Tense Elektric Electronic Industry

ENERGY ANALYZER

TPM-02

EASY TO USE

- It measures up to 31rd voltage (Phase-Neutral and Phase-Phase) and current harmonics.
- 128 x 64 Graphic LCD
- 3-phase voltage and 3-phase current transformer.
- RS485 Modbus RTU (1200-115200 bps)
- It shows per-phase and total active (P1, P2, PΣ) powers.
- It shows per-phase and total reactive (Q, Q2,Q3,QΣ inductive and capacitive) powers.
- It shows per-phase and total apparent (S, S2,S3,SΣ) powers.
- It shows power factors (PF) and Cosφ values of each phase.
- It shows voltage (V) minimum (min), maximum (max) and mean values of phase-to-neutral and phase-to-phase.
- It shows total current value (I1, I2,I3,IΣ) of each phase.
- It shows total imported active energy (ΣkWh) value.
- It shows total exported active energy (ΣkWh) value.
- It shows total inductive reactive energy (ΣkVArh) value.
- It shows total capacitive reactive energy value (ΣkVArh).
- Date and time is adjustable.
- Real time clock
- It shows demands.
- You can delete the energies and demands.
- Menu is password-protected.

Document Number: DK030-3

MADE IN TURKEY CE

1 - Connection Diagrams:

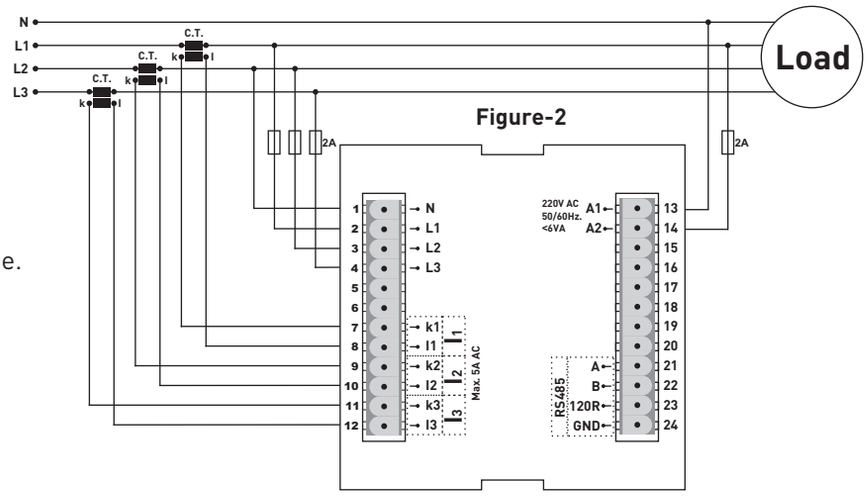


Figure-2

Figure-2: 3P3W connection type: 3 phase current and 3 phase voltage and without neutral. Low voltage.

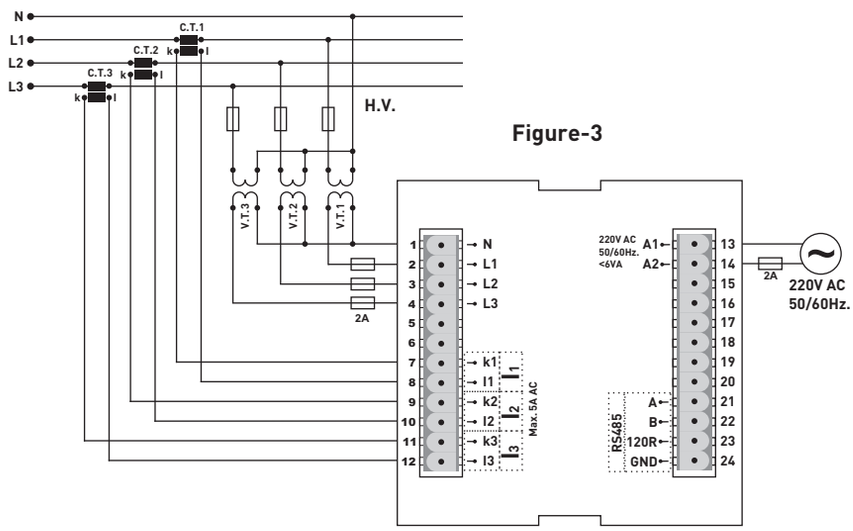


Figure-3

Figure-3: 3 phase current and3 phase voltage and with neutral. It is suitable for medium voltage with voltage transformer.

2 - Points to Take into Consideration in the Selection and Connection of Current Transformer:

- Be sure that the current transformer value is higher than the maximum current drawn from the system.
- It is recommended to use a current transformer in class (can be specified as class, cl, kl) 0,5.
- In order to prevent any mistake while connecting the output terminals of the current transformer, use cables in different colors for each phase or designate a number for each cable.
- Keep the cables connected to the output terminals of the current transformer away from the high-voltage line.
- In order to prevent any shake on the current transformer, fix it on the bus-bar, cable or rail.

3 - Warnings

- Use the device according to the instructions specified by us.
- Do not expose the LCD display directly to sunlight in order to avoid any harm on it.
- Note that the temperature level on the panel to which the device is mounted is at the range of operating temperature of the device (-20ºC – 55ºC).
- There must be a space of 5cm behind the device after its installation.
- Fix the device securely to the front-cover of the panel with the apparatus delivered together with the device.
- Be sure that the panel to which the device is mounted does not operate in a humid environment.
- Place a switch or circuit breaker on the system during installation of the device.
- Place the switch or circuit breaker close to the device or in a location which is easily accessible for the operator.
- Please note that the cables must not be energized during installation.
- Flexible monitored and twisted cables must be used for the input and output lines which are not connected to the mains. These cables must be kept away from lines and devices carrying high voltage.
- Installation of the device and electrical connections must be performed by the technical personnel according with the instructions specified in the user's manual.
- The feeder cables must be compatible with the requirements of IEC 60227 or IEC 60245

4 - Maintenance of the Device

De-energize and disconnect the device. Clean the body of the device with a dry or damp-dry cloth. Do not use conductive or other chemical substances as a cleaning agent that can damage the device. After cleaning the device, make its connections and check whether it is working by energizing it.

5 - General

TPM-03 energy analyzer measures the load on the system and voltage, current, Cosφ, active power, reactive power minimum and maximum values, demands and energies related to this load on the system and saves the cases. It measures the current and voltage harmonics to the 31rd harmonic.

6 - Start-up of the Device:

Read the warnings before the device is energized. Make sure that the device is connected according to the connection diagram. When the device energized for the first time, the figure-2 is displayed. Enter the current transformer ratio and the voltage transformer ratios, if installed, on the settings menu at first.

7 - Changing Current Transformer Ratio

Figure-4

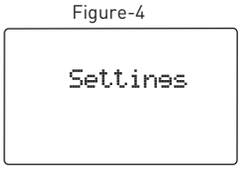


Figure-5

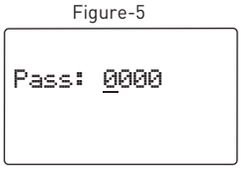


Figure-6

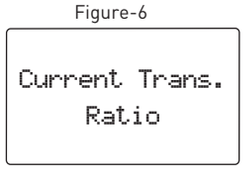
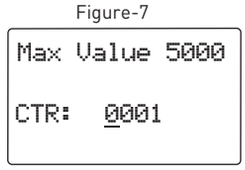


Figure-7



Press DOWN button when figure-4 is being displayed. Press set button if you did not create a new password. Figure-6 will be displayed. When you press set button again, figure-7 is displayed. Press DOWN button to select the digit you want to change. Press the UP button to enter the value of the digit with under-line. When you press the set button after you enter the rate, the current transformer value is saved and the figure-6 is displayed. You can exit the settings menu by using Esc button.

For example: 100/5A current transformer ratio (multiplier value) is 20. CTR value is required to be set as 0020.

8 - Changing Voltage Transformer Value

Figure-4

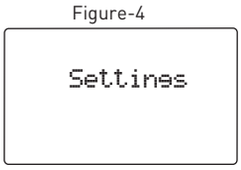


Figure-5

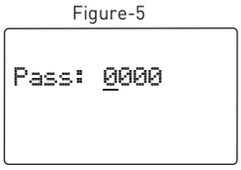


Figure-8

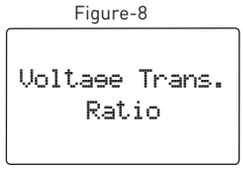
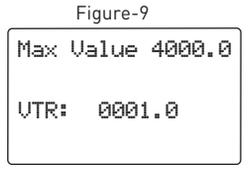


Figure-9



Press DOWN button when figure-4 is being displayed. Press set button if you did not create a new password. Figure-6 will be displayed. When you press down button, figure-8 is displayed. When you press set button, figure-9 is displayed. Press DOWN button to select the digit you want to change. Press the UP button to enter the value of the digit with under-line. When you press the set button after you enter the rate, the voltage transformer value is saved and the figure-8 is displayed. You can exit the settings menu by using Esc button.

9 - Setting Date

Figure-9

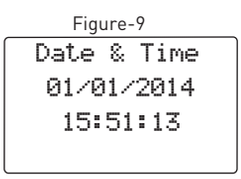


Figure-10

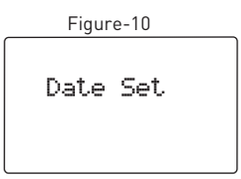
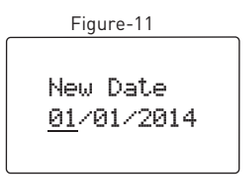


Figure-11



Press DOWN button when figure-9 is being displayed. Figure-10 will be displayed. When you press set button, figure-11 is displayed. The sequence of date is day/month/year. The line is firstly under the digit of day. Press the UP button to change the day. Press DOWN button and see the line is under the digit of month to change month. Enter the month by pressing UP button. Press DOWN button and see the line is under the digit of year to change year. Enter the year by pressing UP button. Then, when you press set button, the date is saved and the figure-10 is displayed. You can exit the settings menu by using Esc button.

10 - Setting the Time

Figure-9

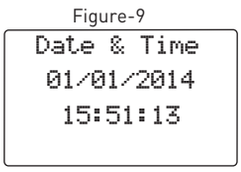


Figure-12

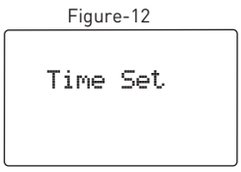
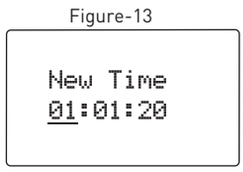


Figure-13



Press DOWN button when figure-9 is being displayed. Figure-10 will be displayed. Figure-12 is displayed when you press the DOWN button again. When you press set button, figure-13 is displayed. The sequence of the time is hour:minute:second. The line is firstly under the digit of hour. Press the UP button to change the hour. Press DOWN button and see the line is under the digit of minute to change minute. Enter the minute by pressing UP button. Press DOWN button and see the line is under the digit of second to change second. Enter the second by pressing UP button. Then, when you press set button, the time is saved and the figure-12 is displayed. You can exit the settings menu by using Esc button.

11 - RS485 Remote Communication Settings:

Figure-4

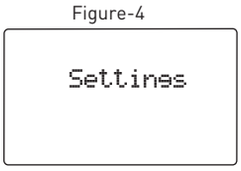


Figure- 5

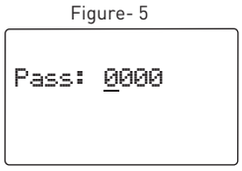


Figure-14

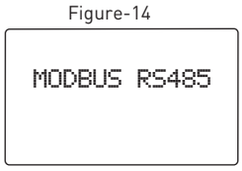
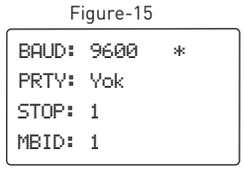


Figure-15



Press DOWN button when figure-4 is being displayed. Press set button if you did not create a new password. Figure-6 will be displayed. When you press DOWN button, figure-8 is displayed. Figure-14 is displayed when you press DOWN button again. When you press set button, figure -15 is displayed. The values herein baud:9600, party: no and stop bit: 1 are adjusted in conformity with the tense products. Put the sign (*) near the relevant value by using DOWN button to change any value . You can change the value by pressing UP button. When a modem is connected with more than one communication device, the serial number or Modbus address should be different. In such cases, enter a value different from that of other devices. If you press set button when the sign(*) is on MBID value, the change is saved and the figure-14 is displayed. You can exit the settings menu by using Esc button.

12 - Deleting the Energy and Demands

Figure-4

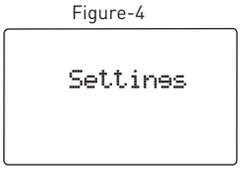


Figure-5

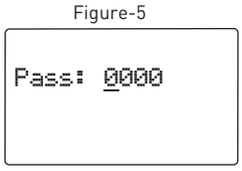


Figure-16

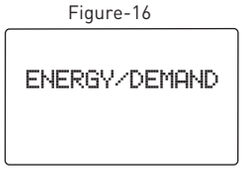
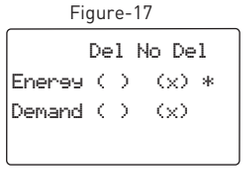


Figure-17



Press DOWN button when figure-4 is being displayed. Press set button if you did not create a new password. Figure-6 will be displayed. When you press DOWN button, figure-8 is displayed. Figure-14 is displayed when you press DOWN button again. Figure-16 is displayed when you press DOWN button again. When you press set button, figure -17 is displayed. If you want to reset the energy values, see the sign (*) is on the energy value and press the UP button, see the sign (x) is on delete option. Then, press DOWN button to bring the sign (*) on demand value. If you also want to reset the demand value, bring the sign (x) on delete option by using up button and then press the set button. When you press the set button, energy and demand values are reset and the figure-16 is displayed. You can exit the settings menu by using Esc button.

13 - Entering the Password Value

Figure-4

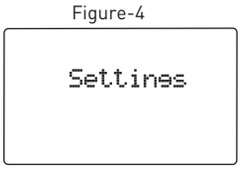


Figure-5

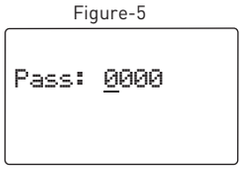


Figure-18

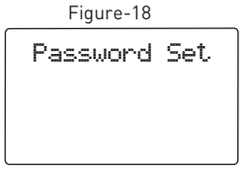
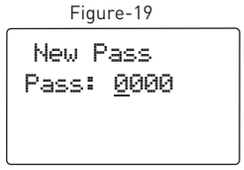


Figure-19



Press DOWN button when figure-4 is being displayed. Press set button if you did not create a new password. Figure-6 will be displayed. When you press DOWN button, figure-8 is displayed. Figure-14 is displayed when you press DOWN button again. Figure-16 is displayed when you press DOWN button again. Figure-18 is displayed when you press DOWN button again. When you press set button, figure -19 is displayed. By pressing DOWN button you can select different digits and you can adjust the digit values by pressing UP button. If you press SET button after you enter the password, the password is changed and the figure-18 is displayed. You can exit the settings menu by using Esc button.

14 - Remote Communication with GSM-MOD

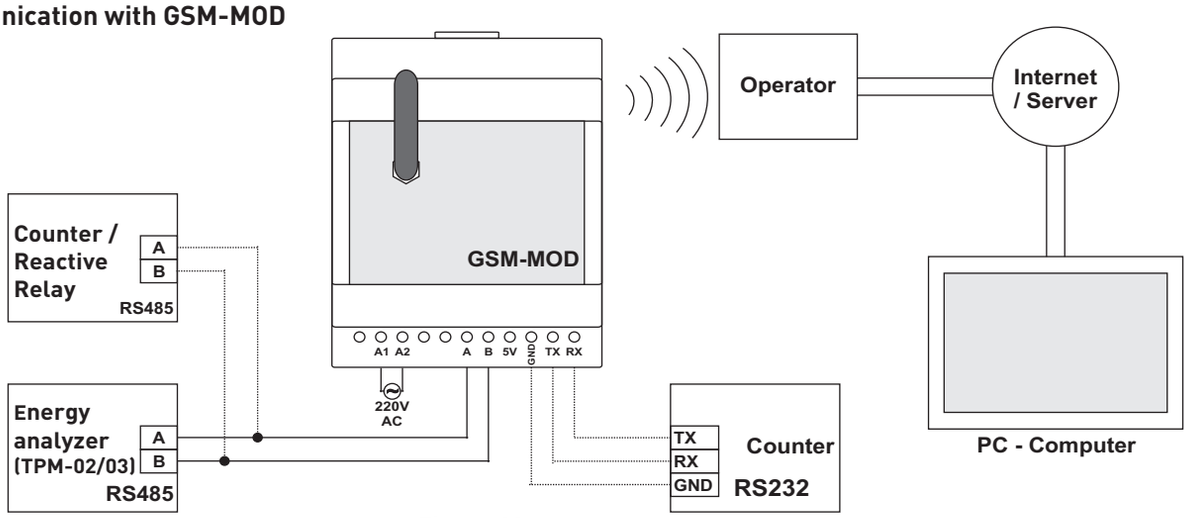
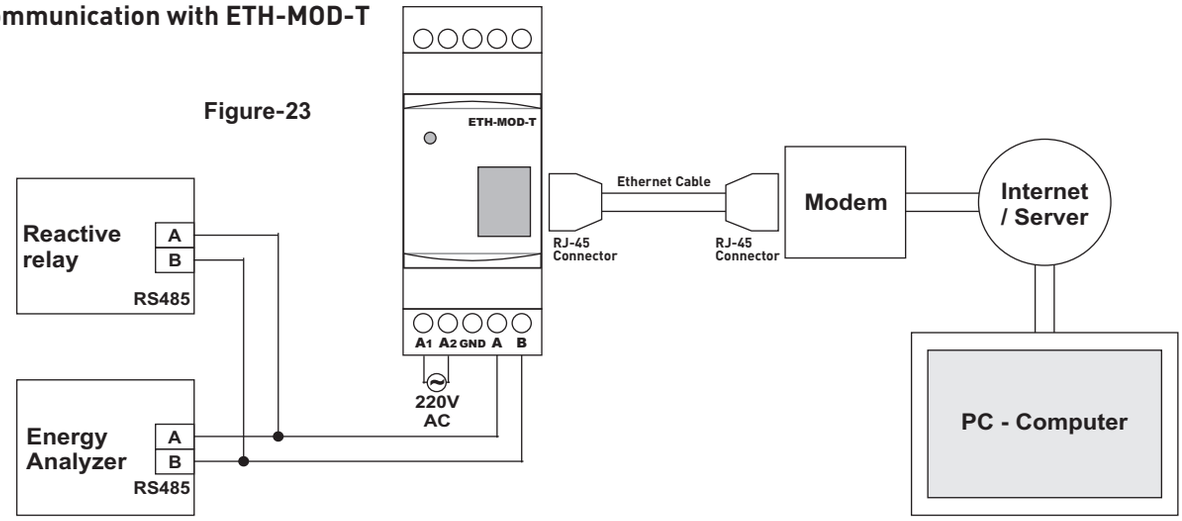


Figure-22

Only the energy analyzer or the counter and reactive relay together with it can be connected for remote communication with GSM-MODE. Remote communication is provided through energy analyzer (counter and reactive relay) on www.tenseenerji.com (server) by using 100MB (recommended) data line from GSM operators.

15 - Remote Communication with ETH-MOD-T

Figure-23



Only the energy analyzer or the reactive relay together with it can be connected for remote communication with ETH-MOD-T. Remote communication is provided through energy analyzer or reactive relay on www.tenseenerji.com (server) by using a modem connected to internet.

16 - Display Information

Figure-24

```
  Voltage L-N
L1: 220.0 V
L2: 220.0 V
L3: 220.0 V
```

Figure-24: It shows phase-neutral voltage values. You can see the minimum, maximum and mean voltage values by pressing DOWN button. Press the UP button to navigate on the display.

Figure-25

```
  Voltage L-L
L12: 380.0 V
L23: 380.0 V
L31: 380.0 V
```

Figure-25: It shows phase-phase voltage values. You can see the minimum, maximum and mean voltage values by pressing DOWN button. Press the UP button to navigate on the display.

Figure-26

```
Current
L1: 0.000 A
L2: 0.000 A
L3: 0.000 A
T : 0.000 A
```

Figure-26: It shows current value of each phase and total current values. You can see the minimum, maximum and mean current values and demands by pressing DOWN button. Press the UP button to proceed on the display.

Figure-27

```
Active Pow
L1: 0.0 W
L2: 0.0 W
L3: 0.0 W
T : 0.0 W
```

Figure-27: It shows (P) active power and total active power values of each phase. You can see the minimum, maximum and mean active power values and demands by pressing DOWN button. Press the UP button to navigate on the display.

Figure-28

```
Reactive Pow
L1: 0.0 Var
L2: 0.0 Var
L3: 0.0 Var
T : 0.0 Var
```

Figure-28: It shows (Q) reactive power and total reactive power values of each phase. The values with (-) show capacitive reactive power values and those without (-) show the inductive reactive power. You can see the minimum, maximum and mean reactive power values and demands by pressing DOWN button. Press the UP button to navigate on the display.

Figure-29

```
Apparent Pow
L1: 0.0 VA
L2: 0.0 VA
L3: 0.0 VA
T : 0.0 VA
```

Figure-29: It shows the (S) apparent power and total apparent power values of each phase. You can see the maximum, mean apparent power values and demands by pressing DOWN button. Press the UP button to navigate on the display.

Figure-30

```
Power Factor
L1: 1.000
L2: 1.000
L3: 1.000
T : 1.000
```

Figure-30: It shows (PF) power factor and total power factor values of each phase. You can see the Cosφ values by pressing DOWN button. Press the UP button to navigate on the display.

Figure-31

```
   THDV %
L1: 0.00
L2: 0.00
L3: 0.00
```

Figure-31: It shows (THDV) total harmonic distortion voltage percentages of each phase. You can see the voltage and current percentages of the 31st harmonic of each phase, (THDI) total harmonic distortion percentages of currents by pressing DOWN button. Press the UP button to navigate on the display.

Figure-32

```
Active Im. kWh
L1: 1.000
L2: 1.000
L3: 1.000
T : 1.000
```

Figure-32: It shows imported (+ΣkWh) active energy values and total imported active energy values of each phase. You can see experted (+ΣkWh) active energy, inductive imported (+ΣkVarh) reactive energy and capacitive (+ΣkVarh) reactive energy values by pressing DOWN button. Press the UP button to navigate on the display.

Figure-33

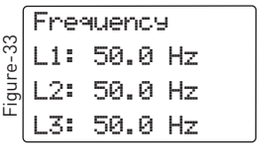


Figure-34: It shows the frequency values of each phase. Press the UP button to proceed on the display.

Figure-34

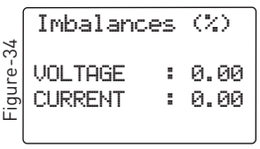


Figure -34: It shows the voltage and current irregularities in phases. Press the UP button to navigate on the display.

Figure-35

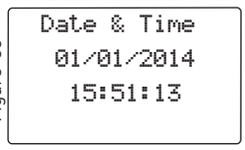


Figure-35: It shows the date and time. You can set the date and time by pressing DOWN button. Press the UP button to navigate on the display.

Figure-36

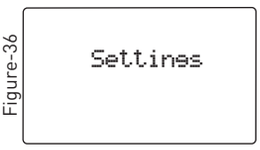
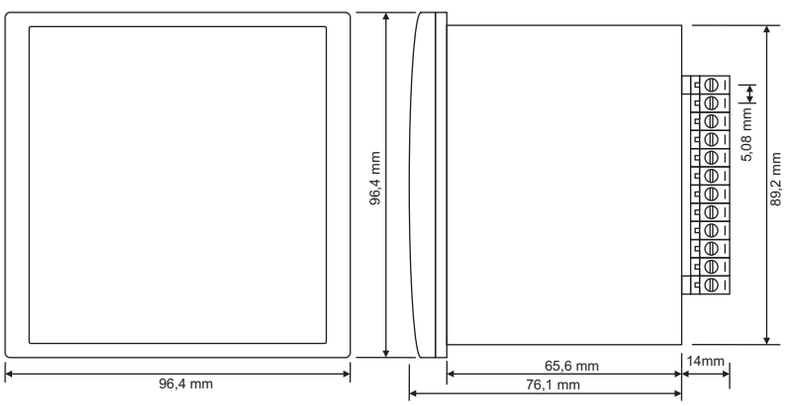


Figure-36: It enables you to enter the settings menu. It wants you enter the password value by pressing the DOWN button. If you press the set button when the default password "0000" is written, you enter the settings menu. You can delete the current transformer ratio, voltage transformer ratio, energy and demand values, enter password value and change RS485 connection values on the settings menu.

If you press set button as the figure-36 is being displayed, you can directly set the current transformer ratio. If you press UP button as the figure-36 is being displayed, figure-24 will be seen on the display. When you press the Esc button, always the figure-24 will be displayed.

17 - Dimensions



18 - Technical Specifications

Operating Voltage	85V - 300V AC
Operating Frequency	50 / 60 Hz
Operating Power	<6VA
Operating Temperature	-20ºC.....55ºC
Voltage input	5V -330V AC
Voltage Measurement Range	5V - 600kV
Current input	5mA - 5,5A
Current Measurement Range	5mA - 50.000A
Voltage Accuracy (L - L)	%±0,5
Voltage Accuracy (L - N)	%±0,5
Current Accuracy	%±0,5
Active Power Accuracy	%±1
Reactive Power Accuracy	%±1
THD-V Accuracy	%±1
THD-I Accuracy	%±1
Connection Type Supperted	3P3W, 3P4W
Current Transformer Ratio	1....10000
Voltage Transformer Ratio	1,0....4000
Harmonic Voltage	2 - 31
Harmonic Current	2 - 31
Neutral Current Measurement	No
Real Time Clock	>5 years
Communication	RS485 MODBUS RTU
Display	128 x 64 graphic lcd
Contact Output	2A / 250V AC (Resistive Load)
Pulse Output	5V - 30V DC, <40mA DC
Weight	<300Gr.
Protection Class	IP40(Front panel), IP00(Body)
Panel Hole Dimensions	91mm x 91mm
Connection Type	Plug in Connection
Cable Diameter	1.5mm²
Installation	Front-mounted to the panel
Opretaing Altitude	<2000meters

19 - Table of Contents