

# smartcontroller

Electrical Excellence

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PRODUCT  
CATALOGUE

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# ABOUT OUR COMPANY:

Smartcontroller is UK most reputable organisation involved in the manufacturing and supply of electrical measuring devices. We specialize in offering solutions for energy measurement, energy saving and consumption along with a range of additional electrical measuring devices for industrial, residential and renewable energy sectors.

Based in the heart of Glasgow, Inchinnan Industrial Park, we have a dedicated team with technical excellence working on our existing and new product range to deliver outstanding technical innovation with new and improved techniques of production.

Smartcontroller is an ISO 9001 certified company and all our products are design to deliver efficient results for our clients all over the world.

We special in the manufacturing of multiple types of Energy Analyser, Dual Tariff Meter, Frequency Meter, Volt Meter, Ampere Meter, Hour Meter and all our products are fully compatible with open protocol software as well our designed software which is the most suitable way to manage all Smartcontroller products by using a single system. All our company products are modular and can easily be expanded if required due to the option of multiple connection possibilities

Smartcontroller has several local and foreign distributors around the world and we share the same goal everywhere we operation which is to **SAVE YOU ON ENERGY COST.**

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Din Rail Smart Energy Meter For Single Phase And Three Phase Electrical System

## SMART Series, Single Phase Ampere Meter

Model Number: V200– A  
Size: 96x96.



### Product Overview:

Smartcontroller offers the SMART series Single phase Ampere Meter which adopts alternating current sampling techniques. This enables it to measure single phase AC current in the grid with high accuracy, good sensitivity and excellent resistance to vibrations.

### Installation and Handling:

The device is easy to maintain and handle, easy to wire and very simple to install for the ease of user and only qualified person should be involved in the wiring and installation job of this power meter. Certain parts of the power meter does contain high voltage, improper handling therefore can cause serious injuries and device damage.

There are certain points that need to be taken into strict account as follow:

- ↳ Only use insulating tools
- ↳ Do not connect when circuit is live
- ↳ Place the device in only dry surroundings
- ↳ Avoid installing the meter in mild dew conditions, explosive area and dusty environments
- ↳ Make sure that the wire used is suitable for the maximum current of this meter
- ↳ Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- ↳ Do not touch the meter connecting clamps with bare hand, metal, blank wire or any other material as it may experience in an electric shock
- ↳ Do not drop or allow physical impact to the meter as the internal components are of high precision and may result in breakage and malfunction of the device

### Certifications

V200 – A complies with all the international standards which includes certification from standardssuch as EN-61326-1: 2013, EN 50470-1: 2006 and also confirm all the requirements of MI-003 of EC Directive 2004/22/EC.

### Warranty:

All Smartcontroller products are covered for a total warranty period of 24 months.

\* The same power meter is available in size 72x72. (Model Number V272–A) and size 48x96 (Model Number V248–A)



## TECHNICAL DATA:

### Measurement:

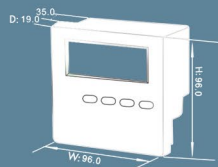
- Accuracy Class: Class 0.5
- Display Range: 0.000 – 9999
- Overload: Continuous 1.2 times
- Instantaneous: Current 10times/5seconds
- Nominal Input: AC Current 100V~600V, using voltage transformer
- Power Consumption: Less than 2VA
- Dielectric Strength: 2kV/1min
- Frequency: 45–65 Hz

### Environment:

- Working Temperature: -10~55 Degree Celsius
- Storage Temperature: -25~70 Degree Celsius
- Relative Humidity is less than 93%, no corrosive gas
- Elevation: Less than 2500m

### DIMENSIONS:

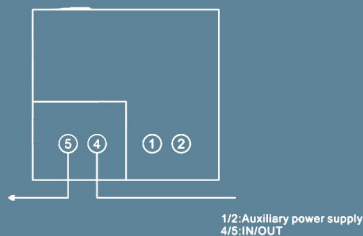
Height: 96mm  
Width: 96mm  
Depth: 19.0, 35.0mm



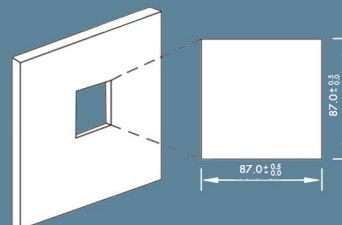
### Electromagnetic Compatibility:

- ESD (Electro-Static Discharge): Level 4
- Electrical fast transient burst: Level 4

### Wiring Diagram



### Installation Diagram



# SMART Series, Single Phase Volt Meter

## Model Number: V200-V

### Size: 96x96.



## Product Overview:

Smartcontroller offers the SMART series Single phase Volt Meter which adopts alternating current sampling techniques. This enables it to measure single phase Voltage in the grid with high accuracy, good sensitivity and excellent resistance to vibrations.

## Installation and Handling:

The device is easy to maintain and handle, easy to wire and very simple to install for the ease of user and only qualified person should be involved in the wiring and installation job of this power meter. Certain parts of the power meter does contain high voltage, improper handling therefore can cause serious injuries and device damage.

There are certain points that need to be taken into strict account as follow:

- ↳ Only use insulating tools
- ↳ Do not connect when circuit is live
- ↳ Place the device in only dry surroundings
- ↳ Avoid installing the meter in mild dew conditions, explosive area and dusty environments
- ↳ Make sure that the wire used is suitable for the maximum current of this meter
- ↳ Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- ↳ Do not touch the meter connecting clamps with bare hand, metal, blank wire or any other material as it may experience in an electric shock
- ↳ Do not drop or allow physical impact to the meter as the internal components are of high precision and may result in breakage and malfunction of the device

## Certifications

V200 – V complies with all the international standards which includes certification from standardssuch as EN-61326-1: 2013, EN 50470-1: 2006 and also confirm all the requirements of MI-003 of EC Directive 2004/22/EC.

## Warranty:

All Smartcontroller products are covered for a total warranty period of 24 months.

\* The same power meter is available in size 72x72. (Model Number V272-V) and size 48x96 (Model Number V248-V)

## TECHNICAL DATA:

### Measurement:

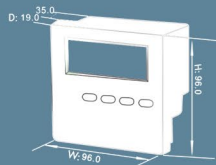
- Accuracy Class: Class 0.5
- Display Range: 0.000 – 9999
- Overload: Continuous 1.2 times
- Instantaneous: Current 10times/5seconds
- Nominal Input: AC Current 100V~600V, using voltage transformer
- Power Consumption: Less than 2VA
- Dielectric Strength: 2kV/1 min
- Frequency: 45~65 Hz

### Environment:

- Working Temperature: -10~55 Degree Celsius
- Storage Temperature: -25~70 Degree Celsius
- Relative Humidity is less than 93%, no corrosive gas
- Elevation: Less than 2500m

### DIMENSIONS:

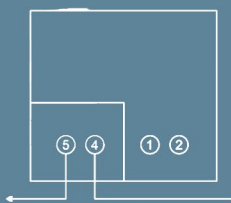
Height: 96mm  
Width: 96mm  
Depth: 19.0, 35.0mm



### Electromagnetic Compatibility:

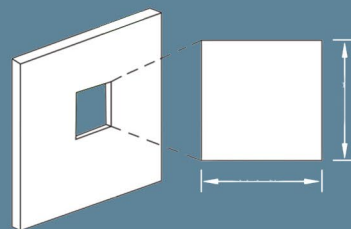
- ESD (Electro-Static Discharge): Level 4
- Electrical fast transient burst: Level 4

### Wiring Diagram



1/2: Auxiliary power supply  
4/5: IN/OUT

### Installation Diagram





## SMART Series, 3 Phase Ampere Meter Model Number: V396-A Size: 96x96.

### Installation and Handling:

The device is easy to maintain and handle, easy to wire and very simple to install for the ease of user and only a qualified person should be involved in the wiring and installation job of this power meter. Certain parts of the power meter do contain high voltage, improper handling therefore can cause serious injuries and device damage.

There are certain points that need to be taken into strict account as follows:

- ↳ Only use insulating tools
- ↳ Do not connect when circuit is live
- ↳ Place the device in only dry surroundings
- ↳ Avoid installing the meter in mild dew conditions, explosive area and dusty environments
- ↳ Make sure that the wire used is suitable for the maximum current of this meter
- ↳ Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- ↳ Do not touch the meter connecting clamps with bare hand, metal, blank wire or any other material as it may experience an electric shock
- ↳ Do not drop or allow physical impact to the meter as the internal components are of high precision and may result in breakage and malfunction of the device

*\*The same power meter is available in size 72x72. (Model Number V372-A)*

### PRODUCT OVERVIEW:

Smart controller offers the SMART series 3 phase Ampere Meter that adopts alternating current sampling techniques. This enables it to measure 3 phase AC current in the grid with high accuracy, good sensitivity and excellent resistance to vibrations.



## Certifications:

V396- A complies with all the international standards which includes certification from standards such as EN-61326-1: 2013, EN 50470-1: 2006 and also confirm all the requirements of MI-003 of EC Directive 2004/ 22/EC.t

## Warranty:

All Smartcontroller products are covered for a total warranty period of 24 months.

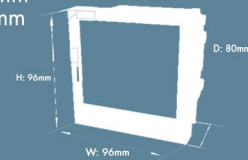
## TECHNICAL DATA:

### Measurement:

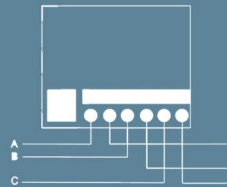
- Accuracy Class: Class 0.5
- Display Range: 0.000 – 9999
- Overload: Continuous 1.2 times
- Instantaneous: Current 10times/5 seconds
- Nominal Input: AC Current 1A, 5A
- Power Consumption: Less than 2VA
- Dielectric Strength: 2kV/1min
- Frequency: 45–65 Hz

### DIMENSIONS:

Height: 96mm  
Width: 96mm  
Depth: 80mm



### Wiring Diagram:



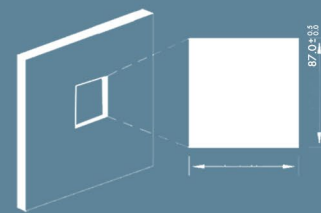
### Environment:

- Working Temperature: -10~55 Degree Celsius
- Storage Temperature: -25~70 Degree Celsius
- Relative Humidity is less than 93%, no corrosive gas
- Elevation: Less than 2500m

### Electromagnetic Compatibility

- ESD (Electro – Static Discharge): Level 4
- Electrical fast transient burst: Level 4

### Installation Diagram:



# SMART Series, 3 Phase Volt Meter

## Model Number: V396 – V

### Size: 96x96.



## Product Overview:

Smartcontroller offers the SMART series 3 phase Volt Meter which adopts alternating current sampling techniques. This enables it to measure 3 phase voltage in the grid with high accuracy, good sensitivity and excellent resistance to vibrations.

## Installation and Handling:

The device is easy to maintain and handle, easy to wire and very simple to install for the ease of user and only qualified person should be involved in the wiring and installation job of this power meter. Certain parts of the power meter does contain high voltage, improper handling therefore can cause serious injuries and device damage.

There are certain points that need to be taken into strict account as follow:

- Only use insulating tools
- ↳ Do not connect when circuit is live
- ↳ Place the device in only dry surroundings
- ↳ Avoid installing the meter in mild dew conditions, explosive area and dusty environments
- ↳ Make sure that the wire used is suitable for the maximum current of this meter
- ↳ Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- ↳ Do not touch the meter connecting clamps with bare hand, metal, blank wire or any other material as it may experience in an electric shock
- ↳ Do not drop or allow physical impact to the meter as the internal components are of high precision and may result in breakage and malfunction of the device

## Certifications

V396 – V complies with all the international standards which includes certification from standards such as EN-61326-1: 2013, EN 50470-1: 2006 and also confirm all the requirements of MI-003 of EC Directive 2004/ 22/EC.

## Warranty:

All Smartcontroller products are covered for a total warranty period of 24 months.

*\*The same power meter is available in size 72x72. (Model Number V372-V)*

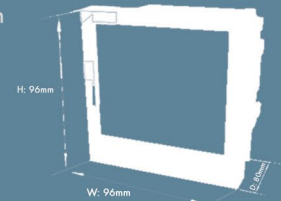
## TECHNICAL DATA:

### Measurement:

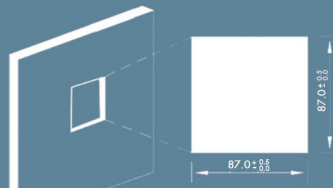
- Accuracy Class: Class 0.5
- Display Range: 0.000–9999
- Overload Continuous: 1.2 times
- Instantaneous: Current 10 times / 5 seconds
- Nominal Input: AC Current  
100V~600V, using voltage transformer
- Power Consumption: Less than 2VA
- Dielectric Strength: 2kV/1min
- Frequency: 45–65Hz

### Dimensions:

Height: 96mm  
Width: 96mm  
Depth: 80mm



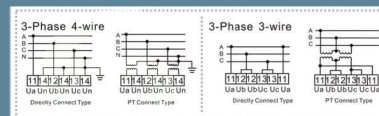
### Installing Diagram



### Environment:

- Working Temperature: -10~55 Degree Celsius
- Storage Temperature: -25~70 Degree Celsius
- Relative Humidity is less than 93%, no corrosive gas
- Elevation: Less than 2500m

### Wiring Diagram



Power		Voltage							
L	N	3-Phase 3-wire	→	11	12	12	13	13	11
1	2	3-Phase 4-wire	→	11	12	12	13	13	11

### Electromagnetic Compatibility:

- ESD (Electro-Static Discharge): Level 4
- Electrical fast transient burst: Level 4



# SMART Series, Single Phase Frequency Meter

Model Number: SMART VEN961-F  
Size: 96x96.



## Product Overview:

Smartcontroller offers the SMART series Single phase Frequency Meter which adopts alternating current sampling techniques. This enables it to measure frequency in the grid with high accuracy, good sensitivity and excellent resistance to vibrations

## Installation and Handling:

The device is easy to maintain and handle, easy to wire and very simple to install for the ease of user and only qualified person should be involved in the wiring and installation job of this power meter. Certain parts of the power meter does contain high voltage, improper handling therefore can cause serious injuries and device damage.

There are certain points that need to be taken into strict account as follow:

- ↳ Only use insulating tools
- ↳ Do not connect when circuit is live
- ↳ Place the device in only dry surroundings
- ↳ Avoid installing the meter in mild dew conditions, explosive area and dusty environments
- ↳ Make sure that the wire used issuitable for the maximum current of this meter
- ↳ Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- ↳ Do not touch the meter connecting clamps with bare hand, metal, blank wire or any other material as it may experience in an electric shock
- ↳ Do not drop or allow physical impact to the meter as the internal components are of high precision and may result in breakage and malfunction of the device

## Certifications

VEN961-F complies with all the international standards which includes certification from standards such as EN-61326-1:2013, EN 50470-1:2006 and also confirm all the requirements of MI-003 of EC Directive 2004/22/EC.



## Warranty:

All Smartcontroller products are covered for a total warranty period of 24 months.

- The same power meter is available in 3 Phase. (Model Number SMART VEN963F)
- Also available in single phase and three phase size 72x72, (Model Number SMART VEN721F, SMART VEN723F) and single phase size 48x96 (Model Number SMART VEN481F)

## TECHNICAL DATA:

### Measurement:

- Accuracy Class: Class 0.5
- Voltage input: AC220V
- Overload: Continuous: 1.2times, Instantaneous: Voltage 2 times/1 seconds
- Auxiliary power supply: AC220V
- Display Range: 0.000-9999
- Overload: Continuous 1.2times
- Instantaneous: Current 10times/5seconds
- Nominal Input: AC Current 1A, 5A
- Power Consumption: Less than 2VA
- Isolation voltage: Between power supply/input/output 2kV/1min
- CT ratio: 0001-9999
- PT ratio: 0001-9999
- Dielectric Strength: 2kV/1min
- Frequency: 45-65 Hz

### Dimensions:

Height: 96mm  
Width: 96mm  
Depth: 80mm

### Environment:

- Working Temperature: -10~55 Degree Celsius
- Storage Temperature: -25~70 Degree Celsius
- Relative Humidity is less than 93%, no corrosive gas
- Elevation: Less than 2500m

## Three phase multifunction din rail meter SMART VEN580D



SMART VEN580 (CT CONNECTION TYPE)  
SMART VEN580D (DIRECT CONNECTION TYPE)

### Product Overview

The Smartcontroller SMART VEN580 SERIES Multi-function is a three-phase DIN rail power quality meter with multi-tariff. Output is LCD displayed and the data can be transported by isolated RS485. The meter is provided with a non-volatile memory system that ensures that the readings are not lost or altered when power off.

The SMART VEN580 has both direct connection version and CT connection version. The direct connection version meter measures up to 100A load And the CT connection type requests an external current transformer with 5A secondary input.

Although we produce the SMART VEN580 meter according to IEC 62053-21 and our quality inspection is very accurate there might always be a possibility that your product shows a fault or failure for which we do apologize. Under normal conditions your product should give you years of benefit and pleasure. In case there is a problem with the energy meter you should contact your dealer immediately. All energy meters are sealed with a special seal. Once this seal is broken there is no possibility to claim for warranty. Therefore NEVER open an energy meter or break the seal of the energy meter. The warranty time is 18 months, after installation, and only valid for construction faults.

## Performance criteria

Operating humidity	≤85%
Storage humidity	≤95%
Operating temperature	-20°C– +50°C
Storage temperature	-30°C– +70°C
International standard	IEC 62053-21 IEC61010

## Meter specifications

Meter type	SMART VEN580 (LCD display)
Nominal voltage (Un)	230/400V AC (3~) ; 110/190V AC (3~)
Operational voltage	161/279 – 300/520V AC (3~) ; 77/133 – 143/247V AC
Insulation capabilities	
- AC voltage withstand	4KV for 1 minute
- Impulse voltage withstand	6KV – 1.2μS waveform
Basic current (Ib)	
- CT type	1.5A
- Directly connect	10A
Maximum rated current (Imax)	
- CT type	6A
- Directly connect	100A
Operational current range	0.4% Ib- Imax
Over current withstand	20Imax for 0.01s
Operational frequency range	50Hz ±10%
Internal power consumption	≤2W / 10VA per phase
Test output flash rate (PULSE LED)	
- CT type	3200imp/kWh
- Directly connect	400imp/kWh
Test pulse output rate (pins 8 & 9)	
- CT type	3200imp/kWh
- Directly connect	400imp/kWh
Consumption indicator (PULSE & SO LED)	Flashing at load running
Communication indicator	Flashing at communication running
Data communication port	RS485 and far infrared
Data save	The data can be stored more than 20 years when power off

## Accuracy class

Voltage, LN & LL (Phase1, 2,3)	±0.5%
Amps (Phase 1,2,3)	±0.5%
PF (Phase 1,2,3 &Σ)	±0.5%
Active power (Phase 1,2,3&Σ)	±0.5%
Reactive power (Phase 1,2,3&Σ)	±1%
Apparent power (Phase 1,2,3&Σ)	±1%
Frequency	±0.5%
Active energy	± 1%
Reactive energy	±1%
Protection against penetration of dust and water	IP51
Insulating encased meter of protective class	II

## RS485 Communication

Bus type	RS485
Protocol	MODBUS RTU with 16 bit CRC & DL/T645
Baud rate	1200(default), 2400, 4800,9600
Address range	0-247 user settable
Bus loading	32 meters per bus
Range	1200m
Parity	Even
Data bit	8
Stop bit	1

## Far Infrared communication

Infrared wavelengths	900- 1000nm
Baud rate	1200bps (default), 9600bps (optional)
Communication distance	5m
Communication angle	-15°~+15°
Protocol	MODBUS RTU with 16 bit CRC & DL/T645



## Tariff specifications

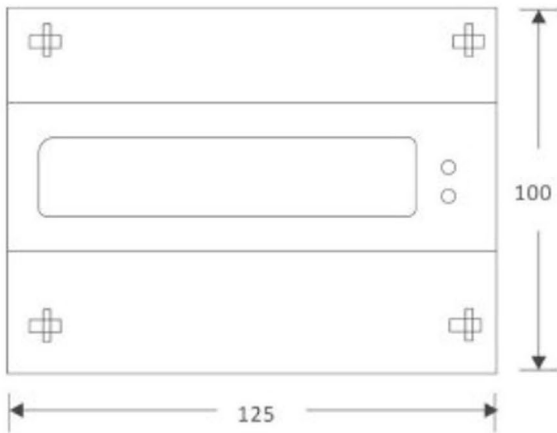
Tariff number	4
Time segments	10
Clock accuracy	$\leq 0.5S$ (every 24 hours)
Battery Voltage	3.6V DC, $\geq 1200mAh$

## Basic errors

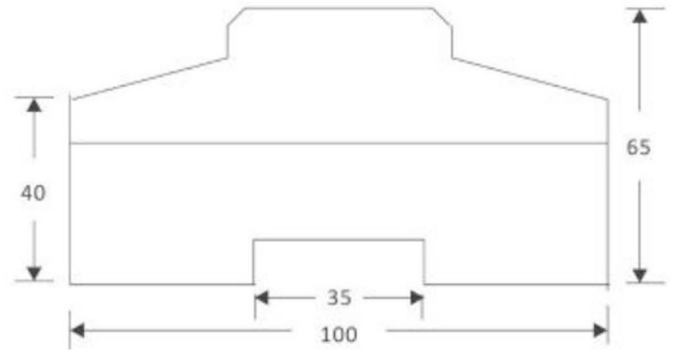
<b>With balanced loads</b>		
0.05Ib	Cos $\phi$ = 1	$\pm 1.5\%$
0.1Ib	Cos $\phi$ = 0.5L	$\pm 1.5\%$
	Cos $\phi$ = 0.8C	$\pm 1.5\%$
0.1Ib - I <sub>max</sub>	Cos $\phi$ = 1	$\pm 1.0\%$
0.2Ib - I <sub>max</sub>	Cos $\phi$ = 0.5L	$\pm 1.0\%$
	Cos $\phi$ = 0.8C	$\pm 1.0\%$
<b>With single phase load</b>		
0.1Ib - I <sub>max</sub>	Cos $\phi$ = 1	$\pm 2.0\%$
0.2Ib - I <sub>max</sub>	Cos $\phi$ = 0.5L	$\pm 2.0\%$

## Materials and Dimension

Front panel	PC inflammable retarding
Cover	ABS inflammable retarding
Base	ABS inflammable retarding
Security hasp	ABS inflammable retarding



front view

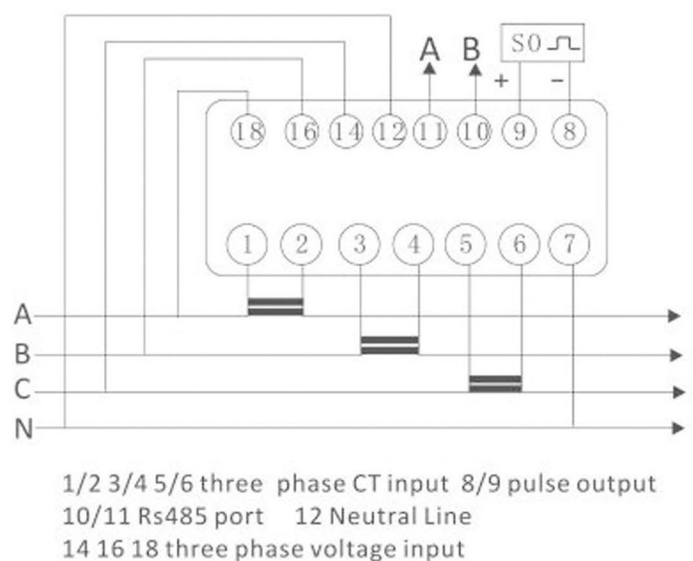
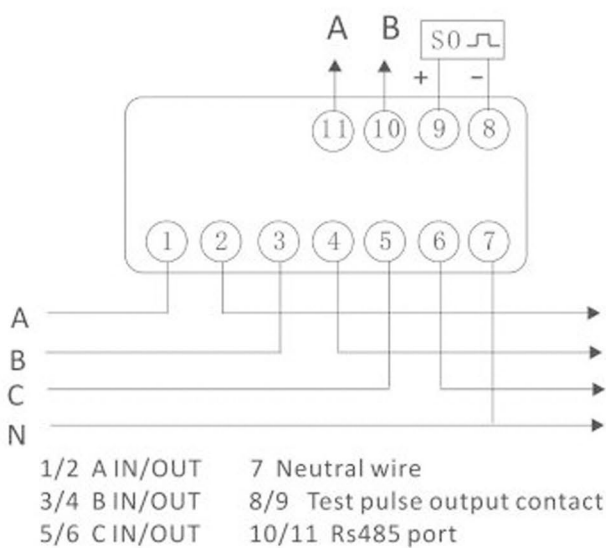


lateral view

Height	100 mm
Width	125 mm
Depth	65 mm
Weight	0.7 Kg (net)

## Installation

Connection of the wires should be done in accordance with the underneath connection diagram.



## Rs485 output

RS485 communication port is between the meter terminals 11 and 10. It is a synchronization wire port. Installing a software in PC, via RS485 adapter Connecting the terminal 11 and 10, PC can communicate with the meter immediately.

## Communication Protocol

Smartcontroller SMART VEN580 has a RS485 port with Modbus RTU protocol. RS485 is a balanced line, half-duple transmission system allowing transmission distances of up to 1km. The following table summarizes the RS-485 Standard:

PARAMETER	
Mode of Operation	Differential
Number of Drivers and Receivers	32 Drivers 32 Receivers
Maximum Cable Length	1200m
Maximum Data Rate	10M baud
Maximum Common Mode Voltage	12V to -7V
Minimum Driver Output Levels (Loaded)	$\pm 1.5V$
Minimum Driver Output Levels (Unloaded)	$\pm 6V$
Drive load	Minimum 60 ohms
Driver Output Short Circuit Current Limit	150mA to Gnd 250mA to 12V 250mA to -7V
Minimum Receiver Input Resistance	12kohms
Receiver Sensitivity	$\pm 200mV$

Further information relating to RS485 may be obtained from either the Smartcontroller directly or the various RS485 device manufacturers, for example Texas Instruments or Maxim Semiconductors. This list is not exhaustive.

# Multifunction Energy Analyser SMART VEN485



## Product Overview

The Smartcontroller multifunction panel meter SMART VEN485 is a state of the art intelligent panel meter, used not only in the electricity transmission and power distribution system but also in the power consumption measurement and analysis in high voltage intelligent power grid.

This document provides operating, maintenance and installation instructions for the Smartcontroller SMART VEN485. The unit measures and displays the characteristics of single phase two wires and three phase four wires supplies, including voltage, frequency, current, power and active and reactive energy, imported or exported. Energy is measured in terms of kWh, kVarh. Maximum demand current can be measured over preset periods of up to 60minutes. In order to measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product. The requisite current input(s) are obtained via current transformers (CT).

The SMART VEN485 can be configured to work with a wide range of CTs, giving the unit a wide range of operation. Built-in interfaces provide pulse and RS485 Modbus RTU outputs. Configuration is password protected.

*LCD Display is available in both blue and green colour. Default setting is green display*



## Unit Characteristics

The SMART VEN485 can measure and display:

- ↳ Line voltage and THD% (total harmonic distortion) of all phases
- ↳ Line Frequency
- ↳ Currents, Current demands and current THD% of all phases
- ↳ Power, maximum power demand and power factor
- ↳ Active energy imported and exported
- ↳ Reactive energy imported and exported

The unit has password-protected set-up screens for:

- ↳ Changing password
- ↳ Supply system selection 1phase2wire, 3phase 4wires
- ↳ CT Ratio and secondary current
- ↳ PT Ratio and secondary voltage
- ↳ Demand Interval time
- ↳ Reset for demand measurements
- ↳ Pulse output duration

A pulse output indicates real-time energy measurement. An RS485 output allows remote monitoring from another display or a computer.

## Current Transformer Current ratio

The unit can be configured to operate with CT ratio between primary and secondary current is 1 and 2000. Maximum CT primary current corresponds to a maximum input current to the unit of 1/5A.

## RS485 Serial – Modbus RTU

This uses an RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the SMART VEN485. Set-up screens are provided for setting up the RS485 port.

## Pulse output

This Unit provides 2 pulse outputs. One pulse output is configurable, which can be set from the SETUP menu to refer to active or reactive energy (total, import, export). While, another pulse output is fixed to total active energy, the constant is 3200imp/kWh.

## SPECIFICATIONS

### Measured Parameters

The unit can monitor and display the following parameters of a single phase, 3-phase 3-wire or 3-phase 4-wire supply.

### Voltage and Current

Phase to neutral voltages 100 to 289V A.C. (not for 3p3w supplies)

Voltages between phases 173 to 500V A.C. (3p supplies only)

Percentage total voltage harmonic distortion (THD%) for each phase to N (not for 3p3w supplies)

Percentage voltage THD% between phases (three phase supplies only)

Current on each phase – 1 to 9999A range, set by external current transformer(s) (CTs)

Current THD% for each phase

### Power Factor, Frequency and Max. Demand

Frequency in Hz

Instantaneous power:

Power 0 to 999MW

Reactive Power 0 to 999MVA<sub>r</sub>

Volt-amps 0 to 999 MVA

Maximum demanded power since last Demand reset Power factor

Maximum neutral demand current, since the last Demand reset (three phase supplies only)

## Energy Measurements

Imported active energy 0 to 99999999.9 kWh

Exported active energy 0 to 99999999.9 kWh

Imported reactive energy 0 to 99999999.9 kVArh

Exported reactive energy 0 to 99999999.9 kVArh

Total active energy 0 to 99999999.9 kWh

Total reactive energy 0 to 99999999.9 kVArh

## Measured Inputs

Voltage inputs through 4-way fixed connector with 2·5mm<sup>2</sup> stranded wire capacity. 3-Phase 3- and 4-wire and Single-phase 2-wire unbalanced. Line frequency measured from L1 voltage or L3 voltage. Three current inputs (six physical terminals) with 2·5mm<sup>2</sup> stranded wire capacity for connection of external CTs. Nominal rated input current 5A or 1A A.C.Rms.

## Accuracy

Voltage	0·5% of range maximum
Current	0·5% of nominal
Frequency	0·2% of mid-frequency
Power Factor	1% of unity (0.01)
Active power (W)	±1% of range maximum
Reactive power (VAr)	±2% of range maximum
Apparent power (VA)	±1% of range maximum
Active energy (Wh)	Class 1 IEC 62053-21
Reactive energy (VARh)	±2% of range maximum
Temperature co-efficient	Voltage and current= 0.013%/°C typical Active energy= 0·018%/°C, typical
Response time to step input	1s, typical, to >99% of final reading, at 50 Hz.

## RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:

<b>Baud rate</b>	2400,4800,9600,19200,38400
<b>Parity</b>	none/odd/even
<b>Stop bits</b>	1 or 2
<b>RS485 network address</b>	nnn – 3-digit number, 1 to 247
<b>Modbus™ Word order</b>	Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from the set-up menu.

## 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)
Auxiliary supply voltage	Nominal ±1%
Auxiliary supply frequency	Nominal ±1%
Auxiliary supply waveform (if AC)	Sinusoidal (distortion factor < 0.05)
Magnetic field of external origin	Terrestrial flux

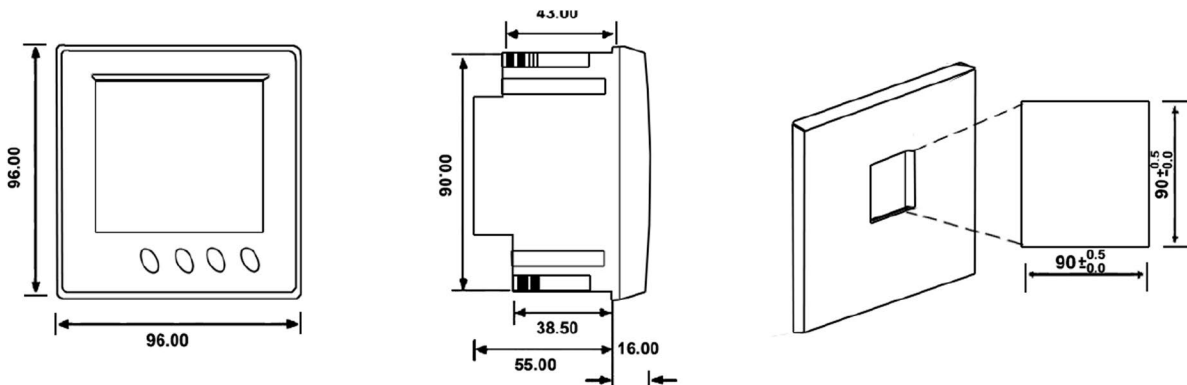
## Environment

Operating temperature	-25°C to +55°C*
Storage temperature	-40°C to +70°C*
Relative humidity	0 to 90%, non-condensing
Altitude	Upto 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.*

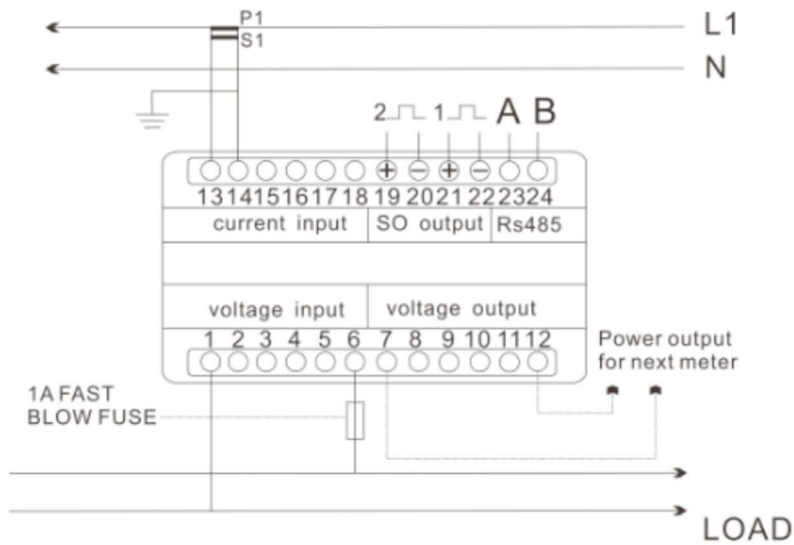


## Dimensions

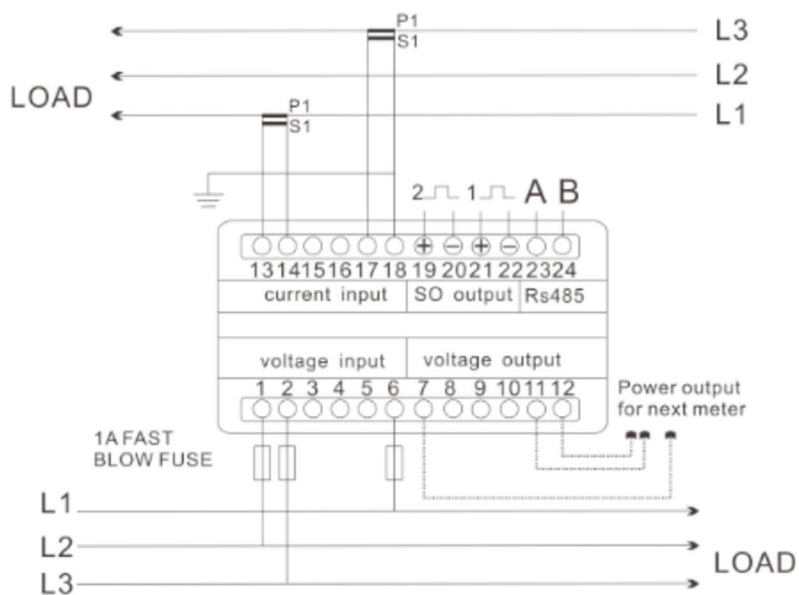


## Wiring diagram

Single phase two wire



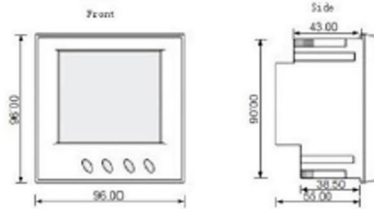
Three phase three wires



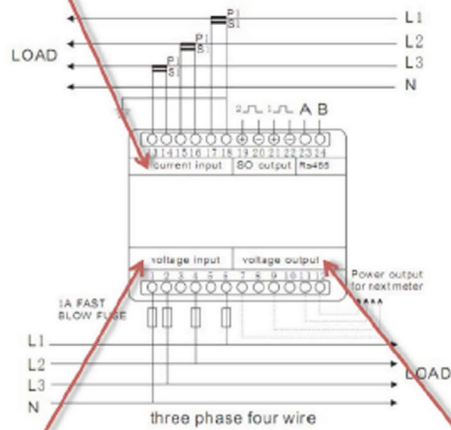
# Three phase four wires

Plug in metering solution :

Dimensions:



1. Current Transformer Input



2. Fuse Voltage input



3. Voltage Output to power the next meters (up to 16)



## Terminal Kit Option :

Optional Terminal kit for customers who want to pre-manufacture their own wiring looms. Also the terminal kit can be used for any standard single phase or split core Current Transformer with a 1A or 5A Secondary. No requirement for additional convertors or hardware

## Parameters:

- Phase to Phase Voltage
- Phase to Neutral Voltage
- Frequency
- Voltage Total Harmonic Distortion (THD)
- Current
- Neutral Current (Calculated Modbus only)
- Current Max Demand (Modbus Only)
- Current Total Harmonic Distortion (THD)
- kW
- KVAh
- kW Max Demand
- Power Factor
- Import kWh
- Export kWh
- Import kVAh
- Export kVAh

## SMART VEN680 CT-2T

# DIN Rail Smart Energy Meter for Single and Three Phase Electrical Systems



Important Safety Information is contained in the Maintenance section. Familiarize yourself with this information before attempting installation or other procedures.

Symbols used in this document:



Risk of Danger: These instructions contain important safety information, Read them before starting installation or servicing of the equipment



Caution: Risk of Electric Shock

## Introduction

This document provides operating, maintenance and installation instructions. The unit measures and displays the characteristics of single phase two wires (1p 2w), three phase three wires (3p 3w) and three phase four wires (3p 4w) supplies, including KWh, kVarh, KW, KVar, KVA, PF, Frequency, Voltage, Current, dmd. THD etc. Energy is measured in terms of kWh, kVArh. Maximum demand current can be measured over preset periods of up to 60minutes. The requisite current input(s) are obtained via current transformers (CT).

This meter can be configured to work with a wide range of CTs, giving the unit a wide range of operation. Built-in interfaces provide pulse and RS485 Modbus RTU outputs. Configuration is password protected.

This unit has 2 Source Powers and can show T1 energy and T2 energy. If you want to shift T1 to T2, as far as there is 230V load between terminal 7 and 8, the meter will count up to T2. When T1 is working, you can get Pulse 1 output 2 from pin 9 & 10. When T2 is working, you can get Pulse 2 output from pin 11 & 12. Both Pulse 1 output and Pulse 2 output Rate are configurable.

## Unit Characteristics

The Unit can measure and display:

- ↳ Line voltage and THD% (total harmonic distortion) of all phases
- ↳ Line Frequency
- ↳ Currents, Current demands and current THD% of all phases
- ↳ Power, maximum power demand and power factor
- ↳ Active energy imported and exported
- ↳ Reactive energy imported and exported

The unit has password-protected set-up screens for:

- ↳ Changing password
- ↳ Supply system selection 1p2w, 3p3w, 3p4w
- ↳ Demand Interval time
- ↳ Reset for demand measurements
- ↳ Pulse output duration

Two-pulse output indicates real-time energy measurement. An RS485 output allows remote monitoring from another display or a computer.

## Current Transformer Primary Current

The unit can be configured to operate with CT ratio between primary current and secondary current. The secondary CT has two options: 1A/5A



## RS485 Serial – Modbus RTU

This uses an RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the Unit  
Set-up screens are provided for setting up the RS485 port. Refers to section 4.8

## Pulse output

This provides two pulse outputs that clock up measured T1 active energy and T2 active energy. The default constant for active energy is 3200imp/kWh. The pulse width for active energy can be set from the set-up menu.

## SPECIFICATIONS

### Measured Parameters

The unit can monitor and display the following parameters of a single phase two wire (1p2w), three phase three wire (3p3w) or four phase four wire(3p4w) supply.

### Voltage and Current

Phase to neutral voltages 100 to 289V a.c. (not for 3p3w supplies)  
Voltages between phases 173 to 500V a.c. (3p supplies only)  
Percentage total voltage harmonic distortion (THD%) for each phase to N (not for 3p3w supplies)  
Percentage voltage THD% between phases (three phase supplies only)  
Current THD% for each phase

### Power factor and Frequency and Max. Demand

Frequency in Hz  
Instantaneous power:  
Power 0 to 3600 MW  
Reactive Power 0 to 3600 MVA  
Volt-amps 0 to 3600 MVA

Maximum demanded power since last Demand reset Power factor  
 Maximum neutral demand current, since the last Demand reset (for three phase supplies only)

## Energy Measurements

↳ Imported/Exported active energy	0 to 99999999.9 kWh
↳ Imported/Exported reactive energy	0 to 99999999.9 kVArh
↳ Total active energy	0 to 99999999.9 kWh
↳ Total reactive energy	0 to 99999999.9 kVArh

## 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 four phase four wire(3p4w) unbalanced. Line frequency measured from L1 voltage or L3 voltage.

Three current inputs (six physical terminals) with 2.5mm<sup>2</sup> stranded wire capacity for connection of external CTs. Nominal rated input current 5A or 1A a.c. Rms

## Accuracy

↳ Voltage	0.5% of range maximum
↳ Current	0.5% of nominal Frequency
↳ Power factor	1% of unity (0.01)
↳ Active power (W)	±1% of range maximum
↳ Reactive power (VAr)	±2% of range maximum
↳ Apparent power (VA)	±1% of range maximum
↳ Active energy (Wh)	Class 1 IEC 62053-21
↳ Reactive energy (VARh)	±2% of range maximum
↳ Total harmonic distortion	1% up to 31st harmonic
↳ Temperature co-efficient	Voltage and current = 0.013%/°C typical
↳ Active energy	= 0.018%/°C, typical
↳ Response time to step input	1s, typical, to >99% of final reading, at 50 Hz.
	0.2% of mid-frequency

## Interfaces for External Monitoring

Three interfaces are provided:

- ☒ An RS485 communication channel that can be programmed for Modbus RTU protocol
- ☒ An relay output indicating real-time measured energy.(configurable)
- ☒ An pulse output 3200imp/kWh (not configurable)

The Modbus configuration (Baud rate etc.) and the pulse relay output assignments (kW/kVArh, import/export etc.) are configured through the Set-up screens.

### Pulse Output

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

Rate can be set to generate 1 pulse per:

0.01 = 10 Wh/VArh

0.1 = 100 Wh/VArh

1 = 1 kWh/kVArh

10 = 10 kWh/kVArh

100 = 100 kWh/kVArh

**Pulse width** 200/100/60 ms.

**Relay Rating** 240V ac 50mA

### RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:

**Baud rate** 2400, 4800, 9600, 19200, 38400

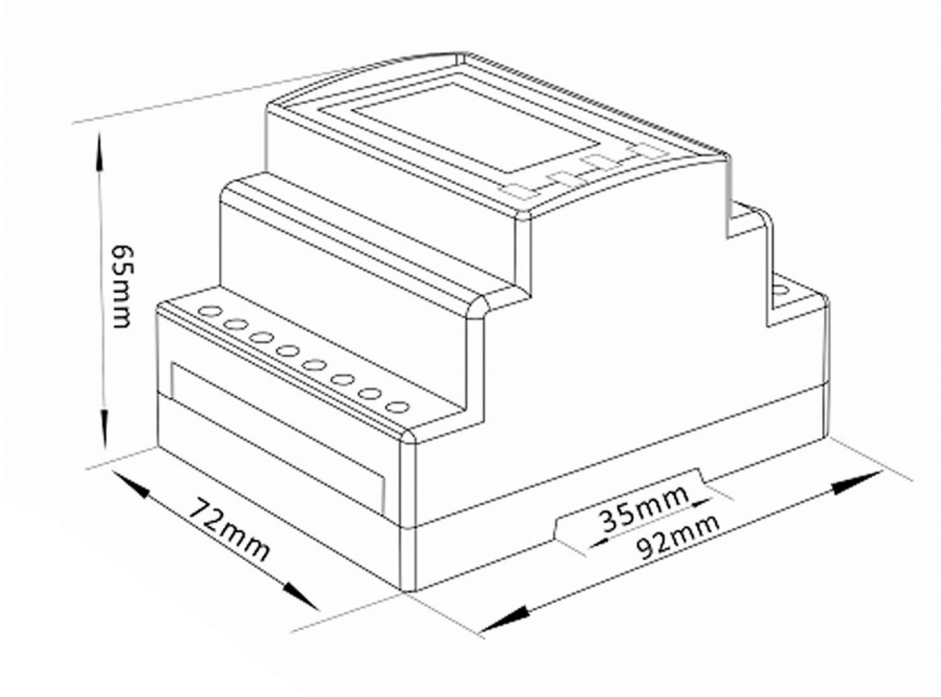
**Parity** none/odd/even

**Stop bits** 1 or 2

**RS485 network address** nnn – 3-digit number, 1 to 247

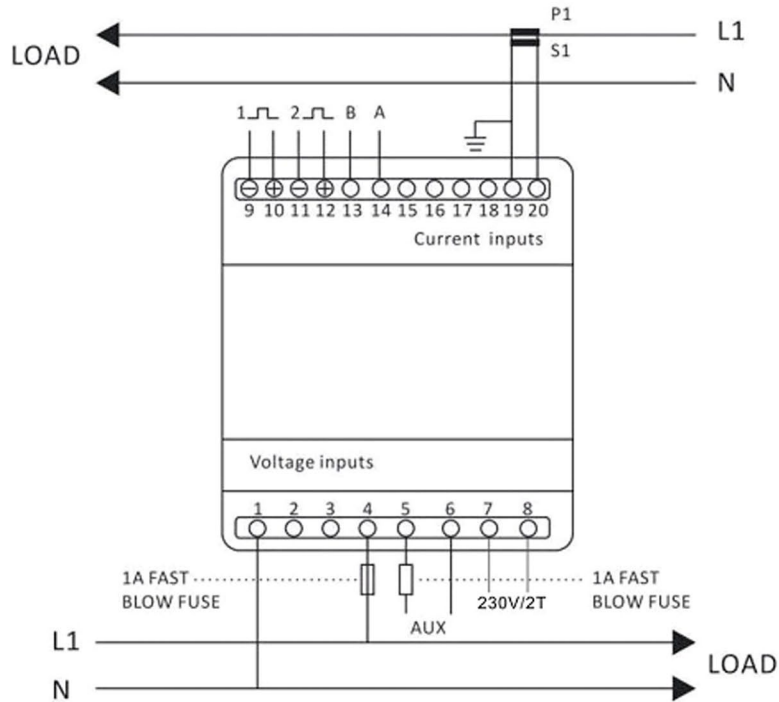
**Modbus™ Word order** Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from the set-up menu.

# Dimensions



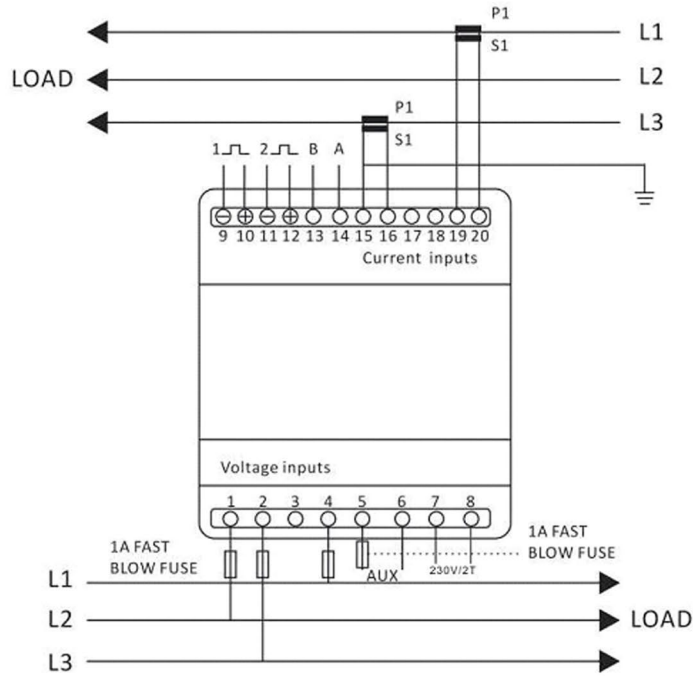
# Installation

## Single Phase Two Wires

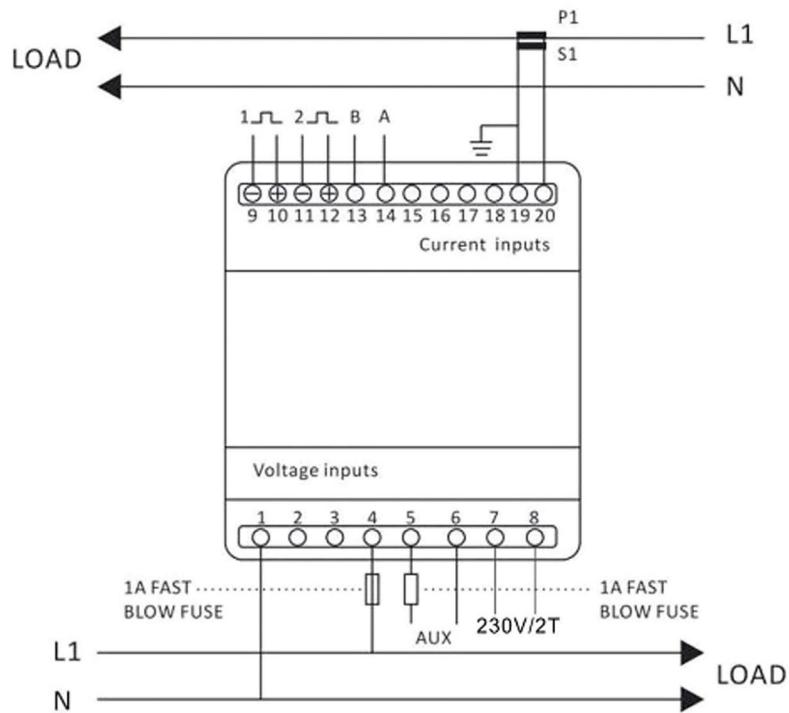




## Three Phase Three Wires



## Three Phase Four Wires



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