Tense Elektric Electronic Industry
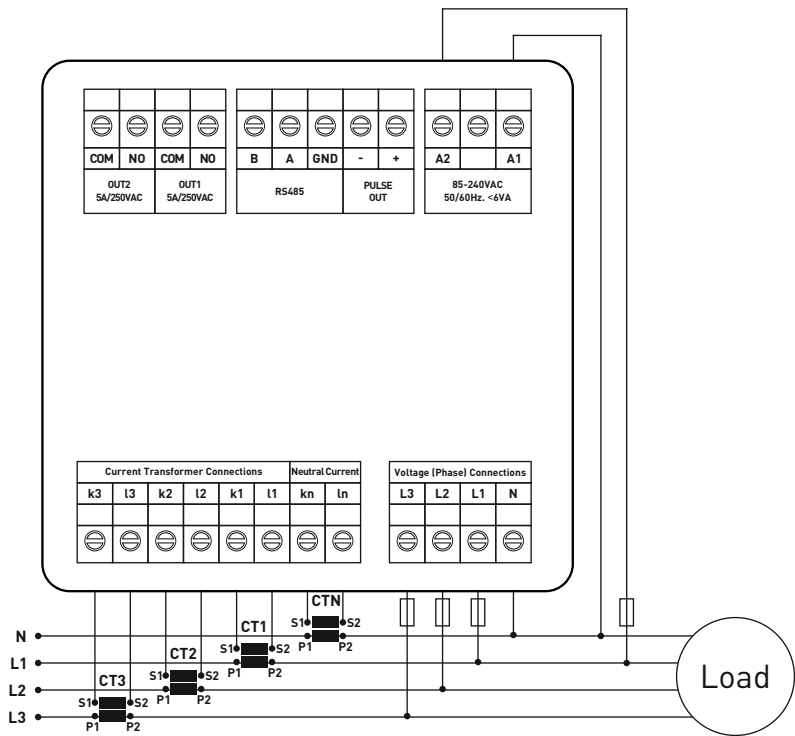
ENERGY ANALYZER

TPM-03

EASY TO USE

❋ It measures up to 63rd voltage and current harmonics.

❋ Neutral current(IN) measurement.

❋ RS485 Modbus RTU (1200-115200 bps)

❋ The menu can be set as Turkish or English.

❋ 128 x 64 Graphic LCD

❋ 3-phase voltage and 3-phase current transformer.

❋ 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).

❋ 2 units of relay outlet (adjustable)

❋ Pulse output.

❋ Case records (high voltage, low voltage, energy interruption, voltage imbalances, high current, current imbalances, crest factor, THDV and THDI limits.)

❋ Date and time is adjustable.

❋ Real time clock

❋ It shows demands.

❋ You can delete the energies, demands and case records

❋ Menu is password-protected.

MADE IN TURKEY CE

1 - Connection Diagram and Dimensions:

Current Transformer Connections						Neutral Current		Voltage (Phase) Connections			
k3	l3	k2	l2	k1	l1	kn	ln	L3	L2	L1	N

OUT2 5A/250VAC — COM NO
OUT1 5A/250VAC — COM NO
RS485 — B A GND
PULSE OUT — - +
85-240VAC 50/60Hz. <6VA — A2 A1

3 phase current, neutral current and 3 phase voltage and with neutral. Low voltage.
*If you do not want to measure the neutral current, there is no need to connect a current transformer for Neutral.

97,5 mm
97,5 mm
6,0 mm
26 mm
26 mm
89,7 mm
61,6 mm
17,8 mm
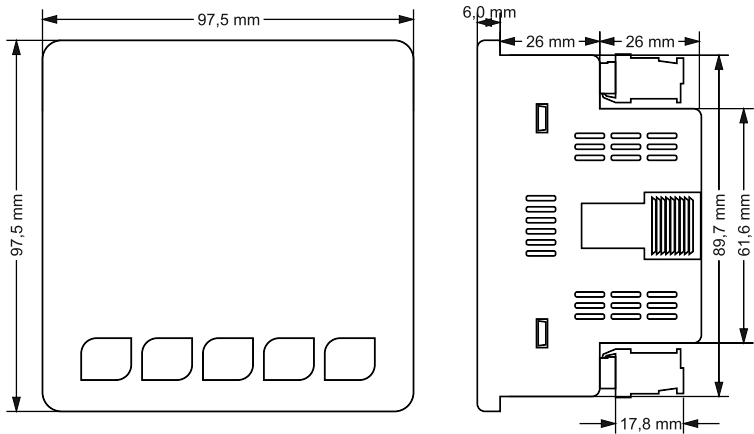
2 - Points to Take into Consideration in the Selection and Connection of Current Transformer:

- 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 63rd 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-5 is displayed. Enter the current transformer ratio and the voltage transformer ratios, if installed, on the settings menu at first.

7 - Display Information

Voltage L-N	Voltage L-N Min	Voltage L-N Max	Voltage L-N Ave	Voltage L-N Dip	Voltage L-N Sw	Voltage L-N Cut
L1: 220.0 V	L1: 215.0 V	L1: 225.0 V	L1: 220.0 V	L1: 01/01/2014 12:00	L1: 01/01/2014 12:00	L1: 01/01/2014 12:00
L2: 220.0 V	L2: 215.0 V	L2: 225.0 V	L2: 220.0 V	L2: 01/01/2014 12:00	L2: 01/01/2014 12:00	L2: 01/01/2014 12:00
L3: 220.0 V	L3: 215.0 V	L3: 225.0 V	L3: 220.0 V	L3: 01/01/2014 12:00	L3: 01/01/2014 12:00	L3: 01/01/2014 12:00
Figure-5	**Figure-6**	**Figure-7**	**Figure-8**	**Figure-9**	**Figure-10**	**Figure-11**

Figure-5: It shows the phase-neutral voltage values. The figure-6 is displayed when you press the Down button.
Figure-6: It shows the phase-neutral minimum voltage values. The figure-7 is displayed when you press the Down button.
Figure-7: It shows the phase-neutral maximum voltage values. The figure-8 is displayed when you press the Down button.
Figure-8: It shows the phase-neutral average voltage values. The figure-9 is displayed when you press the Down button.
Figure-9: It shows the date and time when the phase-neutral voltage values falls below the nominal voltage value by 90% [<{L-N}x0,90]. The figure-10 is displayed when you press the Down button.
Figure-10: It shows the date and time when the phase-neutral voltage values go over the nominal voltage value by 110% [<{L-N}x1,10]. The figure-11 is displayed when you press the Down button.
Figure-11: When the phase-neural voltage values fall below 100V as default, it shows the date and time recorded as energy interruption. The figure-12 is displayed when you press the Down button.

Voltage L-L	Voltage L-L Min	Voltage L-L Max	Voltage L-L Ave	Voltage L-L Dip	Voltage L-L Swl
L12: 380.0 V	L12: 370.0 V	L12: 390.0 V	L12: 380.0 V	L12: 01/01/2014 12:00	L12: 01/01/2014 12:00
L23: 380.0 V	L23: 370.0 V	L23: 390.0 V	L23: 380.0 V	L23: 01/01/2014 12:00	L23: 01/01/2014 12:00
L31: 380.0 V	L31: 370.0 V	L31: 390.0 V	L31: 380.0 V	L31: 01/01/2014 12:00	L31: 01/01/2014 12:00
Figure-12	**Figure-13**	**Figure-14**	**Figure-15**	**Figure-16**	**Figure-17**

Figure-12: It shows the phase-neutral voltage values. The figure-13 is displayed when you press the Down button.

Figure-13: It shows the phase-neutral minimum voltage values. The figure-14 is displayed when you press the Down button.

Figure-14: It shows the phase-neutral maximum voltage values. The figure-15 is displayed when you press the Down button.

Figure-15: It shows the phase-neutral average voltage values. The figure-16 is displayed when you press the Down button.

Figure-16: It shows the date and time when the phase-neutral voltage values falls below the nominal voltage value by 90% [<{L-N}x0,90]. The figure-17 is displayed when you press the Down button.

Figure-17: It shows the date and time when the phase-neutral voltage values go over the nominal voltage value by 110% [<{L-N}x1,10]. The figure-18 is displayed when you press the Down button.

Current	Current Min	Current Max	Current Ave	Current Demand	Current Demand	Current Max Lmt
L1: 0.000 A	L1: 0.000 A	L1: 0.000 A	L1: 0.000 A	L1: 0.000 A	L1: 01/01/2014 12:00	L1: 01/01/2014 12:00
L2: 0.000 A	L2: 0.000 A	L2: 0.000 A	L2: 0.000 A	L2: 0.000 A	L2: 01/01/2014 12:00	
L3: 0.000 A	L3: 0.000 A	L3: 0.000 A	L3: 0.000 A	L3: 0.000 A	L3: 01/01/2014 12:00	L2: 01/01/2014 12:00
T : 0.000 A	T : 0.000 A	T : 0.000 A	T : 0.000 A	T : 0.000 A	T : 01/01/2014 12:00	
Ln: 0.000 A	Ln: 0.000 A	Ln: 0.000 A	Ln: 0.000 A	Ln: 0.000 A	Ln: 01/01/2014 12:00	L3: 01/01/2014 12:00
Figure-18	**Figure-19**	**Figure-20**	**Figure-21**	**Figure-22**	**Figure-23**	**Figure-24**

Figure-18: It shows the current values of each phase, total of phases and neutral. The figure-19 is displayed when you press the Down button.

Figure-19: It shows the minimum current values of each phase, total of phases and neutral. The figure-20 is displayed when you press the Down button.

Figure-20: It shows the maximum current values of each phase, total of phases and neutral. The figure-21 is displayed when you press the Down button.

Figure-21: It shows the average current values of each phase, total of phases and neutral. The figure-22 is displayed when you press the Down button.

Figure-22: It shows the current demand values of each phase, total of phases and neutral. The figure-23 is displayed when you press the Down button.

Figure-23: It shows the date and time of current demand values of each phase, total of phases and neutral. The figure-24 is displayed when you press the Down button.

Figure-24: It shows the date and time of current demand values of each phase, total of phases and neutral. The figure-25 is displayed when you press the Down button.

Active Pow	Active Pow Max	Active Pow Ave	Active Pow Dmd	Active Pow Dmd
L1: 0.0 W	L1: 0.0 W	L1: 0.0 W	L1: 0.0 W	L1: 01/01/2014 12:00
L2: 0.0 W	L2: 0.0 W	L2: 0.0 W	L2: 0.0 W	L2: 01/01/2014 12:00
L3: 0.0 W	L3: 0.0 W	L3: 0.0 W	L3: 0.0 W	L3: 01/01/2014 12:00
T : 0.0 W	T : 0.0 W	T : 0.0 W	T : 0.0 W	T : 01/01/2014 12:00
Figure-25	**Figure-26**	**Figure-27**	**Figure-28**	**Figure-29**

Figure-25: It shows the active power (P) values of each phase and total of phases. The figure-26 is displayed when you press the Down button.

Figure-26: It shows the maximum active power (P) values of each phase and total of phases. The figure-27 is displayed when you press the Down button.

Figure-27: It shows the average active power (P) values of each phase and total of phases. The figure-28 is displayed when you press the Down button.

Figure-28: It shows the active power (P) demand values of each phase and total of phases. The figure-29 is displayed when you press the Down button.

Figure-29: It shows dates and times of active power (P) demand values of each phase and total of phases. The figure-30 is displayed when you press the Down button.

Reactive Pow	Reactive Pow Max	Reactive Pow Ave	Reactive Pow Dmd	Reactive Pow Dmd
L1: 0.0 Var	L1: 0.0 Var	L1: 0.0 Var	L1: 0.0 Var	L1: 01/01/2014 12:00
L2: 0.0 Var	L2: 0.0 Var	L2: 0.0 Var	L2: 0.0 Var	L2: 01/01/2014 12:00
L3: 0.0 Var	L3: 0.0 Var	L3: 0.0 Var	L3: 0.0 Var	L3: 01/01/2014 12:00
T : 0.0 Var	T : 0.0 Var	T : 0.0 Var	T : 0.0 Var	T : 01/01/2014 12:00
Figure-30	**Figure-31**	**Figure-32**	**Figure-33**	**Figure-34**

Figure-30: It shows the reactive power (Q) values of each phase and total of phases. The figure-31 is displayed when you press the Down button.

Figure-31: It shows the maximum reactive power (Q) values of each phase and total of phases. The figure-32 is displayed when you press the Down button.

Figure-32: It shows the average (1 minute) reactive power (Q) values of each phase and total of phases. The figure-33 is displayed when you press the Down button.

Figure-33: It shows the reactive power (Q) demand values of each phase and total of phases. The figure-34 is displayed when you press the Down button.

Figure-34: It shows dates and times of reactive power (Q) demand values of each phase and total of phases. The figure-35 is displayed when you press the Down button.

Apparent Pow	Apparent Pow Max	Apparent Pow Ave	Apparent Pow Dmd	Apparent Pow Dmd
L1: 0.0 VA	L1: 0.0 VA	L1: 0.0 VA	L1: 0.0 VA	L1: 01/01/2014 12:00
L2: 0.0 VA	L2: 0.0 VA	L2: 0.0 VA	L2: 0.0 VA	L2: 01/01/2014 12:00
L3: 0.0 VA	L3: 0.0 VA	L3: 0.0 VA	L3: 0.0 VA	L3: 01/01/2014 12:00
T : 0.0 VA	T : 0.0 VA	T : 0.0 VA	T : 0.0 VA	T : 01/01/2014 12:00
Figure-35	**Figure-36**	**Figure-37**	**Figure-38**	**Figure-39**

Figure-35: It shows the apparent power (S) values of each phase and total of phases. The figure-36 is displayed when you press the Down button.
Figure-36: It shows the maximum apparent power (S) values of each phase and total of phases. The figure-37 is displayed when you press the Down button.
Figure-37: It shows the average (1 minute) reactive power (S) values of each phase and total of phases. The figure-38 is displayed when you press the Down button.
Figure-38: It shows the apparent power (P) demand values of each phase and total of phases. The figure-39 is displayed when you press the Down button.
Figure-39: It shows dates and times of apparent power (P) demand values of each phase and total of phases. The figure-40 is displayed when you press the Down button.

Power Factor	Cos Phi	PF Limit
L1: 1.000	L1: 1.000	L1: 01/01/2014 12:00
L2: 1.000	L2: 1.000	L2: 01/01/2014 12:00
L3: 1.000	L3: 1.000	L3: 01/01/2014 12:00
T : 1.000		
Figure-40	**Figure-41**	**Figure-42**

Figure-40: It shows the power factor (PF) values of each phase and total of phases. The figure-41 is displayed when you press the Down button.
Figure-41: It shows the cosine(CosQ) values of each phase and total of phases. The figure-42 is displayed when you press the Down button.
Figure-42: It shows dates and times when the power factor limit is excessed for each phase. The figure-43 is displayed when you press the Down button.

THDV %	THDI %	THDV % Limit	THDI % Limit	L1 HDV %	L1 HDV %
L1: 0.00	L1: 0.00	L1: 01/01/2014 12:00	L1: 01/01/2014 12:00	T : 0.0 13.0.0 25.0.0	37.0.0 49.0.0 61:0.0
L2: 0.00	L2: 0.00	L2: 01/01/2014 12:00	L2: 01/01/2014 12:00	3 : 0.0 15.0.0 27.0.0	39.0.0 51.0.0 63:0.0
L3: 0.00	L3: 0.00	L3: 01/01/2014 12:00	L3: 01/01/2014 12:00	5 : 0.0 17.0.0 29.0.0	41 :0.0 53.0.0
				7 : 0.0 19.0.0 31.0.0	43 :0.0 55.0.0
				9 : 0.0 21.0.0 33.0.0	45 :0.0 57.0.0
				11:0.0 23.0.0 35.0.0	47:0.0 59.0.0
Figure-43	**Figure-44**	**Figure-45**	**Figure-46**	**Figure-47-1**	**Figure-47-2**

Figure-43: It shows the total harmonic distortion (THDV) voltage values of each phase. The figure-44 is displayed when you press the Down button.
Figure-44: It shows the total harmonic distortion (THDV) current values of each phase. The figure-45 is displayed when you press the Down button.
Figure-45: It shows dates and times when THDV limit is excessed for each phase. The figure-46 is displayed when you press the Down button.
Figure-46: It shows dates and times when THDI limit is excessed for each phase. The figure-47-1 is displayed when you press the Down button.
Figure-47-1: It shows the voltage harmonic values to 35th harmonic of L1 phase. The figure-47-2 is displayed when you press the Down button.
Figure-47-2: It shows the voltage harmonic values to 35th harmonic and 63rd harmonic of L1 phase. You can see the voltage and current harmonic values of the other phases when you press the Down button. The figure-48 is displayed when you press the Down button after the harmonic indicators.

Active Im kWh	Active Ex. kWh	Inductive kVArh	Capacitive kVArh
L1: 1.000	L1: 1.000	L1: 1.000	L1: 1.000
L2: 1.000	L2: 1.000	L2: 1.000	L2: 1.000
L3: 1.000	L3: 1.000	L3: 1.000	L3: 1.000
T : 1.000	T : 1.000	T : 1.000	T : 1.000
Figure-48	**Figure-49**	**Figure-50**	**Figure-51**

Figure-48: It shows the import active energy values of each phase or the total of the phases. The figure-49 is displayed when you press the Down button.
Figure-49: It shows the export active energy values of each phase or the total of the phases. The figure-50 is displayed when you press the Down button.
Figure-50: It shows the inductive reactive energy values of each phase or the total of the phases. The figure-51 is displayed when you press the Down button.
Figure-51: It shows the capacitive reactive energy values of each phase or the total of the phases. The figure-52 is displayed when you press the Down button.

Frequency
L1: 50.0 Hz
L2: 50.0 Hz
L3: 50.0 Hz
Figure-52

Figure-52: It shows the frequency values of each phase or the total of the phases. The figure-53 is displayed when you press the Down button.

Imbalances (%)	Imbalances (%)
VOLTAGE : 0.00	V: 01/01/2014 12:00
CURRENT : 0.00	A: 01/01/2014 12:00
Figure-53	**Figure-54**

Figure-53: It shows the voltage and current imbalances among the phases. The figure-54 is displayed when you press the Down button.
Figure-54: It shows the dates and times when the limit value of the voltage and current imbalances among the phases is excessed. The figure-55 is displayed when you press the Down button.
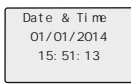
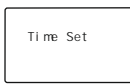| Date & Time 01/01/2014 15:51:13	Date Set	Time Set
Figure-55	**Figure-56**	**Figure-57**

Figure-55: It shows the date and time. The figure-56 is displayed when you press the Down button.
Figure-56: It is used to set the date. (see. Page:7). The figure-57 is displayed when you press the Down button.
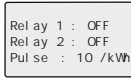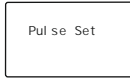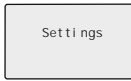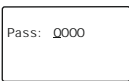**Figure-56:** It is used to set the time. (see. Page:7). The figure-58 is displayed when you press the Down button.

Relay 1 : OFF Relay 2 : OFF Pulse : 10 /kWh	Relay 1 Set	Relay 2 Set	Pulse Set
Figure-58	**Figure-59**	**Figure-60**	**Figure-61**

Figure-58: It shows if the relay1 and relay2 are switched ON or OFF according to the set limit values. It shows the unit set for pulse (kWh, kVArh) and the number of pulse. The figure-59 is displayed when you press the Down button.
Figure-59: It is used to adjust the set values of Relay1. (see. Page:7). The figure-60 is displayed when you press the Down button.
Figure-60: It is used to adjust the set values of Relay2. (see. Page:7). The figure-61 is displayed when you press the Down button.
Figure-61: It is used to set the pulse unit and pulse number. (see. Page:7). The figure-62 is displayed when you press the Down button.

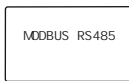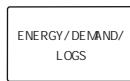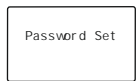| Settings	Pass: 0000	Current Trans. Ratio	Voltage Trans. Ratio	MODBUS RS485	ENERGY/DEMAND/ LOGS	Password Set
Figure-62	**Figure-63**	**Figure-64**	**Figure-65**	**Figure-66**	**Figure-67**	**Figure-68**

Figure-62: It is used to do the setting related to the device. The figure-63 is displayed when you press the Down button.
Figure-63: It is used to enter the settings menu. After you enter the password (see. Page:9). The figure-64 is displayed when you press the Set button.
Figure-64: It is used to enter the current transformer rate. (see. Page:8). The figure-65 is displayed when you press the Down button.
Figure-65: It is used to enter the voltage transformer rate. (see. Page:8). The figure-66 is displayed when you press the Down button.
Figure-66: It is used to do the communication settings. (see. Page:8). The figure-67 is displayed when you press the Down button.

Conn. Type
Figure-69

Language Set
Figure-70

Figure-67: It is used to delete the Energy, Demand and Case records. (see. Page:8). The figure-68 is displayed when you press the Down button.
Figure-68: It is used to set the password. (see. Page:9). The figure-69 is displayed when you press the Down button
Figure-69: It is used to determine the connections. (see. Page:9). The figure-70 is displayed when you press the Down button.
Figure-70: It is used to select the display language. (see. Page:9). The figure-5 is displayed when you press the Down button.
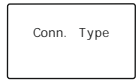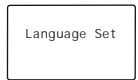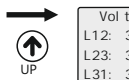
8 - To advance in Display Inventory

Voltage L-N L1: 220.0 V L2: 220.0 V L3: 220.0 V	Voltage L-L L12: 380.0 V L23: 380.0 V L31: 380.0 V	Current L1: 0.000 A L2: 0.000 A L3: 0.000 A Ln: 0.000 A	Active Pow L1: 0.0 W L2: 0.0 W L3: 0.0 W T : 0.0 W	Reactive Pow L1: 0.0 Var L2: 0.0 Var L3: 0.0 Var T : 0.0 Var
Figure-5	**Figure-12**	**Figure-18**	**Figure-25**	**Figure-30**

Apparent Pow L1: 0.0 VA L2: 0.0 VA L3: 0.0 VA T : 0.0 VA
Figure-35

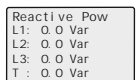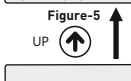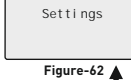| Settings |
|---|
| **Figure-62** |
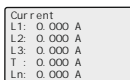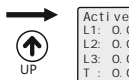
The figure-6 is displayed, when the device is energized. When you press the up button to see the other data on the display, the next data is displayed. The figure-5 is displayed when you press the up button after the figure-62 is displayed.

Press the down button to see the bottom display information. You can advance on the display by pressing the Down button and see the bottom display information.

When you press the ESC button or checking the bottom display information, the figure-5 is always displayed.
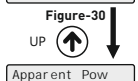
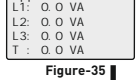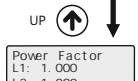| Power Factor
L1: 1.000
L2: 1.000
L3: 1.000
T : 1.000 |
|---|
| **Figure-40** |

Relay 1 : OFF Relay 2 : OFF Pulse : 10 /kWh
Figure-58
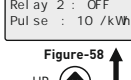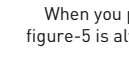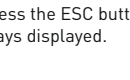
Date & Time 01/01/2014 15:51:13	Imbalances (%) VOLTAGE : 0.00 CURRENT : 0.00	Frequency L1: 50.0 Hz L2: 50.0 Hz L3: 50.0 Hz	Active Im kWh L1: 1.000 L2: 1.000 L3: 1.000 T : 1.000	THDV % L1: 0.00 L2: 0.00 L3: 0.00
Figure-55	**Figure-53**	**Figure-52**	**Figure-48**	**Figure-43**
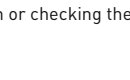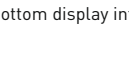
9 - Setting Date

Date & Time 01/01/2014 15: 51: 13	Date Set	New Date 01/01/2014
Figure-55	**Figure-56**	**Figure-71**

Press DOWN button when figure-55 is being displayed. Figure-56 will be displayed. Figure-71 is displayed when you press the DOWN button again. When you press set button, figure-28 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-56 is displayed. You can exit the settings menu by using Esc button.

10 - Setting the Time

Date & Time 01/01/2014 15: 51: 13	Time Set	New Time 01: 01: 20
Figure-55	**Figure-57**	**Figure-72**

Press DOWN button repeatedly until Figure-57 is displayed. Figure-27 when figure-55 is shown on the display. When you press set button, figure-72 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-57 is displayed. You can exit the settings menu by using Esc button.

11 - Adjusting Relay1 and Relay2

Relay 1 : OFF Relay 2 : OFF Pulse : OFF	Relay 1 Set	Param : V(L-N) * Func : < Value : 10 Hyst.% 1
Figure-58	**Figure-59**	**Figure-73**

When the figure-58 is being shown on the display, if you press the down button, the figure-59 will be displayed. If you press the Set button, the figure-73 is displayed. You can search here the parameter, function and hysteresis values related to the relay1. You can do the settings related to the relay2 on figure-60.

Parameter: The parameters to be entered for Relay1: Voltage [**V(L-N)**], current[**IL**], total current [**IL(T)**], total power factor [**PF(T)**], voltage irregularities [**V imb**], current imbalance [**C imb**], harmonic distortion of voltage [**THDV**] and total harmonic distortion of currency [**THDI**].

Function: The functions to be applied for the parameters: if they are higher than the value (>) and lower than the value (<).

Value: The variation to be set for the parameters.

Hyst.%: It is the hysteresis value to enable the Relay1 to switch from ON mode to OFF mode. It can be adjusted between 1%-10%.

Example: Given that if any of Relay1 phase-neutral voltages is higher than 250V, the Relay1switches to ON mode and if the voltages fall below 5%, the Relay 1 switches to OFF mode.

When the figure-73 is being shown on the display, press the down button and bring the mark of "*" near the parameter (**param**) and press the up button to change the parameter to (V). Then press the down button and bring the mark of "*" near the function (**func**) and press the up button to change the function to (>). After you set the function, bring the mark of "*" near the set value (**value**) and press the up button to adjust the set value to 250. And then press the down button to bring the mark of "*" near the hysteresis (**Hyst.**) and press the up button to adjust the set value to 5. And then, when you press the set button, the desired setting for the relay1 is saved and the figure-59 is displayed. You can exit the settings menu by pressing the Esc button.

12 - Adjusting Pulse Output

Role 1: OFF Role 2: OFF Pulse : OFF	Pulse *Set*	Param : kWh Value : 10 imp
Figure-58	**Figure-61**	**Figure-74**

When the figure-58 is being shown on the display, press the down button repeatedly until the figure-61 is displayed. If you press the Set button when the figure-61 is shown on the display, the figure-74 is displayed. You can search here the parameters and values related to the pulse output.

Parameter: The parameters to be entered for pulse output: total active energy [**kWh**] and total reactive energy [**kVarh**].

Function: If it is higher than the fixed value, [**>**] function is used

Value: It adjusts the pulse number per parameter. 10-5000 pulses.

Example: Given that it generates 500 units of pulse per 1 kWh at pulse output.

When the figure-74 is being shown on the display, press the down button and bring the mark of "*" near the parameter (**param**) and press the up button to change the parameter to (**kWh**). Then press the down button and bring the mark of "*" near the set value (**value**) and press the up button to adjust the set value to 500. And then, when you press the set button, the desired setting for the pulse output is saved and the figure-61 is displayed. You can exit the settings menu by pressing the Esc button.

13 - Changing Current Transformer Ratio

Settings	Pass: 0000	Current Trans. Ratio	Max Value 5000 CTR: 0001
Figure-62	**Figure-63**	**Figure-64**	**Figure-75**

   When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value by pressing the up button. Then press the set button. If you have not created a password yet, press the set button and the Figure-64 will be displayed. When you press set button again, figure-75 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 ratio, the current transformer value is saved and the figure-64 is displayed. You can exit the settings menu by using Esc button.
Example: 100/5A current transformer ration (multiplier value) is 20. CTR value is required to be set as 0020.

14 - Changing Voltage Transformer Value

Settings	Pass: 0000	Voltage Trans. Ratio	Max Value 4000.0 VTR: 0001.0
Figure-62	**Figure-63**	**Figure-65**	**Figure-76**

   When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value by pressing the up button. Then press the set button. If you have not created a password yet, press the set button. Press the down button repeatedly until the Figure-65 is displayed. When you press set button, figure-76 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 ratio, the current transformer value is saved and the figure-65 is displayed. You can exit the settings menu by using Esc button.
Example: Let's enter the voltage transformer ratio turning the Medium voltage (M.V.)=34.500V into 110V.
Ration (multiplier)=34,500/110=313,6 voltage transformer ratio. VTR value is required to be set as 0313,6.

15 - RS485 Remote Communication Settings:

Settings	Pass: 0000	MODBUS RS485	BAUD: 9600 * PRTY: Yok STOP: 1 MBID: 1
Figure-62	**Figure-63**	**Figure-66**	**Figure-77**

   When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value by pressing the up button. Then press the set button. If you have not created a password yet, press the set button. Press the down button repeatedly until the Figure-66 is displayed. When you press set button, figure-77 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-66 is displayed. You can exit the settings menu by using Esc button.
Baudrate(BAUD): 1200 - 115200 bps   **Parity (PRTY):** Single, Double   **Stop bit:** 1,2   **ModBus ID(MBID):** 1 - 250

16 - Deleting the Energy, Demand and Case Records

| Settings	Pass: 0000	ENERGY/DEMAND LOGS	Del No Del Energy ( ) (x) * Demand ( ) (x) Logs ( ) (x)
Figure-62	**Figure-63**	**Figure-67**	**Figure-78**

   When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value by pressing the up button. Then press the set button. If you have not created a password yet, press the set button. Press the down button repeatedly until the Figure-67 is displayed. When you press set button, figure-78 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. Then, press DOWN button to bring the sign (*) on case value. If you also want to delete the case records, bring the sign (x) on delete option by using up button and then press the set button. When you press the set button, energy, demand and case records are reset/deleted and the figure-67 is displayed. You can exit the settings menu by using Esc button.

17 - Entering the Password Value

| Settings	Pass: 0000	Password Set	New Pass Pass: 0000
Figure-62	**Figure-63**	**Figure-68**	**Figure-79**

When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value using the up button. Then press the set button. If you have not created a password yet, press the set button. Press the Down button until the Figure-68 is displayed. When you press set button again, figure-79 is displayed. Press DOWN button to select the digit you want to change. You can change the digit values by pressing the Up button. If you press the set button after you enter the password, it is changed and the figure-68 is displayed. You can exit the settings menu by using Esc button.

18 - Changing Connection Type
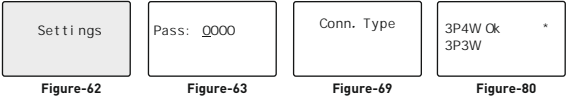
Settings	Pass: 0000	Conn. Type	3P4W Ok * 3P3W
Figure-62	**Figure-63**	**Figure-69**	**Figure-80**

When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value using the up button. Then press the set button. If you have not created a password yet, press the set button. Press the Down button repeatedly until the Figure-69 is displayed. When you press set button again, figure-80 is displayed. Select the connection type from here in order to obtain better results from the measurements. Press the Down button to bring the mark "*" to the connection type of 3P4W(3phase current and 3phase voltage with neutral) or 3P3W(3phase current and 3phase voltage without neutral). After you select the connection type, if you press the set button, the change is saved and the figure-69 is displayed. You can exit the settings menu by using Esc button.

19 - Changing the Menu Language

Settings	Pass: 0000	Language Set	Turkish Ok * English
Figure-62	**Figure-63**	**Figure-70**	**Figure-81**

When you press the Down button when figure-62 is shown on the display, the figure-63 is displayed. Here you are asked to enter a password if you have already created it. Come to the section you want to enter the value in by pressing the down button and change the value using the up button. Then press the set button. If you have not created a password yet, press the set button. Press the Down button repeatedly until the Figure-70 is displayed. When you press set button again, figure-81 is displayed. Press the Down button to bring the mark "*" to any menu language option you want. After you select the menu language, if you press the set button, it is saved and the figure-70 is displayed. You can exit the settings menu by using Esc button.
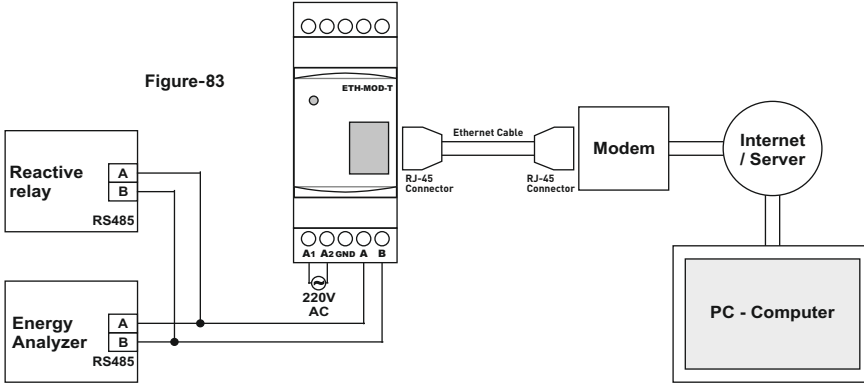
20 - Remote Communication with GSM-MOD
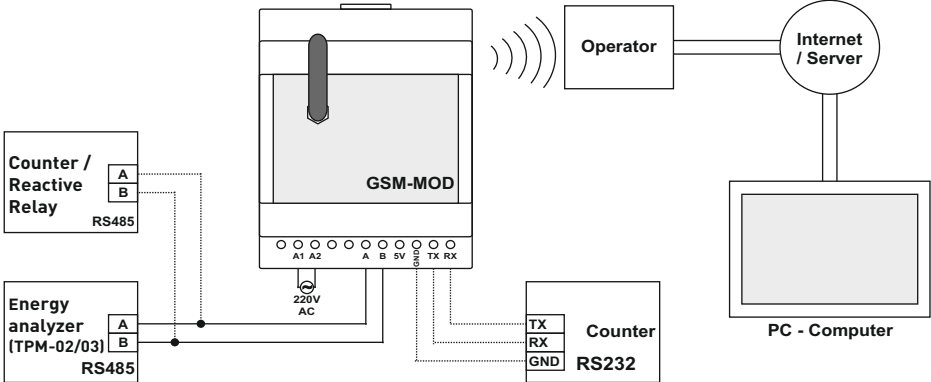
Figure-82

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.

21 - Remote Communication with ETH-MOD-T

Figure-83

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

23 - Table of Contents

22 - 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	1V - 600kV
Current input	1mA - 5,5A
Current Measurement Range	1mA - 50.000A
Voltage, Current Accuracy	%±0,2
Active Accuracy	%±0,5
Reactive Accuracy	%±1
Connection Type Supperted	3P4W
Current Transformer Ratio	1....5000
Voltage Transformer Ratio	1,0....4000
Harmonic Voltage	2 - 63
Harmonic Current	2 - 63
Neutral Current Measurement	Yes
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
Opreating Altitude	<2000meters

24 - Contact Informations:

Energy and
Compensation
Tracking System
www.tenseenerji.com