# SDM530CT-Modbus

*Three Phase Multi-function DIN rail meter*


- Measures kWh Kvarh, KW, Kvar, KVA, P, F, PF, Hz, dmd, V, A, etc.
- Bi-directional measurement IMP & EXP
- Two pulse outputs
- RS485 Modbus
- Din rail mounting 35mm
- 5A CT connection
- Better than Class 1 / B accuracy

***USER MANUAL***

***2015 V1.6***

# Eastron SDM530CT-Modbus User Manual

## Introduction

The SDM530CT-Modbus measures and displays the characteristics of three phase four wires (3p4w) supplies, including voltage, frequency, current, power, 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 60 minutes. In order to measure energy, the unit requires voltage and current inputs in addition to the supply required to power the product.

SDM530CT-Modbus can be configured to work with a wide range of CTs, giving the unit a wide range of operation. Built-in interfaces provides pulse and RS485 Modbus RTU .Configuration is password protected.

## Unit Characteristics

The Unit can measure and display:

- Line voltage
- Line Frequency
- Currents, Current demands
- 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
- Demand Interval Time(DIT)
- Reset for demand measurements
- Pulse output duration

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

## 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.

## Pulse output

This provides two pulse outputs that clock up measured active and reactive energy. The constant of pulse output 2 for active energy is 1000imp/kWh, its width is fixed at 100ms.

The default constant of configurable pulse output 1 is 100imp/kWh. default pulse width is100ms.The configurable pulse output 1 can be set from the set-up menu.

## Start-up Screens

| | | |
|---|---|---|
| 1 |  | The first screen lights up all display segments and can be used as a display check |
| 2 |  | The second screen indicates the firmware installed in the unit and its build number. |
| 3 |  | The interface performs a self-test and indicates the result if the test passes. |

After 5 seconds delay, the screen will display active energy measurements.

## Measurements

The buttons operate as follows:

| | | |
|---|---|---|
| 1 |  | Select the Voltage and Current display screens<br>In Set-up Mode, this is the “Up” or “back” button |
| 2 |  | Select the Power, Frequency and Power factor display screens<br>In Set-up Mode, this is the “Down” button |
| 3 |  | Select the Energy display screens<br>In Set-up mode, this is the “Enter” or “Right” button |

## Voltage and Current and Max Demand

Each successive pressing of the  button selects a new range:

| | | |
|---|---|---|
| 1-1 |  | Phase to neutral voltages |
| 1-2 |  | Phase to phase voltages |
| 2-1 |  | Current on each phase |
| 2-2 |  | Neutral current |
| 3 |  | Maximum Current Demand |

## Power and Frequency and Power factor

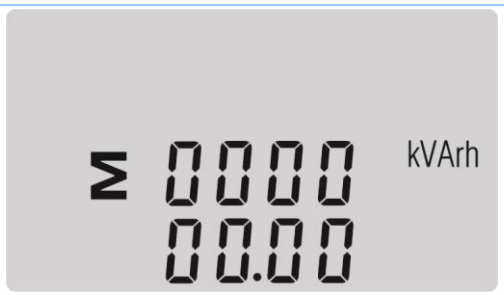
Each successive pressing of the  button selects a new range:

| | | |
|---|---|---|
| 1-1 |  | Instantaneous Active Power in kW<br>When it's exported, there will be a mark of minus "—". |
| 1-2 |  | Instantaneous Reactive Power in kVAr<br>When it's exported, there will be a mark of minus "—". |
| 1-3 |  | Instantaneous Volt-amps in KVA<br>When it's exported, there will be a mark of minus "—". |
| 1-4 |  | Total kW, kVArh, kVA<br>When it's exported, there will be a mark of minus "—". |
| 2 |  | Frequency and Power Factor (total) |
| 3 |  | Power Factor of each phase |

| | | |
|---|---|---|
| 4 |  | Maximum Power Demand |

## Energy Measurements

Each successive short pressing (lasting less than 3s) of the SET button selects a new range:

| | | |
|---|---|---|
| 1-1 |  | Total active energy in kWh<br>Total kWh=imported +exported (kWh) |
| 1-2 |  | Total Imported active energy in kWh |
| 1-3 |  | Total Exported active energy in kWh |
| 1-4 |  | Total reactive energy in kVArh<br>Total kVArh=imported +exported (kVArh) |

| | | |
|---|---|---|
| 1-5 |  | Imported reactive energy in kVArh |
| 1-6 |  | Exported reactive energy in kVArh |

## Set-up

To enter set-up mode, long pressing the SET button for 2 seconds, until the password screen appears.


Setting up is password-protected so you must enter the correct password (default '1000') before processing. If an incorrect password is entered, the display will show: Err


To exit setting-up mode, press ▲ repeatedly until the measurement screen is restored.

## Menu Option Selection

1) Use the ▲ and ▼ buttons to select the required item from the menu

2) Press SET to confirm your selection

3) If an item flashes, then it can be adjusted by the  and  buttons. If not, there maybe a further layer.

4) Having selected an option from the current layer, press 

to confirm your selection. The SET indicator will appear.

5) Having completed a parameter setting, press  to return to a higher menu level. The SET indicator will be removed and you will be able to use the  and  buttons for further menu selection.

6) On completion of all set-up, press  repeatedly until the measurement screen is restored.

## Number Entry Procedure

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

1) The current digit to be set flashes and is set using the  and  buttons

2) Press 

to confirm each digit setting. The SET indicator appears after the last digit has been set.

3) After setting the last digit, press  to exit the number setting routine. The SET indicator will be removed.

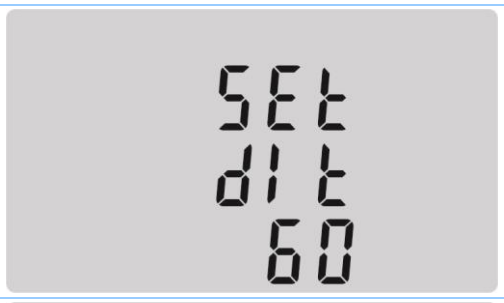
## Change password

| | | |
|---|---|---|
| 1 |  | Use the  and  to choose the change password option |
| 2-1 |  | Press the  to enter the change password routine. The new password screen will appear with the first digit flashing |

| | | |
|---|---|---|
| 2-2 |  | Use ▲ and ▼ to set the first digit and press SET to confirm your selection. The next digit will flash. |
| 2-3 |  | Repeat the procedure for the remaining three digits |
| 2-4 |  | After setting the last digit, SET will show. |
| Press ▲ to exit the number setting routine and return to the Set-up menu. SET will be removed | | |

## DIT Demand Integration Time

This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: 1, 5, 8, 10, 15, 30, 60 minutes

| | | |
|---|---|---|
| 1 |  | From the set-up menu, use ▲ and ▼ buttons to select the DIT option. The screen will show the currently selected integration time. |
| 2-1 |  | Press SET to enter the selection routine. Default is 60<br>The current time interval will flash |

| | | |
|---|---|---|
| 2-2 |  | Use ▲ and ▼ buttons to select the time required. |
| 2-3 |  | Press SET to confirm the selection. SET indicator will appear. |
| Press ▲ to exit the DIT selection routine and return to the menu. | | |

## Backlit set-up

| | | |
|---|---|---|
| **1** |  | **The backlit lasting time is settable**<br>**For example, if it's set as 5, the backlit will be off in 5minutes from the last time operation on the meter.** |
| **2** |  | Press SET to enter the selection routine. The current time interval will flash.<br>**The options can be:0/10/30/60/120**<br>**"0" means always on**<br>**Default lasting time is 60minutes** |
| Use ▲ and ▼ buttons to select the time required. Press SET to confirm the set-up, | | |

## Pulse output

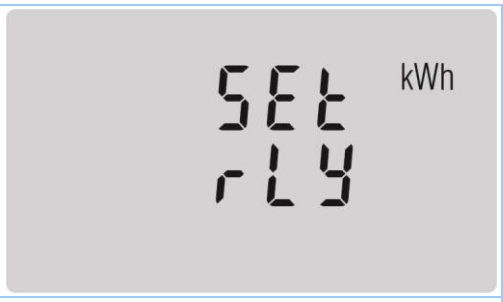
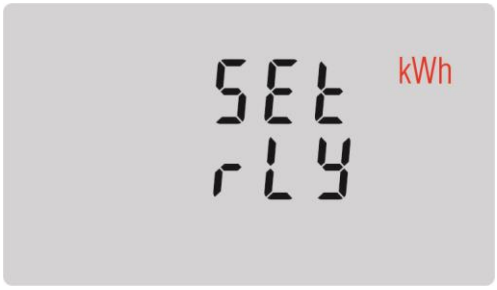
This option allows you to configure the pulse output 1. The output can be set to provide a pulse for a defined amount of energy active or reactive.

Use this section to set up the pulse output for:

Total kWh/ Total kVArh

Active kWh/Reactive kWh

Active kVArh/Reactive kVArh

| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the Pulse output option. |
| 2-1 |  | Press SET to enter the selection routine. The unit symbol will flash. |
| 2-2 |  | Use ▲ and ▼ buttons to choose kWh or kVArh.<br>Default is kwh |
| On completion of the entry procedure, press SET to confirm the setting and press ▲ to return to the main set up menu. | | |

## Pulse rate

Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per 0.01/0.1/1/10/100/1000kWh/kVArh.


(It shows 1 impulse = 0.01kWh/kVArh)

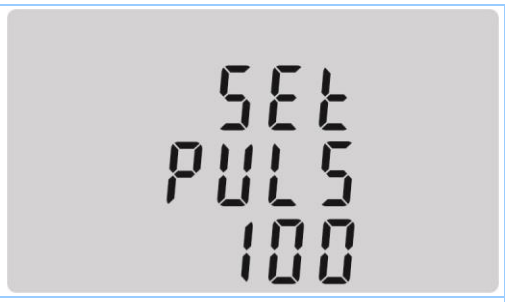
| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the Pulse Rate option. |

| | | |
|---|---|---|
| 2 |  | Press SET to enter the selection routine. The current setting will flash. Default is 0.01 |
| Use ▲ and ▼ buttons to choose pulse rate. On completion of the entry procedure, press SET to confirm the setting and press ▲ to return to the main set up menu. | | |

## Pulse Duration

The energy monitored can be active or reactive and the pulse width can be selected as 200, 100(default) or 60ms.


(It shows pulse width of 100ms)

| | | |
|---|---|---|
| 1-1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the Pulse width option. |
| 1-2 |  | Press SET to enter the selection routine. The current setting will flash. Default is 100 |
| Use ▲ and ▼ buttons to choose pulse width. On completion of the entry procedure, press SET to confirm the setting and press ▲ to return to the main set up menu. | | |

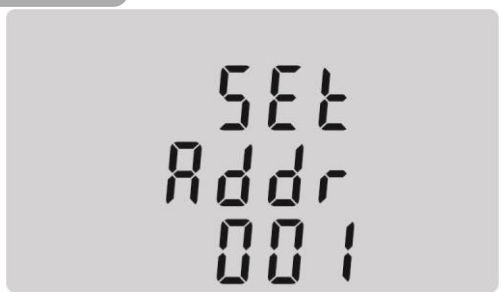
## Scroll display

| | | |
|---|---|---|
| 1-1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the Pulse scroll display option. |
| 1-2 |  | Press SET to enter the selection routine. The current setting will flash. **The options can be:**1 to255 Seconds Default is 255s |
| Use ▲ and ▼ buttons to choose interval of scroll display. On completion of the entry procedure, press SET to confirm the setting and press ▲ to return to the main set up menu. To activate the scroll display mode, press the ▲ lasting for 2seconds on the main interface. To close it, press ▲ button lasting for 2seconds accordingly. The default status of scroll display is closed. | | |

## Communication

There is a RS485 port can be used for communication using Modbus RTU protocol.

## RS485 Address




(The range is from 001 to 247)

| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the Address ID |

| | | |
|---|---|---|
| 2-1 |  | Press SET button to enter the selection routine. The current setting will be flashing. |
| 2-2 |  | Use ▲ and ▼ buttons to choose Modbus Address(001 to 247).Default is 001 |
| On completion of the entry procedure, press SET button to confirm the setting and press ▲ button to return the main set-up menu. | | |

## Baud Rate

| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the Baud Rate option. |
| 2-1 |  | Press SET to enter the selection routine. The current setting will flash. |
| 2-2 |  | Use ▲ and ▼ buttons to choose Baud rate 1.2k 2.4k. 4.8k, 9.6k (default.) |
| On completion of the entry procedure, press SET to confirm the setting and press | | |

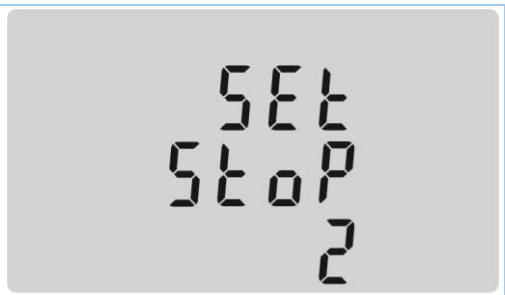
 to return to the main set up menu.

## Parity

| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use  and  buttons to select the Parity option. |
| 2-1 |  | Press SET to enter the selection routine. The current setting will flash. |
| 2-2 |  | Use  and  buttons to choose Parity (EVEN / ODD / NONE) Default is NONE |
| On completion of the entry procedure, press SET to confirm the setting and press  to return to the main set up menu. | | |

Note: Default is 1, and only when the parity is NONE that the stop bit can be changed to 2.

## Stop bits

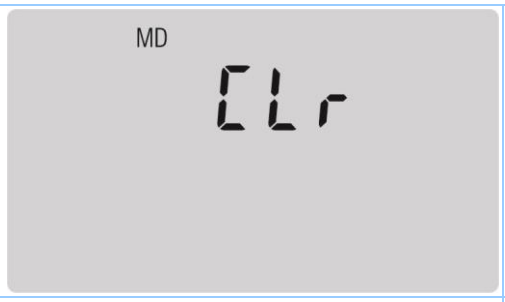
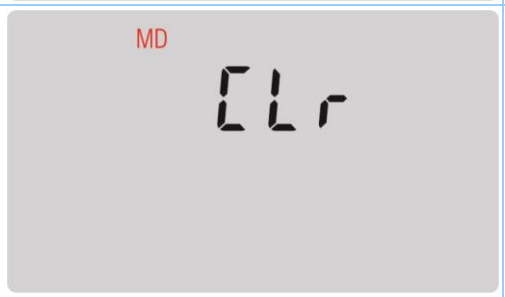
| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use  and  buttons to select the Stop Bit option. |

| | | |
|---|---|---|
| 2-1 |  | Press SET to enter the selection routine. The current setting will flash. |
| 2-2 |  | Use ▲ and ▼ buttons to choose Stop Bit (2 or 1)<br>Default is 1. |
| On completion of the entry procedure, press SET to confirm the setting and press ▲ to return to the main set up menu. | | |

Note: Default is 1, and only when the parity is NONE that the stop bit can be changed to 2.

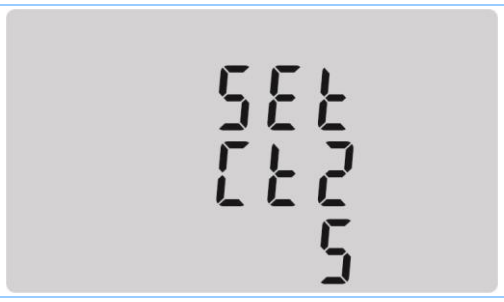
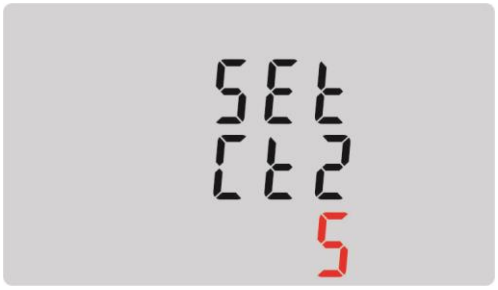
CLR

The meter provides a function to reset the maximum demand value of current and power.

| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the reset option. |
| 2 |  | Press SET to enter the selection routine. The MD will flash. |
| Press SET to confirm the setting and press ▲ to return to the main set up menu. | | |

CT

The CT option sets the secondary current (CT2 1A or 5A) of the current transformer (CT) that wires to the meter.

| | | |
|---|---|---|
| 1 |  | From the Set-up menu, use ▲ and ▼ buttons to select the CT option. |
| 2 |  | Secondary CT setting<br>Press SET to enter the CT secondary current selection routine.:1/5A |
| 3 |  | Set CT Ratio value<br>Press SET to enter the CT Ratio setting screen. The range is from 0001 to 9999.<br>Default is 0001 |
| Example:If set the ratio to be 100,it means the primary current equals secondary currentx100 | | |

## Specifications

### Measured Parameters

The unit can monitor and display the following parameters of four phase four wires (3p4w) supply.

### Voltage and Current

Phase to neutral voltages 176 to 274V a.c.

### Power factor and Frequency and Max. Demand

Frequency in Hz

Instantaneous power:

Power 0 to 9999 MW

Reactive Power 0 to 9999MVAr

Volt-amps 0 to 9999MVA

Maximum demanded power since last Demand reset Power factor

Maximum neutral demand current, since the last Demand reset

### Energy Measurements

- Imported active energy 0 to 9999999.9 kWh
- Exported active energy 0 to 9999999.9 kWh

- Imported reactive energy 0 to 9999999.9 kVArh
- Exported reactive energy 0 to 9999999.9 kVArh
- Total active energy 0 to 9999999.9 kWh
- Total reactive energy 0 to 9999999.9 kVArh

## 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) ±1% of range maximum
- Apparent power (VA) ±1% of range maximum
- Active energy (Wh) Class 1 IEC 62053-21
- Reactive energy (VARh) ±1% of range maximum

## Interfaces for External Monitoring

Three interfaces are provided:

- an RS485 communication channel that can be programmed via protocol remotely.
- an Pulse output(Pulse 1) indicating real-time measured energy.(configurable)
- an Pulse output(Pulse 2)

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

## Pulse Output

The unit provides two pulse outputs. Both pulse outputs are passive type.

Pulse output 1 is configurable. The pulse output can be set to generate pulses to represent total / import/export kWh or kVarh.

The pulse constant can be set to generate 1 pulse per:

0.01 = 10 Wh/VArh

0.1 = 100 Wh/VArh

1 = 1 kWh/kVArh

10=10Wh/kVArh

100 = 100 kWh/kVArh

1000= 10000 kWh/kVArh

Pulse width: 200/100/60ms

Pulse output 2 is non-configurable. It is fixed up with active kWh. The constant is 1000imp/kWh.

## RS485 Output for Modbus RTU

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

**Baud rate** 1200**,** 2400, 4800, 9600

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

**Stop bits** 1 or 2

**RS485 network address** *nnn* – 3-digit number, 001 to 247

## Reference Conditions of Influence Quantities

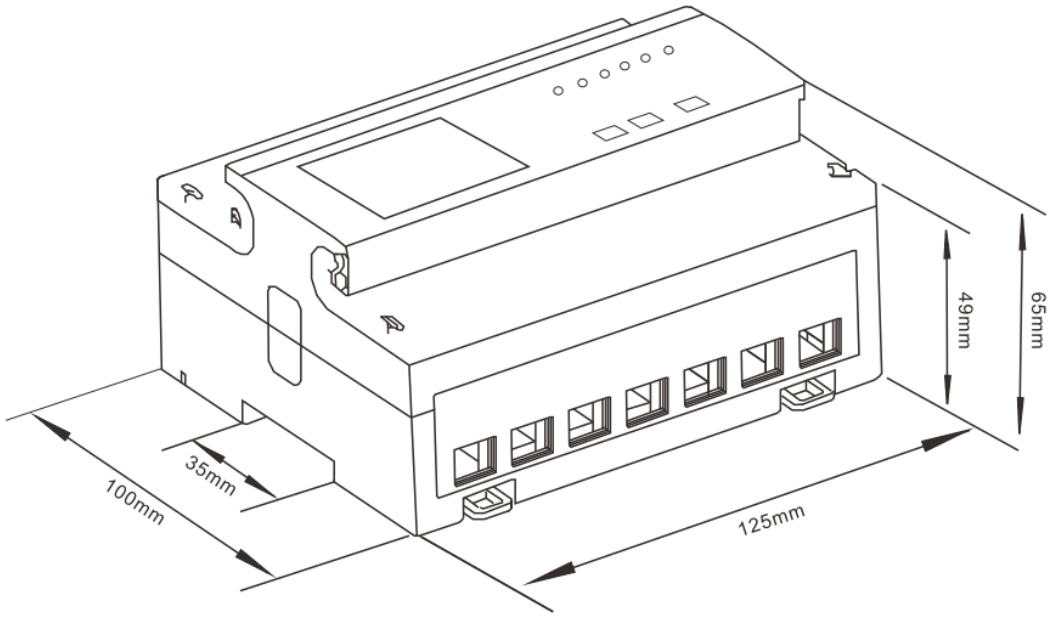
Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

- 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

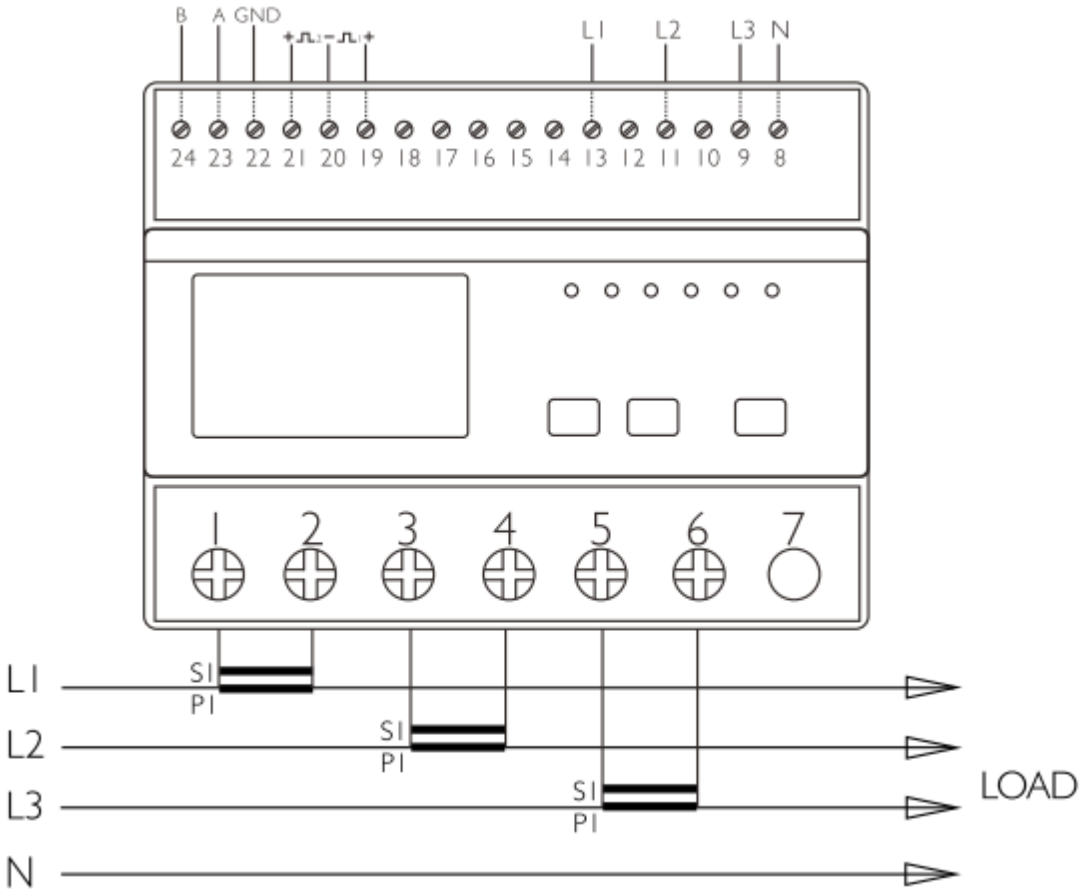
## Environment

- Operating temperature -25°C to +55°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

## Dimensions




## Wiring diagram


B
A
GND
L1
L2
L3
N
24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8
1 2 3 4 5 6 7
L1
L2
L3
N
SI
PI
SI
PI
SI
PI
LOAD