

TRIACTA GATEWAY-S™

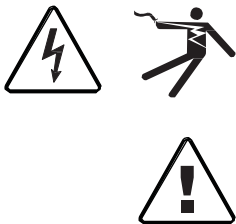
Modular 12 Element Meter

Installation Guide - DRAFT



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 Compliance Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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. Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Changes or modifications not expressly approved by the party responsible for compliance could void the User's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, this equipment should be installed and operated with minimum distance 20 cm (7.9 inches) between the antenna and your body during normal operation. Users must follow the specific operating instructions for satisfying RF exposure compliance.

ISED Compliance Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-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.

This device complies with the Canadian ICES-003 Class A specifications. CAN ICES-003(A) / NMB-003 (A).

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 exempt 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.

Cet appareil numérique de la Canadian ICES-003. Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This equipment complies with ISED RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm (7.9 inches) between the radiator and any part of your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux radiations ISED CNR-102 établies pour un environnement non contrôlé. Une distance de séparation d'au moins 20 cm doivent être maintenue entre l'antenne de cet appareil et toutes les personnes. Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

Model Marketing name (PMN, Canada): **GTWYS**

FCC and ISED notices for Wi-Fi 2.4GHz

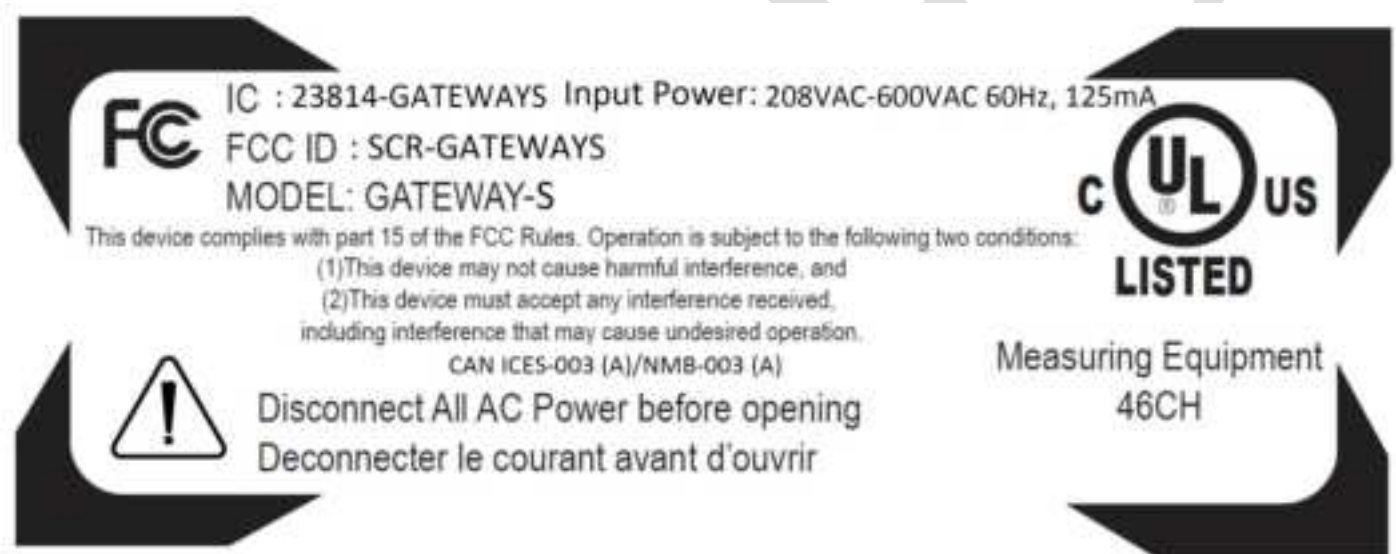
IC: 23814-GATEWAYS
FCC ID: SCR-GATEWAYS

UL (Underwriters Laboratories)

(PENDING)

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.

Product Compliance Label



The regulatory product label covers all the different types of measurement modules used on this product.

Refer to 'Appendix 2: TRIACTA GATEWAY-S Part Number Configuration Guide'

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Introduction

This document describes the TRIACTA GATEWAY-S system, including procedures to install and start up the unit.

This documentation is intended for those responsible for installing the TRIACTA GATEWAY-S. Installers must be qualified electricians with knowledge of local and national code requirements. See “Safety Precautions” on page 8.

***THIS IS A DRAFT VERSION OF THIS DOCUMENT INTENDED FOR
FIELD TRIAL USE OF THIS PRODUCT***

Scope

This Guide is for the mechanical and electrical installation of the TRIACTA GATEWAY-S.

Refer to the TRIACTA GATEWAY™ Flex Configuration Tool Guide for instructions on how to configure the TRIACTA GATEWAY-S.

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 may result in death or serious injury.

System Specifications

Table 1 lists the system specifications of the TRIACTA GATEWAY-S

Table 1: TRIACTA GATEWAY-S Specification

MECHANICAL	
Dimensions	Height: 15.54 in (39.5 cm) Width: 10.25 in (26.0 cm) Depth: 3.86 in (9.8 cm)
Weight	8.5 lbs. (3.85 kg) - Fully configured
VOLTAGE INPUTS	
Sense voltages	90V to 600V 50/60Hz 1W+N+Protective Earth 2W+N+Protective Earth Wye 3W+N+Protective Earth Wye 3W+Protective Earth Delta
Control Voltage	208VAC - 600VAC, line A to line B, 50 watts max, 50/60 Hz (Nominal)
Fuse rating (F1)	1.25A 600VAC Slow Blow
CURRENT SENSING INPUTS (All CTs must be UL recognized/listed)	
80 mA CT module	Meter burden: 4.1 Ω
100 mA CT module	Meter burden: 3.28 Ω
333mV CT Module	Meter burden: 20K Ω
CT Wiring	Max 660 ft (200 m) w/ 22 AWG
PULSE INPUTS	
Pulse Counter Module	Dry Contact form A and solid-state form A compatible Internal 3.3V pull-up Maximum 3mA current at 0V
	Maximum frequency 200Hz Minimum pulse width 2.0ms
Pulse Input Wiring	Max 660 ft (200 m) w/ 22 AWG
REGULATORY	
Measurement accuracy	Measurement Canada Approved in accordance with LMB-EG-07 ANSI C12.20 Class 0.5 (PENDING) IEC 62053-22 Class 5S (PENDING) (Accuracy compliant when used with 0.3% CTs)
Safety	UL/CSA 61010 Ed3 OV 600V CAT III (PENDING) CANADA - CAN/CSA-C22.2 No. 61010-1-12 (IEC 61010-1:2010, MOD) (PENDING) USA - UL61010-01 (IEC 61010-1:2010, MOD) (PENDING)
Emissions	FCC Part 15, ICES 003, EN55022, IEC 61000-4-5 - Class A
Wi-Fi	Industry Canada ID: 23814-GATEWAYS (PENDING) FCC ID: SCR-GATEWAYS (PENDING)
Listings/Approvals for Revenue Applications	Measurement Canada – Watt Hour, up to 12 1-el, 6 2-el, 4 3-el meters, and supported combinations. (NYPSC, CA, MD – (PENDING))
MEMORY STORAGE	
Size	16GB Gigabytes no-volatile RAM
Storage Time	10 Years

COMMUNICATIONS INTERFACES	
Ethernet	10/100BaseT 802.3-2002; RJ45
WIFI	802.11 b,g,n 2.4 GHz
Modbus TCP/IP	Client Side
BACnet IP	ASHRAE 135-1, BTL Listed B-SA (Pending)
ENVIRONMENTAL	
Operating temperature	-40 to 70°C (No LCD display below -20°C)
Operating humidity	5% to 95% non-condensing
Usage environment	Indoor environment, NEMA 250 Type II
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

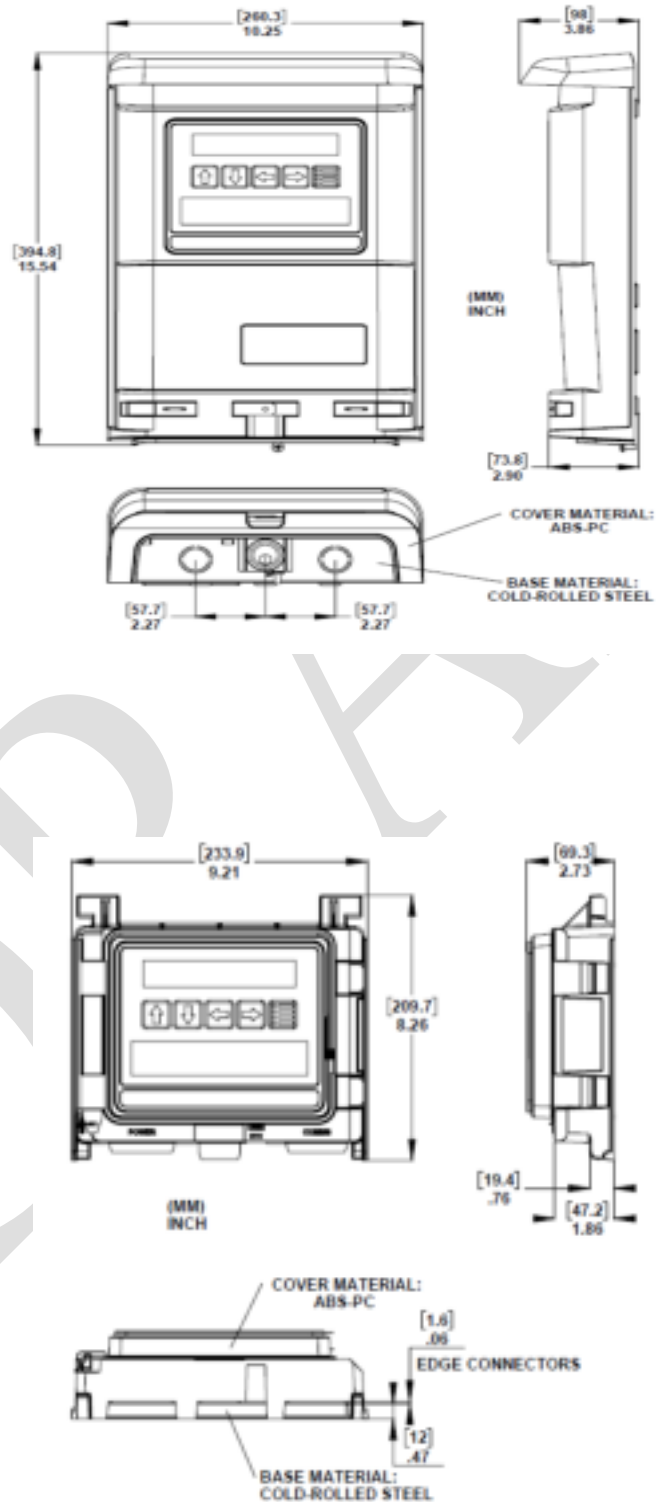
Ensure that the unit is properly earthed.

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.

Dimensions

Figure 1: TRIACTA GATEWAY-S Dimensions



System Description

The TRIACTA GATEWAY-S is a modular, 12 Element electrical meter and pulse collector system for Measurement and Verification, Energy Management, and billing applications. It is an industrial-grade, rapidly deployable platform with powerful communications options.

The TRIACTA GATEWAY-S system architecture consists of separate TRIACTA GATEWAY-S Meter Base and Meter Head units. The Meter Base can be installed, and the electrical connections terminated by electrical contractors, independently of the TRIACTA GATEWAY-S Meter Head. The TRIACTA GATEWAY-S Meter Head may be installed at a later time by a technician with no electrical accreditation. Figures 2 and 3 show the external and internal views of the TRIACTA GATEWAY-S meter.

Figure 2: TRIACTA GATEWAY-S External View

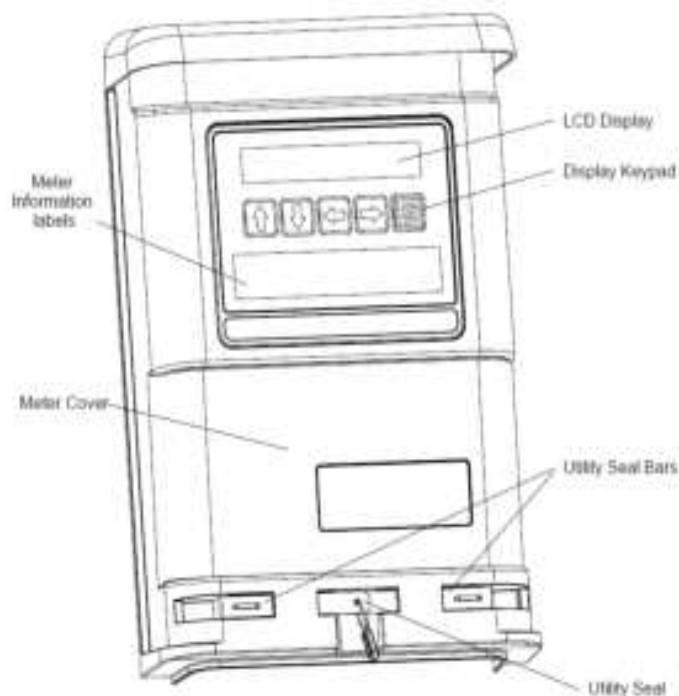
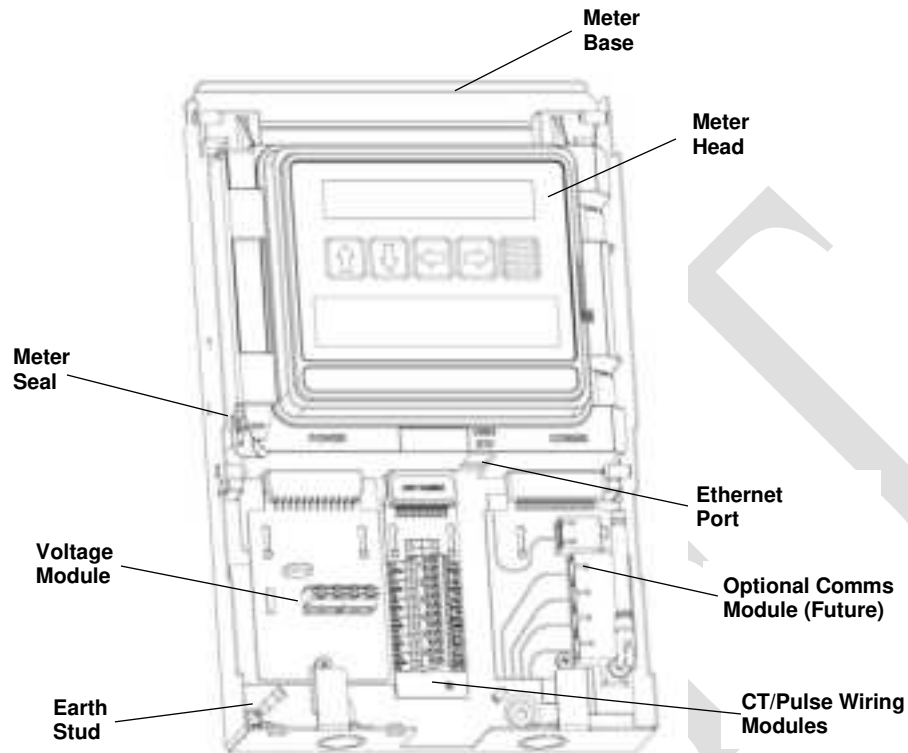


Figure 3: TRIACTA GATEWAY-S Internal view



TRIACTA GATEWAY-S Meter Base

The TRIACTA GATEWAY-S Meter Base supports connection points for the following:

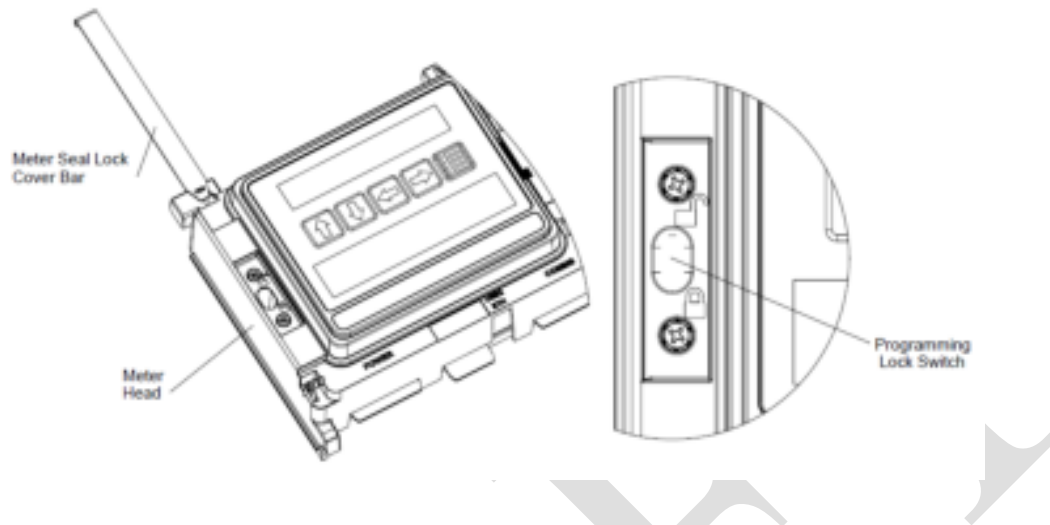
- One Reference/Supply Voltage Input.
- One self-shorting input module supports 12 wire pairs for CTs or pulse output devices.
- Optional future communication modules.

TRIACTA GATEWAY-S Meter Head

The Meter Head unit supports the following:

- One measurement module supporting twelve input pairs for 80mA CTs, 100mA CTs, 333mV CTs, or pulse counters.
- Large front panel 2X20 LCD display for manual meter reading and diagnostics.
- On-board Wifi for craft interface hotspot.
- On-board 10/100BaseT Ethernet.
- Two USB-2.0 ports for future use.
- Dual processor architecture for enhanced system capability and flexibility.
- Metrology programming Lock Switch and Meter Seal
 - As required in some regulatory jurisdictions (i.e. Measurement Canada, CDFA)
 - Fig 4 shows how to access the Programming Switch

Figure 4: TRIACTA GATEWAY-S Programming Lock Switch and Meter Seal



TRIACTA GATEWAY-S Measurement Modules

Each Small GATEWAY Meter can be ordered with one of the following factory installed measurement modules (See Appendix 2):

- 80mA CT Flex
- 80mA CT Residential
- 100mA CT Flex
- 333mV CT Flex
- Pulse Counter

Each Flex Measurement Modules can support 12 CT inputs configured in any combination of 3-element, 2-element, and single element meters.

The 80mA CT Residential Measurement Module has a fixed configuration of up to six 2-element meters only.

A Pulse Counter Measurement module supports up to 12 pulse counters.

TRIACTA GATEWAY-S Voltage Module

The Voltage Module of the TRIACTA GATEWAY-S has a single 4-pin terminal block input for both the sense voltage and the control voltage.

The voltage inputs on the voltage module (A, B, C and N) provide the sense phase voltages (VAC) used for metering different service types

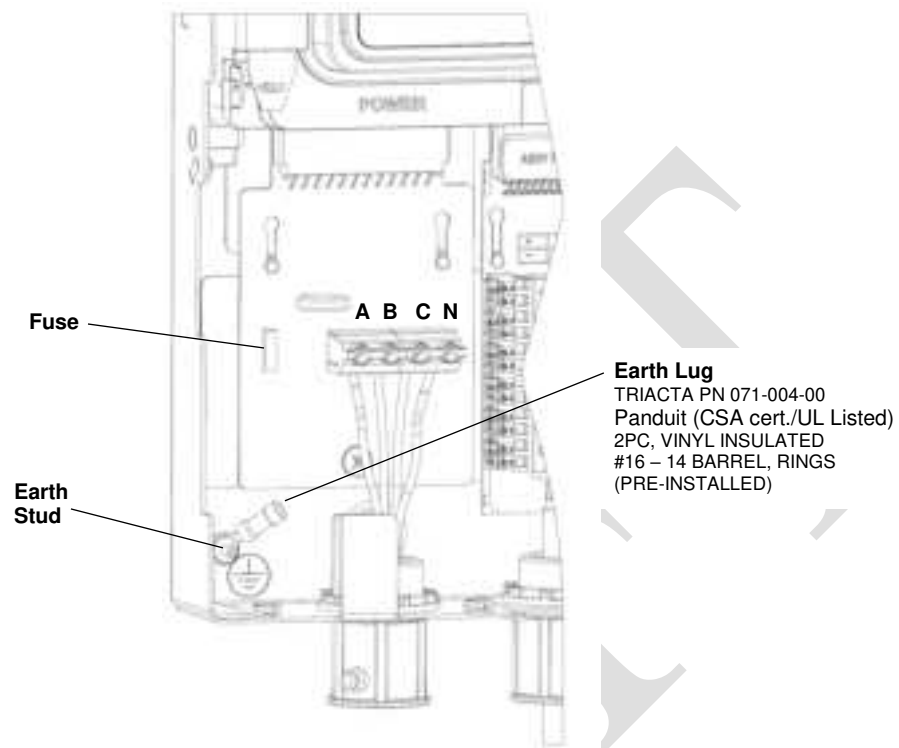
The sense voltage inputs will accept panel voltages from 120VAC to 600VAC. The control voltage is taken from the Phase A to Phase B voltage inputs and must be from 208VAC to 600VAC.

Fig 5 shows the temporary voltage module shipped with the Trial GATEWAY-S meters. The two 3-Pin Connectors will be replaced with a single 4-pin connector in production units.

Figures 21 to 26 show typical voltage wiring installations using the temporary trial voltage module.

Figures 10 to 17 show typical voltage wiring installations with the production voltage module.

Figure 5: Voltage Module



Note: Only the connections of mains shown in this manual are permissible. These all contain a Protective Earth Ground. Earth Stud, lug, nut and washer are provided as shown when shipped.

Pre-Installation Checklist

- The installer must provide the following information, tools, and equipment before proceeding with the installation: certified current transformers for metering (not supplied)
- An appropriate 15-Amp maximum circuit breaker or a fused disconnect switch for the type of panel
- Current/voltage meter to test the phasing of panels
- RJ45 Ethernet patch cable
- 4-wire 14 AWG (1.63 mm²) cable for three-phase wye connected circuits, or 3-wire 14 AWG (1.63 mm²) cable for a single-phase wye connected circuits
 - Lug E52164 ZMVV wire connector soldering lug.
 - Torque 486 A-B UL standard for torque NEC. M4 (No. 6-32 2 Newton meters 14 - 18AWG solid or stranded)
 - Must wire according to breaker size

- Appropriate surge protection to reduce product exposure to CAT II levels at the Power Entry and Voltage Reference inputs are required.
- Small flat-head screwdriver
- #2 Phillips screwdriver
- Manual pig tail lead proper crimping tool
- 18 AWG butt splice connector for CTs
- Wire strippers
- Four 1-inch (25 mm) #8 mounting screws suitable for selected mounting surface

TRIACTA GATEWAY-S CT / Termination Modules

Current transformers and pulse output devices are connected to the TRIACTA GATEWAY-S via specially designed self-shorting CT / Termination Modules as shown in figure 6. The self-shorting mechanism on each CT / Termination Module is activated when the Wiring Module is not connected to the TRIACTA GATEWAY-S Meter Head unit.

The CT / Termination Module supports 12 inputs pairs, numbered P1 to P12. There are two types of CT / Termination modules; The CT / Pulse Screw Terminal module has two rows of wire termination blocks to connect the CT / Pulse meter wires to. The GATEWAY Whip Cable with Shorting comes prewired to a color-coded twisted pair cable supporting up to 12 CTs or pulse input pairs.

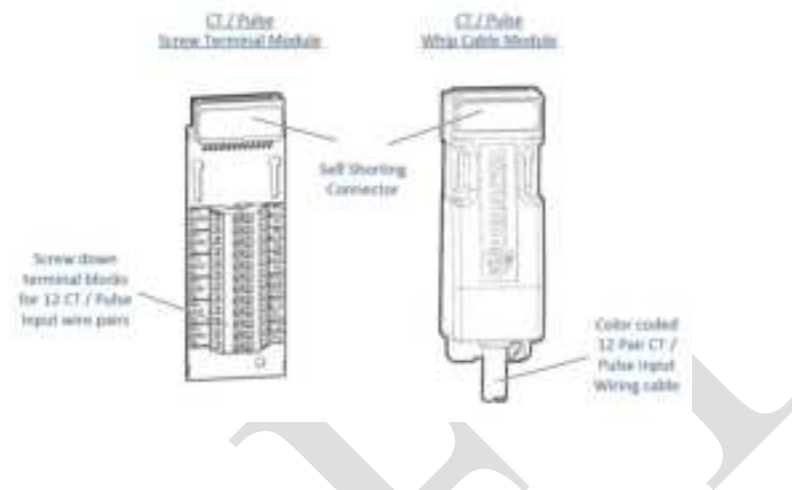
On the CT / Pulse Screw Terminal module, the two inputs on each input pair are designated as + or -. If the CT / Termination Module is for CT connections, the X1 / X2 leads from each CT must respectively connect to the + / - inputs. If the CT / Termination Module is for pulse output devices, the + / - wires for each pair connect as per the specific pulse output device type. (Only dry or solid-state form A contacts are supported)

(Note: - Input pairs will be shorted without the meter module)

Each input pair on a CT / Pulse Termination Module also has a color pair designation that matches one of the color pairs available in the GATEWAY Whip Cable Module with

Shorting. Table 3 describes the CT cable wire pair color scheme for each input pair on the CT / Termination Module.

Figure 6: CT / Termination Modules



TRIACTA GATEWAY-S FLEX configurations

In Flex configuration, The CT inputs in the TRIACTA GATEWAY-S can be each assigned to any combination of 1-element, 2-element or 3-element meters in any order. Each individual CT input pair can be grouped with any other one or two CT pairs to create a 2-Element or 3-element meter.

TRIACTA GATEWAY-S Measurement Canada configurations

When sealing a GATEWAY-S as per Measurement Canada requirements, there are some restrictions to the flex configuration as discussed above:

- 1) The 80mA CT Flex Measurement module can support most combinations of up to four 3-element meters, up to four 2-element meters, or up to 12 single element meters.
- 2) The 80mA CT Residential Measurement module can support up to six 2-element meters only.

These configuration restrictions are automatically applied when using the TRIACTA Flex Configuration Tool. Refer to the **TRIACTA GATEWAY Flex Configuration Tool Guide** for more information.

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.
CT types – 80mA, 100mA and/or 333mV.

(OR)

Determine the number of pulse counters required
2. Determine the number of TRIACTA GATEWAY-S or TRIACTA GATEWAY-S systems to be installed and ensure adequate space. For clearances, see Figure 7.
1. Determine the type of Measurement Modules required for each TRIACTA GATEWAY-S system.
2. Ensure that an approved 15-Amp fused disconnect or breaker is provided for each AC voltage connection.
5. Determine the number of Ethernet drops required, and ensure they are installed before installing the TRIACTA GATEWAY-S system.

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 the installation environment. Each installation may vary depending on physical site restrictions.

Installation Instructions

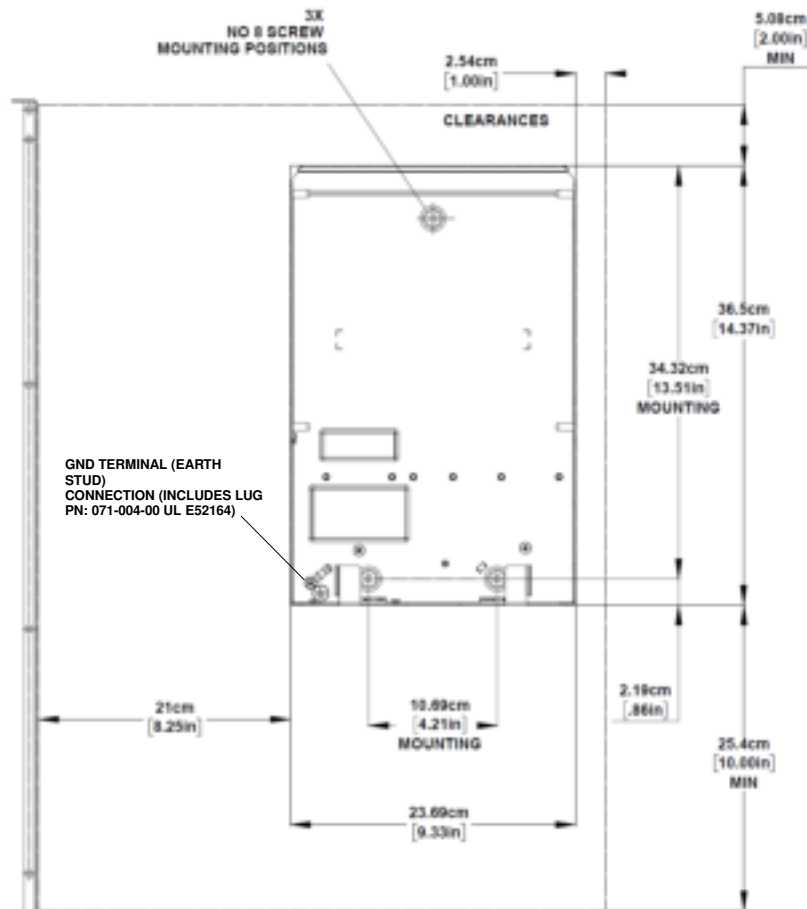
This section provides information about activities that must be performed to install the TRIACTA GATEWAY-S in a single-phase 3-wire (network), three-phase 4-wire, or 3ph 3wire delta application. The installation procedures must be performed in the following order:

Mount the Meter Base Module

The TRIACTA GATEWAY-S meter head must be removed from the base before mounting the base on the wall. Figure 7 shows the general mounting layout for a Meter Base. There are three mounting holes as shown which are all accessible without the Meter Head unit installed.

1. Mount the TRIACTA GATEWAY-S 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 TRIACTA GATEWAY-S on the wall and secure it by inserting a screw in each mounting keyhole and tightening the screws.

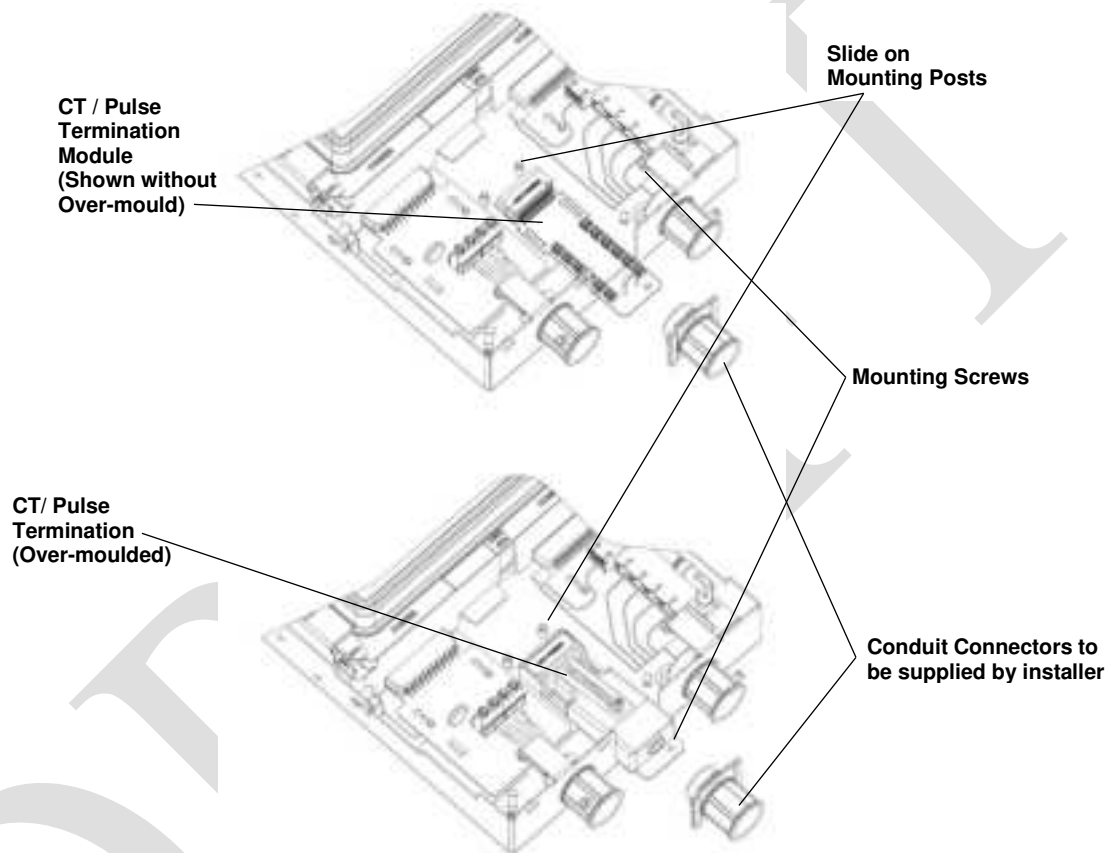
Figure 7: Meter Base Unit Mounting Layout, Dimensions, and Clearances



Install CT / Pulse Termination Module into the Meter Base Unit

If a CT / Pulse Screw Terminal Module are ordered with the GATEWAY-S it is shipped pre-installed in the Meter Base module. If a CT/Pulse Whip Cable Module is ordered, it will be shipped separate from the base unit and must be installed as shown in Figure 8 below. If either module is being replaced, insert it as shown.

Figure 8: Installing CT / Pulse Termination Modules into the Meter Base Unit



Install Disconnect Devices for Sense and Control Voltages

Each TRIACTA GATEWAY-S device must be connected to all 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.

For installations with multiple TRIACTA GATEWAY-S devices, the same disconnect 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 Voltage Wiring

For a split-phase panel, use a 3-wire, 12 or 14 AWG (1.63 mm²), 90°C (194°F) cable.

For a three-phase Wye panel, use a 4-wire, 12 or 14 AWG (1.63 mm²), 90°C (194°F) cable.

For a three-phase Delta service, use a 3-wire, 12 or 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 the 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 voltage source 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 voltage, 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 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.

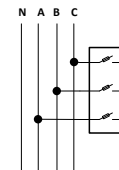
NOTE: The phase wiring sequence A, B, C, and Neutral between the TRIACTA GATEWAY-S meter and the circuit breaker panel must match or the measurement readings will be incorrect. If the circuit breaker panel does not designate phase A, phase B, and phase C feeds, make your designation and use it for the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

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

Figure 9: Drawing Symbols for Voltage Connection Diagrams



CTs



Distribution Panel with 1 Breaker or Disconnect

Voltage Module Wiring for Trial GATEWAY-S Meters

The Voltage module on the trial GATEWAY-S meters have 6 terminals, i.e. three phases with their respective neutral terminals: Phase A, A ret, Phase B, B ret, Phase C and C ret.

The wiring diagram for the aforementioned version of the voltage module can be found in appendix: 3 on Page 37 and 38.

The following wiring diagrams (i.e. from Figure 21 to Figure 26) on Page 23 and 24 are for the final version of the voltage module which has the neutrals (A ret, B ret, C ret) shorted together hence there are only 4 terminals for Phase A, B, C and N respectively.

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fig 10: Single Element Meter
Single phase – 3 wire Panel
120/240V or 230/460V

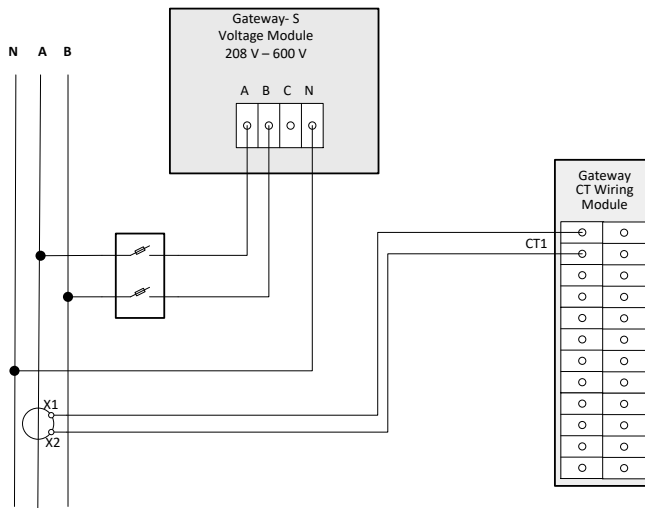


Fig 11: Two Element Meter
Single phase – 3 wire Panel
120/240V or 230/460V

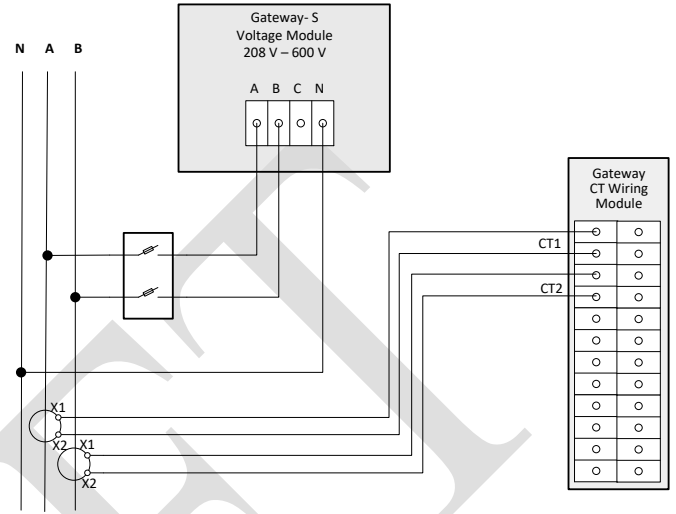


Fig 12: Single Element Meter
3 phase – 4 wire Panel
120/208V, 230/400V, 240/416V, 277/480V or 347/600

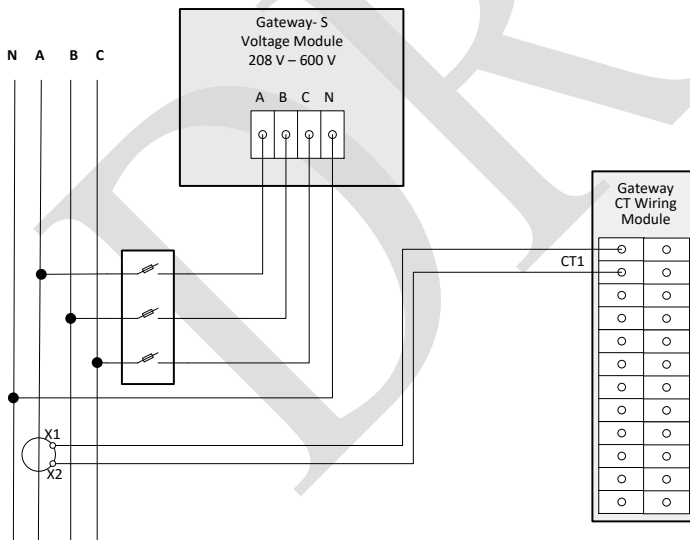


Fig 13: Two Element Meter
3 phase – 4 wire Panel
120/208V, 230/400V, 240/416V, 277/480V or 347/600

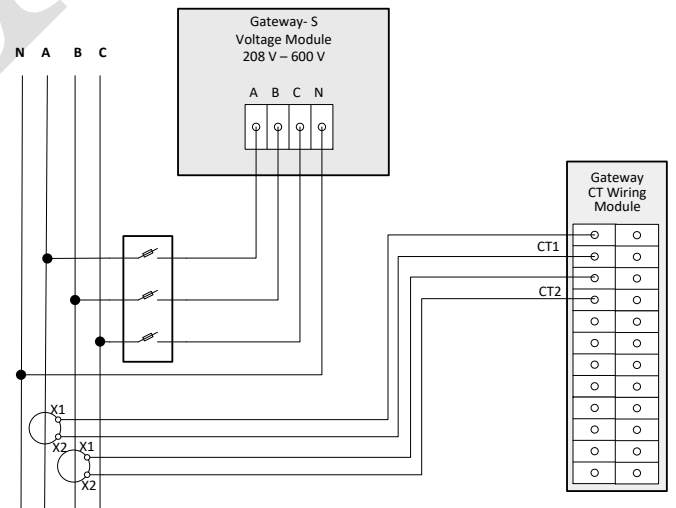


Fig 14: Three Element Meter
3 phase – 4 wire Wye Panel
120/208V, 230/400V, 240/416V, 277/480V or 347/600

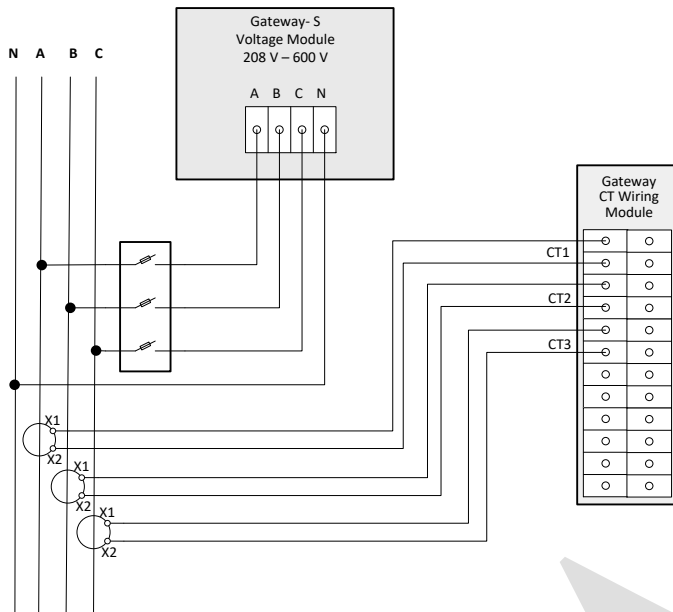
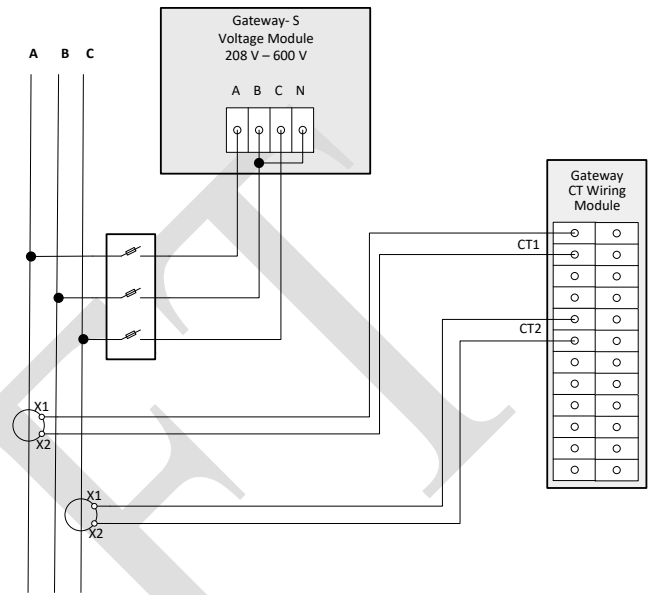


Fig 15: Two Element Meter
3 phase – 3 wire Delta Panel
230V, 240V, 480V or 600V Delta



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 CT connection cable or directly to the CT / Termination Module.
- Use 18-22 AWG, 600V Insulated Butt Connectors for all CT wire to wire connections.

⚠ 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; Connecting CTs to a TRIACTA GATEWAY-S CT / Termination Module will ensure that the CT wire pairs are always either shorted or terminated by the Meter Head.
- Do not crimp the insulation when making the wire connections.

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

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

1. 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.
2. Place the CTs on the desired circuit conductor wires

When installing solid-core CTs

- i. Remove the feed wire from the circuit breaker,
- ii. Feed the circuit conductor wires through the CT
- iii. Ensure that the orientation of the CT is correct with respect to the direction of the current flow as indicated on the CT.
- iv. Reconnect the feed wire to the circuit breaker.

When installing split-core or Rogowski Coil 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.

3. When connecting CTs to a CT / Pulse Whip Cable Module,
 - i. If using a CT / Pulse Screw Terminal Module, skip to step 4.
 - ii. Feed the whip cable through one of the GATEWAY-S conduit adapter plates and conduit connector as shown in Figure 8.
 - iii. Secure the CT / Pulse Whip Cable Module onto the GATEWAY Base unit and secure the cable in place with the retaining screw.
 - iv. At the CT end of the cable, strip the plastic sheaths to an appropriate length to expose the wire pairs. Cut and strip the CT leads and wire pair leads to an appropriate length.
 - v. 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)

4. When connecting CTs to a CT / Pulse Screw Terminal Module
 - i. For each CT, feed two wires with the appropriate wire gauge and length from the CT / Pulse Screw Terminal 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 CT / Pulse Screw Terminal 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 CT / Pulse Screw Terminal 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 CT / Termination Module (CT1 –CT12) (see Table 3)

Table 2: CT Wiring Distances and Wire Gauges

CT Type	Maximum Wiring Distance / Minimum Wire gauge
80mA, 100mA or 333mV	660 ft (200 m) / 22 AWG
5A-With 5A:80mA CT Converter	36 ft (11 m) / 18 AWG (from 5A CT to converter)
	660 ft (200 m) / 22 AWG (from converter to meter)

5. When installing 5 Amp output CTs

Where 5A output CTs are required, they can be connected to a TRIACTA GATEWAY-S with an 80mA CT Measurement Module using TRIACTA 5A:80mA CT converters (Refer to Figure 19.).

- 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 converter per 5A CT in the enclosure. All 5A CTs should have a shorting device installed between the 5A CT and the 5A:80mA CT converter.
 - 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 lead from the CT match the X1/X2 leads from the converter.
 - v. Connect the X1 lead (white) and X2 (black) leads from the 80mA side of the converter to a CT / Pulse Termination Module as described in the previous two sections
6. Complete the installation record provided with each TRIACTA GATEWAY-S system to record which CTs or pulse devices are connected to each input pair on each CT / Pulse Termination Module. See Figure 17 for an example.

Table 3: CT / Termination Module Color Pair Identification

CT / Pulse Input Termination Cable		
CT or Pulse Pair #	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

Connect Pulse Inputs

Connect each external pulse output device to be monitored (gas, water, BTU meter,) to a separate pulse input pair (+/-) on the CT / Pulse Screw Terminal 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 TRIACTA GATEWAY-S pulse in the 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 200 Hz (maximum), and the minimum input pulse width is 2.0 ms.

The recommended wiring for pulse input pairs is 22 AWG twisted pair wires for distances up to 330 ft. (100 m). Use larger gauge wire for larger distances up to 660 ft. (200 m).

For each external pulse generating device, document the Wiring Module number and the wire pair it is connected to, and the units per pulse output of the device.

Connect the Ethernet Cable

Connect the TRIACTA GATEWAY-S 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 Meter Head unit. The Ethernet port enables TR3/TR5 data reporting and BAS Modbus IP or BACnet TCP/IP services to the TRIACTA GATEWAY-S device.

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

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

Table 4: Ethernet Port LED Indicator Status

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 Meter Base.

Figure 16: Installing the Cover



Move both Locking Bars out to each side.

Center the cover over and above the base and move the cover down at a shallow angle until the top of the cover sits in the top of the base

All conduit adapters must be firmly seated to ensure that the 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 TRIACTA GATEWAY-S and is to be completed and delivered to your system administrator.

Figure 17: Installation Record (sample shown)

Triacta GATEWAY - S - Meter Installation Record									
Page (n of n) 1 of 1									
Customer: ABC Properties					 130 Industrial Ave, Unit 100 Carleton Place, ON Canada K7C 3T2 www.triacta.com				
Address: 100 Main st									
City, Prov/State: Ottawa, ON									
Postal/Zip Code: K01 1A0									
Inspector, Date: 1-Jul-20									
Panel Name/Location:			Service Voltage	Amps	Hz	# of Phases	# of Wires		
MSB-Main Electrical Room				600	60	3	4		
Triacta GATEWAY Units									
Gm #	Serial #	MAC Address				Sealed	Badge #		
G8						n			
PTs									
Maker	Serial # A	Serial #B	Serial # C	Type	Primary	Secondary	PT Ratio		
None									
Pair # or X1/X2 Color	CT Amps	Description (Name and element#)	Slot	phase	Slot	Description (Name and element#)	CT Amps	Pair # or X1/X2 Color	
P1	100	Suite 100	1	A	2	Laundry 1	20	blk/red	
P2	100		3	B	4	Laundry 2	20	blk/wht	
P3	100		5	C	6	Laundry 3	20	blk/gre	
P4	100	Suite 101	7	A	8	Air Handler	100	blk/ble	
P5	100		9	B	10		100	blk/ylw	
P6	100	Suite 102	11	C	12			100	blk/bwn

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. Individual components are not user-serviceable and must be returned to TRIACTA Power for repair.

Meter Head Servicing or Replacement

Before removing the Meter Head, be sure to turn off all the power feed/s to the TRIACTA GATEWAY-S Meter Base unit. Always use a properly rated voltage sensing device to confirm power is off.

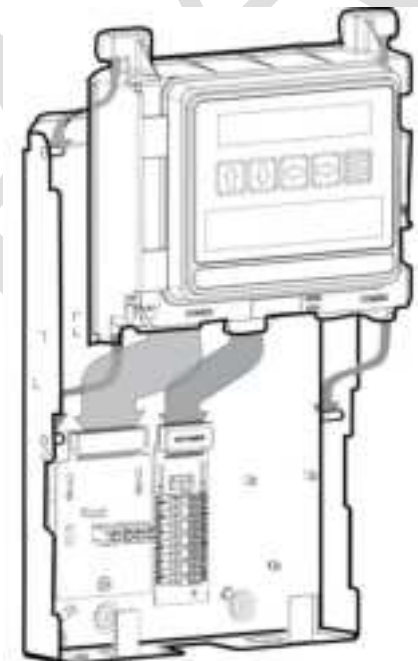
Push up firmly on the Meter Head to disconnect the Meter Head edge connectors from the Voltage, Wiring, and Communication Modules installed in the Meter Base unit.

Slide the Meter Head upwards so that the alignment tabs on the Meter Head go behind the alignment pins on the Meter Base unit as shown in the diagram below.

To replace/reinstall the Meter Head, slide the Meter Head down from above so that each of the alignment tabs on the Meter Head unit goes behind the alignment pins on the Meter Base as shown in the diagram below.

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

Figure 18: Inserting the Meter Head Unit



In most cases the TRIACTA GATEWAY-S will be shipped with the Meter Head unit pre-assembled into a Meter Base unit. Alternately, the Meter Base unit can be pre-installed early in the construction phase (i.e. as the electrical panels are being built) and the Meter Head unit can be inserted later when the installation is ready to be commissioned.

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 TRIACTA GATEWAY-S via a TRIACTA GATEWAY-S CT / Termination Module.

CT Types

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

Table 5 lists the TRIACTA GATEWAY-S CT Measurement 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 TRIACTA GATEWAY-S.

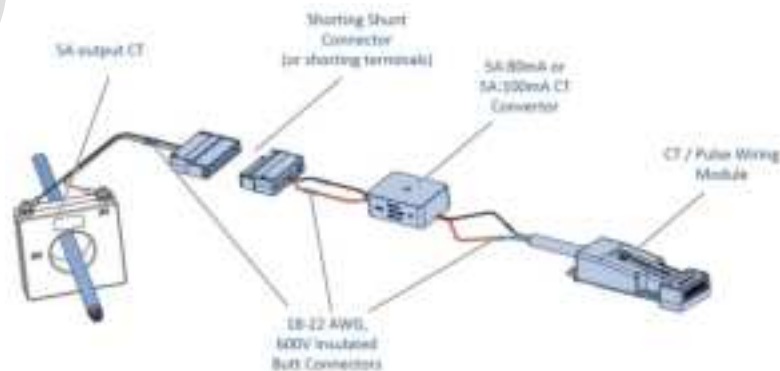
For TRIACTA GATEWAY-S release 1.2 (Base release), provides an internal integrator function that will allow the Rogowski Coil CTs to be directly connected to the TRIACTA GATEWAY-S.

Table 5: Current Transformer Specifications

CT Sensor Module	Solid core CTs	Split-core CTs	Rogowski Coil CTs	Maximum wiring distance/ Wire gauge
80mA	80mA			660 ft. (200 m) / 22 AWG
	5A (with 5A:80mA converter)	5A (with 5A:80mA converter)		36 ft. (11 m) / 18 AWG (from 5A CT to converter)
				660 ft. (200 m) / 22 AWG (from converter to meter)
100mA	100mA			660 ft. (200 m) / 22 AWG
333mV		0.333 V	0.333 V	330 ft. (100 m) / 22 AWG

As shown in Table 5, 5 Amp secondary CTs can work with the TRIACTA GATEWAY-S by using TRIACTA 5A:100mA or 5A:80mA CT convertors (Figure 19). One convertor is required for each 5A secondary CT.

Figure 19: 5A Solid Core CT with 5A:80mA Converter and Shunt Connector



CT Orientation

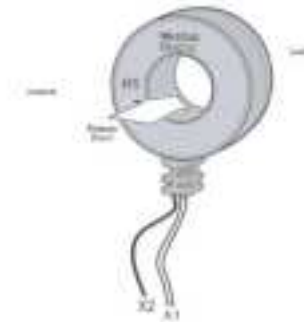
When installing each CT, ensure that the orientation of the CT matches the direction of the energy flow as indicated on each CT.

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 20: 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 TRIACTA GATEWAY-S CT wiring 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.

Table 6: CT Phasing

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 is 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 TRIACTA GATEWAY-S Meter 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 19). For safe access, the 5A converters and shorting should be installed in a dedicated accessible metering compartment located in the main distribution panel, or a separate metal enclosure.

CT Naming Designations

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

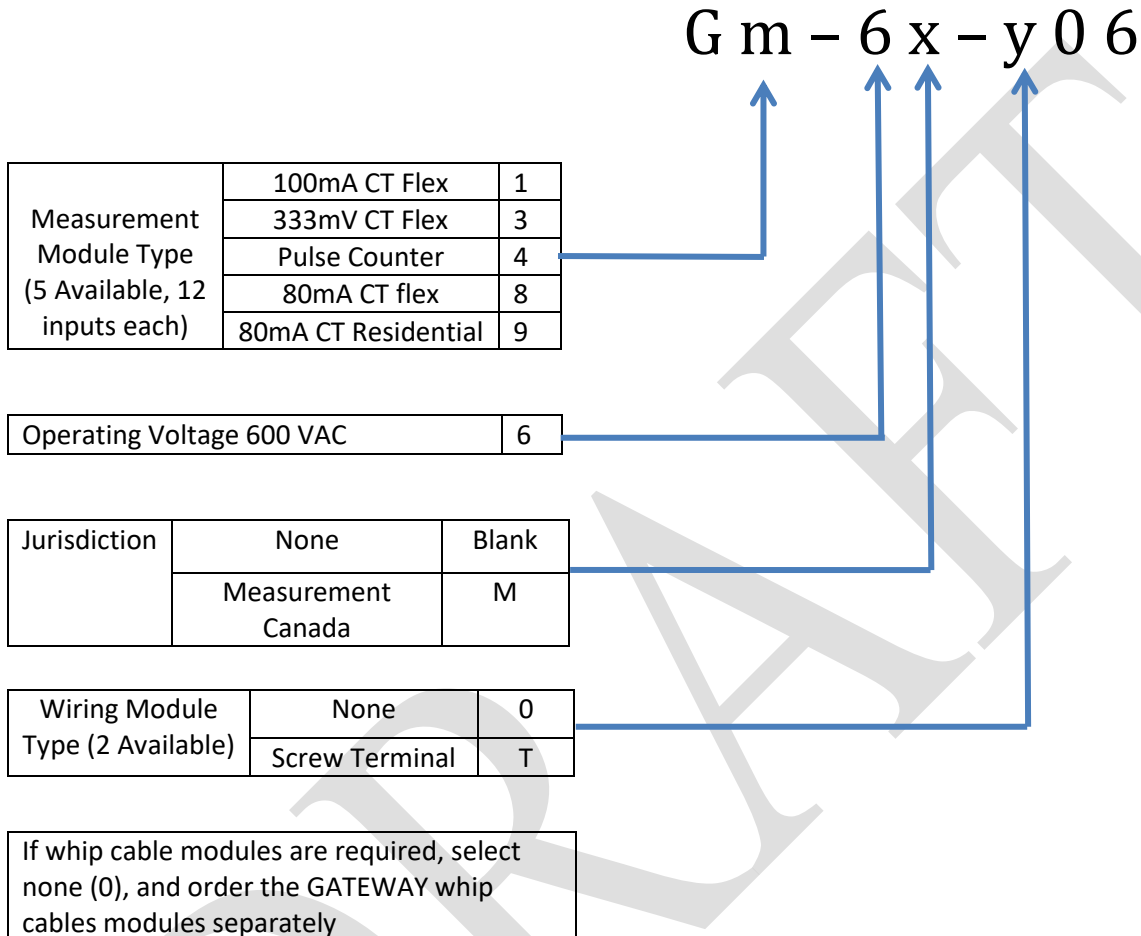
The TRIACTA GATEWAY-S can support any combination of a single element, two-element, and/or three-element meters in any order, up to a total of 12, elements depending on the number of installed CT modules. The number of meters and the number of elements per meter are determined by the metering configuration programmed into the meter.

The following table shows some sample CT naming configurations

Table 7: CT Naming

Metering configuration	CT naming designation (meter#-element#)
All single-element meters	1-1 2-1 3-1 ... 12-1
All two-element meters	1-1, 1-2 2-1, 2-2 3-1, 3-2 ... 6-1, 6-2
All three-element meters	1-1, 1-2, 1-3 2-1, 2-2, 2-3 3-1, 3-2, 3-3 4-1, 4-2, 4-3
Mixed element meters	1-1, 1-2, 1-3 2-1, 2-2 3-1,3-2 4-1 5-1 6-1,6-2,6

Appendix 2: TRIACTA GATEWAY-S Part Number Configuration Guide



Appendix 3: GATEWAY-S Trial Voltage Module Wiring

fig 21: Single Element Meter
Single phase – 3 wire Panel
120/240V or 230/460V

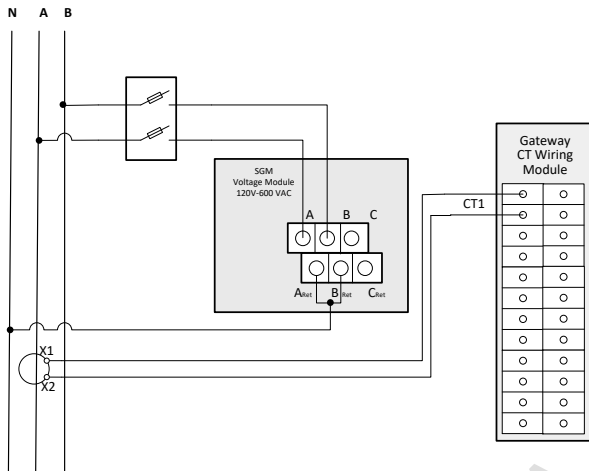


Fig 22: Two Element Meter
Single phase – 3 wire Panel
120/240V or 230/460V

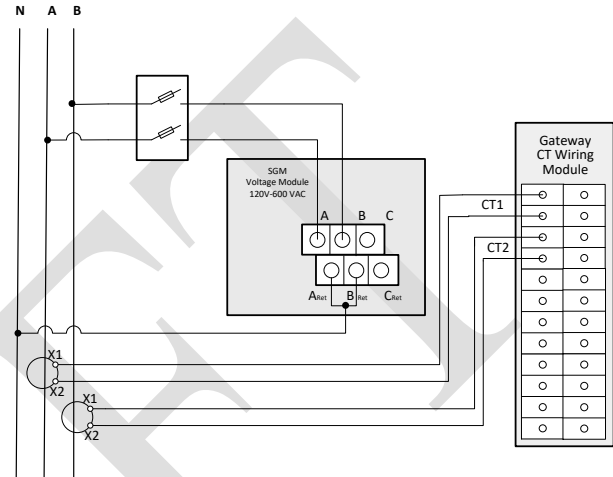


Fig 23: Single Element Meter
3 phase – 4 wire Panel
120/208V, 230/400V, 240/416V, 277/480V or 347/600V

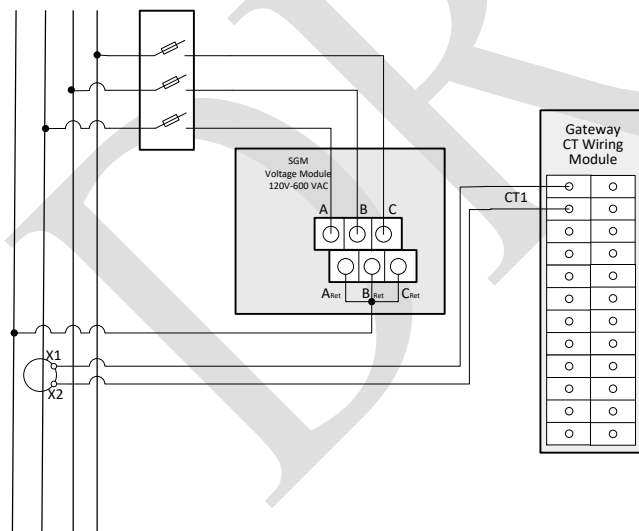


Fig 24: Two Element Meter
3 phase – 4 wire Panel
120/208V, 230/400V, 240/416V, 277/480V or 347/600V

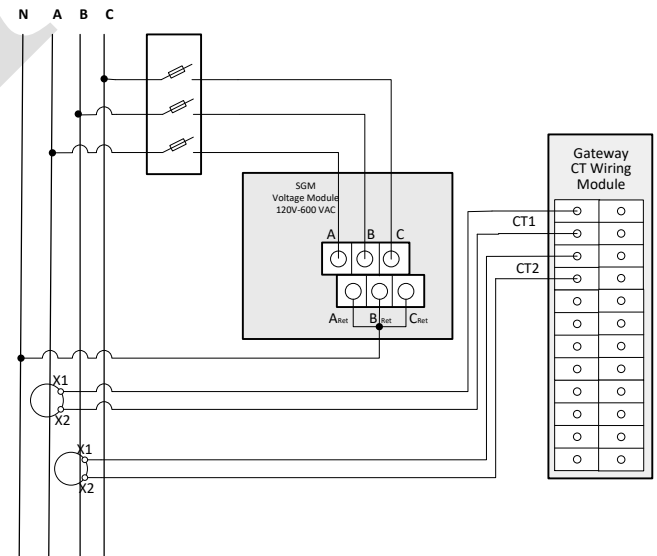


Fig 25: Three Element Meter
3 phase – 4 wire Wye Panel
120/208V, 230/400V, 240/416V, 277/480V or 347/600V

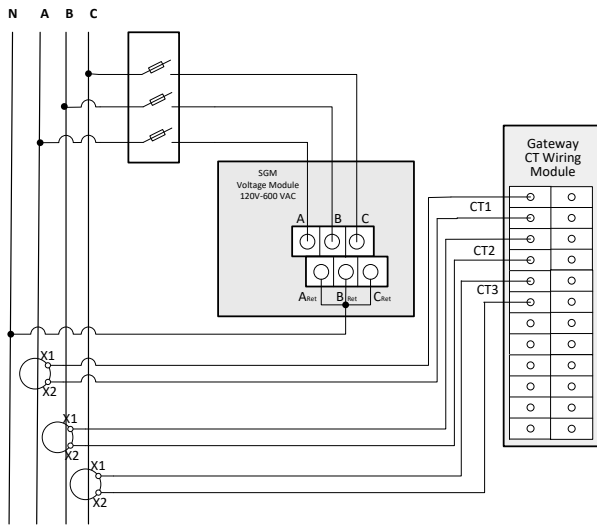
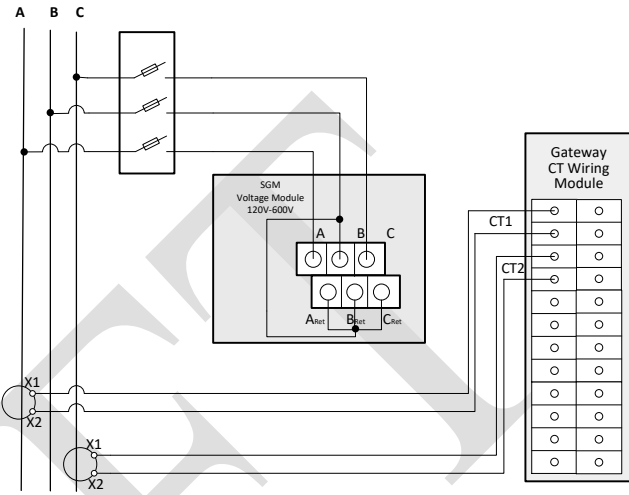


Fig 26: Two Element Meter
3 phase – 3 wire Delta Panel
230V, 240V, 480V or 600V Delta



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 TRIACTA GATEWAY-S.

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 Solutions 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.

Graphical Symbols

Table 8 shows the graphical symbols that appear on the equipment.

Table 8: 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.

DRAFT

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Carleton Place, Ontario K7C 3T2
www.TRIACTA.com

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