smartcontroller

Electrical Excellence

SETUP MANUAL

MULTI - FUNCTION ENERGY ANALYSER SMART VEN 485

INTRODUCTION

FEATURES

High Sample Rate	The synchronous sampling rate reaches as high as 6khz
Real-time Operation	Within 2ms after very cycle, the meter can liquidate all the RMS value, power and other parameters to meet the requirement of protection-level operation.
High Communication Rate	RS485：1200 bps-115.2kbps.
Flexible communication protocol	Each meter supports several usual protocol address or specially designed protocol addresses.
Analysis of Higher Harmonic	Harmonic measurement：2nd-60th,the harmonic algorithm
Accuracy	0.2%；the accuracy of the whole Meter：0.5%
Abundant Statistical Data	The Meter can calculate the demand and maximum or minimum of the voltage,current and power with the RTC time label to choose.
High Reliability	The Meter has passed 4 levels EMC test and can operate with full voltage under the perception power-fail intelligent storage system

FUNCTIONS

The Multi-function panel meter is a top new-generation intelligent panel meter,developed on arm processor and 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.

The Multi-function panel meter can measure the whole power consumption accurately. With the real time clock installed,it supports time-sharing energy. The harmonic measurement is as high as 60 times and more than 0.5%. The heat-emitting electricity machine mode installed inside can be used to protecting the electricity machine of middle and low voltage. The communication port is designed according to MODBUS Protocol. The communication rate is as high as 115.2kpbs.

The main monitoring and controlling function of the multi functional panel meters are as followed. The basic electricity parameters: Voltage, Current, Power Factor, Frequency, Time sharing energy and so on monitoring 2-60 times harmonic content, the total derivation ratio of odd harmonic,the total harmonics content, unbalance level of three phase voltage and current sequence analysis of voltage and current. The demand and the max / min the average, the maximum, the minimum and the demand of,voltage, current and the power.

SPECIFICATION

INFORMATION FOR YOUR OWN SAFETY

This manual dose not contains all of the safety measures for operation of this equipment (module, device) because special operating conditions, local code requirements or local code requirements or regulations may necessitate further measures.

However, it dose contain information which must be adhered to for your own personal safety and to avoid damage to the equipment. This information is highlighted by a warning triangle with an exclamation mark or a lightning bolt depending one the severity of the warning.

QUALIFIED PERSONNEL

Installation and operation of this equipment described in this manual may only be performed by Qualified personnel.

QUALIFIED PERSONNEL EXPLAINED

Only people that are authorized to install, connect and use this equipment and have the proper there knowledge about labeling and grounding electrical equipment and circuits and can do so according to safety and regulatory standards are considered qualified personnel in the manual.

Warning

Means that failure to observe the instruction can result in death, serious injury or considerable material damage.

Caution

Means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

USE FOR THE INTENDED PURPOSE

The equipment (device, module) may only be used for the application cases specified in the catalog and the user manual and only in connection with devices and components recommended and approved by Smart Controller.

PROPER HANDING

The prerequisites for perfect, reliable operation of the product are proper transport, storage, install and connection, as well as proper operation and maintenance.

When operation electrical equipment, certain parts of this equipment carry dangerous voltages. Improper handing can therefore result in serious injury or material damage.

- Only use isolated tools suitable for the voltages the meter is used for.
- Do not connect while circuit is live (hot).
- Place the meter only in fry surroundings.
- Do not mount the meter in an explosive.area or exposed to dust, mildew and/or insects.
- Make sure the AC wires are connected correctly before activating the current/voltage to the meter
- Do not touch the meter's connection clamps directly with your bare hands, with metal, blanket wire or other conducting material as that will cause an electric shock and possible.
- Make sure the protection cover is placed after installation.
- Qualified personnel should only do installation, maintenance and repair.

VOLTAGE INPUTS

- 20 - 280 Volts line to neutral, 2
- 480 Volts Line to line.
- Universal voltage input
- Input withstand capability
- Meets IEEE C37.90.1(surge withstand capability)
- Programmable voltage range to any PT ratio
- Supports: 3 phase 3 or 4 wires, 400/230V, 110/63V, 208/120V
- Burden: 0.36VA per phase max at 600V, 0.014VA at 120 volts
- Input wire gauge max (AWG 12/2.5mm

CURRENT INPUTS

- Class：(0 to 5)A,5 amp nominal
- Fault current withstand： 100 ams for 10 seconds. 300 amps for seconds,500 amps for 1 second.
- Programmable Current to Any CT ratio
- Burden 0.005VA per phase Max at 11Amps
- 5mA Pickup Current
- Pass through wire gauge dimension： 0.177”/4.5mm
- Continuous current withstand： 20 amps for screw terminated or pass through current connections

ISOLATION

All inputs and Output are galvanically isolated to 2500V.

SENSING METHOD

- RMS
- Sampling at 120+ Samples per Cycle on all channels measured readings simultaneously
- Harmonic %THD (% of Total Harmonic Distortion)

UPDATE RATE

- Watts, VAr and VA-100Msec
- All other parameters-1second

POWER SUPPLY

- Option D2
- (65 to 75) Volts AC and (90 to 380) Volts DC. Universal AC/DC Supply
- Option D
- 18-60VDC Burden：10VA max.

COMMUNICATION FORMAT

- 2 Com Ports (Back and Face Plate)
- RS485 Port (Through Back Plate)
- 10/100 Base T Ethernet Modbus TCP (INP10)
- Com Port Baud Rate：（1200 to 115200）
- Com Port Address：0-247
- 8 Bit, No parity
- Modbus RTU protocols

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)	±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.

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
Shock	30g In 3 Planes

STEP BY STEP SET UP INSTRUCTIONS

TWO KEY MODE

Each key has two operating mode. Firstly, the key press down and up instantly. Secondly, the key press down about 2 second. He first mode, we call it short-press mode. The second one, we call it long-press mode.

In measurement status, keys have the following functions:

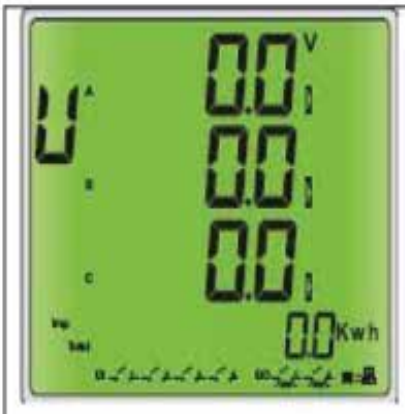
Key	Key mode	Function
	Short Press	Enter Display Volts amps picture
	Short Press	1. Picture Number add 1 2. Enter Display THD, power factor and Frequency picture
	Short Press	1. Picture number sub 1 2. Enter display power picture
	Short Press	Enter Display Energy Picture.
	Long Press	Enter or Exit Auto Display status
	Long Press	Enter or Exit Max Demand Status
	Long Press	Transformation of Input energy and Output energy
	Long Press	Enter Parameter Setting Status

In programming mode, keys have the following function:

Key	Key mode	Function
	Short Press	Picture Number sub 1
	Short Press	1. Picture Number add 1 2. Set the Number add 1
	Short Press	1. Picture number sub 1 2. Set the number sub 1
	Short Press	Picture Number add 1
	Long Press	Exit Current Mode
	Long Press	No Function
	Long Press	No Function
	Long Press	Enter Next Mode

DISPLAY PICTURES

IF YOU WANT TO SEE PHASE VOLTS, LINE VOLTS, PHASE AMPS PICTURES.

		
Phase Volts (Picture 1)	Line Volts (Picture 2)	Phase amps (Picture 3)

Power up you will see phase volts picture 1.

Short press  you will see line volts picture 2.

Short press  you will see phase volts picture 3.

If you want to see system power factor frequency, phase power factor, volts total harmonic Distortion, amps total harmonic distortion pictures.

			
System Power Factor and Frequency (Picture 4)	Phase Power Factor (Picture 5)	Volts Tatal Harmonic Distortion (Picture 6)	Amps Total Harmonic Distortion (Picture 7)

Power up, you will see phase volts picture1.

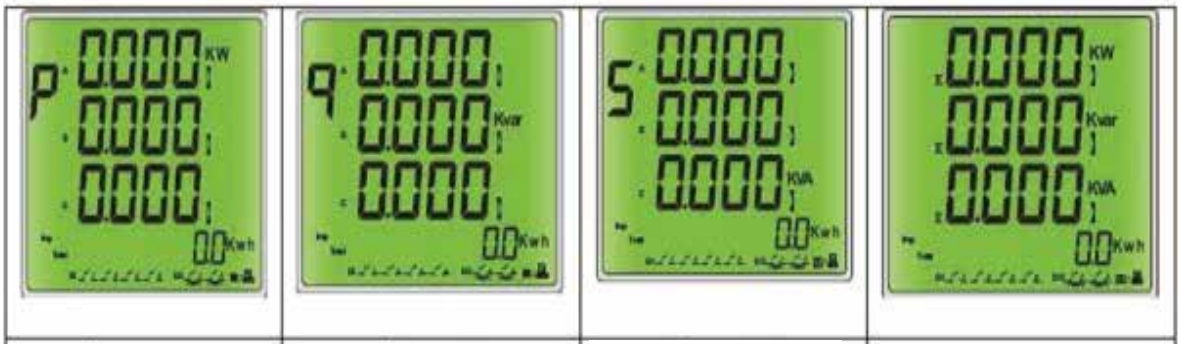
Short press  you will see system power factor and frequency picture 4

Short press  you will see system power factor picture 5

Short press  you will see volts Total Harmonic Distortion picture 6

Short press  you will see amps Total Harmonic Distortion picture 7

IF YOU WANT TO SEE PHASE WATTS, PHASE KVAR, PHASE KVA, SYSTEM POWER PICTURES.



Phase Watts	Phase Var	Phase VA	System Power
(Picture 8)	(Picture 9)	(Picture 10)	(Picture 11)

Power up, you will see phase volts picture 1.

Short press  you will see phase watts picture 8.

Short press  you will see phase VA picture 9.

Short press  you will see phase VA picture 10.

Short press  you will see system power picture 11.

In every picture, you can see KWH energy,
f you want to see KVArh energy,phase short press 

Picture (12)

If you want to Time-average volts, Time-average amps, Peak time-Average volts, Peak-Average amps, Peak hold phase volts, Peak hold phase amps pictures.

Time Average Volts

(Picture 13)

Time Average Amps

(Picture 14)

Peak time Average Volts

(Picture 15)

Peak time Average Amps

(Picture 16)

Peak hold phase Volts

(Picture 17)

Peak hold Phase Amps

(Picture 18)

Power up, you will see phase volts picture 1.

Long press M, you will see Time-average volts picture 13.

Short press M, you will see Time-average amps picture 14.

Short press M, you will see Peak time-average volts picture 15.

Short press M, you will see Peak time-average amps picture 16.

Short press M, you will see Peak hold phase volts picture 17.

If you want to see max system power factor and Max frequency, Min system power factor and Min frequency, Volts sequence component, AMPS sequence component picture.

			
Max System power factor and Max Frequency (Picture 19)	Min System power factor and Min Frequency (Picture 20)	Volts Sequence Component (Picture 21)	Amps Sequence Component (Picture 22)

Power up, you will see phase volts picture 1.

Long press M you will see Time- average volts picture 18.

Short press M you will see Max system power factor and Max frequency picture 19.

Short press M you will see Min system power factor and Min frequency picture 20.

Short press M you will see Volts sequence component picture 21.

Short press M you will see Amps sequence component picture 22.

If you want to see power system demand, min MD, peak holds MD, Min system power, Max system power pictures.

		
Power System demand (Picture 23)	Min Demand (Picture 24)	Pead hold Demand (Picture 25)
		
Min System Power (Picture 26)	Max System Power (Picture 27)	

Short press P you will see Power system demand picture 23

Short press P you will see Min MD picture 24

Short press P you will see Max MD picture 25

Short press P you will see Min system power picture 26

Short press P you will see Max system power picture 27

If you long press UP/ESC you will see pictures will auto display one by one.

If you want to see individual harmonics, please refer to the below steps.

Step1, long press  you will see  (picture 28),

if you input correct password (password is 1000), press  the password

will change to 1000, then long press  you can enter into parameter setting

main menu  (picture 29)  Means that this parameter has child

files (sub menu).  Means child file.  Means parameter number.

SETTING PARAMETER

Set Modbus ID (Parameter 1)

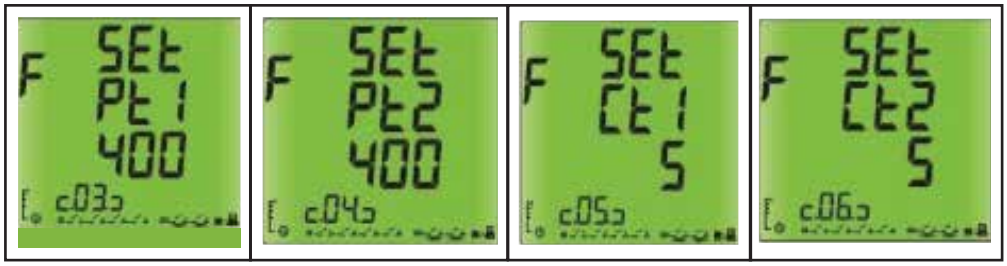
Long press  you can set baud rate

Set Rs485 Baud Rate (Parameter2)

Long press  you can set baud rate

(1200, 2400, 4800, 9600, 19200, 38400, 115200)

Set PT, CT (Parameter 3-6)



Set PT Primary (Parameter 3)	Set PT Secondly (Parameter 4)	Set CT Primary (Parameter 5)	Set CT Secondly (Parameter 6)

The PT1 can be set 100-500000.

The PT2 can be set 100-400.

The CT1 can be set 1-9999.

The CT2 can be set 1-10.

Set backlight time (Parameter 7)

Backlight time can be set from 5s to 65535s.

Set auto display time interval (Parameter 8)

Time interval can be set from 500 ms to 9999 ms.

Clear energy kWh KVArh

	
Clear Kwh (Parameter 9)	Clear Kwh (Parameter 10)

Set password (Parameter 11)

Panel meter information (Parameter 12)

			
	Meter type	Version number	Software data

Individual Harmonic (Parameter 14)

Long press E to enter set-up Menu Structure,

use M and P to find

Short press E you will see

Long press E you will see

If you want see THD of each phase E long press you will see voltage THD%

Use M and P to select 2nd~60th

Short press E to see each THD% under P0, P1, P2.

Long Press UI ESC to exit Voltage THD%, you will see

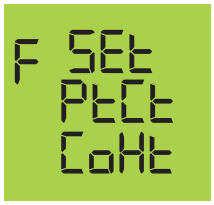
Note
P0: Phase A
P1: Phase B
P2: Phase C

Use M and P to select HU (Voltage THD%) and HI (Current THD%)

Same operation to see Current THD% individual Harmonic under P0, P1, P2.

Note
HU: Voltage THD%
HI: Current THD%

Set System connect status (Parameter 15)

			
	Set Phase 1 Current Forward	Set Phase 2 Current Forward	Set Phase 3 Current Forward
			
Set Meter Working Mode: 3 Phas e 4 Wire 3 phase 3 Wire	Set Hours Run (on roads)	Display Hours	

Set volts, amps, power period (Parameter 16)

		
	Set Power Period (1-60min)	Set Volts, Amps Period (10-1800s)

SET PARAMETER OF RELAY

Long press E enter the next lever sub-menu

Long Press UI to exit.

Use M and P to select from main menu.

P1

Control parameter of Relay on Sub-menu

On first page for control the DO Relay output.

Use M and P to select the five interface as below.

Long press E when it is output with flashing.
You can control the Relay.

Press E to control DO1.

Press UI to control DO2.

Press UI to back the sub-menu.

P1-1

Set the work of Relay 1 on the second sub-menu

Long press E when it is flashing. You can change the status.

Use M and P to change the output of the Relay1.

" Pulse" means the way of pulse.

" LEVEL" means electrical level.

Press E to confirm the change and back the higher sub-menu.

Press UI to give up the setting and go back to the higher sub-menu

P1-2

Set the pulse width of Relay 1 on Third sub-menu

Long press E in to change status.

Use M and P to change the number

Use UI (left) and E (right) to move the bit that you want to set for. (The Range: 50-3000ms).

Press E to confirm the change and back the higher sub-menu.

Press UI to give up the setting and go back to the higher sub-menu

P1-3

Set the output of Relay 2 on the Forth sub-menu

Long press E in to change status.

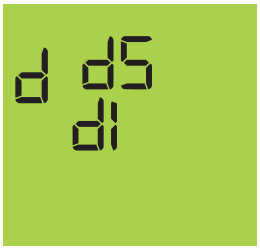
The setting step is same as Relay 1 on the way of output

Set the pulse width of Relay 2

Long press E in to change status.

The setting step is same as Relay 2 on the width of pulse

Set DI input filter time and DI count value menu



Long press E into sub- menu

If you want to see the count value imported menu

Long press E you will see:

If you want to see D11 count imported menu

Press the UI ESC and E or use M and P to

the check the every DI count imported

(It shows the count value imported of D21, 1 time)

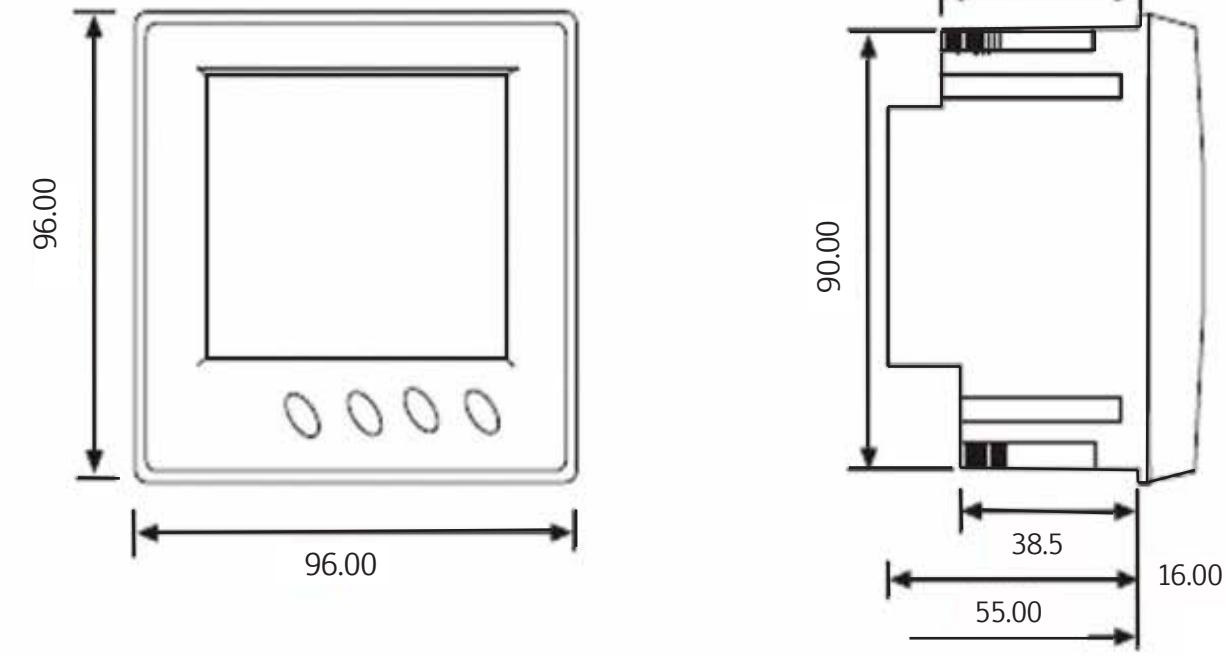
Set DI input filter time

Long press E in to change status.

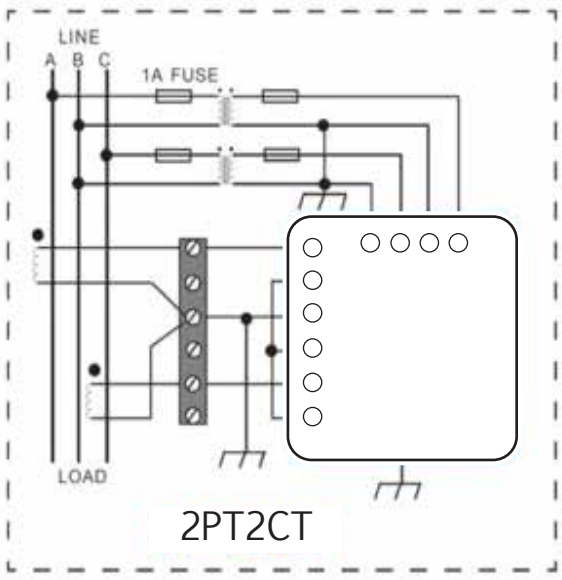
The range is: 0-255ms

(It shows the DI input filter time is 20 ms)

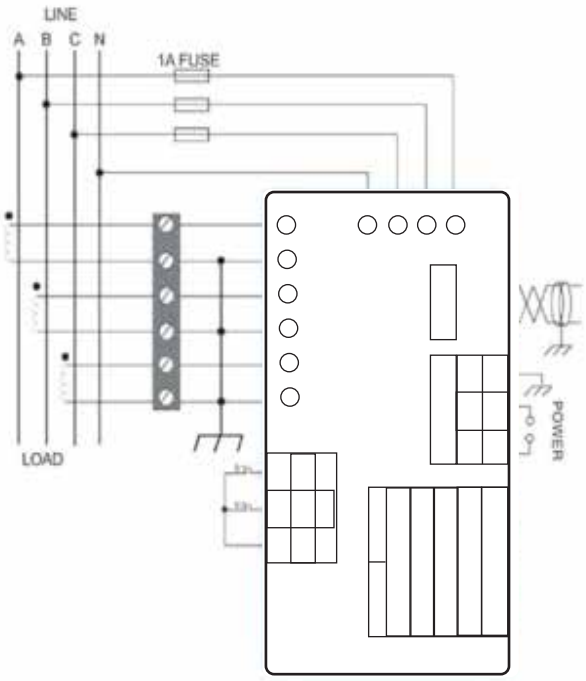
DIMENSION



WIRING DIAGRAM

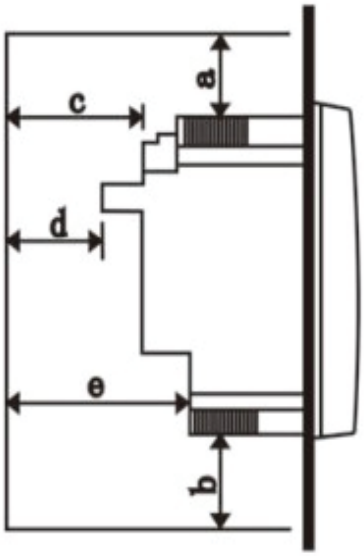


2PT2CT



3PT3CT

INSTALLATION



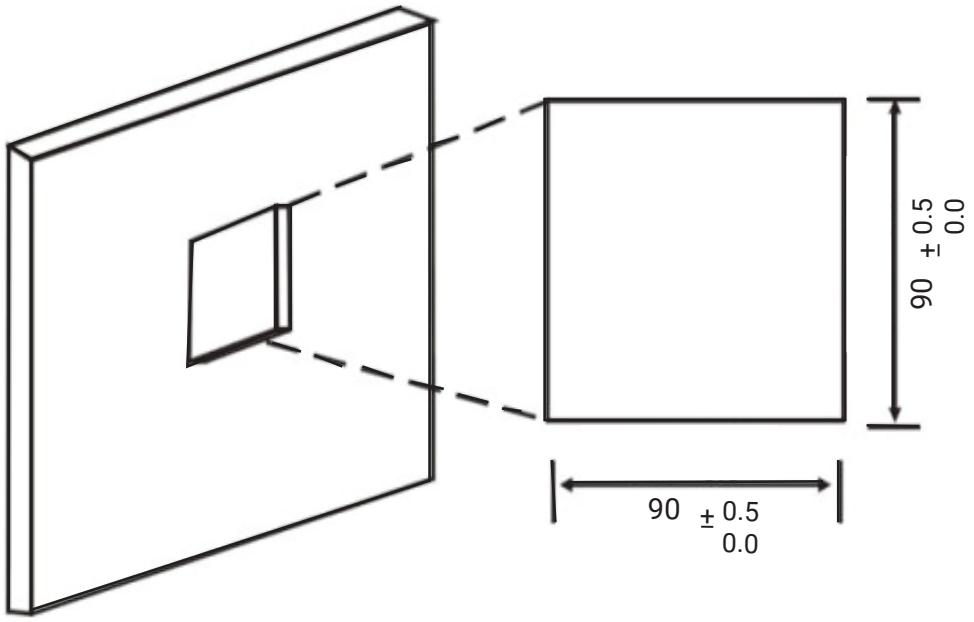
Board

Installation Diagram

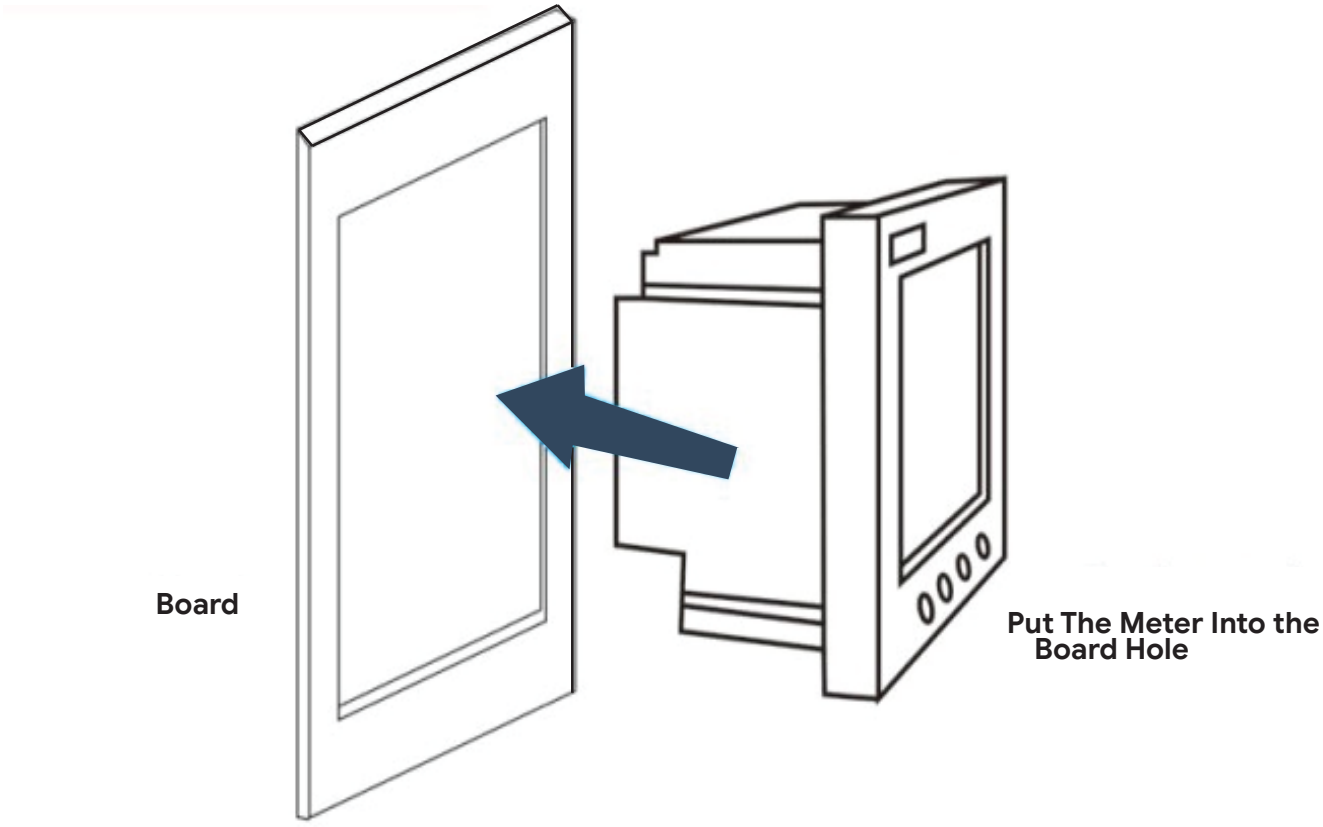
Environment Temperatue	Minimum Distance						
	A	B	C	D	E	F	G
<50C	25	25	38	38	64	25	25
≤50C	38	38	51	51	76	38	38

The Requirements for installation Space

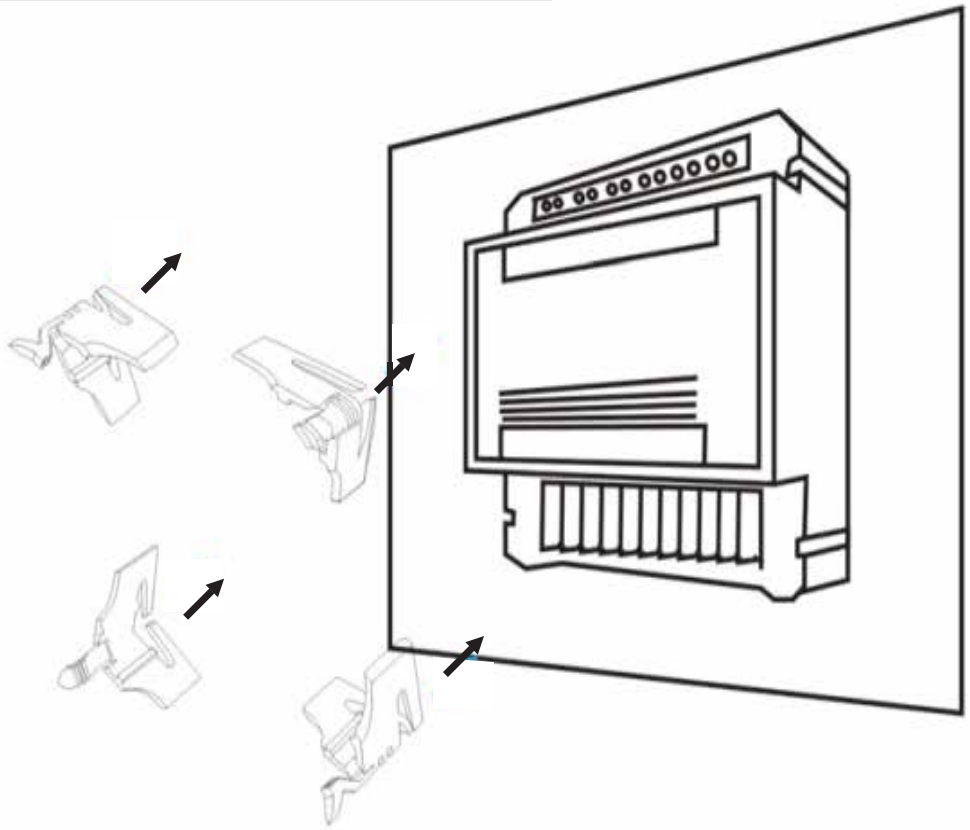
The Dimension of the Hole on the Panel:



Take off The Four Plastic Clamps and Install the Meter into the Hole:



THEN INSTALL THE FOUR CLAMPS ON THE METER



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