PE.AMI GATEWAY

Instruction Manual

Product name: PE.AMI-GW920

(PE.AMI Gateway, 915MHz)

Document reference: DOC-INS-0031-02

Table of Contents

1 DESCRIPTION

PE.AMI Gateway is a key hardware element of PE.AMI, the wireless 6LoWPAN full mesh network platform by Paradox Engineering.

PE.AMI Gateway provides dual narrowband and broadband integrated network technologies to set up wireless infrastructures which can serve as backhaul for sensor-based applications such as street lighting or parking management, as well as data hungry applications such as IP cameras, traffic video surveillance or public Wi-Fi.

PE.AMI Gateway operates as *border router*, connecting each physical object of the PE.AMI network to the Internet or Local Area Network with an addressing system to uniquely identify single devices and adapt different communication layers.

It also acts as coordinator and data concentrator of the PE.AMI network. It serves as central collecting point for data coming from PE.AMI Nodes, leveraging 6LowPAN protocol and IPv6 addressing for radio communication. It coordinates all PE.AMI Nodes connected to the narrowband network section, synchronizing them and routing data coming from field devices to the PE.AMI Central Management Suite (CMS). Furthermore, it forwards to PE.AMI Nodes any command generated by PE.AMI CMS.

FCC statements

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

- This device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

Information to user:

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

Information to user 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 or more 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.

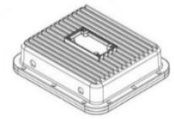
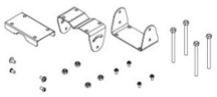
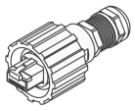
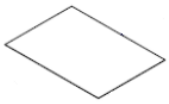
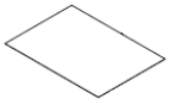
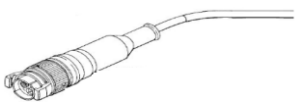
2 FEATURES

PE.AMI Gateway offers the following features:

- narrowband and broadband integrated network interfaces:
  - 1 narrowband radio module (915 MHz);
  - 2 broadband 2.4 GHz / 5.4 GHz Wi-Fi modules;
  - 1 broadband Gigabit Ethernet interface;
- I/O interfaces:
  - 1 opto-isolated Dry Contact input for sensors;
  - 1 analog input;
- coordination of the PE.AMI nodes connected to its narrowband network;
- concentration of data from the PE.AMI nodes connected to its narrowband network;
- management and routing of all messages from PE.AMI Central Management Suite (CMS) down to the PE.AMI nodes and back;
- periodic readings of data coming from connected PE.AMI nodes both in push mode (i.e. PE.AMI Gateway receives data spontaneously sent by PE.AMI nodes) and in pull mode (i.e. PE.AMI Gateway performs cycling polling of the PE.AMI nodes in the narrowband network);
- timestamp feature for any acquired data;
- data encryption;
- SQL database for data storage;
- communication, through its embedded webserver, with network management software, which can be either PE.AMI Central Management Suite (CMS) or a third party software (due to the adopted open standards);
- interoperability with third party applications since it is open standard based;
- software updates of the connected PE.AMI nodes and of the PE.AMI gateways themselves;
- suitable for outdoor-mounting due to its rugged enclosure (IP65 rated).

3 CONTENT LIST

The box contains the following items:

Part	Code	Description	Q.ty	Figure
Gateway	PE.AMI-GW920	PE.AMI Gateway	1	
Mounting brackets (in plastic bag)	NA	Support material for Gateway mounting	1	
Ethernet cable connector (in plastic bag)	ELC-CON-0162	IP67 connector for Ethernet cable	1	
Configuration sheet	DOC-TEM-0011	Gateway configuration sheet	1	
Instruction manual	DOC-INS-0031	This document	1	
Antenna NB (in plastic bag, optional)	ANT-OUT-0020	Outdoor Rubber Antenna Fixed Straight Half Wave, 920 MHz, 3 dbi gain, SMA type	1	
Antenna BB (in plastic bag, optional)	ANT-OUT-021	Outdoor Omnidirectional Antenna, Dual Band Wi-Fi, 2.4-2.5 / 4.900-5.875 GHz, 5 / 7 dBi gain, N type	3	
Power supply cable (optional)	CAB-PWR-0019	Power supply cable for Gateway	1	
IO cable (optional)	CAB-SIG-0026	IO cable, this component is an optional	1	

4 WARNINGS FOR INSTALLERS AND USERS

The following instructions provide important information to safely install, use and maintain PE.AMI Gateway. Please read carefully.

- The equipment is suitable for installation outdoors. The equipment is intended for installation and service by trained personnel only (no operator access)
- Unpack the device and check possible damage.
- Keep potentially hazardous packaging (plastic bags, polystyrene etc.) out of the children reach.
- Dispose of packaging in compliance with current waste disposal requirements.
- Make sure the installation version complies with current safety standards.
- An Omni-polar mains isolator with at least a 3 mm gap between contacts must be installed upstream from the unit on the electrical system of the building.
- Before connecting the device, make sure the voltage indicated on the power plate corresponds to that of the mains power supply.
- Connecting the supplemental ground to the unit in accordance with the NESC is essential before connecting input supply cable
- The bonding conductor used must be >= #13 AWG
- Cover with plugs all unused connectors on the enclosure.
- All antennas must be mounted before powering the device.
- The device must only be used for the purpose for which it is intended. Any other use is considered improper and dangerous.
- The manufacturer declines all responsibility for damage resulting from improper, incorrect or negligent use.
- Before cleaning or servicing the device, disconnect it from the main power.
- In the final installation, an external magneto-thermal switch (20 A, SC 230 V, 2P) must be installed as means of short-circuit backup protection.
- A power supply cord with a minimum conductors section 0.75 mm^2 suitable for outdoor use and in compliance with standard of country where the equipment is sold shall be used.
- This equipment is intended to be used with elevations up to 2000 m.
- The device must be connected to a grounded outlet.
- In case of breakdown and/or faulty operation, disconnect the device from the main power supply.
- Disconnection of the device from the power mains is given only when the power supply cable is removed from the power supply connector of the device.
- The device is intended for the use also in countries having IT type electricity supply systems.
- Repairs must only be carried out by the manufacturer.
- Failure to comply with the above requirement may compromise the safety of the device.
- The installer must ensure that devices are supplied with user instructions (where provided).
- The various units comprising the installation must only be used for the purpose for which they are intended.
- Keep this document along with the device.
- The Gateway belongs to OVC II (OverVoltage Category). Depending on the final installation, it is recommended to install Square D HOM250PSPD Homeline Plug-on Neutral SPD Whole Home Surge Protection Device, Schneider Electric, to protect the device from abnormal overvoltages.

- Fuse is positioned on the PCB of the power supply module near the fuse marking "FS1 T2A/ 250V", as pictured in Figure 1.

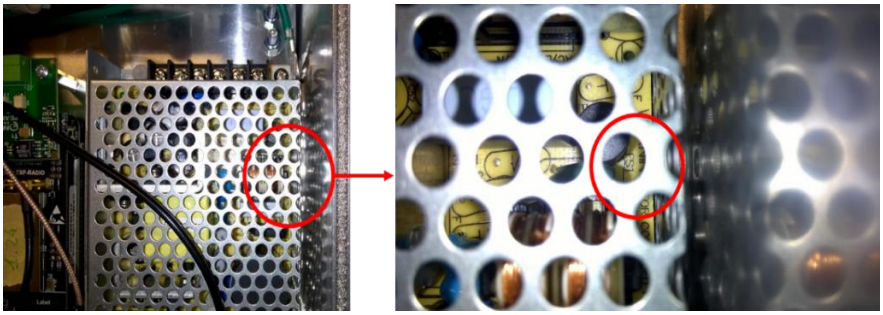


Figure 1 Position of the fuse.

- Connecting the supplemental ground to the unit in accordance with the NESC is essential before connecting input supply cable.
- WARNING: this equipment must be grounded. If the cable strand is not grounded, you must ground this equipment by connecting a customer-supplied ground wire to the grounding lug on the chassis, and then connecting the other end to a reliable earth ground. If you are uncertain that suitable grounding is available, contact the appropriate electrical inspection authority or an electrician.
- To meet UL60950-22 (Clause 4.2) requirements, the installer must ensure that additional protection is provided external to this equipment to reduce transient surges from Overvoltage IV to Overvoltage Category II at the AC power input of the access point.
- The equipment is suitable for installation outdoors. The equipment is intended for installation and service by trained personnel only (no operator access).
- Please refer to section "Grounding instructions" for grounding the product.

5 HOW TO INSTALL PE.AMI GATEWAY

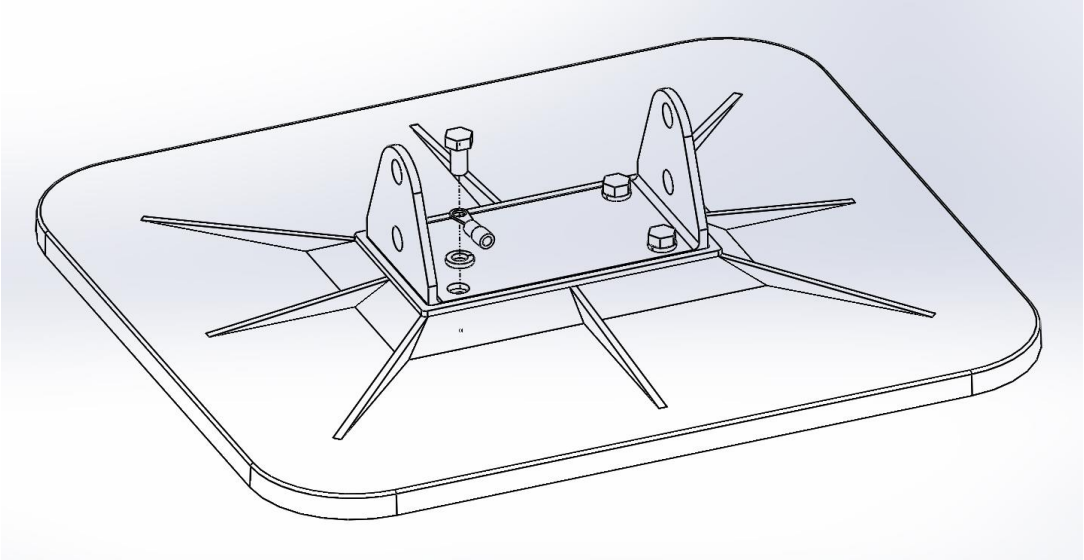
Important: Paradox Engineering is not responsible for errors or damages caused by wrong mounting operations.

5.1 Grounding instructions

In addition to the ground connection present in the power cable of the PE.AMI Gateway is possible to connect a second ground cable.

This connection can be done using the bracket fixing screw identified by the ground label and fixing a Ring Terminal, M5 stud size, (not provided) where has been previously crimped the ground cable between the screw and the washer.

Protective earthing conductor is not provided with the product. The bonding conductor used must be #13 AWG.



5.2 Mounting

PE.AMI Gateway can be mounted either on a pole or on a flat surface. Pictures show a typical installation, since this product can be mounted on poles with different diameters.

The mounting brackets can be used for a pole with a diameter max (74.9 ± 0.1) mm.

The M5 screws of the case must be mounted with (2.4 ± 0.2) N m torque force.

The M6 screws of the case must be mounted with (5.2 ± 0.5) N m torque force.

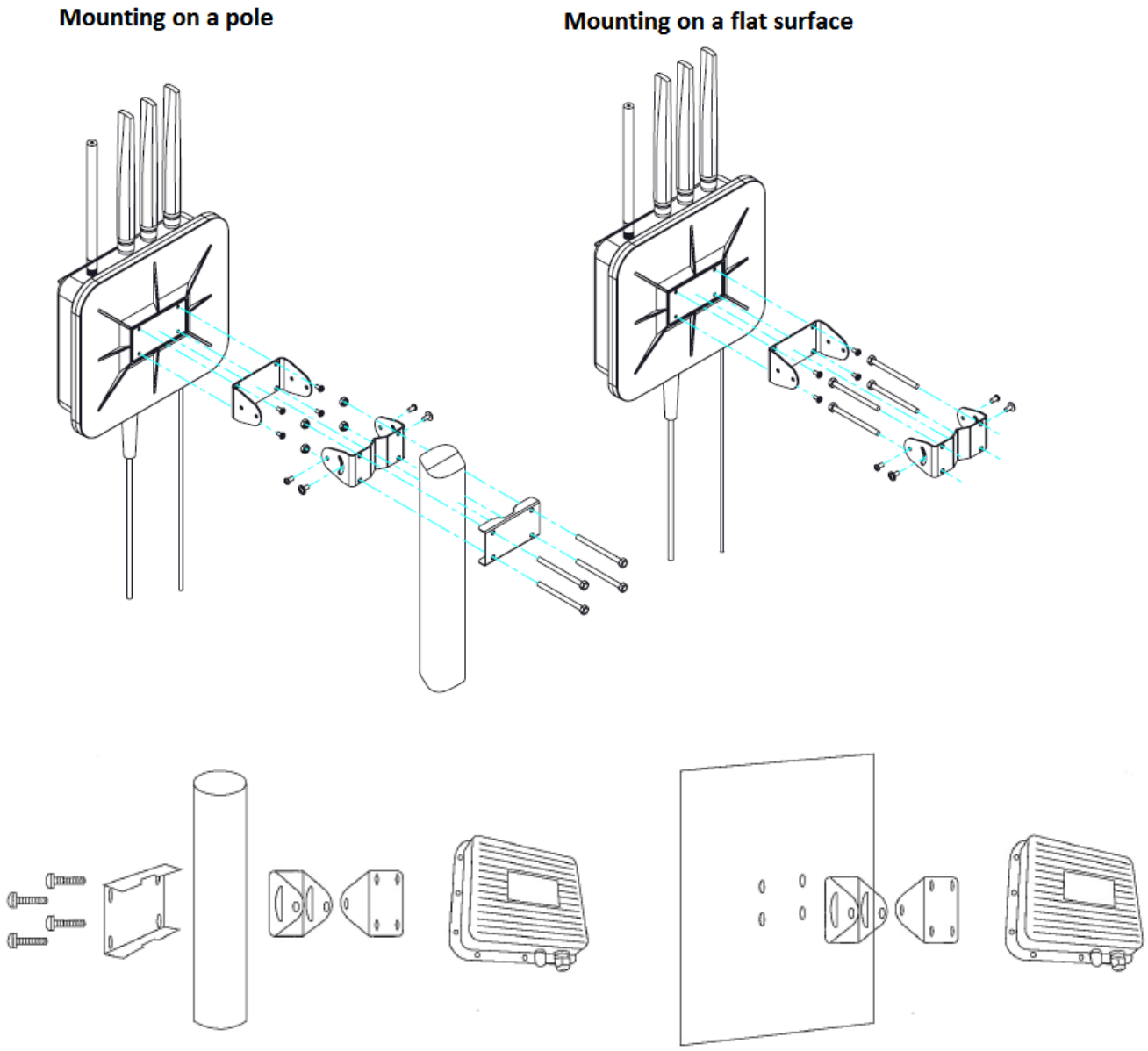
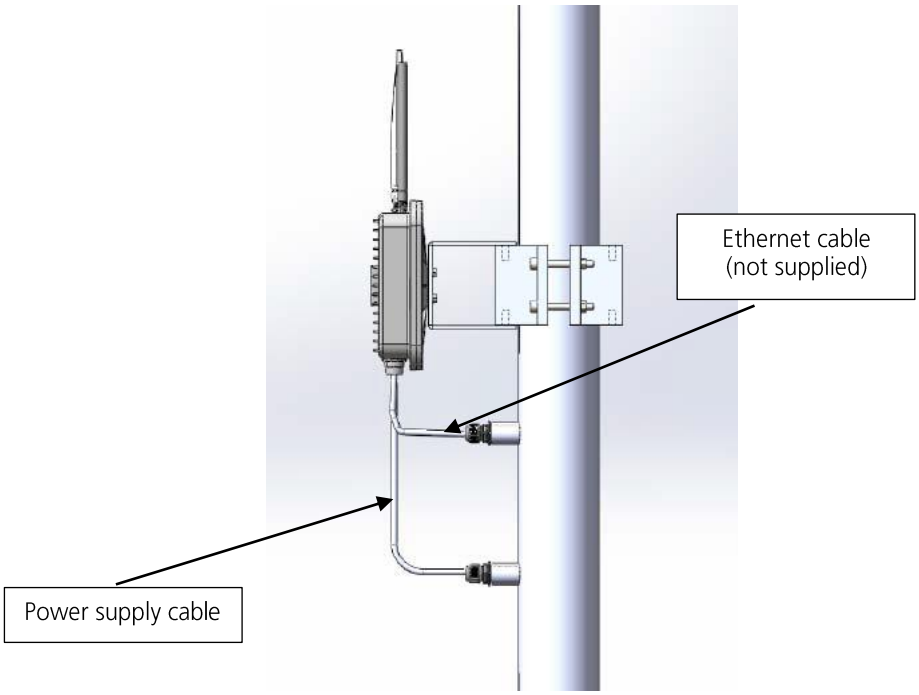


Figure 2 Instructions for mounting PE.AMI Gateway on a pole (left side) and on a flat surface (right side).



5.3 Antenna

Mounting all antennas is mandatory for PE.AMI Gateway's proper operations.

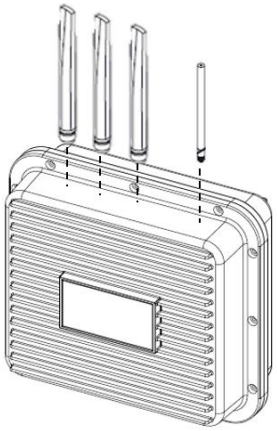


Figure 3 Example of mounting of the Gateway antennas.

5.4 Connectors

Positions and names of connectors are indicated in the following picture. Please notice that all unused connectors need to be covered by plugs.

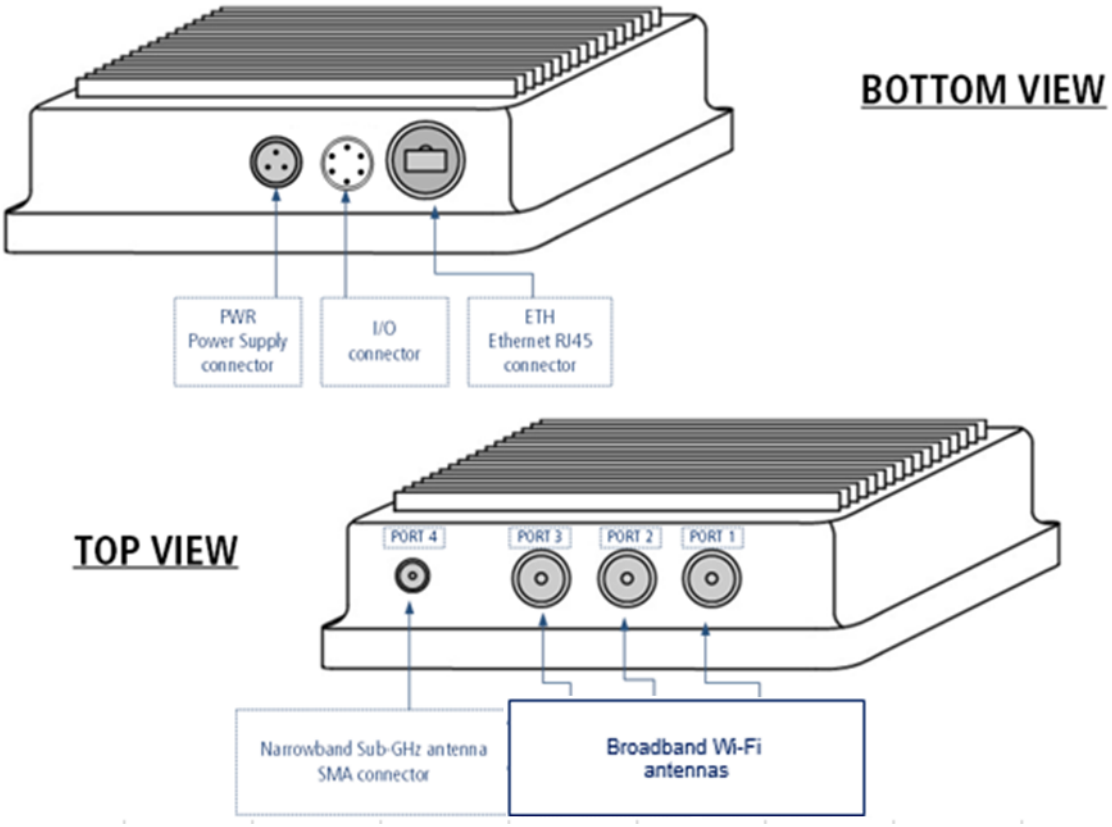


Figure 4 Positions and names of connectors available for the Gateway (top and bottom views).

5.5 Wirings

The wiring scheme is pictured as follows:

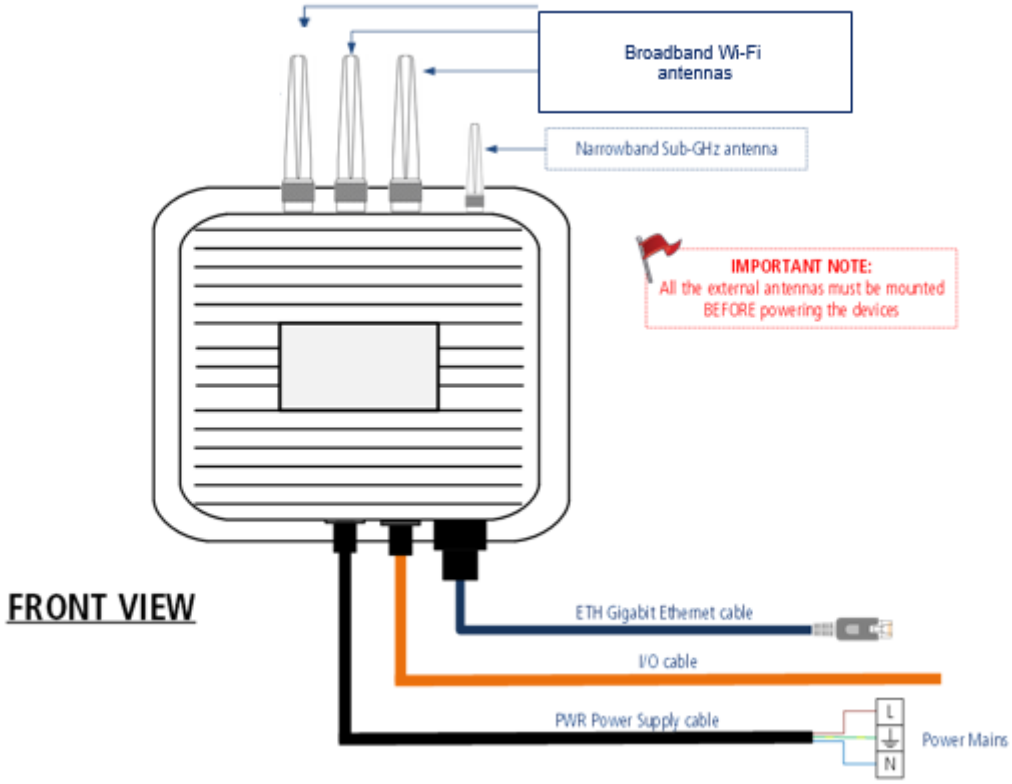


Figure 5 Wiring scheme for the installation of the Gateway.

Please notice the Ethernet cable is not provided by Paradox Engineering.

The power supply cable and the I/O cable are supplied as optional.

It is responsibility of the end-user to install an adequate cable suitable for outdoor use and in compliance with standard of country where the equipment is used.

5.5.1 Optional Power supply cable connection

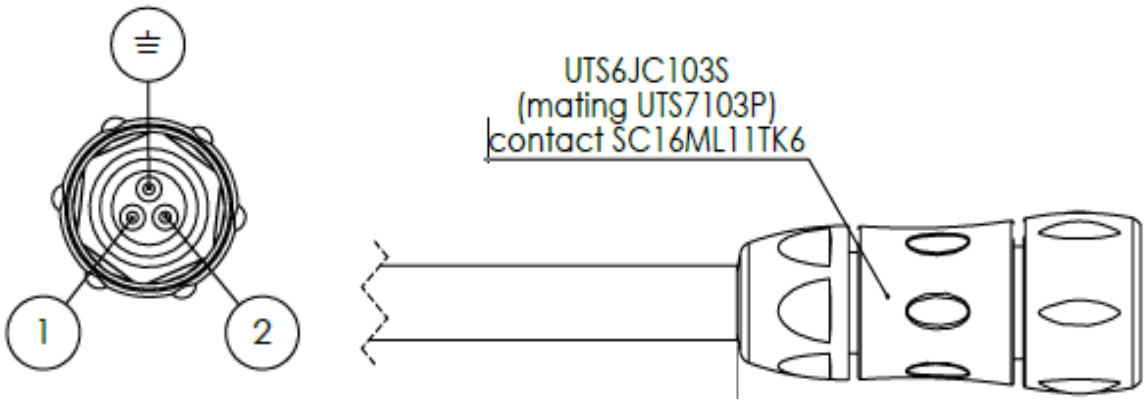


Figure 6 Scheme of the pinout of the power cable, as viewed from the connector side.

The minimum recommended cable section is AWG 16

Power supply cable wires description

Label	Function
1	Neutral input from AC power mains
2	Line/Phase input from AC power mains
⏚	Ground

The power supply cable is not provided by Paradox Engineering. If unused, it is recommended to cover the port with a plug/cap.

5.5.2 I/O connection

The I/O cable mates with the I/O connector providing 1 opto-isolated dry contact input and 1 analog input.

The I/O cable is provided as an optional. If unused, it is recommended to cover the port with the provided plug/cap.

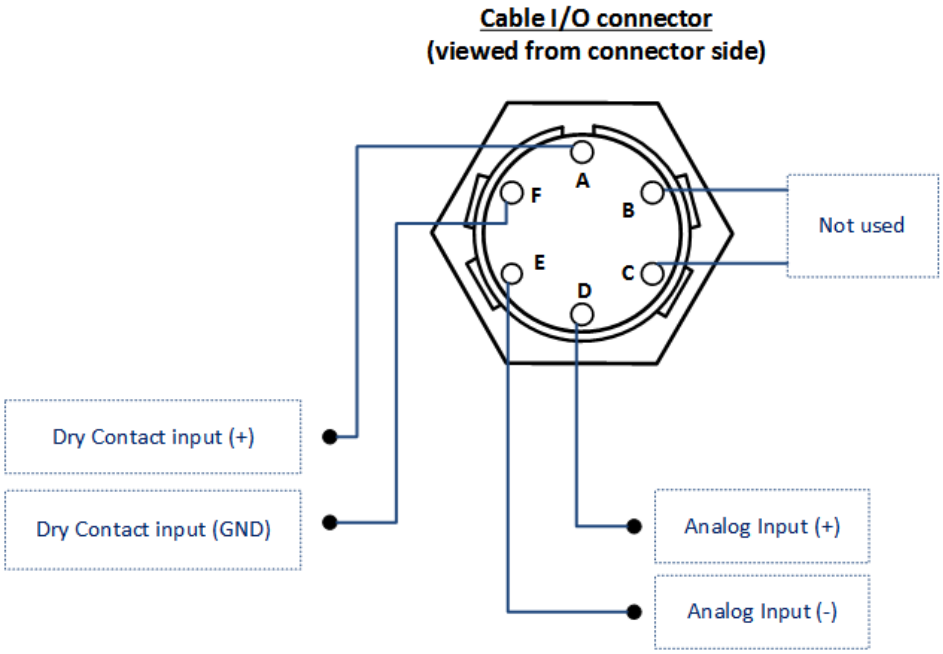


Figure 7 Scheme of the pinout of the I/O connector, as viewed from the connector side.

I/O cable wires description

Label	Function	Ratings
A	Dry Contact, External input (+) – Opto-isolated.	DC 3.3 V (max), 1 mA (max)
B	Not Used.	Not Used.
C	Not Used.	Not Used.
D	Analog input (+).	0.6 – 12 V dc (100 kΩ)
E	Analog input (-).	
F	Dry Contact, External input (GND) – Opto-isolated.	N/A

The I/O cable is not provided by Paradox Engineering. If unused, it is recommended to cover the port with the plug/cap.

5.5.3 Ethernet connection

The Ethernet cable ensures an IP67 degree of protection only if used with the enclosed Ethernet connector.

The Ethernet cable is not provided by Paradox Engineering. If unused, it is recommended to cover the port with the provided plug/cap.

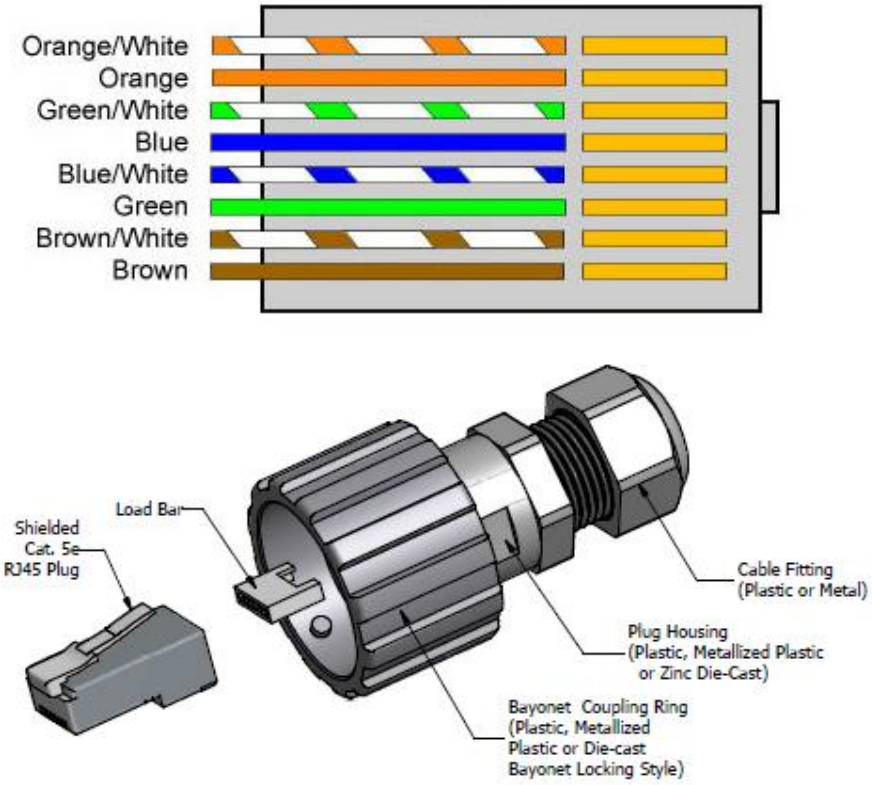


Figure 8 Pinout of the Ethernet connector and IP67 Ethernet connector

6 HOW TO CONFIGURE THE PE.AMI GATEWAY

PE.AMI Gateway must be connected to the customer network via Ethernet port, configuring the IP address to match local addressing plan.

The PE.AMI Gateway has embedded three different network devices, each of them reachable from the external Ethernet port:

- NarrowBand IPv4
- BroadBand IPv4

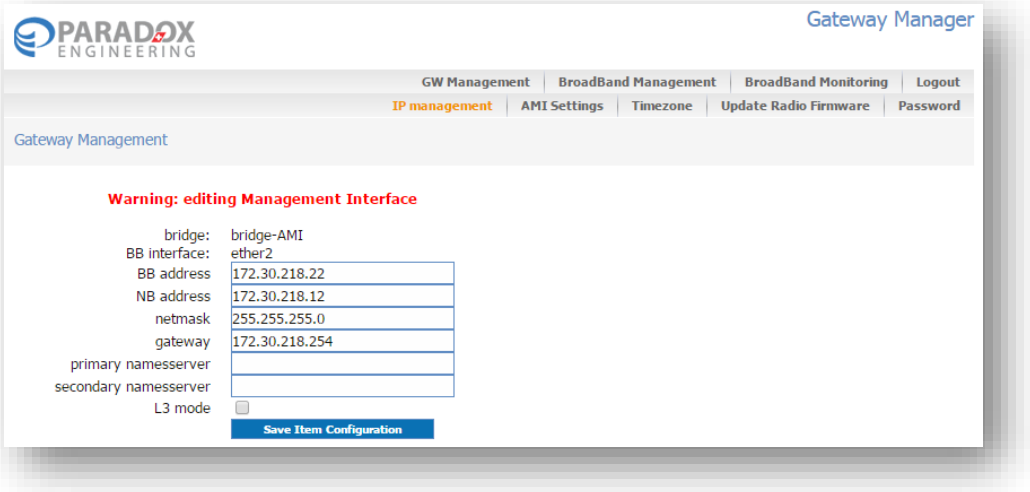
6.1 Configuring the IP address (NarrowBand and BroadBand)

PE.AMI Gateway is delivered with pre-configured addressing. Please refer to PE.AMI Gateway Configuration Sheet to find out the IP addressing set on your device.

To change the configuration, connect a PC directly to PE.AMI Gateway and configure a static IP address on the same subnet of PE.AMI Gateway.

Point your browser to PE.AMI Gateway Narrowband IPv4 address; you will reach the device management interface.

After login (credentials are available on the PE.AMI Gateway Configuration Sheet), click on "IP management" and enter the desired network configuration, as provided by your network administrator. Click on "Save Item Configuration". If available, please enter your DNS server IP address(es).



PE.AMI Gateway will apply the new configuration and try to redirect your browser to the new address of the web interface.

Now connect PE.AMI Gateway to the customer's local network, reconfigure the client PC to its usual IP address, and reload the page in your browser, or point the browser to the IP address assigned to the PE.AMI Gateway.

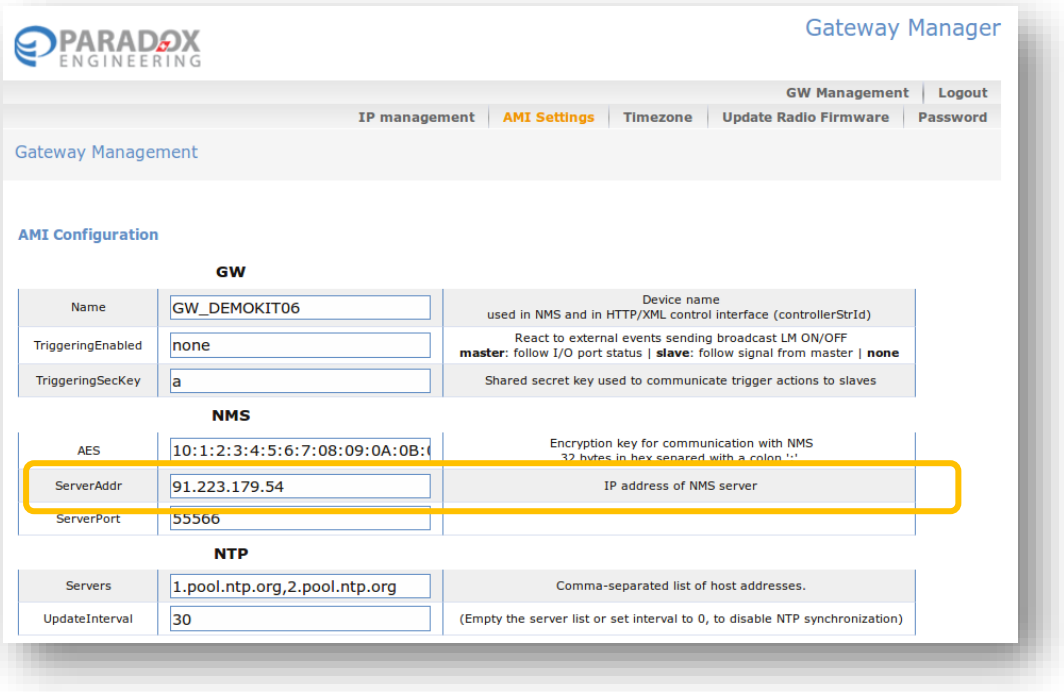
6.2 Gateway to CMS

The PE.AMI-GW must be able to establish a TCP connection to the hosted instance of the PE.AMI-CMS Server on the TCP port 55555 (if not differently indicated).

Please DO NOT modify it, unless receiving specific instruction by Paradox Engineering.

If the CMS' IP is different than the default setting, please modify it accordingly in the AMI Settings section if the GW Manager, by changing the "ServerAddr" IP.

Please ensure to correctly configure your network firewall to allow bidirectional communication over the TCP port range.



6.3 Gateway to PE

PE.AMI Gateway will attempt to establish a VPN link to Paradox Engineering network through TCP port 21194. This link will be used for remote support purposes only.

Allowing this port in your network firewall is not mandatory, but kindly suggested to have a prompt and efficient remote support by Paradox Engineering.

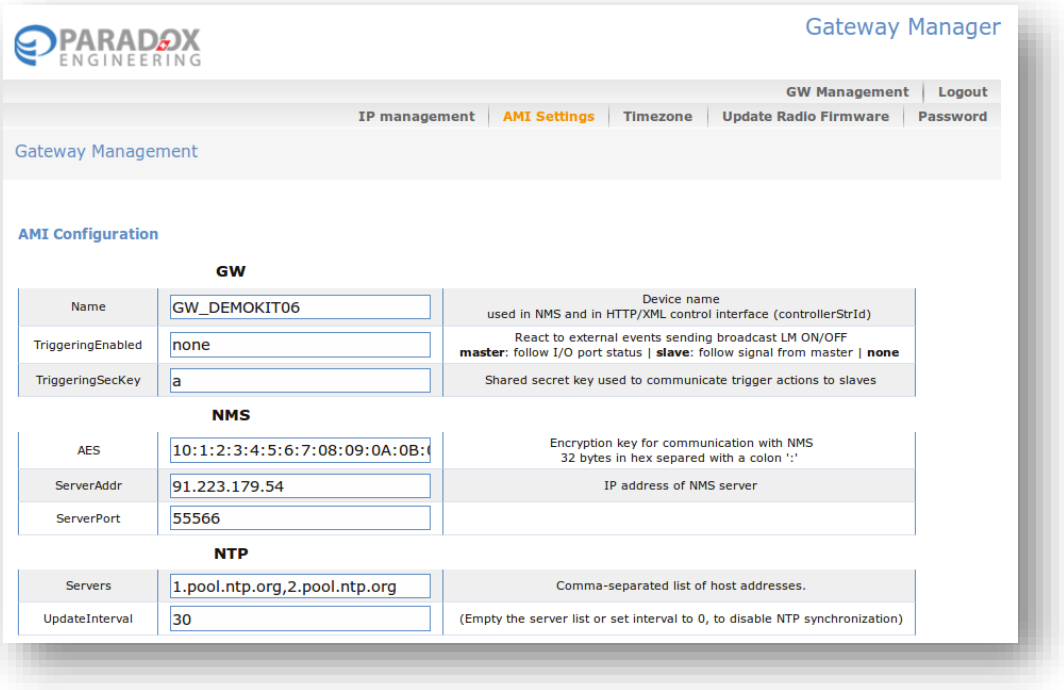
6.4 NTP configuration

It is highly recommended that PE.AMI Gateway has time configured by an NTP server.

PE.AMI Gateway is pre-configured to use public NTP servers.

If public NTP servers (UDP port 123) are filtered by your firewall, or if a DNS server is not available, other NTP servers can be configure under AMI Settings/NTP. Enter one or more IP addresses or names, separated by commas in the NTP/Servers textbox, then click on "Save Settings" and then on "Restart AMI Service".

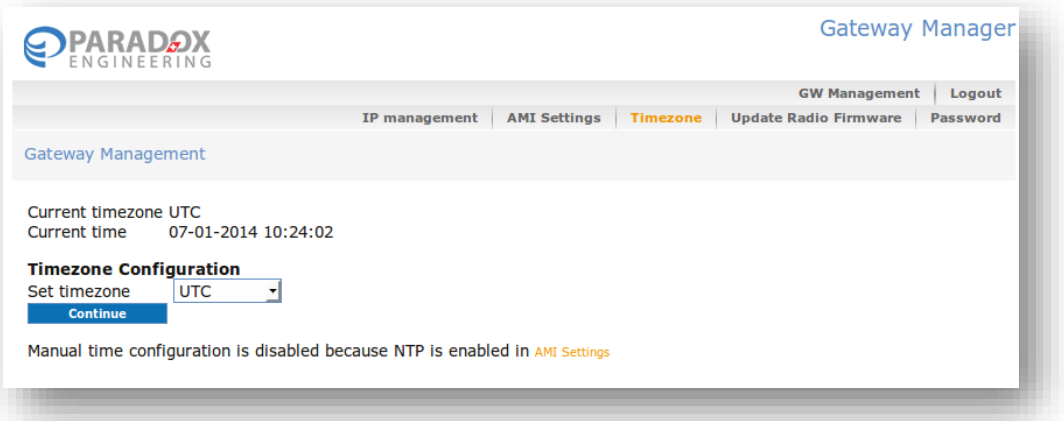
If a NTP service is not available on your network, leave the NTP/Servers textbox blank, click on "Save Settings" and then on "Restart AMI Service", and manually configure time under the "Timezone" page.



6.5 Timezone configuration

To set timezone, click on the "Timezone" page, select the desired option from the drop-down menu and click on "Continue" to confirm.

Based on your selected timezone, further options may be requested. Select accordingly and click on "Continue" to confirm and complete setting.



6.6 Other configurations

Please DO NOT modify any other setting, unless receiving specific instructions by Paradox Engineering.

7 DIMENSIONS

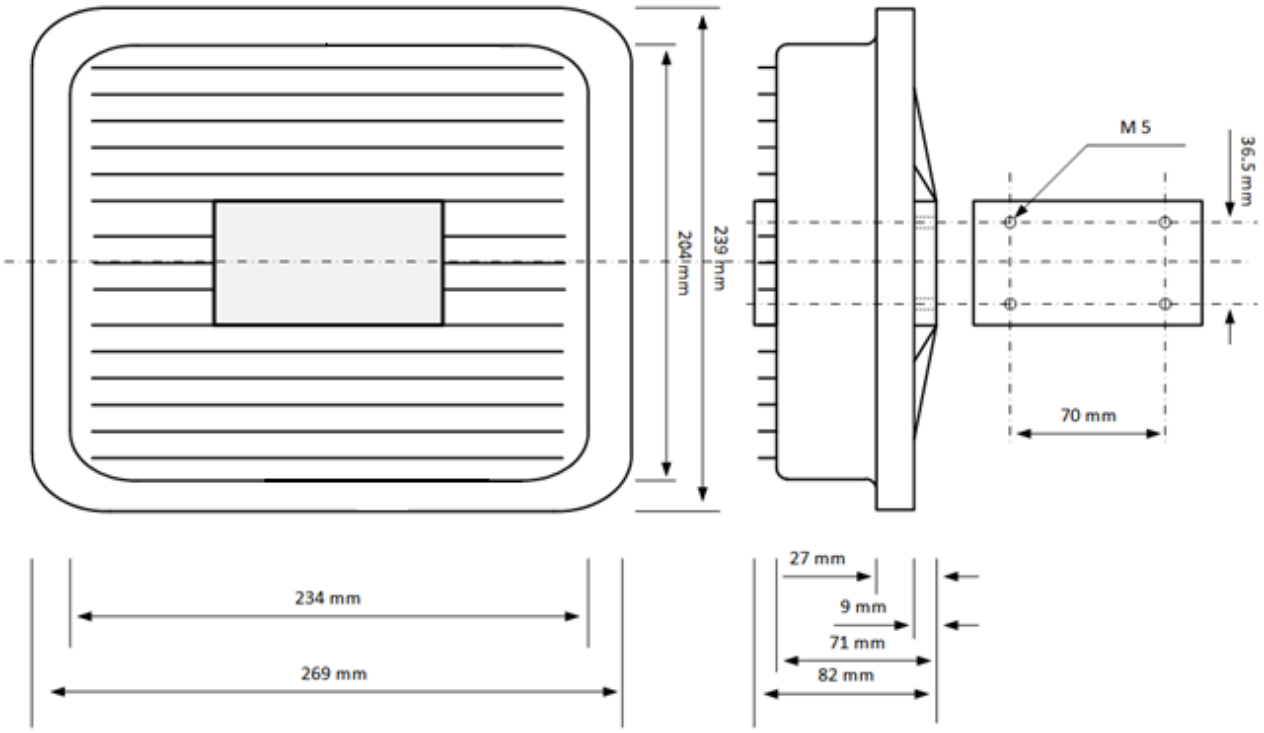


Figure 9 Dimensions of the Gateway

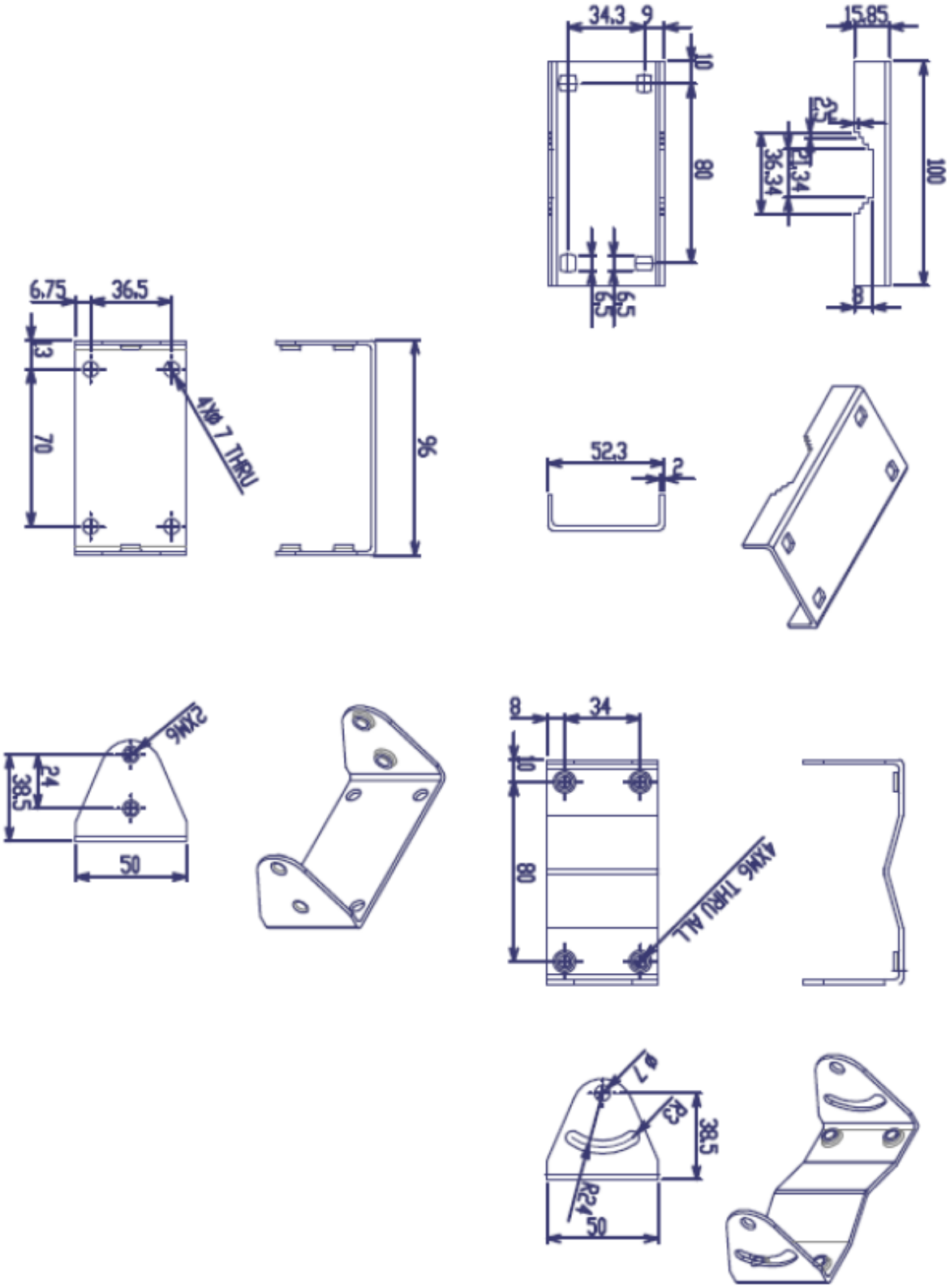


Figure 10 Dimensions of the mounting brackets

8 Characteristics

Environmental

Item	Description
Material	Aluminum
Dimensions	269 mm x 239 mm x 82 mm
Operating Temperature range	-30°C to +50°C
Humidity	5-90% without condensing
IP rating	IP65
Weight	3.5 kg

Power ratings and safety parameters

Item	Unit	Description
Power supply	Vac	(100 – 240)
Electrical insulation	-	Class I
Power consumption	W	10 (max)
Surge protection	kV	2

Sub-GHz Radio Narrowband Interface

Item	Unit	Description
Radio frequency	MHz	902.42-927.58
Spectrum access	-	Frequency hopping, 75 channels, channel spacing 340 kHz
Radio frequency	MHz	909-921
Spectrum access	-	Frequency hopping, 75 channels, channel spacing 160 kHz
Antenna (external)	-	915 MHz ISM Antenna, SMA (m) connector

Gigabit Ethernet Interface

Item	Unit	Description
Communication port	-	10/100/1000 Gigabit Ethernet ports with Auto MDI/X
Cables supported	-	Shielded straight cable (Cat5E) Shielded cross-over cable (Cat5E)
Wiring distance	m	100 (max)
Connector	-	Outdoor industrial RJ45

Wi-Fi 5 GHz Broadband Interface

Item	Unit	Description
Radio protocol	-	IEEE 802.11a/b/g/n
Radio frequencies	GHz	IEEE 802.11a/n: 5.745 – 5.825
Data rate	Mbps	IEEE 802.11n: 6.5 to 72.2
TX power	dBm	Up to +18 (per chain)
Data encryptions	-	WPA2, AES-256bit
Antenna (external)	-	Antenna 5.150-5.875 GHz, N Plug (m)

9 List of optional antennas

It is responsibility of the end-user to install adequate antennas suitable for outdoor use and in compliance with standard of country where the equipment is sold.

List of optional antennas

Code	Description	RF port usage	Art./manufacturer
ANT-OUT-0020	Outdoor Rubber Antenna Fixed Straight Half Wave, 920 MHz, 2 dBi gain, SMA type	PORT 4	MEGWX-1551SAAX-920 / Joymax Electronics Co.
ANT-OUT-0021	Outdoor Omnidirectional Antenna, Dual Band Wi-Fi, 2.4-2.5 / 4.900-5.875 GHz, 5 / 7 dBi gain, N type	PORT 2 PORT 3	OM24580703 / Penson Wireless
ANT-OUT-0025 + ANT-OTH-0000	Outdoor Directional Panel Antenna, 5.15-5.875 GHz, 18 dBi gain, Linear V/H Polarity, N Type + Mounting brackets	PORT 1 PORT 2 PORT 3	MT-485001 / MTI Wireless Edge Ltd.

10 LABELS SPECIFICATIONS

Figure 11 Label of the PE.AMI-GW920

Specifications of the label symbols

Symbol	Description
RoHS	RoHS compliance mark.
	Waste Electrical and Electronic Equipment Directive (WEEE Directive) mark.
	Paradox Engineering mark
IP65	Logo of the protection degree applicable to the case.
c UL US LISTED	UL listing mark

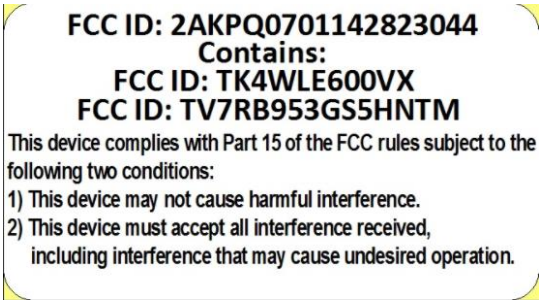


Figure 12 FCC ID label

FCC devices internally installed and RF exposure warning

FCC devices internally installed and RF exposure warning

FCC ID	RF port connected	Exposure to Radio Frequency Radiation minimum distance between ANTENNA and public
TV7RB953GS5HNTM	PORT 1	50 cm
TK4WLE600VX	PORT 2	50 cm
TK4WLE600VX	PORT 3	50 cm

11 ORDERING CODES

Ordering codes for PE.AMI Gateway

Product name	EAN13 UPC code
PE.AMI-GW920	0701142823044

12 REVISION HISTORY

Revision history

Revision	Document No.	Date	Description
00	DOC-INS-0031-00	27.02.2017	First emission of this document
01	DOC-INS-0031-01	29.05.2017	Added recommended SPD for OVC II Added protective earthing conductor sentence in warnings
02	DOC-INS-0031-02	12.09.2017	Added UL warnings: - Supplementary ground according NESC - The equipment must be grounded - OVC II - The equipment is suitable for outdoor installations - Grounding instructions Label update according UL certifications Update MPE safety distance to 50 cm due to C2PC FCC certification

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