



TMM-20

Multifunction Power Meter

Operation Manual

FM4 40A235 Rev.0



TMM-20 Operation Manual

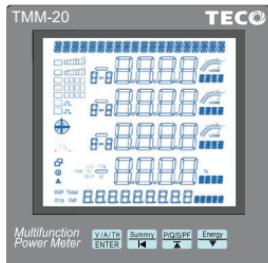
Description

The TMM-20 series Multifunction Power Meter provide high accuracy measurement, display and communication (Modbus RTU) of all electrical and power quality parameters, including harmonic measurement THD(Total Harmonic distortion) Provides electricity bill ratio (Cost) and carbon dioxide ratio (CO₂) set can show cumulative electricity bills and carbon emissions, and suitable for the installation in the power management of remote communication, such as the use of demand.

Application

Control panels and Motor, Generator monitoring Switchgear distribution systems , Energy Management Power quality analysis

Front Panel



Control button:

- VIA/TH ENTER** Enter Key/ Voltage /Current display page
- Shift Key /** Main electric parameters display page
- Up Key /** Electric parameters display page
- Down Key /** Energy parameters display page

Passwords : 4 digits passwords :

Range : 0000~9999

Display : LCD65(W) x 61(H)mm : White backlight : Blue wording Visible under direct sunlight

LCD LED : Backlight on time 0~15Min

Upper row 20 digits : Display date, time

8888 : 4 Digitsx 4 rows, Display value

888888888 : 9 Digits x 1 row, Display Energy parameters

□ : Rs485 communication status : 2 square status icons

Display Master and Slave status :

▲ : Wiring changed

Load status indication: IND : load is inductive

CAP : load is capacitive

LOAD% : Display load percentage

└ : Display load quadrant

Display load quadrant

R-b, b-C, C-R : When on ,value showing Line-Line

R,b,C : When on ,value showing in Phase

N : When on ,value showing in Neutral

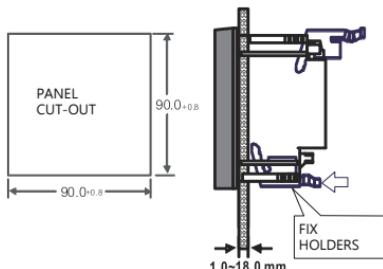
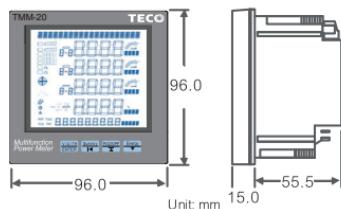
Total : When on ,value showing Total value

Avg : When on ,value showing Average

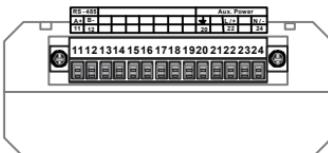
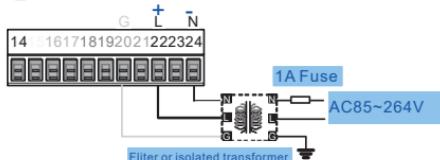
THD : When on ,value showing Total harmonics distortion

VW A KW MVar.. : LED-16 byte display parameters Unit

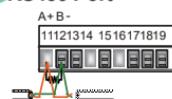
Dimensions



Connection diagram



RS485 Port

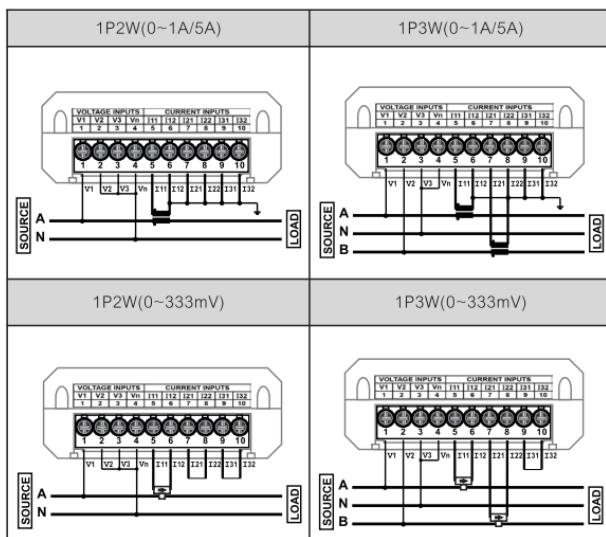


Distance Max.: 1200M
Terminator: 120~300Ω / 0.25W
(Standard: 150Ω)

Terminal	Cable	Screw	Torque
1~10	AWG26~10/0.5~4.0mm ²	M3	8.0kgf.cm(Max)
11~38	AWG28~16/0.5~1.5mm ²	M2	2.04kgf.cm(Max)

Voltage and Current Wiring

(CT secondary side distinguishes 1A/5A and 333mV)

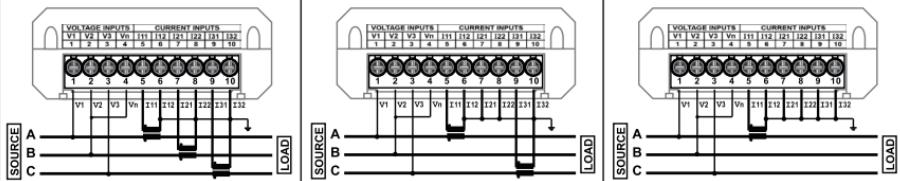


3P3W NO PT

3CT(0~1A/5A)

2CT(0~1A/5A)

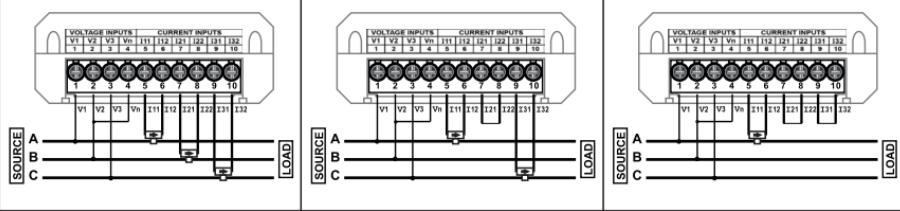
1CT(0~1A/5A)



3CT(0~333mV)

2CT(0~333mV)

1CT(0~333mV)

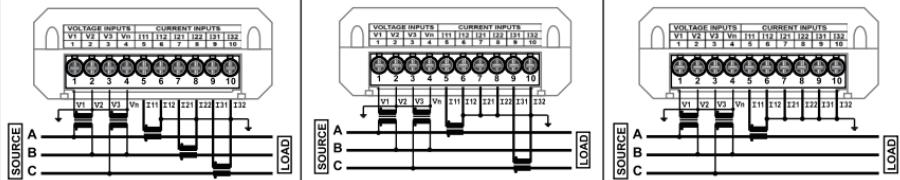


3P3W 2PT

3CT(0~1A/5A)

2CT(0~1A/5A)

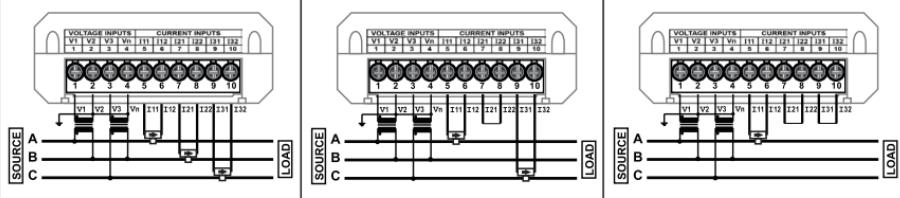
1CT(0~1A/5A)

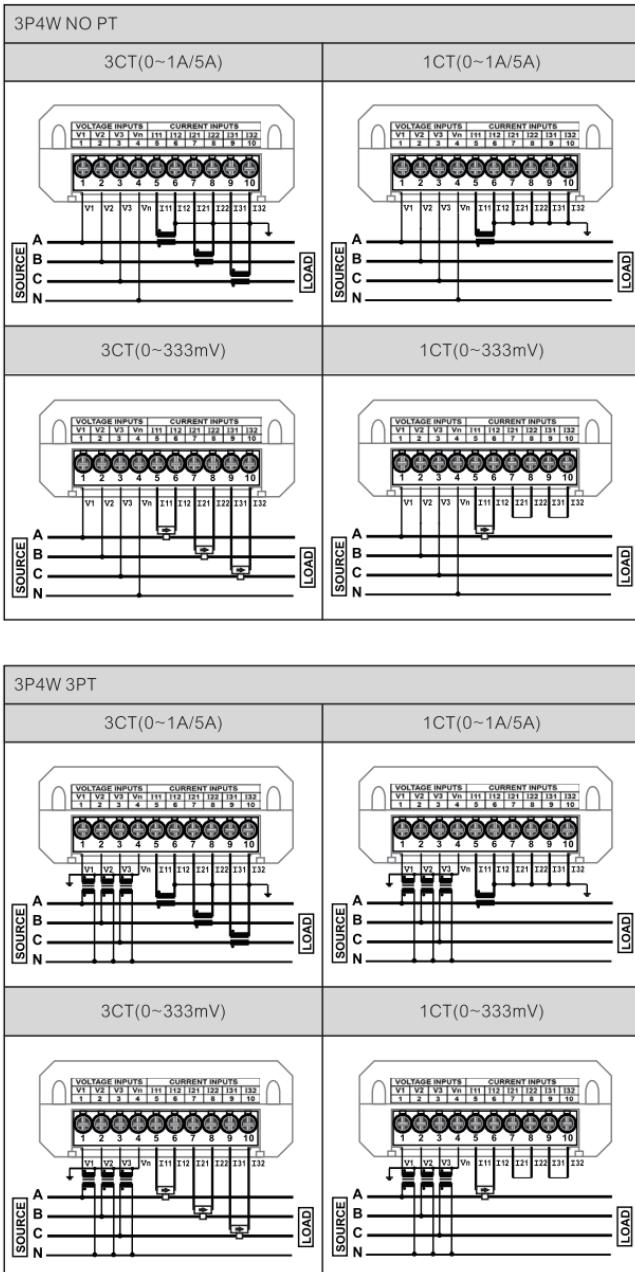


3CT(0~333mV)

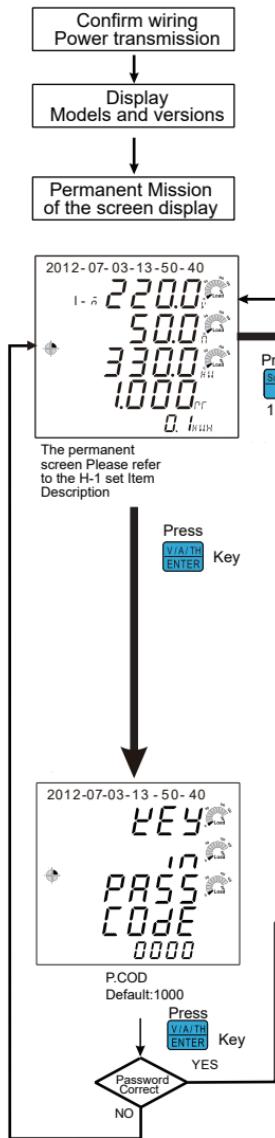
2CT(0~333mV)

1CT(0~333mV)



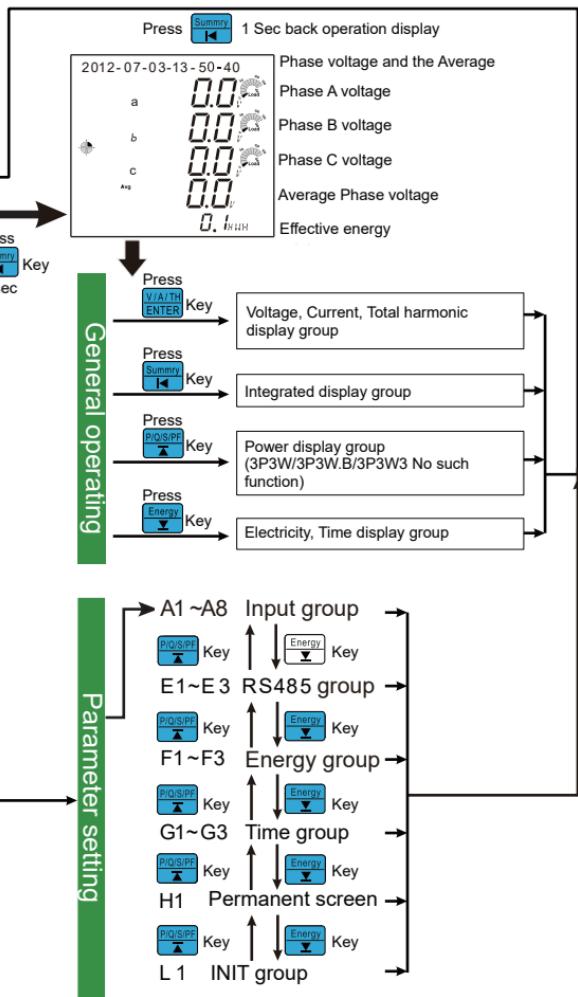


Operational processes



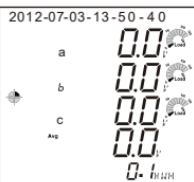
Key definition:

- ENTER : Enter /volt.(Voltage)/AMP.(current)
- Shift : Shift left /Total(Comprehensive)
- Up : Move Up/Power
- Down : Move Down /Energy

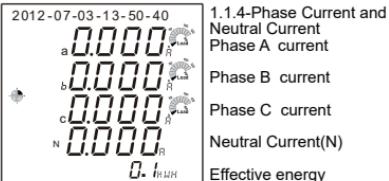


Press **VIA/TH
ENTER** Key (Voltage and Current harmonics screen)

Normal screen 1 seconds,
first showed off the voltage value As follows

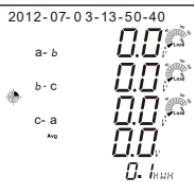


Phase voltage and the Average
Phase A voltage
Phase B voltage
Phase C voltage
Average Phase voltage
Effective energy



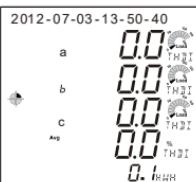
1.1.4-Phase Current and
Neutral Current
Phase A current
Phase B current
Phase C current
Neutral Current(N)
Effective energy

Press **VIA/TH
ENTER** KEY



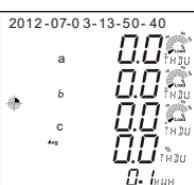
1.1.1-The Value of the Line
voltage and the Average Line voltage
A-B Line Voltage
B-C Line Voltage
C-A Line Voltage
Average line voltage
Effective energy

Press **VIA/TH
ENTER** Key



1.1.5-Current harmonic
distortion rate
THDI/Phase A Current THD
THDI/Phase B Current THD
THDI/Phase C Current THD
Average Current THD
Effective energy

Press **VIA/TH
ENTER** KEY

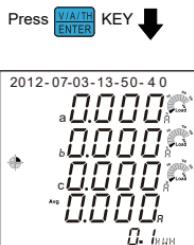


1.1.2-Voltage total harmonic distortion
Phase voltage total harmonic
THDU/ Phase A THD
THDU/ Phase B THD
THDU/ Phase C THD
Average line voltage THD
Effective energy

Press **VIA/TH
ENTER** Key

To 1.1.1 Display Or

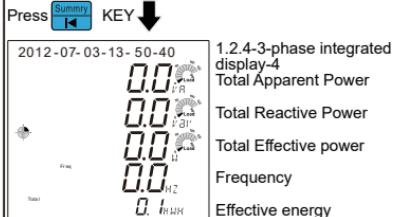
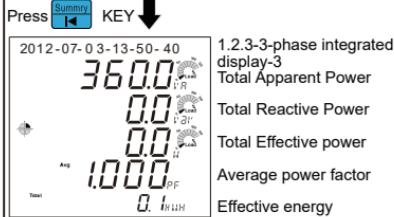
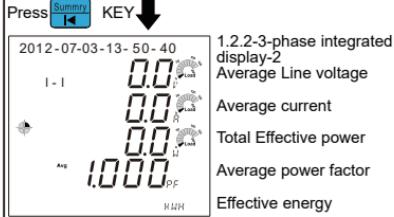
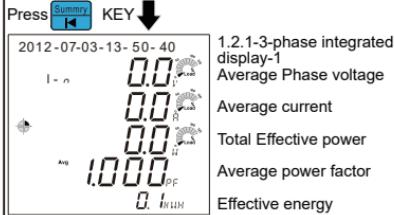
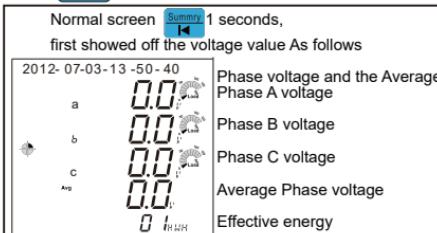
Press **Summary
ENTER** Key1 Sec Back To
Measurement screen



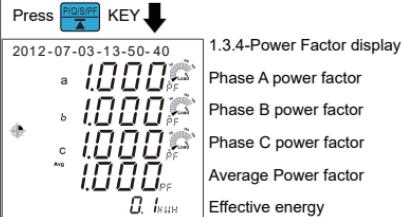
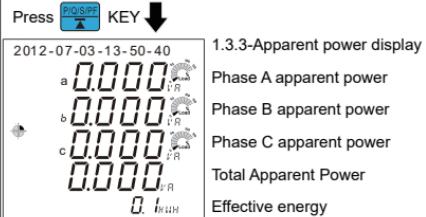
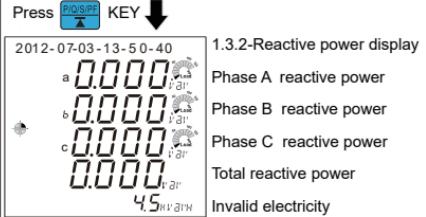
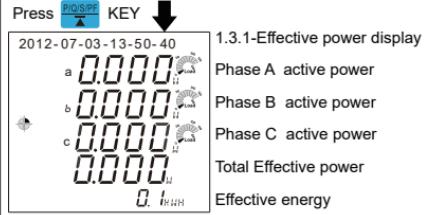
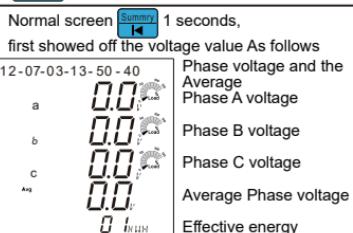
1.1.3-Phase current values and
the average
Phase A current
Phase B current
Phase C current
Average current
Effective energy

Press **VIA/TH
ENTER** KEY

(3P3W/3P3W.B/3P3W3 No such function)

Press **Summary** KEY Shift KEY (Comprehensive screen)Press **P/Q/S/PF** KEY Up KEY (Power Parameters)

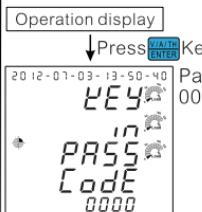
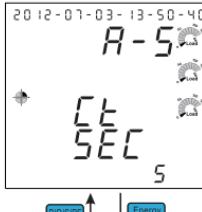
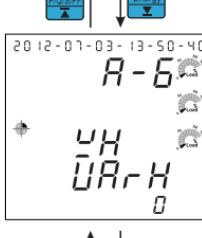
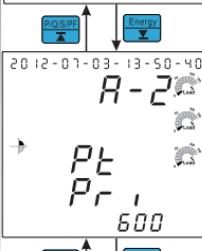
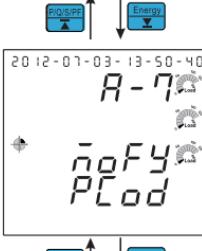
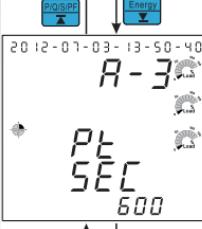
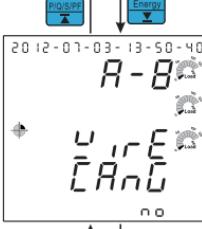
Press **Summary** KEY ↓ Key 1 Sec Back to Measurement screen

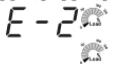
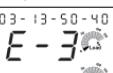


Press **P/Q/S/PF** KEY ↓

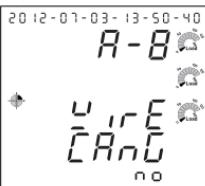
Engineers set class, non-personnel do not arbitrarily enter the change, in order to avoid abnormal.

INPUT Group

 <p>Press ENTER Key Enter the setup menus Password 0000~9999 Default:1000 Press Key : SET Press Key : SHIFT Press Key : MOVE/INCREASE Press Key : DOWN/DECREASE Press Key : CONFIRM</p>	 <p>2012-01-03-13-50-40 A-5 SEC 5 Default:5A (If default is 333mV, it cannot be c)</p>
 <p>2012-01-03-13-50-40 A-1 545 Ure 3P4W Default:3P4W Set range is as follows: 1P2W/1P3W/3P3W/ 3P3W.B(Balanced)/3P3W3/ 3P4W/3P4W.B(Balanced)</p>	 <p>2012-01-03-13-50-40 R-6 UH UR-H 0 Default:5A Set range: 0000~9999 Code:2100</p>
 <p>2012-01-03-13-50-40 A-2 PT Pr, 600 Default:600 Set range:100~500000V</p>	 <p>2012-01-03-13-50-40 R-7 Pcod Default:1000 Set range: 0000~9999</p>
 <p>2012-01-03-13-50-40 A-3 PL SEC 600 Default:600 Set range:100~600V</p>	 <p>2012-01-03-13-50-40 R-8 Carb no Default:5A Set range: YES / NO ©Additional screen display for V3.0 and above version</p>
 <p>2012-01-03-13-50-40 A-4 PL Pr, 5 Default:5 Set range:5~10000A</p>	 <p>2012-01-03-13-50-40 E-1 r485 Addr 1 Default:1 RS485 Group Set range:001~247</p>

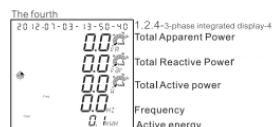
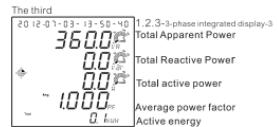
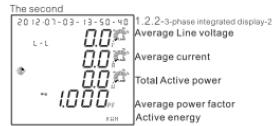
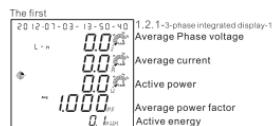
 <p>Set range: 1200、2400、4800、 9600、19200、38400、 57600、115200 Default:9600</p>	<p>E-2 Communications transmission rate Set range: 1200、2400、4800、 9600、19200、38400、 57600、115200 Default:9600</p>	<p>TIME Group G-1 Backlight time Set range:0~15(Minute) 0 is always lit Default:1</p>
 <p>Set range:N.8.1、N.8.2、 O.8.1、E.8.1 Default:N.8.2</p>	<p>E-3 Parity Check Set range:N.8.1、N.8.2、 O.8.1、E.8.1 Default:N.8.2</p>	<p>G-2 Date set Set range: 2000.01.01~2099.12.31 2012.07.03</p>
 <p>F-1 Cost rates Set range: 00.00~99.99 (per /kWh) Default:2.30</p>	<p>ENERGY Group F-1 Cost rates Set range: 00.00~99.99 (per /kWh) Default:2.30</p>	<p>G-3-Time set Set range: 00.00.00~23.59.59 1350.40</p>
 <p>F-2 CO₂ ratio Set range: 0.000~9.999(kg/kWh) Default:0.638</p>	<p>F-2 CO₂ ratio Set range: 0.000~9.999(kg/kWh) Default:0.638</p>	<p>H-1 Permanent screen selection Set range:1~4 Schedule Description Default:1</p>
 <p>F-3 Energy unit setting ②Additional screen display for V3.0 and above version Set range: 0.0001kWh 0.001kWh 0.01kWh 0.1kWh 1kWh 0.01MWh 0.1MWh Default:0.1kWh</p>	<p>F-3 Energy unit setting ②Additional screen display for V3.0 and above version Set range: 0.0001kWh 0.001kWh 0.01kWh 0.1kWh 1kWh 0.01MWh 0.1MWh Default:0.1kWh</p>	<p>I-1 INIT Restore Default Set range:0000~9999 set:7170 Default:0 Back To A-1 Display Or Press Key1 Sec Back to Measurement screen</p>

Auto wiring change

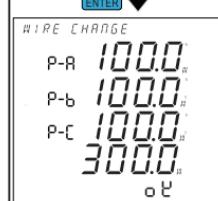


Wire change progress
YES/NO
◎Additional screen display for V3.0 and above version

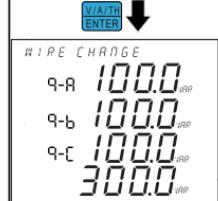
Schedule: The Permanent screen instructions



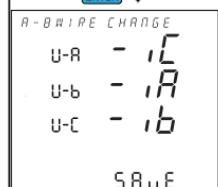
Select system input is
IMP
◎Additional screen display for V3.0 and above version



Confirm active power
values:
OK/NO
◎Additional screen display for V3.0 and above version



Confirm reactive power
values:
OK/NO
◎Additional screen display for V3.0 and above version



Confirm change complete:
default / save / abort
◎Additional screen display for V3.0 and above version



Wiring change failure
enter / quit
◎Additional screen display for V3.0 and above version

Auto wiring change condition limit :
3P4W-3CT : VN must be correct and $\theta < \pm 59^\circ$
3P4W-1CT : $\theta < \pm 59^\circ$
3P3W-2CT : V2 must be correct and $\theta < \pm 59^\circ$
3P3W-3CT : V2 must be correct and $\theta < \pm 59^\circ$
1P3W : VN must be correct and $\theta < \pm 59^\circ$
1P2W : $\theta < \pm 59^\circ$
3P3W-1CT:N/A

Event logging setting (Code:03h,06h,10h) (Additional data for V3.0 and above version)

Register Name	Address	Range	Description	Default	R/W
Event Log	0300h	0~1	Event logging function enable 0:OFF 1:ON	0	R/W
Event Log ch	0301h	0~65535	Logging enable of each channel Bit0:1st event logging~Bit15:16th event logging 0:OFF 1:ON	0	R/W
Event Log ch 1 Parameter SLCT	0302h	0~32	Parameter: 0:FREQ 1:UA 2:UB 3:UC 4:ULNavg 5:UAB 6:UBC 7:UCA 8:ULLavg 9:IA 10:IB 11:IC 12:Avg 13:PA 14:PB 15:PC 16:PSUM 17:QA 18:QB 19:QC 20:QSUM 21:SA 22:SB 23:SC 24:Ssum 25:PFA 26:PFB 27:PFC 28:PAvg 29:D.PSUM 30:D.QSUM 31:D.Ssum 32:D.I.Avg	12	R/W
Event Log ch 1 Compare	0303h	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 1 SP	0304h	According to parameter range	Set point (High Word)	1000	R/W
	0305h		Set point (Low Word)		
Event Log ch 1 delay time	0306h	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 2 Parameter SLCT	0307h	0~32	Refer to ch1	12	R/W
Event Log ch 2 Compare	0308h	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 2 SP	0309h	According to parameter range	Set point (High Word)	1000	R/W
	030Ah		Set point (Low Word)		
Event Log ch 2 delay time	030Bh	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 3 Parameter SLCT	030Ch	0~32	Refer to ch1	12	R/W
Event Log ch 3 Compare	030Dh	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 3 SP	030Eh	According to parameter range	Set point (High Word)	1000	R/W
	030Fh		Set point (Low Word)		
Event Log ch 3 delay time	0310h	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 4 Parameter SLCT	0311h	0~32	Refer to ch1	12	R/W
Event Log ch 4 Compare	0312h	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 4 SP	0313h	According to parameter range	Set point (High Word)	1000	R/W
	0314h		Set point (Low Word)		
Event Log ch 4 delay time	0315h	0~3000	Delay time(x10mS)	0	R/W

Event logging setting (Code:03h,06h,10h)

(Additional data for V3.0 and above version)

Register Name	Address	Range	Description	Default	R/W
Event Log ch 11 SP	0336h	According to parameter range	Set point (High Word)	1000	R/W
	0337h		Set point (Low Word)		
Event Log ch 11 delay time	0338h	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 12 Parameter SLCT	0339h	0~32	Refer to ch1	12	R/W
Event Log ch 12 Compare	033Ah	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 12 SP	033Bh	According to parameter range	Set point (High Word)	1000	R/W
	033Ch		Set point (Low Word)		
Event Log ch 12 delay time	033Dh	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 13 Parameter SLCT	033Eh	0~32	Refer to ch1	12	R/W
Event Log ch 13 Compare	033Fh	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 13 SP	0340h	According to parameter range	Set point (High Word)	1000	R/W
	0341h		Set point (Low Word)		
Event Log ch 13 delay time	0342h	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 14 Parameter SLCT	0343h	0~32	Refer to ch1	12	R/W
Event Log ch 14 Compare	0344h	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 14 SP	0345h	According to parameter range	Set point (High Word)	1000	R/W
	0346h		Set point (Low Word)		
Event Log ch 14 delay time	0347h	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 15 Parameter SLCT	0348h	0~32	Refer to ch1	12	R/W
Event Log ch 15 Compare	0349h	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 15 SP	034Ah	According to parameter range	Set point (High Word)	1000	R/W
	034Bh		Set point (Low Word)		
Event Log ch 15 delay time	034Ch	0~3000	Delay time(x10mS)	0	R/W
Event Log ch 16 Parameter SLCT	034Dh	0~32	Refer to ch1	12	R/W
Event Log ch 16 Compare	034Eh	0~2	Compare condition 0:more than(>) 1:equal(=) 2:less than(<)	0	R/W
Event Log ch 16 SP	034Fh	According to parameter range	Set point (High Word)	1000	R/W
	0350h		Set point (Low Word)		
Event Log ch 16 delay time	0351h	0~3000	Delay time(x10mS)	0	R/W
Event Log Clear	0352h	0 or 55h	Clear all event logs (0:None 55h:Reset)	0	R/W

Event logging data reading (Code:03h)

(Additional data for V3.0 and above version)

Register Name	Address	Range	Description	Default	R/W
Event Log last NO	0600h	0~16	Last logging NO. 0:None 1~16:New number		R
Event Log 1					
Event Source 1	0601h	1~16	Event trigger source 1~16:Event Setting NO. 1~16		R
Event Status 1	0602h	0~1			R
Event Log 1 Parameter	0603h	0~32	Alarm item 0:FREQ 1:UA 2:UB 3:UC 4:ULNavg 5:UAB 6:UBC 7:UCA 8:ULLavg 9:IA 10:IB 11:IC 12:lavg 13:PA 14:PB 15:PC 16:PSUM 17:QA 18:QB 19:QC 20:QSUM 21:SA 22:SB 23:SC 24:SSUM 25:PFA 26:PFB 27:PFC 28:PFAVG 29:D.PSUM 30:D.QSUM 31:D.SSUM 32:D.I.AVG		R
Event Log 1 Value	0604h 0605h	According to item range	Alarm value(High Word) Alarm value(Low Word)		R
Year	0606h	2000~2099	Year		R
Month	0607h	1~12	Month		R
Day	0608h	1~31	Day		R
Hour	0609h	0~23	Hour		R
Minute	060Ah	0~59	Minute		R
Second	060Bh	0~59	Second		R
Event Log 2					
Event Source 2	060Ch	1~16	Event trigger source 1~16:Event Setting NO. 1~16		R
Event Status 2	060Dh	0~1	Event status 0:Recover 1:Alert		R
Event Log 2 Parameter	060Eh	0~32	Refer to Log 1		R
Event Log 2 Value	060Fh 0610h	According to item range	Alarm value(High Word) Alarm value(Low Word)		R
Year	0611h	2000~2099	Year		R
Month	0612h	1~12	Month		R
Day	0613h	1~31	Day		R
Hour	0614h	0~23	Hour		R
Minute	0615h	0~59	Minute		R
Second	0616h	0~59	Second		R
Event Log 3					
Event Source 3	0617h	1~16	Event trigger source 1~16:Event Setting NO. 1~16		R
Event Status 3	0618h	0~1	Event status 0:Recover 1:Alert		R
Event Log 3 Parameter	0619h	0~32	Refer to Log 1		R
Event Log 3 Value	061Ah 061Bh	According to item range	Alarm value(High Word) Alarm value(Low Word)		R
Year	061Ch	2000~2099	Year		R
Month	061Dh	1~12	Month		R
Day	061Eh	1~31	Day		R
Hour	061Fh	0~23	Hour		R
Minute	0620h	0~59	Minute		R
Second	0621h	0~59	Second		R

Event logging data reading (Code:03h)

(Additional data for V3.0 and above version)

Register Name	Address	Range	Description	Default	R/W
Event Log 16					
Event Source 16	06A6h	1~16	Event trigger source 1~16:Even Setting NO.1~16		R
Event Status 16	06A7h	0~1	Event status 0:Recover 1:Alert		R
Event Log 16 Parameter	06A8h	0~32	Refer to Log 1		R
Event Log 16 Value	06A9h	According to item range	Alarm value(High Word)		R
	06AAh		Alarm value(Low Word)		
Year	06ABh	2000~2099	Year		R
Month	06ACh	1~12	Month		R
Day	06ADh	1~31	Day		R
Hour	06AEh	0~23	Hour		R
Minute	06AFh	0~59	Minute		R
Second	06B0h	0~59	Second		R

Phase angle data reading

(Additional data for V3.0 and above version)

Register Name	Address	Range	Description	Default	R/W
Phasor Diagram VB lag VA	0700h	0~3600	Phasor Diagram VB lag VA		R
Phasor Diagram VC lag VA	0701h	0~3600	Phasor Diagram VC lag VA		R
Phasor Diagram IA lag VA	0702h	0~3600	Phasor Diagram IA lag VA		R
Phasor Diagram IB lag VA	0703h	0~3600	Phasor Diagram IB lag VA		R
Phasor Diagram IC lag VA	0704h	0~3600	Phasor Diagram IC lag VA		R
Phasor Diagram VBC lag VAB	0705h	0~3600	Phasor Diagram VBC lag VAB		R
Phasor Diagram VCA lag VAB	0706h	0~3600	Phasor Diagram VCA lag VAB		R
Phasor Diagram IA lag VAB	0707h	0~3600	Phasor Diagram IA lag VAB		R
Phasor Diagram IB lag VAB	0708h	0~3600	Phasor Diagram IB lag VAB		R
Phasor Diagram IC lag VAB	0709h	0~3600	Phasor Diagram IC lag VAB		R

Character Symbol

A	b	C	d	E	F	G	H	i	J	K	L	M
ଅ	ବ	ଚ	ଦ	ଏ	ଫ	ଗ	ହ	ି	ଜ	କ	ଲ	ମ
n	o	P	q	r	S	t	U	v	W	X	y	Z
ନ	ଓ	ପ	କ	ର	ସ	ତ	ୱ	ୟ	ଖ	ୟ	ଶ	
1	2	3	4	5	6	7	8	9	0	/	.	
ଇ	ବୁ	ତ୍ରୀ	ଚ୍ଛୁ	ଶୁ	କୁ	ତ୍ରୁ	ପୁ	ବୁ	୦	ପ୍ରୁ	ପୁ	



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