***Gateway*™** Modular High Density Meter and Pulse Collector

Installation Guide

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury. The safety alert symbol shall not be used with this signal word.

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Triacta for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Notices

FCC Part 15 Notice:

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

Note: 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.

Innovation, Science and Economic Development Canada Compliance Statement

CAN ICES-3 (B)/NMB-3(B)

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC: 23814-GATEWAY
FCC ID: SCR-GATEWAY

UL (Underwriters Laboratories)

UL (Underwriters Laboratories) are listed by the American Federal Occupational Safety and Health Administration (OSHA) under NRTL (Nationally Recognized Testing Laboratory) program. They are also accredited by Standards Council of Canada. This equipment complies with UL 61010-1 Third Edition and CSA C22.2 No. 61010-1-12.

Table of Contents

Introduction

This document describes the Gateway GXXXX, including procedures to install and start up the unit:

This documentation is intended for those responsible for installing the ***GATEWAY***™ Installers must be qualified electricians with knowledge of local and national code requirements. See “Safety Precautions” on page 6.

Scope

This Guide is for the mechanical and electrical installation of the Gateway.

Refer to the ***GATEWAY***™ Configuration and Operations Guide for device configuration, commissioning, and operation of the Gateway.

SAFETY PRECAUTIONS

Carefully observe these safety instructions.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Only qualified electrical workers should install this equipment. Such work should be performed only after reading this entire set of instructions.
- The equipment must be accessible to authorized personnel only. Equipment must be installed in areas where access can be restricted.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance of this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back feeding.
- Turn off all power supplying the meter and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Before closing all covers and doors, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Successful equipment operation requires proper handling, installation, and operation. Neglecting fundamental installation requirements can lead to personal injury as well as damage to electrical equipment or other property.
- NEVER bypass external fusing.
- NEVER short the secondary of a Potential Transformer (PT).
- Always short the secondary of a current transformer prior to disconnecting current input loads.

Failure to follow these instructions will result in death or serious injury.

System Specifications

Table 1 lists the system specifications of the Gateway GXXXX

Table 1: Gateway GXXXX specifications

Type	Description
Mechanical	
Dimensions	Height: 13.125 in. (33.5 cm) Width: 12 in. (30.5 cm) Depth: 2.125 in. (5.5 cm)
Weight	8.77 lb (3.98 kg)
Voltage Inputs	
Sense voltages Vref1 and Vref2	100V to 300V 50/60Hz L-N for stated accuracy 1W+N+Protective Earth 2W+N+Protective Earth Wye 3W+N+Protective Earth Wye 3W+Protective Earth Delta
Aux Power Input	90V - 300V AuxA-AuxN15 watts max 50/60 Hz
Control “Power” Fuse rating (F1)	North America:120V: T125 mA, 250V International 230V: T63 mA, 250V
Current Sensing Inputs	All CTs must be UL recognized/listed.
80 mA CT module	Meter burden: 4.1 ohms
100 mA CT module	Meter burden: 3.28 ohms
333mV CT Module	Meter burden: 20K ohms
Electrical Metering Accuracy	
Measurement accuracy	ANSI C12.20 Class 0.5 IEC 62053-22 Class 0.5S Measurement Canada Approved EG07 compliant (Accuracy compliant when used with 0.3% CTs)
Metering Category	UL/CSA 61010 Ed3 300V CAT II • CANADA - CAN/CSA-C22.2 No. 61010-1-12 (IEC 61010-1:2010, MOD) • USA - UL61010-01 (IEC 61010-1:2010, MOD)
Pulse inputs	
Pulse Input Module	Dry form A and solid-state form A compatible Internal 3.3V pull-up
	Maximum frequency 100 Hz Minimum pulse width
Head Unit Communications Interfaces	
Ethernet	10/100BaseT 802.3-2002; RJ45
Wi-Fi	802.11 b,g,n 2.4 GHz
USB	USB 2.0 1 x Host, 1 x OTG
Environmental	
Operating temperature	-40 to 70^{o}C
Operating humidity	5% to 90% non-condensing

Usage environment	Indoor Environment: NEMA 250 TYPE 2
Maximum altitude	9843 ft (3000 m)
Pollution degree	2
Installation category	II
Measurement category	III

Use the unit only in accordance with the electrical power rating.

The unit is only to be installed by a qualified electrician

Initial installation of the unit must be inspected by the local electrical Inspection Authority

Install the unit in compliance with the following local and national electrical codes:

- Canada: Canadian Electrical Code, Part I, CSA C22.1
- United States: National Fire Protection Association (NFPA) 70; US National Electrical Code
- Elsewhere: International Electro-technical Commission (IEC) 364, Part 1-7

Ensure that the unit is properly earthed

Provide a disconnect device to disconnect the meter from each supply source. Place these devices in close proximity to the equipment and within easy reach of the operator.

If the equipment is installed or used in a manner other than that specified in this document, it may void your warranty or impair the protection of the equipment

System Description

The ***GATEWAY***™ is a modular, high density electrical meter and pulse collector system for Measurement and Verification, Energy Management, and tenant billing applications. The hot-swappable GATEWAY Head, coupled with the GATEWAY Enclosure, comprise a GATEWAY GXXXX System: an industrial grade, rapidly deployed unit with powerful communications options that will fit any building use case.

The ***GATEWAY***™ architecture consists of a separate Gateway base Enclosure and HEAD unit. The Enclosure can be installed, and the electrical connections terminated by electrical contractors, independently of the GATEWAY Head. The Gateway HEAD may be installed at a later time by a technician with no electrical accreditation.

Figure 1*: Gateway*™ External View

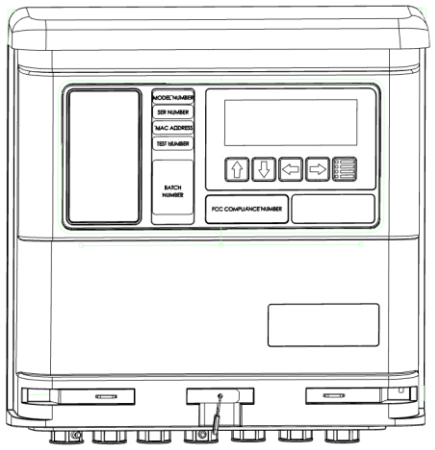
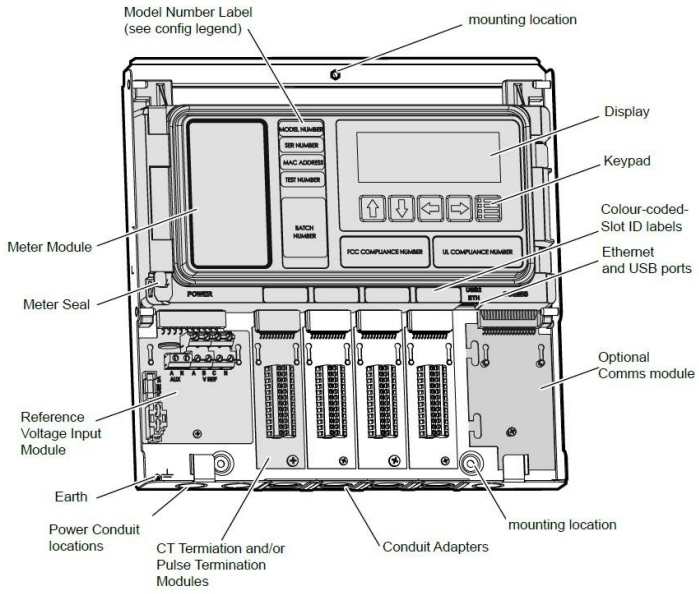


Figure 2: Gateway internal view



GATEWAY™ Meter Brick

The meter brick supports the following:

- One to four sensor modules each supporting twelve inputs for 80mA CTs, 100mA CTs, 333mV CTs or pulse counters.
- Large front panel 4X20 LCD display for manual meter reading and diagnostics
- On-board Wifi for craft interface hotspot and future IP networking
- On-board 10/100BaseT Ethernet
- Two USB-2.0 ports for future use
- Dual processor architecture for MID compliance (Europe) and enhanced system capability and flexibility
- Secure web browser interfaces for programming, meter reading and diagnostics.

GATEWAY™ Enclosure

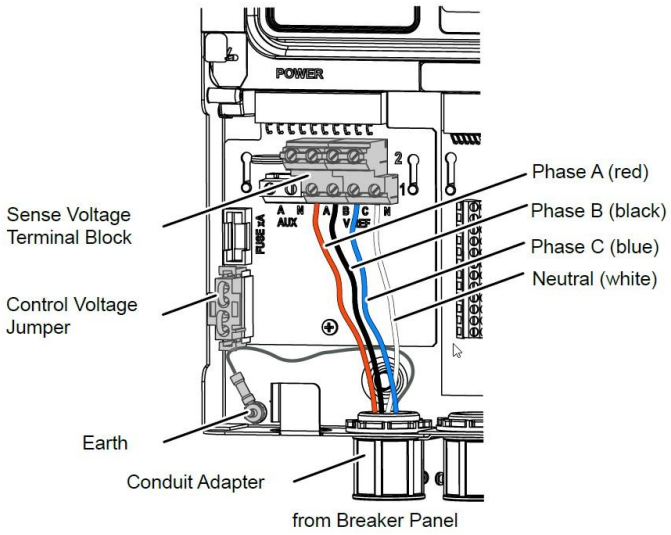
This enclosure supports termination connection points for the following:

- One or two Voltage Reference Inputs
- One optional Auxiliary Control Voltage Input
- One to four self-shorting input modules supporting up to 12, 24, 36 or 48 wire pairs for CT's or pulse output devices.
- Optional future communication modules.

Gateway™ Voltage Module

The GXXXX Voltage Module has two separate Sense Voltage inputs, an optional Auxiliary Control Voltage input, and a control voltage jumper.

Figure 2: Voltage Module



The two sense voltage inputs (Vref1 and Vref2; A, B, C, N) provide the phase voltages (VAC) used for metering one or two different service types. Ref 1 could be used for 120V/208V 3ph 4wire, and Ref. 2 could be used for a 277V/480V 3 ph 4 wire service. Either voltage reference can be assigned to any configured meter point, regardless of which CT module or which CT inputs the meter point uses.

When the control voltage jumper is installed it connects Phase A from the Vref1 sense voltage input to the Gateway device control voltage circuitry. This eliminates the requirement for a separate voltage connection to the Auxiliary Control Voltage Input.

Warning: The control Voltage Jumper must be removed if there is a separate voltage source connected to the Auxiliary Control Voltage Input.

Separate control and sense voltage wiring is required when using the Gateway GXXXX with a Triacta PT Module, or when the meter is expected to be ON at all times - even when the sense voltage source is OFF. I.E. the sense voltage is from an emergency power panel that is not always ON.

Both the control voltage and sense voltage inputs will accept voltages from 90VAC to 300VAC. If the reference voltage for the circuit/s to be metered is larger than 300VAC, external potential transformers (PTs) are required.

Fig xxx shows a typical implementation with discrete external transformers. Fig yyy shows a typical installation with a Triacta PT module.

Typically, external metering PTs are sized to convert from the panel's line-to-line or line-to-neutral voltages (ie 600VAC or 347VAC) down to 120VAC. The appropriate PT ratio (ie 5:1 or 2.89:1) must be programmed into the Gateway GXXXX configuration to provide correct meter readings.

Gateway CT and Pulse Input Termination Modules

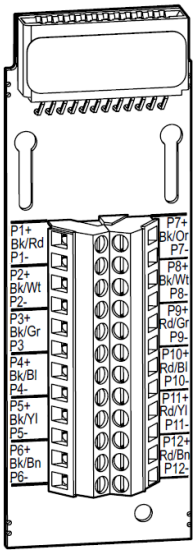
Current transformers and pulse output devices are connected to the Gateway GXXXX via specially designed self-shorting termination modules as shown below. The self-shorting mechanism on each termination module is activated when the Gateway Head unit is not installed.

Each wiring module supports 12 inputs pairs, numbered P1 to P12. The Gateway base unit supports up to 4 termination modules for a total of 48 inputs. The number of inputs available of each type depends on the number of measurement modules and wiring modules installed in the meter.

The two inputs on each input pair are designated as + or -. If the termination module is for CT connections, the X1 / X2 leads from each CT must respectively connect to the + / - inputs. If the termination module is for pulse output devices, the the + / - wires for each pair connect as per the specific pulse output device type.

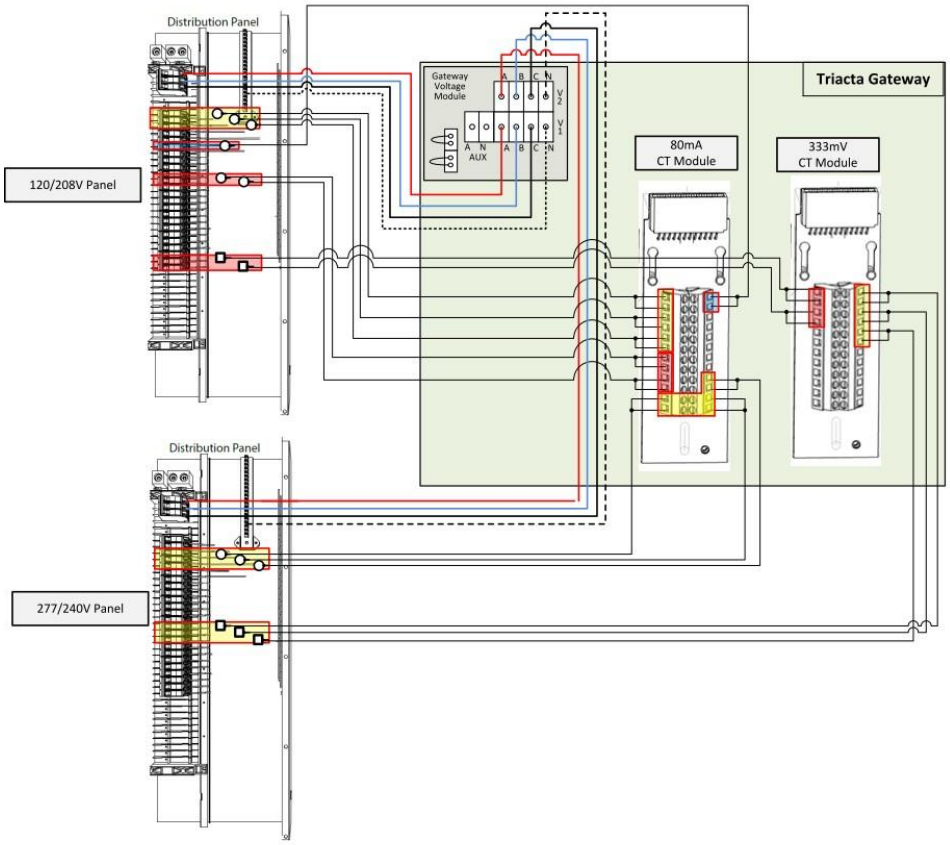
Each input pair on the termination module also has a color pair designation that matches on of the color pairs available in an optional Gateway CT/Pulse Termination Cable. Table 2 describes the termination cable wire pair color scheme for each input pair on the termination module.

The Termination module is also available with a CT/Pulse Termination cable pre-wired and over mold protected to the module as per the color pair table.

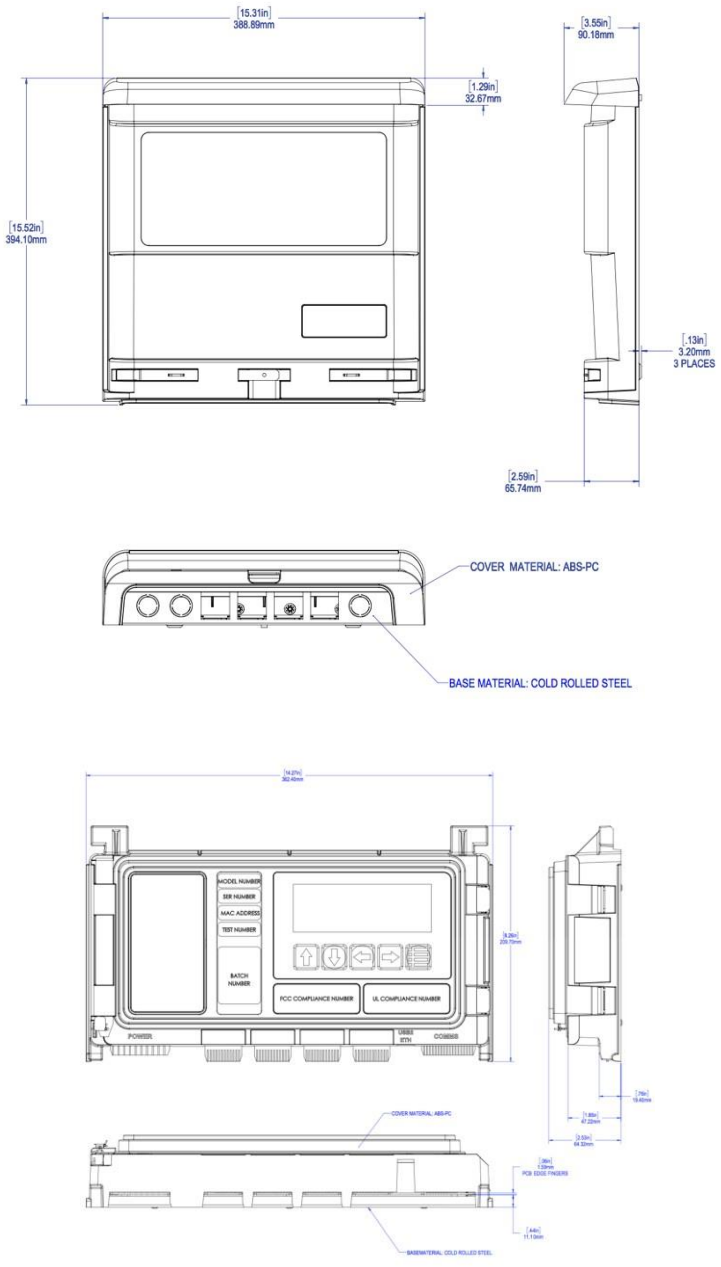


Gateway Flex configuration

The following diagram illustrates how the Gateway GXXXX could be connected to two different voltage panels using two different types of CTs and different numbers of elements per meter point from each panel.



Dimensions



Pre-Installation Instructions

The pre-installation checklist and site planning must be performed before installing the equipment at the site.

Site Planning

1. Determine the number and types of meter points required by;
   # of elements - single-phase, two-phase, or three-phase.
   # of different voltage references
   CT types – 80mA, 100mA and/or 333mV

2. Determine the number of Gateway GXXXX to be installed and ensure adequate space. For clearances, see Figure xx on page xx.

3. Determine the number and types of sensor modules required for each Gateway Gxxx.

4. Determine the number of Ethernet drops required, and ensure they are installed before installing the Gateway GXXXX meter.

Access to Power and Lighting

The installation site must be supplied with access to the main electrical panel and any sub-panels. Portable or permanent lighting must be available to provide the installers with a clear view of the equipment and of the installation environment. Each installation may vary depending on physical site restrictions.

Installation Instructions

This section provides information about activities that must be performed to install the Gateway GXXXX in a single-phase 2-wire, single-phase 3-wire (network), three-phase 4-wire or 3ph 3wire delta application. The installation procedures must be performed in the following order:

1. “Mounting the Base Module on page xxx

…….

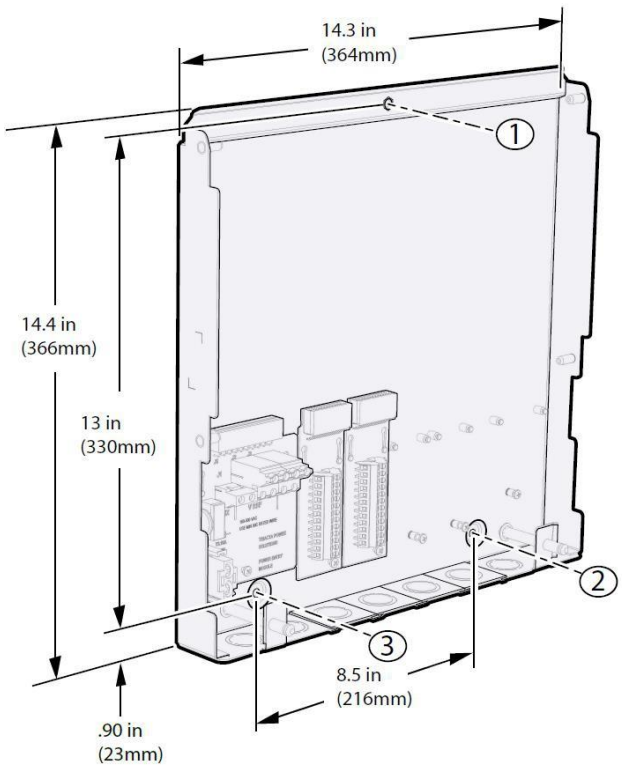
7. “Recording the Meter Map” on page xxx

Mount The Base Module

The Gateway Gxxxx can be mounted on a wall as a complete system with the Head unit pre-installed or as just the Base unit with the Head unit to be installed later. Figure 4 shows the general mounting layout for a base unit on its own. There are three mounting holes as shown which are all accessible with or without the Head unit installed.

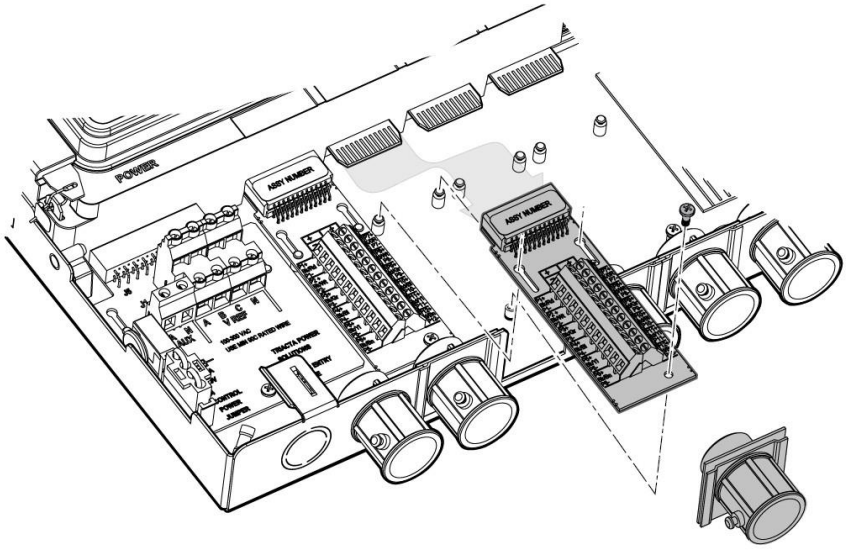
1. Mount the Gateway GXXXX adjacent to the main circuit breaker box using the 1-inch (25-mm) #8 screws. If mounting the unit on a plasterboard surface, use cylinder plugs.
2. Remove the front cover from the meter by removing the three screws with a #2 Phillips screwdriver. Retain the cover and screws for later re-installation.
3. Mount the Gateway GXXXX on the wall and secure it by inserting a screw in each mounting keyhole and tightening the screws.
4. Use the provided washer on the top mounting screw when installing the Gateway GXXXX onto soft surfaces. Install the washer between the GXXXX Base unit and the soft surface.

Figure 4: Base Unit and PT module Mounting Layout, Dimensions and Clearances



Install Termination Modules into the Base Unit

In most cases the Termination Modules are shipped pre-installed in the base module. If new modules are being added or replaced insert them as shown in Fig xxx below.



Install disconnect devices for sense and control voltages

Each Gateway GXXXX device must be connected to all sense and control voltages through properly rated (15 Amp) disconnects or breakers that disconnect all line wires so that they can be powered down. Each disconnect or breaker must be located within easy reach of the meter operator, and must be labeled to indicate which set of device inputs it supplies power to.

One disconnect is required for each separate sense or control voltage input.

For installations with multiple Gateway devices, the same disconnects can be used to power multiple meters. Each disconnect must be labeled for all devices it supplies power to.

The disconnect device or devices must meet IEC 60947-1, IEC 60947-3 and/or comply with the local electrical code.

Connect Control and Sense Voltage Wiring

For a single-phase panel, use a 3-wire, 14 AWG (1.63 mm2), 90°C (194°F) cable.

For a three-phase Wye panel, use a 4-wire, 14 AWG (1.63 mm2), 90°C (194°F) cable.

For a three-phase Delta service, use a 3-wire, 14 AWG (1.63 mm2), 90°C (194°F) cable.

Metallic, flexible armored cable (BX cable) is recommended for commercial installations.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- The meters must be connected to the sense voltage and control voltage through a properly rated 15A breaker or voltage disconnect.

Failure to follow these instructions will result in death or serious injury.

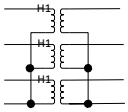
1. Before connecting the sense or control voltages, turn off the power to the circuit being connected.
2. Always use a properly rated voltage sensing device to confirm power is off.
3. Connect the sense and control voltages voltage leads from the voltage disconnect/s to the meter as described below for each service type:
4. If more than one meter is being installed, repeat this procedure for each additional meter

NOTE: The phase wiring sequence A, B, C between the Gateway GXXXX meter and the circuit breaker panel must match or the measurement readings will be incorrect. If the circuit breaker panel does not designate phase A, phase B and phase C feeds, make your own designation and use it for the rest of the installation.

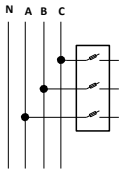
The following diagrams show the required voltage connections for various different panel voltages and sample CT connections for different single element, 2 element and 3 element circuit configurations.

Drawing Symbols:

CTs



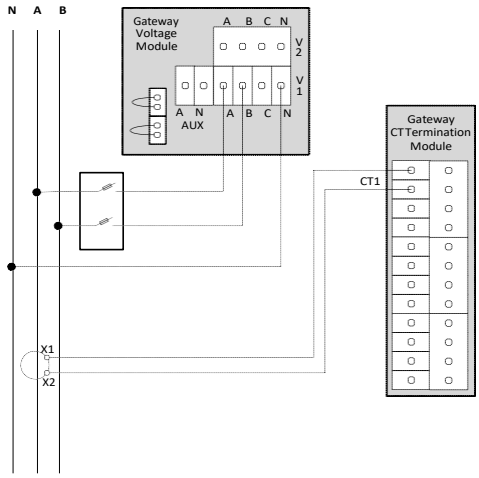
PTs (3 phase)



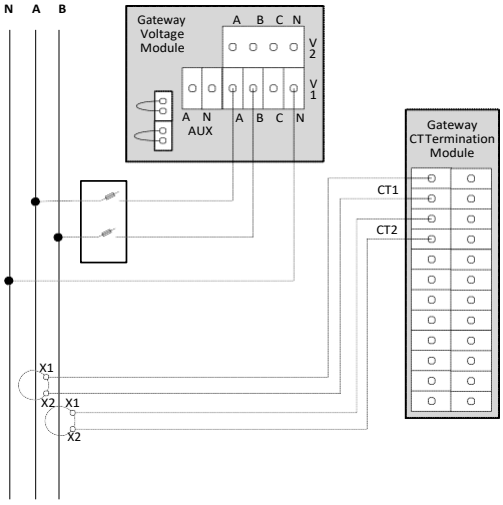
Distribution Panel with 15A Breaker or Disconnect

Single Element Meter
Single phase – 3 wire Panel

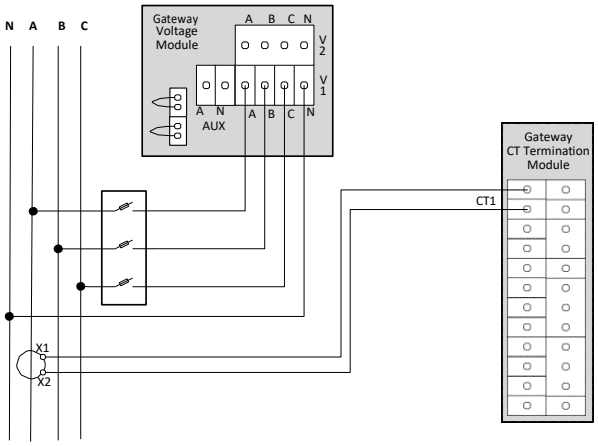
120/240V or 230/460V



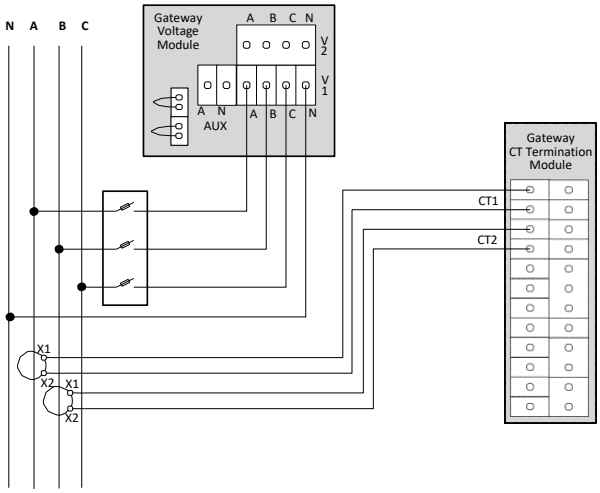
Two Element Meter
Single phase – 3 wire Panel
120/240V or 230/460V

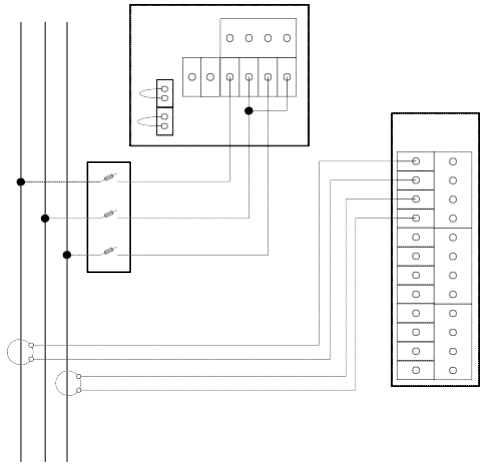


Single Element Meter
3 phase – 4 wire Panel
120/208V, 230/400V, 240/416V or 277/480V

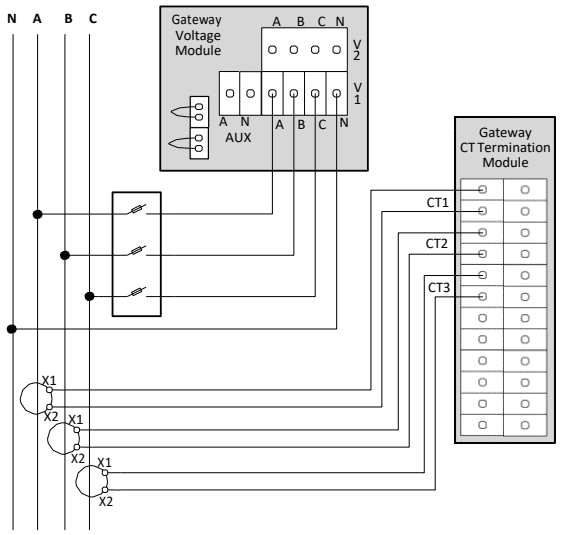


Two Element Meter
3 phase – 4 wire Panel
120/208V, 230/400V, 240/416V or 277/480V

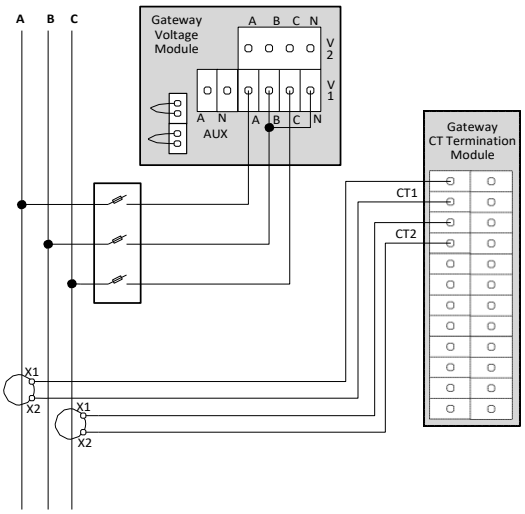




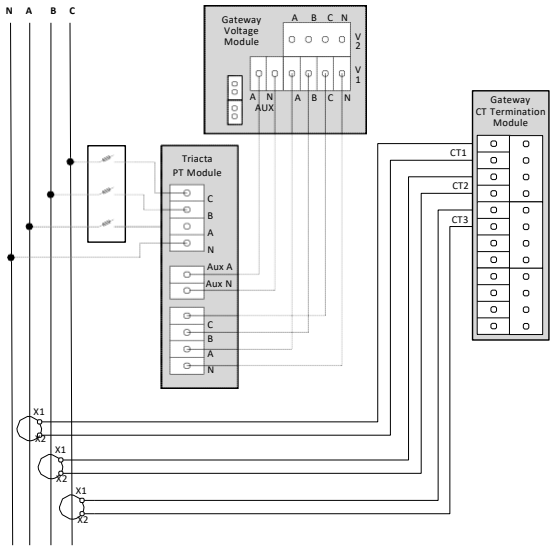
Three Element Meter
3 phase – 4 wire Wye Panel
120/208V, 230/400V, 240/416V or 277/480V



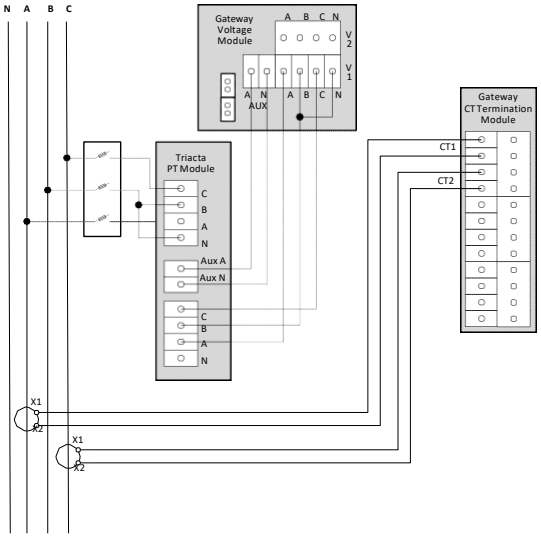
Two Element Meter
3 phase – 3 wire Delta Panel
230V or 240V Delta



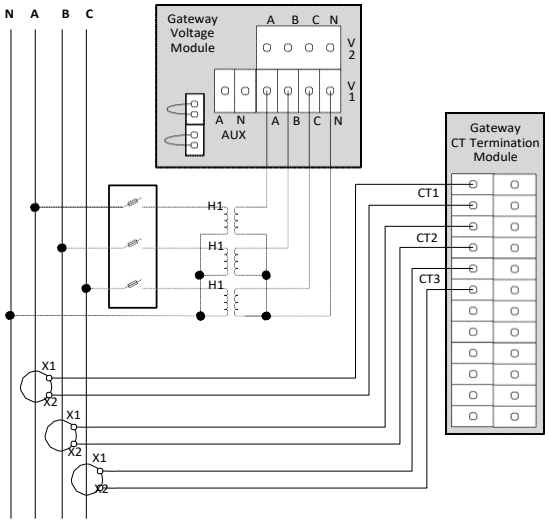
Three Element Meter
3 phase – 4 wire Wye Panel
With Triacta 347/600V PT Module



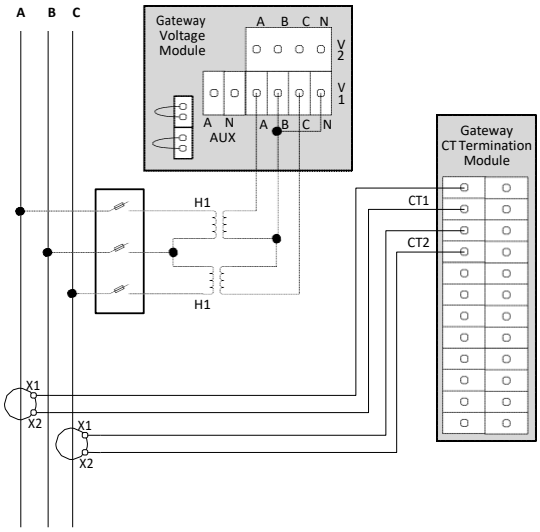
Two Element Meter
3 phase – 3 wire Delta Panel
With Triacta 480V or 600V Delta PT Module



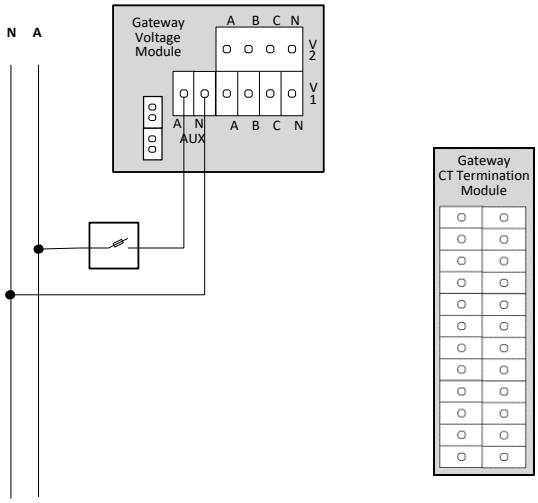
Three Element Meter
3 phase – 4 wire Wye Panel
With External PTs
i.e. 347/600V

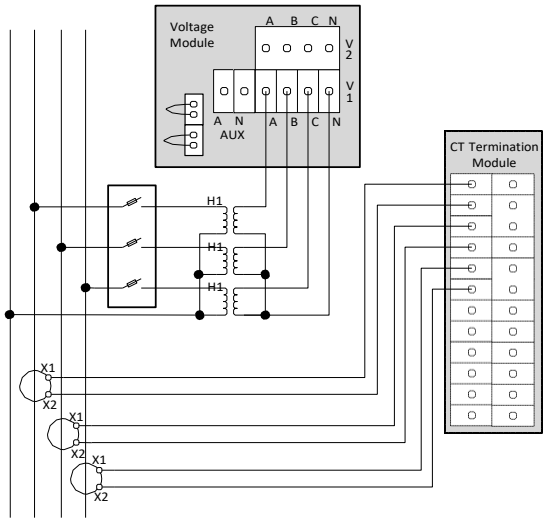


Two Element Meter
3 phase – 3 wire Delta Panel
With External PTs
480V or 600V Delta



Auxiliary Voltage Connection





Install and Connect CTs

Do not apply power until you have made these connections and followed all of the instructions below:

- Connect all CTs to the appropriate circuits.
- Connect the CTs to the to the CT connection cable or directly to the termination module.
- Use 18-22 AWG, 600V Insulated Butt Connectors for all CT wire to wire connections.

When installing current transformers of any type, follow these steps:

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm the power is off.
- NEVER open circuit a CT; use the shorting block to short circuit the leads of the CT before removing the connection from the meter.
- Do not crimp the insulation when making the wire connections.

Failure to follow these instructions will result in death or serious injury.

i. Turn off the power feed to the panel where the CTs are being installed. Always use a properly rated voltage sensing device to confirm power is off.

ii. Place the CTs on the desired circuit conductor wires

When installing solid-core CTs

i. Remove the feed wire from the circuit breaker,

ii. Place the CT over the wire, and reconnect the wire to the circuit breaker.

iii. Ensure that the orientation of the CT is correct with respect to the direction of the current flow as indicated on the CT.

When installing split-core or rope CTs,

i. Open the CT and place the CT over the wire to the circuit breaker.

ii. Ensure that the orientation of the CT is correct with respect to the direction of the current flow as indicated on the CT.

iii. Close the CT and Install cable ties if necessary to ensure that the CT is held together securely.

iii. When connecting CTs to a CT cable,

i. Feed the CT cable from the Gateway GXXXX meter into the panel through the appropriate punch-outs with approved strain reliefs.

ii. Strip the plastic sheaths on the cable to an appropriate length to expose the wire pairs. Cut and strip the CT leads and wire pair leads to an appropriate length.

iii. Identify the proper circuit and phase of each CT and crimp the CT leads to the correct X1 and X2 wire pairs in the CT cable for each meter element. (see Table 3)

iv. Connect the CT cable to the termination module or directly to the PowerHawk meter and secure it in place with the retaining clips.

iv. When connecting CTs to a termination CT module

i. For each CT, feed two wires with the appropriate wire gauge and length from the termination module to the CT in the panel through the appropriate punch-outs with approved strain reliefs. Ensure that each pair of wires is made up of two different colors and that each pair of wires is clearly and uniquely identified at each end (electrical panel and termination module).

ii. Cut and strip the CT leads and wire pair leads to an appropriate length to expose the wire for crimping.

iii. Crimp the X1/X2 CT leads from each CT to one of the wire pairs.

iv. Strip the plastic sheaths on the termination module end of each wire to an appropriate length to expose the wire.

v. Identify the proper circuit and phase of each CT connected to each wire pair and insert the correct pair of wires into the X1 X2 (+/-) inputs of the correct connection point in the termination module (CT1 –CT24) (see table 4)

Table xxx – CT wiring distances and wire gauges

CT Type	**Maximum Wiring Distance / Minimum Wire gauge**
80mA, 100mA or 333mV	300 ft (100 m) / 22 AWG
5A - With 5A:100mA or 5A:100mA Convertor	10 ft(3 m) / 18 AWG (from 5A CT to converter)
	300 ft (100 m) / 22 AWG (from converter to meter)

v. When installing 5 Amp output CTs

Where 5A output CTs are required, they can be connected to a Gateway GXXXX 80mA or 100mA CT module using Triacta 5A:80mA CT converters.

i. Install or use an existing sealable metal enclosure outside of the electrical panel within 10 feet of the 5A CTs.

ii. Mount a shorting device and one 5A:80mA CT convertor per 5A CT in the enclosure. All 5A CTs should have a shorting device installed between the 5A CT and the 5A:80mA CT convertor.

iii. Connect the X1 and X2 leads of the 5A CT to a shorting device with the shorting engaged.

iv. Connect the X1 (red) and X2 (black) leads from the 5A side of the converter to the other side of shorting device. Ensure that the connections from X1 and X2 leads from the CT match the X1/X2 leads from the convertor.

v. Connect the X1 lead (white) and X2 (black) leads from the 80mA side of the converter to a CT cable or a termination module as described in the previous two sections

Table 2: Termination module color pair identification

CT / Pulse Input Termination Cable		
CT or Pulse Input #	**Connect CT X1 or Pulse + lead to:**	**Connect CT X2 or Pulse - lead to:**
1	Black	Red
2	Black	White
3	Black	Green
4	Black	Blue
5	Black	Yellow
6	Black	Brown
7	Black	Orange
8	Red	White
9	Red	Green
10	Red	Blue
11	Red	Yellow
12	Red	Brown

Complete the installation record provided with each Gateway system to record which CTs or pulse devices are connected to each input pair on each termination module. See Figure X for an example.

Connect Pulse Inputs

Connect each external pulse output device to be monitored (gas, water, BTU meter, …) to a separate pulse input pair (+/-) on any of the termination modules designated as a pulse input module.

Each pulse input is compatible with both dry (reed) and solid-state Form A contacts.

When the pulsing device provides solid-state form A outputs, the negative terminal from the source device must be connected to the negative (-) terminal of the Gateway GXXXX pulse in terminal block.

When the pulsing device provides dry contact (reed) pulse outputs the pulse input wire pairs are not polarity-sensitive.

The maximum input pulse rate is 10 Hz (maximum), and the minimum input pulse width is 20 ms.

The recommended wiring for pulse input pairs is 22 AWG shielded twisted pair wires for distances up to 300 ft (100 m). Use larger gauge wire for larger distances up to 600 ft (200 m).

For each external pulse output device, document the pulse input module and the wire pair it is connected to, and the units per pulse output of the device.

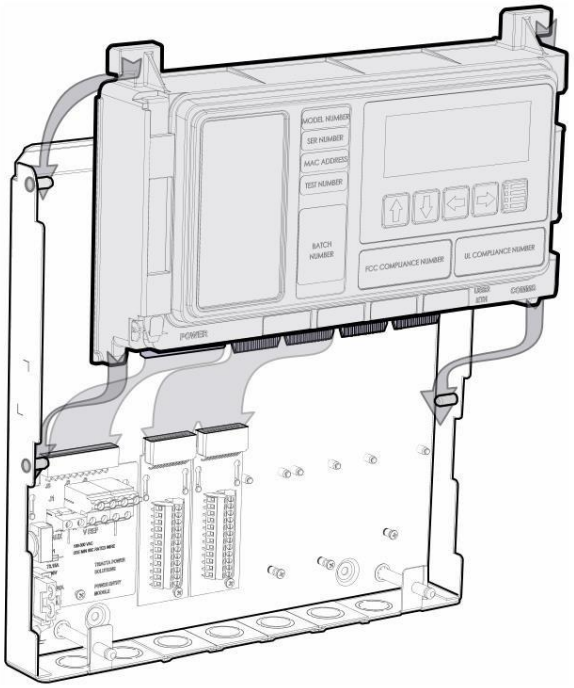
Insert the Head unit

In most cases the Gateway meter will be shipped with the Head unit pre-assembled into a base unit. Alternately, the base unit can be pre-installed early in the construction phase (ie as the electrical panels are being built) and the Head unit can be inserted later when the installation is ready to be commissioned.

Before installing the Head unit be sure to turn off all the power feed/s to the Gateway Base unit and to all panel/s where the CTs are installed. Always use a properly rated voltage sensing device to confirm power is off.

Slide the Head unit down from above so that each of the alignment tabs on the Head unit go behind the alignment pins on the Base unit as shown in the diagram below.

Push down firmly on the Head unit to fully insert the Head unit edge connectors into the Voltage, Termination and Communication Modules installed in the Base unit.



Connect the Ethernet Cable

Connect the Gateway GXXXX to a 10/100BaseT 802.3-2002 compliant IP network or device by connecting a CAT5 Ethernet cable to the RJ45 Ethernet port on the Head unit. The Ethernet port enables TR3/TR5 data reporting and BAS Modbus IP or BACnet TCP/IP services to the Gateway GXXXX device.

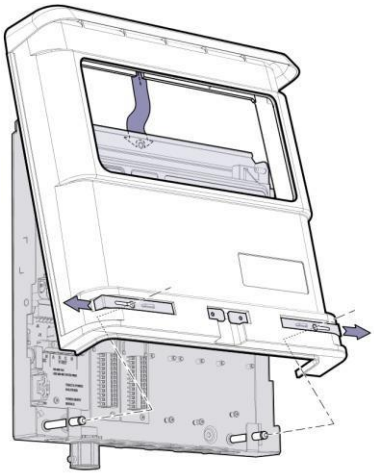
Route the Ethernet cable through one of the punch-outs in the bottom of the enclosure.

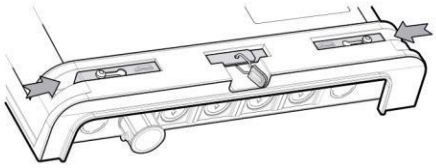
There are two LEDS on the RJ45 jack which will indicate the status of the Ethernet connection as shown in the following table:

LED Color	Description
Green	Connection State: On – An active device has been detected Off – No active device is connected.
Amber	Activity indicator: Flashing On – Data activity detected on the interface Off – No network activity detected.

Install the Cover

The cover is installed from the top by holding it at a shallow angle and dragging down until the inside of the drip cover catches the flange at the top of the base.





Move both locking bars out to each side.

Centre the cover over and above the base and move the cover down at a shallow angle until the 'v' groove at the cover locates on the top mounting stud

All conduit adapters must be firmly seated to ensure that cover closes.

When the cover is firmly seated, slide the locking bars inward to secure the cover. Pull up on each bottom corner to ensure that the locking bars are seated properly.

When the cover locking bars are pushed in, the utility seal holes should be in alignment allowing for a Service Utility seal wire to be installed as shown.

Record the Meter Map

If an Installation Record was not provided with the metering equipment to direct the installation the final step in the installation process is to complete the Installation Record to record the mapping of the circuits being measured to the meter points. A copy of Figure 17, which is organized to resemble a breaker panel, is provided with each Gateway GXXXX, and is to be completed and delivered to your system administrator.

Figure 17: Installation Record (sample shown)

PowerHawk GXXXX Installation Record

TRIACTA
Triacta Power Technologies Inc.
Box 582 - 7 Mill Street
Almonte, ON Canada K0A 1A0
Ph: (613) 256-2868
Fax: (613) 256-6602
www.TRIACTAPOWER.com

Panel Description: Main electrical Room
Customer: ABC Properties
Address: 100 Main St.
City: Ottawa
Prov/State: Ontario
Postal/Zip Code: K0A 1A0
Inspection Date: July 1st 2017
Inspector:
PowerHawk MAC 0021B6000001 **PowerHawk Serial #:** 117010001

Installation											
Volts	120	Amps	600	Hz	60	Phase	3	Wire	4	Service	Y

Units												
Insp #	Maker	Badge #	Serial #	Type	Volts	Amps	Multi	Kh	Phase	Wire	Elements	Sealed

PTs								
Meter	Maker	Serial # A	Serial #B	Serial # C	Type	Primary	Secondary	PT Ratio

Note: Connect the X1 lead (positive Lead) of the CT to the first colour of each wire pair (X1 CT input)

Wire Mod. #	CT #	CT Amps	Description	circuit	phase	circuit	CT Amps	Description	CT #	Wire Mod. #
1	1	100	Suite 100	1		2	20	Laundry 1	1	2
1	2	100		3		4	20	Laundry 2	2	2
1	3	100	Suite 101	5		6	20	Laundry 3	3	2
1	4	100		7		8	100	Air Handler	4	2
1	5	100	Suite 102	9		10	100		5	2
1	6	100		11		12	100		6	2
1	7	100	Suite 103	13		14	400	Elevator	7	2
1	8	100		15		16	400		8	2
3	1	200	Penthouse 1	17		18	400		9	2
3	2	200		19		20				
3	3	200		21		22				
3	4	200	Penthouse 2	23		24				
3	5	200		25		26				
3	6	200		27		28				
				29		30				
				31		32				
				33		34				

MAINTENANCE

Do not perform any operation or maintenance procedures that are not described in this product documentation. No preventive maintenance is required on any of the equipment. Visually inspect the equipment yearly and ensure it is free of dust or other particles. If necessary, wipe with a clean cloth. Individual components are not user-serviceable and must be returned to Triacta Power for repair.

Fuse Replacement

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm the power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury

1. Turn off all sources of power before attempting to replace the fuse. Always use a properly rated voltage sensing device to confirm the power is off.
2. Remove the outer cover from the unit.
3. Locate fuse F1 at the top left corner inside the unit.
4. Replace fuse F1 with a fuse that meets the specifications listed in Table 1 on page 2.

Appendix 1: Current Transformers Overview

Current transformers (CTs) measure the current flowing through a wire. They are installed around each wire for each circuit to be monitored and connected to the Gateway Gxxxx via a Gateway termination module.

CT Types

Current transformers are classified by their secondary output (80 mA, 100 mA, 5A, or 333 mVolt) and by their physical appearance (solid core, split core, or rope).

Table 2 lists the Gateway GXXXX CT Sensor Modules and the types of CT that can be used with each module. The table also indicates the maximum distance and corresponding wire gauge for connecting each type of CT to the Gateway GXXXX.

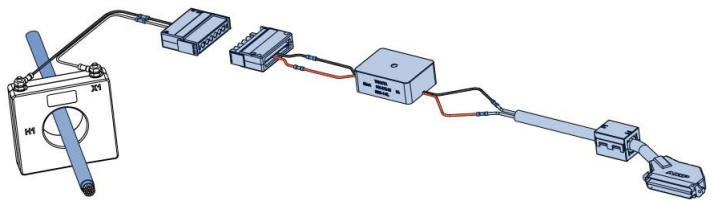
For Gateway GXXXX release 1.0, rope (Rogowski Coil) CTs must have an external integrator. Future releases will provide an internal integrator function which will allow the rope CTs to be directly connected to the Gateway GXXXX.

Table 2: Current transformer specifications

CT Sensor Module	Solid core CTs	Split core CTs	Rope (Rogowski Coil) CTs	Maximum wiring distance/ Wire gauge
80mA	80mA			300 ft (100 m) / 22 AWG
	5A (with 5A:80mA converter)	5A (with 5A:80mA converter)		10 ft(3 m) / 18 AWG (from 5A CT to converter
				300 ft (100 m) / 22 AWG (from converter to meter)
100mA	100mA			300 ft (100 m) / 22 AWG
	5A (with 5A:100mA converter)	5A (with 5A:100mA converter)		10 ft(3 m) / 18 AWG (from 5A CT to converter
				300 ft (100 m) / 22 AWG (from converter to meter)
333mV		0.333 V	0.333 V	300 ft (100 m) / 22 AWG

As shown in table 2, 5 Amp secondary CTs can work with the Gateway GXXXX by using Triacta 5A:100mA or 5A:80mA CT convertors (figure 13). One convertor is required for each 5A secondary CT.

Figure 13: 5A solid core CT with 5A:80mA converter and shunt connector



CT Orientation

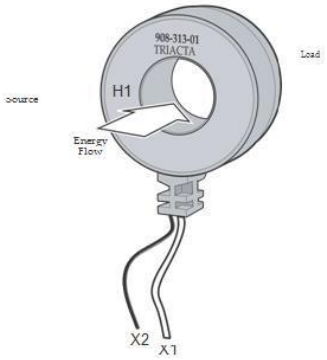
When installing each CT, ensure that the orientation of the CT matches the direction of the energy flow as indicated on each CT.

The direction of energy flow is identified by either;

1) a label - "*This side towards source"*,
2) an arrow - the arrow points away from the source, or
3) a stamp or label indicating which side is H1 - the H1 side faces towards the source.

If the orientation is backward, the meter readings will be incorrect.

Figure 14: Triacta 100 or 80 mA current transformer



CT Wiring polarity

Each CT has two output wires or posts. One output is X1 (positive) and the other output is X2 (neutral). The X1 output is normally labeled directly on the CT. It may be explicitly identified as X1, or it may be identified with a dot. If there is no X1 marking, refer to the CT manufacturer's documentation to determine the proper polarity.

The X1/X2 outputs from each CT for each circuit must be connected to the X1/X2 inputs of each corresponding CT input connection on the appropriate Gateway GXXXX CT input module.

When installing CTs in a panel, ensure that all CT wiring is labeled with the proper X1/X2 designations, or that it follows a standard X1/X2 color pair mapping. If the

CT wiring polarity is incorrect, the meter readings will be incorrect.

CT Phasing

Depending on the number of voltage phases and the number of wires connected to each circuit being measured, a minimum of one, two or three CTs are required for each meter point to correctly measure energy usage by the circuit.

Voltage phases and wiring	Number of CTs required	Phases typically used
Single-phase 2-wire	1	A, B or C
Single-phase 3-wire	2	A-B
Two-phase 3-wire	2	A-B, C-A, B-C
Three-phase 3-wire Delta	2 (optionally 3)	A-C
Three-phase 4-wire	3	A-B-C

Ensure that the correct number of CTs are properly installed on each circuit, and that the X1/X2 wire pair connected to each CT is labeled with the correct circuit name and phase.

Ensure that the phase of the wire that each CT is installed on matches the sense voltage input phase connections as shown in the relevant voltage connections drawings.

Note that standard circuit wire phase colors and/or breaker positions do not always match from one panel or circuit breaker to another. It is recommended that the phasing is verified from the circuit to the sense voltage source with a voltmeter and not just by visual inspection.

If the CT phases do not match the sense voltage phases, the meter readings will be incorrect.

CT Shorting and Termination

The X1 and X2 outputs for all 5A, 100mA or 80mA CTs MUST always be either shorted or terminated to a meter when the circuits that they are installed on are energized. Failure to terminate or short a CT on an energized circuit can cause dangerous voltages on the open CT leads that can result in a fire hazard and/or catastrophic damage to the CT.

The CT termination modules have built-in shorting that is activated whenever the Gateway Head unit is not installed.

5A CTs should have their own shorting/shunt connector that allows each set of 5A CTs to be independently shorted at the 5A secondary (see Figure 13 on page 22). For safe access, the 5A converters and shorting should be installed in a dedicated metering compartment located in a main distribution panel, or in a separate metal enclosure.

CT Wiring Modules

Two types of CT wiring modules are available for the Gateway GXXXX.

One wiring module has built-in termination blocks for direct connections of up to 12 CT wire pairs. When connecting CTs to a CT Wiring - Termination module, each CT is connected to one of the connection points on the termination block, labeled from P-1 to P-12. The X1 and X2 inputs for each CT are labeled +/- for each connection point.

A second wiring module provides a XXX foot long cable with 12 uniquely color coded wire pairs. Each CT is connected to one of the twisted-pair wire color pairs in the 25-pair CT connection cable. The color codes for the X1 (positive) and X2 (neutral) connections for each of the 12 CTs are listed in Table XXX. The first color of each color pair is connected to X1, and the second color of each color pair is connected to X2 of each CT.

Typically, the CT Wiring - CT cable module would be used when all CTs are located in the same distribution panel. The CT cable can be easily routed from the Gateway

GXXXX to the distribution panel and the CTs can then be direct connected to the CT cable inside the panel.

If CTs are located in different panels, or if there is a very long distance from the CTs to the Gateway GXXXX, it may be more desirable to route separate CT wiring from each circuit direct to the CT Wiring - Termination module.

If more than one type of CT Sensor Module (ie 80ma, 100mA or 333mV) is installed in the HEAD unit, ensure that all of the CTs on each wiring module are of the same type. Do not mix CTs of different types on the same CT wiring module. The position of each wiring module in the base unit for each type of CTs much also match the position of the corresponding CT Sensor module in the HEAD unit.

CT Naming designations

Each CT is physically identified by the CT wiring module slot and wire pair it is connected to and then logically identified (named) by a meter number and an element number (meter-element).

The Gateway GXXXX can support any combination of single element, two element and three element meters in any order, up to a total of 12, 24, 36 or 48 elements depending on the number of installed CT modules. The number of meters and the number of elements per meter are determined by the metering configuration programmed into the meter.

The following table shows some sample meter naming configurations

Metering configuration	CT naming designation (meter-element)
All single-element meters	**1-1** **2-1** **3-1** **...** **48-1**
All two-element meters	**1-1, 1-2** **2-1, 2-2** **3-1, 3-2** **...** **24-1, 24-2**
All three-element meters	**1-1, 1-2, 1-3** **2-1, 2-2, 2-3** **3-1, 3-2, 3-3** **...** **16-1, 16-2, 16-3**
Mixed element meters	**1-1, 1-2, 1-3** **2-1, 2-2, 2-3** **3-1, 3-2** **4-1** **5-1** **6-1,6-2** **…..** **n-1, n-2, n-3**

REGULATORY COMPLIANCE

The Gateway GXXXX must be installed by a certified electrician with knowledge of local safety regulations. Initial installation of the unit, and any subsequent modification to the unit, must be inspected by the local electrical safety authority.

The Gateway GXXXX complies with the standards listed in Table 4.

Table 4: Regulatory Compliance

Discipline	Regulatory and industry standard
Safety	UL certified to IEC/EA/UL/CSA 61010-1 3rd Edition CSA-C22.2 No. 61010-1-04
Emissions (EMC)	FCC Part 15 Class B, ICES-003 EN55022, IEC 6100-4-5
Surge power/telephone lines	ANSI/TIA968-A: 2002

Equipment servicing and access

The information in this section must be considered as a mandatory requirement, and must be strictly adhered to when installing and operating Gateway GXXXX.

Access to equipment

The equipment must be accessible to authorized personnel only. Equipment must be installed in areas where access can be restricted.

Servicing the equipment

No preventive maintenance is required on any of the equipment. Visually inspect the equipment yearly and ensure it is free of dust or other particles. If necessary, wipe with a clean cloth.

Component servicing

Individual components are not user-serviceable, and must be returned to Triacta Power for repair. If an equipment fault occurs, do not attempt to repair the faulty component.

All maintenance activities should be performed by qualified personnel only. Do not perform any operating or maintenance procedures that are not described in the product documentation provided by Triacta Power.

Graphical symbols

Table 5 shows the graphical symbols that appear on the equipment.

Table 5: Graphical symbols that appear on equipment

Symbol	Description
	Indicates the supply wire protective earth, also known as chassis ground, for the primary ground.
	This symbol indicates a replaceable fuse.

Triacta Power Solutions LP
130 Industrial Ave, Unit 100
Carleton Place, Ontario K7C 3T2
www.triacta.com