

FL SWITCH SFNT...

Five and Eight-Port Standard Function Ethernet Switches for Extreme Environments



AUTOMATION

Data Sheet
2665_en_G

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1 Description

The FL SWITCH SFNT... range of Factory Line switches can be used for quick and cost-effective Ethernet network expansion to the field level. These unmanaged switches allow operation across a wider temperature range than most switches, allowing networks to expand into process industry environments, such as oil/gas, chemical, water/wastewater, wind energy, security, monitoring and some marine segments. Due to the narrow housing design, the switches are suitable for use in control cabinets and junction boxes.

The FL SWITCH SFNT... switches support the auto negotiation function on the RJ45 ports and offer transmission speeds of 10/100 Mbps. Mixed operation for the connection of segments with different data transmission speeds is also supported. The RJ45 ports offer an auto crossing function, which means it is not necessary to make a distinction between 1:1 and crossover cables. Unused RJ45 ports can be fitted with security caps to provide mechanical protection against unauthorized use.

Fiber optic ports are available in an SC or ST format and offer speeds of 100 Mbps. The fiber optic ports extend the segment length to 2000 m or more, depending on the quality of the fiber optic cable.

2 Features and Benefits

- -40 to 75°C operating range
- Pretagged high priority messages are forwarded before lower priority messages during periods of high network traffic
- Auto-negotiation and autocross simplify cabling
- Couple copper network segments with different bit rates with automatic detection of the data transmission speed of 10 or 100 Mbps
- Individual LEDs at each port indicate communication activity and data rate
- Redundant power supply capable with local (LED) and remote (dry contact) alarms to indicate failure of one or both power supplies
- Switch-selectable link diagnostics indicate disconnected ports via local and remote alarms
- Available fiber optic options for extended distance and electrical noise immunity
- Fiber optic ports available in SC or ST formats
- Low-cost, low-complexity security by connecting Layer 1 security elements at the RJ45 ports to restrict access and tampering (optional)



Please note the different connection directions of the transmission media for five-port switches: copper cables are connected at the front, glass fiber cables at the bottom.



This data sheet is valid for all products listed on the following page:



Make sure you always use the latest documentation. It can be downloaded at www.phoenixcontact.net/catalog.

3 Ordering Data

Description	Type	Order No.	Pcs./Pkt.
Ethernet switch , wide temperature with 5 RJ45 ports for 10/100 Mbps	FL SWITCH SFNT 5TX	2891003	1
Ethernet switch , wide temperature with 8 RJ45 ports for 10/100 Mbps	FL SWITCH SFNT 8TX	2891005	1
Ethernet switch , wide temperature with 4 RJ45 ports and 1 fiber optic port in SC format, for 10/100 Mbps	FL SWITCH SFNT 4TX/FX	2891004	1
Ethernet switch , wide temperature with 7 RJ45 ports and 1 fiber optic port in SC format, for 10/100 Mbps	FL SWITCH SFNT 7TX/FX	2891006	1
Ethernet switch , wide temperature with 7 RJ45 ports and 1 fiber optic port in ST format, for 10/100 Mbps	FL SWITCH SFNT 7TX/FX ST	2891007	1
Ethernet switch , wide temperature with 6 RJ45 ports and 2 fiber optic ports in SC format, for 10/100 Mbps	FL SWITCH SFNT 6TX/2FX	2891025	1
Ethernet switch , wide temperature with 6 RJ45 ports and 2 fiber optic ports in ST format, for 10/100 Mbps	FL SWITCH SFNT 6TX/2FX ST	2891026	1

Accessories

Description	Type	Order No.	Pcs./Pkt.
Universal end clamp	E/NS 35 N	0800886	50
Patch angle with 2 ports in CAT 5e	FL PF 2TX CAT5E	2891165	1
Patch angle with 8 ports in CAT 5e	FL PF 8TX CAT5E	2891178	1
Patch angle with 2 ports in CAT 6	FL PF 2TX CAT6	2891068	1
Patch angle with 8 ports in CAT 6	FL PF 8TX CAT6	2891071	1
Patch angle with security elements for 2 ports in CAT 5e	FL PF SEC 2TX	2832687	1
Patch angle with security elements for 8 ports in CAT 5e	FL PF SEC 8TX	2832690	1
Patchbox 8 x RJ45 CAT 5e, pre-assembled, can be retrofitted	FL PBX 8TX	2832496	1
Patch cable, CAT 5, pre-assembled, 0.3 m long	FL CAT5 PATCH 0,3	2832250	10
Patch cable, CAT 5, pre-assembled, 0.5 m long	FL CAT5 PATCH 0,5	2832263	10
Patch cable, CAT 5, pre-assembled, 1.0 m long	FL CAT5 PATCH 1,0	2832276	10
Patch cable, CAT 5, pre-assembled, 1.5 m long	FL CAT5 PATCH 1,5	2832221	10
Patch cable, CAT 5, pre-assembled, 2.0 m long	FL CAT5 PATCH 2,0	2832289	10
Patch cable, CAT 5, pre-assembled, 3.0 m long	FL CAT5 PATCH 3,0	2832292	10
Patch cable, CAT 5, pre-assembled, 5.0 m long	FL CAT5 PATCH 5,0	2832580	10
Patch cable, CAT 5, pre-assembled, 7.5 m long	FL CAT5 PATCH 7,5	2832616	10
Patch cable, CAT 5, pre-assembled, 10.0 m long	FL CAT5 PATCH 10	2832629	10
Security frame for SFN switch and patch fields, green	FL PLUG GUARD, GN	2891615	20
Security frame for SFN switch and patch fields, red	FL PLUG GUARD, RD	2891712	20
Security frame for SFN switch and patch fields, white	FL PLUG GUARD, WH	2891819	20
Security frame for SFN switch and patch fields	FL PORT GUARD	2891220	20
Security frame for SFN switch and patch fields	FL PLUG GUARD KEY	2891327	1
Security element for FL CAT patch	FL PATCH SAFE CLIP	2891246	20
Mounting plate for SFNT... 5 and 8 port switches	FL PA SFNT 5-8	2891012	1

4 Technical Data

General Data

Function	Switch/repeater; conforms to standard IEEE 802.3
Latency of the communication processor	8 µs plus frame time
Housing dimensions (width x height x depth)	
5-port switch, without connectors	30 x 130 x 100 mm
8-port switch, without connectors	50 x 130 x 100 mm
Weight, without connectors	
FL SWITCH SFNT 5TX	271 g
FL SWITCH SFNT 8TX	457 g
FL SWITCH SFNT 4TX/FX	276 g
FL SWITCH SFNT 7TX/FX	464 g
FL SWITCH SFNT 7TX/FX ST	465 g
FL SWITCH SFNT 6TX/2FX	484 g
FL SWITCH SFNT 6TX/2FX ST	484 g
Operating temperature	-40°C to 75°C
Storage temperature	-40°C to 85°C
Degree of protection	IP20, DIN 40050, IEC 60529
Protection class	Class 3 VDE 0106; IEC 60536
Humidity (operation and storage)	5% to 95%, no condensation
Air pressure (operation)	62 kPa to 108 kPa, 4160 m above sea level
Air pressure (storage)	62 kPa to 108 kPa, 4160 m above sea level
Mounting	NS 35 (EN 60715)
Preferred mounting position	Perpendicular to a standard mounting rail
Connection to protective earth ground	Snapped onto a grounded mounting rail

Supply Voltage (US)

Connection type	Removable, screw-clamp connector
Wire size (solid/stranded/AWG)	0.2 to 2.5 mm ² / 0.2 to 2.5 mm ² / 24 to 12 AWG
Recommended PE wire size	2.5 mm ²
Nominal power supply	24 V DC
Permissible ripple	3.6 V _{pp} within the permissible voltage range
Permissible voltage range	9 V DC to 32 V DC
Test voltage	500 V DC for one minute
Protection against polarity reversal	Present

Current Consumption and Inrush Current

	Current Consumption (max) @ 24 V DC	Inrush Current
FL SWITCH SFNT 5TX	120 mA	5.0 A for 68 µs
FL SWITCH SFNT 8TX	153 mA	7.0 A for 30 µs
FL SWITCH SFNT 4TX/FX	180 mA	8.1 A for 4 µs
FL SWITCH SFNT 7TX/FX	175 mA	8.0 A for 31 µs
FL SWITCH SFNT 7TX/FX ST	175 mA	8.0 A for 30 µs
FL SWITCH SFNT 6TX/2FX	250 mA	11.6 A for 30 µs
FL SWITCH SFNT 6TX/2FX ST	250 mA	10.8 A for 30 µs

Interfaces	
Total number of RJ45 Ethernet interfaces	4... 8
MAC Address Table Size (Entries)	2 K
Properties of RJ45 Ports	
Connection format	8-pos. RJ45 female connector on the switch
Connection medium	Twisted-pair cable with a conductor cross section of 0.14 mm ² to 0.22 mm ²
Cable impedance	100 Ω
Transmission speed	10/100 Mbps
Maximum network segment length	100 m
Properties of Fiber Optic Ports	
Connection format	SC duplex or ST female connector
Fiber type	Multimode
Laser protection	Class 1 according to DIN EN 60825-1:2001-11
Transmission rate	100 Mbps full duplex
Wavelength	1300/1310 nm
Fiber optic segment length	12.1 km glass fiber with F-G 62.5/125 0.7 dB/km F1000 3.3 km glass fiber with F-G 62.5/125 2.6 dB/km F600
Transmission power (medium type) dynamic (average)	
Minimum	-23.5 dBm (50/125 μm) / -20 dBm (62.5/125 μm)
Maximum	-14 dBm (50/125 μm) / -14 dBm (62.5/125 μm)
Transmission power (medium type) static	
Minimum	-22.5 dBm (50/125 μm) / -19 dBm (62.5/125 μm)
Maximum	-14 dBm (50/125 μm) / -14 dBm (62.5/125 μm)
Receiver sensitivity	
Minimum	-31 dBm (dynamic) / -31 dBm (static)
Maximum	-14 dBm (dynamic) / -14 dBm (static)
Alarm Contacts	
Voltage	24 V DC
Current carrying capacity	100 mA maximum including inrush
Mechanical Tests	
Shock test according to IEC 60068-2-27	Operation: 25g, 11 ms period, half-sine shock pulse Storage/transport: 50g, 11 ms period, half-sine shock pulse
Vibration resistance according to IEC 60068-2-6	Operation/storage/transport: 5g, 150 Hz, Criterion 3
Free fall according to IEC 60068-2-32	1 m
Conformance With EMC Directives	
Developed according to IEC 61000-6-2	
IEC 61000-4-2 (ESD)	Contact: ±4 kV, Criterion B Air: ±8 kV, Criterion B
IEC 61000-4-3 (radiated-noise immunity)	10 V/m, Criterion A
IEC 61000-4-4 (burst)	Ports: ±1 kV, Criterion B DC power: ±2 kV, Criterion B
IEC 61000-4-5 (surge)	Ports: ±1 kV, Criterion B DC power: ±500 V, Criterion B
IEC 61000-4-6 (conducted noise immunity)	10 V/m, Criterion A
IEC 61000-4-8 (noise immunity against magnetic fields)	30 A/m, Criterion A
EN 55022 (noise emission)	Class A

Conformance With Environmental and EMC Directives for Marine Applications¹

Developed according to IEC 60945:2002

- 8.2 Dry Heat
- 8.3 Damp Heat (including test of insulation resistance)
- 8.4 Cold
- 8.7 Vibration
- 9 Electromagnetic emission
 - 9.2 Conducted emission
 - 9.3 Radiated emission
- 10.3 Immunity to conducted radio frequency
- 10.4 Immunity to radiated radio frequencies
- 10.5 Immunity to fast transients
- 10.6 Immunity to surges
- 10.7 Power supply variations
- 10.8 Power supply failure
- 10.9 Electrostatic discharge

IEC 60945 Standard magnetic compass

Safe compass distance	1.05 m
Reduced safe distance	0.65 m




IEC 60945 Steering magnetic compass

Safe compass distance	0.60 m
Reduced safe distance	0.40 m


¹ SFNT 6TX/2FX or SFNT 6TX/2FX ST approvals are pending

Approvals

General

   ROHS EEE 2002/95/EC, WEEE 2002/96/EC

Hazardous location¹

 Class 1, Division 2, Groups A, B, C, D Temp Code T4
installed in minimum IP54 enclosure

Marine¹

   **ABS** **LRV** **ClassNK**

¹ SFNT 6TX/2FX or SFNT 6TX/2FX ST approvals are pending

5 Overview

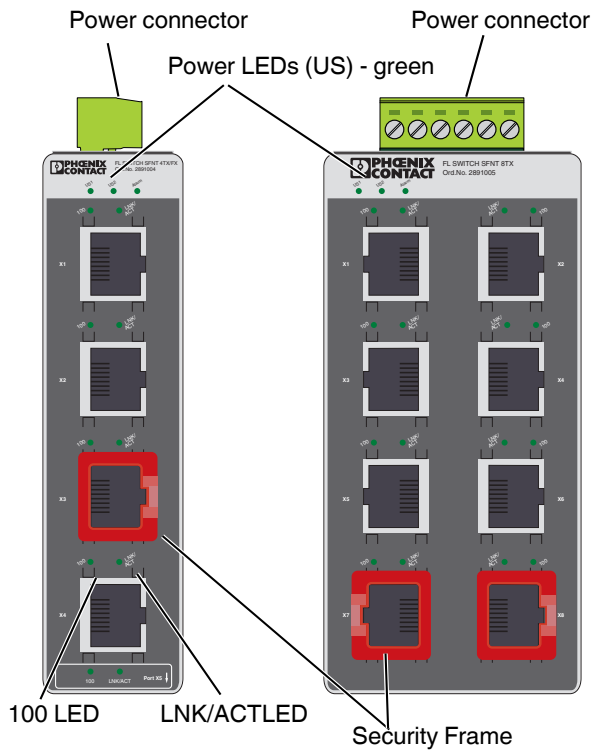


Figure 1 Power Connector, LED Locations and Security Frame

5.1 Diagnostic and Status Indicators

Des.	Color	Status	Meaning
US1 and US2	green	ON	Supply voltage (US) in the tolerance range
		OFF	Supply voltage (US) too low
Alarm	red	ON	US1 or US2 is too low or missing Port link failure
		OFF	Normal operation

5.2 Data Transmission Speed LEDs (2 LEDs/Port)

	10 Mbps	100 Mbps
LNK/ACT	ON/blinking	ON/blinking
100	OFF	ON



LNK/ACT LED:

ON: indicates an electrical link

Flashing: indicates network traffic (at high data rates the blinking is in a constant rate)

6 Installation



CAUTION:

Only qualified personnel may start up and operate this device. Qualified personnel are persons authorized to start up, ground and mark devices, systems, and equipment according to the standards of safety technology.



NOTE:

The FL SWITCH SFNT... module is designed for SELV and PELV operation according to IEC 61140/EN 61140.

Install the FL SWITCH SFNT... on a clean NS 35 rail. To avoid contact resistance use only clean, corrosion-free rails that meet the EN 60715 standard. End clamps can be mounted on both sides of the module to stop the modules from slipping on the rail.



NOTE:

Connect the mounting rail to protective earth ground using a grounding terminal block. The modules are grounded when they are snapped onto the rail. Connect protective earth ground with low impedance.

6.1 Assembly

1. Place the module onto the rail from above. The upper holding keyway must be hooked onto the top edge of the rail.
2. Push the module from the front towards the mounting surface.
3. Once the module has been snapped on properly, check that it is fixed securely on the rail.

6.2 Removal

1. Insert a suitable tool (e.g., needle-nose pliers) into the arresting latch and pull it down.
2. Pull the module slightly away from the mounting surface.
3. Lift the module from the rail.

6.3 FL PA SFNT 5-8 Mounting Plate

The FL PA SFNT 5-8 mounting plate provides a method for mounting SFNT 5- and 8-port switches to a flat surface in any orientation. The plate can be mounted on either side of the switch to allow the network ports to face the proper direction.

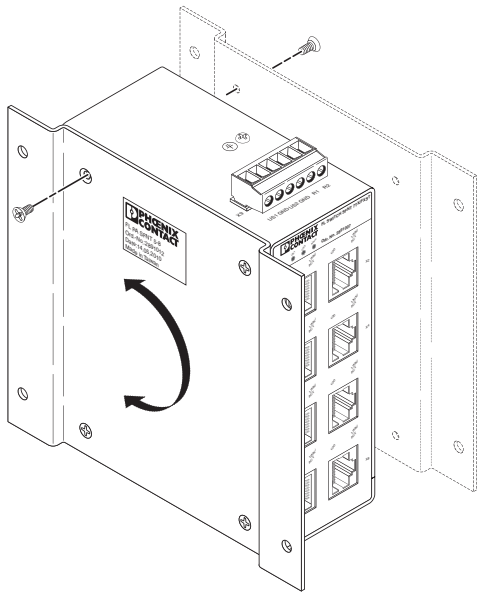


Figure 2 FL PA SFNT 5-8 Mounting Plate



The dimensions of the FL PA SFNT 5-8 are shown in Figure 10.



Additional information for the FL PA SFNT 5-8 can be found at www.phoenixcontact.net/catalog.

6.4 Power Connection

The switch is designed for SELV and PELV operation at +24 V DC according to IEC 61140/EN 61140. Only SELV and PELV according to the defined standards may be used for supply purposes.

Snapping the switch onto a grounded rail connects it to the ground potential. In an environment particularly prone to

EMI, noise immunity can be increased by an additional low-impedance connection to protective earth (see Figure 3).

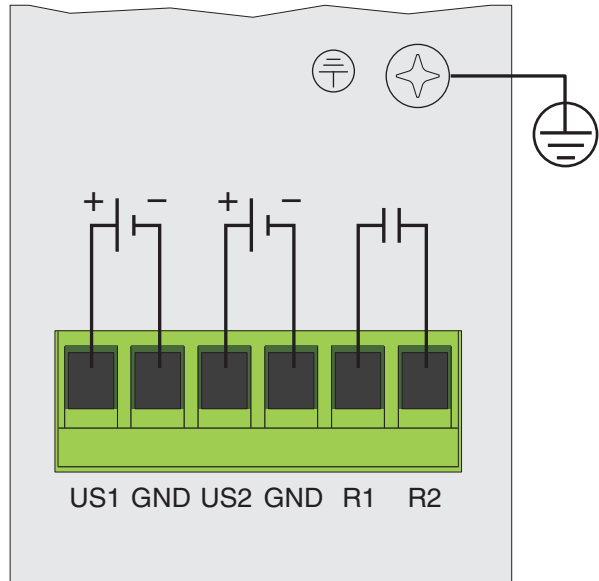


Figure 3 Power connections for redundant power supply

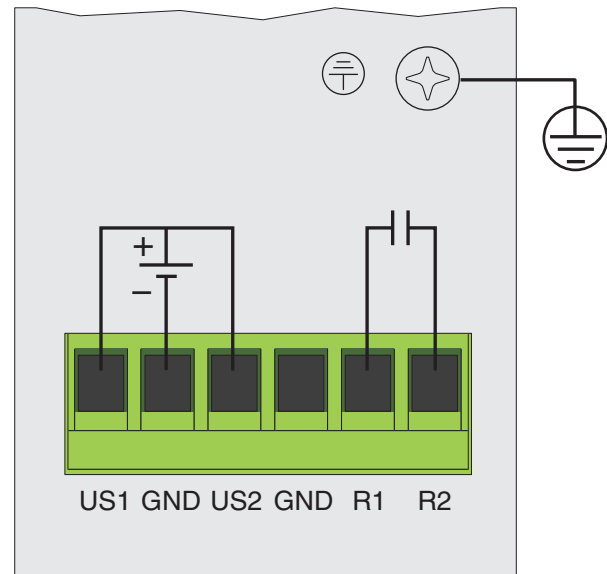


Figure 4 Power connections for single power supply

Use power conductors between 0.2 - 2.5 mm² (24 - 12 AWG). Torque connection screws to 0.5 - 0.6 Nm (5 - 7 lb-in.).

6.5 Alarm Contact

The FL SWITCH SFNT... switch provides contacts (R1, R2) for remote alarms if a failure is detected. Alarms are triggered if one or both power supplies fail. An alarm can be triggered if a port fails. Individual port alarms can be enabled via a DIP switch located on the bottom of the switch.

The alarm relay is a normally closed type. When there are no faults, the contact is held open. When a fault occurs, the relay is de-energized to close the contact.

The FL SWITCH SFNT 5TX and FL SWITCH SFNT 4TX/FX use a five-position DIP switch. The FL SWITCH SFNT 8TX, FL SWITCH SFNT 7TX/FX and FL SWITCH SFNT 7TX/FX ST use an eight-position DIP switch. Each DIP switch position corresponds to the port number.

To enable an alarm, move the appropriate slider to the ON position.



In addition to the remote alarm, failure is also indicated by the alarm LED On.
Failure indication of a fiber optic port can be in either the RX or TX fiber.

To disable an alarm, move the appropriate slider to the off position.

6.6 Ethernet Interface

The FL SWITCH SFNT... has five Ethernet ports on the front in RJ45 format to which only twisted-pair cables with an impedance of 100 Ω can be connected. The data transmission speed is 10/100 Mbps. In addition, every port has an auto crossing function: it is not necessary to make a distinction between 1:1 or crossover Ethernet cables.

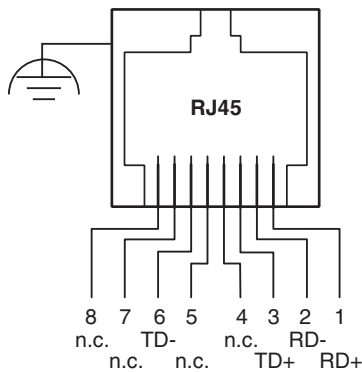


Figure 5 RJ45 pin assignment

6.7 Fiber Optic Connection

Two different types of fiber optic connection are available. The fiber optic connector(s) are located on the lower front face of the 8-port models or on the bottom face of the 5-port models.

The ST connectors are typically individual round connectors and use a 1/4-turn connection.

The SC connectors have a square interface and the “conductors” are typically locked together through the connector.

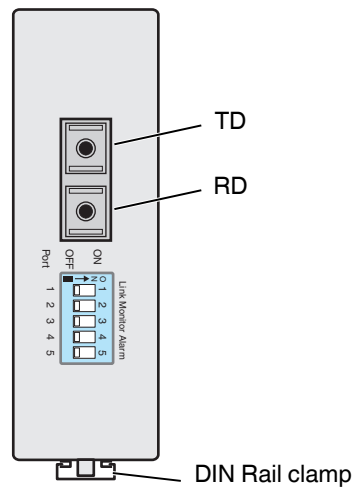


Figure 6 5-port fiber optic ports (SC connectors)

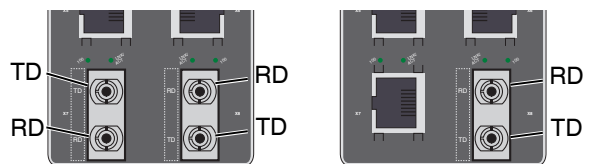


Figure 7 8-Port ST fiber optic ports

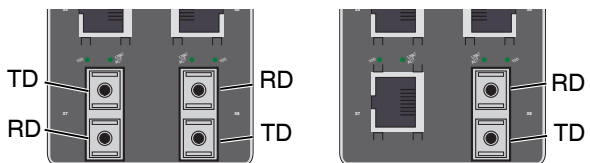


Figure 8 8-port SC fiber optic ports

7 Switching Characteristics

Store and Forward

All data telegrams received by the switch are saved and their validity checked. Invalid or faulty data packets (> 1522 bytes or CRC errors) and fragments (< 64 bytes) are rejected. Valid data telegrams are forwarded by the switch. The switch always forwards the data using the data transmission speed that is used in the destination network segment.

Multi-Address Function

The switch independently learns the addresses for termination devices, which are connected via a port, by evaluating the source addresses in the data telegrams. Only packets with unknown addresses, with a source address of this port or with a multicast/broadcast address in the destination address field are forwarded via the corresponding port. The switch can store addresses in its address table with an aging time of 5 minutes. This is important when more than one termination device is connected to one or more ports. In this way, several independent subnetworks can be connected to one switch.



A restart deletes the entire address table.

Quality of Service (QoS): IEEE 802.1P/Q

The FL SWITCH SFNT... switches are capable of reading Ethernet packets that have already been assigned a priority level by a managed switch. In cases of heavy traffic, packets with a priority level between 4 and 7 are considered high priority and processed before packets with a priority level between 0 and 3. After prioritization the packets are forwarded without modification.

8 Dimensions

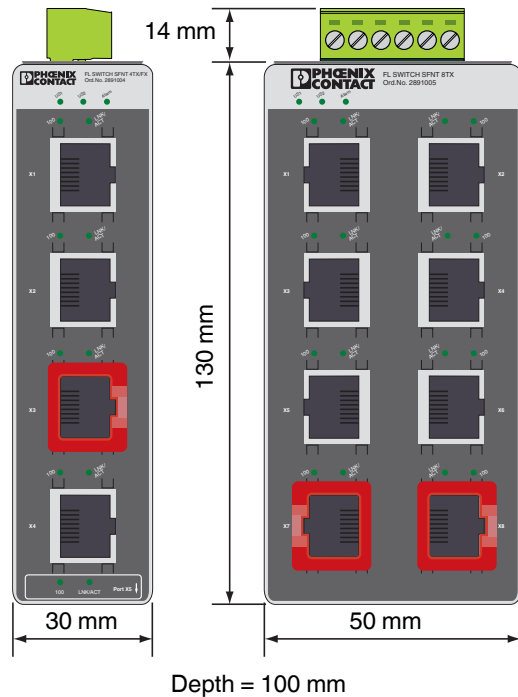


Figure 9 Housing dimensions

8.1 FL PA SFNT 5-8 Mounting Plate

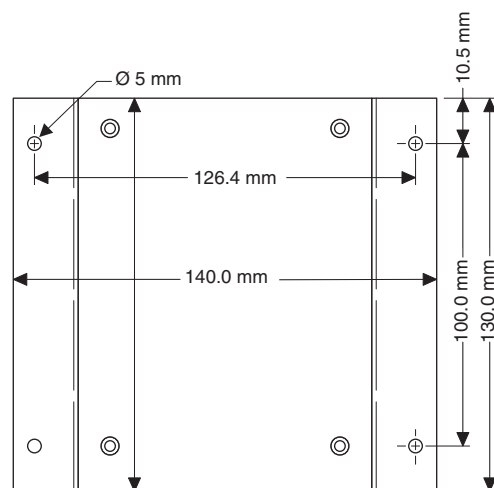


Figure 10 FL PA SFNT 5-8 Dimensions