# EM-08
# USER MANUAL


- Supports 3P3W and 3P4W connections.
- 4x4 digits and 1x8 digits LED display.
- It shows the active (P1, P2, P3, ΣP) powers of each phase and total.
- It shows the reactive (Q1, Q2, Q3, ΣQ inductive or capacitive) powers of each phase and the total.
- It shows the apparent (S1, S2, S3, ΣS) powers of each phase and in total.
- It shows the power factor (PF) and Cosφ values for each phase and in total.
- It shows the min., max., and average values of phase-to-neutral and phase-to-phase voltage (V).
- It shows the current values of each phase and total current (I1, I2, I3, ΣI).
- It shows the import and export active (ΣkWh) energies of each phas and the total.
- It shows the inductive and capacitive reactive (ΣkVArh) energies of each phase and the total.
- It shows the voltage and current unbalancing.
- It shows the current, active and apparent power demands.
- Energy and demand values can be deleted.
- It shows the phase sequence.
- Voltage and current transformer values can be entered.
- The menu is password protected.

Document No: DK-121-1

**1 - Connection Diagram:**

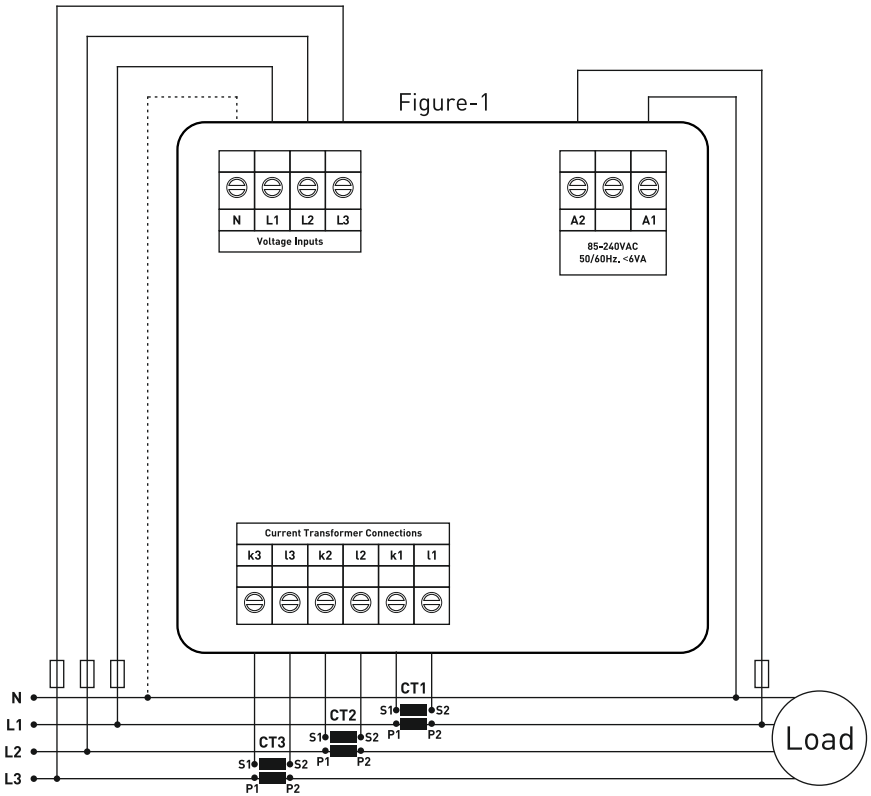



**Figure-1:** 3P4W connection type 3 phase current and 3 phase voltage. With neutral.
*3P3W connection type, 3 phase current and 3 phase voltage. Without neutral.

*If 3P3W connection type is to be used, connection type setting must be changed from the menu.
See: Page 11.

**2 - Points to Consider 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.
- 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 LED screen from sun light.
- Please take 5 cm. space behind the device after the device installation.
- Please not use device in the damp board.
- 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.

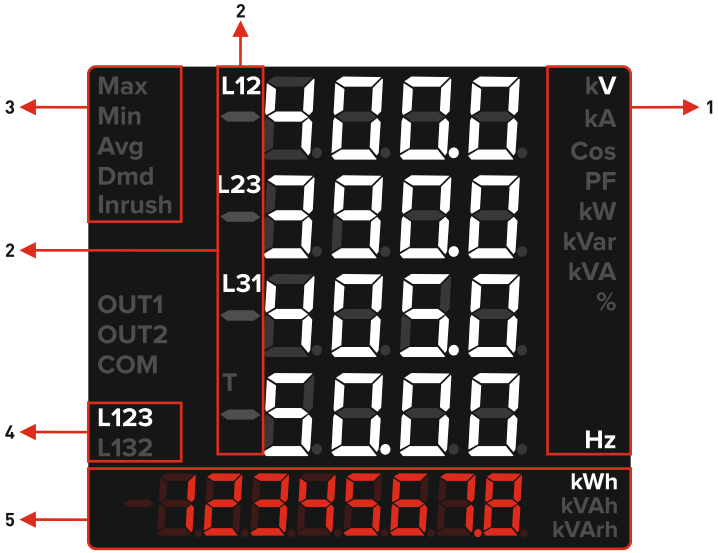
**5 - General:**

EM-08 measures the voltage, frequency, current, cosφ, power factor, active power, reactive power, minimum, maximum, average, demand values and energy of the load or loads in the system.

**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 if the voltage transformer medium voltage is being measured), enter the voltage transformer ratios.

**7- Introduction of Screen:**




Şekil-2

1 - Indicates the unit of the value shown on the screen.
**kV / V:** Voltage,
**kA / A:** Current,
**Cos:** Cosine Phi,
**PF:** Power Factor,
**kW / W:** Watt (Active Power) (Export Active if shown with "-"),
**kVAr / Var:** Reactive Power (Capacitive Power if shown with "-"),
**kVA / VA:** Apparent Power,
**%:** Voltage and Current Unbalance,
**Hz:** Frequency.

2 - Indicates which phase the value belongs to. (L1, L2, L3, L12, L23, L31, T (Total))

3 - Specifies the type of value displayed. Minimum, maximum, average and demand.

**Min.:** Indicates that the values displayed are minimum. (Period: 1 second.)
**Max.:** Indicates that the values displayed are maximum. (Period: 1 second.)
**Average:** Indicates that the values displayed are average. (Period: Continuous.)
**Demand:** Indicates that the values displayed are demand. (Period: 15 minutes.)

4 - Indicates phase order status.
If L123 is lit on the screen, the order of the phases connected to the device is correct, if L132 is lit, it is reversed.

5 - Shows active, reactive and apparent energy consumption.
Pressing the down key switches between values.
**kWh:** It shows the total active energy consumption (import). If there is a "-" sign at the beginning of the value, it shows the total active energy production (export).
**kVAh:** It shows total apparent energy consumption.
**kVArh:** It shows the total reactive energy consumption. If there is a "-" sign at the beginning of the value, the value shown is capacitive reactive, if there is no "-" sign, it is inductive reactive energy.

**See:** The above screen shows the phase-to-phase voltage values of L12, L23 and L31 and the total active energy consumption with Hz (frequency) value. The phase sequence is in the correct order.

**8- Introduction of Buttons:**

**ESC:** When pressed while in the menu, it returns to the upper menu without saving the values. When pressed for 2 seconds outside the menu (on measurement screens), it always brings figure-3 to the screen.

**SET:** Enters the menu/parameter. Saves the changes in the parameter and exits the parameter.

**UP:** It allows switching between the total energy consumption values shown on the bottom line of the screen outside the menu. It allows navigating between the parameters while in the menu, and changing/increasing the value shown on the screen while inside the parameters.

**DOWN:** It allows progress by displaying the measured electrical values outside the menu. When pressed while in the menu, it allows navigation between parameters and changing/decreasing the value shown on the screen while within the parameters.

**9 - Scrolling through the Screen Information:**

Figure-3

Figure-4

Figure-5

Figure-6

**Figure-3:** It shows the phase-neutral voltage values and instant frequency value. When you press the Down button, figure-4 appears on the screen.

**Figure-4:** It shows the minimum (Min) phase-neutral voltage values and the instant frequency value. When you press the Down button, figure-5 appears on the screen.

**Figure-5:** It shows the maximum (Max) phase-neutral voltage values and the instant frequency value. When you press the Down button, figure-6 appears on the screen.

**Figure-6:** It shows the average (Avg) phase-neutral voltage values and the instant frequency value. When you press the Down button, figure-8 appears on the screen.

Figure-7

**NOTE:** When the phase-neutral voltage values are greater than 9999, the "k" LED lights up.

**Example:** The voltage value of the system in Figure-7 is shown as 34.50, but since the "k" LED is on, the displayed value is read by multiplying it by 1000. In other words, the voltage value in the system is 34500V.

Figure-8

Figure-9

Figure-10

Figure-11

**Figure-8:** It shows the phase-phase voltage values and instant frequency value. When you press the Down button, figure-9 appears on the screen.

**Figure-9:** It shows the minimum (Min) phase-phase voltage values and the instant frequency value. When you press the Down button, figure-10 appears on the screen.

**Figure-10:** It shows the maximum (Max) phase-phasel voltage values and the instant frequency value. When you press the Down button, figure-11 appears on the screen.

**Figure-11:** It shows the average (Avg) phase-phase voltage values and the instant frequency value. When you press the Down button, figure-13 appears on the screen.

Figure-12

**NOTE:** When the phase-phase voltage values are greater than 9999, the "k" LED lights up.

**Example:** The voltage value of the system in Figure-12 is shown as 59.68, but since the "k" LED is on, the displayed value is read by multiplying it by 1000. In other words, the voltage value in the system is 59680V.

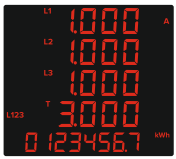


Figure-13

Figure-14

**Figure-13:** It shows the current values of each phase and the total current value. When you press the Down button, Figure-14 appears on the screen.

**Figure-14:** It shows the current demand (Dmd) values of each phase. When you press the Down button, Figure-15 appears on the screen.

Figure-15

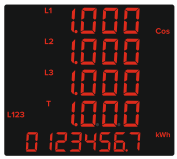


Figure-16

**Figure-15:** It shows the power factor(PF) values of each phase and the total power factor value. When you press the Down button, Figure-16 appears on the screen.

**Figure-16:** It shows the cosine phi values of each phase and the total cosine phi value. When you press the Down button, Figure-17 appears on the screen.

Figure-17

Figure-18

Figure-19

**Figure-17:** It shows the active power (P) values of each phase and total active power value. When you press the Down button, figure-18 appears on the screen.

**Figure-18:** It shows the active power(P) demand (Dmd) values of each phase. When you press the Down button, figure-19 appears on the screen.

**NOTE:** The "-" sign at the beginning of the value shown here indicates that the active power is in the export direction.

**Figure-19:** It shows the reactive power (kVAr) values of each phase and total reactive power value. When you press the Down button, figure-20 appears on the screen.

**NOTE:** The "-" sign at the beginning of the value shown here indicates that the reactive power is in the capacitive direction.

Figure-20

Figure-21

**Figure-20:** It shows the apparent power (kVA) values of each phase and total apparent power value. When you press the Down button, figure-21 appears on the screen.

**Figure-21**: It shows the apparent power(kVA) demand (Dmd) values of each phase. When you press the Down button, figure-22 appears on the screen.

Figure-22

**Figure-22:** The upper line of the screen shows the voltage between the phases and the lower line shows the current unbalance. When you press the Down button, figure-23 appears on the screen.

Figure-23

Figure-24

Figure-25

**Figure-23:** It shows the import active energy value of L1 phase. When you press the Down button, figure-24 appears on the screen.
**Figure-24:** It shows the import active energy value of L2 phase. When you press the Down button, figure-25 appears on the screen.
**Figure-26:** It shows the import active energy value of L3 phase. When you press the Down button, figure-26 appears on the screen.

Figure-26

Figure-27

Figure-28

**Figure-26:** It shows the export active energy value of L1 phase. When you press the Down button, figure-27 appears on the screen.
**Figure-27:** It shows the export active energy value of L2 phase. When you press the Down button, figure-28 appears on the screen.
**Figure-28:** It shows the export active energy value of L3 phase. When you press the Down button, figure-29 appears on the screen.

Figure-29

Figure-30

Figure-31

**Figure-29:** It shows the inductive reactive energy value of L1 phase. When you press the Down button, figure-30 appears on the screen.
**Figure-30:** It shows the inductive reactive energy value of L2 phase. When you press the Down button, figure-31 appears on the screen.
**Figure-31:** It shows the inductive reactive energy value of L3 phase. When you press the Down button, figure-32 appears on the screen.

Figure-32

Figure-33

Figure-34

**Figure-32:** It shows the capacitive reactive energy value of L1 phase. When you press the Down button, figure-33 appears on the screen.
**Figure-33:** It shows the capacitive reactive energy value of L2 phase. When you press the Down button, figure-34 appears on the screen.
**Figure-34:** It shows the capacitive reactive energy value of L3 phase. When you press the Down button, figure-33 appears on the screen.

Figure-35

Figure-36

Figure-37

**Figure-35:** It shows the apparent energy value of L1 phase. When you press the Down button, figure-36 appears on the screen.
**Figure-36:** It shows the apparent energy value of L2 phase. When you press the Down button, figure-37 appears on the screen.
**Figure-37:** It shows the apparent energy value of L3 phase. When you press the Down button, figure-3 appears on the screen.

## 10 - Menu Structure:

Figure-3

Figure-38

Figure-45

Figure-39

Figure-40

Figure-44

Figure-41

When you press the set button while the figure-3 is on the screen, the figure-38 password query will appear on the screen. If the password has been created, enter the password and then press the set button. If the password has not been created, when the value is "0000" and you press the set button, you will enter the menu and figure-39 will appear on the screen.

You can navigate between the parameters by pressing the UP or DOWN button while in the menu. Press the set button to set the parameters. Press the Esc button for 2 seconds to exit the menu.

**Figure-39:** Used to enter the voltage transformer ratio.
**Figure-40:** Used to enter the current transformer ratio.
**Figure-41:** Used to set the connection type.
**Figure-42:** Used to delete demand records.
**Figure-43:** Used to delete energy records.
**Figure-44:** Used to change the menu password.
**Figure-45:** Shows the version information of the device.

Figure-43

Figure-42

## 11 - Adjusting the Voltage Transformer Ratio:

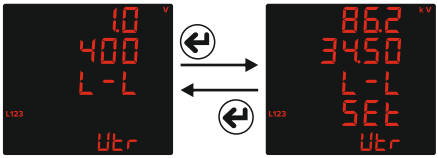



Figure-39 Figure-46

**Example:** The ratio of the voltage transformer that converts Medium Voltage (MV) = 34.500V to 400V is set on the screen.

Ratio(multiplier) = 34.500/400 = 86.2
Voltage transformer primary value (value in 2nd row) = value in 1st row (86.2) * 400V = 34.50 kV

To change the voltage transformer ratio, press the set button while the figure-39 is on the screen. Figure-46 appears on the screen. Press the UP button to increase the value, and the DOWN button to decrease it. The voltage transformer ratio is displayed on the 1st line of the screen, and the primary value (voltage transformer ratio x 400V) is displayed on the 2nd line. When the value on the 2nd line is over 9.999V, the "k" LED in the upper right corner of the screen lights up. Only the value of the voltage transformer can be adjusted.

After entering the ratio, when you press the set button, the voltage transformer ratio is saved and the figure-39 appears on the screen. You can advance between the parameters in the menu by pressing the UP or DOWN button or you can exit the menu by pressing the ESC button for 2 seconds.

## 12 - Adjusting the Current Transformer Ratio:

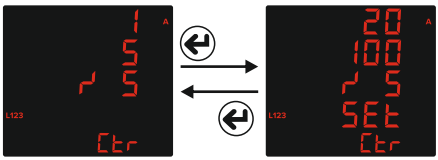



Figure-40 Figure-47

**Example:** The current transformer value on the screen is set to 100/5A. The current transformer ratio (multiplier value) is 20. This information is shown on the top line of the screen.

To change the current transformer ratio, press the set button while figure-40 is on the screen. Figure-47 appears on the screen. Press the UP button to increase the value, and the DOWN buttonto decrease it. The current transformer ratio is displayed on the 1st line of the screen, the primary value on the 2nd line, and the secondary value on the 3rd line. Only the primary value of the current transformer can be adjusted.

After entering the ratio, when you press the set button, the current transformer ratio is saved and the figure-40 appears on the screen. You can advance between the parameters in the menu by pressing the UP or DOWN button or you can exit the menu by pressing the ESC button for 2 seconds.

## 13 - Setting the Connection Type:

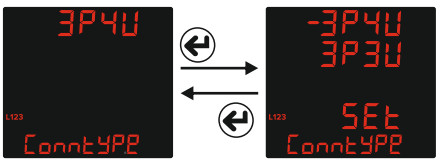



Figure-41 Figure-48

To change the connection type setting, press the set button while figure-41 is on the screen. Figure-48 appears on the screen. Press the UP or DOWN button to change the value.

After changing the setting, when you press the set button, the setting is saved and the figure-41 appears on the screen. You can advance between the parameters in the menu by pressing the UP or DOWN button or you can exit the menu by pressing the ESC button for 2 seconds.

**14 - Deleting Demand Records:**

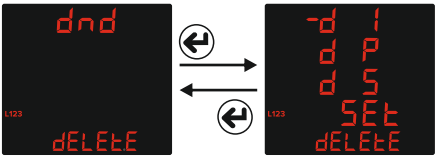



Figure-42 Figure-49

To delete the demand values, press the set button while figure-42 is on the screen. Figure-49 appears on the screen. Current is on the 1st line, active power (import and export) is on the 2nd line, and apparent power demand is on the 3rd line. The selected value is shown with the "-" sign on the left side of the screen.

You can select the value you want to delete by pressing the UP or DOWN button, then delete the demand value you selected by pressing the SET button, or exit without deleting by pressing the ESC button.

When you press the set button to delete the selected demand value, the selected demand value is deleted and figure-42 appears on the screen. You can advance between the parameters in the menu by pressing the UP or DOWN button or you can exit the menu by pressing the ESC button for 2 seconds.

**15 - Deleting Energy Records:**

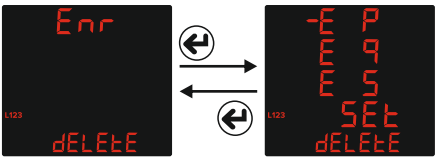



Figure-43 Figure-50

To delete energy values, press the set button while figure-43 is on the screen. Figure-50 appears on the screen. Active energy (import and export) is on the 1st line, reactive energy (inductive and capacitive) is on the 2nd line, and apparent energy values are on the 3rd line. The selected value is shown with the "-" sign on the left side of the screen.

You can select the value you want to delete by pressing the UP or DOWN button, then delete the energy value you selected by pressing the SET button, or exit without deleting by pressing the ESC button.

When you press the set button to delete the selected energy value, the selected energy value is deleted and figure-43 appears on the screen. You can advance between the parameters in the menu by pressing the UP or DOWN button or you can exit the menu by pressing the ESC button for 2 seconds.

**16 - Entering Password Value:**

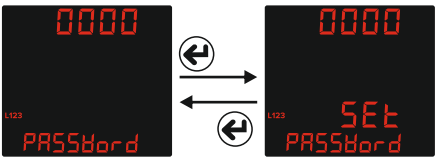



Figure-44 Figure-51

To change the password, press the SET button while figure-44 is on the screen. Figure-51 appears on the screen. Press the UP or DOWN button to change the password.

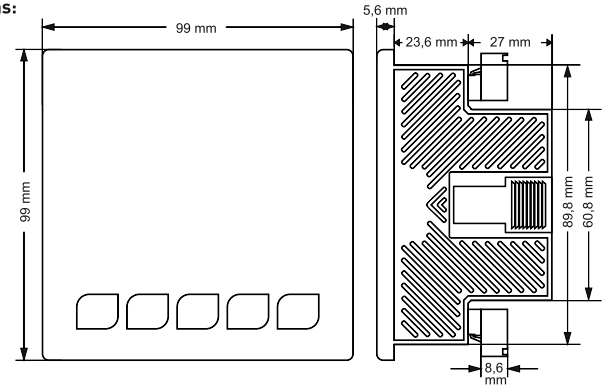
After changing the password, when you press the set button, the new password is saved and figure-44 appears on the screen. You can advance between the parameters in the menu by pressing the UP or DOWN button or you can exit the menu by pressing the ESC button for 2 seconds.

**17 - Device Version:**


Figure-45

This screen shows the version information of the device. No changes can be made on this screen.

## 18- Dimensions:




## 19 - Technical Specifications:

| | |
|---|---|
| Operating Voltage | 85V - 260V AC / 85 - 220V DC |
| Operating Frequency | 50 / 60 Hz |
| Operating Power | <10VA |
| Operating Temperature | -20ºC.....55ºC |
| Voltage Meas. Range (L-N) | 5V - 300V AC RMS |
| Voltage Meas. Range (L-L) | 10 - 520V AC RMS |
| Current Meas. Range | 10mA - 5.5A AC |
| Frequency Meas. Range | 45 - 65 Hz. |
| Voltage, Current Accuracy | %±0.5 |
| Active Power Accuracy | %±1 |
| Reactive Power Accuracy | %±2 |
| Frequency Accuracy | %±0,2 |
| Active Energy Accuracy | %±1 |
| Supported Connections | 3P3W, 3P4W |
| Current Transformer Ratio | 1....1200 |
| Voltage Transformer Ratio | 1,0....400,0 |
| Demand Period | 15 minutes (Fixed) |
| Screen Refresh Rate | 1 second |
| Display | 4x 4 Digit 11mm and<br>1x 8 Digit 10mm LED Display |
| Weight | <300gr. |
| Protection Class | IP54(Front Panel), IP20(Body) |
| Panel Hole Dimensions | 91mm x 91mm |
| Connection Type | Plug-in terminal connection |
| Cable Diameter | 1.5mm² |
| Mounting | Mounting on the front cover of the panel |
| Operating Altitude | <2000meters |

## 20 - Index:



## 21 - Contact Information: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