

**TRENDnet<sup>®</sup>**

## User's Guide



**Inline PoE Tester**

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**TC-NTP1**

# TC-NTP1 Inline PoE Tester

## Common Terms

**Power over Ethernet (PoE) System:** A typical PoE system comprises a Power Sourcing Equipment (PSE) and Powered Device (PD).

**PSE:** Devices that provide power over the Ethernet cable, such as PoE Switches and PoE Injectors.

**PD:** Devices that receive power from PSE or Injector, such as IP cameras, IP phones, and Wireless Access Points.

### **Passive PoE**

These type of injectors do not follow IEEE standard and they transmit power at all times.

To prevent damaging the PD, before making a connection, check to make sure that you are using the correct injector for the PD.

**Inline Testing:** Connecting both PSE and PD to the tester to monitor the PD's power usage.

## Standards

IEEE 802.3af (PoE), IEEE 802.3at (PoE+), and IEEE 802.3bt 4PPoE (type 3 & 4)

IEEE standard PSE only transmits power when it detects IEEE standard PD.

### Mode A

Uses RJ-45 port pin 1, 2, 3, and 6 to transmit power. DC+ on 1 and 2. DC- on 3 and 6.

Reversed Polarity: DC+ on 3 and 6. DC- on 1 and 2

### Mode B

Uses RJ-45 port pin 4, 5, 7, and 8 to transmit power. DC+ on 4 and 5. DC- on 7 and 8.

Reversed Polarity: DC+ on 7 and 8. DC- on 4 and 5.

## Precautions

- Use the TC-NTP1 (tester) to test standard PoE devices from 36V ~ 60V and Passive PoE (non-standard) devices from 11V ~ 60 volts. Maximum current 990mA/50W per mode.

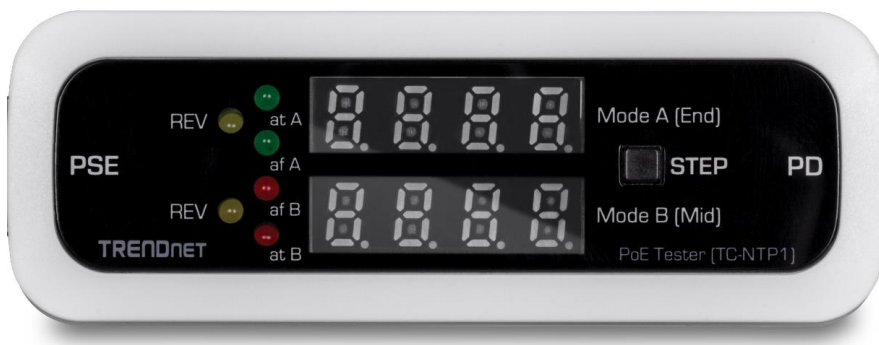
- Always test the PSE first, make sure the PSE and PD are compatible, and then connect the PD to the tester.

- Please test with Cat 5 or higher network cables.

- During the testing, if you see "HI" on the tester's display, this means the tester detects voltage of over 60V. When this happens, disconnect all the cables from the tester to avoid damaging the tester.

- Never connect a reversed or unprotected PSE to the tester's PD port, doing so can damage the PoE equipment and the tester.
- When performing testing in "T-Mode", limit the testing time to less than 20 minutes to avoid overheating the tester.
- For long duration real-time inline testing, please select the "I-Mode".
- Network cable's length and quality may affect the test result. Always perform the testing at the jack where you plan to connect the PD.

## **TC-NTP1 Front Panel**



### **LED Indicators**

LED	Status	Definition
<b>REV (Both)</b>	Solid Yellow	Reversed Polarity Power Source
<b>at A</b>	Two Solid Green	PSE providing 802.3at power at Mode A
<b>af A</b>	One Solid Green	PSE providing 802.3af power at Mode A
<b>af B</b>	One Solid Red	PSE providing 802.3af power at Mode B
<b>at B</b>	Two Solid Red	PSE providing 802.3at power at Mode B
<b>at A, af A, at B, af B</b>	All Four Solid Red and Green	PSE providing 802.3bt power
<b>Dual 4 Digit LED</b>		
	U	Indicates Voltage (Volts)
	A	Indicates Current (mAs)
	P	Indicates Current (Watts)

**Note:** When testing with IEEE 802.3bt devices, both Mode A and Mode B should show readings. The total power consumption is the combine of the two readings.

**STEP Button:** During inline testing (tester connects to both PSE and PD), by default the tester's display shows voltage, amperage, and then wattage in sequence repeatedly. Pressing the STEP button once allows you to manually go through these readings one at a time starting from the voltage. This is useful for monitoring a desired reading in real-time.

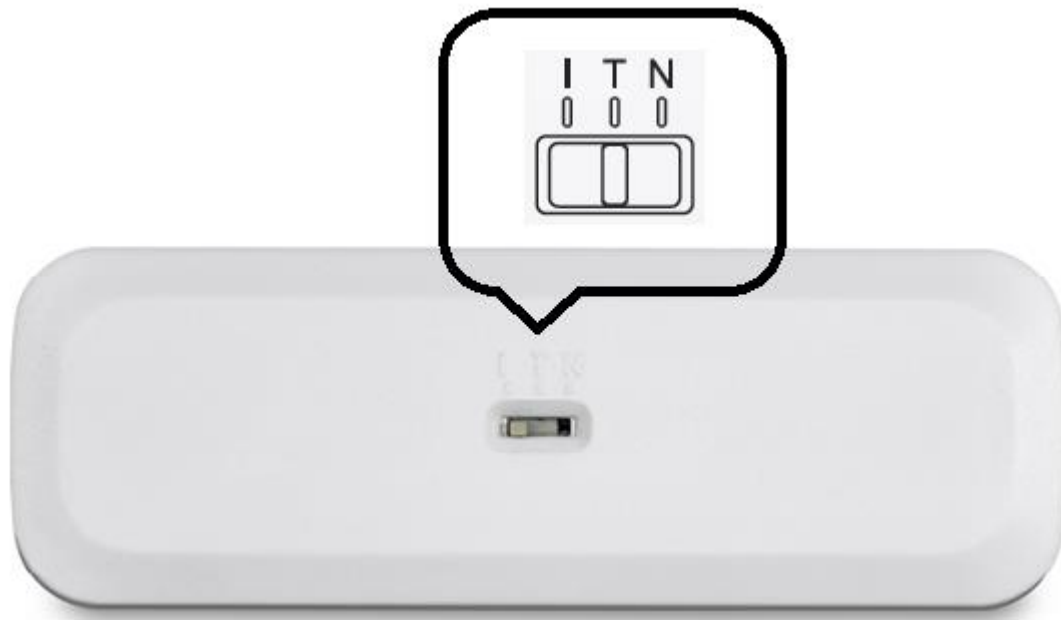
#### Ports

**PSE:** Connection from PSE

**PD:** Connection to PD

### TC-NTP1 Back Panel

#### Testing Mode Selector



**I - Mode:** For inline testing over a long period of time. In this mode, the tester measures PD's power consumption (Watts) by connecting the PSE's port to the tester's PSE port and then connect the tester's PD port to a compatible PD. The tester's display shows the voltage, current, and power consumption in sequence. Press the "STEP" button at the front panel to stop the cycle and select the desired reading to monitor in real-time.

**T - Mode:** The tester acts like a PD and detects PSE's PoE standard, PoE mode, and measures the voltage (no reading for current and power). In this mode, you can also perform inline test by connecting tester's PD port to a PD that matches PSE's specification, but limit the testing time to less than 20 minutes to avoid overheating the tester. For inline testing over a long period of time, please use "I-Mode".

**N - Mode:** Select this mode to test passive/non-standard PoE.

If you are not sure if the PSE you are testing is standard or non-standard PoE, select the T-Mode first and then connect the PSE to the tester's PSE port. If the tester's display does not show any reading, it is most likely a passive PoE PSE. Disconnect the PSE from the tester, select N-Mode and reconnect the PSE to the tester.

During the testing, if you see "HI" on the tester's display, this means the tester detects voltage of over 60V. When this happens, disconnect all the cables from the tester to avoid damaging the tester.

For inline testing, after connecting the PSE to the tester, you should see a voltage reading, then you can connect a compatible PD to the tester.

### **Testing PSE (in N-Mode and T-Mode)**

*Note:*

*- During the testing, if you see "HI" on the tester's display, this means the tester detects voltage of over 60 volts. When this happens, disconnect all the cables from the tester to avoid damaging the tester.*

*- When performing testing in "T-Mode", limit the testing time to less than 20 minutes to avoid overheating the tester.*

Most of the PoE injectors on the market are passive PoE injectors and the power is always available at the PoE port. If the injector provides higher voltage than the PD needs, it can damage the PD. This is why it is very important to check and make sure your injector and PD are compatible before connecting them together.

When testing injector/PSE, if you are not sure if it is standard PoE or not, set the tester to T-Mode and then connect the PSE to the tester's PSE port. If there is no reading on the display, then the PSE is probably Passive PoE. Disconnect the PSE, set the tester to N-Mode and then reconnect the PSE. If there is no reading again in N-Mode, then the PSE is not a PoE device or it is not working correctly.

In N-Mode, if the voltage reading is on the tester's upper display, the PSE is Mode A (Endspan). If the reading is on the lower display, the PSE is Mode B (Midspan).

In T-Mode, in addition to displaying the PSE's voltage, the tester also detects PSE's PoE standard (IEEE 802.3af, at, or bt), Mode A or B, and if it is reversed polarity. Please reference the **LED indicator section** above for more information.

## PSE Test Results in Each Mode

**N:** No reading on the tester

**Y:** The tester displays a reading

	<b>I-Mode</b>	<b>T-Mode</b>	<b>N-Mode</b>
Standard Active af/at/bt PoE [47V-57V]	<b>N</b>	<b>Y</b>	<b>N</b>
Legacy Passive PoE [36V-57V]	<b>N</b>	<b>Y</b>	<b>Y</b>
Passive PoE [36V-57V]	<b>Y</b>	<b>Y</b>	<b>Y</b>
Passive PoE [11v-30V]	<b>N</b>	<b>N</b>	<b>Y</b>
Non-PoE	<b>N</b>	<b>N</b>	<b>N</b>

## Using the Tester to troubleshoot PoE related issues

- After connecting a PD to the PSE, the PD does not power up and the PSE's PoE port LED is not on.

1. Check and make sure the PD is compatible with the PSE and the PSE is powered up.
2. Check the network cables are at least Cat 5, in good working order, less than 100 meters long, and connected to the ports properly.
3. When applicable, check PSE's settings and make sure the PoE port is enabled.
4. Use the tester to verify that the PSE's PoE port status and if it is compatible with the PD.
5. If the above are all verified and in good working condition, then the PD could be defective.

## **Reference Data**

### **PoE Specification**

Property	802.3af (PoE) Type 1	802.3at (PoE+) Type 2	802.3bt (4PPoE) Type 3	802.3bt (4PPoE) Type 4	Non-Standard UPoE
Max. power delivered by PSE (Watts)	15.4	30	60	90/100	60
Min. power Available for PD (Watts)	12.95	25.5	51-60	71-90	51
Voltage range At PSE (Volts)	44-57	50-57	50-57	52-57	Max. 57
Voltage available at PD (Volts)	37-57	42.5-57	42.5-57	41.1-57	Max. 57
Max current (mA)	350	600	600 per pair	960 per pair	600-720
Number of wire that carries power (pair)	2-pair	2-pair	4-pair	4-pair	4-pair

### **PoE Classification**

Class Number	PSE output Power (Watts)	PD input power (Watts)	PD type	Notes
0	15.4	12.95	1	802.3af (2-pair PoE)
1	4	3.84	1	
2	7	6.49	1	
3	15.4	12.95	1	
4	30	25.5	2	802.3at (PoE+)
5	45	40	3	802.3bt (4PPoE)
6	60	51	3	
7	75	62	4	802.3bt (4PPoE)
8	99	71.3	4	

**Note:**

- PSE does not always meet the wattage specification for its class.
- Actual wattage may vary depending on the network cable's grade/quality and length.

**Federal Communication Commission Interference Statement**

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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.



**Limited Warranty**

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TRENDnet warrants only to the original purchaser of this product from a TRENDnet authorized reseller or distributor that this product will be free from defects in material and workmanship under normal use and service. This limited warranty is non-transferable and does not apply to any purchaser who bought the product from a reseller or distributor not authorized by TRENDnet, including but not limited to purchases from Internet auction sites.

**Limited Warranty**

TRENDnet warrants its products against defects in material and workmanship, under normal use and service. Specific warranty periods are listed on each of the respective product pages on the TRENDnet website.

- AC/DC Power Adapter, Cooling Fan, and Power Supply carry a one-year warranty.

**Limited Lifetime Warranty**

TRENDnet offers a limited lifetime warranty for all of its metal-enclosed network switches that have been purchased in the United States/Canada on or after 1/1/2015.

- Cooling fan and internal power supply carry a one-year warranty

To obtain an RMA, the ORIGINAL PURCHASER must show Proof of Purchase and return the unit to the address provided. The customer is responsible for any shipping-related costs that may occur.

Replacement goods will be shipped back to the customer at TRENDnet's expense.

Upon receiving the RMA unit, TRENDnet may repair the unit using refurbished parts. In the event that the RMA unit needs to be replaced, TRENDnet may replace it with a refurbished product of the same or comparable model.

In the event that, after evaluation, TRENDnet cannot replace the defective product or there is no comparable model available, we will refund the depreciated value of the product.

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, or (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. International customers shipping from outside of the USA and Canada are responsible for any return shipping and/or customs charges, including but not limited to, duty, tax, and other fees.

**Refurbished product:** Refurbished products carry a 90-day warranty after date of purchase. Please retain the dated sales receipt with purchase price clearly visible as evidence of the original purchaser's date of purchase. Replacement products may be refurbished or contain refurbished materials. If TRENDnet, by its sole determination, is unable to replace the defective product, we will offer a refund for the depreciated value of the product.

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