



## Setup and Operation Full Guide

### Integra 1221

## Panel Mounted Energy Meter for Single and Three Phase Electrical Systems

### Warnings Caution: Risk of Electric Shock

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit.
- At voltages below that specified in the Range of Use the meter may shut down. However, voltages hazardous to life may still be present at some of the terminals of this unit.
- Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations.
- Ensure all supplies are de-energised before attempting connection or other procedures.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
- The unit does not have internal fuses therefore external fuses must be used for protection and safety under fault conditions.
- Never open-circuit the secondary winding of an energized current transformer.
- If this equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

### EMC Installation Requirements

Whilst this unit complies with all relevant EU EMC (electromagnetic compatibility) regulations, any additional precautions necessary to provide proper operation of this and adjacent equipment will be installation dependent and so the following can only be general guidance:

- Avoid routing wiring to this unit alongside cables and products that are, or could be, a source of interference.
- The supply to the unit should not be subject to excessive interference. In some cases, a supply line filter may be required.
- To protect the product against incorrect operation or permanent damage, surge transients must be controlled. It is good EMC practice to suppress transients and surges at the source. The unit has been designed to automatically recover from typical transients; however in extreme circumstances it may be necessary to temporarily disconnect the supply for a period of greater than 10 seconds to restore correct operation.
- Screened communication leads are recommended and may be required. These and other connecting leads may require the fitting of RF suppression components, such as ferrite absorbers, line filters etc., if RF fields cause problems.
- It is good practice to install sensitive electronic instruments that are performing critical functions in EMC enclosures that protect against electrical interference causing a disturbance in function.

### 1 Introduction

This document provides operating, maintenance and installation instructions. This unit measures and displays the characteristics of Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) (Auxiliary model) and Three Phase Four Wire (3P4W) networks. The measuring parameters include voltage (V), current (A), frequency (Hz), power (kW/KVA/KVAh), power factor (PF), imported, exported and total energy (kWh/kVAh). The unit also measures maximum demand current and power, this is measured over pre-set periods of up to 60 minutes. This particular model accommodates 100mA RJ12 connected CT and can be configured to work with a wide range of CTs. It also comes with a complete communications capability with built in RS485 Modbus RTU outputs, configuration is password protected. This product is available in an auxiliary version (powered from a separate auxiliary) or a self-powered version (self-powered from any phase of the supply).

#### 1.1 Unit Characteristics

The Integra 1221 can measure and display:

- Phase to neutral voltage and THD% (Total Harmonic Distortion) of all phases
- Line frequency
- Current, maximum demand current and current THD% of all phases
- Power, maximum power demand and power factor
- Imported, exported & total active energy
- Imported, exported & total reactive energy

The unit has a password-protected setup menu for:

- Changing the password
- System configuration - 1P2W, 3P4W, 3P3W (Auxiliary model only).
- Demands integration time (DIT)
- Reset for max demand measurements

#### 1.2 Current Transformer Primary Current

This unit requires configuring to operate with the appropriate current transformer(s), (100mA secondary). It is programmed by inputting the CT Primary value. It can be used on primary currents up to 9999A. e.g for a 250/0.1A Pri (A) = 0250

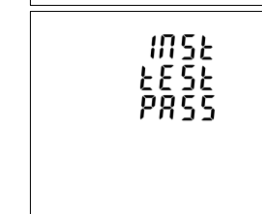
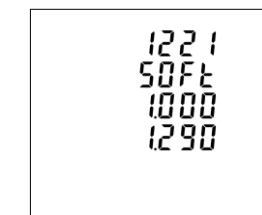
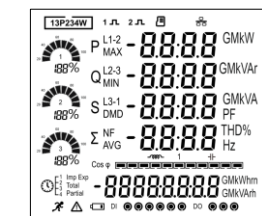
#### 1.3 RS485 Serial – Modbus RTU

This unit is compatible with remote monitoring through RS485 Modbus RTU. Setup screens are provided for configuring the RS485 port.

#### 1.4 Pulsed Outputs (Self-Powered version only)

The Integra 1221 has two pulsed outputs. One pulsed output is configurable to active (Wh) or reactive (VAh) energy. The second pulsed output is fixed to 3200 pulses per displayed energy unit e.g. when the energy display is indicating kWh the pulsed output will produce 3200 pulses/kWh.

### 2 Start Up Screens



The first screen lights up all display segments and can be used as a display check. The "Running Man" symbol will pulse at a rate which is controlled by the accumulation of the energy units currently shown on the display.

"Warning Triangle" symbol - The 1% energy threshold is deactivated ( default ) – sometimes enabled to eliminate " energy creep " on Import and Export.

The second screen indicates the product number, firmware and its build number.

Please note: The numbers on the product may vary from those shown here.

The interface performs a self-test and indicates the result if the test passes.

If the test fails, the display will show 'ERR=XXXX XXXX' where the X's will identify the fault. The product will remain on this screen until the user enters the setup mode (the setup mode will operate as normal). No Input registers will be available whilst the 'ERR=XXXX XXXX' is displayed.

If the error cannot be rectified from the setup menu, it is advised to power cycle the product. If the issue remains, return the product to the factory for inspection.

\*After a short delay, the meter will display the power, volts and amps screen.

### 3 Measurements

The buttons operate as follows:



Selects the power, voltage, current and energy display screens. In setup mode, this is "escape" (hold 3 sec) button.



Selects the voltage, current and THD display screens. In setup mode, this is the "left" (press) button.



Selects the frequency, power factor and max demand display screens. In setup mode, this is the "up" (press) button.




Selects the power (active, reactive, apparent and system) display screens. In setup mode, this is the "down" (press) button.

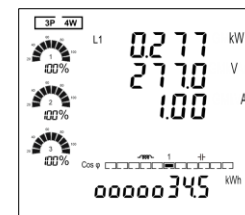


Selects the energy (active, reactive and total) display screens. In setup mode, this is the "right" / "enter" (press) button.

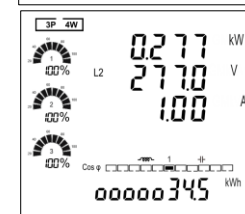
#### 3.1 Phase and System



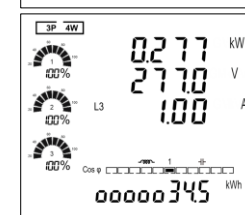
Each successive press of the  button displays the Power, Voltage, Current and Total Active Energy per phase. Followed by the Power, Voltage and Current with Total Reactive Energy per phase.



L1 Power, Voltage, Current, Total Active Energy.



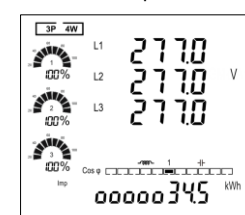
L2 Power, Voltage, Current, Total Active Energy.



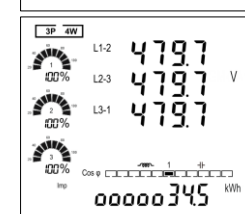
L3 Power, Voltage, Current, Total Active Energy.

#### 3.2 Voltage and Current

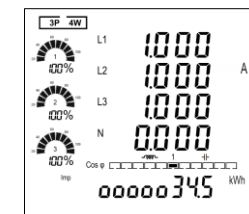
Each successive press of the  button selects the next screen:



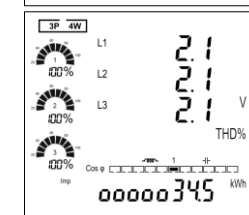
Voltage L-N



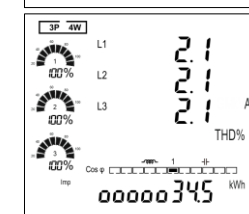
Voltage L-L



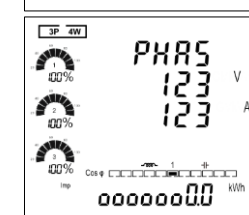
Current on each phase.



Phase to neutral voltage THD%.



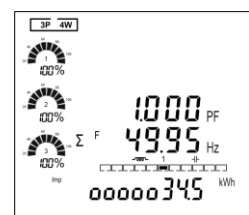
Current THD% for each phase.



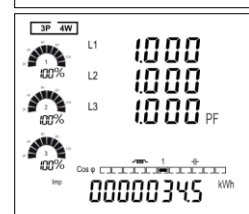
Phase Sequence V&I

#### 3.3 Frequency, Power Factor and Demand

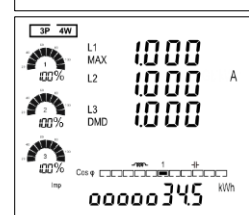
Each successive press of the  button selects the next screen:



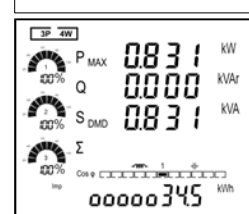
Frequency and Power Factor (total).



Power Factor of each phase.




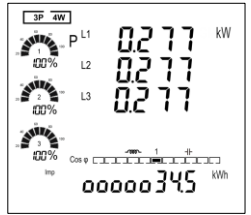
Maximum Current Demand.



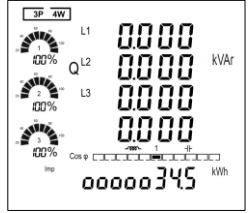
Maximum Power Demand.

### 3.4 Power

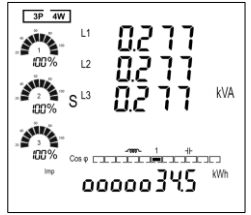
Each successive press of the  selects a new range:



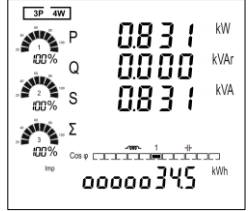
Instantaneous Active Power in kW.



Instantaneous Reactive Power in kVAR.



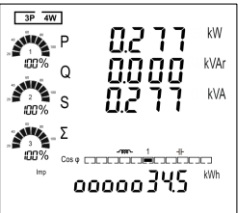
Instantaneous Volt-Amps in kVA.



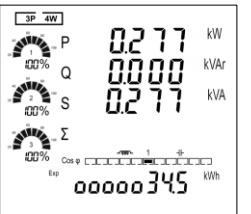
Total kW, kVA, kVAh.

### 3.5 Energy Measurements

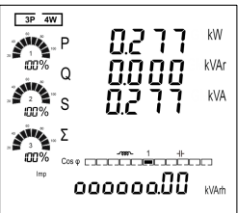
Each successive press of the  button selects the next screen:



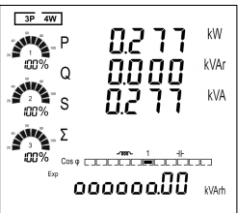
Imported active energy in kWh.



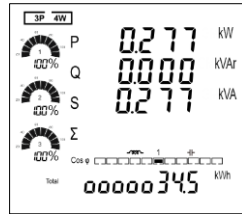
Exported active energy in kWh.



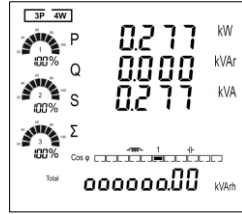
Imported reactive energy in kVAh.



Exported reactive energy in kVAh.



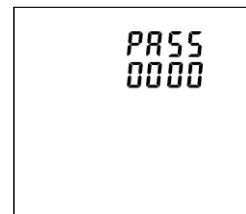
Total active energy in kWh.



Total reactive energy in kVAh.

### 4 Setup

To enter setup mode, hold the  and  buttons for 3 seconds, until the password screen appears.



The setup is password-protected and must be entered before proceeding (default '0000').







If an incorrect password is entered, the product will exit the setup menu and return to the measurement screens.

To exit the setup menu, hold the  button for 3 seconds, the measurement screen will display.

#### 4.1 Set up Entry Methods





Some menu items, such as password and CT, require a four-digit number entry while others, such as supply system, require selection from a range of options.

#### 4.1.1 Menu Option Selection

- To edit the current option, press . The current option will begin to flash.
- Use the  and  buttons to scroll through the available options.
- Press the  button to confirm your selection. The word 'SET' will appear.
- On completion of setting-up, press the  button to go back to the setup menu or hold the  button for 3 seconds to exit the setup menu completely.

#### 4.1.2 Number Entry Procedure

When setting up the unit, some screens require the entering of a number. In particular, on entry to the setup menu, a password must be entered. Digits are set individually from left to right. The procedure is as follows:


- The current digit to be set flashes and then can be adjusted using the  and  buttons.
- Press the  button to move right to the next digit.
- After setting the last digit, press the  button to save your selection. The word 'SET' will appear underneath as confirmation.

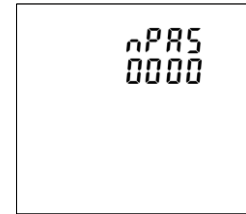
### 4.2 Setup Menu Structure

#### 4.2.1 Change Password (0000)

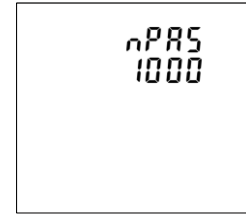
The 'CHNG PASS' menu enables the user to change the current password to a new four-digit number. To change the current password:






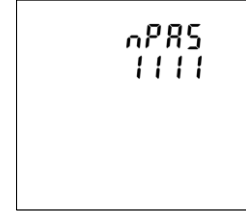
Use the  key to scroll to the top menu 'CHNG PASS'.



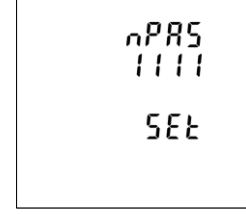
Press the  key to enter the menu. The first digit will start flashing.




Use the  /  keys to change the first digit and press  to enter. The next digit will flash.



Repeat the procedure for the remaining three digits.



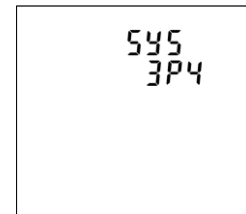
After setting the last digit, press the  key to save your selection.

The 'SET' indicator will show to confirm save.

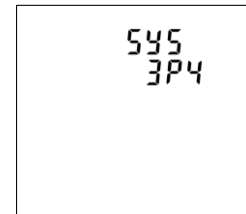
Press the  key to exit the menu.

#### 4.2.2 System Type (default 3P4W)

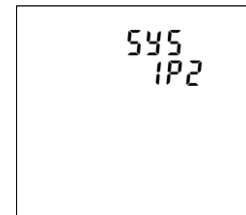
The 'SYS' menu enables the user to set the type of electrical system. To change the current system type:




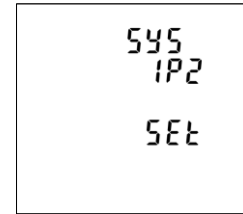
Use the  /  keys to scroll to the menu 'SYS'.




Press the  key to enter the menu. The first option will start flashing.



Use the  /  keys to scroll through the available options: 3P4 (3 Phase 4 Wire), 3P3 (3 Phase 3 Wire – Auxiliary only) and 1P2 (Single Phase 2 Wire).



Press the  key to save your selection.

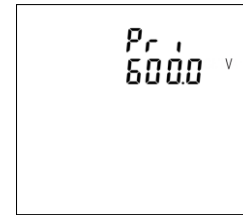
The 'SET' indicator will show to confirm save.

Press the  key to exit the menu.

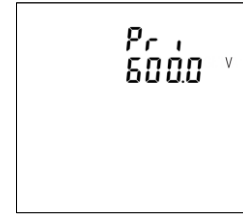
#### 4.2.3 Voltage Transformer Primary Voltage (Pri277.0V)


The 'Pri' menu enables the user to set the primary voltage (10V – 999 kV) of the voltage transformer (PT) that may be connected to the meter. In 3 wire mode voltages are entered L-L and in 4 wire mode voltages are entered L-N.

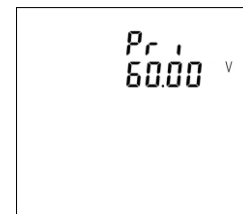
To change the primary voltage:






Use the  /  keys to scroll to the menu 'Pri'.

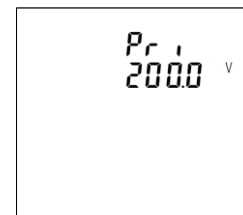


Press the  key to enter the menu. The decimal point will start flashing.

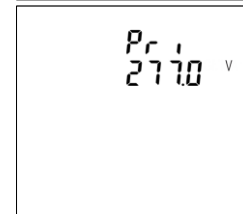


To move the decimal point, press the  /  keys.

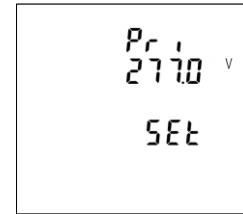
To keep the decimal point in its current position, press . The first digit will then flash.




Use the  /  keys to change the first digit and press  to enter. The next digit will flash.



Repeat the procedure for the remaining three digits.



After setting the last digit, press the  key to save your selection.

The 'SET' indicator will show to confirm save.

Press the  key to exit the menu.

#### 4.2.4 Voltage Transformer Secondary Voltage (SEC 277.0V)

The 'SEC' menu enables the user to set the secondary voltage between 100 – 277V AC.

In 3 wire mode voltages are entered L-L and in 4 wire mode voltages are entered L-N.

To change the secondary voltage see below:

Use the / keys to scroll to the menu 'SEC'.

Press the key to enter the menu. The first digit will start flashing.

Use the / keys to change the first digit and press to enter. The next digit will flash.

Repeat the procedure for the remaining three digits.

After setting the last digit, press the key to save your selection.

The 'SET' indicator will show to confirm save.

Press the key to exit the menu.

#### 4.2.5 Current Transformer Primary Current (Pri 0005 A)

The 'Pri' (A) menu enables the user to set the maximum primary current that can be monitored according to CT in use (1A to 9999A). To change the primary current:

Use the / keys to scroll to the menu 'Pri' (A).

Press the key to enter the menu. The first digit will start flashing.

Use the / keys to change the first digit and press to enter. The next digit will flash.

Repeat the procedure for the remaining three digits.

After setting the last digit, press the key to save your selection.

The 'SET' indicator will show to confirm save.

Press the key to exit the menu.

#### 4.2.6 Current Transformer Secondary Current (SEC 0.1A)

The 'SEC' (A) menu is set to 0.1A.

This option is set to 0.1A.

#### 4.2.7 Incomer Entry (Ct Entr BOT)

The meter is capable of two operating modes. **TOP** Entry when the incoming cable is from the top. **Bottom** Entry when the incoming cable is from the bottom. **BOT** for bottom entry - **TOP** for top entry

Use the / keys to scroll to the 'CT Entr toP' or 'CT Entr bot' menus.

Press the key to save your selection.

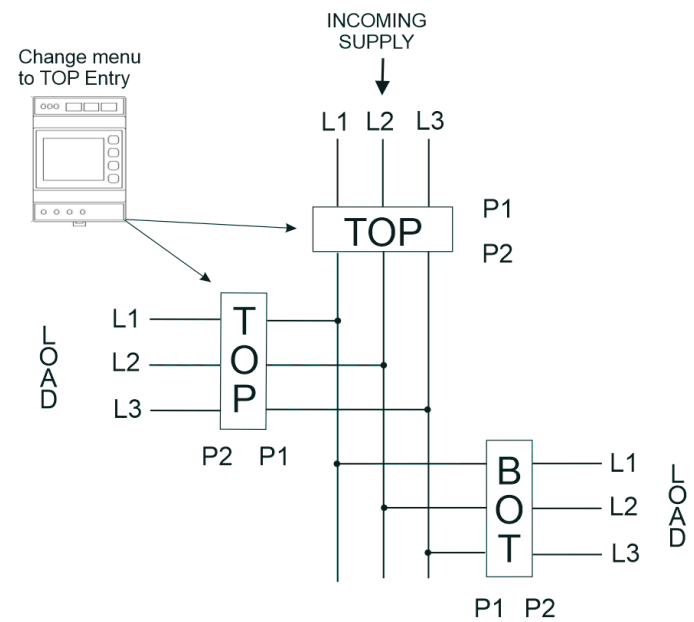
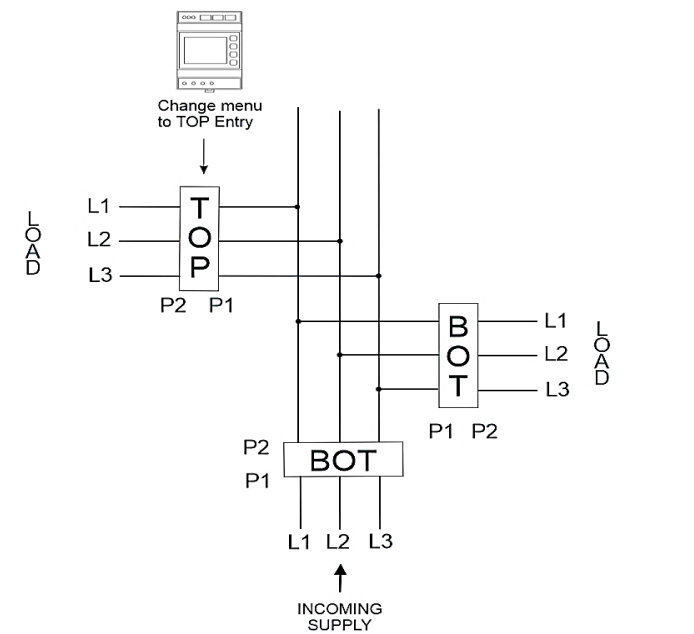
The 'SET' indicator will show to confirm save.

Press the key to exit the menu

Select either **BOT** or **TOP** on each meter according to the orientation of the line phases - See diagram for example Selections **BOT** or **TOP** will automatically switch L1 to L3 (**TOP**) or L3 to L1 (**BOT**) in line with RJ CT label shown below.

#### Current Transformer Label

	P2	L1	L2	L3	Meter Setting BOT (default)	Rj12-35-125/0.1 Kn 3x125/0.1A Aperture 21 x 22mm IEC 61869-2
	P1	L3	L2	L1		
	TOP	L3	L2	L1	Meter Setting TOP	
	P1	L1	L2	L3		



Use the / keys to scroll through the available options: 60, 30, 20, 15 and 8.

Press the key to save your selection.

The 'SET' indicator will show to confirm save.

Press the key to exit the menu.

#### 4.2.9 Energy Units Selection (EnrG Unit 10E3)

The 'EnrG Unit' menu enables the user to set the energy units used by the meter. To change the energy units:

Please note: The energy units available for selection are dependent on the values/magnitude of the Primary Inputs.

Use the / keys to scroll to the menu 'EnrG Unit'.

Press the key to enter the menu. The first option will start flashing.

Use the / keys to scroll through the available options: 10E0 (None) 10E3 (Kilo) and 10E6 (Mega) 10E9 (Giga).

Press the key to save your selection.

The 'SET' indicator will show to confirm save.

Press the key to exit the menu.

#### 4.2.10 Energy Low Power Limit (EnrG Flor On)

The 'EnrG FLor' menu enables the user to prevent creep caused by electrical noise being accumulated as energy, the product will employ a low power limit, below which energy will not be accumulated. To turn the energy low power limit on/off:

Use the / keys to scroll to the menu 'EnrG Flor'.

Press the key to enter the menu. The first option will start flashing.

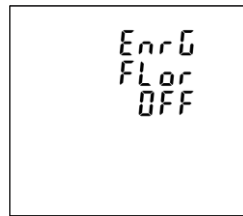
#### 4.2.8 Demands Integration Time (dlt 30)

The 'dlt' menu enables the user to set the period (in minutes) in which the current and power readings are integrated for maximum demand measurement. To change the DIT:

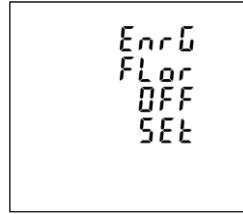
Use the / keys to scroll to the menu 'dlt'.

Press the key to enter the menu. The first option will start flashing.





Use the / keys to scroll through the available options: On and Off.



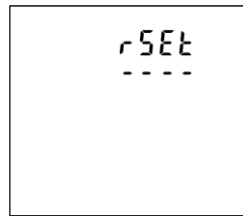
Press the key to save your selection.

The 'SEt' indicator will show to confirm save.

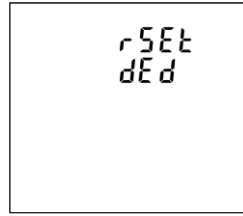
Press the key to exit the menu.

#### 4.2.11 Resets (rSEt ----)

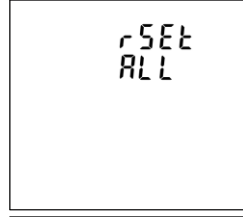
The 'rSEt' menu enables the user to reset the maximum demand value of current and power. To perform resets on the current and power:



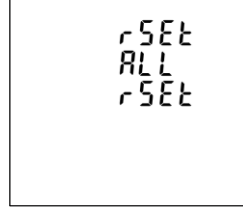
Use the / keys to scroll to the menu 'rSEt'.



Press the key to enter the menu. The first option will start flashing.



Use the / keys to scroll through the available options: dEd (max demand) / ALL / Energy.



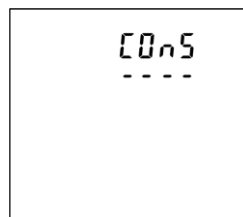
Press the key to reset your selected parameter.

The 'rSEt' indicator will show to confirm reset.

Press the key to exit the menu.

#### 4.2.12 Comms (COoS)

The RS485 port can be used for communication using Modbus RTU Protocol. The 'COoS' menu enables the user to configure the Modbus settings, such as Address and Baud Rate. To configure the communication settings:

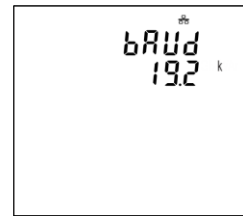
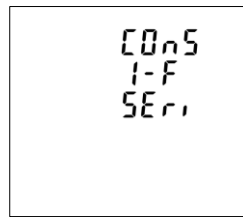


Use the / keys to scroll to the menu 'COoS'.

Press the key to enter the second level menu.

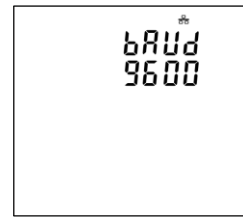
This screen becomes active when the Ethernet module is connected to the product.

Press the key to enter the third level menu.

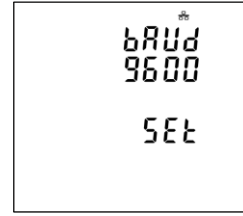


Within the third-level menu you can change the baud rate, parity, stop bits, address and word order.

To change the baud rate press the key on the 'bAUd/' option. The current option will begin to flash.



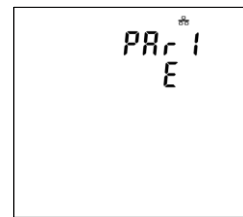
Use the / keys to scroll through the available options: 4800, 9600, 19.2K and 38.4K.



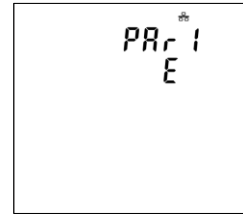
Press the key to save your selection.

The 'SEt' indicator will show to confirm save.

Press the key to exit the second level menu.



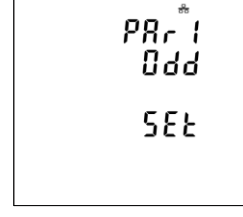
Next, use the / keys to scroll to the menu 'PAR1' to change the parity setting.



Press the key to enter the menu. The first option will start flashing.



Use the / keys to scroll through the available options: E (even), None and Odd.

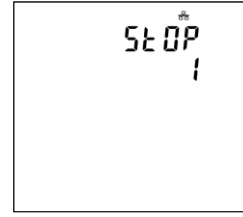


Press the key to save your selection.

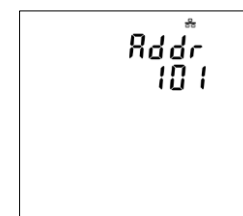
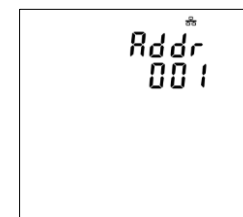
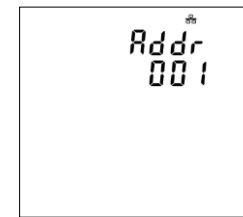
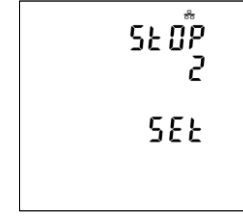
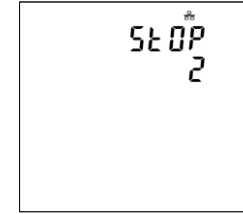
The 'SEt' indicator will show to confirm save.

Press the key to exit to the second-level menu.

Press the key to enter the third level menu.



Next, use the / keys to scroll to the menu 'StOP' to change the stop bits setting.



Press the key to enter the menu. The first option will start flashing.

Use the / keys to scroll through the available options: 1 and 2 (Please note: option '2' is only available when parity is set to 'None').

Press the key to save your selection.

The 'SEt' indicator will show to confirm save.

Press the key to exit to the second-level menu.

Press the key to enter the third level menu.

Next, use the / keys to scroll to the menu 'Addr' to change the address register (accepted values are between 1-247).

Press the key to enter the menu. The first digit will start flashing.

Use the / keys to change the first digit and press to enter. The next digit will flash.

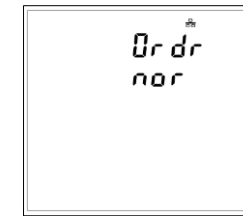
Repeat the procedure for the remaining two digits.

After setting the last digit, press the key to save your selection.

The 'SEt' indicator will show to confirm save.

Press the key to exit the menu.

Press the key to enter the third level menu.



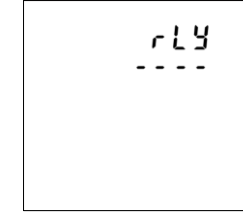
Next, use the / keys to scroll to the menu 'Ordr' to view the Modbus word order.

Please note this is a read-only screen.

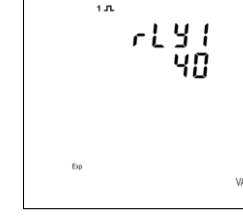
Once viewed, press twice to return to the first-level setup menu.

#### 4.2.13 Relays (rLY ----) (Self-powered version only)

The 'rLY' menu enables the user to configure the settings for relay 1. To configure the relay settings:

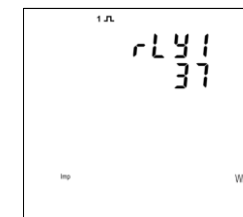


Use the / keys to scroll to the menu 'rLY'.



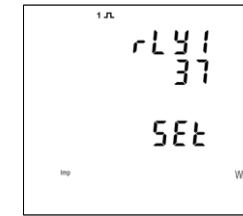
Press the key to enter the menu. This will take you to the second-level menu.

To configure the relay menu, press the key. The current option will begin to flash.



Use the / keys to scroll through the available options:

- Off
- Imp Wh (37)
- Exp Wh (38)
- Imp VARh (39)
- Exp VARh (40)
- Exp Vah (41)



Press the key to save your selection.

The 'SEt' indicator will show to confirm save.

Press the key twice to exit to the first level menu.

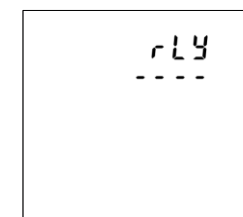
#### 4.2.14 Pulse Rate (Self-powered version only)

You can configure the number of pulses to relate to a defined amount of Total Energy.

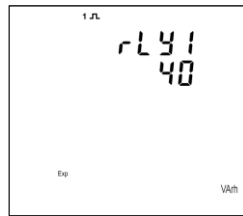
**Please note there are limitations that need to be factored in when setting the pulsed output. This is based upon the relay output only being able to pulse 2 times per second.**

For example, if the CT is set to 500/5A on a Single Phase network this would generate (500Ax230V=115,000 / 1000) 115kWh which is 31W per second. A setting of 10IMP/kWh (10 pulses per kWh) would generate 3 pulses per second. This will exceed the 2 pulse per second limitation.

Pulse settings: 1 Pulse per: 1W (0.001) / 10W (0.01) / 100W (0.1) / 1000W/1kWh (1) / 10kWh (10) / 100kWh (100) / 1000kWh (1k)



Use the / keys to scroll to the menu 'rLY'.



Press the key to enter the menu. This will take you to the second-level menu.

Next, use the / keys to scroll to the menu 'rAtE' to change the pulse rate settings.

Press the key to enter the menu. The first option will start flashing.

Use the and keys to scroll through the available options: 0.001 / 0.01 / 0.1 / 1 / 10 / 100 / 1k

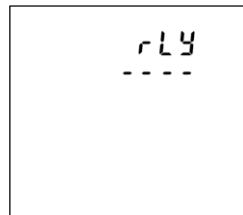
Press the key to save your selection.

The 'SEt' indicator will show to confirm save.

Once viewed, press twice to return to the first-level setup menu.

#### 4.2.15 Pulse Duration (Self-powered version only)

The energy monitored can be active or reactive and the pulse width can be selected as 200, 100 or 60mS.



Use the / keys to scroll to the menu 'rLY'.

Press the key to enter the menu. This will take you to the second-level menu.

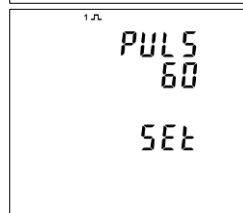
Next, use the / keys to scroll to the menu 'PULS' to change the pulse width settings.

Press the key to enter the menu. The first option will start flashing.

Use the and buttons to scroll through the available options: 200, 100 or 60mS.

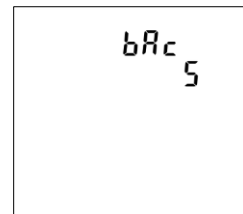
Press the key to save your selection. The 'SEt' indicator will show to confirm save.

Once viewed, press twice to return to the first-level setup menu.

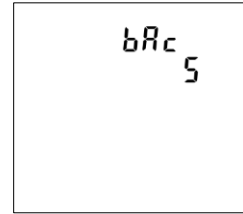


#### 4.2.16 Back Light (bAc 10)

The back light has a programmable time (in minutes) that determines how long this remains on for before this goes into standby.



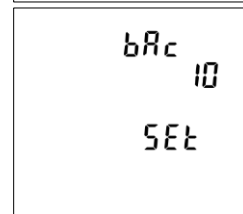
Use the and buttons to select the menu option. The screen will show the current setting.



Press the button to enter the menu option, the current selection will flash.



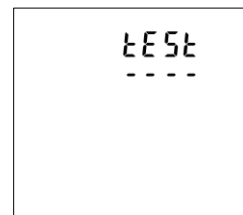
Use the and buttons to select the required time. Available options: 5/10/30/60



Press the button to confirm the selection.

Push the button to exit the menu.

#### 4.2.17 Display test (tEst ----)



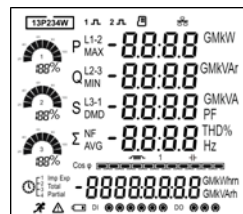
Use the / keys to scroll to the menu 'tEst'

Press the button to confirm the selection.



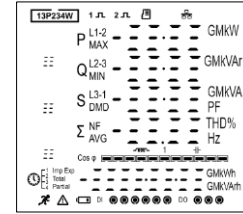
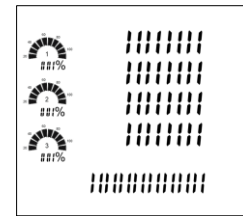
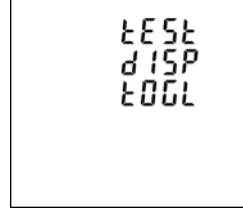
Use the and buttons to select the desired display test. Available options are: DISP On or DISP toGL.

DISP On: All segments will light up this allows you to check that the display is fully working.

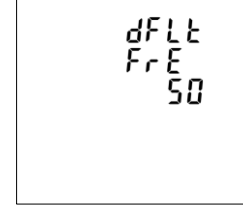


DISP toGL: The meter will continuously switch

Press the button to select an option.



#### 5 Default Frequency (dFit 50)



Push the button twice to exit the test screen to the first level set up menu.

Use the / keys to scroll to the menu 'dFLt'

Press the button to select option.

Available options 50 or 60.

Use the and buttons to select 50 or 60.

Press the button to confirm the selection.

#### 6 Specifications

##### 6.1 Measured Parameters

The unit can monitor and display the following parameters of a Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) or Three Phase Four Wire (3P4W) system.

##### 6.1.1 Voltage and Current

- Phase to neutral voltages 57.7-277V AC (L-N) (Auxiliary Powered only)
- Phase to neutral voltages 100-277V AC (L-N) (Self-Powered only)
- Phase to phase voltages 100-480V AC (L-L) (Auxiliary Powered only)
- Phase to phase voltages 173-480V AC (L-L) (Self-Powered only)
- Percentage total voltage harmonic distortion (V %THD) for each phase to neutral (not for 3P3W supplies).
- Percentage total voltage harmonic distortion (V% THD) for L1-2, L2-3, L3-1 (3P3W supplies).
- Current %THD for each Phase.
- Burden <6VA
- Auxiliary version: Auxiliary powered 100 to 250 VAC ±20%, at 45 to 66Hz or 100 to 250 VDC ±20%.
- Self-powered version: Self powered from any phase and neutral (in 3P4W mode only)

##### 6.1.2 Power factor and Frequency and Max. Demand

- Frequency in Hz
- Instantaneous power:
- Power 0-3600 MW
- Reactive power 0-3600 MVA
- Volt-amps 0-3600 MVA
- Maximum Demand Power since last reset
- Power factor
- Maximum Neutral Demand Current, since the last reset (for 3P4W supplies only)

##### 6.1.3 Energy Measurements

- Imported/Exported active energy 0 to 9999999.9 kWh
- Imported/Exported reactive energy 0 to 9999999.9 kVAh
- Total active energy 0 to 9999999.9 kWh
- Total reactive energy 0 to 9999999.9 kVAh

##### 6.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 2.5mm<sup>2</sup> stranded wire capacity. Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) or Three Phase Four Wire (3P4W) unbalanced. Line frequency measured from L1 Voltage or L3 Voltage. Three current inputs via RJ12 connector.

#### 6.3 Accuracy

- Voltage ±(0.4% of Reading + 0.1% of Range Maximum)
- Current ±(0.4% of Reading + 0.1% of nominal)
- Frequency ±0.2% of mid-frequency
- Power factor ±1% of unity (0-01)
- Active power (W) ±(0.4% of Reading + 0.1% of Range Maximum)
- Reactive power (VAR) ±(0.4% of Reading + 0.1% of Range Maximum)
- Apparent power (VA) ±(0.4% of Reading + 0.1% of Range Maximum)
- Active energy (Wh) Class 0.5S IEC 62053-22
- Reactive energy (VARh) Class 0.5S IEC 62053-24
- Total harmonic distortion 2%, up to 63rd harmonic

#### 6.4 Auxiliary Supply (Auxiliary version only)

Auxiliary version: Three-way plug and socket connector with 2.5mm<sup>2</sup> stranded wire capacity. 100 to 250 VAC ±20%, at 45 to 66Hz or 100 to 250 VDC ±20%.

Consumption <6VA

The auxiliary may be powered from the signal source, providing the source remains within tolerance of the auxiliary range.

Self-powered version: This product is self-powered from any of the three phases and neutral.

#### 6.5 Interfaces for External Monitoring

Self-powered version: The following interfaces are provided:

- Pulse output 1 indicating real-time measured energy (configurable)
- Pulse output 2 3200 pulses/energy unit (not configurable). Only valid for 1:1 or 5:5 CT ratios only.

Self-powered and Auxiliary versions: The Modbus configuration (baud rate etc.) assignments are configured through the setup screens.

##### 6.5.1 Pulse Output (Self-Powered version only)

Opto-coupler with potential free SPST-NO Contact

• Pulse Output-1: Contact rating 250V AC, 50mA max

• Pulse Output-2: Contact rating 70V DC, 27mA max

The two pulsed outputs use a common (-) negative terminal.

The pulse output can be set to generate pulses to represent kWh or kVAh.

Rate can be set to generate 1 pulse per:

0.001 = 1 Wh/VArh

0.01 = 10 Wh/VArh

0.1 = 100 Wh/VArh

1 = 1 kWh/kVAh

10 = 10 kWh/kVAh

100 = 100 kWh/kVAh

1000 = 1000 kWh/kVAh

Pulse width 200/100/60 milliseconds.

##### 6.5.2 RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the setup menu:

**Baud rate:** 4800/9600/19200/384000

**Parity:** none (default)/even/odd

**Stop bits:** 1 or 2

**RS485 Network Address:** 3 digit number - 001-247

**Modbus™ Word order** Hi/Lo byte order is set automatically to normal and cannot be configured from the setup menu.

#### 6.6 Reference Conditions of Influence Quantities

Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

- Ambient temperature 23°C ±1°C
- Input waveform 50 or 60Hz ±2%
- Input waveform Sinusoidal (distortion factor < 0.005)
- Magnetic field of external origin Terrestrial flux

Auxiliary product (additional reference conditions):

- Auxiliary supply voltage Nominal ±1%
- Auxiliary supply frequency Nominal ±1%
- Auxiliary supply waveform (if AC) Sinusoidal (distortion factor < 0.05)

#### 6.7 Environment

• Operating temperature -25°C to +70°C\*

• Storage temperature -40°C to +70°C\*

• Relative humidity 0 to 90%, non-condensing

• Altitude Up to 2000m

• Warm up time 1 minute

• Vibration 10Hz to 50Hz, IEC 60068-2-6, 2g

• Shock 30g in 3 planes

\*Maximum operating and storage temperatures are in the context of typical daily and seasonal variation.



**6.8 Mechanics**

- Enclosure Style DIN 96 panel mount
- Dimensions 96x96x (52mm rear of panel)
- Panel cut-out 92x92mm
- Panel thickness 1-5 mm
- Protection rating Front IP54, Rear IP30, IP64 with additional kit
- Material UL 94-VO
- Weight 340 g

**7 Installation and Maintenance**

**7.1 Installation notes**

Units should be installed in a dry position, where the ambient temperature is reasonably stable and will not be outside the range -25 to +70°C. Vibration should be kept to a minimum. Preferably, mount the Integra so that the display contrast is not reduced by direct sunlight or other high intensity lighting.

**7.2 Input Wiring and Fusing (Auxiliary version only)**

Voltage lines must be fused with a fast blow AC fuse 1A maximum. Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations. A switch or circuit breaker allowing isolation of supplies to the unit must be provided.

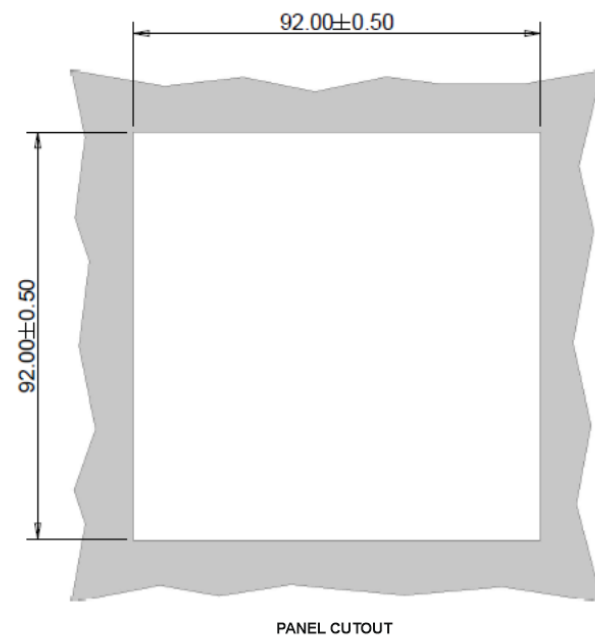
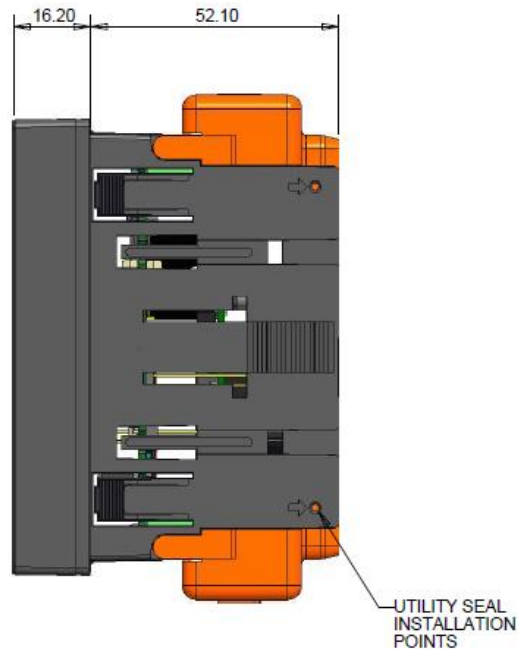
**7.3 Wire Size**

Voltage terminal blocks will accept 0.5mm<sup>2</sup> to 2.5mm<sup>2</sup> stranded cable.

**7.4 Maintenance**

The front of the case should be wiped with a dry cloth only, using minimal pressure. If necessary wipe the rear case with a dry cloth. No user serviceable parts.

**8 Dimensions**

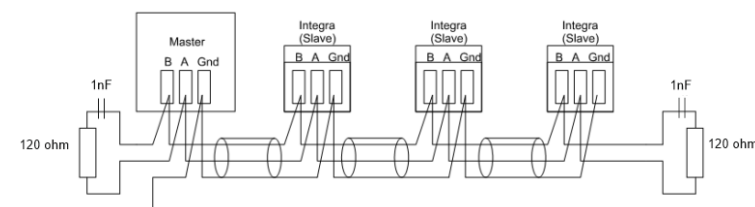


**9 Installation**

**9.1 RS485 Serial – Modbus RTU**

Screened twisted pair cable should be used. For longer cable runs or noisier environments, use of a cable specifically designed for RS485 may be necessary to achieve optimum performance. All "A" terminals should be connected together using one conductor of the twisted pair cable, all "B" terminals should be connected together using the other conductor in the pair. The cable screen should be connected to the "Gnd" terminals.

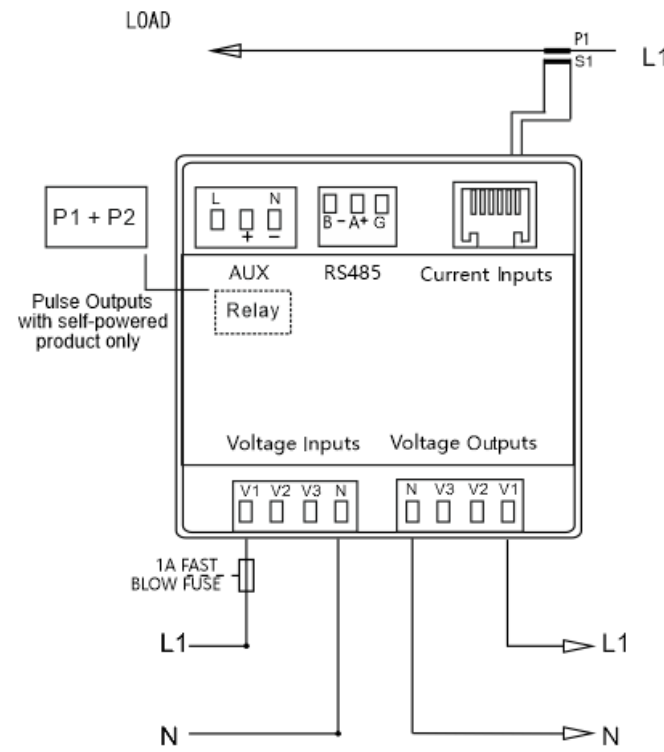
A Belden 9841 (Single pair) or 9842 (Two pair) or similar cable with a characteristic impedance of 120 ohms is recommended. The cable should be terminated at each end with a 120 ohm, quarter watt (or greater) resistor.



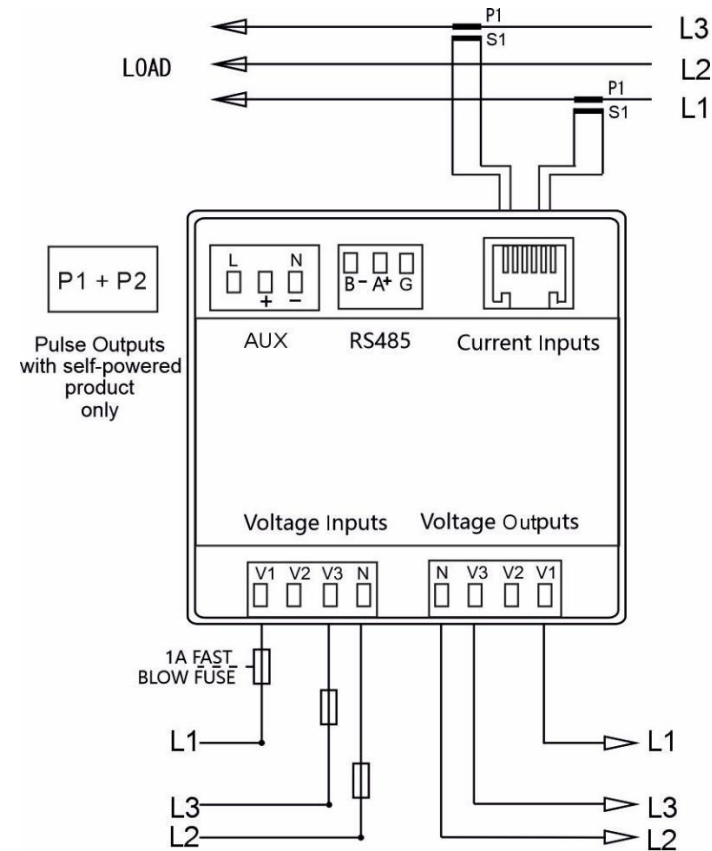
For further information please refer to CI-3L12002 communications guide.

**9.2 Self-powered/Auxiliary Connection Diagrams**

**9.2.1 Single phase two wires**

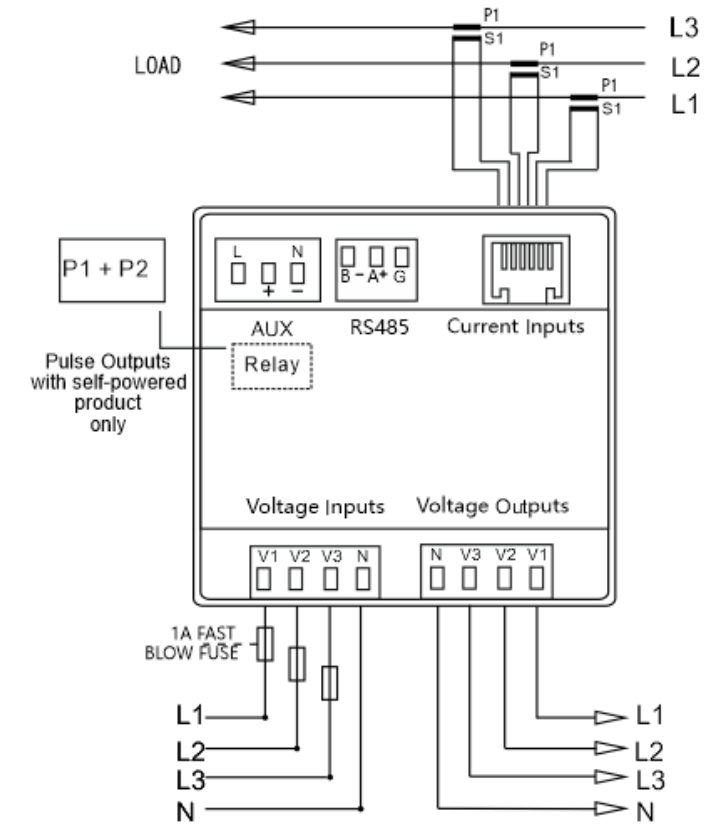


**9.2.2 Three phase three wires (Auxiliary version only)**



Please note for 3P3W configuration L2 is connected through the neutral and not V2.

**9.2.3 Three phase four wires**



The maximum number of products that can be connect is a single chain is 20 products

**Explanation of Symbols**

- ⚠ Refer to manual
- ⚡ Danger of electric shock
- ♻ Do not discard

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