A-300 series
Three Phase Multifucntion DIN Rail Energy Meter

DIN RAIL SMART METER FOR SINGLE AND THREE PHASE ELECTRICAL SYSTEMS

User Manual V1.0

1. Introduction

This document provides operating, maintenance and installation instructions.These units measure and display the characteristics of single phase two wires (1p2w),three phase three wires (3p3w) and three phase four wires (3p4w) networks.The measuring parameters include voltage (V), frequency (Hz),current (A),power (kW/Kva/Kvar),Imported, exported and total Energy (kWh/kvArh).The units can also measure Maximum demand current and power, this is measured over preset periods of up to 60 minutes.

These units are max 100A direction operated and do not need to connect with external current transformers (CT).Built-in pulse, RS485 Modbus RTU/Mbus outputs.Configuration is password protected.

1.1 Unit Characteristics

The A-300 series meters consists of four models:
A-300P, A-300M, A-300MT, A-300M-B
Their major differences are as follows:

Model	Measurement	Output	Tariff
A-300P	kWh/kVarh,kW/kVar,kVA, P,F,PF,dmd,V,A,THD,etc.	pulse	no
A-300M	kWh/kVarh,kW/kVar,kVA, P,F,PF,dmd,V,A,THD,etc.	pulse/Modbus	no
A-300M-B	kWh/kVarh,kW/kVar,kVA, P,F,PF,dmd,V,A,THD,etc.	pulse/Mbus	no
A-300MT	kWh/kVarh,kW/kVar,kVA, P,F,PF,dmd,V,A,THD,etc.	pulse/Modbus	4 tariffs 10 segments

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

1.2 RS 485 Serial Modbus RTU

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.

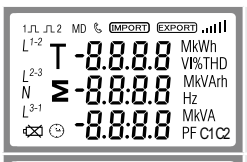
1.3 MBUS

*For A300-M, A300-MT
This uses an MBus port with EN13753-3 protocol to provide a means of remotely monitoring and controlling the Unit. screens are provided for setting up the RS485 port.
Set-up screens are provided for setting up the MBus port.

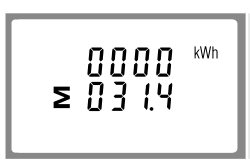
1.4 Pulse Output

Two pulse outputs that pulse measured active and reactive energy.The constant of pulse output 2 for active energy is 400imp/kWh (unconfigurable),its width is fixed at 100ms. The default constant of configurable pulse output 1 is 400imp/kWh,default pulse width is 100ms.The configurable pulse output 1 can be set from the set-up menu.

2. Start Up Screens

	The first screen lights up all display segments and can be used as a display check.
	Software version information 1.4 indicates version * The actual version maybe different, please refers to the actual display.
	The interface performs a self-test and indicates the result if the test passes.

*After a short delay, the screen will display active energy interface as follows:

	Total active energy in kWh.

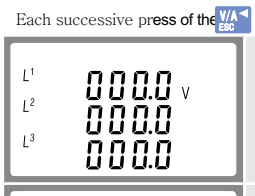
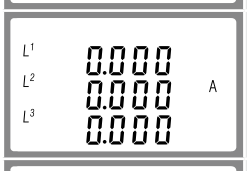
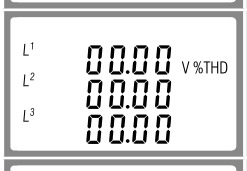
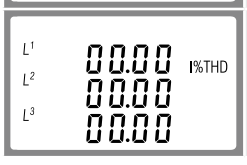
3. Measurements

The buttons operate as follows:

V/A ESC	Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left" or "Back" button.
MD/ PF/HZ	Select the Frequency and Power factor display screens. In Set-up Mode, this is the "Up" button.
P	Select the Power display screens. In Set-up Mode, this is the "Down" button.
E	Select the Energy display screens. In Set-up mode, this is the "Enter" or "Right" button.

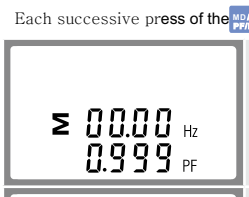
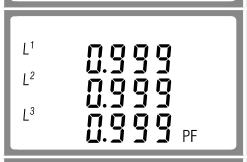
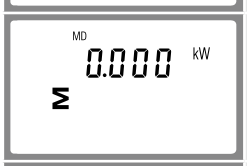
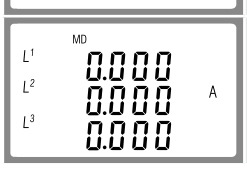
3.1 Voltage and Current

Each successive press of the V/A ESC button selects a new parameter:

	Phase to neutral voltages.
	Current on each phase.
	Phase to neutral voltage THD%.
	Current THD% for each phase.

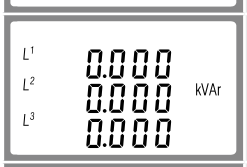
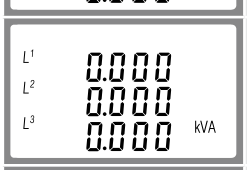
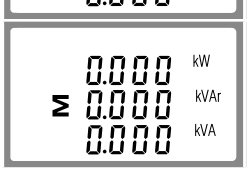
3.2 Frequency and Power Factor and Demand

Each successive press of the MD/ PF/HZ button selects a new range:

	Frequency and Power Factor (total).
	Power Factor of each phase.
	Maximum Power Demand.
	Maximum Current Demand.

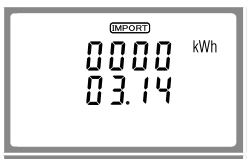
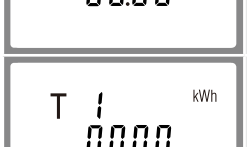
3.3 Power

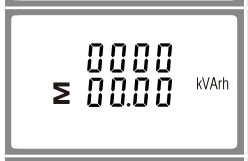
Each successive press of the P button select a new range:

	Instantaneous Active Power in kW.
	Instantaneous Reactive Power in kVAr.
	Instantaneous Volt-Amps in KVA.
	Total kW, kVArh, kVA.

3.4 Energy Measurements

Each successive press of the E button selects a new range:

	Imported active energy in kWh.
	Exported active energy in kWh.
	Tariff 1 active energy Tariff 2 active energy Tariff 3 active energy Tariff 4 active energy *For A300-M, A300-MT
	Total active energy in kWh.
	Imported reactive energy
	Exported reactive energy

	Tariff 1 reactive energy Tariff 2 reactive energy Tariff 3 reactive energy Tariff 4 reactive energy *For A300-MT only
	Total reactive energy
	Date : Year/month/day. 1st,Jan,2000 (default) *For A300-MT only
	Time : Hour/minute/second Example:00:02:16 *For A300-MT only

***The parameters of date and time can only be setted via RS485 communication.**

4. Set Up

To enter set-up mode, press the E button for 3 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: PASS Err

To exit setting-up mode, press V/A ESC repeatedly until the measurement screen is restored.

4.1 Set-up Entry Methods

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

4.1.1 Menu Option Selection

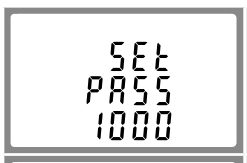
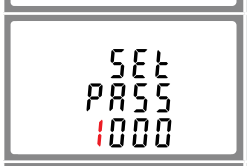
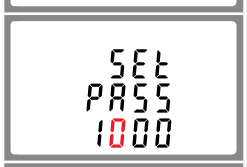
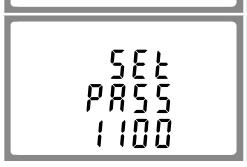
1. Use the MD/ PF/HZ and P buttons to scroll through the different options of the set up menu.
2. Press E to confirm your selection
3. If an item flashes, then it can be adjusted by the MD/ PF/HZ and P buttons.
4. Having selected an option from the current layer, press E to confirm your selection. The SET indicator will appear.
5. Having completed a parameter setting, press V/A ESC to return to a higher menu level. The SET indicator will be removed and you will be able to use the MD/ PF/HZ and P buttons for further menu selection.
6. On completion of all setting-up, press V/A ESC repeatedly until the measurement screen is restored.

4.1.2 Numbeer 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 MD/ PF/HZ and P buttons
2. Press E to confirm each digit setting. The SET indicator appears after the last digit has been set.
3. After setting the last digit, press V/A ESC to exit the number setting routine. The SET indicator will be removed.

4.2 Change Password

	Use the MD/ PF/HZ and P to choose the change password option.
	Press the E to enter the change password routine. The new password screen will appear with the first digit flashing.
	Use MD/ PF/HZ and P to set the first digit and press E to confirm your selection. The next digit will flash.
	Repeat the procedure for the remaining three digits.
	After setting the last digit, SET will show.

Press V/A ESC to exit the number setting routine and return to the Set-up menu. SET will be removed

4.3 DIT Demand Integration Time

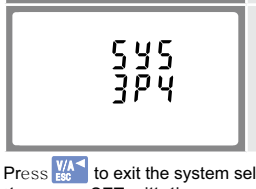
This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: off, 5, 10,15 30,60 minutes.

	From the set-up menu, use MD/ PF/HZ and P buttons to select the DIT option. The screen will show the currently selected integration time.
	Press E to enter the selection routine. The current time interval will flash.
	Use MD/ PF/HZ and P buttons to select the time required.
	Press E to confirm the selection. SET indicator will appear.

Press V/A ESC to exit the DIT selection routine and return to the menu.

4.4 Supply Systems

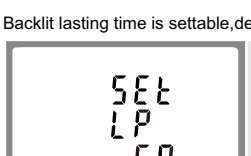
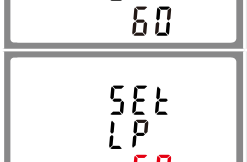
The unit has a default setting of 3Phase 4wire (3P4).
Use this section to set the type of electrical system.

	From the set-up menu, use MD/ PF/HZ and P buttons to select the system option. The screen will show the currently selected power supply.
	Press E to enter the selection routine. The current selection will flash.
	Use MD/ PF/HZ and P buttons to select the required system option: 1P2 (W),3P3 (W),3P4 (W).
	Press E to confirm the selection. SET indicator will appear.

Press V/A ESC to exit the system selection routine and return to the menu. SET will disappear and you will be returned to the main set-up Menu.

4.5. Backlit set-up

Backlit lasting time is settable,default lasting time is 60minutes

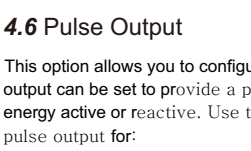
	If it's setted as 5,the backlit will be off in 5minutes if there is no more further operation.
	Press E to enter the selection routine.The current time interval will flash The options are: 0(always on)/5/10/30/60/120

Press MD/ PF/HZ and P to select the time interval.Then press E to confirm the set-up.

4.6 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
Import kWh/Export kWh
Import KVArh/Export KVArh

	From the set-up menu, use MD/ PF/HZ and P buttons to select the Pulse output option.
	Press E to enter the selection routine. The unit symbol will flash.
	Use MD/ PF/HZ and P buttons to choose kWh or kVArh.

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

Warning:

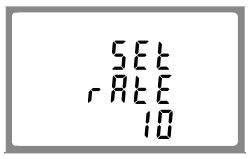
Important Safety Information is contained in the Maintenance section. Familiarize yourself with this information before attempting installation or other procedures. Symbols used in this document:

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

Caution: Risk of Electric Shock

4.6.1 Pulse rate

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



(It shows 1 pulse = 10kWh/kVArh)

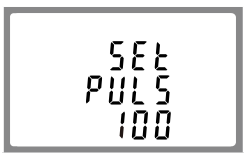
From the set-up menu, use MD/PF/HZ and P buttons to select the Pulse Rate option.

Press E to enter the selection routine. The current setting will flash. When it's dFt (default),it means 2.5Wh/VArh.

Use MD/PF/HZ and P buttons to choose pulse rate.
On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

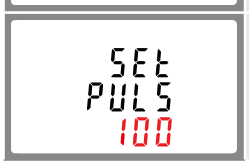
4.6.2 Pulse Duration

The energy monitored can be active or r eactive and the pulse width can be selected as 200 (for non-MID version meters only), 100 (default) or 60ms.



(It shows pulse width of 200ms)

From the set-up menu, use MD/PF/HZ and P buttons to select the Pulse width option.



Press E to enter the selection routine. The current setting will flash.

Use MD/PF/HZ and P buttons to choose pulse width.
On completion of the entry procedure press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.7 Modbus communication

There is an RS 485 wired connection (terminals 9-10) for Modbus RTU, all parameters can be altered via the keys on the front panel.

4.7.1 Setting the Modbus address

***For A300-MT(Modbus only)**

(The range is from 001 to 247)

From the set-up menu, MD/PF/HZ and P buttons to select the address ID.

Press E button to enter the selection routine. The current setting will be flashing.

Use MD/PF/HZ and P buttons to choose Modbus address (001 to 247).

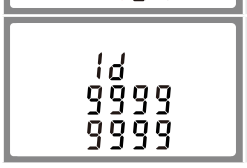
On completion of the entry procedure, press E button to confirm the setting and press V/A ESC button to return the main set-up menu.

4.7.2 Mbus address

***For SDM630-Mbus only**

Primary address: 001 to 250
Use MD/PF/HZ and P buttons to select the address value.

Press E to enter the selection routine. The current setting will flash.

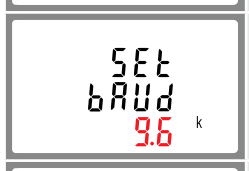


Secondary address:
00 00 00 01 to 99 99 99 99

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.7.2 Baud Rate

From the set-up menu, use MD/PF/HZ and P buttons to select the Baud Rate option.



Press E to enter the selection routine. The current setting will flash.

Use MD/PF/HZ and P buttons to choose Baud rate.

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.7.3 Parity

From the set-up menu, use MD/PF/HZ and P buttons to select the parity option.

Press E to enter the selection routine. The current setting will flash.

Use MD/PF/HZ and P buttons to choose parity (EVEN / ODD / NONE).

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.7.4 Stop Bits

From the set-up menu, use MD/PF/HZ and P buttons to select the stop bit option.

Press E to enter the selection routine. The current setting will flash.

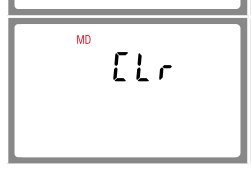
Use MD/PF/HZ and P buttons to choose stop bit (2 or 1)

On completion of the entry procedure, press E to confirm the setting and press V/A ESC to return to the main set up menu.

4.8 Reseting Max Demand

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

From the set-up menu, use MD/PF/HZ and P buttons to select the reset option.



Press E to enter the selection routine. The MD will flash.

Press E to confirm the setting and press V/A ESC to return to the main set up menu.

5. SPECIFICATION

5.1 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.

5.1.1 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

5.1.2 Power Factor,Frequency and Max Demand

- Frequency in Hz
- Instantaneous power:
- Power 0 to 83 kW
- Reactive power 0 to 83 kVAr
- Volt-amps 0 to 83 kVA
- Maximum demanded power since last Demand reset Power factor
- Maximum neutral demand current, since the last Demand reset (for three phase supplies only)

5.1. Eneregy Measurements

• Imported active energy	0 to 999999.99 kWh
• Exported reactive energy	0 to 999999.99 kVarh
• Imported active energy	0 to 999999.99 kWh
• Exported reactive energy	0 to 999999.99 kVarh
• Total active energy	0 to 999999.99 kWh
• Total reactive energy	0 to 999999.99 kVArh

5.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 25mm² 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.

5.3 Interfaces for External Monitoring

Three interfaces are provided:

- RS485/Mbus communication channel that can be programmed via protocol remotely. (not for SDM630-Pulse)
- Pulse output (pulse1) indicating real-time measured energy. (configurable)
- Pulse output (pulse2) 400imp/kWh (not configurable)

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

5.3.1 Pulse Output

The pulse output can be set to generate pulses to represent kWh or kVArh.
Rate can be set to generate 1 pulse per:

dFt (default) = 2.5 Wh/VArh
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, 200ms is not available for MID meter.
Pulse output 2 is non-configurable.It is fixed up with active kWh.
Its constant is 400imp/kWh.

5.3.2 Modbus RS 485 Communication

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
Maximum modbus address numbers 001 to 247

5.3.3 MBUS Communication

For Mbus,the following communication parameters can be configured from the set-up menu:
Baud rate 300,600,2400, 4800, 9600
Parity none/ odd / even
Stop bits 1 or 2
Mbus network primary address nnn - 3-digit number,001 to 250
Mbus network secondary address 00 00 00 00 to 99 99 99 99

***If the Modbus/Mbus protocol document is required, please contact us for it.**

5.4 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 Class B EN50470-3
• Reactive energy (VARh)	±1% of range maximum
• Total harmonic distortion	1% up to 31st harmonic
• Response time to step input	1s, typical, to >99% of final reading, at 50 Hz.

5.5 Reference conditions of Influenece 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 ±2%
• Input waveform	Sinusoidal (distortion factor < 0·005)
• Magnetic field of external origin	Terrestrial flux

5.6 Enviroment

• Operating temperature	-25°C to +55°C*
• Storage temperature	-40°C to +70°C*
• Relative humidity	0 to 95%, non-condensing
• Altitude	Up to 3000m
• 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.

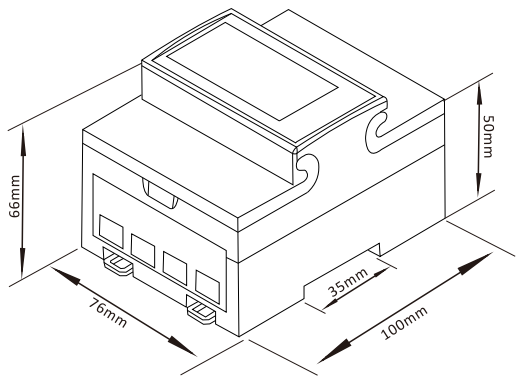
5.7 Mechanics

• DIN rail dimensions	76 x 94.5 mm (WxH) per DIN 43880
• Mounting	DIN rail (DIN 43880)
• Sealing	IP51 (indoor)
• Material	Self-extinguishing UI94 V-0

5.8 Declaration of Conformity(for the MID approved version meter only)

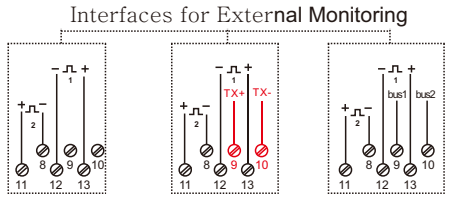
We Autometers Systems Ltd.
Declare under our sole responsibility as the manufacturer that the poly phase multifuntion electrical meter "A-300 series" correspond to the production model described in the EC-type examination certificate and to the requirements of the Directive 2004/22/EC EC type examination certificate number 0120/SGS0195.
Identification number of the NB0120

6. Dimensions



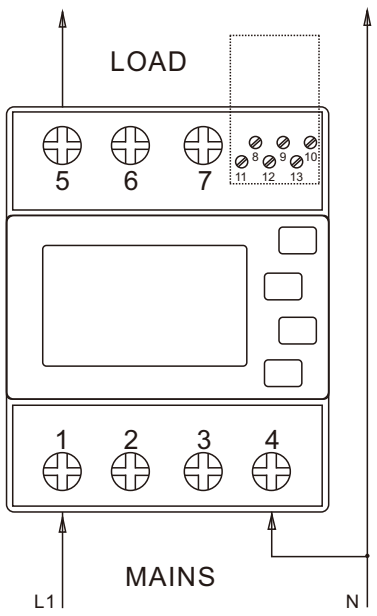
7.Wiring diagram

Interfaces for External Monitoring

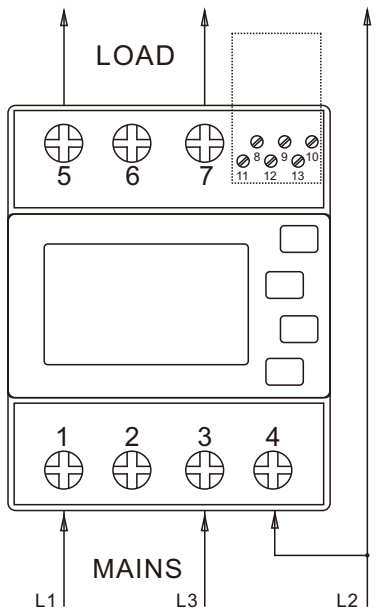


A300-P (pulse) A300-M(Modbus) A300-MBUS
A300-MT (Modbus+Tariffs)

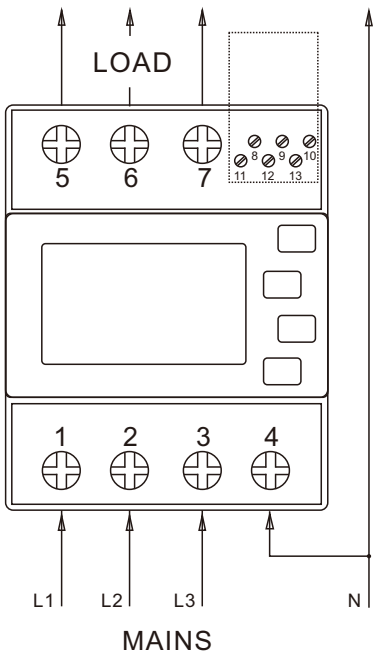
7.1 Single phase two wires



7.2 Three Phase Three Wire



7.3 three phase four wires



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