Perle PoE/PoE+ 10/100 Ethernet Media Converters

Installation Guide

S-110P

S-110PP

S-110P-SFP

S-110PP-SFP

P/N 5500318-12

Overview

This document contains instructions necessary for the installation and operation of the Perle Standalone PoE/PoE+ 10/100 rate converting Media Converters (S-110P). These products have the ability to convert 10/100Base-T cable connections (copper) to 100Base-X connection (fiber). The Perle media converters function as a PoE switch, and support a variety of port configurations. These media converters function as Power Sourcing Equipment (PSE) and can power up one Powered Device (PD) using standard UTP cables that carry Ethernet data. The S-110P models are compatible with Powered Devices that comply with the IEEE 802.3af standard and the S-110PP models are compatible with Powered Devices that comply with both the IEEE 802.3af and the 802at-2009 standards. The fiber connection can be either single mode (SM) or multimode (MM) and can operate over different wavelengths and distances, depending on the model selected (see table below).

POE/POE+

PoE (P) PoE+ (PP)	Connector (xx)	Mode Distance	Wavelength (TX/RX)
S-110**P**-M2**xx**2 S-110**PP**-M2**xx**2	SC/ST	MM 2 km/1.2 mi.	1310 nm
S-110**P**-S2**xx**20 S-110**P**-S2**xx**20	SC/ST	SM 20 km/12.4 mi.	1310 nm
S-110**P**-S2**xx**40 S-110**PP**-S2**xx**40	SC/ST	SM 40 km/24.9 mi.	1310 nm
S-110**P**-S2**xx**80 S-110**PP**-S2**xx**80	SC/ST	SM 80 km/49.7 mi.	1550 nm
S-110**P**-S2**xx**120 S-110**PP**-S2**xx**120	SC/ST	SM 120 km/74.6.	1550 nm
S-110**P**-S1SC20U S-110**PP**-S1SC20U	SC	SM 20 km/12.4 mi.	1310/1550 nm
S-110**P**-S1SC20D S-110**PP**-S1SC20D	SC	SM 20 km/12.4 mi.	1550/1310 nm
S-110**P**-S1SC40U S-110**PP**-S1SC40U	SC	SM 40 km/24.9 mi.	1510/1590 nm
S-110**P**-S1SC40D S-110**PP**-S1SC40D	SC	SM 40 km/24.9 mi.	1590/1510 nm
S-110**P**-SFP S-110**PP**-SFP	SFP	**NOTE 1**	

Installation

The default DIP switch settings (all switches in the UP position) will work for most installations.

These are the steps required to configure the Perle S-110P Ethernet media converter:

1. Insert SFP Module (SFP Model only).
2. Set the DIP switch settings (if required).
3. Set the Powering Option Jumpers (if required).
4. Install and connect the fiber cable.
5. Install and connect the copper cable.
6. Install the Power cord Relief clip (optional).
7. Power up the media converter.

Power Sourcing Pinouts

When Power Sourcing is enabled on a copper port, the S-110P will provide power to the connected PD device over the Ethernet cable (see PSE function on Dip Switch configurations). The wire pairs on the cable used for delivering power will depend on the device. The following options are available.

RJ-45	PoE Option		
	Alternative A	Alternative B	Legacy
1	positive		
2	positive		
3	negative		
4		positive	negative
5		positive	negative
6	negative		
7		negative	positive
8		negative	positive

UTP (copper) Power

PoE

- IEEE 802.3af (PoE) up to 15.4 Watts for the UTP port.

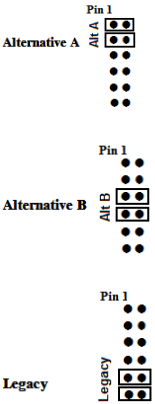
PoE+

- IEEE 802at-2009 (PoE+)
- Up to 30 Watts on UTP port
- PoE+ models will also support 802.3af PDs (Type 1) and PoE+ PDs (Type 2)

Powering Options Jumper Settings

Note: The factory settings for Power Sourcing Pinouts will work for most installations as 802.3a and 802at-2009 (POE/POE+) devices will detect and sync to the correct POE option. However, in the rare case that you need to modify the settings, the procedure is below.

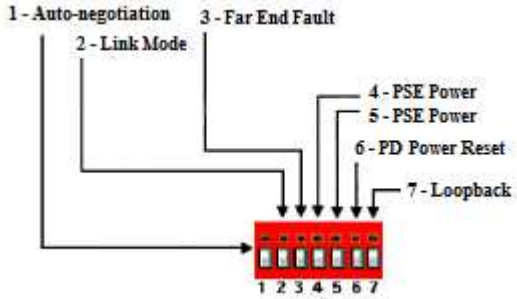
In order to select a powering option, the Power Options Jumper settings must be set. Each copper port has a set of Power Option jumpers. To access the Powering Options Jumper settings, unscrew the six side screws on the case and remove the cover plate. Locate the Power Option jumper set and strap the option pins as detailed below.



DIP Switches

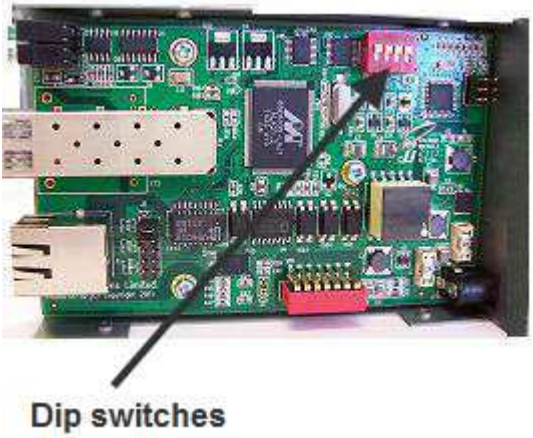
The DIP switches for Bank 1 are accessible through the opening in the side of the enclosure**.**

Bank 1

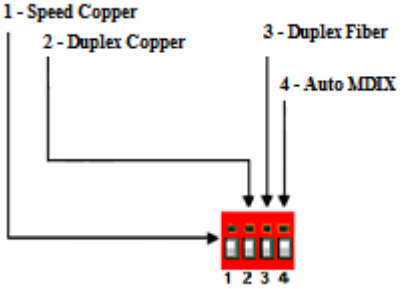


Bank 2

To access the DIP switches for Bank 2, unscrew the six side screws on the case and remove the cover plate. Locate the jumper set as detailed below.



Bank 2



Note: All switch changes take effect immediately. Switch changes will cycle power to the PD only if the PD Reset switch is set to On or you make changes to the PSE Power switches.

DIP Switch Settings

Bank 1

Auto-negotiation (copper) (Switch 1)

Switch Position	Copper Port
Up (default)	Auto
Down	Off

Note: Auto-negotiation should only be turned off, if the copper link partner does not support Auto-negotiation and fixed settings are required by the copper link partner.

Auto: When enabled, the media converter will negotiate with its link partner to determine the most optimal parameters for this connection. The S-110P will advertise capabilities of 10 and 100 Mbps, full and half duplex as well as pause to the link partner.

If the copper link partner does not support Auto-negotiation, the S-110P will parallel detect to 10 or 100 Mbps and force Half Duplex mode as per IEEE specifications.

Off: When the Auto-negotiation switch is set to the OFF position, the media converter will not negotiate the Ethernet parameters

with the copper link partner. The parameters used by the media converter will be determined by the Copper Speed (Bank 2 - switch 1) and Duplex Copper (Bank 2 - switch 2) DIP switch settings. Pause receive and send will be disabled.

Link Pass-Through Mode (Switch 2)

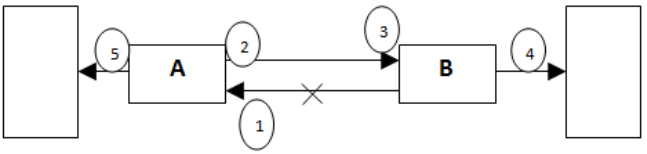
Switch Position	Mode
Up (default)	Link Pass-Through Mode
Down	Standard Mode

Link Pass-Through Mode: In this mode, the link state on one connection is directly reflected through the media converter to the other connection. If link is lost on one of the connections, then the other link will be brought down by the media converter.

If the installation has a media converter on both ends of the fiber link and both are set-up for Link Pass-Through, then a loss of copper link on the far end device will propagate through both media converters and will result in a loss of link at the near end device.

Standard Mode: In this mode, links on the fiber and copper sides can be brought up and down independently of each other. A loss of link on either the fiber or copper port can occur without affecting the other connection.

Link Pass-Through Behaviour



(A) – Remote Media Converter setup for Far End Fault Enabled, Auto-negotiation – OFF and Link Mode – Standard.

(B) – Local Media Converter setup for Far End Fault enabled, Link Pass-Through On and Auto-negotiation - OFF

1. **(A)** Loses fiber connection on its receiver.
2. **(A)** Sends FEF.
3. **(B)** Detects FEF signal and shuts down the fiber link.

4. **(B)** Drops link on copper connection because Link Pass-Through is configured.
5. **(A)** Link on copper connection is not affected because Link Pass-Through Mode is set to Standard.

Far End Fault (Switch 3)

Switch Position	Fiber Port
Up (default)	Enabled
Down	Disabled

Enabled: If the media converter detects a loss of signal on the fiber receiver, it will immediately disable its fiber transmitter signal on the same port. This, in effect, notifies the fiber link partner that an error condition exists on the fiber connection.

If the remote media converter is set up for Far End Fault(FEF) and the local media converter is set up with Link Pass-Through, a loss of fiber link on either the transmit or receive line will be passed through to the local copper connection thus notifying the connected device.

If the media converter has been set to Link Pass-Through mode, the effect will be the same as FEF, since the link loss on the fiber receiver will result in bringing down the copper link, which will in turn cause the transmit fiber link to be brought down.

Note: This feature only takes affect if Auto-negotiation (Switch 1) has been turned Off.

Disabled: The media converter will not monitor for or generate Far End Fault.

PSE Enable Copper (Switch 4 and 5)

Switch Position 4	Switch Position 5	Type
Up (default)	Up (default)	PSE enabled normal detection
Up	Down	PSE enabled High capacitance detection
Down	Up	PSE enabled Legacy device

		detection
Down	Down	PSE disabled

These switches must be set in order to enable the power sourcing function and to indicate the type of device detection required. If the device type is unknown, the default should be used as per IEEE802.3af/at standards.

Enabled: When enabled, the media converter will perform Power Sourcing Equipment (PSE) functions as per IEEE802.3af (POE) or 802.3at-2009 (POE+) standards.

Disabled: When disabled the media converter will not perform PSE functions.

PD Power Reset (Switch 6)

Switch Position	Mode
Up (default)	Disabled
Down	Enabled

Disabled: When disabled, the loss of fiber link has no effect on PSE power to the PD device.

Enabled: When enabled, if the media converter detects loss of link on the fiber port it will turn off PSE output power to the PD device connected to the copper port. After 2 seconds, the media converter will restore power to the PD and the power will remain on until the fiber link transitions from a link up to link down state.

Loopback Fiber (Switch 7)

Switch Position	Mode
Up (default)	Disabled
Down	Enabled

Disabled: The loopback feature is disabled. This is default position for normal operation. The switch must be set to this position in order for data to pass through the media converter.

Enabled: This is a test mode. All data received on the receive (RX) fiber connection is looped back to the transmit (TX) fiber connection. The data link will be disabled; however power to the

powered devices will be maintained. This mode will override all other switch settings.

Bank 2

Speed Copper (Switch 1)

Switch Position	Copper port
Up (default)	100
Down	10

100: When Switch 1 is in the Up position, the S-110P will force the speed to 100 Mbps.

10: When Switch 1 is in the Down position the media converter will force the speed to 10 Mbps.

Duplex Copper (Switch 2)

Switch Position	Copper port
Up (default)	Full Duplex
Down	Half Duplex

Full Duplex: In the Up switch position; the media converter will be set to Full Duplex mode.

Half Duplex: The media converter will be set to Half Duplex mode.

Duplex Fiber (Switch 3)

Switch Position	Copper port
Up (default)	Full Duplex
Down	Half Duplex

Note: When Auto-negotiation (SW1) is set to Off, the media converter will use this Duplex setting for the copper port.

Full Duplex: In the Up switch position; the media converter will be set to Full Duplex mode.

Half Duplex: The media converter will be set to Half Duplex mode.

Auto/MDIX (Switch 4)

Switch Position	Copper port
Up (default)	Auto
Down	MDIX

Auto: In the Up switch position; the media converter will automatically detect the Ethernet cable's polarity.

MDIX: The S-110P will operate as a MDIX device.

Installing the SFP Fiber Module

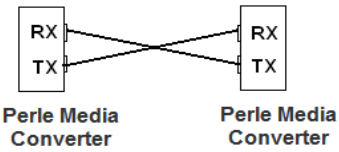
SFP models only.

1. Locate the appropriate fiber module and insert the SFP into the opening on the front of the media converter.
2. Ensure the SFP module is properly seated. The release latch of the SPF fiber transceiver must be in the closed (up) position before insertion.
3. The SFP module may be inserted before or after applying power to the media converter.
4. Proceed with cable connections.

Installing the Duplex Fiber Cable

Locate a 100Base-X compliant duplex (2 strands) fiber cable with appropriate connectors.

Connect the fiber cables from one media converter to the other media converter/switch/fiber device ensuring that the RX and TX are reversed (crossed) at the opposite end.



Installing the Simplex Fiber Cable

- Locate a 100BASE-X compliant simplex (1 strand) fiber cable with appropriate connectors. Ensure that the TX wavelength matches the RX wavelength at the other end and the RX wavelength matches the TX wavelength at the other end.
- Connect the fiber cable from one media converter to the other media converter/switch/fiber device.

Installing the Copper Cable

- Locate 10/100Base-T compliant copper cables with the appropriate connectors.
- Connect the RJ-45 cable between the Perle media converter and the device.

Attaching the Power Cord Strain Relief Clip

1. Remove the screw from the chassis that is closest to the power cord connector.
2. Feed the power cord through the opening in the power cord relief clip.
3. Attach the power cord relief clip to the chassis and secure with the provided screw.
4. Plug the power cord into the AC power connector at the rear of the chassis.

5. Plug the other end of the power cord into an appropriate power outlet.

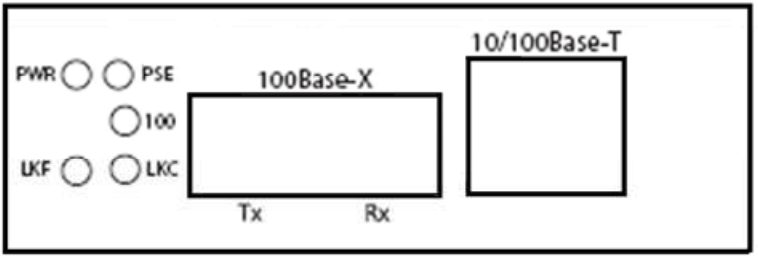
Powering up the Perle Media Converter

- Connect the Perle supplied power adapter to the media converter.
- Connect the power adapter to a power source.
- Check that the PWR LED is lit.

Operation

Status LED

The Perle PoE/PoE+10/100 Rate converting Media converters have status LEDs located on the front panel of the unit.



PWR
On – Power is applied to the unit
Blinking (slow) – Loopback mode - fiber interface is in loopback mode
Blinking (fast) *Power On* failure. See LED Pattern to determine pattern combination and failure cause

LED Pattern

LKF	LKC	100	PSE	
Off	Off	On	On	SFP incompatible
All other LED patterns				Internal hardware failure

LKF- (Status on Fiber Link)

On – Fiber link is present

Off – No fiber link present

Blinking (fast) – Fiber link up and receiving data

100- (Copper Port)

On – 100 Mbps (valid link and detected speed is 100 Mbps)

Off – 10 Mbps (if link is currently established)

LKC- (Link Status on Copper port)

On – Copper link is present

Off – No copper link present

Blinking (fast) – Copper link up and receiving data

PSE

Solid Green (Active) – The PSE has successfully detected a compliant PD and is applying power over UTP.

Solid Orange (Inactive) – The PSE is not active. The PSE has been configured to provide power, however

- a compliant PD not detected - no power applied
- a PSE has turned off power for Reset function

Off – (Disabled) The PSE function is disabled in the configuration.

Error conditions

A blinking red light is an error condition. The led light will cycle with a 3 second stop interval between the error condition code.

PSE-LED	
1 blink	PD Capacitance too high
2 blinks	PD Resistance too low or short circuit
3 blinks	PD Resistance too high

Other Features

Auto-MDIX

Auto-MDIX (automatic medium-dependent interface crossover) detects the signalling on the 10/100BASE-T interface to determine the type of cable connected (straight-through or crossover) and automatically configures the connection.

Pause (IEEE 802.3xy)

Integrated Pause signalling is an IEEE feature that temporarily suspends data transmission between two devices in the event that one of the devices becomes overwhelmed with data. The Perle media converter can generate and respond to Pause messages. If Auto negotiation is set to On, the media converter will advertise symmetrical and asymmetrical pause. If Auto negotiation is set to Off, the Pause receive and send will be disabled.

Troubleshooting

General

- Ensure power is supplied to the media converter. Only the Perle provided power supply may be used.
- Ensure the remote device's fiber connection type is compatible with the media converter. If using a simplex fiber connection, ensure that you have both an Upstream (U) and Downstream (D) media converter.
- Ensure all cabling is of the correct type and is in good working order.
- For duplex fiber connections, ensure the RX and TX has been reversed between the two media converters.

No connectivity

If unable to get full connectivity with all DIP switches in the UP position, this procedure is recommended for troubleshooting.

Method 1

1. Set the Link Pass-Through mode to Standard on both media converters. Leave all other switches in the Up position.
2. Connect the copper device to the copper port on the media converter. The LKC LED light indicates good copper connection. If the LKC LED is not lit, then check the copper cable and the attached device.
3. Repeat for the far end media converter.
4. Connect the fiber cable to both media converters. The LKF LED indicates good fiber connection. If no LKF LED then check the fiber cabling. Ensure the transmitter and receiver pairs are crossed.
5. Return units to desired configuration.

Method 2:

The fiber connection can also be verified by configuring the remote media converter for loopback mode. The LKF LEDs on both media converters should be lit. Data should pass through the local converter, over the fiber connection to the remote media converter. At the remote media converter, the data will be looped

back and passed through the fiber, back to the local converter and passed to the copper link.

No Power to the PD

- Ensure that the PD is compatible with the S-110P. If the PD is a POE+ device then a POE+ media converter must be used (S-110PP)
- Ensure that the power supply being used is the one provided with the product
- If the PD does not support Alternative A (including Legacy PD's), the Power Option Jumpers must be set accordingly. Also ensure the correct pin out for the device.
- For proper detection of different classes of devices, the dip switches must be set correctly.

Technical Specifications

The following applies to all S-110P media converters:

Power Input / Consumption: 48V DC to 56V DC @ 6 W

Operating Temperature: 0℃ to 50℃ (32℉ to 122℉)

Storage Temperature: -25℃ to 70℃ (-13℉ to 158℉)

Operating Humidity: 5% to 90% non-condensing

Storage Humidity: 5% to 95% non-condensing

Operating Altitude: Up to 3,048 m (10,000 ft)

Dimensions: 80 mm by 120 mm by 26 mm

MTBF	No Power supply	POE	POE+
1 SFP / 1 copper ports	437,237 hours	229,220 hours	81,386 hours
1 SC/ST / 1 copper	385,526 hours	214,161 hours	79,404 hours

Fiber Optic Specifications:

PoE (P) PoE+ (PP)	Mode	Wavelength (nm)	TX Power (dB)	RX Power (dB)	Budget (dB)
S-110**P**-M2xxC2 S-110**PP**-M2xxC2	MM	TX: 1310 RX: 1310	Min: -20 Max: -12	Min: -31 Max: -14	11
S-110**P**-S2SC20 S-110**PP**-S2SC20	SM	TX: 1310 RX: 1310	Min: -18 Max: -7	Min: -32 Max: -3	14
S-110**P** -S2ST20 S-110**PP** -S2ST20	SM	TX: 1310 RX: 1310	Min: -15 Max: -8	Min: -32 Max: -3	17
S-110**P** -S2xx40 S-110**PP** -S2xx40	SM	TX: 1310 RX :1310	Min: -5 Max: 0	Min: -34 Max: -3	29
S-110**P**-S2SC80 S-110**PP**-S2SC80	SM	TX: 1550 RX: 1550	Min: -5 Max: 0	Min: -34 Max: -3	29
S-110**P**-S2ST80 S-110**PP**-S2ST80	SM	TX: 1550 RX: 1550	Min: -5 Max: 5	Min: -34 Max: -3	29
S-110**P**-S2SC120 S-110**PP**-S2SC120	SM	TX: 1550 RX: 1550	Min: 0 Max: 5	Min: -35 Max: -3	35

S-110**P**-S2ST120 S-110**PP**-S2ST120	SM	TX: 1550 RX: 1550	Min: 0 Max: 5	Min: -35 Max: 0	35
S-110**P**-S1SC20U S-110**PP**-S1SC20U	SM	TX: 1310 RX: 1550	Min: -14 Max: -8	Min: -32 Max: -3	18
S-110**P**-S1SC20D S-110**PP**-S1SC20D	SM	TX: 1550 RX:1310	Min: -14 Max: -8	Min: -32 Max: -3	18
S-110**P** -S1SC40U S-110**PP** -S1SC40U	SM	TX: 1310 RX:1550	Min: -8 Max: -3	Min: -33 Max: -3	25
S-110**P** -S1SC40D S-110**PP** -S1SC40D	SM	TX: 1550 RX:1310	Min: -8 Max: -3	Min: -33 Max: -3	25
S-110**P**-SFP S-110**PP**-SFP	**SFP**	**Note 1**	**Note 1**	**Note 1**	**Note 1**

Fiber Cabling Requirements:

MM: 50/125 microns or 62.5/125 microns

SM: 9/125 microns

Ethernet Copper Cabling Requirements:

- Category 5 UTP or STP
- 24-22 AWG
- Straight through or Ethernet crossover

Note: Please refer the product page on the Perle website for the most up to date models and specifications.

http://www.perle.com/

Compliance Information

FCC

This product has been found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this Guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

EN 55022, Class A

WARNING This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EN 55024, Class A

Laser Safety – IEC 60825-1:2007

This product meets Class I Laser safety requirements per IEC-60825-1:2007 standard and complies with FDA/CDRH 21 CFR1040.10 and 21CFR1040.11.

WARNING: Visible and invisible laser radiation may be present when cables are not connected. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Warranty / Registration

Perle's standard Lifetime Warranty provides customers with return to factory repairs for Perle products that fail under the conditions of the warranty coverage. Details can be found at:
http://www.perle.com/support_services/warranty.shtml

Contacting Technical Support

Contact information for the Perle Technical Assistance Center (PTAC) can be found at the link below. A Technical Support Query may be made via this web page.
www.perle.com/support_services/support_request.shtml