

# Operation and maintenance manual

## PAN-10 and PAN-12 Sensor installation guide

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## Copyright notice

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## 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 Raptor 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 - 50°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.

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## Overview

The Panoramic Power System monitors electrical energy consumption at individual circuit level and detects excess usage allowing organizations to identify and reduce energy and maintenance expenses.

The Panoramic Power System consists of wireless, self-powered sensors engineered to allow for rapid, non-invasive installation, with almost no disturbance to operations. Sensors are easily attached to circuit breakers by just snapping them on to the outgoing electrical wire. They monitor the flow of electricity through the resulting magnetic field and also use the field as a power source. The sensors do not require any maintenance.

Data collected by the sensors is sent to a bridge, which, in turn, transfers the information to the Panoramic Power System server through the Internet, using Cloud technology.

The sensors report the energy consumption to the bridge at sub-minute intervals. Consumption reports can be retrieved through the system.

This user guide explains how to install the sensors.

## Workflow

Sensor installation consists of the following steps:

1. Map the circuits. See 'Panoramic Power deployment tool user guide'.
2. Physically attach the sensors to the wires (this guide).
3. Monitors the proper functioning of the sensors. See 'Panoramic Power deployment tool user guide'.

## Unpacking the hardware

63A (PAN-10) sensors are shipped in 12-unit packs and 225A (PAN-12) sensors are shipped in 9-unit packs.

The package includes the following items:

- 9 or 12 sensors.
- 1 sensor opener for 63A sensors

## Safety precautions

- The sensor must be installed only on an insulated conductor.
- The conductor's diameter and maximum current must match the specification printed on the sensor.
- The sensor 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 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.

## Hardware description

This procedure must be carried out only by a certified electrician. The following sensors are supported:

- 32A/63A , snapped-in cover.
- 225A, screwed cover.

The sensors are shipped closed, in order to protect the core from dust and other pollutants. Open a sensor only when preparing to install it.



Figure 1. 32A/63A

Figure 2. 225A

Figure 3. Core

The sensor comes with a label fixed on it, containing a unique ID.



## Mapping the site

See 'Panoramic Power deployment guide'.

## Installing a sensor

This process is divided into two stages:

1. Physically attaching the sensors to the circuit wires;
2. Registering the installation in Panoramic Power System.

### Attaching the sensors to the circuits

To install a sensor, follow these steps:

1. Open the cover of the electrical panel board.
2. Make sure you have a plan that indicates the circuits to be monitored and the sensor IDs associates with each such circuit. Identify the circuit breaker on which you would like to install the sensor.

The ID appears on the label fixed to the sensor.

3. Pick a sensor and slide the opener into position from the labeled side towards the cover.
4. Snap the opener's pins into the four holes (in 225A unscrew the cover).



Figure 4. Slide opener into position

5. Press the two sides of the opener to release the sensor cover.



Figure 5. Press the opener to release the cover.

6. Open the four screws.



7. Make sure the four core surfaces are free of dust or any other particles.  
If necessary, wipe it with a dry cloth

**Note** Whenever possible, avoid installing the sensor behind wires and position it at the front of the panel board.

8. Place the opening of the sensor on a clean section of the electrical cable with the arrow on the label pointing towards the load, so that the sensor ID and barcode are visible and easily readable.
9. Close the sensor cover, snapping it into its place (in 225A screw back the cover) and making sure that all four pins are properly inserted and the sensor is tightly closed.

## Registering the installed sensor

Visit our Knowledge Base Center to read our articles about [mapping the sensors to the devices](#) configured to the site.

## Post installation troubleshooting

If the sensor vibrates after installation (you can hear the vibration noise or feel it when touching the sensor), it means that the sensor is not properly closed.

Try to press the two parts of the sensor or tighten the screws to close it tightly.

If the vibration persists, open the sensor and reinstall it or try using another sensor.

## 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

Specifications	PAN-10	PAN-12
Physical dimensions	17 x 20 x 32 mm 0.67 x 0.79 x 1.26 inch	46.2 x 22.8 x 32.6 mm 1.82 x 0.90 x 1.28 inch
Max hot-air outer diameter (including insulation)	7 mm 0.28 inch	18.8 mm 0.74 inch
Current measurement range	0-63 A	0-225 A
Current measurement accuracy (typical, at 25° C) (@ Crest Factor <1.5)	<2% at I>3A	<2% at I>10A
Minimum operating current	0.5 – 1 A	0.7 – 1.2 A
AC frequency supported	50 Hz (EU, JPE) 60 Hz (US, JPW)	50 Hz (EU, JPE) 60 Hz (US, JPW)
Transmission frequency	434 MHz (EU) 902-928 MHz (US) 923 MHz (JPE, JPW)	434 MHz (EU) 902-928 MHz (US) 923 MHz (JPE, JPW)
Transmission power (ERP)	0 dBm (Max) -4 dBm (Max JPE, JPW)	0 dBm (Max) -4 dBm (Max JPE, JPW)
Transmission interval	10 seconds	10 seconds
Safety and EMC certificates	<b>USA &amp; Canada</b> Safety: UL-61010-1, CSA-C22.2 (ETL listed) EMC/Radio: FCC Part 15 subpart B, C  <b>Europe</b> Safety: EN-61010-1 (CE) EMC: EN-ETSI 301489-3, Radio: EN-ETSI 300220-1  <b>Japan</b> Radio: ARIB STD-T108	<b>USA &amp; Canada</b> Safety: UL-61010-1, CSA-C22.2 (ETL listed) EMC/Radio: FCC Part 15 subpart B, C  <b>Europe</b> Safety: EN-61010-1 (CE) EMC: EN-ETSI 301489-3, Radio: EN-ETSI 300220-1  <b>Japan</b> Radio: ARIB STD-T108
Flammability rating of external enclosure	UL94 V-0	UL94 V-0
Operating temperature	-25 - 60° C (-13 – 140° F)	-25 - 50° C (-13 – 122° F)
Operating humidity range	5% - 95% non-condensing	5% - 95% non-condensing
Storage temperature	-25 - 65° C (-13 – 149° F)	-25 - 65° C (-13 – 149° F)

## Troubleshooting

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

Problem	Solution
The sensor is vibrating	<p>Make sure that the sensor is completely closed (all four pins/screws are in place).</p> <p>If they are, try pressing the sensor again like you did when closing it.</p>
The sensor is not sending measurements	<p>Make sure the circuit has current.</p> <p>Make sure that the sensor arrow points in the direction of the load.</p> <p>Make sure the sensors are near enough to the bridge for the bridge to receive its signals.</p> <p>Check the reception LED of the bridge. If it is not blinking it means that it is not receiving signals.</p>

## Support

More support can be obtained at

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