

The Philips logo is displayed in a bold, blue, sans-serif font. It is positioned within a white rectangular box that has a rounded bottom-right corner. This box is overlaid on a background image of a modern building's interior, featuring a glass facade and a wooden floor.

PoE Switch

Connected Lighting

Installation Guide

PoE switch LCN5228/00



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Preface

Audience

This guide is for the installers responsible to install the Philips PoE switch.

Purpose

This guide describes the hardware features and the physical and performance characteristics of the Philips PoE switch.
In addition installation guidelines are provided as well as troubleshooting information.

Conventions

This document uses the following conventions and symbols for notes, cautions, and warnings:

Note(s) Note(s) contain useful suggestions or references. They may also warn for actions that may result in equipment damage or loss of data.

Related Documentation

| | |
|--|--|
| Philips PoE switch, What is in the boxes ? | One pager included in box for all 5 packages. |
| <ul style="list-style-type: none">• LCN5228/00 Philips PoE Switch• Optional packages<ul style="list-style-type: none">• LCN5221/00 US mains connection kit• LCN5223/00 Rack mount bracket (19")• LCN5224/00 T-bar mounting bracket• LCN5222/00 RJ45 protection cover | |
| Philips PoE switch, Datasheet | Technical specifications |
| Philips PoE switch, Installation Guide | Mounting instructions for installer(this manual) |
| Philips PoE switch, Configuration Guide | How to setup special switch configurations |

1 Product Overview

The Philips PoE switch connects devices such as luminaires, wireless Access Points, IP Phones, and other network devices including servers, routers, and other switches. This chapter provides a functional overview of the Philips PoE switch (see the *Datasheet* for detailed specifications).

1.1 Features

The eight ports of type PoE aggregate 10BASE-T, 100BASE-TX, and 1000BASE-T Ethernet traffic from other network devices. All available RJ-45 ports except the console port (the one on the right) are usable for Ethernet traffic.

1.2 Front Panel Description

The front panel of the switch has a console port, eight PoE 10M/100M ports, and two 10M/100M/1000M uplink ports. All connectors are of type RJ-45

1.2.1 10M/100M/1000M Uplink Ports

The 10M/100M/1000M ports (9 to 10) can be configured to operate at 10, 100 or 1000 Mb/s in full-duplex or half-duplex mode. It is also possible to configure these ports for speed and duplex *auto-negotiation*. The default setting is *auto-negotiation*.

Cable specifications and pin-outs for cables are described in *appendix A Connector and Cable Specifications*.

1.2.2 10M/100M PoE Ports

For technical details see the *Datasheet*.

1.2.3 Console Port

For technical details see the *Datasheet* and the *Configuration Guide*.

The console port on the Philips PoE switch is located on the front panel. Cable details are specified in *appendix A.1 Console Port*.

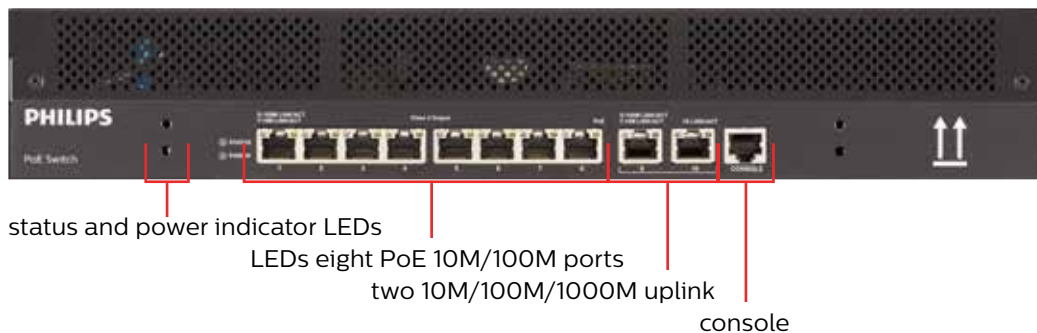


Figure 1 Front panel PoE switch

1.2.4 Indicator LEDs

For technical details see the *Datasheet*.

The LEDs of the switch are useful to monitor the activity and performance of the switch.

Power saving mode can be initiated as follows:

- 1 Turn ON power save mode
- 2 Specify an idle time between 1..3600 sec.

When idle time elapses, all LEDs switch OFF except Power LED.

Power saving mode is OFF by default.

1.3 Rear Panel Description



Figure 2 Rear panel of the PoE switch

The Philips PoE ports are powered by an internal power supply. The mains power (AC in) has an auto ranging unit. This means that input voltages between 100 and 240 VAC are allowed.

Use the supplied AC power cord to connect the AC power connector to an AC power outlet.

For applications outside US, a strain relief must be attached to the hole (red circle) below AC inlet and attached to power cable.

2 Philips PoE Switch Installation

This chapter explains:

- How to install the PoE switch.
- How to start the Philips PoE switch
- How to interpret the *power-on self-test* that ensures proper operation

2.1 Preparing For Installation

Warnings

- Read the installation instructions before connecting the switch to the power source.
- To prevent the switch from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 45° C.
- Remove jewelry (including rings, necklaces, and watches), before working on equipment connected to power lines,
- Do not stack the chassis on any other equipment. If the chassis falls, it can cause severe injury and equipment damage.
- The PoE switch ports must only be connected to ethernet or Power-over-Ethernet (PoE) IEEE802.3at and IEEE802.3af compliant devices (for example a Philips luminaire).
- It is not allowed to connect the PoE switch ports to devices that are not PoE compliant.
- Do not work on the switch or connect or disconnect cables during periods of lightning activity.
- The plug-socket combination must be possible to access at all times, because it serves as the main disconnecting device.
- To prevent injury when mounting or servicing this unit in a rack, take special precautions to ensure that the switch remains stable. The following guidelines are provided to ensure your safety:
 - The unit must be mounted at the bottom of the rack if it is the only unit in the rack.
 - When mounting the unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
 - If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.
- This equipment must be connected to Protective Earth (PE). Do not use the equipment in absence of PE. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

- Dispose of the product according to all national laws and regulations.
- When installing or replacing the unit, the ground connection must always be made first and disconnected last.
- No user-serviceable parts are inside. Do not open. Doing so will invalidate the warranty.
- Installation of the equipment must comply with local and national electrical codes.

2.2 Guidelines

Check the following guidelines before deciding where to place the Philips PoE switch:

- Temperature around the unit does not exceed 45°C.
- The air flow around the switch and the vents must be unrestricted. It is advised to have at least 1.57" (4 cm) free space around the ventilation openings.
- The operating environment must be within the ranges listed in the PoE switch *Datasheet*
- The top of the switch might be hot to the touch if the switch is operating at its maximum temperature 45°C and is in an environment that exceeds normal room temperature (such as in a closet, in a cabinet, or in a closed or multi-rack assembly).
- Humidity around the switch must not exceed 95 percent.
- Altitude at the installation site must not be greater than 6561 ft. (2000 m).
- Do not place any items on the top of the PoE switch.
- Do not stack switches or place switches side-by-side unless they are separated on all sides by at least 4 cm of clearance from each other.
- Allow at least 1.57" (4 cm) of clearance above each switch in the rack.
- The mounting restrictions of the Philips PoE switch are described in section 3.1
- Clearance to the switch front and rear panels meets the following conditions
 - Front-panel indicators must be easy readable.
 - Access to ports is sufficient for unrestricted cabling.
- Cabling is away from sources of electrical noise, such as radios, power lines, HID and fluorescent lighting fixtures. Make sure the cabling is safely away from other devices that might damage the cables.
- For cable specifications see *appendix A Connector and Cable Specifications*

2.3 Packages

This section explains packaging units with associated accessories for the Philips PoE switch. For ordering information of individual packages see the *Datasheet*. Mounting instructions are explained in this document.

If any item in one of the packages is missing or damaged, contact your Philips representative or reseller for support.

2.3.1 Package 1: LCN5228/00 Philips PoE Switch

- PoE Switch
- EU power cord with strain relief
- Bracket for wall/ceiling mounting
- Plastic anchors (4X)
- Screws (4X).

2.3.2 Optional packages

2.3.2.1 Package 2: LCN5221/00 US mains connection kit

Holds accessories for eight *Package 1*

- Junction box + 2 screws
- Cover plate with label + 2 screws
- US power cord
(short power cord with IEC connector)

2.3.2.2 Package 3: LCN5223/00 Rack mount bracket (19")

Holds accessories for eight *Package 1*

- 2 brackets
- 6 screws

2.3.2.3 Package 4: LCN5224/00 T-bar mounting bracket

Holds accessories for eight *Package 1*

- 2 T-bar brackets
- 6 screws

2.3.2.4 Package 5: LCN5222/00 RJ45 protection cover

Holds accessories for eight *Package 1*

- Cover assembly
- 2 screws

3 Installer activities

This chapter explains the physical installation of the switch including cable wiring. In general this is a task for an electrical installer.

Before mounting the switch in a rack, on a wall, or on a ceiling, check/verify its operation as follows:

Power the switch:

- Connect the AC power cord between the AC power connector on the switch and an AC power outlet.
- At power-up, the switch automatically starts the *power-on self-test* to ensure that the switch functions properly.

power-on self-test takes approximately 1 minute.

- The power LED turns solid green.
- Initially all port LEDs blink orange shortly. When this does not occur, the *Status* LED turns green.
- During power-on self-test the *Status* LED blinks green.
- What to do with the test results:
 - When the Status LED continues to blink green the test failed.
Power-on self-test failures are usually fatal. Do not use the switch.
Contact your Philips technical support representative for advice.
 - When the Status LED turns off, the test passed successfully.
Continue with section 3.1

3.1 Physically Mount/Install the switch

This section explains the mounting and configuration procedures. The subsections explain all possible mounting options, so skip the ones that are not applicable for the implementation project.

Note: The RJ 45 cover in pictures shown is only applicable for US

3.1.1 Mounting on ceiling/wall using supplied bracket

This component is always available in *package 1*. When other optional brackets are applied, skip this section.

3.1.1.1 Ceiling mount

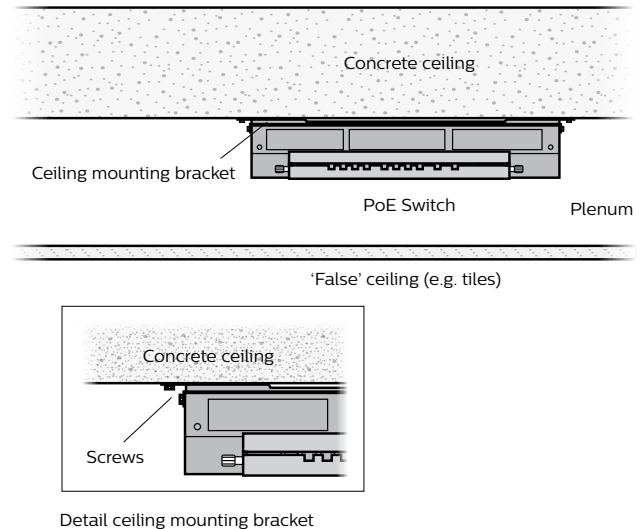


Figure 3 Ceiling mount

Execute the following steps to mount on the ceiling.

Note: The arrows of both the bracket and the switch must point in the same direction for correct placement (see figures below).

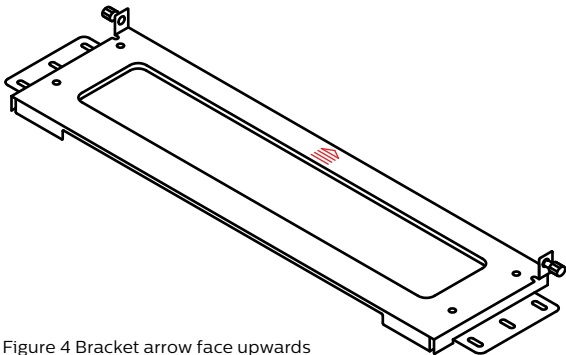


Figure 4 Bracket arrow face upwards

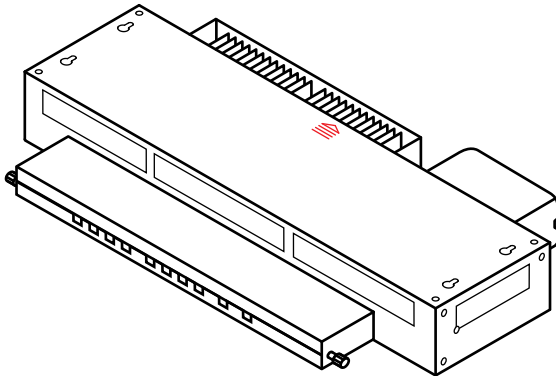


Figure 5 Switch arrow face upwards

- 1 Position the bracket in such a way that the red arrows face upwards, as shown above.
For optimal support of the switch and cables, make sure to mount the switch securely to a wall stud or to a firmly attached plywood mounting backboard.
- 2 Mount the bracket with 4 screws.
- 3 Slide the switch on the bracket.
- 4 Lock the switch using the screws in the red circles (see figure below and Figure 4).

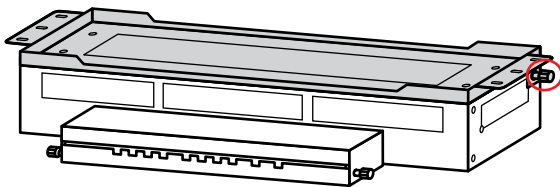


Figure 9 Lock the switch

Upon completion of the physical installation proceed with section 3.2.

3.1.1.2 Wall mount

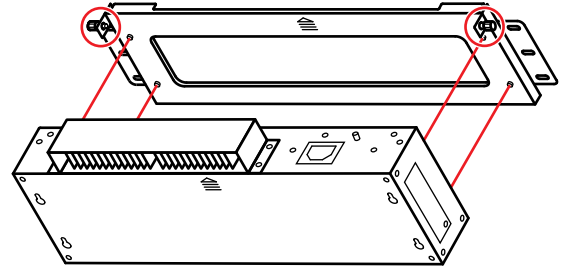


Figure 7 Wall mount

For wall mount situations observe the following:

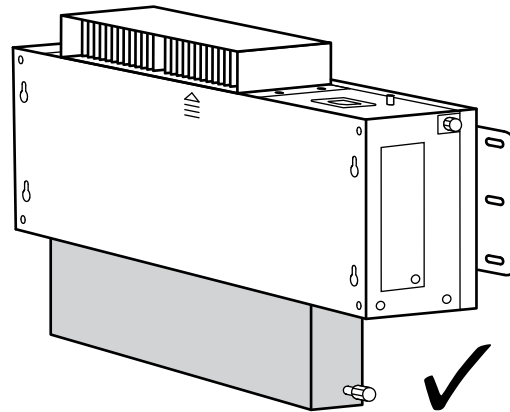


Figure 8 Correctly mounted switch, RJ 45 ports down

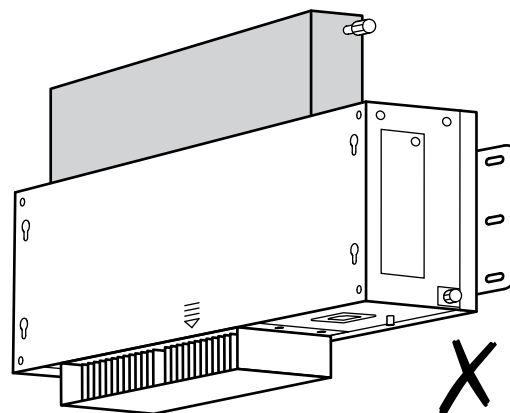
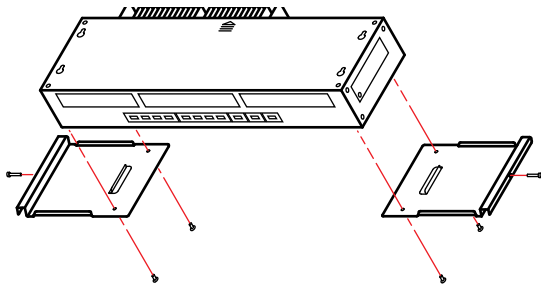


Figure 9 Incorrectly mounted switch, RJ 45 ports up

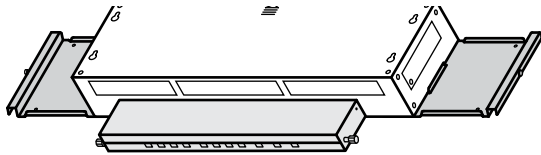
Note: Do not mount the PoE switch with the front cover facing up or sideways, see Figure 9. To meet safety regulations, mount the PoE switch with its front panel facing down to prevent airflow restriction and to provide easier access to the cables, see Figure 8.

3.1.2 Attach the optional LCN5224/00 T-bar mounting brackets

Skip this section when the option is not applicable.
When mounting the PoE switch on a suspended ceiling using T-bar clips do go as follows:



- 1 Mount the T-bar brackets on each bottom side of the PoE switch as shown in figures above and below (2 screws per side).



Note: Areas above false ceilings may contain dangerous electrical cabling, gas pipes, and other hazards. Take required precautions to create a safe work environment. It is recommended to use a non-conductive step ladder, for instance one made of fiberglass.

- 2 Remove/relocate two ceiling tiles, one on each side of the T-bar to install the switch
- 3 Mount the switch on the T-bars (both sides).
- 4 Fix the T-bar clip screws (see picture below).

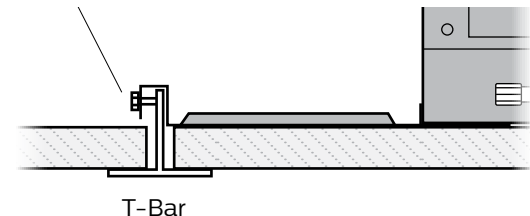
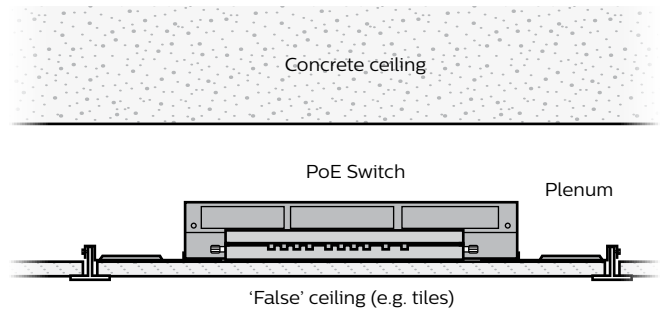


Figure 10 Fix the screws

- 5 Verify that the switch is firmly anchored to the T-bar on both sides.

Note: It is strongly recommended to have at least 1.57" (4 cm) of clearance above the switch in the ceiling for ventilation purposes.

3.1.2.1 Standard T-bar mount



Detail T-Bar Brackets

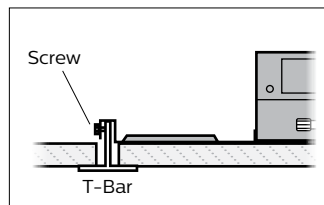
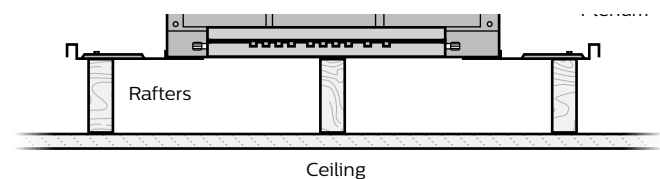


Figure 11 Standard T-bar mount

3.1.2.2 Use rafters to mount the T-bar



Detail Rafter Brackets

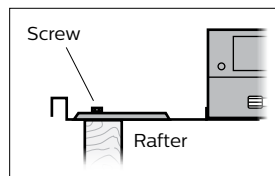


Figure 12 T-bar mounted on rafters

Upon completion of the physical installation proceed with section 3.2.

3.1.3 Attach the optional LCN5223/00 Rack mount brackets (19")

Skip this section when rack mounting is not applied. Use the optional 19" rack mount bracket to mount the switch in a 19" rack.

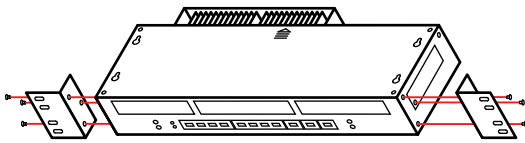


Figure 13 Attach rack mounting brackets

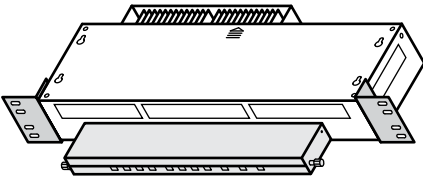


Figure 14 Rack mount assembly

Figure 13 above shows how to attach the 19" brackets to the switch.

Note: To prevent injury when mounting or servicing this unit in a rack, special precautions are required to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- The unit must be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from bottom to top with the heaviest component(s) at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

When the brackets are attached to the switch, slide the switch into the 19-inch rack, and align the brackets in the rack. Use screws to secure the switch in the rack.

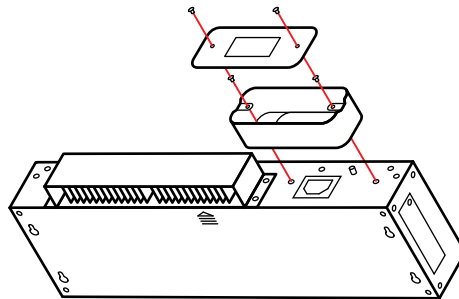
Note: It is strongly recommended to have at least 1.57" (4 cm) of clearance above each switch in the rack for ventilation purposes.

Upon completion of the physical installation proceed with section 3.2.

3.1.4 Attach the optional LCN5221/00 US mains connection kit

Skip this section when the option is not applicable.

This optional package is only necessary in the US when mounting a switch in the plenum. This accessory provides a metal junction box required to connect AC power to the mains outlet. The junction box is the branch circuit splice compartment.



The power cord is used to connect to the IEC inlet and provide the lead wires necessary for the building mains wires to connect to.



Figure 15 Optional LCN5221/00 US mains connection kit

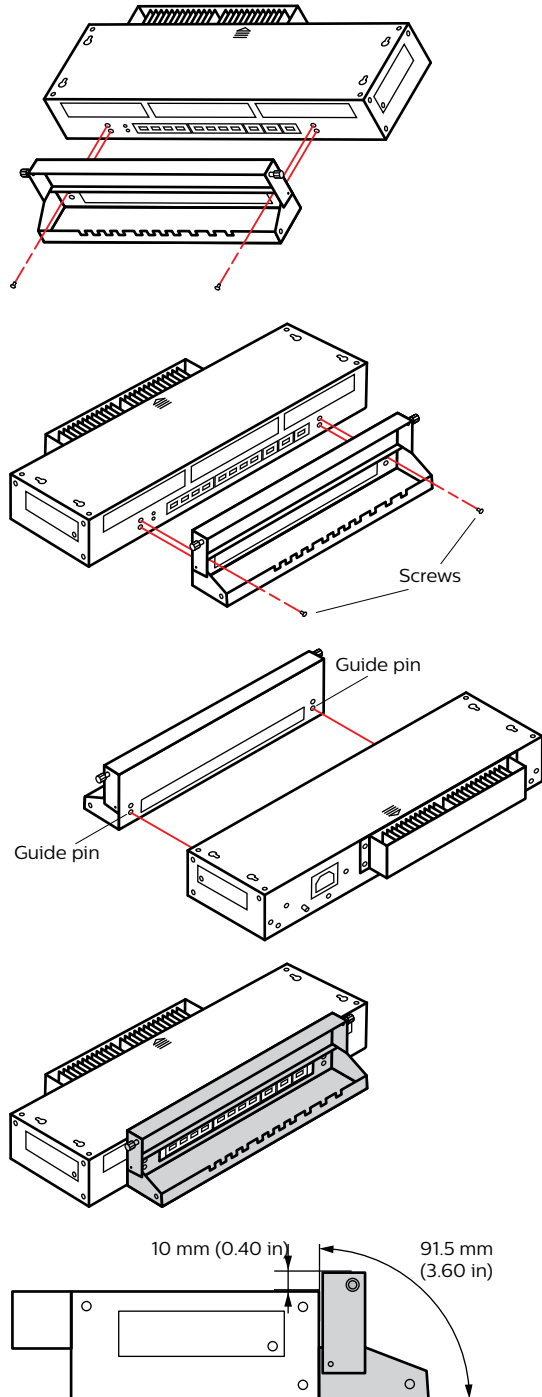
The cord plug and IEC inlet should be considered no different than if a Molex inline connector were provided in wires in the switch wiring to connect to building mains. Cord plug (inserted into IEC inlet) provides wires to connect to building mains (branch circuit). The flying lead wires for the branch circuit connection to the PoE switch are part of a flexible power-supply cord and appliance inlet assembly; which is all located inside the metal of the PoE switch enclosure and the metallic junction box on the back of the PoE switch.

Note: The Molex connector is an example and must be delivered by the installer.

3.1.5 Attach the optional LCN5222/00 RJ45 protection cover

Skip this section when the option is not applicable.

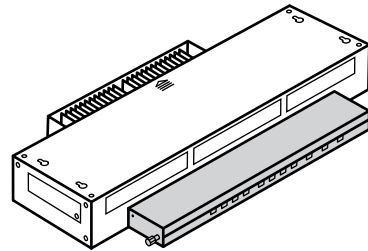
This option is in general only applicable for US market, to cover requirements in UL2043 when used in the plenum



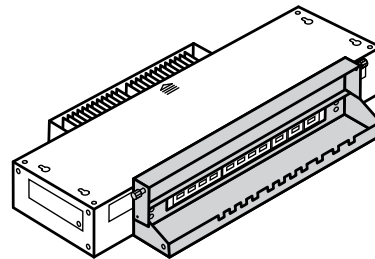
3.2 Connect the port cables and AC power

In the example we explain the cable connection including the optional RJ 45 cover.

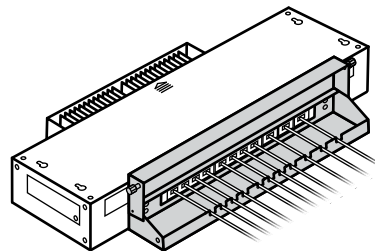
- Power on the switch (connect power cord between switch and AC outlet).



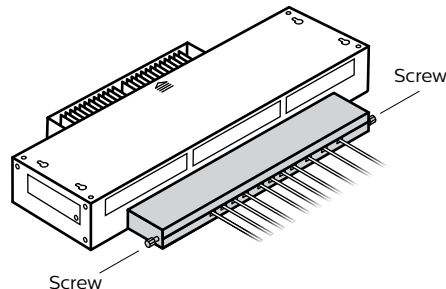
1 When applicable open the RJ 45 cover

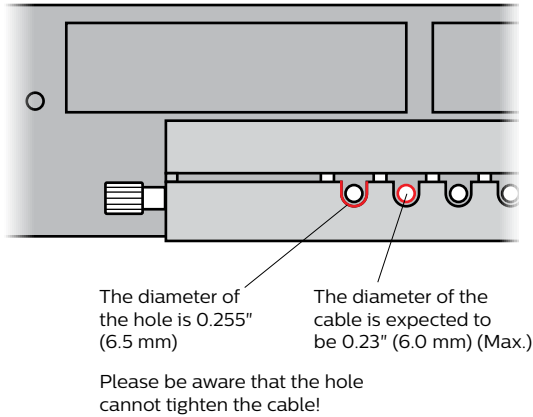


2 Connect the RJ 45 cables.
Only CAT5e and CAT6 cables fit the cover cut outs.



3 When applicable close RJ 45 cover and lock with the screws.





The ports of the Philips PoE switch configure themselves to operate at the speed of attached devices. If the attached ports do not support *auto-negotiation*, the speed and duplex parameters can be configured manually.

Note: To prevent damage due to electrostatic discharges (ESD), use the appropriate board and component handling procedures.

- 1 The cable specifications used to connect to distribution switches, routers and luminaires are specified in appendix A *Connector and Cable Specifications*.
- 2 Connect the switch with the appropriate RJ-45 connector to the device.
The port LED turns on when the switch and the connected device established the link.
- 3 Repeat Steps 1 and 2 to connect each device.

3.3 Site Acceptance Test

After completing the physical installation including cable connections and power supply the behavior of the system must be:

- System power up (switch) takes about 1 minute.
- Connected luminaires turn on within in 5 seconds after the device is powered.

System is now ready to commission.

4 Troubleshooting / Diagnosing problems

The LEDs on the front panel provide useful troubleshooting information about the switch. They report failures:

- During the *power-on self-test*,
- When port-connectivity problems occur.
- In case of overall switch performance problems.

For a full description of the PoE switch LEDs, see section 1.2.4 *Indicator LEDs*.

Another way is to get statistics from the web interface, the CLI, or via an SNMP workstation.

4.1 Check/verify power-on self-test Results

When the switch powers on, it starts the *power-on self-test*, that runs automatically to ensure that the switch functions properly. The test takes about one minute to complete and passes the following LED scenes:

- The power LED turns solid green.
- Initially all port LEDs blink orange shortly.
When this does not occur, the *Status* LED turns green.
- During power-on self-test the *Status* LED blinks green.
- What to do with the test results:
 - When the Status LED remains amber or blinks green, the test failed.
Power-on self-test failures are usually fatal.
Do not use the switch.
Contact your Philips technical support representative for advice.
 - When the Status LED turns off, the test passed successfully.
Continue with section 3.1

4.2 Monitor Switch LEDs

Check/verify the port LEDs for troubleshooting information about the switch. See section 1.2.4 *Indicator LEDs* for a description of the LED colors with their meanings.

4.3 Check/verify switch connections

Review the following subsections when troubleshooting switch connectivity problems:

4.3.1 Ethernet Cables

Make sure that you have used the correct cable type for the connection (see *appendix A Connector and Cable Specifications*):

4.3.2 Bad/damaged cable

A cable may connect at the physical layer, but still cause packet corruption because of subtle damage to its wiring or connectors.

In such a situation the port will have many packet errors, or the port constantly loses its connection (unlinks and links again). Handle such issues as follows:

- Try connecting the cable to another port or interface.
If the problem moves to the other port, replace the possibly faulty cable with a known good one.
- Check/verify the cable for marginal damage or failure
- Look for broken or missing pins on cable connectors.
- Rule out any insufficient patch panel connections or media convertors between the source and the destination. If possible, bypass the patch panel or eliminate faulty media convertors.

Note: Behavior between PoE ports and uplink ports can be different in case of cable damage. For PoE ports an additional symptom exists. The lights may switch off, because of damaged power wires.

4.3.3 Link Status

A link LED does not guarantee that the cable is fully functional. The cable might have encountered physical stress that causes it to function at a marginal level. If the link LED for the port is off:

- Verify that both devices are powered.
In the Philips PoE switch the power is connected to the spare pairs, and they are separated from the data pairs
- Connect the cable from the switch to a known, operational device.
- Make sure that both ends of the cable are connected to the correct ports.
- Verify that the correct cable types are used. See *appendix A* for detailed information.
- Look for loose connections. Sometimes a cable appears to be seated, while it is not. Disconnect and then reconnect the cable.

4.3.4 Port and Interface Settings

A disabled port is sometimes an obvious however overlooked cause of port connectivity failure. Verify that the port or interface is not disabled or for some reason powered off. If a port or interface is manually shut down on one or the other side of the link, the link does not re-establish until the port is enabled.

4.3.5 Ping the End Device

Verify the end device connection using the following sequence of steps:

- 1 Use *ping* from the switch which is directly connected
- 2 Work your way back: port by port, interface by interface, trunk by trunk, until you find the source of the connectivity issue.

Make sure that each switch can identify the end device MAC address in its table.

4.3.6 Spanning Tree Loops

Spanning Tree Protocol (STP) loops can cause serious performance issues that may appear to be port or interface problems. In this situation, the switch bandwidth is used repeatedly by the same frames, these frames displace legitimate traffic.

A unidirectional link can cause loops. This occurs when the traffic that the switch sends is received by its neighbor, but the switch does not receive the traffic that is sent from the neighbor. A broken cable or a port issue could cause such one-way communication.

4.4 Monitor Switch Performance

Review the following subsections when troubleshooting switch performance problems:

4.4.1 Speed, Duplex and Auto-negotiation

When the port statistics show a large number of alignment errors, frame check sequence, or late-collisions errors, a speed or duplex mismatch might be the problem.

A common issue with speed and duplex occurs when the duplex settings are mismatched between two switches, between a switch and a router, or between the switch and a workstation or server. This can happen when you manually set the speed and duplex or because of auto-negotiation issues between the two devices.

These circumstances can result in a mismatch:

- A manually set speed or duplex parameter is different from the manually set speed or duplex parameter on the connected port.
- A port is set to *auto-negotiation*, and the connected port is set to full duplex without *auto-negotiation*.
- To maximize switch performance and to ensure a link, follow one of these guidelines when you set or change the settings for duplex and speed:
 - Enable *auto-negotiation* for both ports
 - Manually set the speed and duplex parameters for the ports on both ends of the connection.
 - When *auto-negotiation* is disabled for a remote device, configure matching duplex settings on the two ports.

4.4.2 Cabling Distance

Cable dimensions are determined by Philips System Centers and System Experts as the Luminaire type can affect the permitted cable length.

4.5 Clearing the Switch IP Address and Configuration

When a new switch is configured with an incorrect IP address, the IP address that is configured on the switch must be removed.

Note: This procedure removes the IP address and all configuration information stored on the switch. Do not follow this procedure unless you want to completely reconfigure the switch. The switch will behave like an un-configured switch. The switch can also be configured using the procedures explained in the *Configuration Guide*.

5 Technical Support

Technical support for the Philips PoE switch is available via the local Philips representative or certified partner, which provides:

- 1 Access to our web site with restricted-access (Philips authorization required) to download:
 - a All new software updates and upgrades.
 - b Technical documents, such as user guides, release notes and more.
 - c Sales documents, including return on investment studies, Powerpoint presentations, proposal templates, brochures and more.
- 2 Remote technical support and assistance in setting up projects.
- 3 Answers to any technical questions.

Please contact controls.support@philips.com
or call 1-800-526-2731

A. Connector and Cable Specifications

This appendix describes the Philips PoE switch ports connectors and the cables to be used to connect the switch with other devices.

Note: Cable specifications may be subject to regional regulations and must be applied in accordance with all national and local electrical and construction codes and regulations.

A.1 Console Port

For configuration purposes the console port of the switch can be connected to a PC using a standard RJ 45 CAT cable.

A.2 PoE RJ 45 ports

The PoE cables must meet the following requirements:

- Cable specifications are implementation project specific. Requirements will be made available to the installer by Philips.
- When connecting the switch to luminaires, straight-through cable-wiring must be applied.

A.3 RJ 45 ports

- For 10M/100M/1000M ports, 100 meter (380 feet) cable lengths from the switch to connected devices are allowed for data communication purposes only.
- The 10M/100M/1000M Ethernet ports on the Philips PoE switch use standard RJ 45 connectors of types: Cat5e/6/6A/7/7A conform AWG-24 – AWG-22. Figure 16 shows the pin-out.

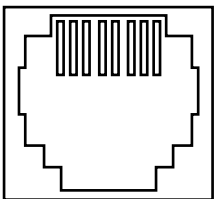
| Pin | Label | 1 2 3 4 5 6 7 8 |
|-----|-------|---|
| 1 | TP0+ |  |
| 2 | TP0- | |
| 3 | TP1+ | |
| 4 | TP2+ | |
| 5 | TP2- | |
| 6 | TP1- | |
| 7 | TP3+ | |
| 8 | TP3- | |

Figure 16 Port pin-outs 10M/100M/1000M

- When connecting ports to 10BASE-T- and 100BASE-TX-compatible devices, such as luminaires, and routers, it is allowed to use a four twisted-pair, straight-through cable wired for 10BASE-T, 100BASE-TX and 1000BASE-T (Alternative B according IEEE802.3at standard). Maximum cable lengths are determined by the solution architect (implementation specific)

| | | | | |
|---|------|----|---|------|
| 1 | TP0+ | ←→ | 1 | TP1+ |
| 2 | TP0- | ←→ | 2 | TP1- |
| 3 | TP1+ | ←→ | 3 | TP0+ |
| 6 | TP1- | ←→ | 6 | TP0- |
| 4 | TP2+ | ←→ | 4 | TP3+ |
| 5 | TP2- | ←→ | 5 | TP3- |
| 7 | TP3+ | ←→ | 7 | TP2+ |
| 8 | TP3- | ←→ | 8 | TP2- |

Note: Be sure to use a four twisted-pair, Category 5 cable or higher when connecting to a 10M/100M/1000M BASE-T-compatible device.

Notes

[illegible]

