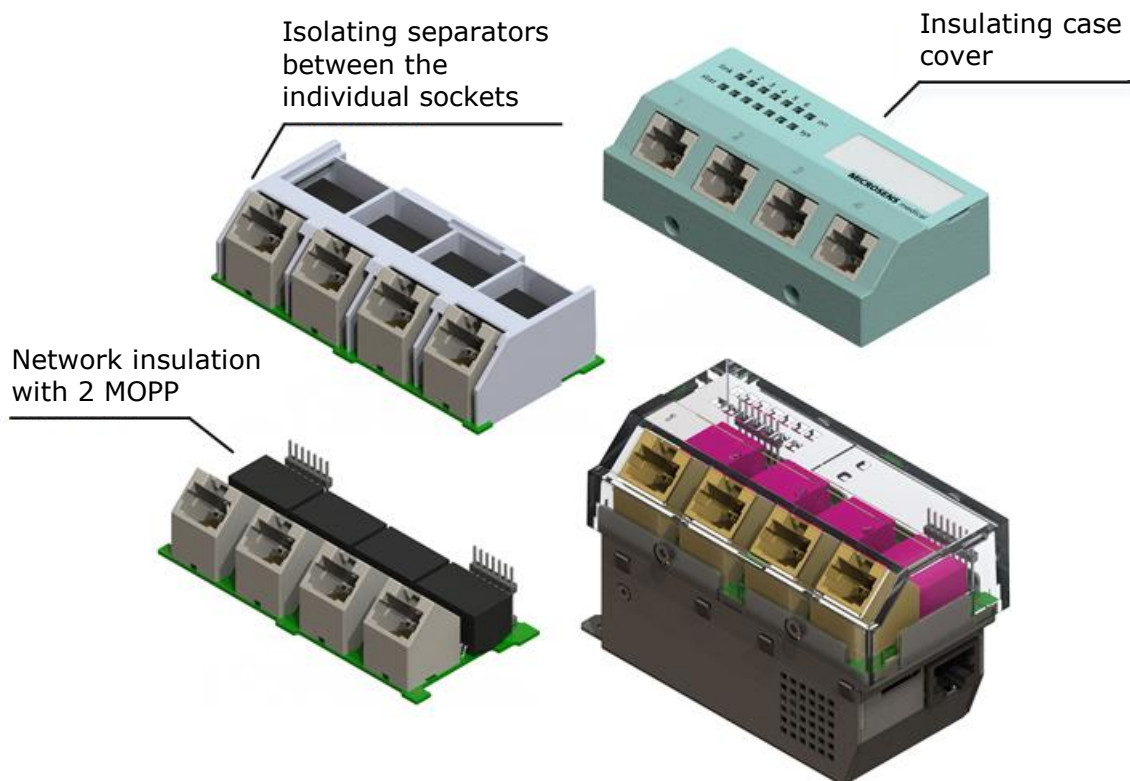
MICROSENS proudly presents the Medical Micro Switch – an innovative new version of the company's tried-and-tested Generation 6 Micro Switch series for Fiber To The Office (FTTO) networks. The MICROSENS Medical Micro Switch caters for the very special demands placed on patient protection – the ideal solution for running networks in medical environments.

The freely-accessible network ports of the MICROSENS Medical Micro Switch are equipped with special, galvanically-isolated transformers. The minimum distance between the primary and secondary connectors is 8 mm. Due to their minimum dielectric strength of 4,000 volts and 2x MOPP insulation resistance in compliance with IEC/EN 60601-1, the insulators effectively prevent endangerment of both patients and medical personnel in the case of a failure or voltage flashover.

Our extremely compact switch excels through its minimal space requirements which allow it to be installed in a wide variety of different installation environments, such as in ceiling installation units. Apart from a model with its own internal 230 VAC power supply, we also offer a Medical Micro Switch designed for power intake from an external 48 VDC medical power unit. In the case of our 48 V model, the deployment of a separate medical power supply also provides additional protection from the power supply device.

Patient Protection Measures

The transformers, which have a dielectric strength of more than 4 kV and 2x MOPP insulation resistance, guarantee that all terminal equipment connected to the Medical Switch is galvanically isolated, thus protecting it from disruptions in the power supply. The coating of the RJ-45 ports and the case cover are made of insulating plastic materials, thus providing additional galvanic touch protection.



MOPP – Means of Patient Protection

MOPP is a measure for describing the level of protection of a patient against electric shocks. This protection is achieved through construction measures, such as isolating different electrical sections from one another. One MOPP stands for simple insulation, two MOPP for double or reinforced insulation with a dielectric strength of at least 4,000 volts (4 kV) over a 60-second period. This is set down in the international standard IEC 60601-1 which was adopted within the European Union as EN 60601-1.

Models

In addition to our standard series, equipped with a Small Form-Factor Pluggable (SFP) uplink port, we also offer models with two SFP-based uplink ports. These open up a broad array of different network redundancy scenarios, such as dual homing via fiber optic cables and implementation in a ring topology.

The Medical Switch is supplied with either one or two SFP uplink ports. Both models incorporate an internal 230 VAC power supply. Alternatively the devices are offered for connection of an external low voltage DC power supply.

Characteristics

Medical Gigabit Ethernet Switch

- Fanless Gigabit Ethernet Switch for application in medical equipment
- Additional galvanic touch protection by means of insulating plastic at the free accessible parts
- 4 free accessible network ports with
 - galvanically isolating transformers
 - Minimum dielectric strength: > 4 kV/60 sec.
 - 2 MOPP acc. to IEC/EN 60601-1
- Energy-saving switching chip (Marvell), Energy Efficient Ethernet
- Layer-2+ store-and-forward, full wire-speed, non-blocking
- Max. 8,192 MAC addresses, automatic learning and ageing
- Jumbo frames (max. 10,240 Bytes)

Energy Efficient Ethernet

- IEEE 802.3az
- Power consumption optimisation depending on the network utilisation per RJ-45 port
- Up to 50 % less power consumption (according to IEEE 802.3az)

Network Management

- Support of all common management standards
- High performance 32Bit ARM CPU clock frequency: 800 MHz
- Linux operating system with fast system boot phase
- Web manager (HTTP/HTTPS)
- Telnet/SSH/Console, incl. standard commands (ping, traceroute, etc.) SNMP v1/v2c/v3
- Support of the MICROSENS NMP central management platform (available as a separate product)
- Secondary IP interface (IPv4 / IPv6 Dual Stack)
- microScript: Integrated scripting for the implementation of user-specific special functions

- Firmware-, script- and/or configuration files can be directly loaded into the switch, saved and executed via FTP, SFTP and TFTP
- Exchangeable memory card for configurations, scripts or firmware

Connections

Up-Downlink

- SFP slot 100/1000Base-X + 1x 10/100/1000 Base-T or 2x SFP slot in 100/1000Base-X

Local

- 4x 10/100/1000Base-T (RJ-45) Auto-Negotiation
- Auto MDI/MDI-X function for using standardised patch cords

Expansion port

- RS-232 console port (Mini-USB) (in case of the 2x SFP variant as RJ-45 port)

Power Supply

- 3-pin screw-/ plug terminal for fixed and/or flexible strands
- Additional grounding (PE) by means of a 6.3 mm flat connector

Installation

- Snap-in installation 45 mm (without screw fastening)
- Compatible to common installation systems by means of adaptor frames
- Direct installation in ceiling installation units
- Bevelled edge enables installation in dual frames
- Comprehensive installation accessories available

Compatibility

- Tested compatibility to standard CISCO switches a.o. QoS, VLANs, CDP, RSTP
- AVAYA Fabric Connect: client mode

Network Management Features

The general document „[Firmware Features Generation 6](#)“ exhibits a current overview of the functional characteristics provided by the firmware.

IEEE- / RFC Standards

The document „[Firmware Features Generation 6](#)“ also states the IEEE standards and RFCs, which are supported by the Micro Switch G6.

This document is available for download from www.microsens.com on the respective device page.

Quality – Made in Germany

All variants are manufactured at our production site Hamm/Germany thus assuring a consistent high quality of the Medical Micro Switch Generation 6.

In addition to this the devices pass a so-called Burn-in test which represents a component pre-ageing and guarantees their reliability in continuous operation. Random samples of the switches are continuously tested for their functionality for a period of 48 h and with high load. In this way early failures can be detected prior to delivery.

Technical Data

Switch

Type	Gigabit Ethernet Switch Layer 2+, IEEE 802.3 compliant
Performance	Store-and-forward, full wire-speed, non-blocking on all ports
MAC Addresses	8,192 Addresses, automatic learning und ageing
Jumbo Frames	max. 10,240 bytes

Twisted-Pair Connections

Quantity	5 for the 1x SFP variant, 4 for the 2x SFP variant
Type	Gigabit Ethernet, Triple Speed 10/100/1000Base-T
Connection Type	4 RJ-45 sockets, unshielded and insulated 1 RJ-45 socket, shielded, for downlink connection (1x SFP variant only)
Cable Type	Twisted-Pair cable, min. Cat. 5e, impedance 100 Ohm, max. length 100 m
Flow Control	Pause frames (IEEE 802.3x), configurable
Pin Assignment	Auto MDI/MDI-X, Auto Polarity

Optical Fiber Connection

Type	SFP (dual speed) 100/1000Base-X, support of SFP diagnostic functions
Flow Control	Pause frames (IEEE 802.3x), configurable

Indicators

Type	14 LEDs, switchable
Link	Ports 1..6 <i>Flashing</i> Data transmission - <i>green</i> - activated - <i>orange</i> - blocked - <i>red</i> - non-authorized
On	<i>green</i> Switch ready for operation
Sys	<i>flashing</i> Boot process <i>blue</i> Factory reset without IP reset in progress <i>purple</i> Factory reset with IP reset in progress <i>green</i> Process completed

LED Modes	<i>Dynamic</i>	Standard indicator (LED flashing when active)
	<i>Static</i>	Standard indicator without flashing
	<i>Quiet</i>	<i>Only ON-</i> and Sys-LED
	<i>Off</i>	No LED indicator

Control Panel

Reset Button	Switch reset, reloading of the last saved configuration (direct hardware function)
System Button	Request of the IP configuration for management, reset to factory default (switchable)

Power Supply (DC)

Input	44..57 V (48 V typ.)
Power Cons.	Typ. 4.5 W
Connection	3-pin screw terminal, PE/-/+
Functional Grounding	6.3 mm flat connector

Power Supply (AC)

Input	195..265 V (230 V typ.) 50..60 Hz (50 Hz typ.)
Power Cons.	Typ. 4.5 W
Connection	3-pin screw terminal, PE/N/L
Grounding (PE)	6.3 mm flat connector

Operating Conditions

Temperature	Operation 0..40 °C Storage -20..85 °C
Rel. Humidity	10..90 %, non-condensing

Mechanical

Dimensions	90 x 45 x 60 mm ³ (L x W x H, without connections)
Mounting Depth	35 mm
Weight	215 g

Standards	
CE	2014/30/EU (EMV) 2014/35/EU (Low Voltage)
Safety	EN 60950-1:2011-01 IEC/EN 60601-1
Interference	EN 55022:2011-12
Noise Immunity	EN 55024:2011-09

Reliability	
MTBF	100,000 h
Method	MIL-HDBK-217F

Delivery / Contents	
<i>Standard Packing</i>	
Packing Unit	1 piece
Dimensions	158 x 75 x 65 mm ³
Weight	380 g
Scope of Delivery	1x Micro Switch G6 1x MicroSD Memory Card (2x FO variant only) 1x Ground cable (PE), 20 cm 1x Power supply plug 1x Quick start guide 1x Set Pictogram stickers

Memory Card



- Stores firmware and configuration data
- Swapping the card transfers the **complete** equipment status
- Firmware can be updated through swapping the card
- Fault-tolerant journaling file system
- Industrial grade – long-term availability

In devices without an internal storage facility, the microSD Memory Card serves to permanently save configuration data, scripts and firmware files.

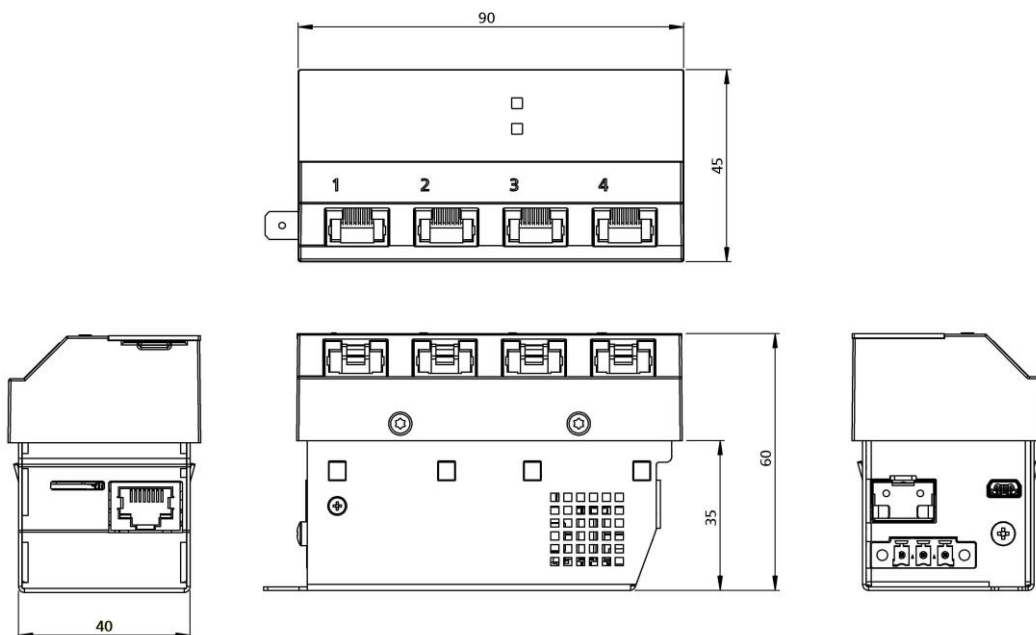
For all devices, whether they have their own internal storage facility or not, a memory

card can be used to transfer an existing configuration over to a new device (service case).

There is also an enhanced version of the microSD Memory Card available with its own MAC address. This MAC address takes priority over the switch's internal MAC address. In the case that the device then requires servicing, an exact clone of the device can be created simply by swapping the card.

Only original MICROSENS microSD Memory Cards should be used in order to guarantee long-term stability (extended temperature range, industrial grade etc.)





Dimensions [mm]



Ordering Designations

Designation	Article Number
Medical Micro Switch Generation 6, 230 VAC (no Power over Ethernet)	
Gigabit Ethernet 45x45 Micro Switch for medical applications 5x 10/100/1000TX, 1x 100/1000X SFP, internal memory	MS445209M-G6+
Gigabit Ethernet 45x45 Micro Switch for medical applications 4x 10/100/1000TX, 2x 100/1000X SFP	MS445207M-G6
Medical Micro Switch Generation 6, 48 VDC (no Power over Ethernet)	
Gigabit Ethernet 45x45 Micro Switch for medical applications 5x 10/100/1000TX, 1x 100/1000X SFP, internal memory	MS445209M-48G6+
Gigabit Ethernet 45x45 Micro Switch for medical applications 4x 10/100/1000TX, 2x 100/1000X SFP	MS445207M-48G6
Memory Cards Micro Switch Generation 6/Generation 6+	
microSD Memory Card 4 GB for MICROSENS Generation 6 Switches, Extended temperature range -25 °C up to +85 °C Standard	MS140894X-4G
microSD Memory Card 4 GB für MICROSENS Generation 6 Switches, Extended temperature range -25 °C up to +85 °C with own MAC address	MS140894X-4G-M
microSD Memory Card 4 GB for MICROSENS Generation 6 Switches, Extended temperature range -25 °C up to +85 °C with individual switch configuration according to customer specifications	MS140894X-4G-C
microSD Memory Card 4 GB for MICROSENS Generation 6 Switches, Extended temperature range -25 °C up to +85 °C with individual switch configuration acc. to customer specifications and own MAC address	MS140894X-4G-MC

Accessories

	Designation	Art.-No.	
	SFP Transceiver (further variants upon request)		
	SFP Transceiver, Gigabit Ethernet, digital diagnostic 850 nm multimode, 1000Base-SX, LC duplex Extended temperature range -40 °C up to +85 °C	MS100200DX	
	SFP Transceiver, Gigabit Ethernet, digital diagnostic 1310 nm single mode, 1000Base-LX, LC duplex Extended temperature range -40 °C up to +85 °C	MS100210DX	
	SFP Transceiver, Fast Ethernet, digital diagnostic 1310 nm multimode, 100Base-FX, LC duplex Extended temperature range -40 °C up to +85 °C	MS100190DX	
	SFP Transceiver, Fast Ethernet, digital diagnostic 1310 nm single mode, 100Base-FX, LC duplex Extended temperature range -40 °C up to +85 °C	MS100191DX	
	Title Block Sheets		
	Set of DIN A4 sheets with 80 labels each for the title block field of the Generation 6 Switch, suited for laser printers, perforated, 10 sheets per set, suitable form sheet generator via NMP software	MS140005	
	Console Cable (mini-USB to SUB-D9)		
	Console cable for Micro Switch Generation 6 Mini-USB 5-pin to SUB D9 socket, 1.5 m	MS190410-01,5	
	Network Management		
	NMP Professional – Network Management Platform Software incl. one year update licence	MS200160-1	
	NMP Professional – additional update licence for n years	MS200161-n	
		NMP Server – Network Management Platform Software incl. one year update licence	MS200164-1
		NMP Server – additional update licence for n years	MS200165-n
		NMP Server – additional client access licences	MS200166-Cn
	Installation Sets*		
	Universal installation set for E2 mounting boxes, plate and cover frame	MS140029	
	Universal installation set incl. cover frame for ducts with C-profile	MS140040BR2	
	Underfloor 3 pcs GB3-Set, support 3x 45x45, 2x cover, triple mounting box	MS140027-G6	
	Power Supply for 48 V Variant		
	Medical power supply 90-264 VAC, 48 VDC, 1.31 A, 63 W	MS700680	

* Further installation accessories for all installation situations can be found on our web site <http://www.microsens.com> in the document "Accessories for FTTO Installation Components"

Service

Designation	Art.-No.
Warranty Extension following 24 Months Manufacturer Warranty**	
1 year Warranty Extension	MSGV01
2 years Warranty Extension	MSGV02
3 years Warranty Extension	MSGV03
Pre-Configuration according to Customer Specifications	
Component pre-configuration according to customer specifications	MSKonfig

**The manufacturer warranty is defined in the [GTCT \(§9\)](#) of MICROSENS GmbH & Co. KG.

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