Operation and maintenance manual

PAN-14 Sensor installation guide

Version 3.6 May 2025

Panoramic Power

Copyright notice

FCC compliance statement

This device 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 residential installations. 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 and television reception.

However, there is no guarantee that interference will not occur in a particular installation. If this device does cause such interference, which can be verified by turning the device off and on, the user is encouraged to eliminate the interference by one or more of the following measures:

- Re-orient or re-locate the receiving antenna.
- Increase the distance between the device and the receiver.
- Connect the device to an outlet on a circuit different from the one that
  supplies power to the receiver.
- Consult the dealer or an experienced radio/TV technician.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference that may be received or that
   may cause undesired operation.

RF Exposure

This device has been tested for compliance with FCC RF exposure limits in a portable configuration. At least 20 cm of separation distance between the PAN-14 device and the user's body must be maintained at all times. This device must not be used with any other antenna or transmitter that has not been approved to operate in conjunction with this device.

Manufacturer information

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IC compliance statement

This device complies with Innovation, Science and Economic Development Canada license-exempt RSS standard(s). Operation is subject to two conditions:

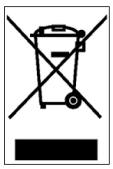
1. This device may not cause harmful interference, and
2. This device must accept any interference that may be received or that may cause undesired operation.

A distance of at least 10 cm between the equipment and all persons should be maintained during the operation of the equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. *l'appareil ne doit pas produire de brouillage, et*
2. *l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

Une distance d'au moins 10 cm entre l'équipement et toutes les personnes devraient être maintenues pendant le fonctionnement de l'équipement.



Product end of use handling (WEEE) - Waste of Electrical and Electronic Equipment

Panoramic Power is committed to protect the global environment and helping our customers with recycle responsibilities. Disposal of electrical and electronic products must be done according with the local and national regulations. You can return your product to a local collection point.

For information about your disposal or collection points, call your distributor or vendor, or contact https://www.powerradar.energy/support .

⚠ Safety Precautions – Panoramic Power Sensor Installation

The installation of this product (the 'sensor') must be undertaken by an electrically qualified and competent person to prevent danger, injuries or a fatality due to the significant risks associated with work on or near live electrical conductors. An electrical safe system of work (SSoW)/electrical safe work condition must be followed to prevent any potential incident, which shall include a suitable and sufficient risk assessment. The risk assessment shall cover the work on or near the specific electrical equipment and shall be carried out by someone with comprehensive knowledge and experience of this type of work and the means of controlling the risks.

The electrical supply to the distribution panel where the install is taking place must be isolated (shut off following appropriate Lockout/Tagout procedures/guidelines) before and during the installation of the sensor(s).

Where it is determined acceptable, and in compliance with all applicable and current International, Federal, State, and local laws, rules, or regulations (e.g. NFPA 70E) and any other Authorities Having Jurisdiction, for the installation to be performed on an energized conductor (live wire), then for reasons of safety and inadvertent shock hazard suitable additional controls must be detailed within the SSoW. This shall include, but not be limited to; the use of suitably (International Electrotechnical Commission - IEC) verified insulated tools, equipment, protective clothing including electrically insulated gauntlets and Arc Flash resistant.

On aged electrical installations, consideration must be given when removing barriers/covers from electrical enclosures to the potential for exposed electrical parts (i.e. no insulating material) within the distribution equipment or any deterioration of insulation on single insulated conductors within, where intrusive interaction is needed to fit the sensor.

The sensor must be installed only on an insulated conductor and shall not be installed near or touching any other non-insulated exposed electrical conductor as proximity to un-insulated electrical conductors could result in an electrical short circuit (Arc Flash) incident occurring.

The sensor shall be compatible with the physical size and maximum electrical load current of the conductor and in accordance with the installation specification guidance which shall be comprehensively adhered to; this includes such information as sensor orientation in relation to the electrical load, installed in non-hazardous areas (e.g. explosive dust, vapor or gas atmospheres) and within the sensor's standard operating temperature of between 0 - 60°C

Installation is possible both on external entry/exit conductors before the terminal strip and both ends of the circuit breaker. The most accessible location within the electrical enclosure should be chosen for installation of the sensor in order to minimize the risk of danger and injury. The sensor should be installed so that the arrow points in the direction of the load, panoramic power does not take any responsibility for the incorrect fitting of the device.

Contents

Overview

This user guide explains how to install the PAN-14 sensors.

PAN-14 Current sensor

Current Transformer (CT)

Workflow

Sensor installation consists of the following steps:

1. Map the circuits.
2. Physically attach the sensors and the CTs to the wires.
3. Monitor the proper functioning of the sensors.

⚠ This manual covers steps 1 and 2 of the workflow. For step 3, visit our Knowledge Base Center to learn how.

⚠ Safety precautions

The sensor must be installed only on an insulated conductor.

CTs output/secondary current must not exceed 5A.

The sensor and CT should be installed and removed only by a qualified electrician.

Installation must not be performed on a live wire for reasons of safety and random shock hazard. Power supply to the panel must be shut off before and during installation.

The sensor and CT must not be installed lying or touching bus bars or any other non-insulated, exposed conductors.

Installation is possible both on external entry/exit conductors before the terminal strip, as well as both ends of the circuit breaker. The least cramped, most accessible location should be chosen for installation. The sensor should be installed such that the arrow points in the direction of the load.

Caution Protection provided by the equipment can be impaired if used in a manner not specified by the manufacturer.

Mapping the site

Sensors are installed at the electrical panel of the mains and/or devices you wish to monitor. Per zone or panel, a Bridge must be installed within range to collect the sensor data. Visit our Knowledge Base Center to learn more about how to install Bridges and map sensors.

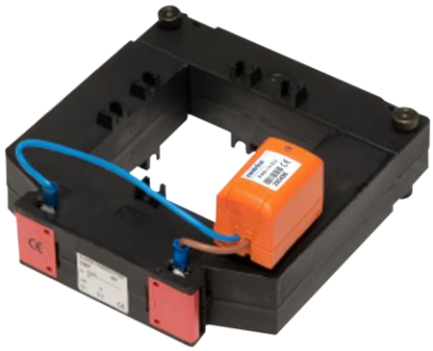
⚠ Installing the sensor

PAN-14 and the associated current transformer should be installed in a location not accessible to an average user. The voltage and current measurement circuit insulation should be adequate for 300V, CAT III, double/reinforced insulation from mains.

This procedure must be carried out by a certified electrician.

1. Connect the PAN-14 sensor to the CT by connecting the two CT's outputs to the PAN-14 sensor using 1.0-4.0mm^2 (12-17 AWG) wires, min. temperature rated 90°C copper wires, as follows:
   a. Connect the PAN-14 sensor's terminal marked as '1' to the CT's terminal marked as 'S1' or 'X1'
   b. Connect the PAN-14 sensor's terminal marked as '2' to the CT's terminal marked as 'S2' or 'X2'

⚠ **Caution:** A loose CT connection can become a fire hazard. When connecting the unit to the CT make sure that both CT wires are properly inserted and that the screws are well tightened.



2. Mount the CT on the hot wire:
   a. If the CT is split-core:

      Close the CT on the hot wire by disconnecting its two parts and closing them around the hot wire.

   b. If the CT is solid -core:

      Disconnect one of the ends of the hot wire from the panel, insert it through the CT, and then reconnect it to the panel.

   c. In both cases, make sure the CT is placed on the wire so that the direction of current flow on the wire is from the side marked ‘P1’ or ‘H1’ on the CT, to the side marked ‘P2’ or ‘H2’ on the CT.

      Other used CT polarity markings are K for entry and L for exit or Load side (respectively P1 and P2).

3. Make sure the sensor’s LED is blinking.

4. Finalize the PAN-14 sensor and the CT’s position on the panel:
   a. Maintain a reasonable distance between the CT and the sensor.
   b. Place the PAN-14 sensor on the side that is closer to the bridge (to avoid RF blocking, make sure the CT is not positioned between the sensor and the bridge).

⚠ **Caution:** Do not hang the PAN-14 sensor from the CT, as the connection cannot withstand the sensor weight and can become a fire hazard. Make sure that the sensor is properly mounted, for example using plastic ties.

⚠ Important notes

- Do not mount the CT on the hot wire before you have already connected the PAN-14 sensor securely to the CT!
- If a PAN-14 sensor needs to be replaced, short circuit the CT's outputs to each other using a length of wire before PAN-14 is disconnected!
- Do not leave the CT mounted/installed on a hot wire without being short circuited.
- It is possible to have both the PAN-14 sensor and the short-circuiting wire connected to the CT at the same time (but PAN-14 will not measure current accurately while the short-circuiting wire is connected).

Registering the installed sensor

Visit our Knowledge Base Center to read our articles about mapping the sensors to the devices configured to the site.

Monitoring sensor activity

Visit our Knowledge Base Center to learn more about the sensor summary window that helps monitor sensor activity.

Uninstalling a sensor

Open the sensor in the way you first opened it and remove it from the cable.

Sensor specifications

Physical dimensions	33.8 × 29 × 42.5 mm 1.33 1.14 × 1.67 inch
Current input range - from external current transformer	0-5 A_{RMS} (up to 10 A peak)
Current measurement range	Any applicable range based on CT ratio
Current measurement accuracy (typical, at 25° C)	<2% at I > 2% of full-scale current
Minimum operating current (at input from external current transformer)	0.03 – 0.05 A
AC frequency supported	50 Hz (EU) 60 Hz (US)
Transmission frequency	434 MHz (EU) 915 MHz (US)
Transmission power (ERP)	0 dBm (max)
Transmission interval	10 seconds
Certification	USA and Canada Safety: UL 61010-1, UL 61010-2-030, CAN/CSA-C22.2 No. 61010-1 EMC: FCC Part 15 subpart B, ICES-003 Radio: FCC Part 15 subpart C, RSS-210, RSS-Gen Europe Safety: EN 61010-1, EN 61010-2-030 (CE) EMC: EN ETSI 301 489-1, 301 489-3, 613 326-1 Radio: EN ETSI 300 220-1, 300 220-2 CB Certification IEC 61010-1, IEC 61010-2-030 by Intertek Testing Services
Flammability rating of external enclosure	UL94 V-0
Operating temperature	-25 – 60° C (-13 – 140° F)
Operating humidity range	5% - 90% non-condensing

Range of rated environmental conditions

The unit is intended for indoor use.

Altitude up to 2000m

CAT III

Pollution Degree 2

Certified CTs

General notes

- Solid-core or split-core CTs can be used.
- CT's accuracy class should be 0.5% or better.
- Relay CTs, Rogowski coils, or CTs with included burden resistors cannot
  be used.

The following list includes the CTs that were already tested and approved by Panoramic Power.

Dixsen CTs

- 600A split (model DBP-58)
- 600A non-split rectangular (model MES-62)
- 1000A split (model DBP-58)
- 1000A non-split rectangular (model MES-60)

Veris CTs

- 600A non-split round (BL601)
- 1000A non-split round (BL102)

Magnelab CTs

- 600A split (ICT-2000-600)
- 600A non-split rectangular (CCT-1200-600)
- 1000A split (ICT-2000-1000)

Troubleshooting

If you encounter a problem, first try the following solutions:

Problem	Solution
The sensor is not sending measurements	Make sure the circuit has current. Make sure that the sensor arrow points in the direction of the load. Make sure that the sensor LED is blinking. Make sure the sensors are near enough to the Bridge for the Bridge to receive its signals. Check the reception LED of the Bridge. If it is not blinking it means that it is not receiving signals.

Maintenance and Servicing

Maintenance is not required. For any issues, please reach out to your Support Provider who can submit a support ticket on your behalf at: https://www.powerradar.energy/support

Support

More support can be obtained at by submitting a support ticket at:

https://www.powerradar.energy/support .