19 - Technical Specifications:

Operating Voltage	85V - 300V AC
Operating Frequency	50 / 60 Hz
Operating Power	<10VA
Operating Temperature	-20ºC.....55ºC
Input Voltage	5V -330V AC
Voltage Measuring Range	5V - 600kV
Input Current	10mA - 5.5A
Current Measuring Range	10mA - 27.500A
Voltage, Current Accuracy	%±0.5
Active Accuracy	%±1
Reactive Accuracy	%±2
Supported Connection	3P4W
Current Transformer Ratio	1....5000
Voltage Transformer Ratio	1,0....999,9
Harmonic Voltage	3 - 31
Harmonic Current	3 - 31
Communication	RS485 MODBUS RTU
Baudrate	1200bps - 38400bps
Stop Bit	1 (Fixed)
Parity	None (Fixed)
Display	71.5 x 61.5mm Cam LCD
Contact Output	-
Dijital Input	-
Weight	<300Gr.
Protection Class	IP40(Front Panel), IP00(Body)
Panel Hole Measurements	91mm x 91mm
Connection Type	Plug-in Terminal Connection
Cable Diameter	1.5mm²
Assembly	Assembly to panel front cover
Working Altitude	<2000meters.

20 - Contents:

21 - Contact Informations:

www.vteke.com.tr

VTEKE

EA-C4
USER MANUAL

- Measures up to voltage harmonics 31st (L-N).
- Measures up to current harmonics 31st.
- Supports 3P4W connections.
- RS485 Modbus RTU
- 71.5 x 61.5 Custom Design Glass LCD
- It shows the active powers of each phase (P1, P2, P3).
- It shows the reactive powers of each phase (Q1, Q2, Q3 inductive or capacitive).
- It shows the apparent powers of each phase (S1, S2, S3).
- It shows power factors (PF) and Cosφ values of each phases.
- It shows the minimum, maximum and average values of the phase-to-phase and Phase-neutral voltages (V).
- It shows the current values of each phase (I1, I2, I3).
- It shows total import and export active (ΣkWh) energy.
- It shows total inductive and capacitive reactive (ΣkVArh) energy.
- It shows the high voltage, low voltage, voltage irregularity,current irregularity, THDV and THDI values.
- It shows demands.
- You can delete energies and demands (I, P, Q, S).
- The menu is password protected.

Document Number: DK-088-1

MADE IN TURKEY CE

1 - Connection Schemes:

Figure-1: Connection Type of 3P4W: 3 Phase current and 3 phase voltage.

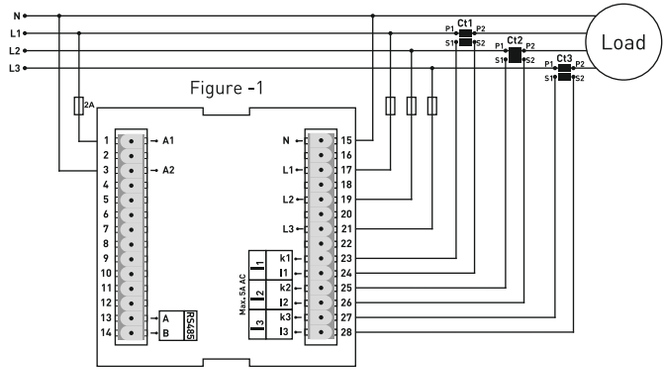
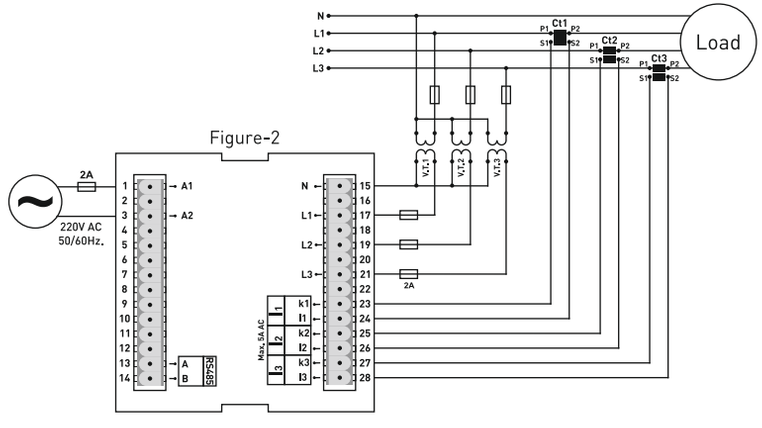


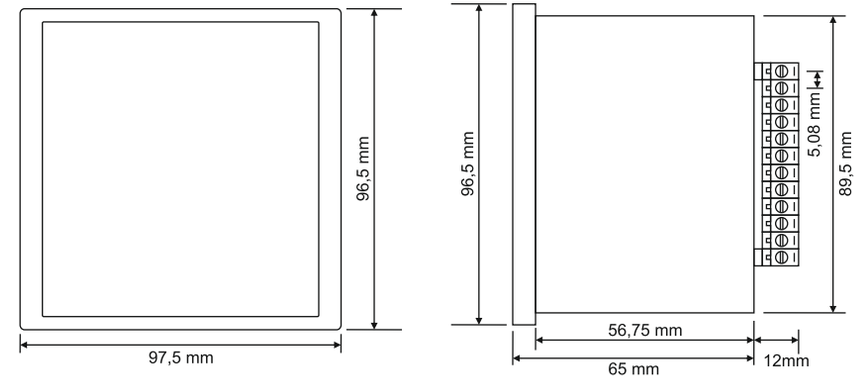
Figure-2: 3 Phase current and 3 phase voltage. It is suitable for medium voltage with voltage transformer.



17 - Menu Values Table:

Parameter Number	Parameter	Unit	Factory Value	Minimum Value	Maximum Value
Ctr	Current Transformer Ratio	-	1	1	5000
Vtr	Voltage Transformer Ratio	-	1.0	0.1	999.0
br	Baudrate	bps	9600	1200	38400
-	Stop bits	-	1	-	-
-	Data bits	-	8	-	-
-	Parity	-	none	-	-
Id	ModBus ID	-	1	1	247
En	Deleting Total Energy	-	No	Yes	No
dE	Deleting Demand Values	-	No	Yes	No

18- Dimensions:



16 - Enter Password Value:

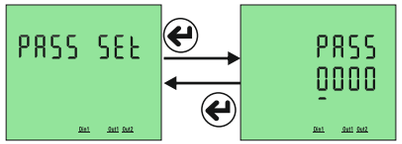


Figure-38 Figure-43

In order to change password; press set button while Figure-38 is on the screen. The Figure-43 comes to the screen. In order to pass through steps; press the button on the right. In order to change the value of the step press the "down" button. You can change the step value with underline. If you press the set button after entering the password, the password is saved and the screen comes in, figure-38. Pressing the right button; you can pass through the parameters in the menu or pressing "Esc" button; you can exit the menu.

2 - Matters to be considered in current transformer selection and connection

- Note that the value of current transformer is higher than the maximum current drawn from the system.
- It is advisible that the class of the current transformer (it can be written class, klas, cl, kl) is 0.5 .
- To avoid the complexity when connecting the current transformer output terminal use different colour cables or give cable numbers.
- It is recommended not to add additional cables to the current transformer output ends.
- The cross section of the cables used for the current transformer must be at least 1.5mm².
  As the distance between the current transformer and the device increases, the cross-section of the used cable should also be increased.
- Please spread the cables which are connected to current transformer output terminal from remote high voltage lines.
- Please fix current transformers to bara, cable or rail to avoid rattling .

3 - Warnings:

- Please use the device properly according to our directions.
- Please protect LCD screen from sun light.
- Please take 5cm space behind the device after the device installation.
- Please fix the device front cover panel with the apparatus that comes with it.
- Please do not use the device in places with high humidity.
- Please add a key or circuit breaker to assembly.
- Please keep key or circuit breaker close the device or in an easily accessible location by the operator.
- There should be no electricity in the connection cables when assembling device.
- There should be used shielded or twisted cord cable at the non-network-connected input and output lines. These cables should not be passed near the high power lines and the device.
- Assembling and electrical connections must be done by technical staff according to instruction manuel.
- The feed cables should be suitable for IEC 60227 or IEC 60245 requirements.

4 - Device Maintenance :

Turn off energy of the device and disconnect from connections. Clean the device body by using slightly moist or dry cloth. Do not use conductor or other chemical as a cleaning agent matter which is harmful to device. Make connections after the cleaning of device and give energy to device and make sure that device works properly.

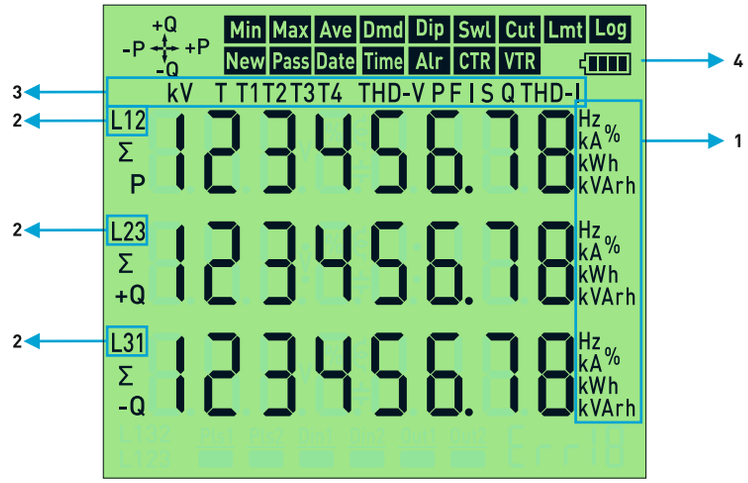
5 - General:

The EA-C4 energy analyzer measures the voltage, current, cosφ, active power, reactive power, minimum and maximum values, demands and energies of the loads in the system. Measures current and voltage harmonics up to 31st harmonic.

6 - First Operation of the Device:

Please read the warnings before powering the device. Make connections of the device according to the connection scheme. When the device is first powered up figure-3 displayed on the screen. Firstly enter the current transformer ratio from the settings menu and enter the voltage transformer ratios (If a voltage transformer is used in the system.)

7- Introduction of Screen:



1 - Indicates the unit of the value.

2 - Indicates which phase the value belongs to.

3 - Indicates displayed values. V-voltage, I-current, F-frequency and S-apparent power, P-active power, PF-power factor, FI-Cosine, THD-I- total current harmonics, THD-V- total voltage harmonics, Q- reactive power.

→+P Specified that the indicated active energies are imported.

-P→ Specified that the indicated active energies are exported.

+Q Specified that the indicated reactive energies are inductive.

-Q Specified that the indicated reactive energies are capacitive.

Specified that the indicated reactive energies are inductive.

Specified that the indicated reactive power are capacitive.

Min Indicates that the values shown are minimum.

Max Indicates that the values shown are maximum.

Ave Indicates that the values shown are average.

Dmd Indicates that the values shown are demand.

Σ_P Total active energy

Σ_{+Q} Total inductive reactive energy

Σ_{-Q} Total capacitive reactive energy

12 - Setting the Current Transformer Ratio:

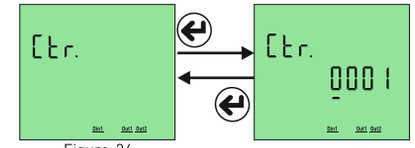


Figure-34

Figure-39

To change the current transformer ratio, press the set button while the figure-34 is on the screen. Figure-39 comes to the screen. Press right button to move between digits. Press the down key to change the value of the digit You can change the digit value which is the underline. When you press the set button after entering the ratio, the current transformer ratio is recorded and the screen shows figure-34. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc button.

Example: 100 / 5A current transformer ratio (multiplier value) is 20. The CTR value needs to be set to 0020.

13 - Changing Voltage Transformer Ratio:

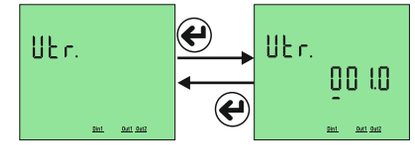


Figure-35

Figure-40

To change the voltage transformer ratio, press the set button while the figure-35 is on the screen. Figure-40 comes to the screen. Press right button to move between digits. Press the down button to change the value of the digit. You can change the digit value which is the underline. When you press the set button after entering the ratio, the voltage transformer ratio is recorded and the screen shows figure-35. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc button.

Example: Medium voltage (M.V.) = Enter the ratio of the voltage transformer that converts 34.500V to 110V. The ratio (multiplier) is calculated as 34,500 / 110 = 313,6 voltage transformer ratio. The VTR value must be set to 313.6.

14- RS485 Remote Communication Settings

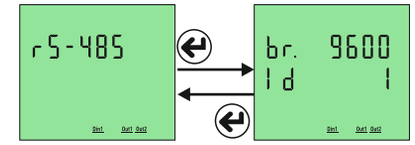


Figure-36

Figure-41

To change the RS-485 remote communication settings, press the set button while figure-36 is on the screen. Figure-41 comes to the screen. Two parameters can be set here. Baudrate (br -communication speed) and Modbus ID (Id - the number that identifies the device on the RS 485 line). Press the right button to move the point (.) to the parameter you want to set.

Then change the parameter value by pressing the down button. When you press the Set button, the changes that you made are saved and Figure-36 comes to the screen. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc button. Modbus ID (MBID) value; when more than one communication devices connect to a modem, Serial number or ModBus address must be different. In such cases, enter a different value from other devices.

Baudrate(br): 1200 - 115200 bps, **ModBus ID(Id):** 1 - 247 **Stop bits:** 1, **Party** : none.

15 - Deleting Energy and Demand Records:

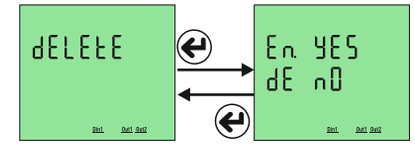


Figure-37

Figure-42

To delete the records, press the set button while figure-37 is on the screen. Figure-71 comes to the screen. You can delete 2 records here. Energy (En) and Demand (dE). Press the right button to move the point (.) to the record which you want to delete. Then press the down button to change the value to "yes". The record value which you do not want to delete must remain in "no".

When you press the Set key, only records with the value "yes" will be deleted and the Figure-37 comes to the screen. You can scroll through the parameters in the menu by pressing the right button or you can exit the menu by pressing the Esc button.

11 - Menu Structure:

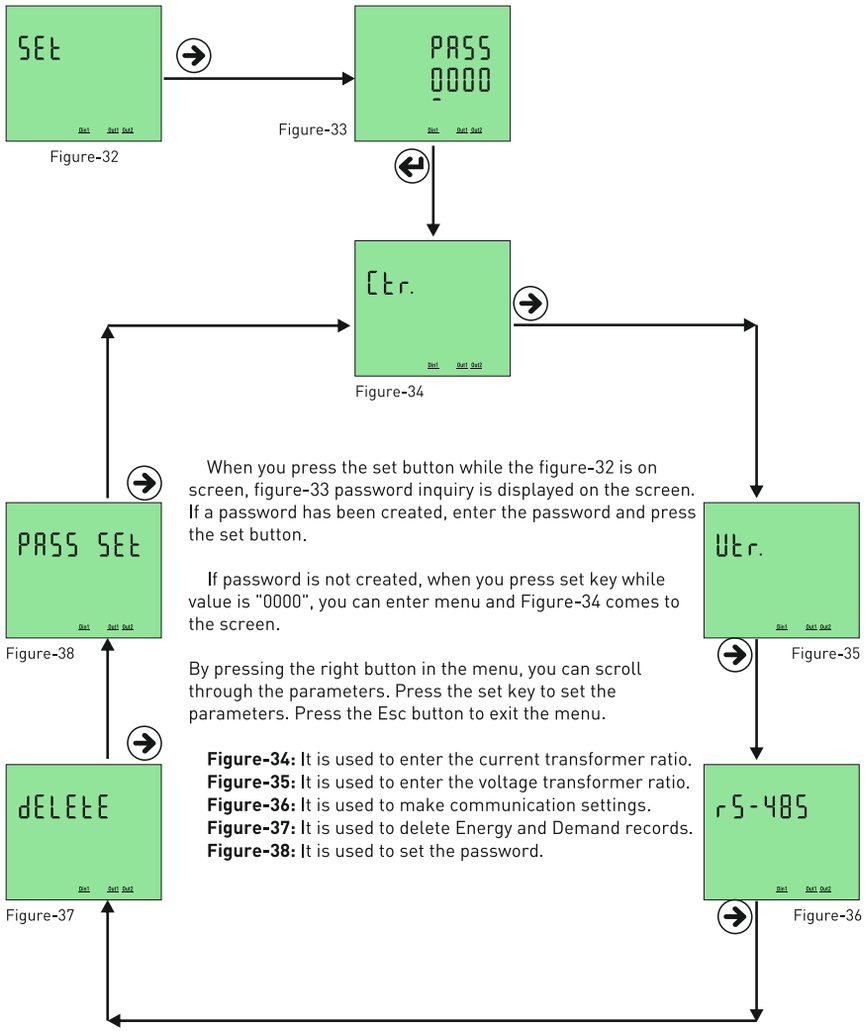


Figure-32

Figure-33

Figure-34

Figure-38

Figure-35

Figure-37

Figure-36

When you press the set button while the figure-32 is on screen, figure-33 password inquiry is displayed on the screen. If a password has been created, enter the password and press the set button.

If password is not created, when you press set key while value is "0000", you can enter menu and Figure-34 comes to the screen.

By pressing the right button in the menu, you can scroll through the parameters. Press the set key to set the parameters. Press the Esc button to exit the menu.

Figure-34: It is used to enter the current transformer ratio.
Figure-35: It is used to enter the voltage transformer ratio.
Figure-36: It is used to make communication settings.
Figure-37: It is used to delete Energy and Demand records.
Figure-38: It is used to set the password.

8- Introduction of Buttons:

ESC: Press this button while in menu to exit the menu without saving the values.
When this key is pressed while not in the menu, the screen always shows figure-3.

SET: This button enters menu/parameter. It records the changes of parameters and remove from parameter.

DOWN: This button enables to fast progress between the values that are measured out of menu.

RIGHT: This button allows to progress by displaying the measured values outside the menu together with the details. It allows navigation between parameters when pressed in menu.
In the parameter, it allows to transition between steps and parameters.

9 - Progress On Screen Information:

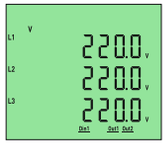


Figure-3


Figure-4

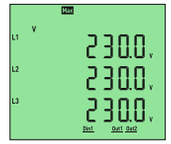


Figure-5

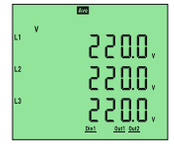


Figure-6

Figure-3: Shows the phase-neutral voltage values of each phase. When you press right button, the figure-4 appears on the screen.

Figure-4: Shows the minimum(Min) voltage values of phase-neutral voltage values of each phase. When you press right button, the figure-5 appears on the screen.

Figure-5: Shows the maximum(Max) voltage values of phase-neutral voltage values of each phase. When you press right button, the figure-6 appears on the screen.

Figure-6: Shows the average(Ave) voltage values of phase-neutral voltage values of each phase. When you press right button, the figure-7 appears on the screen.


Figure-7

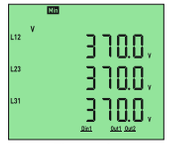


Figure-8

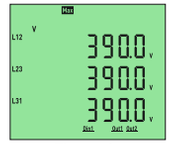


Figure-9

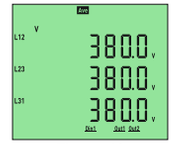


Figure-10

Figure-7: Shows the phase-phase voltage values of each phase. When you press right button, the figure-8 appears on the screen.

Figure-8: Shows the minimum(Min) values of the phase-phase voltage values of each phase. When you press right button, the figure-9 appears on the screen.

Figure-9: Shows the maximum(Max) values of the phase-phase voltage values of each phase. When you press right button, the figure-10 appears on the screen.

Figure-10: Shows the average(Ave) values of the phase-phase voltage values of each phase. When you press right button, the figure-11 appears on the screen.

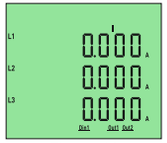


Figure-11


Figure-12

Figure-11: Shows the current values of each phase. When you press the right button, figure-12 appears on the screen.

Figure-12: Shows the current demand (Dmd) values for each fuse. When you press the right button, figure-13 appears on the screen.

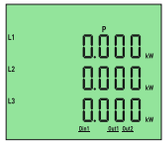


Figure-13

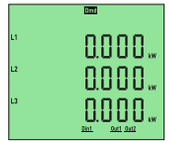


Figure-14

Figure-13: Shows the active power (P) values for each phase. When you press the right button, figure-14 appears on the screen.

Figure-14: Shows the active power (P) demand (Dmd) values for each phase. When you press the right button, figure-15 appears on the screen.

10 - Fast Forwarding of Screen Information:


Figure-3

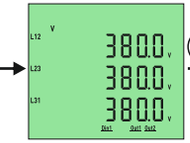


Figure-7

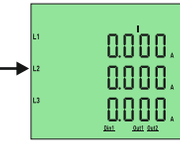


Figure-11

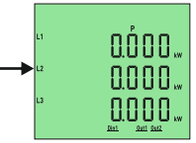


Figure-13


Figure-15


Figure-17

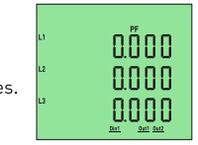


Figure-19

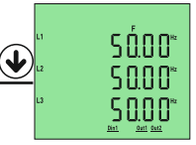


Figure-21

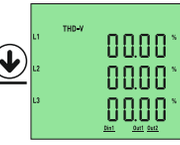


Figure-22

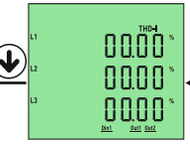


Figure-24

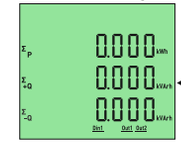


Figure-26

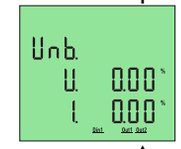


Figure-31

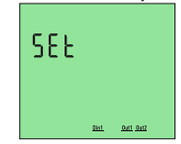


Figure-32

When the device is energized, figure-3 is displayed
When you press the down button, figure-7 is displayed.
When you press the down button, figure-11 is displayed.
When you press the down button, figure-13 is displayed.
When you press the down button, figure-15 is displayed.
When you press the down button, figure-17 is displayed.
When you press the down button, figure-19 is displayed.
When you press the down button, figure-21 is displayed.
When you press the down button, figure-22 is displayed.
When you press the down button, figure-24 is displayed.
When you press the down button, figure-26 is displayed
When you press the down button, figure-31 is displayed.
When you press the down button, figure-32 is displayed.
When you press the down button, figure-7 is again displayed.

Figure-3: Shows the phase-neutral voltage values.
Figure-7: Shows the phase-phase voltage values.
Figure-11: Shows the current values.
Figure-13: Shows the active power (P) values.
Figure-15: Shows the reactive power (Q) values.
Figure-17: Shows the apparent power (S) values.
Figure-19: Shows the power factor (PF) values.
Figure-21: Shows the frequency (F) values
Figure-22: Shows the THD-V values.
Figure-24: Shows the THD-I values.
Figure-26: Shows the total energy (active & reactive) values.
Figure-31: Shows the voltage and current irregularities.
Figure-32: It is used to enter the menu.

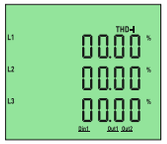


Figure-24

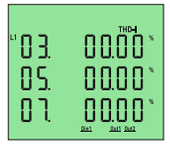


Figure-25

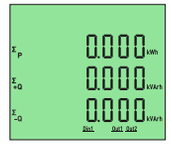


Figure-26

Figure-24: It shows total current harmonic distortion value (THD-I) of each phase. When you press the right button, figure-25 appears on the screen.

Figure-25: Current harmonics values of up to 31st harmonics are displayed on each screen, with 3 values per screen. When you press the right button, the values of the L2 and L3 phases are displayed on the screen respectively. When you press the right button, figure-26 appears on the screen.

Figure-26: It shows the import active, inductive and capacitive reactive energy values of the total of the phases. When you press the right button, figure-27 appears on the screen.

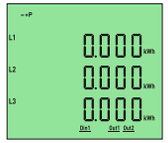


Figure-27

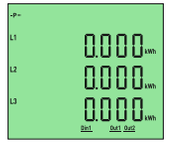


Figure-28

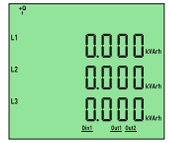


Figure-29

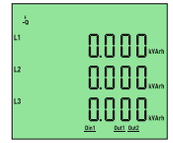


Figure-30

Figure-27: It shows the value of import active energy value of each phase. When you press the right button, figure-28 appears on the screen.

Figure-28: It shows the value of export active energy value of each phase. When you press the right button, figure-29 appears on the screen.

Figure-29: It shows the value of inductive reactive energy value of each phase. When you press the right button, figure-30 appears on the screen.

Figure-30: It shows the value of capacitive reactive energy value of each phase. When you press the right button, figure-31 appears on the screen.

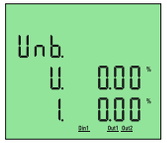


Figure-31

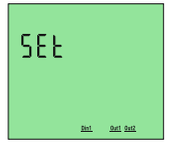


Figure-32

Figure-31: It shows the voltage and current irregularities of the phases with each other. When you press the right button, figure-32 appears on the screen.

Figure-32: It is used to make settings related to the device. When you press the right button again on this screen, the password entry screen for entering the menu is displayed.

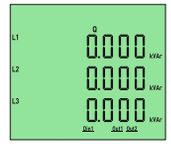


Figure-15

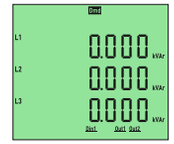


Figure-16

Figure-15: It shows the reactive power value(Q) values for each phase. When you press the right button, figure-16 appears on the screen.

Figure-16: It shows the demand (Dmd) of reactive power(Q) values for each phase. When you press the right button, figure-17 appears on the screen.

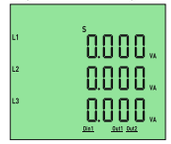


Figure-17

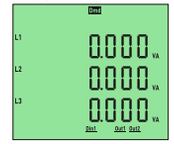


Figure-18

Figure-17: It shows apparent power (S) values for each phase. When you press the right button, figure-18 appears on the screen.

Figure-18: It shows the demand (Dmd) of apparent power (S) values for each phase. When you press the right button, figure-19 appears on the screen.

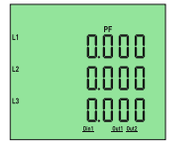


Figure-19

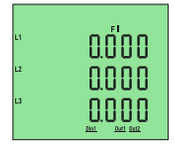


Figure-20

Figure-21

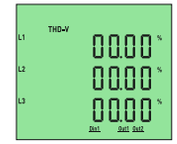


Figure-22

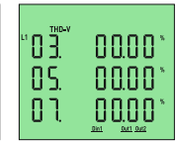


Figure-23

Figure-19: It shows the power factor value (PF) values for each phase. When you press the right button, figure-20 appears on the screen.

Figure-20: It shows the cosinus phi value (FI) values for each phase. When you press the right button, figure-21 appears on the screen.

Figure-21: It shows the frequency (F) value of each phase. When you press the right button, figure-22 appears on the screen.

Figure-22: It shows total voltage harmonic distortion value (THD-V) of each phase. When you press the right button, figure-23 appears on the screen.

Figure-23: Voltage harmonics values of up to 31st harmonics are displayed on each screen, with 3 values per screen. When you press the right button, the values of the L2 and L3 phases are displayed on the screen respectively. When you press the right button, figure-24 appears on the screen.