




# ETH-T1L

## User's Manual



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## Warnings and Safety

### **STATIC ELECTRICITY**

The instrument contains CMOS devices and when serviced, be careful to prevent damage due to static electricity. This is very important to ensure long-term reliability of the unit. Such risk exists when both the instrument cover and the front panel removed.

### **INSIDE THE INSTRUMENT (MAINTENANCE)**

Under normal circumstances, there is no need to remove the front panel of the instrument.

In any case, only trained person should remove the front panel. Moreover, untrained access may lead to serious damage to the instrument, as well as may void the warranty.

Before removing the front panel:

1. Turn the unit off;
2. Wait for 10 seconds till all LED indicators are OFF;
3. Disconnect all cables connected to the unit.

### **DO NOT USE IN LIFE SUPPORT OR LIFE CRITICAL APPLICATIONS**

The instrument should not be used for Life Support or Life-Critical Systems.

This product is not designed for operating in life critical support systems and should not be used in applications where failure to perform can reasonably be expected to cause a risk of harm to property or persons (including the risk of bodily injury and death).

### **INSTALLATION SITE**

This instrument is designed for highly specialized applications. If installed in publicly accessible areas it is the responsibility of the instrument owner to ensure that the device installed in a safe and secure manner.

The instrument should be installed in a well-ventilated place and when possible be protected from direct sunlight and heat.

The housing provides no protection against explosive atmosphere. The instrument must not be operated without necessary protective measures (e.g. EX-proof housing) in an area where explosive gases could be present.

## Symbols and Abbreviations

CLI	Command Line Interface.
Flash	Electronic non-volatile storage medium that can be electrically erased and reprogrammed.
FW	Firmware.
LED	Light Emission Diode
MCU	Microcontroller Unit.
PoE	Power over Ethernet.
PoE PSE	PoE Power Sourcing Equipment.
PoE PD	PoE Powered Device.
PoDL	Power over Data Line.
SPE	Single-Pair Ethernet



Direct current. This symbol indicates a direct current (DC) power line derive from an alternating current (AC) power source.



Earth terminal.



CE. This symbol indicates that the device conforms to all legal requirements needed to achieve free movement and sale of the product through the European Economic Area (EEA).

# 1. Introduction

Dear Valued GeoSIG Customer, thank you for purchasing this product.

These products have been optimised to meet the requirements of the majority of customers out of the box and may have even be delivered tailored to your needs. In any case, to be able to get the most out of our product, please carefully study this manual, its appendices and referenced manuals, as well as any other documents delivered with it.

This is a reliable and easy to use device, and at the same time a sophisticated product, which requires care, attention and know-how in configuring, installing, operating and maintenance.



***The ETH-T1L can be referred as the GeoSIG long distance ethernet switch in this document. The ETH-T1L is a device name for the GeoSIG long distance ethernet switch.***



***The ETH-T1L Ethernet switch can be supplied with power from one of the following sources:***

- ***External power supply or external UPS;***
- ***SPE port in PoE PSE mode of another GeoSIG Ethernet switch. Power consuming GeoSIG Ethernet switch must have SPE port 1 in PoE PD mode.***

***All these power sources must be safely grounded and meets all applicable local regulations.***



***WARNING!***

***Improper connection of power supply or PoE injector may damage the Ethernet Switch. Always connect the power supply with the correct polarity and avoid powering the Ethernet Switch through Ethernet ports 1 or 2.***



***It is strongly recommended to use the manufacturer-provided power supply for the Ethernet Switch. However, if you must use a custom power supply, ensure it provides the precise voltage and current requirements as specified in the device's documentation, even under varying operating conditions. Contact the manufacturer for specific recommendations on compatible power supplies. You are solely responsible for the safety of your power system. Make sure to provide proper grounding for all connected equipment to prevent electrical hazards.***

## 2. Device description

Figure 1 shows the open view of GeoSIG Ethernet switch.

The GeoSIG ETH-T1L switch features two pairs of communication ports that adhere to distinct standards:

- 100BASE-TX or 10BASE-T: Ethernet connections up to 100 meters in length, utilizing UTP Cat 5e cables. This standard will be referred to simply as "Ethernet" throughout this document. For specific details regarding Ethernet cables, refer to the "Cable Requirements" chapter.
- 10BASE-T1L: Long-distance Single-Pair Ethernet (SPE) connections reaching up to 1 kilometre in length. This standard will be designated as "SPE" in this document. Actual distances may exceed 1 kilometre. For comprehensive information on SPE cables, consult the "Cable Requirements" chapter.

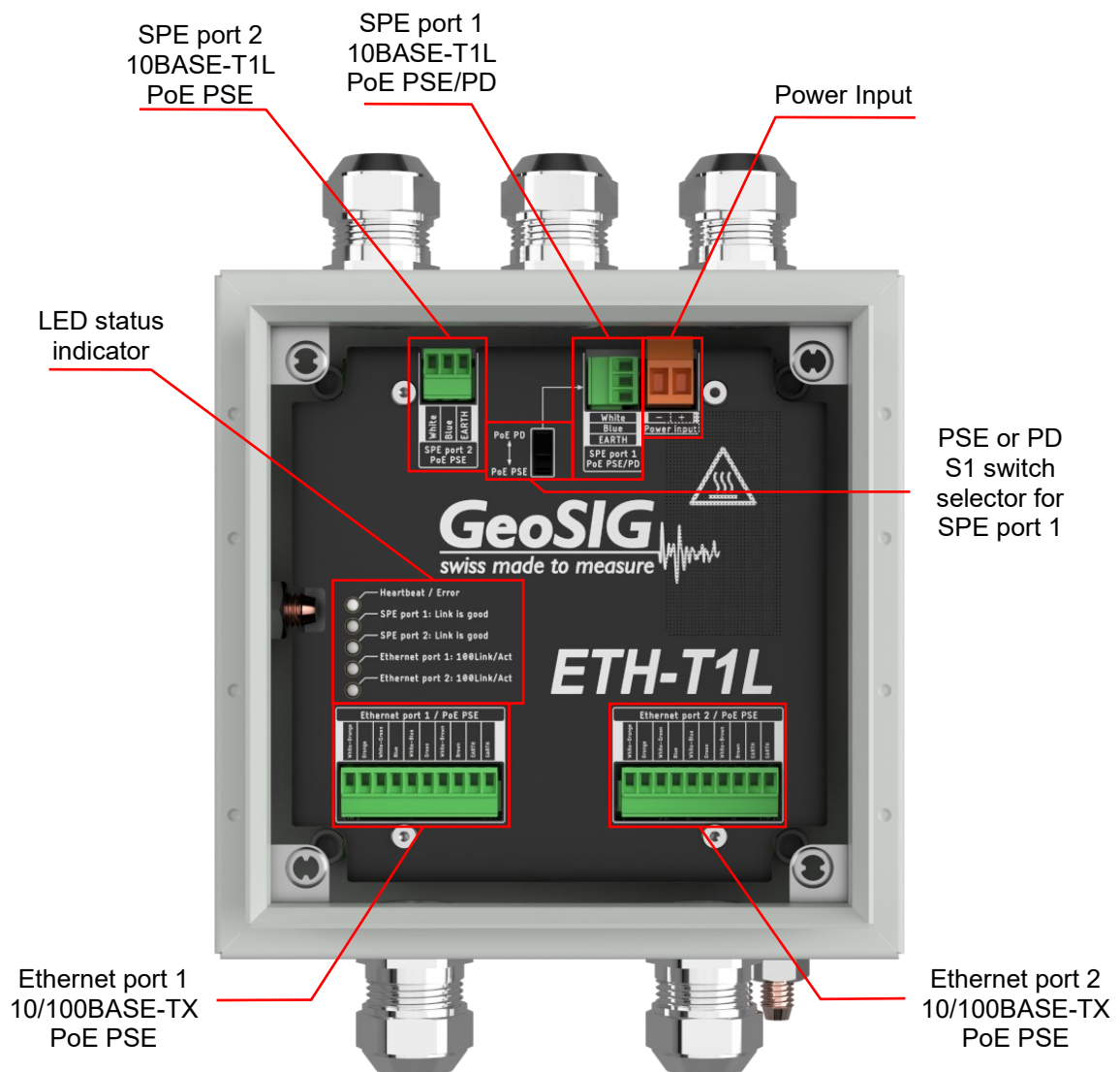


Figure 1. Ethernet switch connectors

The ETH-T1L switch can be powered either by an external power supply or an uninterruptible power supply (UPS) connected to the power input connector. Additionally, all Ethernet ports and SPE port 1 and 2 can act as Power Sourcing Equipment (PSE), providing power to devices with Power over Ethernet (PoE) capability. SPE port 1 can also be configured to function as a Power over Ethernet (PoE) Device (PD), drawing power from another PSE device.

Refer to the chapter "Configuration of SPE Port 1 into PoE PSE or PoE PD Mode" for detailed instructions on switching SPE port 1 between PSE and PD modes.



## 2.1. Standards Supported by ETH-T1L Ethernet Switch Ports

Table 1 shows communication and PoE standards supported by ports of GeoSIG Ethernet switch.

Port	Communication Standard	PoE Standard
SPE port 1	10BASE-T1L – IEEE802.3cg	PoE PSE – IEEE802.3at Type 1, Type 2
		PoE PD – IEEE802.3at Type 2
SPE port 2	10BASE-T1L – IEEE802.3cg	PoE PSE – IEEE802.3at Type 1, Type 2
Ethernet port 1	100BASE-TX – IEEE802.3u or 10BASE-T – IEEE 802.3i	PoE PSE – IEEE802.3at Type 1, Type 2
Ethernet port 2	100BASE-TX – IEEE802.3u or 10BASE-T – IEEE802.3i	PoE PSE – IEEE802.3at Type 1, Type 2

Table 1. Standards supported by GeoSIG Ethernet switch ports

## 3. Requirements

### 3.1. Compatible Products

The ETH-T1L switch offers two pairs of communication ports that operate within distinct standards:

- SPE Ports 1 and 2: These ports enable communication with Single-Pair Ethernet (SPE) devices, including third-party products, adhering to the 10BASE-T1L standard, extending up to 1 kilometre through twisted-pair cables. Auto-negotiation ensures compatibility with both full-duplex and half-duplex modes.
- Ethernet Ports 1 and 2: These ports facilitate communication with any Ethernet device compatible with 10BASE-T and/or 100BASE-TX standards, providing connectivity up to 100 meters using UTP Cat5e cables. Auto-negotiation ensures compatibility with both full-duplex and half-duplex modes.
- SPE Port 1: This port can be configured between acting as a Power Sourcing Equipment (PSE) or a Power over Ethernet Device (PD), providing or receiving power according to IEEE802.3at Type 1 or Type 2 PoE standards. The PSE/PD selection is controlled by the S1 switch.
- SPE Port 2: This port can deliver power according to the IEEE802.3at standard, supporting both Type 1 and Type 2 PoE (Power over Ethernet) protocols.
- Ethernet ports 1 and 2 can provide power according to PoE standard IEEE802.3at Type 1 or Type 2.

#### **IMPORTANT!**

***The ETH-T1L switch does not support SPE Power over Data Line (PoDL) functionality. Third-party SPE devices that adhere to the PoDL standard cannot provide or receive power through the SPE ports of the Ethernet switch.***

### 3.2. Installation requirement

The housing of the GeoSIG Ethernet switch must be grounded to the PE (Protective Earth) bus of the Main AC or to an individual Protection Earth circuit if no Main AC is used. This grounding connection is crucial for ensuring electrical safety and preventing potential hazards.

To facilitate grounding, the GeoSIG Ethernet switch features a dedicated grounding bolt located on its housing (see Figure 2). This bolt should be securely connected to a proper grounding point, such as the Main AC's PE bus or an individual Protection Earth circuit.



Figure 2. Grounding Bolt on the GeoSIG Ethernet Switch Housing

In addition to grounding the GeoSIG Ethernet switch, the housing must be securely fixed on the mounting surface to ensure stability and prevent potential damage. Secure mounting prevents the switch from becoming loose or dislodged, which could lead to jostling or vibrations that could affect its performance or cause physical damage. See chapter 4.2 for details.

### 3.3. Power Supply requirement

The GeoSIG Ethernet switch requires a power supply or UPS with an output of 54 VDC and 1 A to operate properly. The power supply should be connected to the power input connector as described in Figure 1 and the wiring diagram of section 4.3.1.

It is important to use the correct power supply for the ETH-T1L switch. Using a power supply with an insufficient or incorrect output voltage or current could damage the switch. Please refer to the manufacturer's instructions of the power supply to select the proper device or contact GeoSIG for a compatible choice.

Optionally, the ETH-T1L switch can be internally equipped with a DC/DC converter that allows it to accept input voltages ranging from 9 VDC to 75 VDC. Please ensure that the delivered product is compatible with the intended power supply voltage.

### 3.4. Cable requirement

The GeoSIG ETH-T1L switch requires two types of cables for connecting devices. One type for the Ethernet and one for the SPE.

For Ethernet connections, the recommended cable type is UTP Cat 5e, or better, which is widely available and compliant with the EIA/TIA T568B standard. Ethernet cables with this specification can be up to 100 meters in length.

For the long-distance connections, the switch supports Single-Pair Ethernet (SPE) cables. SPE cables must have one twisted pair of conductors and it is highly recommended that it complies with either IEC 61156-13 or IEC 61156-14 standards. According to these standards, SPE cables can be up to 1000 meters in length. However, real testing indicates that SPE cables with 18 AWG conductors can achieve distances of up to 1500 meters for data communication only. Nevertheless, **GeoSIG recommends a maximum cable length for SPE connections of 1200 meters**. In some exceptional cases, the maximum length can be extended to 1500 meters, but only after thorough testing of the wiring configuration has been conducted before site installation.

If power over Ethernet (PoE) is used, it is important to note that cables with too thin conductors can experience significant power loss, which could lead to unstable network performance or even complete power or network failure. For reliable PoE operation over long distances, it is recommended to use thicker SPE cables with larger conductor gauges.

When using the SPE Power over Ethernet (PoE) function, the gauge of the cable conductors needs to be larger as the cable length increases and the number of PoE Power Device (PD) devices connected in the network branch increases. This ensures that power losses are minimized and the network operates reliably.

Table 2 show results of real tests for SPE cable with 18 AWG conductor's gauge.

Distance, m	Maximum power, W
1000	16.8
1500	12.5

Table 2. Tested SPE cable distance versus power consumed by network branch.

## 4. Installation

This device is maintenance-free due to its design with no replaceable or disposable parts. However, if installed in publicly accessible areas, it is the responsibility of the device owner to ensure that the device is installed in a safe and secure manner to prevent unauthorized access or damage.

The housing of the Ethernet switch offers IP66 protection against dust and water ingress. This means that the device can withstand dust and water jets from any direction, providing exceptional protection for outdoor installations.

However, it's crucial to note that IP66 protection does not guarantee protection against being submerged in water or explosive atmospheres. The device must not be operated in areas where explosive gases are present without implementing necessary protective measures (e.g., using an EX-proof housing) to ensure safety.

Despite the device's robust, weatherproof housing, it's recommended to install it in a protected location, free from direct sunlight, precipitation, and potential hazards such as falling objects during earthquakes. Moreover, consider installing the device in a secure location to minimize the risk of tampering or vandalism, especially if it will be left unattended for extended periods.

### 4.1.1. Configuration Considerations

To ensure the proper functioning and compatibility of the ETH-T1L switch, it is recommended to conduct thorough testing and configuration in a controlled environment before deploying it in the field. This approach minimizes the risk of errors and ensures a smooth and seamless integration into the network. See chapter [Configuration](#).

## 4.2. Mechanical installation



*Seismic equipment is often installed in environments prone to electrical disturbances, such as lightning strikes or industrial environments. While the Ethernet switch has built-in overvoltage protection, additional surge protection may be necessary to safeguard the equipment from severe electrical surges. For specific recommendations on surge protection, please consult GeoSIG or your local representative.*

The mounting location for the Ethernet switch should provide ample space for cable glands and cable routing without sharp bends or kinks.

To minimize crosstalk and potential damage, Ethernet and SPE cables should be routed at least 150 mm away from main AC cables. In areas with high voltages (> 240 VAC), this distance should be increased and/or separate metal conduits may be considered.

The Ethernet switch can be mounted directly to a wall or plate using the mounting holes on the housing or securely attached using mounting brackets. Mounted brackets include sealing washers to maintain the IP rating. Figure 3 demonstrate view of generic housing mounted with help of mounting brackets.

Type of mounting brackets can be one of:

- AW41 – material of brackets is 3 mm zinc plated steel
- AWS41-304 – material of brackets is 3 mm stainless steel 304
- AWS41-316 – material of brackets is 3 mm stainless steel 316



*Direct mounting of the housing through its holes is not recommended for environments that require IP protection.*

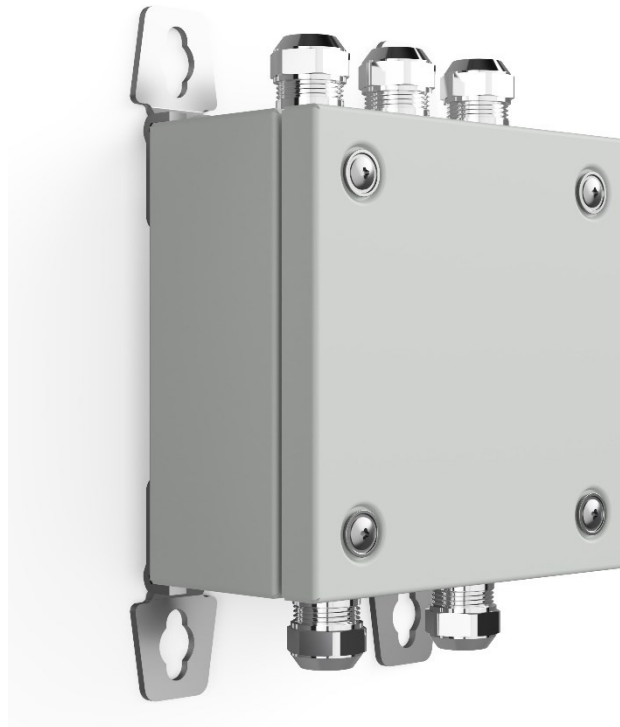
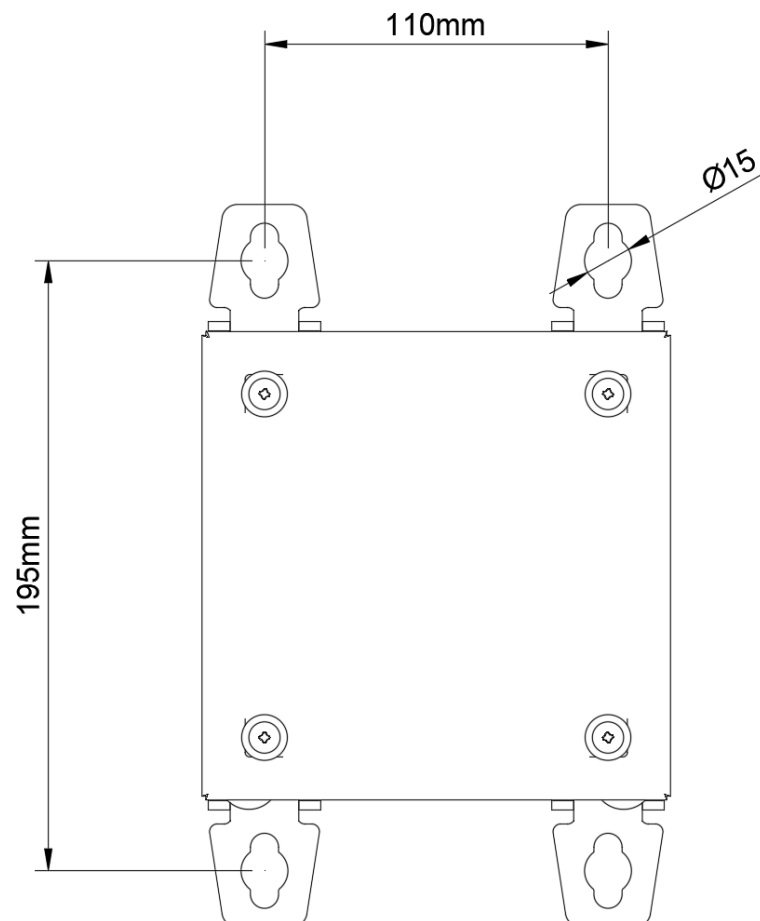


Figure 3. Housing mounted with brackets.

The necessary clearance and the drilling pattern for the mounting holes are illustrated in the following image.



## 4.3. Wiring Diagrams

### IMPORTANT

Due to the delicate nature of the internal components, the wiring installation should be performed exclusively by a qualified electrician. GeoSIG is available to provide additional assistance with the installation process if any questions or uncertainties arise. The improper wiring installation can bring to safety hazards and damage to the connected devices or the Ethernet switch itself.

#### 4.3.1. Power Input Cable

The output cable of the external power supply must be wired according to the specifications in Table 3. Using wires sleeves of the correct size is highly recommended for a secure and reliable connection.

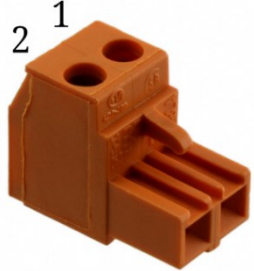
Wire polarity	Pin #	Description	
-	1	Negative power supply (GND)	
+	2	Positive power supply	

Table 3. Power cable pinout.

#### 4.3.2. SPE Cables

The SPE cables must be wired in accordance with Table 4. Using wires sleeves of the correct size is highly recommended for a secure and reliable connection.

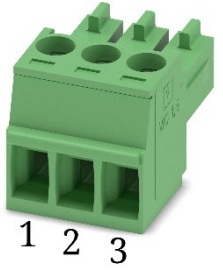
Pin #	Wire colour	Description	
1	Shield	Shield or earth protection	
2	Blue	SPE negative signal, PD/PSE negative	
3	White	SPE positive signal, PD/PSE positive	

Table 4. SPE cable pinout.

### 4.3.3. RJ-45 Ethernet Cables

Ethernet cables must be wired according to the ANSI/TIA-568B standard, which specifies the order in which the wires are paired and connected to the RJ-45 connectors. See Table 5.

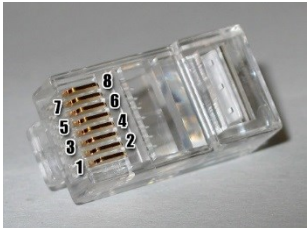
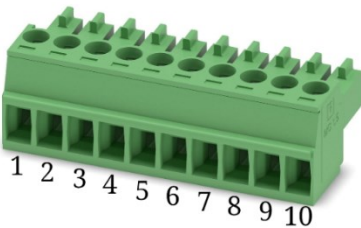
RJ-45 connector	Pin #	Wire colour		Wire colour	Pin #	Description
	1	White-orange	↔	White-orange	10	
	2	Orange	↔	Orange	9	
	3	White-green	↔	White-green	8	
	4	Blue	↔	Blue	7	
	5	White-blue	↔	White-blue	6	
	6	Green	↔	Green	5	
	7	White-brown	↔	White-brown	4	
	8	Brown	↔	Brown	3	
	Shield			Shield	2	
	Shield			Shield	1	

Table 5. Ethernet cable pinout.

### 4.3.4. Ethernet Cables for GMS series

The GMS recorders can be equipped with two different Ethernet cable types: a two-pair and a four-pair cable.

For two-pair cables, only data transmission is supported. The wiring connection should be made in accordance with Table 6. It's recommended that the output power to the device is disabled in this case; instructions are provided in Chapter 6.2.

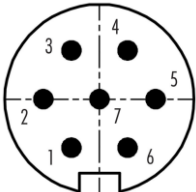
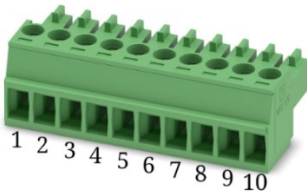
GMS connector	Pin #	Wire colour		Wire colour	Pin #	Description
	4	WHITE or White-orange	↔	WHITE or White-orange	10	
	5	BLUE or Orange	↔	BLUE or Orange	9	
	2	RED or White-green	↔	RED or White-green	8	
	-	-	↔	Not Connected	7	
	-	-	↔	Not Connected	6	
	3	Green	↔	ORANGE or Green	5	
	-	-	↔	Not Connected	4	
	-	-	↔	Not Connected	3	
	Shield			Shield	2	
	Shield			Shield	1	

Table 6. Ethernet cable pinout for GMS series (2-pairs)

For four-pair cables, both data and power transmission are supported. The wiring connection should be made in accordance with Table 7.

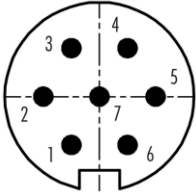
GMS connector	Pin #	Wire colour		Wire colour	Pin #	Description
	4	White-orange	↔	White-orange	10	
	5	Orange	↔	Orange	9	
	2	White-green	↔	White-green	8	
	6	Blue	↔	Blue	7	
		White-blue	↔	White-blue	6	
	3	Green	↔	Green	5	
	7	White-brown	↔	White-brown	4	
		Brown	↔	Brown	3	
	Shield			Shield	2	
	Shield			Shield	1	

Table 7. Ethernet cable pinout for GMS series (4-pairs)



## 4.4. Examples of Installation

Example 1 in Figure 4 illustrates a network topology where the main site, Site 1, acts as a central hub for power distribution. It receives power from the Main AC source, through a power supply or UPS, and distributes it to other sites via PoE (Power over Ethernet) or SPE (Single Pair Ethernet) cables.

- Site 1 provides power to Site 2 through a standard Ethernet cable, the maximum cable length is 100 meters.
- Site 1 provides power to Site 3 and Site 4 through SPE cables, which are designed for longer distances and higher power transmission capabilities. The SPE Port 1 is configured as PoE PSE, see chapter 6.1. The maximum length is 1200 meters when AWG18 cables are used. Please note that if more devices are connected in cascade, the cable length is reduced.
- Site 3 receives power from the Site 1 and then distributes power to Site 5 through another Ethernet cable. On Site 3 the SPE Port 1 is configured as PoE PD, see chapter 6.1.
- Site 4 finally provides power to Site 6 through an Ethernet cable. On Site 4 the SPE Port 1 is configured as PoE PD, see chapter 6.1.

It's crucial to maintain a balanced network topology with evenly distributed power branches.

Excessively long or thick PoE branches can lead to power losses, potentially affecting the functionality of downstream sites.

To visualize this example, refer to Figure 4.

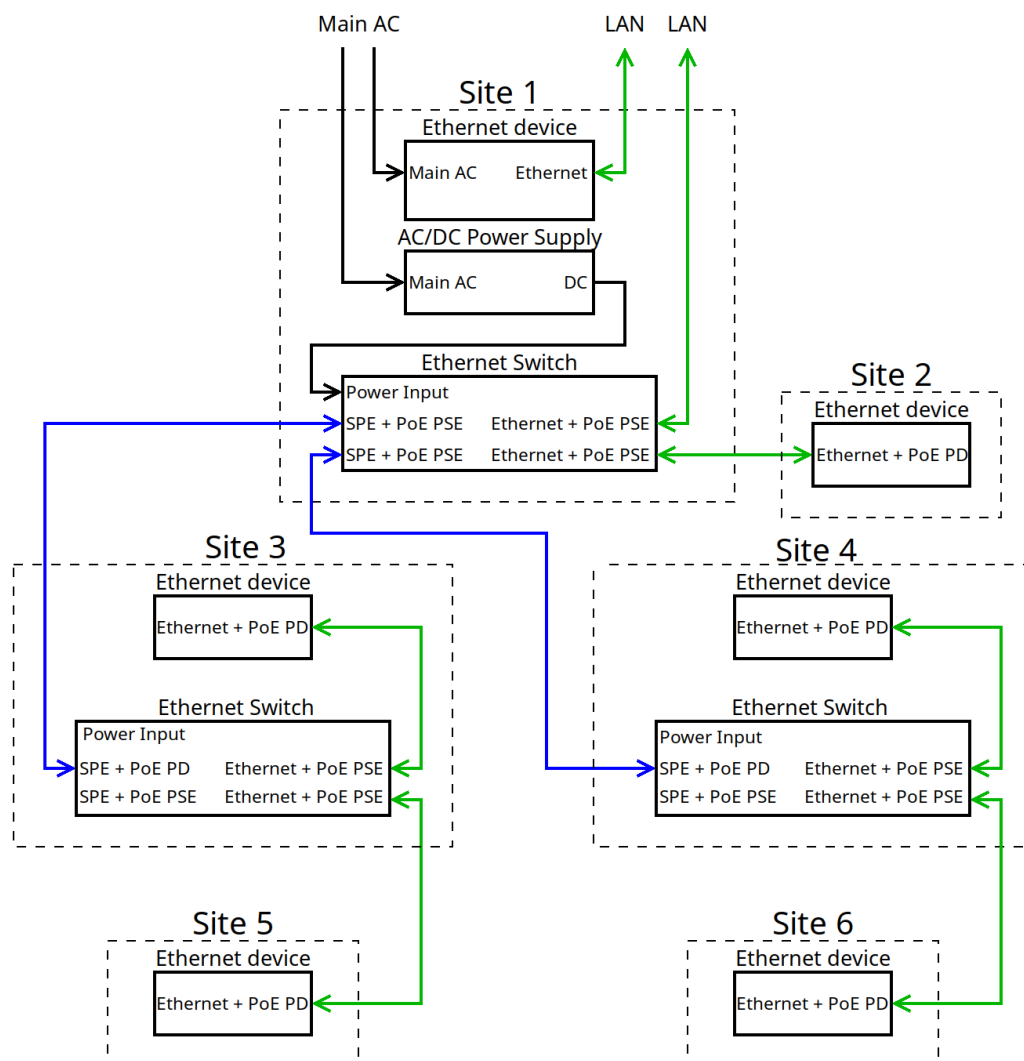


Figure 4. Example 1 of network topology.

Example 2 in Figure 5 demonstrates a network topology where the main site, Site 1, acts as the power source for Site 2 and Site 3. It receives power from the Main AC source and distributes it to these two sites via PoE (Power over Ethernet) or SPE (Single Pair Ethernet) cables.

- Site 1 provides power to Site 2 through an SPE cable, ensuring sufficient power delivery over a longer distance.
- Site 2 then distributes power to Site 3 through an Ethernet cable, allowing for data transmission and power delivery simultaneously.

This topology is suitable for situations where distance between Site 2 and Site 3 is shorter.

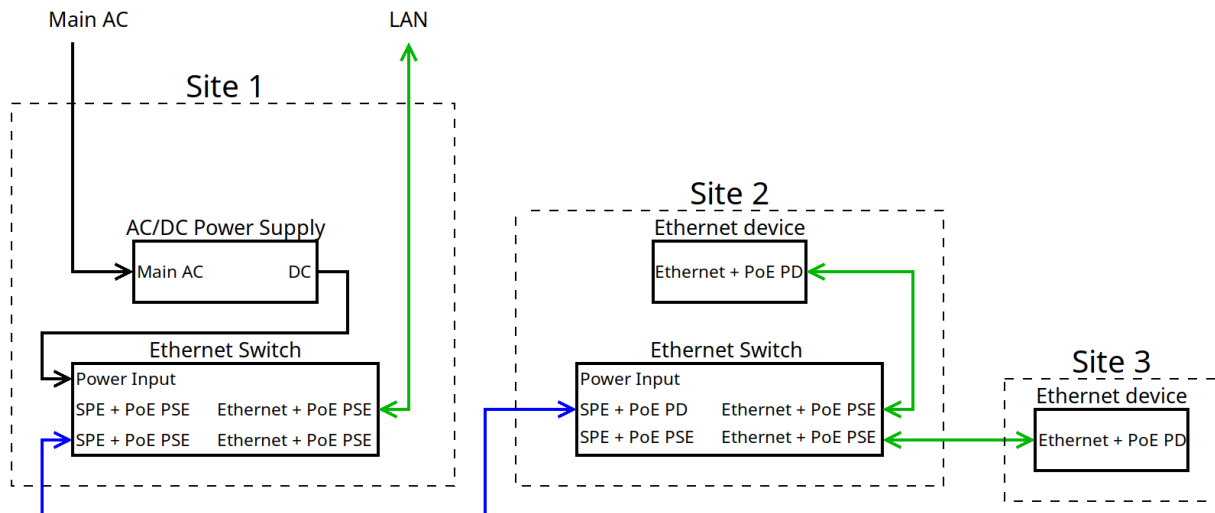


Figure 5. Example 2 of network topology.

## 4.5. Example of installation with GMS series

The ETH-T1L is a versatile Ethernet adapter that can effortlessly connect with any ethernet compatible device, including all GMS series products. It offers the added advantage of Power over Ethernet (PoE) technology, enabling the device to simultaneously transmit both power and data over a single cable. This feature is particularly beneficial in applications where power is difficult to access. In contrast, the older product, while also compatible with ethernet devices, does not support PoE and can only transmit data.

### 4.5.1. Compatibility with PoE devices

The following GMS series product are compatible with PoE installation type:

- GMS scai
- GMS nair
- GMS ela
- GMS albris

Figure 6 depicts an example of a PoE network installation within a building. At the main site (Site 1), an ETH-T1L device connected to the main power source serves as a central power distributor. It provides power and data via its SPE port 1 (configured as a Power Sourcing Equipment, PSE, see chapter 6.1) to the SPE port 1 of the Site 2. Additionally, a GMS albris device is connected to the ETH-T1L, receiving data and power through one of its Ethernet ports while the other port remains dedicated to LAN/Internet connectivity.

Similarly, the Site 2 distributes power and data from its SPE port 2 to the Site 3. Both the Site 2 and the Site 3 have PoE devices connected to their Ethernet ports, eliminating the need for separate power sources.

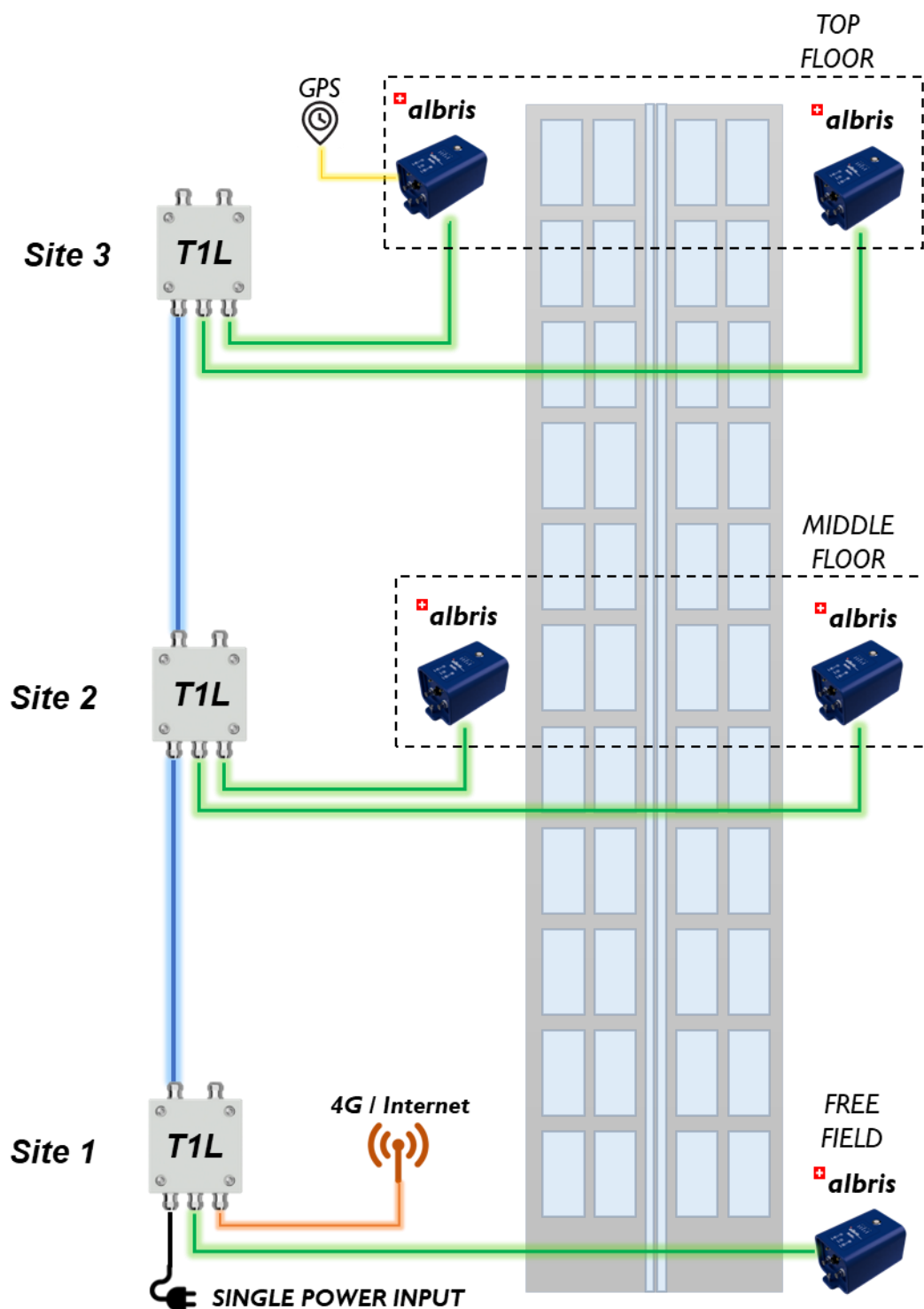


Figure 6. Example of installation of GMS albris with PoE support

#### 4.5.2. Compatibility with other devices

The ETH-T1L can be used in conjunction with both PoE and non-PoE devices. For non-PoE devices, simply connect them to any of the Ethernet ports on the ETH-T1L. The GeoSIG products that can be connected to the T1L switch without PoE support are:

- GMSplus and previous models
- “fora” and previous CR series

The ETH-T1L can be connected to a wide range of devices, including computers, laptops, printers, routers, and modems, as long as they have an Ethernet port that complies with the ANSI/TIA-568B standard.

Figure 7 illustrates an installation involving multiple GMSplus recorders connected in a daisy chain configuration, which can be extended indefinitely. Each ethernet switch is individually powered at its respective site by the GMSplus, which also provides backup power from its internal battery. In this configuration, each ETH-T1L module employs an internal DC/DC converter to accept an input voltage range of 9 to 75 VDC. To ensure proper operation, all the Ethernet and SPE ports in this configuration have their power output disabled, as explained in Chapter 6.2.

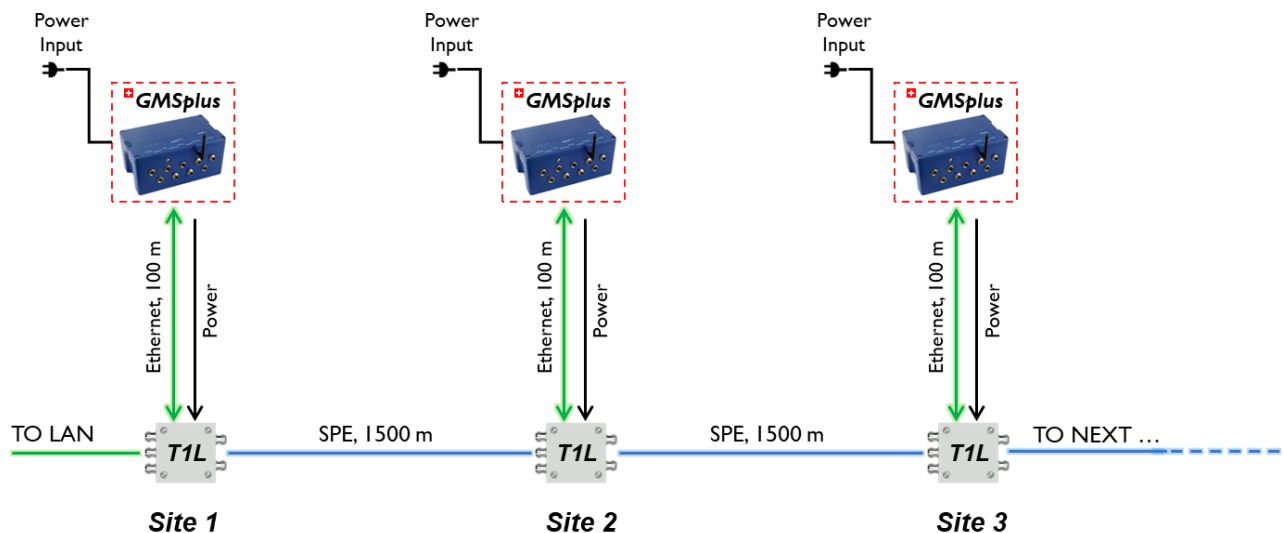


Figure 7. Example of installation with GMSplus recorders in a daisy chain configuration

## 5. Indication

### 5.1. Indication LEDs

The GeoSIG ETH-T1L Ethernet switch has five LEDs on top of the housing:

- **Heartbeat / Error:** Blinking green indicates normal operation; blinking red indicates an error.
- **SPE port 1:** Link is good: Steady green indicates a good link; blinking green indicates activity.
- **SPE port 2:** Link is good: Steady green indicates a good link; blinking green indicates activity.
- **Ethernet port 1:** 100Link/Act: Steady green indicates an established link; blinking green indicates activity.
- **Ethernet port 2:** 100Link/Act: Steady green indicates an established link; blinking green indicates activity.

These LEDs can be seen in Figure 8:

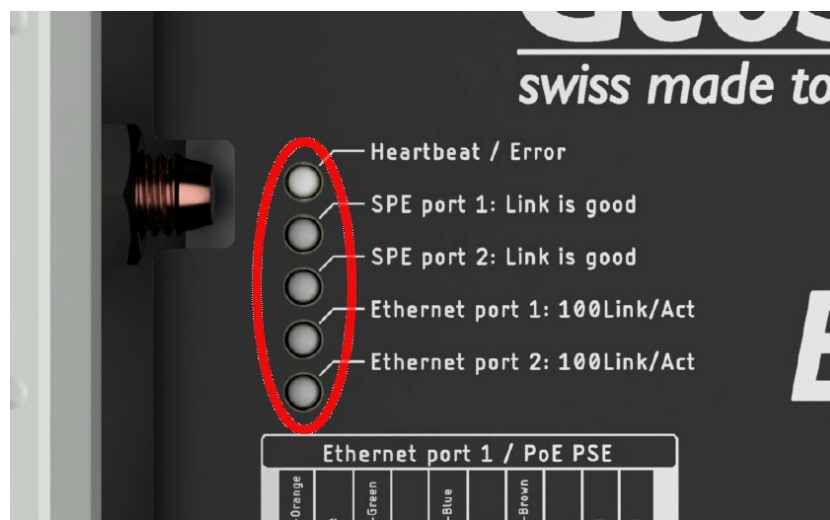


Figure 8. Position of LEDs.

### 5.1.1. Error LED Indication

In case of an error, the Heartbeat LED stops blinking green and the Error LED blinks repeatedly to indicate the Error Subsystem and Error Code. The error indication stages are as follows:

1. The Error LED blinks the number of times corresponding to the Error Subsystem, as per Table 8.
2. A short pause of approximately 2 seconds occurs.
3. The Error LED blinks the number of times corresponding to the Error Code, as specified in Table 9.
4. A longer pause of approximately 5 seconds occurs.
5. The sequence repeats from step 1.

Number of Blinks	Error Subsystem	Possible action/troubleshooting
1	ADC	Disconnect power, wait 10 seconds and power it on again. If the problem persists contact GeoSIG support.
2	Watchdog	Disconnect power, wait 10 seconds and power it on again. If the problem persists contact GeoSIG support.
3	Ethernet switch IC	Check the wiring connection of the Ethernet port 1 or port 2. If the problem persists contact GeoSIG support.
4	10BASE-T1L IC port 1	Check the wiring connection of the SPE port 1. If the problem persists contact GeoSIG support.
5	10BASE-T1L IC port 2	Check the wiring connection of the SPE port 2. If the problem persists contact GeoSIG support.

Table 8. Error Subsystems

Number of Blinks	Error Code
1	Timed out
2	Reading
3	Writing
4	Input/Output

Table 9. Error codes

## 6. Configuration

### 6.1. Configuration of SPE Port 1 into PoE PSE or PoE PD Mode

The SPE port 1 can function in two different PoE modes:

- PoE PSE: It acts as a Power Sourcing Equipment (PSE) and provides power to a Power Device (PD) connected to the other end of the SPE cable.
- PoE PD: It functions as a Power Device (PD) and draws power from a Power Sourcing Equipment (PSE) connected to the other end of the SPE cable.

The configuration of PoE PSE or PoE PD mode is determined by the S1 switch on the board. S1 switch is highlighted in Figure 9.

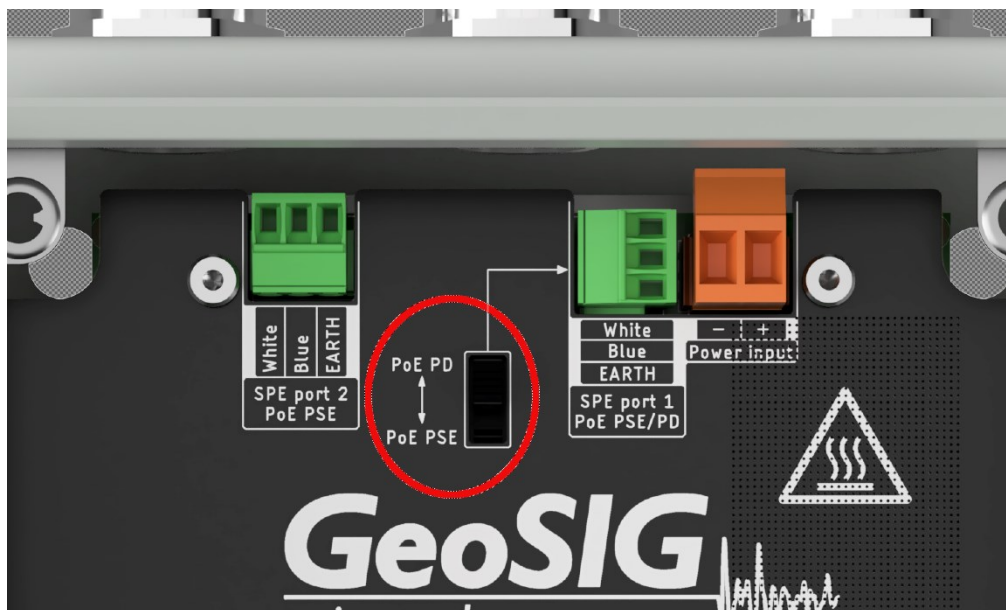


Figure 9. S1 switch for selection of PoE PSE or PoE PD mode for SPE port 1.



#### IMPORTANT!

Ensure that when the S1 switch is set to the PSE position, a compatible PoE device is connected to the other end of port 1.

## 6.2. Disable PoE function for SPE or Ethernet ports

In case of incompatibility with certain devices, it is possible to disable the power delivery of the device (SPD) for the SPE and Ethernet ports.

To disable the powering function of any of the Ethernet ports or SPE ports, open the cover panel by removing the four screws shown in the Figure 10. Locate the DIP-Switches at the bottom and configure them according to Table 10 and the desired function.

### STATIC ELECTRICITY

Due to the presence of sensitive components, caution should be taken when opening the top cover to prevent electrostatic discharge (ESD) damage. Employ all necessary precautions to minimize ESD risks and refrain from touching any integrated circuits (ICs) with your bare hands.

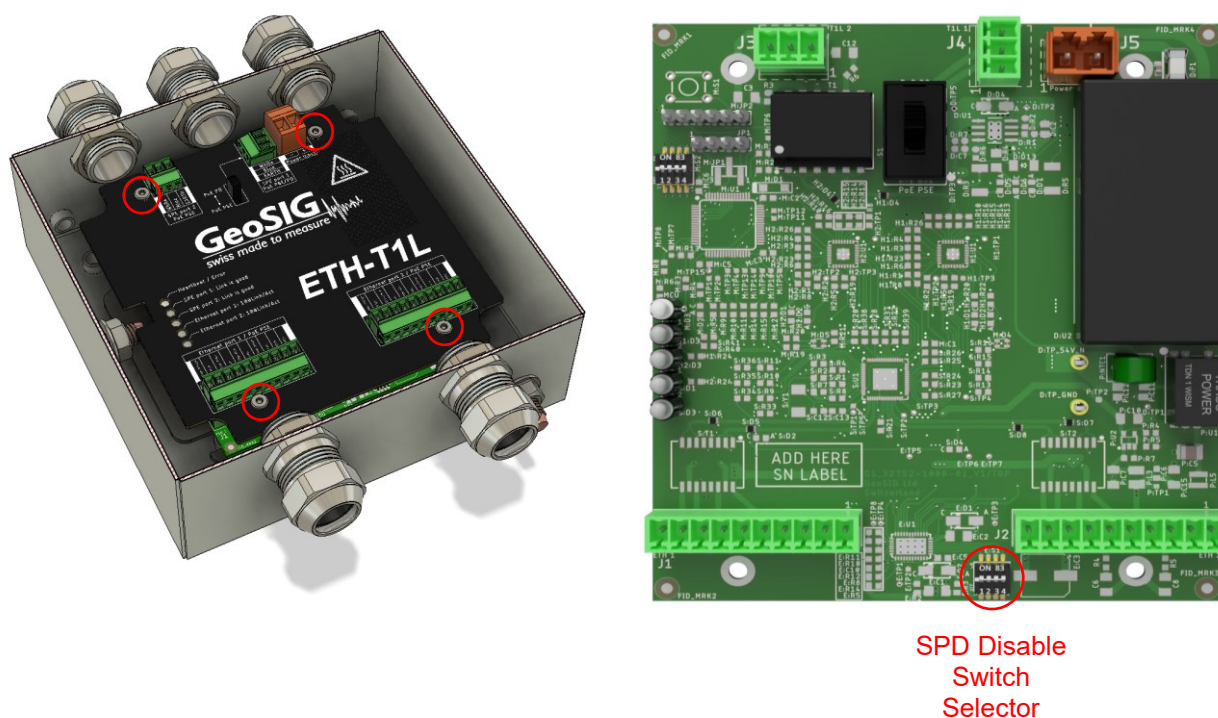


Figure 10. Location of SPD disable switched

PORT	SWITCH	POWER SOURCE DEVICE ENABLED/DISABLED
Ethernet port 1	1	ON POSITION = Disable power source OFF POSITION = Enable power source
Ethernet port 2	2	ON POSITION = Disable power source OFF POSITION = Enable power source
SPE/T1L port 1	4	ON POSITION = Disable power source OFF POSITION = Enable power source
SPE/T1L port 2	3	ON POSITION = Disable power source OFF POSITION = Enable power source

Table 10. SPD mode switch configuration



### 6.3. Ethernet Mode Switches

By default, Ethernet ports 1 and 2 automatically negotiate the speed (10 Mb or 100 Mb) and duplex (Full or Half) with connected devices to establish the fastest and most efficient connection.

In some cases, especially when the Ethernet cable length is near or exceeds the maximum limit, auto-negotiation may encounter difficulties and fail to establish the optimal configuration. To address this, you can manually configure the speed and duplex settings to lower speeds or half-duplex mode for each specific port. Manually reducing the Ethernet speed and/or duplex can resolve connection issues in situations where devices experience instability or connectivity loss over long Ethernet cables. This can be done without restarting the Ethernet switch or disconnecting and reconnecting the cable.

To change the operating modes of the Ethernet ports, open the cover panel by removing the four screws shown in the Figure 11. Locate the DIP-Switches at the top-left and configure them according to Table 11 and the desired function.

#### STATIC ELECTRICITY

Due to the presence of sensitive components, caution should be taken when opening the top cover to prevent electrostatic discharge (ESD) damage. Employ all necessary precautions to minimize ESD risks and refrain from touching any integrated circuits (ICs) with your bare hands.

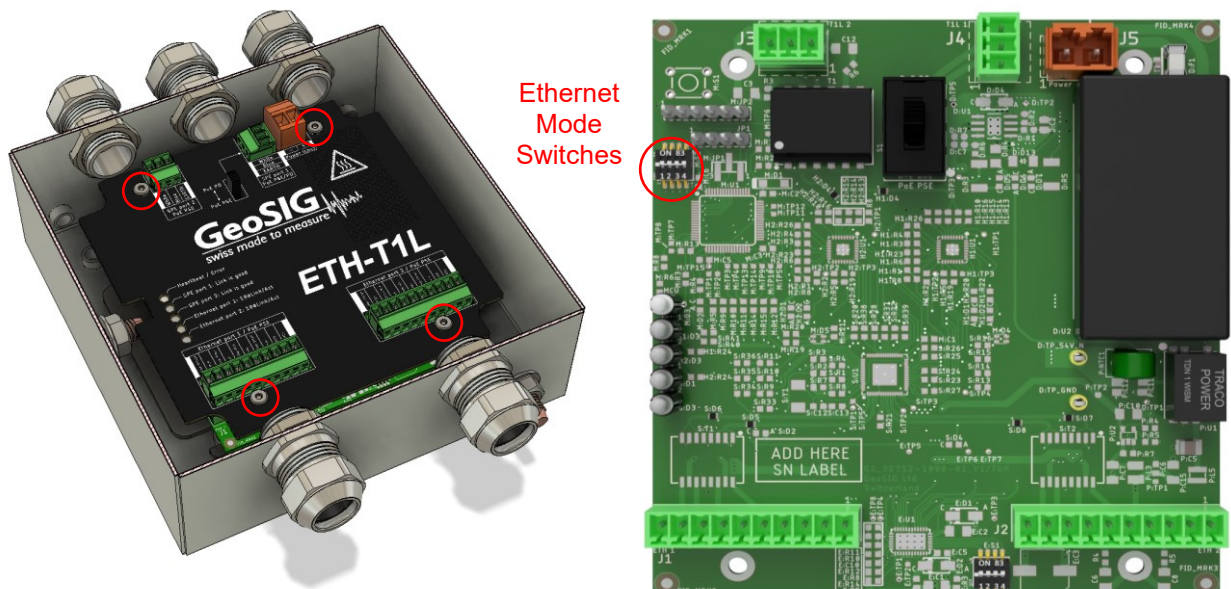


Figure 11. Position of DIP-switch for Ethernet speed and mode configuration.

Ethernet port	Switch 1	Switch 2	Advertised Auto-negotiation Modes
1	Off	Off	100 Mb, 10 Mb, Full duplex, Half duplex
	Off	On	100 Mb, 10 Mb, Half duplex
	On	Off	10 Mb, Full duplex, Half duplex
	On	On	10 Mb, Half duplex
Ethernet port	Switch 3	Switch 4	Advertised Auto-negotiation Modes
2	Off	Off	100 Mb, 10 Mb, Full duplex, Half duplex
	Off	On	100 Mb, 10 Mb, Half duplex
	On	Off	10 Mb, Full duplex, Half duplex
	On	On	10 Mb, Half duplex

Table 11. Ethernet ports speed and modes switches configuration

## 7. Accessories and optional devices

The GeoSIG ETH-T1L switch can be supplied with either an external power supply or an uninterruptible power supply (UPS) as an option. Please specify your choice in your order. The number of power supplies required depends on the installation type and the number of devices connected and powered via PoE.

Another option for the ETH-T1L switch is to embed an internal DC/DC converter to accommodate an input voltage range of 9 to 75 VDC and enhance galvanic isolation. Please specify your preference for this option in your order.