

3CT SENSING POWER FACTOR CONTROLLER



**UNO+
SERIES**



NIPPEN ELECTRICAL INSTRUMENTS CO.
www.nippenco.com

DESCRIPTION:

NIPPEN Model UNO+ is a Automatic Power Factor Controller used for measurement and control of PF using reactive power compensation (kVar based sensing). Capacitor banks are suitably switched ON and OFF automatically to provide necessary compensation. The sensitivity setting optimizes the switching speed. Intelligent switching algorithm executes the data processing at ultra high speed to achieve the target PF. This ensures protection of capacitor banks against abnormality in voltage, current and set value of capacitors whenever these are beyond the higher and lower threshold limits. Crisp bright 14.2mm 3 digit display in 3 rows give instantaneous values of electrical parameters. Correct compensation is also monitored and signaled when improper.

INPUTS

- Voltage Input : 80 to 500VAC
- CT primary setting from 5A-9999A
- Auxiliary Supply : 80-300VAC DC
- Frequency : 45 to 60Hz

- Energy :- Active energy (kWh)(active import & active export energy)
(Acc.1.0%) Reactive energy (kVarh) (active capacitive & inductive energy) .
Apparent energy (kVAh).
- Alarm status.
- THD for Voltage and current of all phases.(upto 31st harmonic for %A,%V for all model).
- RTC(REAL TIME CLOCK).
- Run(Load) Hours (min current >50mA) resettable.
- ON hours (lifetime counter).
- Number of Interruptions.
- Optional RS 485 serial port with standard MODBUS RTU protocol.
- Optional Measuring Temperature.
- Error Indication to Phase sequence and CT reverse.

RELEVANT STANDARDS

EMC: IEC 61326
Fast Transient Burst Test (EFT): IEC 61000-4-4
Safety: IEC 61010-1-2001
Test of insulation properties; IEC 60060-1
Test of accuracy requirements: IEC 62052-11
Test of electrical requirements: IEC 62052-1

ENVIRONMENT

Enclosure: IP-52(Front)
IP-20 (Terminal back)

Temperature:

Ambient temperature: -10° C to 55° C
Storage temperature: -10° C to 70° C
Relative Humidity: <95%, Non-condensing
Net Weight: 550 gm(approx)
Gross Weight: 600 gm(approx)

CAPACITOR & RELAY

- Up to 6/12 stages with stage indication.
- Automatic/Manual Mode selections.
- Capacitor kVar value phase wise .
- Target PF Programmable(Lead/Lag).
- Stage wise led indication.
- Individual Capacitor mode can be programmed by ON-OFF-AUTO.
- Control Function: PF, sensitivity rated steps, switching program, reconnecting time, discharge time & reaction time.
- Relay Output contact rating 5A/250V AC.
- 2 relay output to trip the alarm ,VLN, VLL, ILN, Hz, THD, Temperature on site.
- Programmable with UNDER / OVER & TIME DELAY selection.

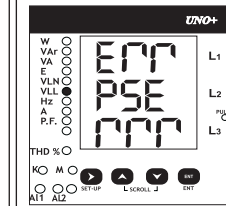
UNIQUE FEATURES

- True RMS measurement & 4 quadrant operation.
- Simultaneous sampling of volts & amps using internal ASIC.
- 0.5 % accuracy in Multifunction Metering.
- %Harmonics measurement for voltage and current (up to 31st Harmonic)
- CT reverse polarity Auto detecting.
- Phase sequence error indication.
- Capacitor bank failure detection.
- Manual and Auto scrolling facility.
- Password protection.
- User configurable (Editable) Password.
- Since kVar is sensed, the instrument works at very low current (>5%load.)
- Pulse 1000 pulses/kWh.

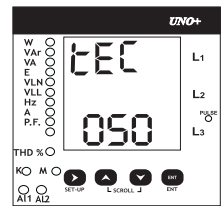
PAGEWISE DETAILS

S.No	Display	LED'S "ON"	Description	Model
1	VLN	● VLN	Voltage line to Neutral	All model
2	VLL	● VLL	Voltage Phase to Phase	All model
3	A	● A	Line current	All model
4	F ¹ E	● HZ	Frequency	All model
5	W	● W	Active power	All model
6	VAr	● Var	Reactive power	All model
7	VA	● VA	Apparent power	All model
8	PF.	● P.F.	Power Factor of system	All model
9	VLN THD %	● VLN THD %	% Harmonics for Voltage	All model
10	A THD %	● A THD %	% Harmonics for Current	All model
11	t	● t	Real Time Clock	All model
12	RLP	● ALL AL2	Alarm status	All model
13	ERR PSE PRR	● PSE- Phase sequence error ● PRR- CT reverse phase wise		All model
14	RUG	● VLN	Average voltage line to Neutral	All model
15	RUG	● VLL	Average voltage Phase to Phase	All model
16	RUG	● A	Average Current	All model
17	t0E	● W	Total Active Power kW	All model
18	t0E	● kVar	Total Reactive Power kVar	All model
19	t0E	● kVA	Total Apparent Power kVA	All model
20	RUG	● P.F	Average PF	All model
21	t	● t	ON hours (Life Time Counter)	All model
22	L	● L	Run(Load) hours (re-settable)	All model

S.No	Display	LED'S "ON"	Description	Model
23	tE.C	● tE.C	Temperature sensor indicator	Optional
24	R	● R	Total Active Energy (kwh) consumed (EB)	Energy model
25	E	● E	Energy Export (EB)	Energy model
26	J	● J	Energy Import (EB)	Energy model
27	J	● J	Reactive Energy Total (Algebraic Sum) (EB)	Energy model
28	C	● C	Capacitive reactive Energy (EB)	Energy model
29	L	● L	Inductive reactive Energy (EB)	Energy model
30	P	● P	Apparent Energy (EB) KVAh	Energy model
31	RS 485	● RS 485	RS 485 communication port(Modbus-RTU)	Optional



ERROR Page
PSE - Phase seq.error
rrr - CT polarity reverse



TEMPERATURE

OPTIONAL FEATURES

- Communication with PCs, PLCs, DCS through an optional RS485 Serial Port (MODBUS RTU).
- Monitors Energy kWh, Import & Export, Reactive of capacitive, Reactive of Inductive, kVAh.
- Temperature sensor output.

MODELS

- UNO+6R(optional temperature output)
- UNO+6RS(RS485+optional temperature output)
- UNO+6RS(RS485+Energy+optional temperature output)
- UNO+8R(optional temperature output)
- UNO+8RS(RS485+optional temperature output)
- UNO+8RS(RS485+Energy+optional temperature output)
- UNO+12R(optional temperature output)
- UNO+12RS(RS485+optional temperature output)
- UNO+12RS(RS485+Energy+optional temperature output)

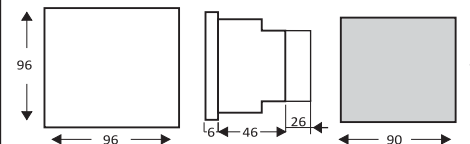
PARAMETER DISPLAYED MEASURED

- Voltage :- 3 phase Line -neutral voltage(VLN), Average
- Voltage :- 3 phase Line -line voltage (VLL), Average
- Current :-3 phase Current (IL1,IL2,IL3), Average current (Acc. 0.5%)
- Frequency :- 45-65Hz(Acc. 0.2%)
- Active power (kW) :- L1,L2,L3 and Total.
- Re active power (kW) :- L1,L2,L3 and Total.
- Apparent power (kW) :- L1,L2,L3 and Total.
- Power factor :- L1,L2,L3 and Average. (Acc. 1 Elect.)

For installing the meter

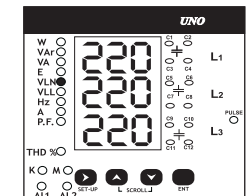
(1)Prepare the panel cutout with proper dimension as shown below:

Mechanical Installation

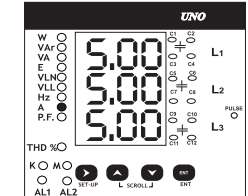


OVERALL DIMENSIONS (All dimensions in mm)

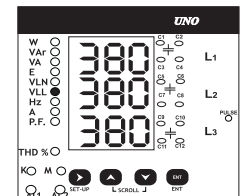
- (2)Push the meter into the panel cutout. Secure the meter in its place by pushing the clamp on the rear side. The screws, of the pane of the clamp ,must be in the farthest forward slot.
- (3)For proper sealing ,tighten the screws evenly with required torque.



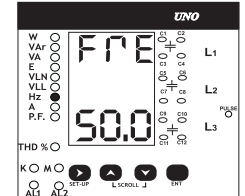
Voltage Line-Neutral(L1N,L2N,L3N)



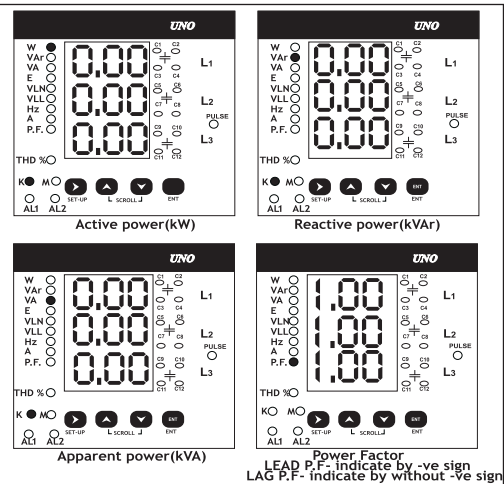
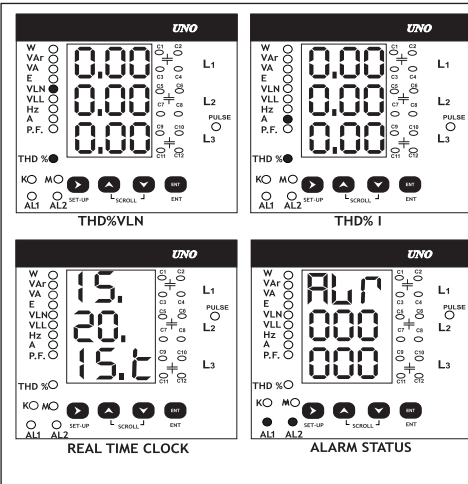
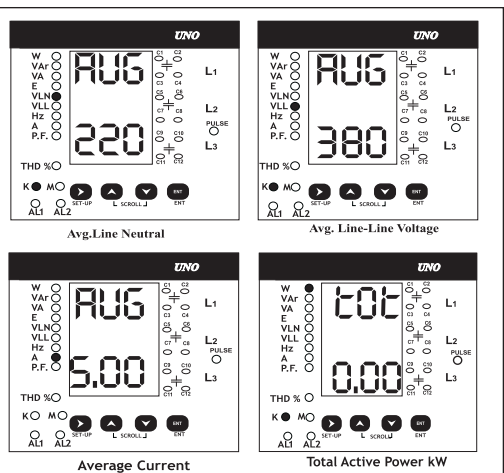
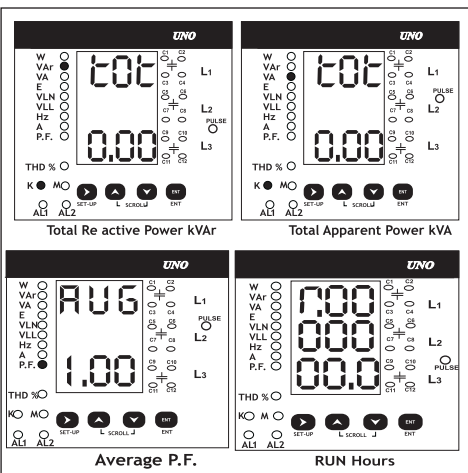
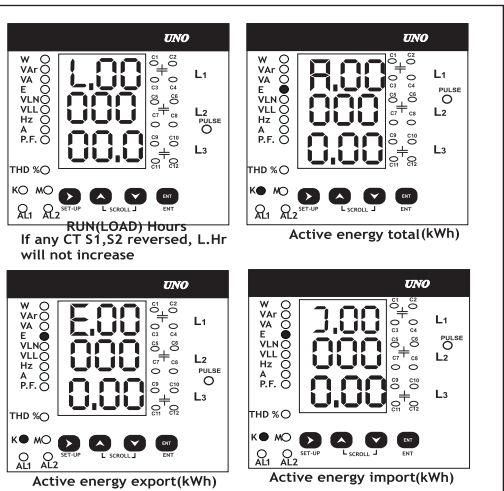
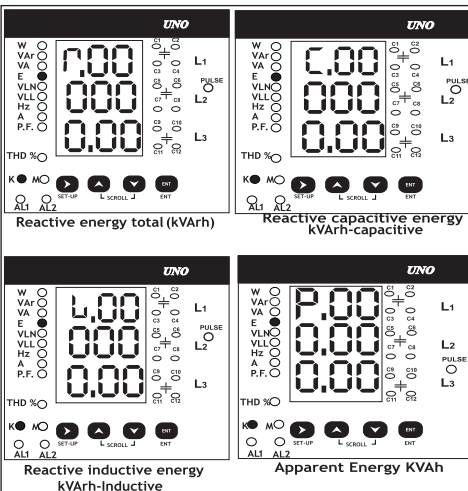
Current(1,12,13)



Voltage Line-Line(L1L2,L2L3,L3L1)



Frequency Hz



There are basically two modes of operation :

1. Programming Mode

2. Run Mode

After supplying power (230 VAC), the unit displays immediately power Receiving information, on LED display screen and by default stored last display at factory comes into Run Mode. Now, the unit can be operated by using the following keypad provided for both the Programming Mode and Run Mode such as shown below.

Keypad Description

- ▶ SET UP key to go to set up menu and exit from programming mode. SET UP Key to move the cursor from left to right side in programming mode.
- ▲ UP Direction key to scroll the alpha numeric value 0-9 in programming mode and To scroll the pages forward direction in RUN mode. To go into Scroll mode ON(continuous press 7Sec.)
- ▼ Down Direction key to scroll the alpha numeric value 9-0 in direction and To scroll the pages reverse direction in RUN MODE. To go into Scroll mode OFF(continuous press 7Sec.)
- ↵ Complete the operation in programming mode once have done, ENTER.

Programming Mode

Press ▶ SET UP key on Run Mode for about TWO seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

In order to operate for all the field programmable parameters, it is easy for user interface by pressing the keys such as ▶ , ▲ , ▼ and ↵ . Once the display is in Programming Mode, press ▲ key to move into the following programmable parameters: CT Primary & Secondary, PT Primary & Secondary, Clear energy, ID, Password, Alarm setting, PF setting.

Setting the Main CT Ratio

In order to give actual current values in your systems, the main CT Ratio between the primary and secondary current should be set accordingly. The CT Ratio can be set from 5 A to 9999 A.

Press ▶ SET UP key on Run Mode for about TWO seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

On Pressing Enter key once, the display will prompt

CTP

- The CT primary value to be set here. Press Enter, the display indicates the default value 0005. Set CTR by pressing ▶ , ▲ , ▼ keys until desired CT value is received, Press ENTER key to conform the value and Press ▲ key to proceed into CT secondary value. Press Enter key the display indicates the default value 0005. Press Enter to conform.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ▶ SET UP key once to return into Run Mode.

Setting the Main PT Ratio

Press ▶ SET UP key on Run Mode for about TWO seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing enter key once, the display will prompt CTP.
- Press ▲ key two time, the display will prompt PTP.
- The PT primary value to be set here. Press enter key, the display indicates the default value 0220. Set PTR by pressing ▶ , ▲ , ▼ , keys until desired PT value is received, press enter key to conform the value stored. Then Press ▲ key to proceed into PT secondary value . Then display will prompt PT5 .On pressing enter key one, the display indicates default value 0220. Set PT secondary by pressing ▶ , ▲ , ▼ keys until desired PT value is received . Press enter key to conform the value stored.
- If the CONTROL mode is not desired, Press ▲ key to go to the parameter . Or else, Press ▶ SET UP key once to return into Run Mode.

Set Meter ID to RS 485

Press ▶ SET UP key on Run Mode for about TWO seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing enter key once, the display will prompt CTP.
- Press ▲ key five time, the display will prompt ID.
- Here meter ID to be set for RS 485 communication protocol .On pressing enter key once, the display indicates default 001 on the display. Set meter ID by pressing ▶ , ▲ , ▼ until the desired value is received . Then press enter key to conform the ID value is stored.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter . Or else, Press ▶ SET UP key once to return into Run Mode.

Clear load Hours

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing enter key once, the display will prompt **CLP**.
- Press ▲ key six time, the display will prompt **CLM**.
- Here meter load hours to be clear, if required. On pressing enter key once, the display indicates **SUPE** screen on the display. Then press enter key to conform the load hours value is cleared.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key once to return into Run Mode.

Setting Password

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing enter key once, the display will prompt **CLP**.
- Press ▲ key seven time, the display will prompt **PAS**.
- Here user can set desired password. On pressing enter key once, the display indicates default value 0000. Set password by using ►, ▲, ▼, key until desired password value is received. Press enter key to conform the value is stored.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key once to return into Run Mode.

Energy Screen appear, when supply the energy model only

Clear Energy Value

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key once, the display will prompt **CLP**.
- Here kWh, kVAh, Re active energy value to be clear.
- Press enter key **once**, the display will prompt total active energy(kWh) **ALP**. On pressing enter key once **SUPE** screen appear on the display. Press enter key to conform the energy value cleared.
- Press ▲ key to go active import energy to Apparent energy. Do setting to VARh, VAh same as kWh.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key once to return into Run Mode.

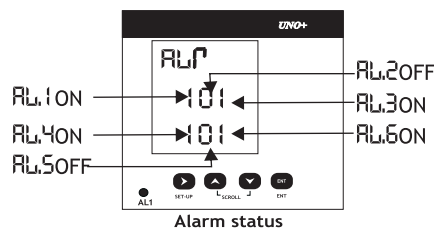
(11)

Alarm configuration

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key once, the display will prompt **ALP**.
- There is a DUAL relay output for alarm. Here we can set **ALARM** trip point to relay output, for VLn, VLL, Current, Hz, THD%, Temperature.
- Press enter key to indicates the display **AL1**.
- On pressing enter key again, the display indicates **ULN** screen on the display. Suppose, we required VLL or current, Hz, THD, Temp. Press ▲ key to select the desired parameters. Once the desired parameters selected, Press enter key to display indicates **OUR**. It means over limit relay selected. Then Press ENTER key to conform or Press ▼ key to select under **UND**.
- Once OVER or UNDER selected, Press ENTER key to go **AUT**. It means relay works **Automatically**. Suppose, we require to works relay **MANUAL**, Press ▲ key to, select Manual operation **MAN**.
- Once Auto or Manual selected, Press ENTER key to select relay 1 or relay2 or OFF. **AL1**- 1st Alarm relay output on **AL2**- 2nd Alarm relay output on **OFF**- relay output off. But Alarm status ON in display.
- Once relay condition selected, Then Press enter key to Set the ON delay of relay. Set ON delay, by pressing ►, ▲, ▼, keys until desired value is received.
- Once ON delay selected, Then Press enter key to Set the OFF delay of relay. Set OFF delay, by pressing ►, ▲, ▼, keys until desired value is received.
- Once OFF delay selected, Then Press enter key to Set the TRIP value of the selected parameters. Set TRIP value, by pressing ►, ▲, ▼ keys until desired value is received.
- Once done, Press UP key to go **AL2** to **AL6**. Do setting same as **AL1**. Or else, Press ► key twice to return into Run Mode.



- In display indicates 1 means alarm relay ON. 0 means alarm relay OFF.

(15)

Alarm Pages

ULN - Voltage line to neutral
ULL - Voltage line to line
CLP - Line current
FRE - Line Frequency
THD - Harmonics %
TCC - Temperature

OUR - Over
UND - Under
AUT - Relay ON automatically
MAN - Relay ON forcefully (manually)
ON - To ON the relay
OFF - To OFF the relay only. not in display.

Set Desired Power Factor

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key twice, the display will prompt **PFC**.
- Press enter key to indicates the display **SET PF**.
- Here we can set the desired power factor.
- On pressing enter key once, the display indicates default value 0.99 on the display. Set PF by using ►, ▲, ▼ key until desired PF value is received.
- Then press enter key to set power factor lead or lag. The default setting is **LAG**. Press enter key to conform the value is stored.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key twice to return into Run Mode.

Setting Re connection time to capacitor

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key twice, the display will prompt **PFC**.
- Press enter key to indicates the display **SET PF**.
- Press ▲ key two time to indicates the display **RECON**.
- Here we can set the desired Reconnection time of CAP.
- On pressing enter key once, the display indicates default value 030 on the display. Set Re connection time by using ►, ▲, ▼ key until desired time is received. Press enter key to conform the value is stored.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key twice to return into Run Mode.

(13)

Capacitor kVAR Value phase wise

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key twice, the display will prompt **PFC**.
- Press enter key to indicates the display **SET PF**.
- Press ▲ key three time to indicates capacitor value **CAP VAL**.
- Here we can see the capacitor kVAR value phase wise.
- On pressing enter key once, the display indicates of capacitor 1 kVAR value in phase wise in a row. First display indicates L1 kVAR value of capacitor, second display indicates L2 kVAR value of capacitor, Third display indicates L3 kVAR value of capacitor.
- After that want to see the remaining capacitor kVAR value, Press enter key one by one.
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key twice to return into Run Mode.

Capacitor Mode

Press ► SET UP key on Run Mode for about **TWO** seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key twice, the display will prompt **PFC**.
- Press enter key to indicates the display **SET PF**.
- Press ▲ key four time to indicates capacitor mode **CAP MOD**.
- Here we can set the capacitor mode. **Auto ON(2), Forced ON(1), Forced Off (0)**.
- On pressing enter key once, the display indicates the default AUTO(2) mode of capacitor 2. It is 1, 2. Set capacitor mode by using ►, ▲, ▼ keys until desired mode is received.
- Then press enter key to set mode to all capacitors. Once have done,
- If the CONTROL mode is not desired, Press ▲ key to go to the desired parameter. Or else, Press ► SET UP key twice to return into Run Mode.

(14)

Performing Auto Sense of Capacitor

Press ► SET UP key on Run Mode for about TWO seconds continuously, the unit will therefore enter into Programming Mode such as shown below.

GEN

- On pressing ▲ key twice, the display will prompt PFC.
- Press enter key to indicates the display SET PF
- Press ▲ key five time to indicates capacitor Auto sense AUT SENSE
- It senses the kVAR value of each capacitor in phase wise
- On pressing enter key once, the display senses the capacitor value in sequence from L01 to upto capacitor selected.
- Once capacitor senses done,It will come into the same screen AUT SENSE
- Press ► SET UP key twice to return into RUN Mode.

Resolution of POWER

CT Primary& PT Primary/Secondary	kW Reading	kVA Reading	kWh Reading	kVAh Reading
5Primary<=500	Kilo	Kilo	Kilo	Kilo
501>Primary<=500	Mega	Mega	Kilo	Kilo
5001>Primary<=9999	Mega	Mega	Mega	Mega
5001>=PT11KV/110V	Giga (K&M led on)	Giga (K&M led on)	Mega	Mega

Resolution of ENERGY

CT Primary& PT Primary/Secondary	Wh	VAh
5Primary<=5	00000.000K	00000.000K
5>Primary<=50	000000.00K	000000.00K
50>Primary<=500	0000000.0K	0000000.0K
500>Primary<=5000	00000000K	00000000K
5001>Primary<=9999	000000.00M	000000.00M
<=5 & PT11KV/110V	000000.00K	000000.00K
<=5 & PT22KV/110V	00000000K	00000000K
5>to<=50 & PT11KV/110V	00000000K	00000000K
5>to<=50 & PT22KV/110V	000000.00M	000000.00M
50>to<=500 & PT11KV/110V	000000.00M	000000.00M
50>to<=500 & PT22KV/110V	0000000.0M	0000000.0M
500>to<=5000 & PT11KV/110V	0000000.0M	0000000.0M
500>to<=9999 & PT11KV/110V PT22KV/110V	00000000M	00000000M

OPTIONAL :

when supplied with RS 485 computer communication port.

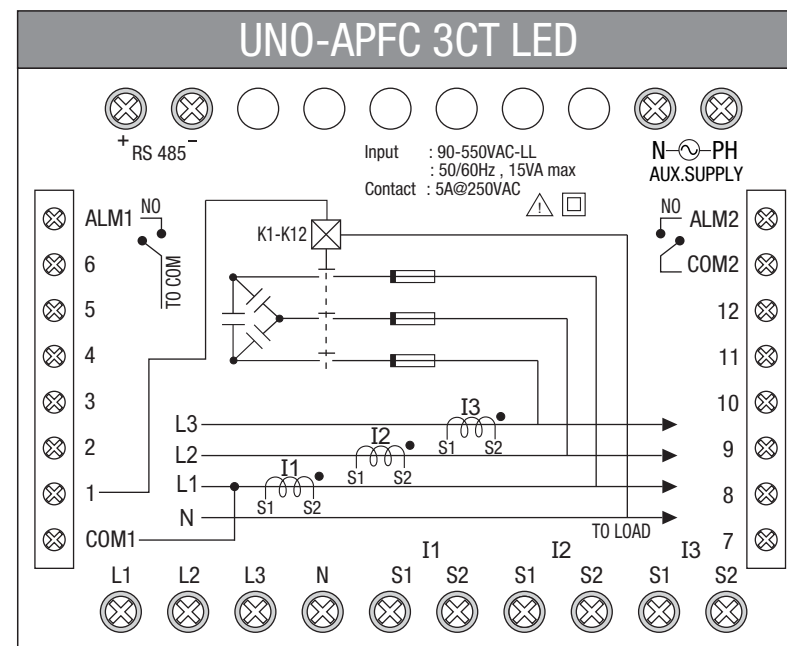
COMMUNICATION REGISTER MAP

Parameters as follows

Data Bits : 8
Baud Rate : 9600Bps (19200Bps on Request)
Stop Bits : 1
Parity : None
Data Format : Float

Address	Parameter	Multplier
1000	VLN-L1	1
1002	VLN-L2	1
1004	VLN-L3	1
1006	Current - I1	1
1008	Current - I2	1
1010	Current - I3	1
1012	kw-L1	1
1014	kw-L2	1
1016	kw-L3	1
1018	kVar (L1)	1
1020	kVar (L2)	1
1022	kVar (L3)	1
1024	kVA (L1)	1
1026	kVA (L2)	1
1028	kVA (L3)	1
1030	PF-L1	1
1032	PF-L2	1
1034	PF-L3	1
1036	Total kW	1
1038	Total kVar	1
1040	Total kVA	1
1042	FREQUENCY	1
1044	CT Ratio	1
1046	PT Ratio	1
1048	THD VLN -L1	1
1050	THD VLN -L2	1
1052	THD VLN -L3	1
1054	THD ILN -L1	1
1056	THD ILN -L2	1
1058	THD ILN -L3	1
1060	MD Fast(Set time/60)	1
1062	MD Predict(Set time/2)	1
1064	MD Fast(Set time)	1
1066	VLL-L1L2	1
1068	VLL-L2L3	1
1070	VLL-L3L1	1
2000	kWh(R)	1
2002	kWh Export - E	1
2004	kWh Import - I	1
2006	kVArh - P	1
2008	kVArh Capacitive - C	1
2010	kVArh Inductive - I	1
2012	kVAh - P	1

Wiring Diagram of UNO 12RS



TEST CERTIFICATE

S.No.	TEST	TEST CONDITION	STATUS																												
1	Insulation	a)Voltage Circuit and Earth b)Current Circuit and Earth	Complied																												
2	H V Test	2kV for 1min a)Voltage Circuit and Earth b)Current Circuit and Earth	Complied																												
3	Accuracy Test	<table> <tr> <th>Parameter</th><th>100%</th><th>50%</th><th>5%</th></tr> <tr> <td>PF</td><td>Less than 1elect.</td><td></td><td></td></tr> <tr> <td>kW</td><td>Within 0.5%</td><td></td><td></td></tr> <tr> <td>kVA</td><td>Within 0.5%</td><td></td><td></td></tr> <tr> <td>V</td><td>Within 0.5%</td><td></td><td></td></tr> <tr> <td>A</td><td>Within 0.5%</td><td></td><td></td></tr> <tr> <td>F</td><td>Less than 0.1Hz</td><td></td><td></td></tr> </table>	Parameter	100%	50%	5%	PF	Less than 1elect.			kW	Within 0.5%			kVA	Within 0.5%			V	Within 0.5%			A	Within 0.5%			F	Less than 0.1Hz			Complied
Parameter	100%	50%	5%																												
PF	Less than 1elect.																														
kW	Within 0.5%																														
kVA	Within 0.5%																														
V	Within 0.5%																														
A	Within 0.5%																														
F	Less than 0.1Hz																														

Ref Calibration standards

- MTE SWS 1.3 class 0.1
- YEW 2533E 31 class 0.1

> 12 months WARRANTY

Tested by :

S.No. 39822 ☒
S No 26BU006513 ☐

Approved by :

S.No.22904 ☐

Date.....

Trouble shooting Guide

- If Voltage and CT polarities are reverse, Meter will not read the correct capacitor value. For that ,Please check the error pages on the screen of meter and correct the wiring. After that, go for autosense of capacitor.
- Relay does not indicate expected power factor.Your wiring is wrong.Change around the wries leading to the R,Y,B voltage terminals of the relay.