

User's Guide

TRENDNET[®]



**Powerline 200 AV PoE+ Adapter
Powerline 200 AV PoE+ Adapter Kit**

TPL-331EP / TPL-331EP2K

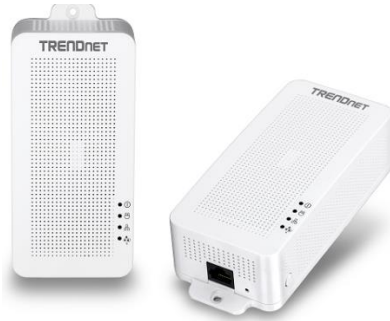
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Product Overview



TPL-331EP



TPL-331EP2K

Package Contents

TPL-331EP package includes:

- TPL-331EP
- Quick Installation Guide
- Network cable (1.2m / 4 ft.)

TPL-331EP2K package includes:

- 2 x TPL-331EP
- Quick Installation Guide
- 2 x network cables (1.2m / 4 ft.)

If any package contents are missing or damaged, please contact the retail store, online retailer, or reseller/distributor from which the product was purchased.

Features

Powerline 200 AV PoE+ Adapter (TPL-331EP)

TRENDnet's Powerline 200 AV PoE+ Adapter, model TPL-331EP, creates a high-speed Powerline 200 network using your home's existing electrical system. It features a PoE+ output port to connect PoE devices such as IP cameras, wireless access points and VoIP handsets over a Powerline network. Two adapters are needed to start a network. No CD installation required—encrypted TRENDnet adapters auto-connect out of the box. Plug in the first adapter and network it to your existing router. Plug in other adapters on the same electrical system and they auto-connect to the first adapter for instant internet access.

Powerline 200 AV PoE+ Adapter Kit (TPL-331EP2K)

TRENDnet's Powerline 200 AV PoE+ Adapter Kit, model TPL-331EP2K, comes with two PoE+ Powerline adapters that add PoE+ capabilities to your existing Powerline network. Each adapter features a single PoE+ output port to connect PoE+ devices such as IP cameras, wireless access points and VoIP handsets over a Powerline network. Two adapters are needed to start a network. Encrypted TRENDnet adapters auto-connect out of the box.

Sync Button

Press the Sync button to change existing Powerline encryption keys

Powerline 200

Powerline 200 technology delivers fast and stable networking to seamlessly connect devices.

PoE+ Port

Features a PoE+ output port for connecting PoE devices such as IP cameras, wireless access points and VoIP handsets over a Powerline network.

Cross Compatibility

Cross compatible with Powerline 1200, 600, 500, and 200 adapters

Expandable

Use up to 8 adapters on a single Powerline network

Easy Installation

TRENDnet adapters auto-connect out of the box

128-bit AES Encryption

Powerline communication is protected with 128-bit AES encryption

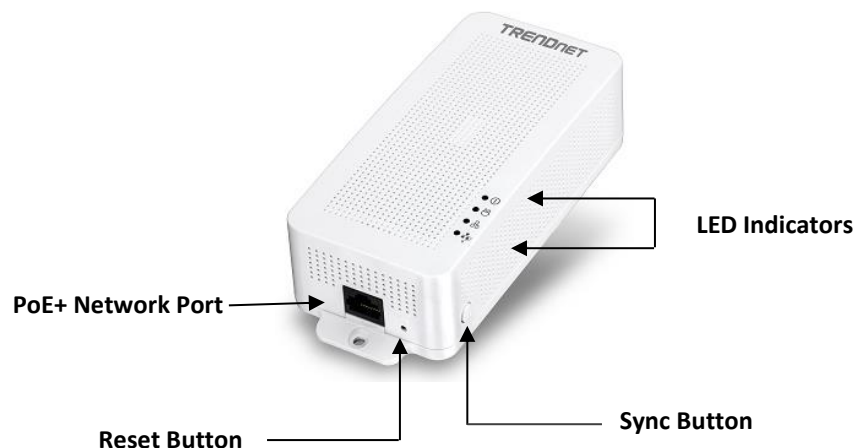
Note:

* Maximum of 8 adapters (nodes) recommended for streaming video across your network.

** 200Mbps is the maximum theoretical Powerline data rate when connected to another Powerline 200 device. Data throughput may vary by circuit wire conditions.

*** Powerline communication works on a single electrical system. (Usually controlled by a single distribution panel). Power strip, GFCI outlets, and AFCI circuit breakers may degrade Powerline network signals.

Product Hardware Features



Button	Action	Function
Sync	Press for 3 seconds	Begins synchronization session. The POWER LED will begin to blink for 2 minutes. Press the Sync button on additional adapters within the time frame to synchronize to the powerline network.
Reset	Press for 10 seconds	Resets device to factory defaults settings (All LEDs will turn off and on again). <i>Note: Will reset to the factory default private network name "HomePlug AV".</i>

Power Save Mode: The Powerline adapter will automatically going into standby mode to reduce power usage when there is no network traffic for more than 10~20 minutes. All LEDs are going off. It can be wake up automatically when the network traffic is coming again. It will take a couple of seconds to wake up and resume back to full speed of service.

LED	Color	Sequence	Definition
Power	Green	Solid	Device is powered on
	N/A	Off	Device is powered off or in sleep mode
Powerline	Green	Solid	Powerline connected
	Green	Blinking	Data transmitting over powerline
	N/A	Off	Powerline is not connected
Ethernet	Green	Solid	Ethernet port connected
	Green	Blinking	Data transmitting over Ethernet port
	N/A	Off	Ethernet is not connected
PoE	Green	Solid	PoE/PoE+ device connected
	N/A	Off	No PoE/PoE+ device connected

Powerline Connections: Powerline LED color indicates the strength and quality of the Powerline connection through the electrical system. The following factors may affect the Powerline network's connection quality:

- **Ground Wire** - Adapters should use all 3 wire sockets to boost up the Powerline communication speed to gigabit.
- **Noise** – Generated by appliances which use your electrical system (e.g. Microwaves, ovens, hair dryer, irons, dishwashers, etc.). The quality of your household electrical wiring may also cause additional noise on your electrical system.
- **Distance** – Long lengths of electrical wiring through your electrical system between connected Powerline adapters.

Expanding a Powerline Network

What is a network?

A network is a group of computers or devices that can communicate with each other. A home network of more than one computer or device also typically includes Internet access, which requires a router.

A typical home network may include multiple computers, a media player/server, a printer, a modem, and a router. A large home network may also have a switch, additional routers, access points, and many Internet-capable media devices such as TVs, game consoles, and Internet cameras.

- **Modem** – Connects a computer or router to the Internet or ISP (Internet Service Provider).
- **Router** – Connects multiple devices to the Internet.
- **Switch** – Connect several wired network devices to your home network. Your router has a built-in network switch (the LAN port 1-4). If you have more wired network devices than available Ethernet ports on your router, you will need an additional switch to add more wired connections.

How to expand a home network

Wireless Access Points add or extend wireless connectivity to an existing network.

Integrated Powerline technology allows you to further extend your network using your existing electrical system in your home using multiple powerline adapters.

Where to find more help

In addition to this User's Guide, you can find help below:

- <http://www.trendnet.com/support> (documents, downloads, and FAQs are available from this Web page)

Basic Installation

Note: It is recommended to plug the adapters into nearby outlets before installing the devices to the desired locations.

Note: If you are connecting the adapters to a third-party powerline device other than TRENDnet and encounter issues, please refer to the manufacturer's documentation for the appropriate sync button procedure.

Note: The sync button procedure steps below demonstrate using TRENDnet powerline model TPL-331EP, but the same procedure applies to TRENDnet powerline models TPL-406E / TPL-407E / TPL-420E / TPL-421E / TPL-422E / TPL-423E / TPL-331EP.

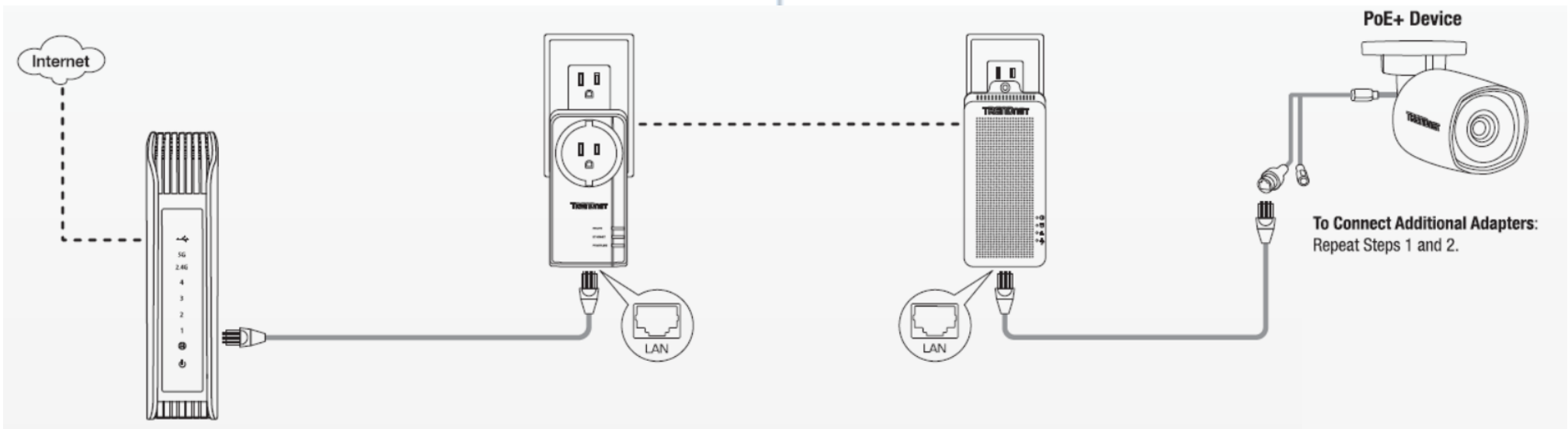
Connecting the adapters using Powerline

Requirement:

Must have existing TRENDnet Powerline Network.

NOTE: TRENDnet adapters auto-connect out of the box over a pre-encrypted Powerline signal.

- ① In your existing powerline network press the Sync button on the powerline adapter connected to your router for 3 seconds. The POWERLINE LED will begin to blink.
- ② Plug the TPL-331EP into an available outlet. Press the Sync button for 3 seconds. The POWERLINE LED will blink and then turn solid.
- ③ Connect a PoE+ device to TPL-331EP's LAN Port.



Installing your Powerline Adapters

Powerline Security

All out-of-the-box TRENDnet HomePlugAV Powerline adapters can be connected to each other without further configuration. To add additional network security to your network, you can change your Powerline network name away from the factory default. With a customized private network name, no one can connect to your Powerline network with an out-of-the-box HomePlugAV adapter.

TRENDnet HomePlugAV certified Powerline adapters have the same default network name "HomePlugAV". TRENDnet recommends that you change the Powerline network name away from the factory default to increase network security. Once configured, the Powerline network name will be saved on device. You can freely unplug the adapter and moved to the other location within its operating range. If a mistake is made in the settings, the adapter can be reset to the factory default settings by pressing the **Reset** button for 1 second.

If you want to use the default network name for easy connection, skip the synchronization steps and go directly to **Connect a Powerline adapter to your router** on page 6.

Scramble your Network Name Away from the Factory Default

1. Use the physical **Sync** button on your Powerline adapter to generate a random private network name.

Before you Install

1. Before you proceed with the installation, verify the following:

- You already have a router already installed.
- You already have Internet access through your existing network.
- An Ethernet port (also called LAN port) is available on your router.
- Verify that you have at least two Powerline adapters. You will need at least two Powerline adapters to create a Powerline network.
-

2. Plan the location of where you will install your Powerline adapters.

- Avoid plugging the adapters into power strips, extension cords, or surge protectors as this may prevent the adapter from functioning correctly or degrade performance.
- Avoid plugging the adapters into wall power outlets that are controlled by a light switch to prevent the Powerline adapter from being turned off accidentally.
- Avoid plugging the adapters into wall power outlets that are located near appliances that consume a lot of power (e.g. refrigerators, washers, dryers) as this may degrade performance.
- Make sure there are available wall power outlets in the room where the router is installed and the room where you want to extend network connectivity.
- For AV2 Powerline adapters, make sure your electric network has 3 wires properly installed.

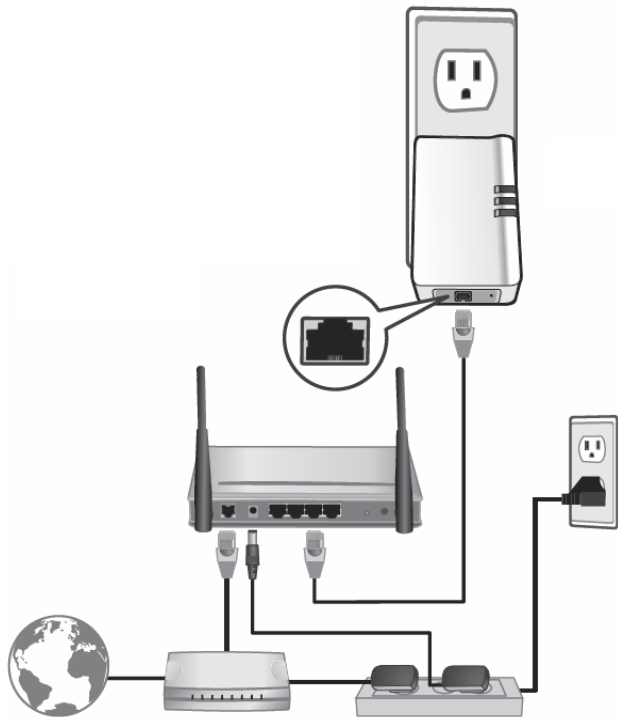
Connect a Powerline adapter to your router

1. Plug the Powerline adapter into an available wall power outlet near your router.

Note: This will allow devices connected to your Powerline network to access the Internet and other devices connected to your network.

2. Connect the included Ethernet cable (also called network cable) from the Ethernet port (also called network port) of your Powerline adapter to an available Ethernet port (also called LAN port) on your router.

3. Once the Powerline adapter is installed and connected to your router, verify that the **Power LED** is on or blinking and the **Ethernet LED** is on or blinking.



Add adapters to your network

Once you have installed and connected the first Powerline adapter to your router, you can easily extend your network to other rooms by adding additional Powerline adapters. TPL-331EP is best suited as an added adapter because its Ethernet port can be used to power PoE+ devices.

To extend your network using an additional Powerline adapter:

1. First, make sure the first Powerline adapter is installed and connected to your router.

Note: This will allow devices connected to your Powerline network to access the Internet and other devices connected to your network.

2. Plug the additional Powerline adapter into an available wall power outlet in another room near a computer or network device (e.g. game consoles, network-enabled TVs, network attached storage, network media server/players, etc.) that you would like to connect to your network.

3. Connect the included Ethernet cable from the Ethernet port on your Powerline adapter to the Ethernet port of your computers or network devices.

4. After the additional Powerline adapter is connected and installed to your computer or network device, wait for the **POWERLINE LED** to turn on. After the **POWERLINE LED** turns on, verify that the **Power LED** is on, the **POWERLINE LED** is on or blinking, and the **Ethernet LED** is on or blinking.

Note: To verify that your Powerline adapters are connected successfully to your network, you can check if the computer(s) or network device(s) can access the Internet through your Powerline network.

To install additional Powerline adapters in other rooms, repeat the steps above for each adapter.

Connect a PoE+ Device

TPL-331EP is best suited as an added adapter because its Ethernet port can be used to power PoE+ devices. After connecting a powerline adapter to your router and syncing with TPL-331EP, simply use TPL-331EP's Ethernet port to provide up to 30W of power to PoE+ devices.

Securing your Powerline Network

Powerline networks consist of two or more Powerline devices connected together using the same encryption key. TRENDnet Powerline adapters automatically connect to each other over a secure encrypted signal and share the same encryption key (Default encryption key: HomePlugAV).

In order for your Powerline devices to connect to the same Powerline network, the same encryption key must be assigned to all Powerline devices in that network. Powerline devices that are not assigned the same encryption key will not be able to connect to the Powerline network.

For additional security, TRENDnet recommends changing adapter default encryption key to prevent a neighbor with a Powerline adapter and the same default encryption key from gaining access to your network.

Note: *After the default encryption key has been changed and the Powerline adapters have been connected using a new encryption key, the Powerline adapters will retain their security settings when they are unplugged and moved to a new location. No additional reconfiguration of the Powerline adapters is needed after the default encryption has been changed.*

To change the default encryption key:

- Use the physical **Sync/Link** button on your Powerline adapter to generate a random encryption key.

****Recommended method****

Scramble your Network Name and Encryption

TRENDnet adapters auto-connect out of the box over a pre-encrypted Powerline signal. The following optional steps are recommended to secure your powerline network.

1. Make sure your TPL-331EP is powered on and not in sleep mode.
2. The physical **Sync** button on the Powerline adapter provides an easy way to change the network name. Push and hold the **Sync** button for 15 seconds. All LEDs will turned off and then turned on again. This will generate a new random network name for your Powerline adapter.
3. Push the Sync button on each adapter within the powerline network for 3 seconds to re-sync to the new network name and encryption. The POWERLINE LEDs will turn solid when devices have successfully reconnected.

Technical Specifications

Standards

- IEEE 802.3
- IEEE 802.3u
- IEEE 802.3x
- IEEE 802.3af
- IEEE 802.3at

Device Interface

- 1 x 10/100Mbps PoE+ port
- Sync button
- Reset button
- LED indicators

Frequency Band

- 2 – 28MHz

Modulation/Protocol

- OFDM, 4096/1024/256/64/16/8-QAM, QPSK, BPSK, ROBO
- CSMA/CA, TDMA, CSMA

Data PHY Rate

- Up to 200Mbps

Networking Distance

- Powerline: Up to 300m (980ft.) linear distance over electrical power lines***

Encryption

- 128-Bit AES (Advanced Encryption Standard)

Powerline Nodes

- Up to 8 (max.)

Overlapping Powerline Networks

- Up to 4 (per electrical system)

Special Features

- Auto-connects to other TRENDnet Powerline adapters
- IPv6 support
- IGMP / MLDv2 Streams

Power

- Input: 100 - 240V AC, 50-60Hz
- Consumption: Active mode: 2.3W (max.); Standby mode: 1.7W (max.)
- PoE Budget: 30 Watts (max.)

Operating Temperature

- 0 – 55°C (32 – 131°F)

Operating Humidity

- Max. 93 % non-condensing

Certifications

- FCC

Dimensions

- 156 x 67 x 43 mm (6.14 x 2.6 x 1.7 in.)

Weight

- 205g (7.2 oz.)

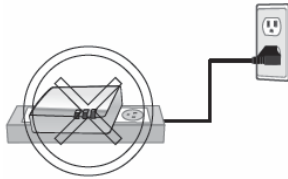
Warranty:

- 3 year limited

Troubleshooting

Please reference the items below if you continue to experience difficulty with installing and using your Powerline adapters.

- Do not plug the Powerline adapters into a power strip. Make sure to plug the adapters directly into a power outlet and not through power strip. Using adapters through a power strip may negatively affect Powerline connectivity and performance.



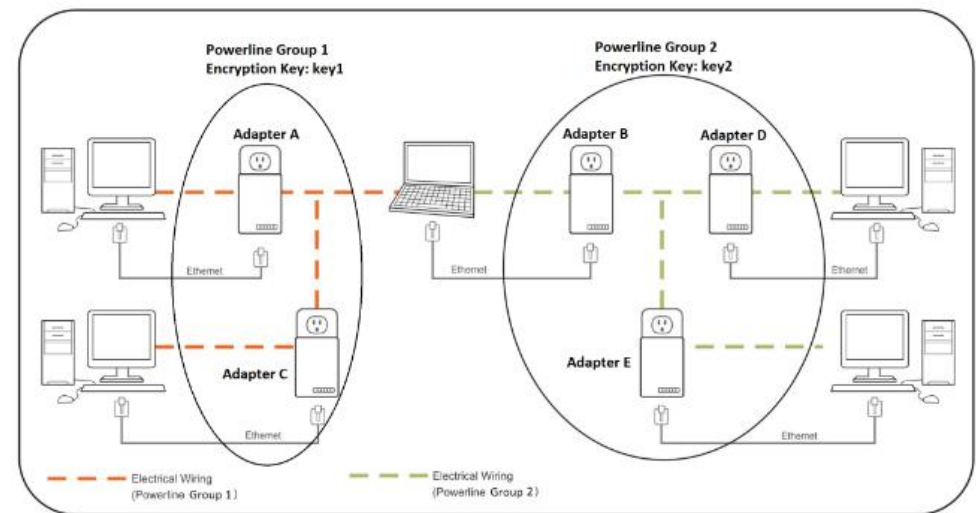
- Do not use the Sync button for more than 2 Powerline adapters to connect simultaneously. Wait for each Powerline adapter to connect to your Powerline network one at a time before connecting the next adapter. Using more than one adapter to Sync simultaneously may cause some of your adapters not to Sync and establish connection to your Powerline network.
- Power-cycle the Powerline adapters by disconnecting them from their power outlets for 15 seconds and then reconnect them.
- If the Powerline (PL) LED is red, try plugging the Powerline adapter into another available power outlet. The quality of the connection may be better in a different power outlet.
- If you are having issues connecting the Powerline adapters after changing the encryption key using the Sync button, reset the Powerline adapters to defaults using the physical Reset button.
- Using a pin or paperclip; press and hold the Reset button for 1 second on each Powerline adapter. All LEDs will turn off then turn back on. This will reset the Powerline adapters to their default settings. The default encryption key is HomePlugAV.
- The Powerline adapters can provide better connectivity and performance when plugged directly into a power outlet. Connecting the Powerline adapters to a power strip or surge protector may degrade or block Powerline signals.
- Avoid using the Powerline adapters on GFI protected outlets and electrical systems with AFCI circuit breakers. They may degrade or block Powerline signals.
- The Powerline adapters should not be used in areas with excessive heat.

- Florescent and incandescent lighting can generate significant Powerline interference.
- If your building has more than one circuit breaker box, the Powerline adapter may not be able to establish connectivity between them. In this case, connect a Powerline adapter into a power outlet located on each of the circuit breaker boxes. Then connect an Ethernet cable between the Powerline adapters to bridge the two circuits together.

Overlapping Powerline Networks

It is possible to create multiple Powerline networks on the same electrical system separated and grouped by different network encryption keys. The Powerline networks will work and communicate independently of each other which can provide security between different groups of Powerline adapters. For example, if you have five powerline adapters (Adapter A, Adapter B, Adapter C, Adapter D, Adapter E), you can group Adapters A, B, and C together on one powerline network and group Adapters D and E on a different Powerline network. Each group will use a different encryption key.

Note: It is recommended that only a maximum of up to 4 Powerline networks can be created per electrical system. Any additional Powerline networks above the recommended may result in significant degradation in Powerline performance.



Appendix

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For product, available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device and its antennas(s) must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.



RoHS

This product is RoHS compliant.



Limited Warranty

TRENDnet warrants its products against defects in material and workmanship, under normal use and service, for the following lengths of time from the date of purchase.

TPL-331EP/ TPL-331EP2K – 3 Years Warranty

AC/DC Power Adapter, Cooling Fan, and Power Supply carry 1 year warranty.

If a product does not operate as warranted during the applicable warranty period, TRENDnet shall reserve the right, at its expense, to repair or replace the defective product or part and deliver an equivalent product or part to the customer. The repair/replacement unit's warranty continues from the original date of purchase. All products that are replaced become the property of TRENDnet. Replacement products may be new or reconditioned. TRENDnet does not issue refunds or credit. Please contact the point-of-purchase for their return policies.

TRENDnet shall not be responsible for any software, firmware, information, or memory data of customer contained in, stored on, or integrated with any products returned to TRENDnet pursuant to any warranty.

There are no user serviceable parts inside the product. Do not remove or attempt to service the product by any unauthorized service center. This warranty is voided if (i) the product has been modified or repaired by any unauthorized service center, (ii) the product was subject to accident, abuse, or improper use (iii) the product was subject to conditions more severe than those specified in the manual.

Warranty service may be obtained by contacting TRENDnet within the applicable warranty period and providing a copy of the dated proof of the purchase. Upon proper submission of required documentation, a Return Material Authorization (RMA) number will be issued. An RMA number is required in order to initiate warranty service support for all TRENDnet products. Products that are sent to TRENDnet for RMA service must have the RMA number marked on the outside of return packages and sent to TRENDnet prepaid, insured and packaged appropriately for safe shipment. Customers shipping from outside of the USA and Canada are responsible for return shipping fees. Customers shipping from outside of the USA are responsible for custom charges, including but not limited to, duty, tax, and other fees.

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Governing Law: This Limited Warranty shall be governed by the laws of the state of California.

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2018/12/1



Product Warranty Registration

Please take a moment to register your product online.
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