

# MULTISER

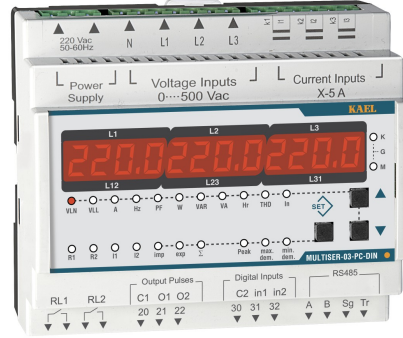
- 03-PC-96
- 02-PC-96
- 01-PC-96
- 01-96
- 11-96
- 11-PC-96

# MULTISER

- 03-PC-DIN
- 02-PC-DIN
- 01-PC-DIN
- 01-DIN
- 11-DIN
- 11-PC-DIN



## NETWORK ANALYSER



ISO 9001:2008

[www.kael.com.tr](http://www.kael.com.tr)

KAEL Mühendislik Elektronik Tic. ve San. Ltd.Şti.

	With RS485 MODBUS RTU VL1,VL2,VL3 VL12,VL23,VL13 IL1,IL2,IL3,I-Neutral,HZ P1,P2,P3,Q1,Q2,Q3,S1,S2,S3 CosΦ1,CosΦ2,CosΦ3 PFD1,PFD2,PFD3,ΣPF ΣP,ΣQi,ΣQc,ΣQ,ΣS imp-exp ΣkWh imp-exp ΣkVARh(ind) imp-exp ΣkVARh(cap) ΣkVAh 3 – 31. harmonics for currents 3 – 31. harmonics for voltages	Standart Benefits ■ Voltage ■ Current ■ Power Factor ■ Frequency ■ Active Power ■ Reactive Power ■ Apparent Power ■ Active Energy ■ Reactive Energy ■ Neutral Current ■ THD-V and THD-I ■ Peaks and Demands ■ True RMS ■ Current and Voltage Transformer Ratio ■ Password ■ 3P&4W , 3P&3W , ARON connection	■ ALARMS (Over Voltage – Under Voltage and Voltage Unbalance)	■ ALARMS (Over Current – Under Current and Current Unbalance)	■ ALARMS (Phase sequence-Phase failure Over THD-V and Over THD-I)	■ 2 Relay Outputs	■ 2 Digital Inputs	■ 2 Pulse Outputs for energies	■ RS-485 MODBUS-RTU	■ LED display	■ 96 x 96	■ DIN
MULTISER-01-96												
MULTISER-01-PC-96												
MULTISER-02-PC-96												
MULTISER-03-PC-96												
MULTISER-01-DIN												
MULTISER-01-PC-DIN												
MULTISER-02-PC-DIN												
MULTISER-03-PC-DIN												
<b>New</b> MULTISER-11-96												
MULTISER-11-PC-96												
MULTISER-11-DIN												
MULTISER-11-PC-DIN												

Table-1

## Introduction

The device was designed to measure, report and analyse the electrical magnitudes in the 3-phase electric network and both design and software were produced by KAEEL engineers. The state-of-the-art technologies were inserted in this device and both menus which facilitate the use of the user and the required features were included.

All the information and warnings you need to know concerning the device were described in the user operation manual. Please read this manual carefully before engaging with the device. Please do not take any action before consulting with our company for any matters not clearly understood.

Tel: +90 232 877 14 84 (pbx) Fax: +90 232 877 14 49  
Factory: Atatürk Mh. 78. Sok. No:10 Ulucak Köyü Kemalpaşa İzmir- TURKIYE

## ⚠ WARNINGS

- 1- The device shall be engaged by competent and licensed persons in conformity with the instructions set forth in the operation manual. In case required, controls shall be carried out by such persons also.
- 2- Do not open the inside of the device or cause to be opened. There are no parts inside the device which the user or anyone else may intervene.
- 3- Use the device according to assembly instructions
- 4- Before making electrical connection to the terminals of the device, make sure there is no electric power on the cables and terminals. The switchboard shall not have electric power on.
- 5- The fuses used in the device are of 1A FF type.
- 6- Make sure to fix the device on the switchboard firmly without swings with the apparatus given with the device.
- 7- Do not touch the keys on the front panel of the device with any substance other than your finger.
- 8- Wipe the device only with dry cloths after making sure the electric energy of the device is cut-off. Water or chemicals used for cleaning may cause damage to the device.
- 9- Before activating (energizing) your device please make sure that the terminal connections are made according to the connection scheme and without causing any contact problems (loose connection or contact of multiple copper cables).
- 10- The above measurements and warnings are for your safety. Kael Elektronik Ltd Şti or the dealer may not be held liable for any inconveniences when those warnings are not observed.

## Features

- Easy use with menu
- Improved dynamic software
- Ability to enter current and voltage transformer rates
- True RMS
- Voltage, current and harmonic protection
- Multiple alarms
- Password protection
- 3P&4W, 3P&3W, ARON Connection

## Measurements

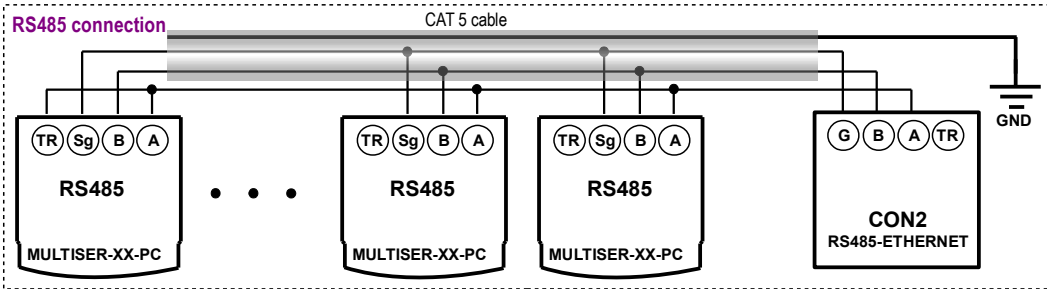
- Voltage (V1N, V2N, V3N, V12, V23, V13)
- Current (I1, I2, I3, ΣI)
- Power Factor (PF1, PF2, PF3)
- $\cos\Phi$  values (CosΦ1, CosΦ2, CosΦ3, )
- Frequency (Hz)
- Active Power (ΣP)
- Inductive Reactive Power [ΣQ(ind)]
- Capacitive Reactive Power [ΣQ(cap)]
- Apparent Power (ΣS)
- Active Energy (ΣkWh)
- Inductive Reactive Energy (ΣkVARh(ind))
- Capacitive Reactive Energy (ΣkVARh(cap))
- Neutral Current (I(N))
- Total harmonic distortion for current and voltage (THD-V ve THD-I)
- Peak and Demands

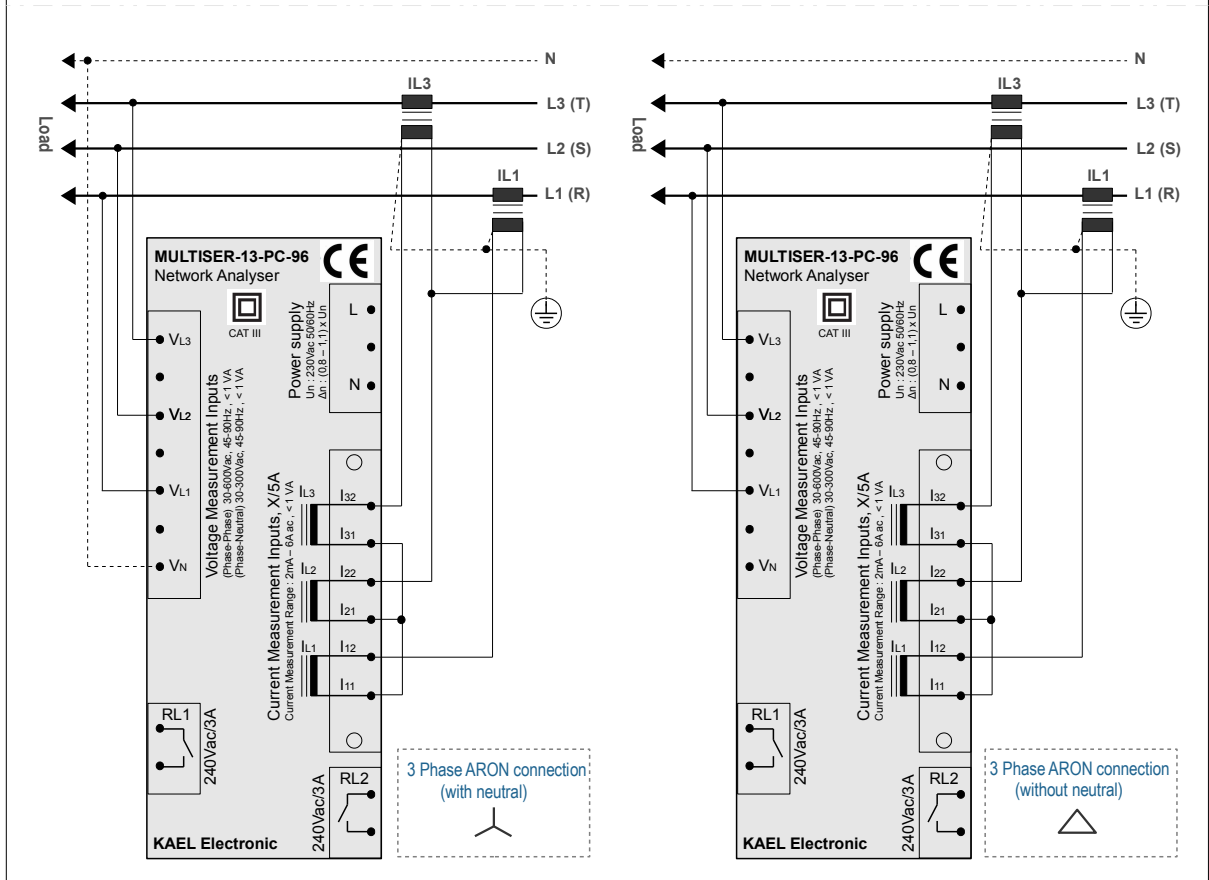
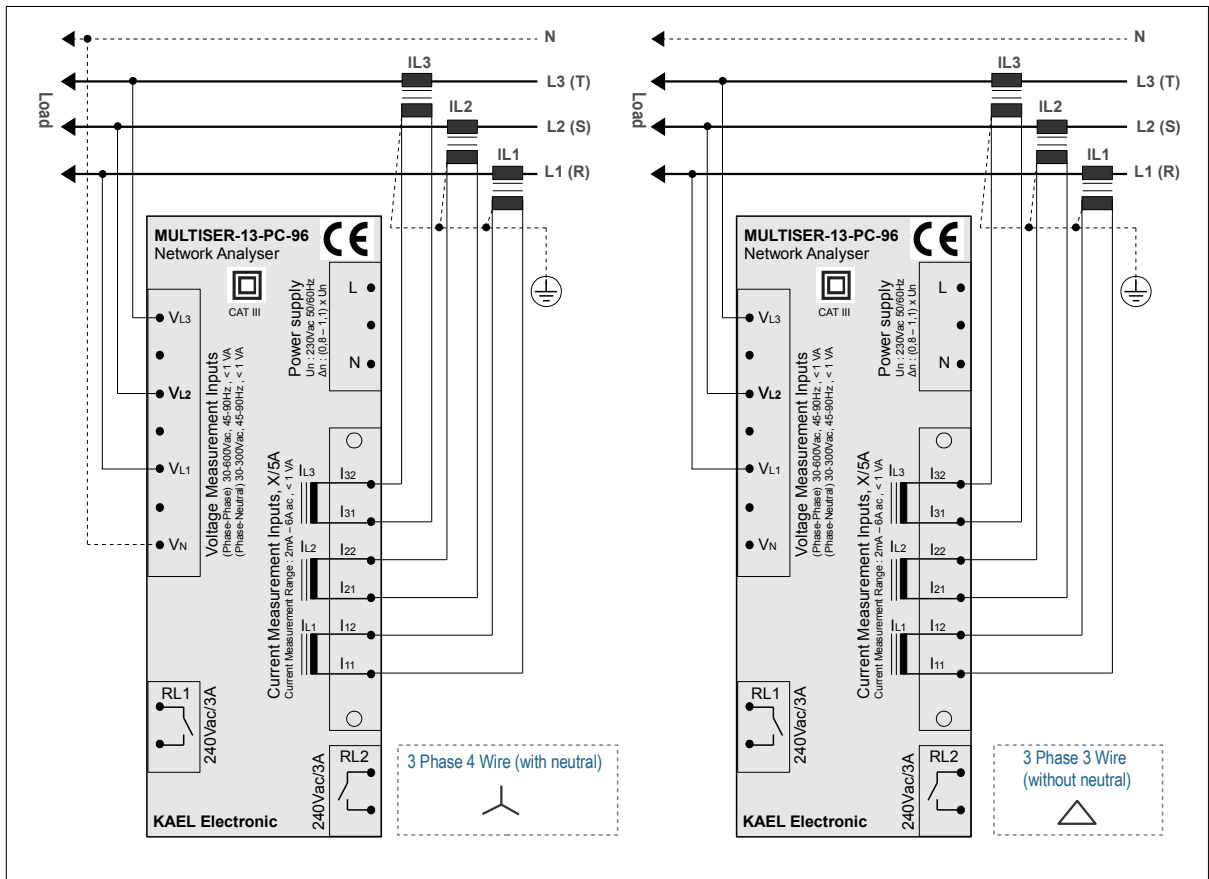
## Inputs & Outputs

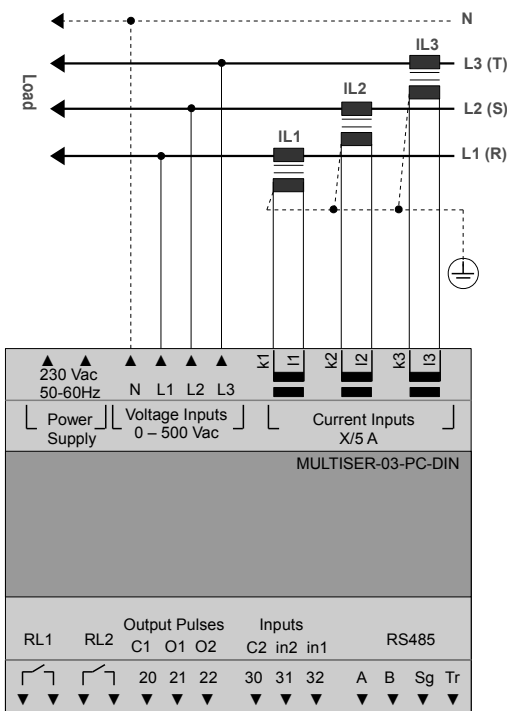
- Relay Output ( 2pcs)
- Pulse Output ( 2pcs)
- Digital Inputs ( 2pcs)
- RS-485 MODBUS-RTU

## ⚠ Making the Connections

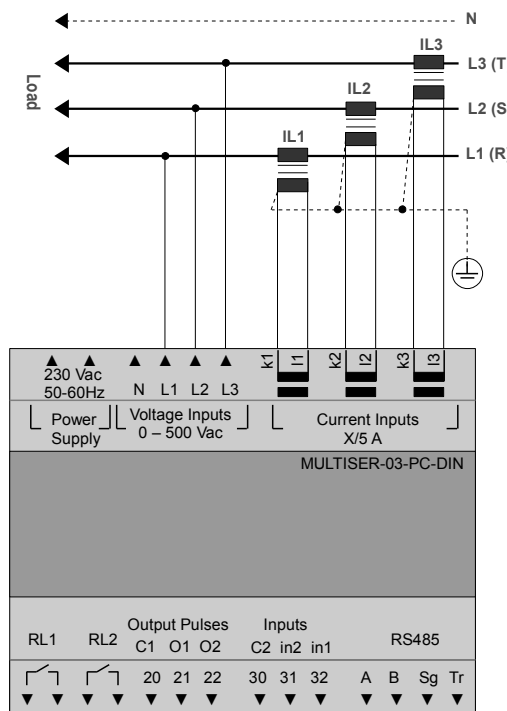
- The connections of the system must be made when it is out of power.
- The connections of the device shall be connected as shown in the connection scheme.
- The current and voltage connections shall be connected in a manner that they are placed on the same phase same current transformer and with the same direction. Connection scheme must be observed.
- The value of the current transformer chosen shall not be less than the real load value and X/5 amperes. Moreover, it is recommended to chose class 0,5.
- Fuses to be used shall be FF type. Fuses to be used shall be chosen according to given current values.
- RS485 connection shall be made.
- Do not supply power to the device before all the connections are checked by means of a measurement apparatus.
- The terminals for currents and voltage are suitable for cables with 2,5mm<sup>2</sup> cross- section.
- Pulse outputs, Inputs and RS485 terminals are suitable to max. 1,5 mm<sup>2</sup> cables
- CAT5 (category 5) cables are recommended for RS485 connection



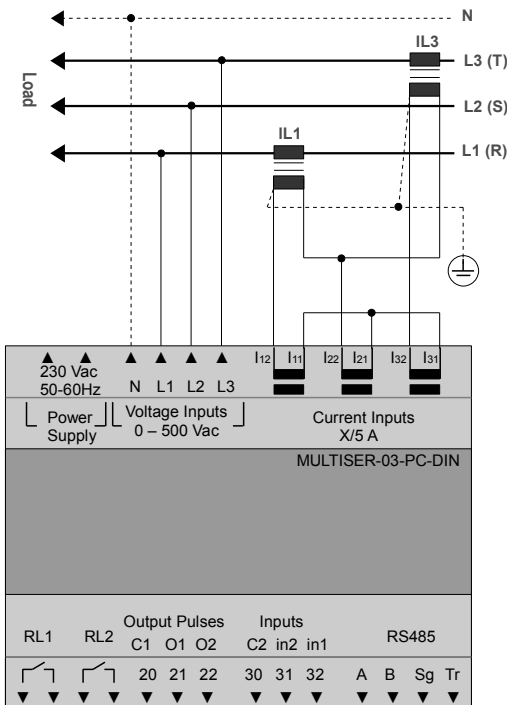




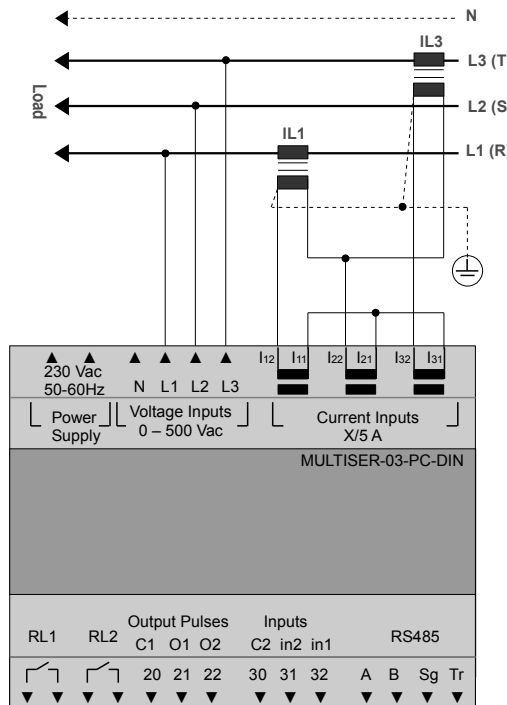
3 Phase 4 Wire (with neutral)



3 Phase 3 Wire (without neutral)



3 Phase ARON connection (with neutral)



3 Phase ARON connection (without neutral)

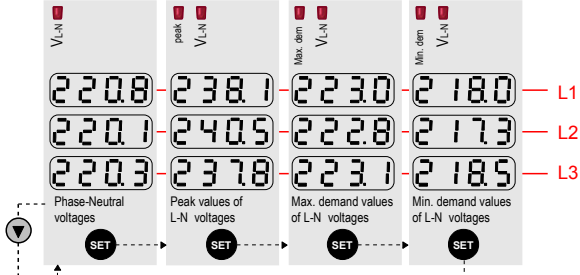
**MEASUREMENTS**

(VL-N, VL-L, I, I-neutral, Hz, THD-V, THD-I, CosΦ, W, VAR, VA, ΣW, ΣVAR, ΣVA, ΣWh, ΣVArh, ΣVAh )

The above parameters can be reached step by step using arrow keys. Related leds lights up and displays the corresponding parameter value which is displayed at the same time.

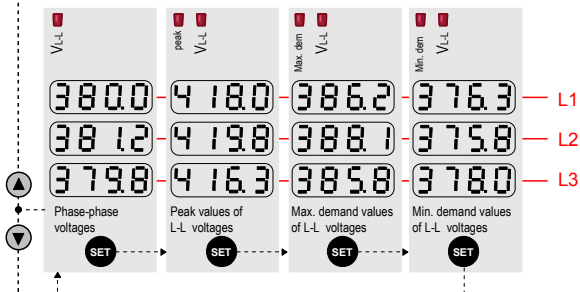
**Voltages of phase to neutral (VL-N)**

Phase-to-neutral voltages , their peak and demand values can be found in this menu. Demand and peak values are cleared in ( cLr UL-n ) menu . Also setting of the demand time can be set in ( dEnn SEt ) menu.



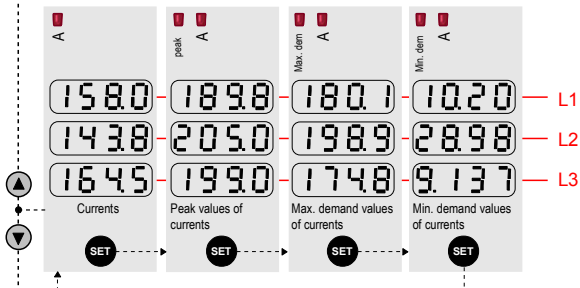
**Voltages of phase to phase (VL-L)**

Phase-to-phase voltages , their peak and demand values can be found in this menu. Demand and peak values are cleared in ( cLr UL-L ) menu . Also setting of the demand time can be set in ( dEnn SEt ) menu.



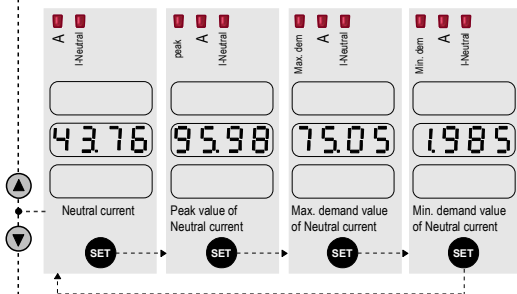
**Currents (I1, I2, I3)**

Phase currents , their peak and demand values can be found in this menu. Demand and peak values are cleared in ( cLr A ) menu . Also setting of the demand time can be set in ( dEnn SEt ) menu.



**Neutral Current (I-Neutral)**

Neutral current , its peak and demand values can be found in this menu. Demand and peak values are cleared in ( cLr A ) menu . Also setting of the demand time can be set in ( dEnn SEt ) menu.



MEASUREMENTS

**Frequency (Hz)**

Hz

500.1

Frequency

**Power Factor (P.F)**

P.F

1.000 — L1

0.986 — L2

0.982 — L3

Power Factors

**Active Power (P1, P2, P3, ΣP)**

Active powers for each phases, total active power , their peak and demand values are in this menu. Demand and peak values are cleared in ( cLr P ) menu . Also setting of the demand time can be set in ( dEnn SET ) menu.

W	K	imp. Σ W K	imp. peak W K	imp. max.dem W K	imp. min.dem W K	exp. Σ W K	exp. peak W K	exp. max.dem W K	exp. min.dem W K
148.6	606.1	208.3	168.4	13.43	606.1	0.000	0.000	0.000	0.000
150.8	ACP	217.8	189.0	34.76	ACP-	0.000	0.000	0.000	0.000
156.3	455.7	235.6	199.8	41.85	0.000	0.000	0.000	0.000	0.000
Active powers P1, P2, P3	Total import Active Power	Peak values of imp. active powers	Max.demand values of imp. active powers	Min.demand values of imp. active powers	Total export Active Power	Peak values of exp. active powers	Max. demand values of exp. active powers	Min. demand values of exp. active powers	

**Reactive Power (+Q1, -Q1, +Q2, -Q2, +Q3, -Q3, ΣQ+, ΣQ-)**

Reactive powers for each phases, total positive and negative reactive power , their peak and demand values are in this menu. Demand and peak values are cleared in ( cLr q ) menu . Also setting of the demand time can be set in ( dEnn SET ) menu.

VAR	K	Σ +VAR K	Σ -VAR K	peak +VAR K	peak -VAR K	max.dem +VAR K	max.dem -VAR K
38.35	606.1	606.1	139.0	-7.69	108.9	-0.008	
36.48	POS	7.66-	156.8	-0.01	12.73	-3.93	
40.61	115.4	278.4	148.0	-4.65	118.6	-9.65	
Reactive powers ±Q1, ±Q2, ±Q3	Total positive reactive pow. (ΣQ+)	Total negative reactive pow. (ΣQ-)	Peak values of pos. reactive powers	Peak values of neg. reactive powers	Max.demand values of pos.reactive powers	Max.demand values of neg.reactive powers	

**Apparent Power (S1,S2,S3, ΣS)**

Apparent powers for each phases, total apparent power , their peak and demand values are in this menu. Demand and peak values are cleared in ( cLr S ) menu . Also setting of the demand time can be set in ( dEnn SET ) menu.

VA	K	Σ VA K	peak VA K	Max.dem VA K	Min.dem VA K
148.6	606.1	208.3	168.4	13.43	
150.8	AP-P	217.8	189.0	34.76	
156.3	455.7	235.8	199.8	41.85	
Apparent powers S1, S2, S3	Total apparent power (ΣS)	Peak values of apparent powers	Max.demand values of apparent powers	Min.demand values of apparent powers	

MEASUREMENTS

MEASUREMENTS

**Active Energy (KWhr,MWhr,GWhr)**  
Total import and export active energy can be monitored. Energies can be deleted in (CLR Energy) menu.

imp	VAR	hr	K	exp	VAR	hr	K
ACT				ACT-			
0039				0000			
2306				0000			
Total import Active Energy				Total export Active Energy			

**Reactive Energy (KVARhr,MVARhr,GVARhr)**  
Total import/export positive and negative energy can be monitored. Energies can be deleted in (CLR Energy) menu.

imp	VAR	hr	K	imp	VAR	hr	K	exp	VAR	hr	K	exp	VAR	hr	K
POS				NEG-				POS				NEG-			
0000				0000				0000				0000			
1380				0655				0000				0000			
Total import positive Reactive Energy				Total import negative Reactive Energy				Total export positive Reactive Energy				Total export negative Reactive Energy			

**Apparent Energy (KVAhr)**  
App. Energy can be deleted in (CLR Energy) menu.

VAR	hr	K
APP:		
0000		
168.2		
Total Apparent Energy		

**Total Harmonic Distortion for Voltages (THD-V %)**  
Total Harmonic Distortion for Voltages, their peak and demand values can be monitored in this menu. Demand and peak values can be deleted in (CLR thdU) menu. Also setting of the demand time can be set in (dEnn SET) menu.

V	THD	peak	V	THD	max.dem	V	THD	min.dem	V	THD
02.09		03.35		02.89		01.36		- L1		
02.30		02.98		02.69		01.28		- L2		
03.00		03.47		02.58		01.10		- L3		
Total Harmonic Distortion (THD-V)		peak (THD-V)		max.demand (THD-V)		min.demand (THD-V)				

**Total Harmonic Distortion for Currents (THD-I %)**  
Total Harmonic Distortion for currents, their peak and demand values can be monitored in this menu. Demand and peak values can be deleted in (CLR thd I) menu. Also setting of the demand time can be set in (dEnn SET) menu.

A	THD	peak	A	THD	max.dem	A	THD	min.dem	A	THD
25.38		32.89		26.08		09.57		- L1		
20.83		29.03		18.93		11.28		- L2		
22.60		28.00		20.38		08.32		- L3		
Total Harmonic Distortion (THD-I)		Peak (THD-I)		max.demand (THD-I)		min.demand (THD-I)				

**Parameters**

If the password is active, SET button is pressed for 3 seconds, the parameter menu can be accessed only after entering 4-digit password. Temporary password is "0000". if password is not active, you can enter to the parameter menu without entering password. First parameter is current transformer ratio. After pressing the SET key, value is increased or decreased by using the arrow keys. By pressing the SET button, the new value will be saved.

**SET** Press for 3 seconds      **PIN (Password)** Factory setting for the password is "0000". To the desired number is reached by using the arrow keys for each a digit. Confirmed by pressing the SET key.

SET	increase	increase	increase	increase
Pin				
Code	0000	0000	0000	0000
SET	Decrease	Decrease	Decrease	Decrease

PARAMETERS

**Ct :Current Transformer Ratio ( 1.....5000 )**  
Current transformer ratio value is entered.  
Example: For 500 / 5A is entered 100. (500/5A=100)

Ct	
Rate	0001
SET	SET

**Ut :Voltage Transformer Ratio ( 1.....4000 )**  
Voltage transformer ratio value is entered.  
Example: For 34500 /100V is entered 345. (34500/100V=345)

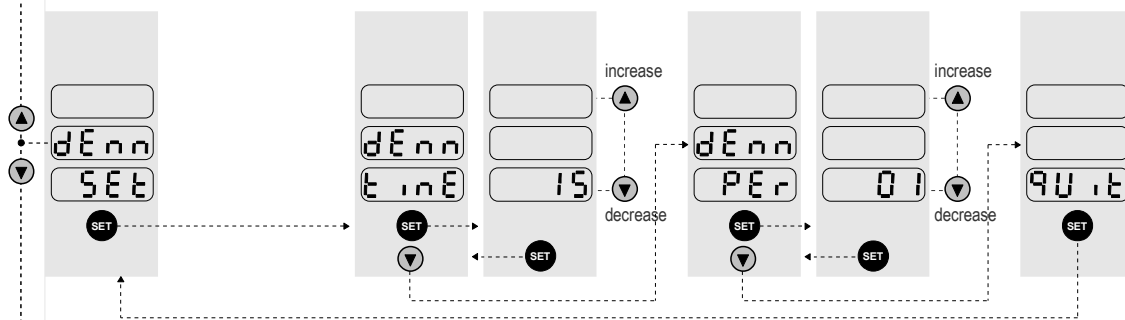
Ut	
Rate	0010
SET	SET

PARAMETERS

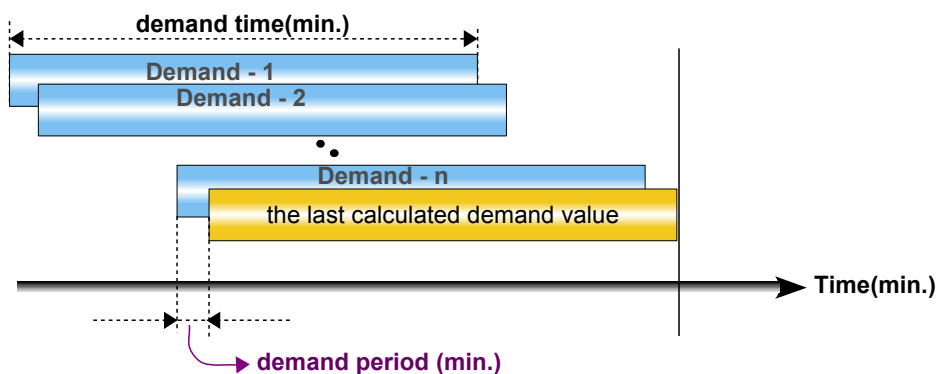
**dEnn SET :Demand SET**  
There are two parameters.  
These are shown in the graph below.

**dEnn tinE :Demand Time**  
(demand period +1) ..... (60 minutes)  
Refers to the computation time.

**dEnn PEr :Demand Period (1minute) ....( demand time - 1)**  
Refers to the time between two calculations.



**Example:** if , demand time= 15 minutes and demand period= 3 minutes ; Every 3 minutes, demand value is re-calculated for the last 15 minutes.



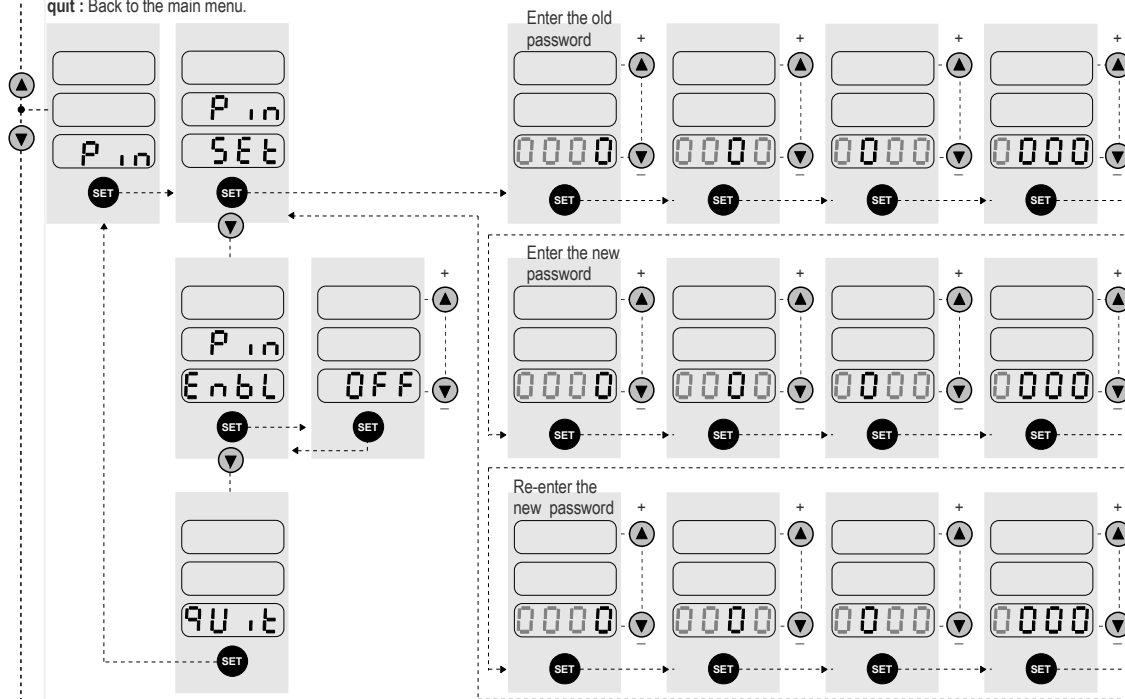
**PIN (Password) :** In this section, the password can be changed. Also password can be enabled or disabled.

**Pin SET :** Default value for the password is "0000". First of all, the old password (PIN OLD) must be entered correctly. If the old password is correct, the user can enter the new password (Pin nEU). You must enter the new password again (Pin rEP). If both passwords are the same, "NEU Pin Suite" message appears on the screen and a new password will be stored.

**Pin EnbL :** Password protection is enabled or disabled. **Pin On** ; password is enabled, **Pin OFF** ; password is disabled.

**quit :** Back to the main menu.

PARAMETERS



PARAMETERS

● **PULS oUt** : The device has two digital pulse output. Menus and functions are the same for the two outputs. Outputs can be set differently according to the type of the desired energy. *NOTE: Choose a device from table 1 for this characteristic.*

**Pulse Type (PULS tyPE)** :  
For Active Energy, it can be selected as **import-export-OFF**  
For Reactive Energy, it can be selected as **import(ind)-import(kap)-export(ind)-export(kap)-OFF**

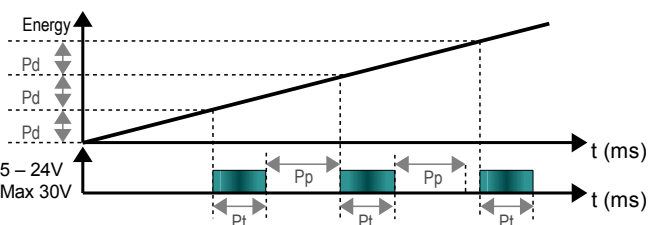
**Pd (PULS dEAL)** : 1  
The amount of energy equivalent to Pulse.  
It can be selected between 0,1kWh – 10MWh

**Pp (PULS pER)** : Pulse delay time  
It can be selected between 50ms – 900 ms

**Pt (PULS tInE)** :  
Pulse Time  
It can be selected between 50ms – 900 ms

**usage with relay**

**NOTE** : If one of the three parameters P,Q,S is activated, the other two parameter will not appear in the setting menu. You can access to the other parameters menus only if they are all deactivated.



**Connection to another device as insulated**

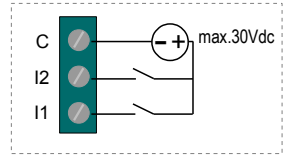
when amount of each energy (Pd) occurs , a pulse is generated from output, during time of (Pt). And then, output stays as 0V ,during time of (Pp)

● **PULS In** : The device has two digital inputs. Menus and functions are the same for the two outputs.

*NOTE: Choose a device from table 1 for this characteristic.*

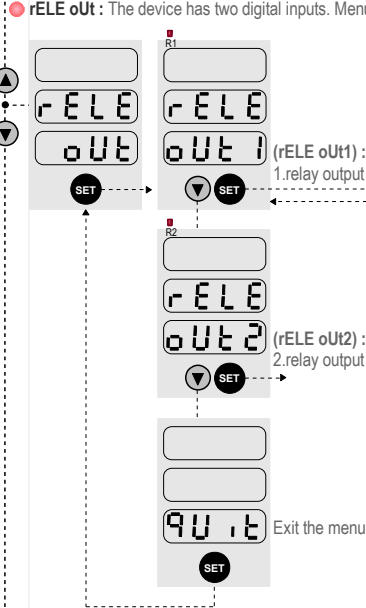
For example, it can understand position of the circuit breaker.

- There is an input at i1.
- There is not an input at i1.



PARAMETERS

PARAMETERS



PARAMETERS

**NOTE: Choose a device from table 1 for this characteristic.**

**Relay contact position**  
no : Normally open  
nc : Normally closed

**Permission to Access**  
on : enabled  
oFF : disabled

**NOTE: If remote Access Permission (ten) is made, can not be accessed to the other parameters. The pre-set parameters are disabled. In this case, the relay can be accessed only via remote access (if device has RS485 port).**

**Over-Voltage Adjustment:**  
SEt VAL : Set value. 110V - 260V  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 10 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Under-Voltage Adjustment:**  
SEt VAL : Set value. 80V - 210V  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 10 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Voltage Unbalance Adjustment:**  
SEt VAL : Set value. 1 - 50 %  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 30 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over-Current Adjustment:**  
SEt VAL : Set value. (Current transformer ratio) x (0,1 - 5) A  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Under-Current Adjustment:**  
SEt VAL : Set value. (Current transformer ratio) x (0,1 - 5) A  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Current Unbalance Adjustment:**  
SEt VAL : Set value. 1 - 50 %  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 30 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over-Frequency Adjustment:**  
SEt VAL : Set value. 50,0 - 75,0 Hz  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 20 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Under-Frequency Adjustment:**  
SEt VAL : Set value. 40,0 - 60,0 Hz  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 20 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over THD-V Adjustment:**  
SEt VAL : Set value. 1 - 99 %  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over THD-I Adjustment:**  
SEt VAL : Set value. 1 - 99 %  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over HD-V Adjustment:**  
SEt VAL : Set value. 1 - 99 %  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over HD-I Adjustment:**  
SEt VAL : Set value. 1 - 99 %  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Over-Neutral Current Adjustment:**  
SEt VAL : Set value. (Current transformer ratio) x (0,1 - 5) A  
d - t dELy : Delay time. 1 - 300 s  
r - t rEt tImE : Return time from fault. 1 - 300 s  
hYS : Hysteresis value. 1 - 50 %  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Phase Sequence Protection:**  
d - t dELy : Delay time. 0 - 10 s  
r - t rEt tImE : Return time from fault. 0 - 10 s  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

**Phase Failure Protection:**  
d - t dELy : Delay time. 0 - 10 s  
r - t rEt tImE : Return time from fault. 0 - 10 s  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

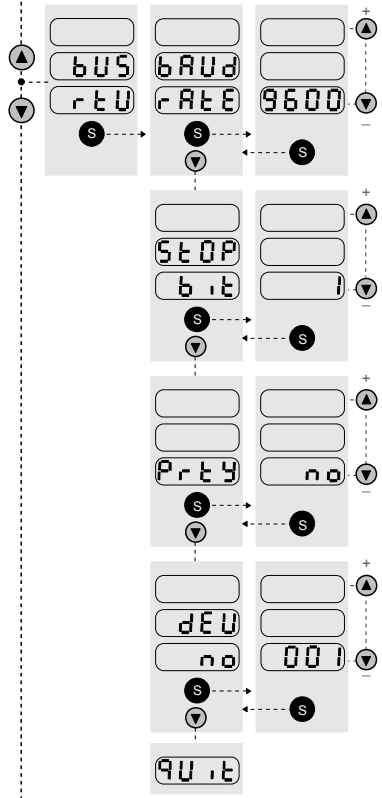
**Connection Failure:**  
d - t dELy : Delay time. 0 - 10 s  
r - t rEt tImE : Return time from fault. 0 - 10 s  
EnbL : Enable. If enable is on, relay is enabled.If enable is off, relay is disabled

110 - 260V  
001 - 300s  
001 - 300s  
1 - 10 %  
on - off

9Uit Exit the menu

PARAMETERS

● **bUS rtU** : Modbus rtu adjustments.



*NOTE: Choose a device from table 1 for this characteristic.*

Baud rate : 2400,4800,9600,19200,28800,38400,57600,115200  
 Stop Bits : (0.5) , (1) , (1.5) , (2)

Parity : no , even , odd  
 Cihaz No : 001 .....255

**MODBUS – RTU**

ADRES	FUNCTION	DATA	CRCL	CRCH	T
8 BIT	8 BIT	8 BIT	8 BIT	8 BIT	Delay time for 3,5 character

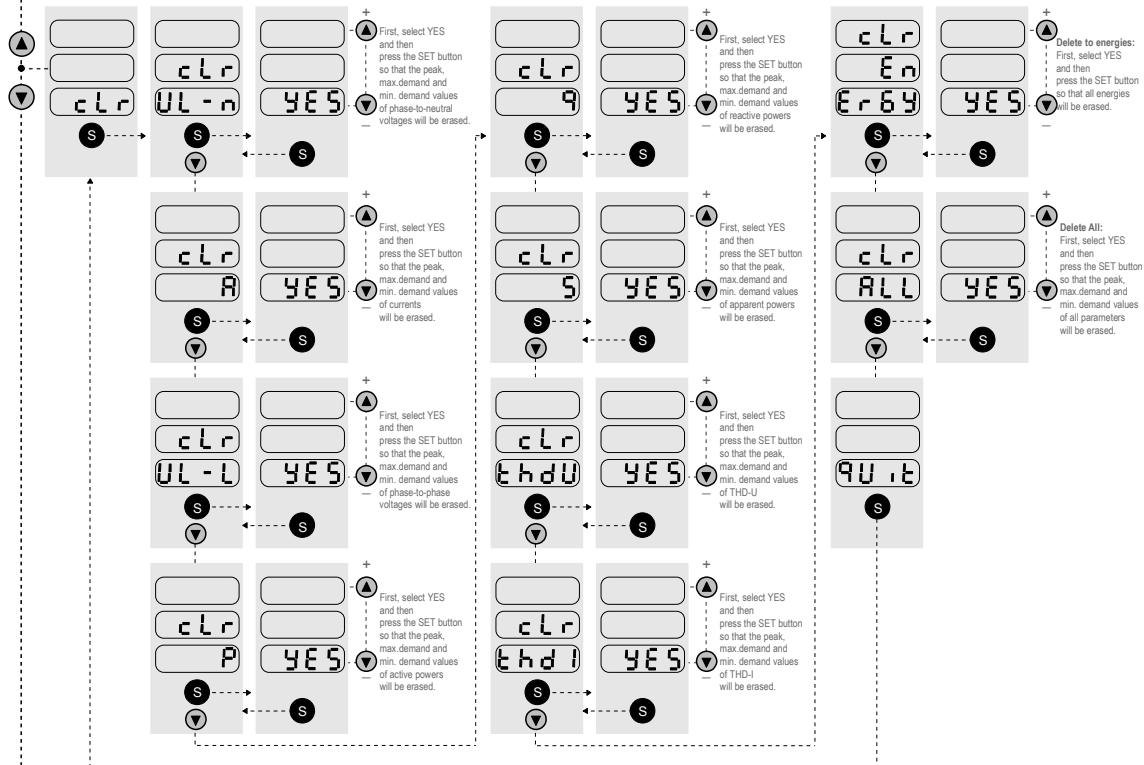
The maximum length of this package is 12 Byte.

**MODBUS – RTU Functions**

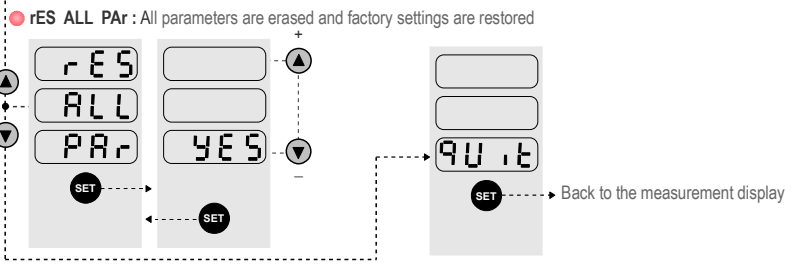
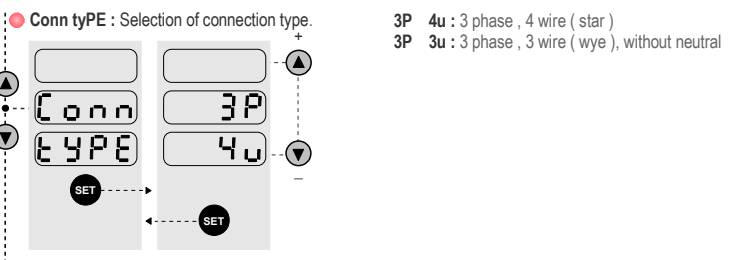
- 03H READING SINGLE REGISTER
- 06H WRITING SINGLE REGISTER
- 10H WRITING MULTIPLE REGISTER

PARAMETERS

● **clR** : Demands, peak values, and accumulated energies can be erased in this section. The parameters which indicated by the LEDs at the top of the device, will be erased.



PARAMETERS



**Installation Instructions**

- 1- A space with a dimension of 92mm \* 92mm shall be emptied on the panel where the device will be mounted.
  - 2- Before assembly of the device, remove panel fixing apparatuses.
  - 3- Place the device from front into the window opened in the panel as flush.
  - 4- -Fix the device on to the panel by using fixing apparatuses from back part.
- Make the assembly in a manner to assure 50 cms space between the device and the wall to enable good ventilation of the device.

PANEL SPACING DIMENSIONS



**Technical Specifications**

Operating Voltage (Un) : (Phase-Neutral ) 230Vac  
 Operating Range : (0,8-1,1) x Un  
 Operating Frequency : 50/60 Hz  
 Supply Power Consumption : < 6VA  
 Power Consumption of Measurement Inputs: < 1VA  
 Vin : 1 – 300 Vac (L-N)  
 : 2 – 600 Vac (L-L)  
 Iin : (as the secondary current of the current transformer)  
 : 0,01 - 6 Amp AC  
 Measurement Class : CAT III  
 Voltage Transformer Ratio: 1 ..... 4000  
 Current Transformer Ratio : 1 ..... 5000 (25000/5A)  
 Connection Type : 3P&4W , 3P&3W , ARON  
 Demand Time : 1 – 600 min

Display range : 1,0V - 400,0 kV  
 : 0,001A ..... 25000 A  
 : 0 – 999,9 M (W,VAR,VA)  
 : 0 – 999,9 k (W,VAR,VA)  
 : 0 – 999.999.999.999 (GWh,GVARh,GVAh)

**accuracy**  
 Voltage : 0,5 class  
 Current : 0,5 class  
 Active Power : 1 class  
 Reactive Power : 2 class  
 Apparent Power : 1 class

**Relay Outputs (2 pcs)** : 2 NO and max.3A/240 Vac

**Pulse Outputs (2 pcs)**  
 Operating Voltage : 5 – 24Vdc max. 30Vdc  
 Operating Current : max 50 mA  
 Min. Switching Time : 100 ms

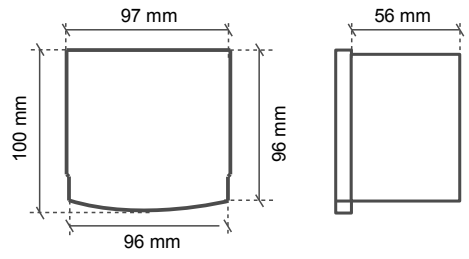
**Digital Inputs ( 2 pcs)**

Operating Voltage : 5 – 24Vdc max. 30Vdc

**RS485**

Baud rate : 2400,4800,9600,19200,28800,38400,57600,115200  
 Stop Bits : (0.5) , (1) , (1.5) , (2)  
 Parity : no , even , odd  
 Device No : 1 .....255

Device Protection Class : IP 20  
 Terminal protection class : IP 00  
 Ambient temperature : - 5 °C ..... + 50 °C  
 Installation Type : to panel cover from front  
 Dimensions : 96x96x56 mm



NOTE: Operating Voltage (Un): ask price and delivery time for 85-256Vac/dc

## Factory Settings

	Current Transformer(Primary) Value	: 5 / 5 A
	Voltage Transformer Ratio	: 1
	Password	: if not changed by user (0000) <b>NOTE 1</b>
	Password use	: Off (disabled)
	Connection Type	: 3P&4W
MODBUS RTU	Port Settings ( Baud Rate )	: 9600
	Port Settings ( Stop Bits )	: 1
	Port Settings ( Parity )	: No
	Port Settings ( Device No )	: 1
	Demand Time	: 15 minutes
	Demand Interval	: 3 min
1. Pulse output	Pulse Type for 1.Pulse Output	: OFF
	Pulse Value for 1. Pulse Output (Pd)	: 1 KWh
	Pulse Duration for 1.Pulse Output (Pt)	: 100 ms
	Pulse OFF Time for 1.Pulse output (Pp)	: 200 ms
2. Pulse output	Pulse Type for 2.Pulse Output	: OFF
	Pulse Value for 2. Pulse Output (Pd)	: 1 KVARh
	Pulse Duration for 2.Pulse Output (Pt)	: 100 ms
	Pulse OFF Time for 2.Pulse output (Pp)	: 200 ms
1. Relay output	1.Digital Input	: Alarm Input
	2.Digital Input	: Alarm Input
	Contact Position	: N.O Normally Open
	Remote Access Permit	: off
	Over Voltage	: 255V Relay OFF
	Under Voltage	: 185V Relay OFF
	Voltage Unbalance	: 10% Relay OFF
	Over Current	: 5A Relay OFF
	Under Current	: 1A Relay OFF
	Current Unbalance	: 50% Relay OFF
	Over Frequency	: 53Hz Relay OFF
	Under Frequency	: 48Hz Relay OFF
	Over THD-V	: 6% Relay OFF
	Over THD-I	: 15% Relay OFF
	Over HD-V	: 6% Relay OFF
	Over HD-I	: 15% Relay OFF
	Over Neutral Current	: 3A Relay OFF
	Phase Sequence Failure	: Relay OFF

1. Relay output	Phase Failure	: Relay OFF
	Connection Failure	: Relay OFF
	Contact Position	: N.O Normally Open
	Remote Access Permit	: off
	Over Voltage	: 255V Relay OFF
	Under Voltage	: 185V Relay OFF
	Voltage Unbalance	: 10% Relay OFF
	Over Current	: 5A Relay OFF
	Under Current	: 1A Relay OFF
	Current Unbalance	: 50% Relay OFF
2. Relay output	Over Frequency	: 53Hz Relay OFF
	Under Frequency	: 48Hz Relay OFF
	Over THD-V	: 6% Relay OFF
	Over THD-I	: 15% Relay OFF
	Over HD-V	: 6% Relay OFF
	Over HD-I	: 15% Relay OFF
	Over Neutral Current	: 3A Relay OFF
	Phase Sequence Failure	: Relay OFF
	Phase Failure	: Relay OFF
	Connection Failure	: Relay OFF

**Note 1** :The password is primarily defined as 0000. However the password will not change even in the event that factory values are restored after having amended the password. The latest password entered by the user is valid.

**Note 2** :When factory settings are restored, energies are set to zero.

## Formulas

RMS Voltage	$V_{RMS} = \sqrt{\frac{1}{N} \sum_{i=0}^N V_i^2}$	$V_{THD} \% = \frac{\sqrt{\sum_{i=2}^N V_i^2}}{V_1} \times 100$
RMS Current	$I_{RMS} = \sqrt{\frac{1}{N} \sum_{i=0}^N I_i^2}$	
Active Power	$P = \frac{1}{N} \sum_{i=0}^N P_i$	$I_{THD} \% = \frac{\sqrt{\sum_{i=2}^N I_i^2}}{I_1} \times 100$
Reactive Power	$Q = \frac{1}{N} \sum_{i=0}^N Q_i$	
Apparent Power	$S = \sqrt{P^2 + Q^2}$	
Power Factor	$PF = \frac{P}{S}$	