

# CPM-70 Multifunction Power Analyzer

## Description

CPM-70 multifunction power analyzer provide high accuracy single phase and three-phase energy measuring and displaying, energy accumulating, power quality analysis, data logging and data communication.

CPM-70 series meters are able to measure bidirectional, four quadrants kWh and kVarh.

It provides maximum/minimum records for power usage and power demand parameters.

Hardware standard built in a RS485 Modbus communication port , 4 Digital inputs, 2 Relay outputs, LCM and 2 MB flash for data-logging.

In addition , also provide TOU , voltage and current THD, harmonics up to the 31st and auto wiring change (Note) via software .

FCC and CE Approved

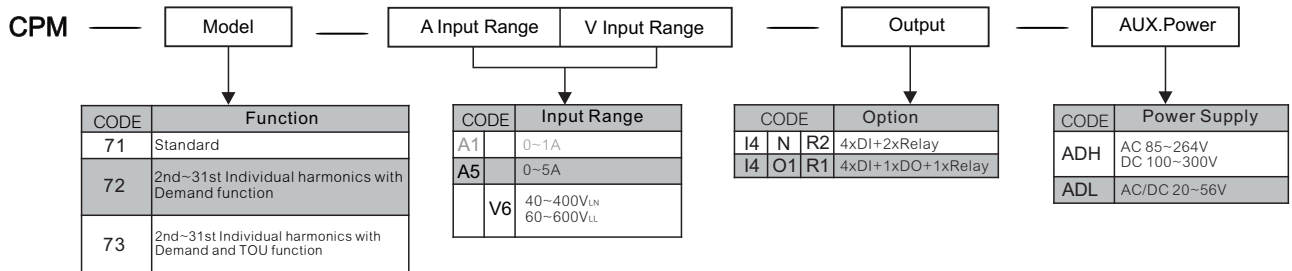
**Note: Auto wiring change will be had condition limit ,please refer to operation manual.**



## 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

Features	71	72	73	
Voltage	V <sub>12</sub> V <sub>23</sub> V <sub>31</sub> V <sub>LL,Avg</sub> / V <sub>1</sub> V <sub>2</sub> V <sub>3</sub> V <sub>LN,Avg</sub>	●	●	●
Current	I <sub>1</sub> I <sub>2</sub> I <sub>3</sub> I <sub>Avg</sub> I <sub>N</sub>	●	●	●
Active Power	Four quadrants P <sub>1</sub> P <sub>2</sub> P <sub>3</sub> Σ P	●	●	●
Reactive Power	Four quadrants Q <sub>1</sub> Q <sub>2</sub> Q <sub>3</sub> Σ Q	●	●	●
Apparent Power	S <sub>1</sub> S <sub>2</sub> S <sub>3</sub> Σ S	●	●	●
Power Factor	PF <sub>1</sub> PF <sub>2</sub> PF <sub>3</sub> PF <sub>Avg</sub>	●	●	●
Frequency	Hz	●	●	●
Active Energy	Wh Imp Wh Exp Wh Total Wh Net	●	●	●
Reactive Energy	Varh Imp Varh Exp Varh Total Varh Net	●	●	●
Apparent Energy	VAh	●	●	●
THD/Voltage	THD <sub>V12</sub> THD <sub>V23</sub> THD <sub>V31</sub> THD <sub>V,Avg</sub>	●	●	●
THD/Current	THD <sub>I1</sub> THD <sub>I2</sub> THD <sub>I3</sub> THD <sub>I,Avg</sub>	●	●	●
Individual harmonic	2nd~31st Individual harmonics		●	●
Demand	Current Demand, Power Demand		●	●
Max. Demand recording	Max. Demand of Current & Power and time stamp		●	●
Max/Min Values	Maximum / Minimum values and time stamp	●	●	●
Event Record	FREQ, V, U, I, P, Q, S, PF, Unbl_V, Unbl_I, LCR, THD_V, THD_I, DM_P, DM_Q, DM_S, DM_I	●	●	●
Data Record	FREQ, V, U, I, P, Q, S, PF, Unbl_V, Unbl_I, LCR, THD_V, THD_I, DM_P, DM_Q, DM_S, DM_I, AE, QE, SE, Phasor Diagram_V, Phasor Diagram_I, MAX/MIN	●	●	●
External Control Input	ECI1 ECI2 ECI3 ECI4	●	●	●
Digital Output	DO1	●	●	●
Relay Output	RO1 RO2	●	●	●
Time of Use	4 seasons, 8 tariff settings per day, Per year or up to 5 years setting			●
Date and Time	Year, Month, Day, Hour, Minute, Second	●	●	●
Run hour	Operating hour, Run hour	●	●	●
CO <sub>2</sub> Emission	Total CO <sub>2</sub> weight of energy	●	●	●
Cost	Total cost of energy	●	●	●

## Accuracy & Resolutions

PARAMETER	ACCURACY	RESOLUTION	MEASUREMENT RANGE
Voltage	0.2%	0.1V	40.0~400.0Vac(V <sub>LN</sub> )
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	-999999999~999999999W
Reactive Power	0.5%	1Var	-999999999~999999999Var
Apparent Power	0.5%	1VA	0~999999999VA
Power Factor	0.5%	0.001	-0.020~+1.000-0.020
Frequency	0.1%	0.01Hz	45.00~65.00Hz
Active Energy	0.5%	0.1kWh	0~99999999.9kWh
Reactive Energy	0.5%	0.1kVarh	0~99999999.9kVarh
Apparent Energy	0.5%	0.1kVAh	0~99999999.9kVAh
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%

## Technical Specification

### Electrical Characteristics

- Measurement: True RMS  
 Sampling: 128 point/Cycle  
 Metering system type: 1P2W, 1P3W, 3P3W, (1 ∨ 2 ∨ 3CT) ∨ 3P4W (1 ∨ 3CT) ; Balance/Unbalance  
 Voltage: 40~400V<sub>LN</sub> ; 60~600V<sub>LL</sub>  
 PT Primary side ratio: 100~1200000V  
 PT Secondary side ratio: 50~500V  
 Current: 0~5A, (Optional:0~1A)  
 CT Primary side ratio: 5~9999A  
 Frequency: 45~65Hz  
 Metering over range: Voltage: 2x rated voltage continuous ; 2500V,1sec  
 Current: 2x rated current continuous ; 20x rated current 1sec  
 Input load: Voltage: <0.2VA ; Current:<0.1 V A

### Power Quality

- THD: Total harmonic distortion for voltage and current  
 Individual harmonic: 2nd~31st individual harmonics for voltage and current

### Relay Output(RO)

- Relay contact form: Dual SPST(1a) ; 5A/250Vac ; 5A/30Vdc ;  
 Relay action mode: Hi / Lo/Hi.Hold / Lo.Hold /DO  
 Set points: Up to 34 parameters of power and Demand for assign  
 Digital output mode: Second RO if set to pulse output mode, the maximum frequency is 50Hz

### External Control Input (ECI)

- Input mode: 4 channels ECI input ; mechanical contact open collector input are available  
 Input function: Can set up for DI /Demand reset / Max. Demand reset / Energy values reset / Max. and Min. values reset / Relay reset  
 Debouncing time: 0~99 (x8mS) programmable

### Digital Output (DO)

- Output mode: Open collect(O.C.) ; Output: 30Vdc, 30mA(max)  
 Output frequency: 1000Hz(max)  
 Pulse divider: 1~9999 (1 Pulse= 0.1kWh; if set 100, 1 Pulse= 10.0kWh)  
 Pulse width: 0~5000(mS),0 is duty cycle 50%  
 Energy pulse output: 3200 Pulse/1kWh,Duty cycle 50%

### Demand

- Calculation method: Slide / Fix



## TOU (Time of Use)

4 Seasons: 1~4 seasons per year  
 8 Tariff setting: 1~8 each day (For peak, mid peak, off peak per day for billing)  
 Parameters of TOU: AE-Imp、AE-Exp、AE-Total、RE-Imp、RE-Exp、RE-Total、SE、SE-Total  
 Yearly setting: Tariff setting for 1 year or set up to 5 years

## Data Logging

Setting: Load setting from previous saved file or set according to needs. Time interval from 1~32767 for second, minute, hour or day, depend on value record needs.  
 Memory storage: 2MB Flash ROM, Store various parameters. Even if the working power is lost, the parameter data is not lost.

## RS485 communication

Protocol: RS485 Modbus RTU mode  
 Baud rate: 1200/2400/4800/9600/19200/38400 bps  
 Response time: ≤ 50ms (receive command completion to start transferring data), 9600 bps or more.  
 Data bits: 8 bits  
 Parity: None / Even / Odd  
 Stop bit: 1 or 2  
 Address: 1~247  
 Distance: 1200M max  
 Terminate resistor: 120~300Ω/0.25W (typical: 150Ω)

## Environmental Characteristics

Operating Temp.: 0~60℃  
 Humidity rating: 5~95%RH, Non-condensing  
 Temp. coefficient: ≤100 PPM/℃  
 Storage Temp.: -10~70℃  
 IP Enclosure: Front panel: IEC 529 (IP50) ; Housing: IP20

## Power Supply

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

## Mechanical Characteristics

Dimensions: 96mm(W)x96mm(H)x78mm(L)  
 Panel cutout: 90mm(W)x90mm(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)

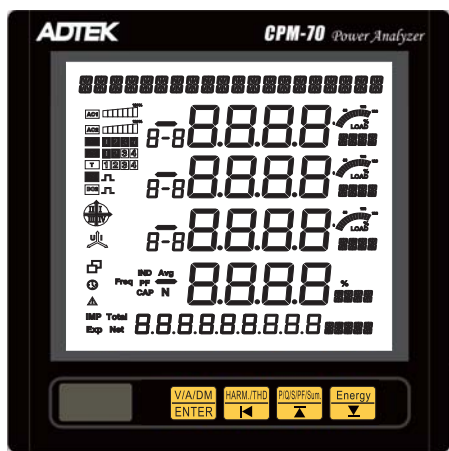
## Safety

Isolation: AC 2KV, 50/60Hz, for 1 min, Between Power / Input / Output / Case  
 Insulation resistance: ≥ 100MΩ @ 500V<sub>dc</sub>  
 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  
 LVD: EN61010-1:2010  
 FCC: FCC PART15 SUBPART B 2010

## Accuracy of energy

Active energy 0.5S Class (IEC62053-22:2003)  
 Reactive energy 2.0 Class (IEC62053-23:2003)

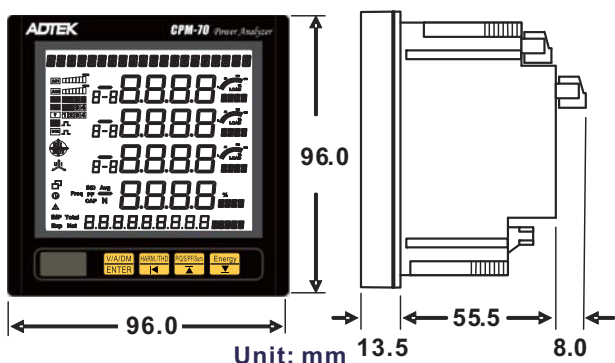
## Front panel



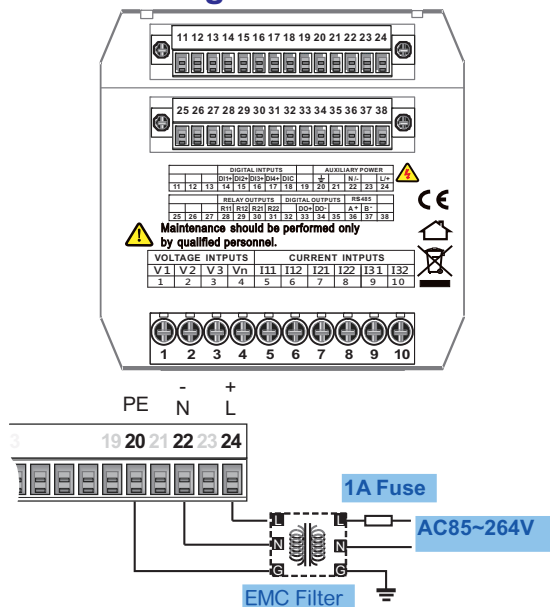
Display: LCD 65(W)x61(H)mm ; White back light blue words visible.  
 Backlight delay time : 0~15 min ( "0" is always on).

Description: Twenty digits in the top of display area: Display mode indication.  
 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 metering area : Display metering data unit.  
 Three line - digits: 1, 2, 3 for 3 phase ; 1-2, 2-3, 3-1 for 3 phase line to line.  
 Nine and five digits: Display energy data and unit.  
 Also display real time o'clock.

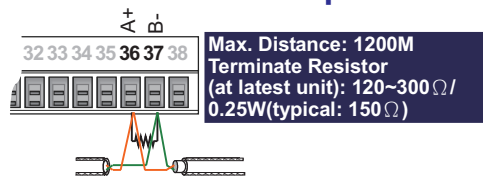
## Dimensions



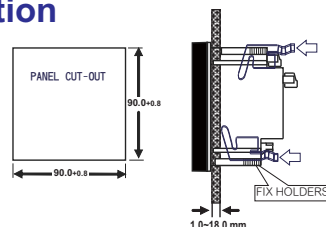
## Connection diagram



## RS485 Communication port



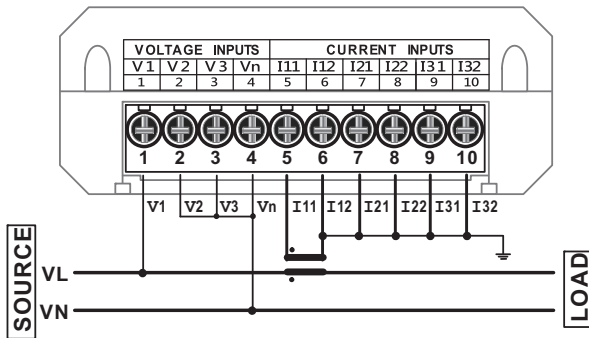
## Installation



# Voltage and current connection

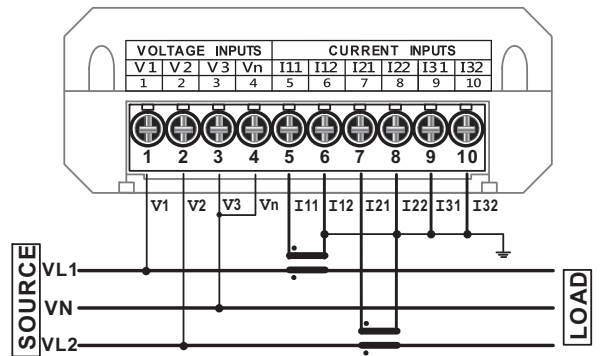
## 1P2W

w/o PT/ 1CT



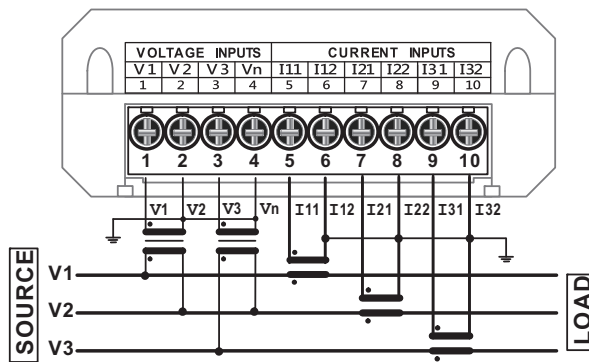
## 1P3W

w/o PT/ 2CT

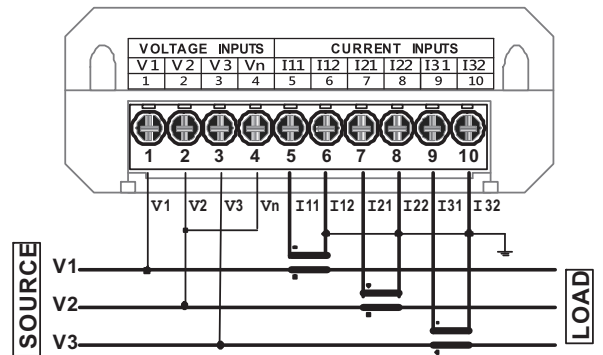


## 3P3W

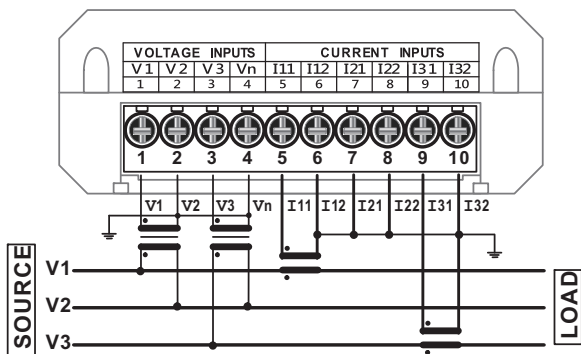
2PT/ 3CT



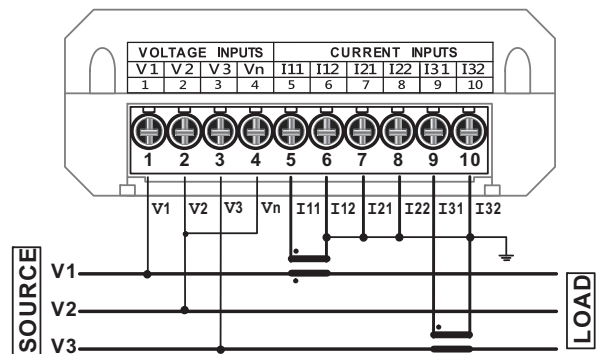
w/o PT/ 3CT



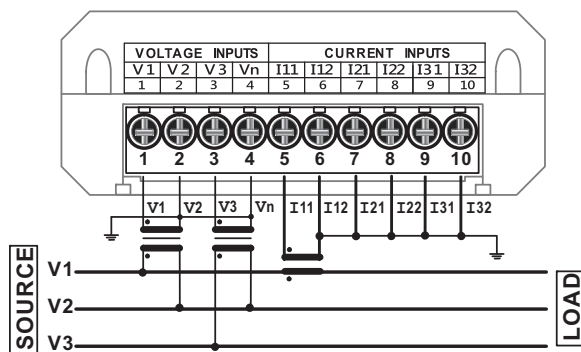
2PT/ 2CT



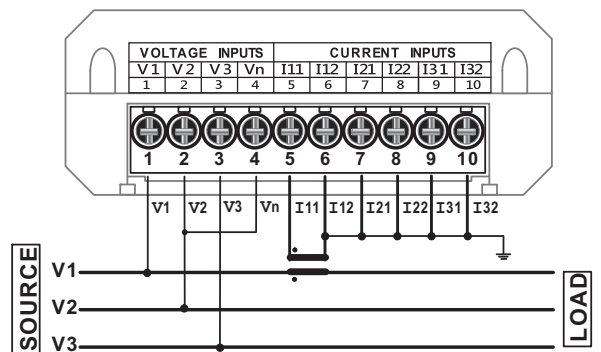
w/o PT/ 2CT



2PT/ 1CT



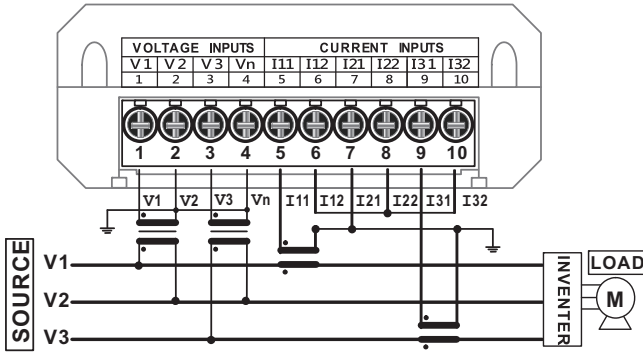
w/o PT/ 1CT



CPM-70

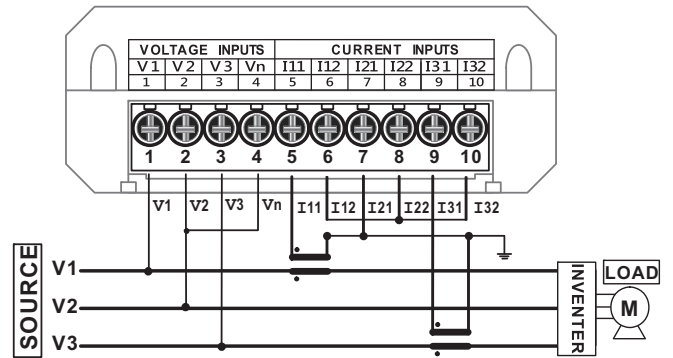
2PT/ 2CT

※This CT connection is available use for Inverter load or normal load situation



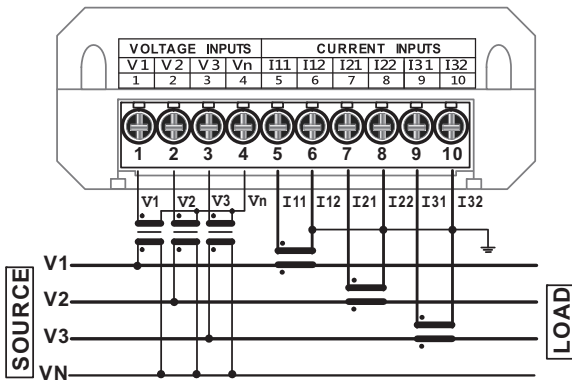
w/o PT/ 2CT

※This CT connection is available use for Inverter load or normal load situation

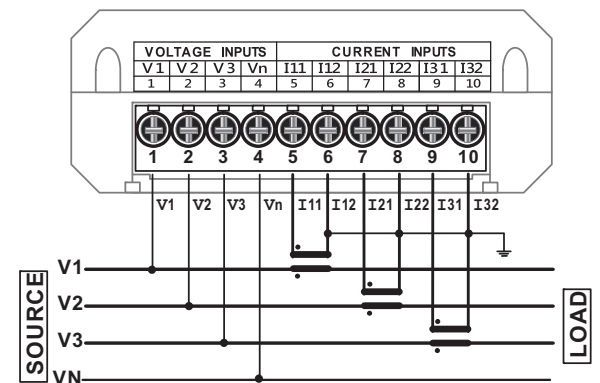


3P4W

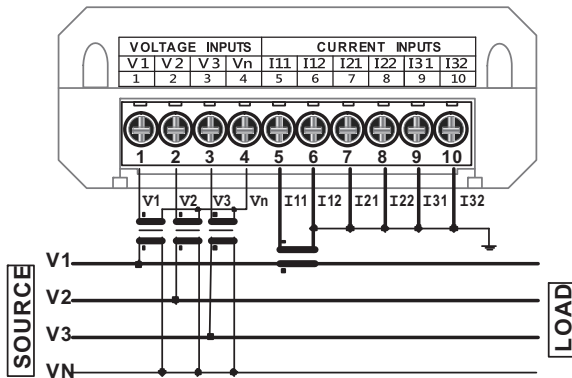
3PT/ 3CT



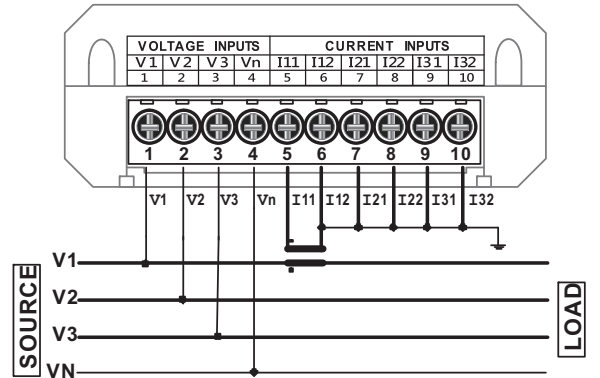
w/o PT/ 3CT



3PT/ 1CT

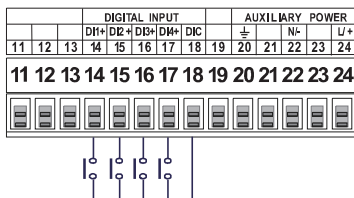


w/o PT/ 1CT



External Control Input (ECI)

Wire:AWG22~16(0.5~1.3mm<sup>2</sup>)



Relay Output(RO)/ Digital Output (DO)

Wire:AWG22~16(0.5~1.3mm<sup>2</sup>)

