

## ■ Description

CPM-70 multi-function power quality analysis meter provides a variety of single-phase and three-phase high-precision power parameter measurement, and can measure the 2~51st individual harmonics of voltage and current, which is critical for power system health analysis and optimization.

Standard with 4 sets of digital inputs, 2 sets of relay outputs, RS-485 Modbus RTU communication port and Rthernet/WiF Modbus TCP interface to support modern communication needs so as to ensure seamless integration into diverse power management systems. In addition, CPM-70 provides a time-of-use billing (TOU) function, allowing it to accurately calculate electricity bills based on electricity prices in different time periods.

The built-in 2MB Flash storage supports long-term data record to save a large amount of power usage data without frequent export. And CPM-70 can display the accumulated electricity bill and CO<sub>2</sub> carbon emission, providing users with an effective tool to monitor and manage energy consumption and assess environmental impact. PM-70 series electricity meters are very suitable for applications in the fields of power monitoring, management, and power quality analysis.



## ■ Features

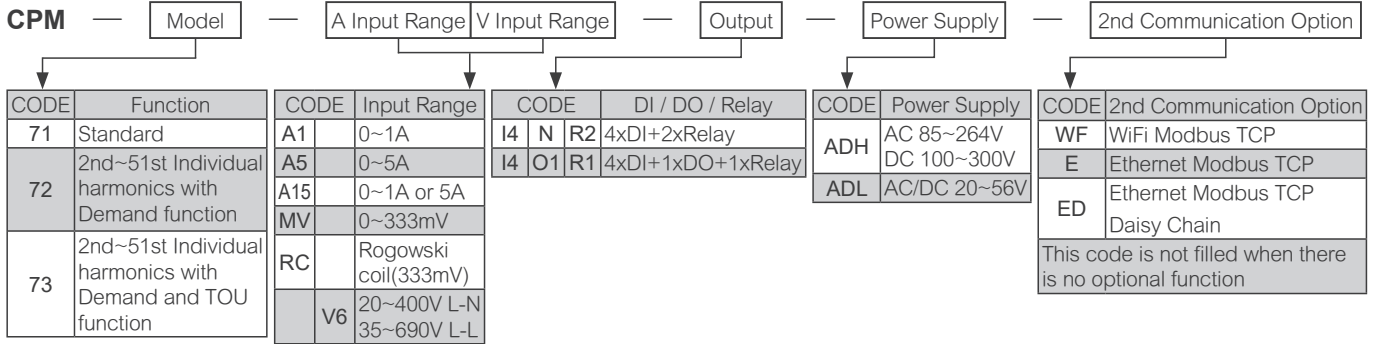
- Measuring 1P2W/1P3W/3P3W/3P4W system and the setting is programmable.
- Measuring balance unbalance loading system, including power parameters such as voltage, current, frequency, power factor, active power, reactive power, apparent power and energy.
- CT input current can be set 1A or 5A by the user.
- The number of sampling cycles is the number of cycles of the input frequency, and each cycle samples 128 points.
- The large-size, high-brightness LCD is easy and clear to read even under direct sunlight.
- Innovative meter AI calculation can perform automatic line adjustment (See Note).
- Embedded 2MB non-volatile memory(NVM) which is with data and events recording function, can record for a long time.
- Ethernet Modbus TCP is optional for the second communication. And the dual-port design and daisy-chaining capability remove need for additional switches.
- Measuring voltage and current up to 51st individual harmonic, and can maintain power stability, and moreover, to avoid risk of equipment malfunction.
- Standard with time of use (TOU) function, which can perform power consumption with differential statistics according to the electricity consumption period.
- Standard with 4 sets of DI and 2 sets of DO, and is designed with a variety of I/O control functions to facilitate on-site monitoring and alarm needs.
- Standard with 1 set of RS-485 Modbus RTU, and it's optional for one more set of Ethernet or WiFi interface (Modbus TCP).
- CE, and FCC approved.

**Note: Auto wiring function is conditional, please refer to operation manual.**

## ■ Applications

- Energy management system
- Intelligent power panel
- Community power monitoring
- Power Grid automation
- Factory automation
- Industrial automation
- Intelligent green building

**Ordering Information**



**Meter Selection Guide**

Measurement items and functions		71	72	73
Voltage	Total and per phase L-L and L-N	●	●	●
Current	Total and per phase and neutral	●	●	●
Active Power	Four quadrants/per phase and active power total	●	●	●
Reactive Power	Four quadrants/per phase and reactive power total	●	●	●
Apparent Power	Total and per phase	●	●	●
Power Factor	Total and per phase	●	●	●
Frequency	Frequency	●	●	●
Active Energy	Import / Export / Total / Net	●	●	●
Reactive Energy	Import / Export / Total / Net	●	●	●
Apparent Energy	Total	●	●	●
THD/Voltage	Total and per phase	●	●	●
THD/Current	Total and per phase	●	●	●
Individual Harmonic	Current and voltage 2nd~51st individual harmonics		●	●
Phase Angle	Current and voltage	●	●	●
Unbalance	Current and voltage	●	●	●
Demand	Current, active, reactive, apparent power		●	●
Max/Min Demand values	Max Current, Max/Min power and time stamp		●	●
Max/Min Values	Parameter values and time stamp	●	●	●
Event Recording	Record the following parameter alarm events(up to16 records): frequency, phase voltage, line voltage, current, active/reactive/apparent power, power factor, voltage/ current unbalance, active/reactive/apparent power demand, current demand	●	●	●
Data Logging	With a 2MB memory capacity and a setting of "10 data points recorded per minute, each data point being 4 bytes", data can be recorded continuously for 28 days, storing a total of 40,300 records. The following parameters can be set to logging: frequency, phase voltage, line voltage, current, active/reactive/apparent power, power factor, active/ reactive/apparent energy, voltage THD max/min values, current THD max/min values, active/reactive/ apparent power demand max/min values, current demand max values	●	●	●
Communication Port	RS-485 Modbus RTU	●	●	●
Wireless Port	WiFi Modbus TCP	◎	◎	◎
Ethernet Port	Single or dual port Ethernet Modbus TCP	◎	◎	◎
Digital Input	DI1, DI2, DI3, DI4	●	●	●
Digital Output	DO1	●	●	●
Relay Output	RO1, RO2	●	●	●
Time of Use	4 time zones, 8 periods, 4 tariff			●
Date and Time	Year, Month, Day, Hour, Minute, Second	●	●	●
Run hour	Operating hours, Running hours	●	●	●
CO <sub>2</sub> Emission	Total CO <sub>2</sub> weight of energy(Kg)	●	●	●
Cost	Total cost of energy	●	●	●

◎ Optional features

## Accuracy & Resolutions

Parameter	Accuracy	Resolution	Measurement Range
Voltage	0.2%	0.1V	20~400V L-N / 35~690V L-L
Current	0.2%	0.001A	1%~120% CT rating current
Neutral Current	1.0%	0.001A	1%~120% CT rating current
Active Power	0.5%	1W	-999,999,999~999,999,999W
Reactive Power	0.5%	1Var	-999,999,999~999,999,999Var
Apparent Power	0.5%	1VA	0~999,999,999VA
Power Factor	0.5%	0.001	-0.020~+1.000~0.020
Frequency	0.05%	0.01Hz	45.00~65.00Hz
Active Energy	Class 0.5S	0.1kWh	0~99,999,999.9kWh
Reactive Energy	Class 2.0	0.1kVarh	0~99,999,999.9kVarh
Apparent Energy	0.5%	0.1kVAh	0~99,999,999.9kVAh
THD	1.0%	0.1%	0~100.0%
Individual harmonic	1.0%	0.1%	0~100.0%
Unbalance	0.5%	0.1%	0~300.0%
Voltage and Current Phase Angle	1.0%	0.1°	0.0°~359.9°
Current demand	0.2%	0.001A	0.000~9,999A
Active Power demand	0.5%	1W	-999,999,999~999,999,999W
Reactive Power demand	0.5%	1Var	-999,999,999~999,999,999Var
Apparent Power demand	0.5%	1VA	0~999,999,999VA

## Technical Specification

### Electrical Characteristics

Measurement:	True RMS measurement
Sampling:	128 point/cycle
Display refresh rate:	0.5s
Power system:	1P2W, 1P3W, 3P3W, (1, 2, 3CT); 3P4W(1,3CT) Balance/Unbalance
Input range:	Voltage: 20~400VLN ; 35~690VLL PT primary ratio: 100~1,200,000V PT secondary ratio: 50~500V Current: 5A / 1A / 333mV CT primary ratio: 1~9999A CT secondary ratio: 1A / 5A / 333mV
Overload capacity:	Current: 2x rated continuous ; 20x rated / 1s
Input burden:	Voltage: <0.2VA ; Current: <0.1VA

### Power Quality

THD:	Total harmonic distortion for voltage and current
Individual harmonic:	2nd~51st individual harmonics for voltage and current and odd, even harmonic content The display can be switched to display the odd harmonic content of the 3rd to 15th of voltage and current
Unbalance:	3-phase voltage and current

### Relay Output (RO)

Relay capacity:	2 channels SPST(1a), 5A/250Vac, 5A/30Vdc
Action mode:	Hi / Lo / Hi.Hold / Lo.Hold / RO / OFF
Alarm set points:	Up to 36 parameters of power and demand for alarm

Action function:	Start delay / Start band / Delay ON / Delay OFF / Hysteresis
Start delay time:	0:00.0~9(M):59.9(S)
Start band:	0~9999 counts
Delay ON time:	0:00.0~9(M):59.9(S)
Delay OFF time:	0:00.0~9(M):59.9(S)
Hysteresis:	0~9999 counts

### Digital Input (DI)

Input capacity:	4 channels DI input, mechanical contact or open collector input are available
Function mode:	Can be set to DI / Demand reset / Max. Demand reset / Energy reset / Max. and Min. reset / Relay reset
Debouncing time:	0~99 (x8ms) programmable

### Digital Output (DO)

Output capacity:	Open collector(O.C.), 30Vdc, 30mA(max)
Output frequency:	1000Hz(max)
Pulse divider:	1~9999 (1 Pulse= 0.1kWh, if set 100, 1 Pulse= 10.0kWh)
Pulse width:	0~5000ms, 0 is duty cycle 50%
Energy assign:	Import active energy / Export active energy / Import reactive energy / Export reactive energy / Test pulse
Test pulse output:	3200 Pulse/1kWh, Duty cycle 50%

### Demand

Calculation method:	Block / Sliding
Period:	1~60 min
Demand record:	Records of Max/Min value and time stamp

### TOU (Time of Use)

4 time zones:	1~4 zones per year
8 periods:	Each time zone can set 1~8 periods The sharp, peak, valley and normal tariff can be specified for each period
Parameters of TOU:	Cumulative value of import and export active energy, import and export reactive energy, total apparent energy for each tariff of previous and current month; and maximum current and power demand of each tariff for current month
Holiday setting:	The date and timetable of holiday for five years can be set individually or set on the same holiday for five years

### Data Log

Log setting:	The specified parameters can be recorded according to the set interval time, the interval time can be set from 1 to 32767, and the interval time unit can be set as day, hour, minute, second With a 2MB memory capacity and a setting of "10 data points recorded per minute, each data point being 4 bytes", data can be recorded continuously for 28 days, storing a total of 40,300 records.
Event recording:	The event and time when an exception occurs can be recorded (up to 16 records)
Memory storage:	32KB FRAM & 2MB Flash, no battery life issue

### RS-485 Communication

Protocol:	Modbus RTU mode
Address:	1~247

Baud rate: 1200/2400/4800/9600/19200/38400/57600/115200 bps  
 Response time: ≤50ms(receive command completion to start transferring data)  
 Parity: None / Even / Odd  
 Data bits: 8 bits  
 Stop bit: 1 or 2  
 Distance: 1200M max

### WiFi (Optional)

Standard: IEEE 802.11 b/g/n Standard  
 Protocol: Modbus TCP  
 Antenna connector: SMA Female  
 TCP socket: 4 sockets

### Ethernet (Optional)

Interface: Single or dual port, 10/100M BASE-TX RJ45 connector  
 Dual-port structure: Daisy-chaining capability  
 Protocol: Modbus TCP  
 TCP socket: 4 sockets

### Environmental Conditions

Operating Temp.: 0~60 °C  
 Humidity rating: 5~95 %RH, Non-condensing  
 Temp. coefficient: ≤100 PPM/°C  
 Storage Temp.: -10~70 °C  
 Degree of protection: Front panel: IP50; Housing: IP20  
 Operating altitude(maximum): 2000m above sea-level

### Power Supply

Range: ADH: AC 85~264V, 50/60 Hz  
 DC 100~300V  
 ADL: AC/DC 20~56V  
 Power consumption: AC: ≤ 10VA @ 230V / DC: ≤ 3W

### Mechanical Structure

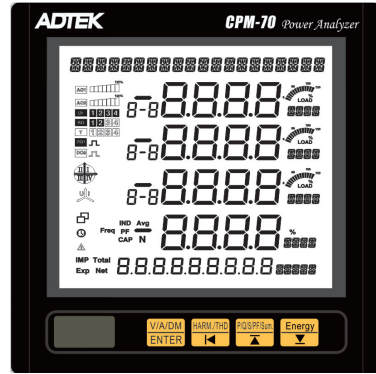
Dimensions: 96mm(W)x96mm(H)x77mm(L)  
 Panel cutout: 90.8mm(W)x90.8mm(H)  
 Material: ABS, Black (with fire-retardant)  
 Mounting: Panel mounting  
 Weight: ≤450g  
 Wire terminal: PA 66 (UL 94V-0)  
 Voltage / Current input:  
 AWG: 26~10 / 0.5~4.0mm<sup>2</sup>  
 Screw Torque Value: M3 / 8.0kgf.cm(Max)  
 Others input:  
 AWG: 28~16 / 0.5~1.5mm<sup>2</sup>  
 Screw Torque Value: M2 / 2.04kgf.cm(Max)

### Safety

Isolation: AC 2.5KV, 50/60Hz, for 1 min, Between Power / Input / Output / Case  
 Surge immunity: AC±4KV, 1.2 / 50us  
 Voltage input / Current input / AUX. power  
 Insulation resistance: ≥100MΩ @ 500Vdc  
 EMC: EN61326-1:2013  
 EN55011:2009+A1:2010  
 EN61000-3-2:2014  
 EN61000-3-3:2013  
 IEC61000-4-2:2008  
 IEC61000-4-3:2010  
 IEC61000-4-4:2012  
 IEC61000-4-5:2014  
 IEC61000-4-6:2013

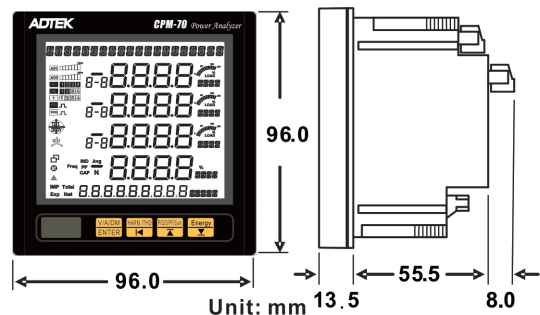
IEC61000-4-8:2009  
 IEC61000-4-11:2004  
 Safety(LVD): EN 61010-1:2010  
 FCC: FCC PART15 SUBPART B 2010  
 Accuracy of Standard  
 Active energy: Class 0.5S (IEC62053-22:2003)  
 Reactive energy: Class 2.0 (IEC62053-23:2003)

## Front Panel

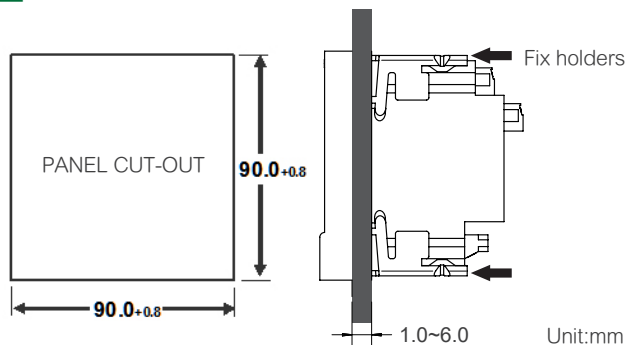


Display: LCD 65(W)x61(H)mm; White back light blue words visible.  
 Backlight: 1~15 min, or light could be set as always on  
 Description: Twenty digits in the top of display: Display parameter name.  
 Four line of digits in the metering area: Display metering data such as voltage, current, power, power factor, frequency, unbalance, etc.  
 Four line of digits in the righty metering area: Display metering data unit.  
 Three line - : 1,2,3 for 3 phase;1-2, 2-3, 3-1 for 3 phase line to line.  
 Nine and five digits: Display energy value and unit. Also display date and time.  
 Display 5 power parameters at the same time  
 Bar Graph indicates load percentage  
 Display perpetual calendar date and time  
 IND & CAP load type display  
 Load quadrant display  
 7 kinds of summary pages for home page could be set according to user needs

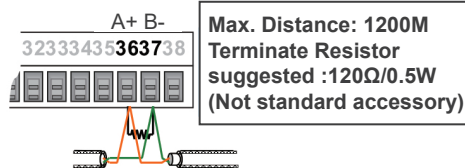
## Dimensions



## Installation

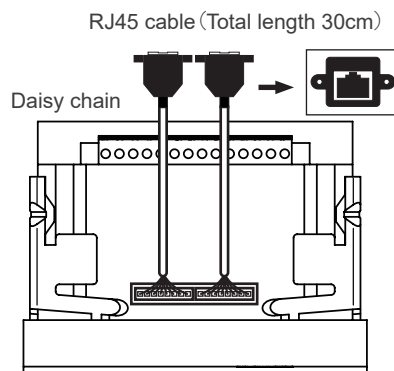


## RS-485 Communication Port

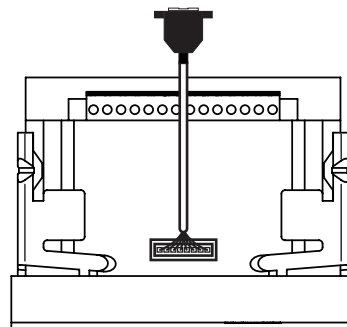


## Ethernet Port

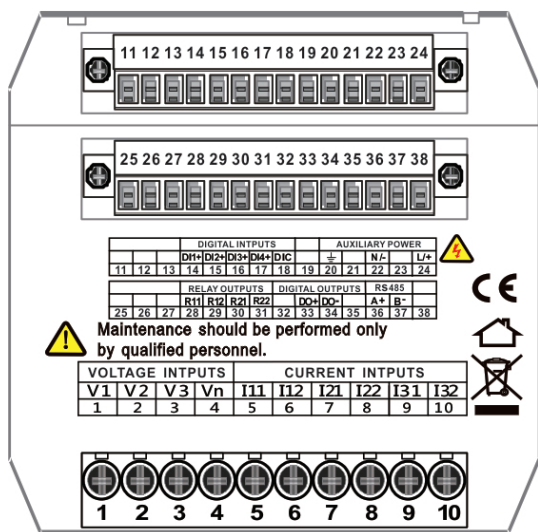
Dual port



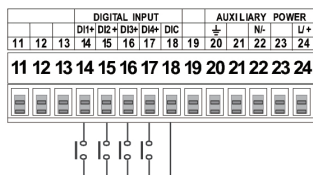
Single port



## Terminal Block



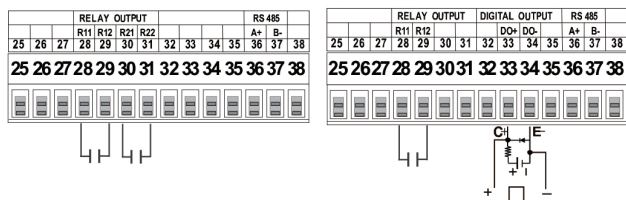
## Digital Input(DI)



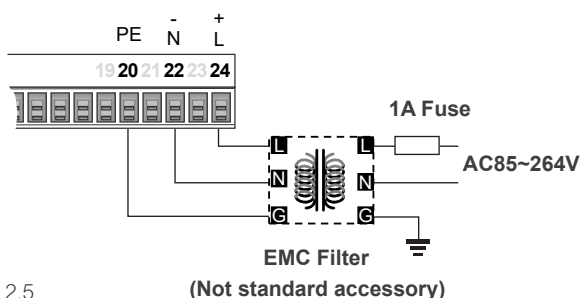
## Relay Output(RO)/Digital Output(DO)

2xRelay

1xRelay+1xDO

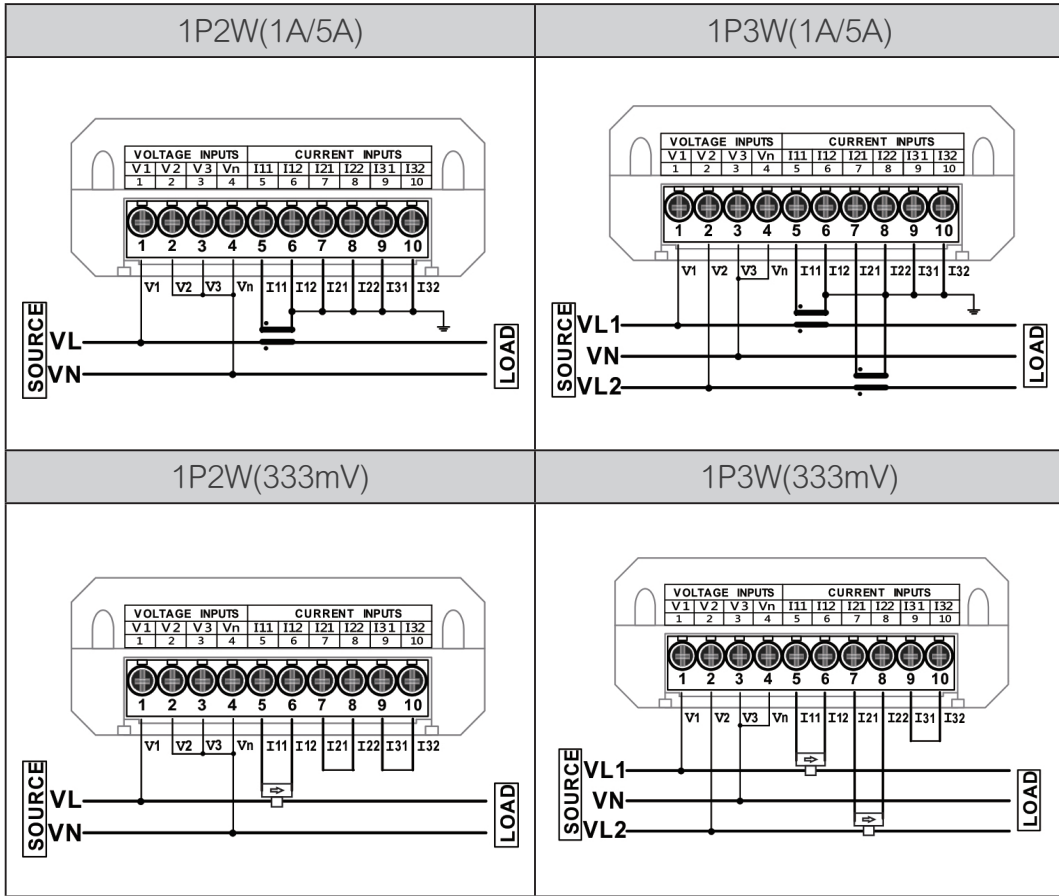


## Power Connection

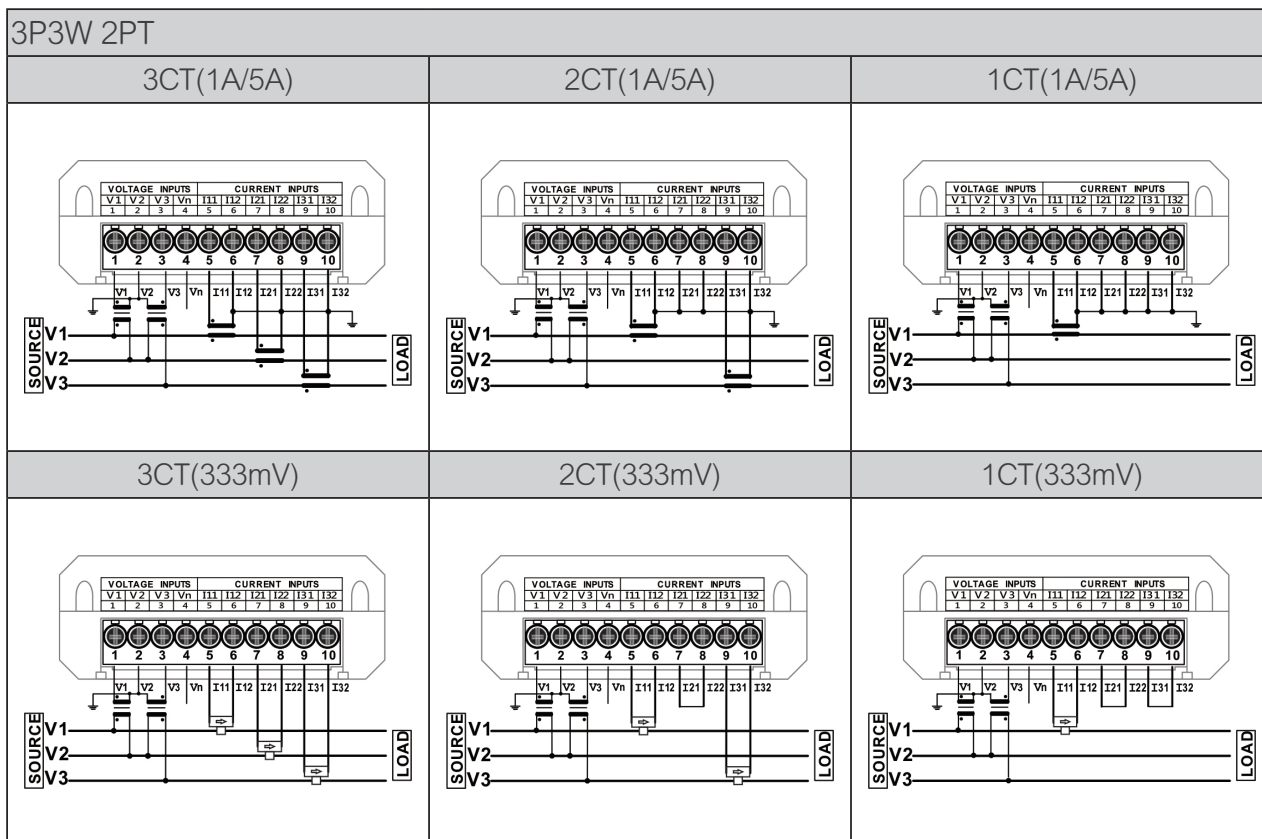
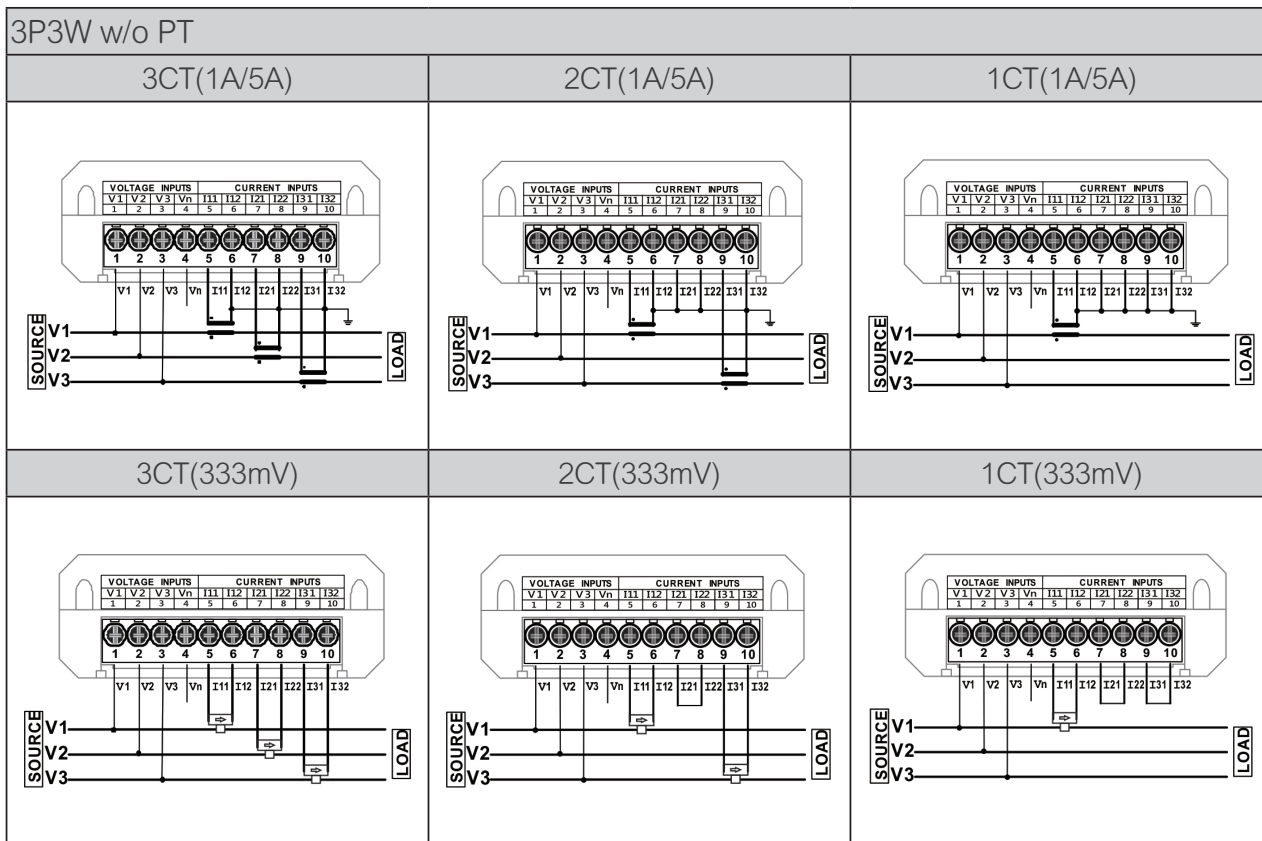
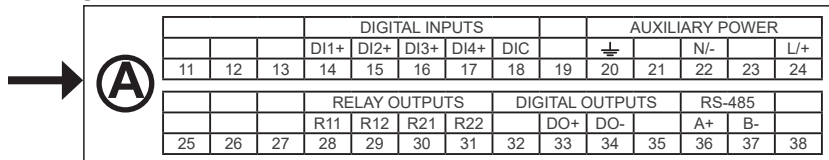


**Voltage and Current Wiring**

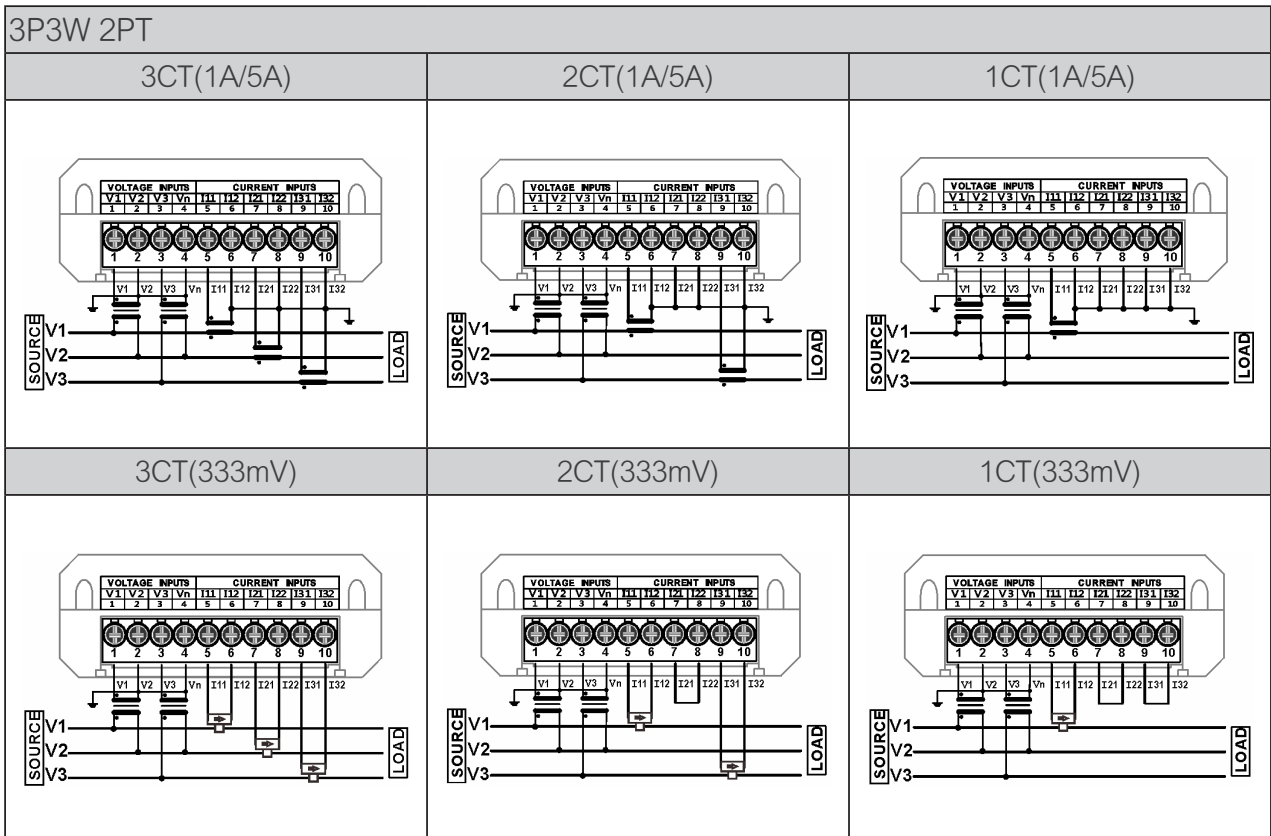
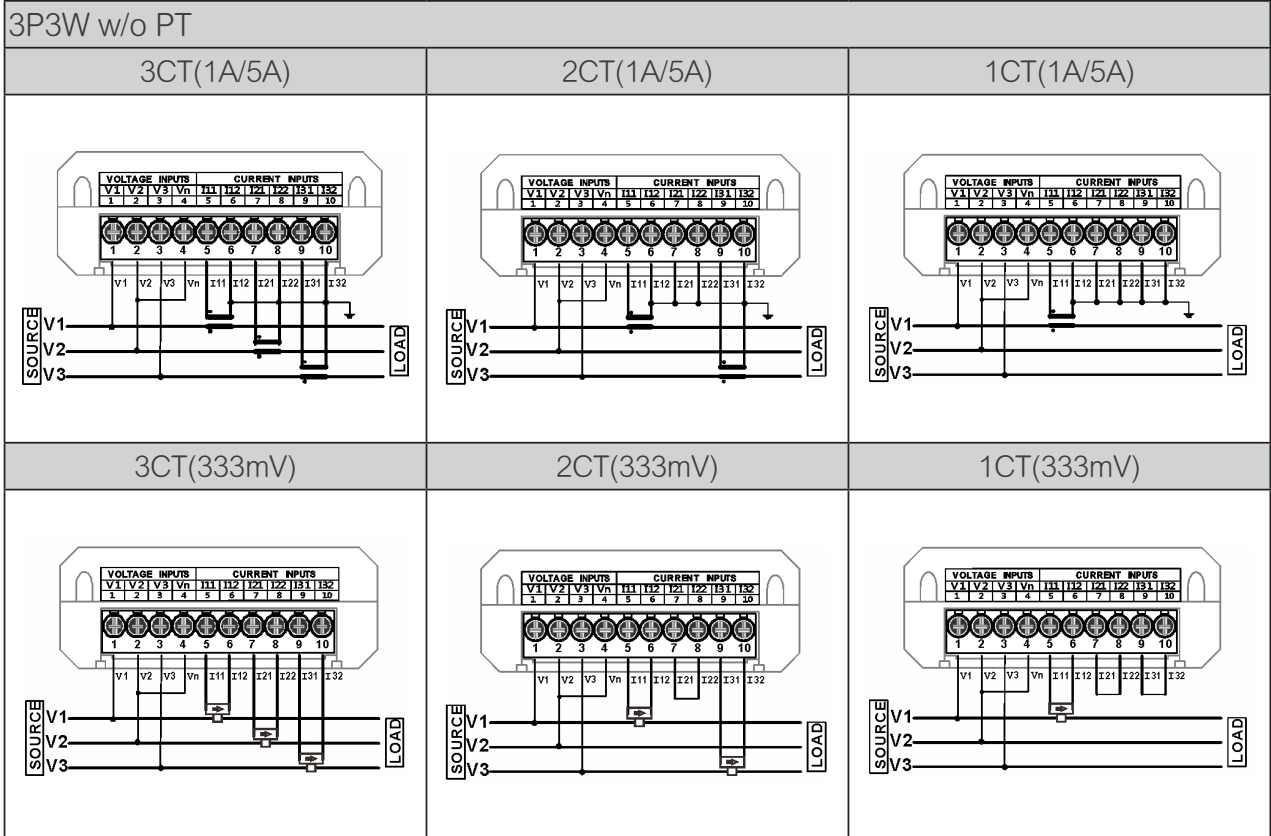
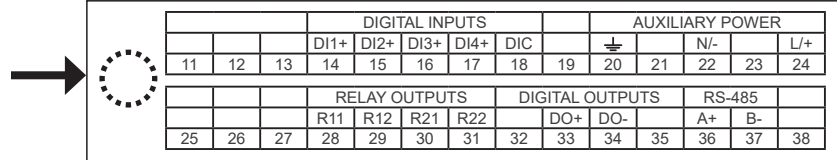
CT secondary side distinguishes 1A/5A and 333mV, the mV of CT signal needs to be wired independently, and cannot be grounded or connected together with each other.

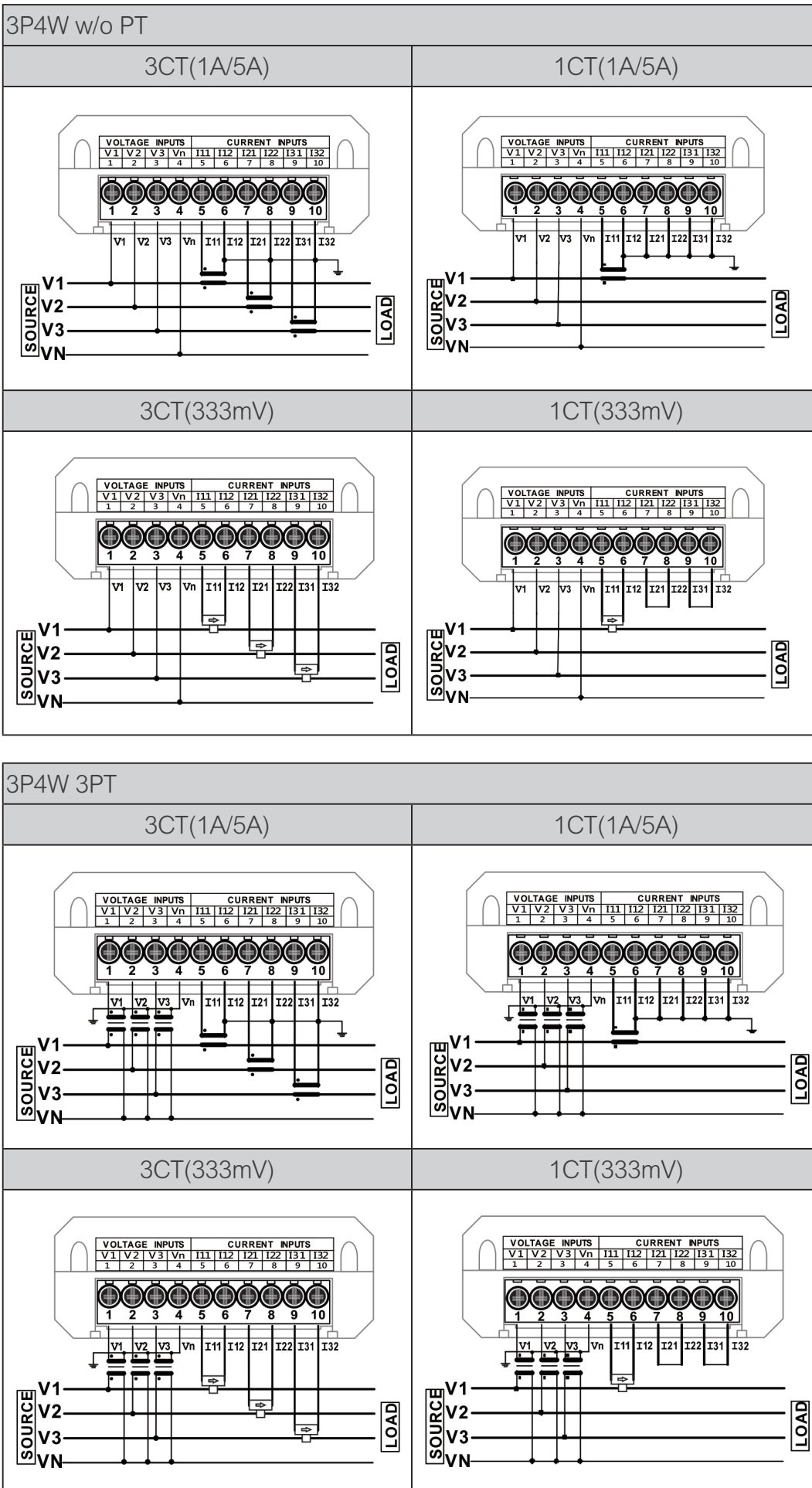


※When the pin label on the back is as shown **A** in the figure below, please refer to the wiring method on this page for 3P3W:



※When the pin label on the back isn't as shown **A** in the figure below, please refer to the wiring method on this page for 3P3W:





**Split Core CT Ordering Information**

(The output line of mV on the secondary side of the CT needs to be wired independently, and cannot be connected together or grounded for protection purposes.)

**US – CTV** — Hole — Primary Current — **2** — Cable Option

CODE	Diameter(mm)	CODE	Rated Current
10	Φ10	005	5A
16	Φ16	060	60A
		100	100A
		150	150A
24	Φ24	200	200A
35	Φ35	300	300A
		400	400A
		600	600A
50	Φ50	800	800A

CODE	Cable Spec.
LSFH	Low smoke zero halogen
This code is not filled when there is no optional function	

Type	Current of primary (A)	Voltage of secondary (mV)	Accuracy %F.S.	Weight
US-CTV-10-005	5A	333	1.0	60g
US-CTV-16-060	60A	333	0.5	100g
US-CTV-16-100	100A	333	0.5	100g
US-CTV-16-150	150A	333	0.5	100g
US-CTV-24-200	200A	333	0.5	205g
US-CTV-35-300	300A	333	0.5	375g
US-CTV-35-400	400A	333	0.5	375g
US-CTV-35-600	600A	333	0.5	375g
US-CTV-50-800	800A	333	0.5	655g



## Meter Screen Protection Cover (Optional)

Model: **U – COV – K100A**

Function: To upgrade the protection degree to IP67

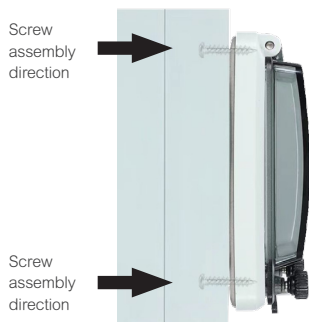
Material: PC and foaming material

Dimensions: Square shape, 143 x 121 x 33mm

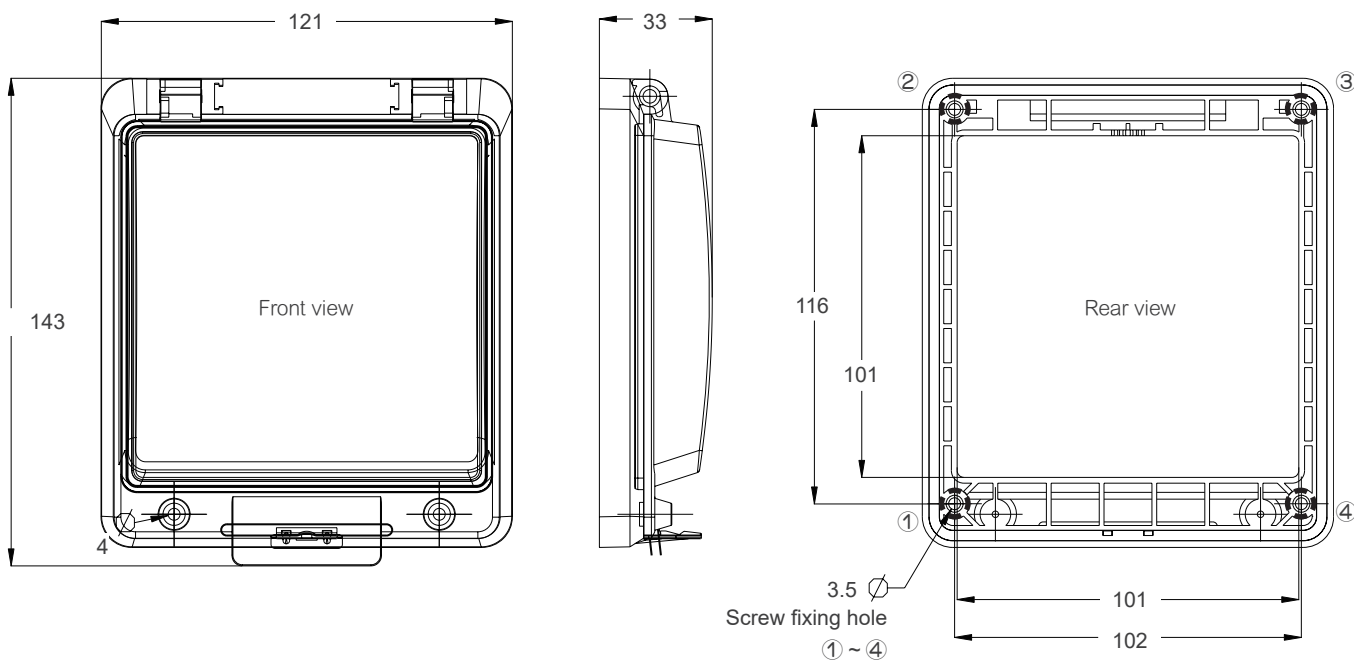
Installation: Secure the protective cover with 4 screws from the rear of the mounting board.



(This is an assembly diagram. Please order the meter separately.)



### Dimensions



(Unit: mm)