

MULTIMETER EPM-07 / EPM-07S

trA Programming the Turn Number:

This menu is available for CT-25 adapted devices. User enter the turn number, which is the number of how many tour the current cable has rounded into the CT-25. Numbers can be selected between 1-20. Greater the number of turn means greater the sensitivity.

| | | | | | | | | | | | | | | | | | | | | |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| trn | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| min(A) | 2.00 | 1.00 | 0.66 | 0.50 | 0.40 | 0.33 | 0.28 | 0.24 | 0.20 | 0.18 | 0.16 | 0.15 | 0.14 | 0.13 | 0.12 | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 |
| max(A) | 120 | 60 | 40 | 30 | 24 | 20 | 17 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 |

Voltage Transformer Ratio Setup

In this menu, voltage transformer ratio is set between 0000,1 - 4000,0.

trA Note: If the voltage transformer is not used between the system and EPM-07/07S, voltage transformer ratio is entered as "1".
Fo Example: If a voltage transformer which has a ratio of 34.5KV/100V is used between the system and EPM-07/07S; Voltage transformer ratio is entered as 345. (34500/100)

Reactive Energy Calculation Method Setting

CAL Three different methods exist for reactive energy calculation in EPM-07/07S. Brief information about these methods are explained in below table.
CLL Related values which must be entered in the menu are also indicated in the table in order to select reactive power calculation method for mechanical and digital energymeters.

| Mechanical Energymeter (Vectorial summation of 3 phases) | Digital Energymeter (Each phase separately) | Reactive Energy (Q) | Description |
|---|--|---|---|
| 0 | 1 | 90° rotation of voltage vector and multiply with current | It is the most preferred reactive power calculation method. |
| 2 | 3 | $\sum V_n \cdot I_n \cdot \sin(\phi_n)$ | Total value of the multiplication of V_n and I_n values up to 19 th harmonics. This calculation method is mostly preferred for network analysers. |
| 4 | 5 | Power Triangle Methode : According to this methode; $Q = S \cdot P$ (Q : Reactive power, S : Apparent power, P : Active power) | |

- Press SET button for 3 seconds (trA Fo menu is displayed)
- Press SET button (trA Fo Ctr menu is displayed)
- By using UP-DOWN buttons, find "CAL CLL" menu. **CAL CLL**
- Press SET button.
- By using UP-DOWN buttons, select energy calculation method.
- Press SET button.
- Press ESC button one by one until "SAU E SET yES" is displayed.
- Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

Demand Time Setup:

dE In this menu, demand time is set between 1-60 minutes.
t1

- Press SET button for 3 seconds (trA Fo menu is displayed)
- By using UP-DOWN buttons find "dE t1" menu. **dE t1**
- Press SET button (First digit blinks.)
- By using UP-DOWN buttons, enter the value to the first digit.
- Press SET button (Second digit blinks.)
- By using UP-DOWN buttons, enter the value to the second digit.
- Press SET button, "dE t1" is displayed. (Data is entered but is not activated yet. For activating the new data please follow the below steps).
- Press ESC button one by one until (SAU E SET yES) is displayed.
- Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

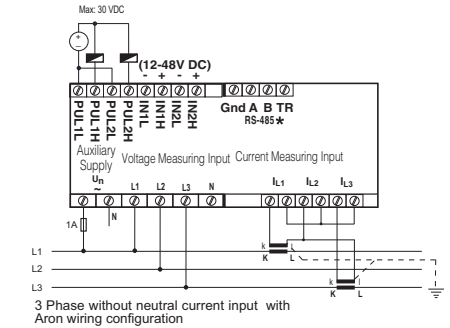
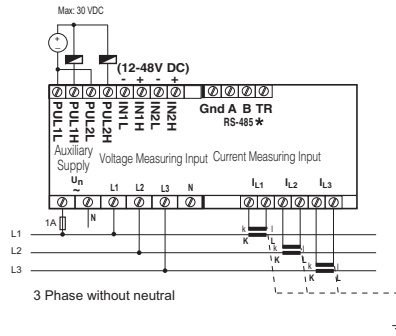
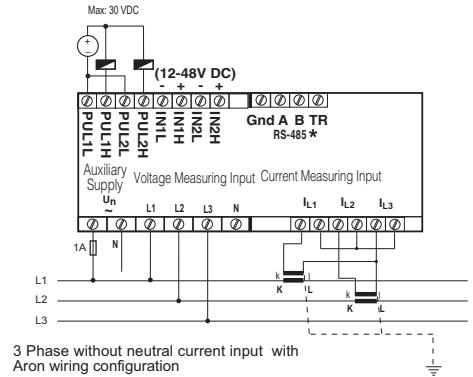
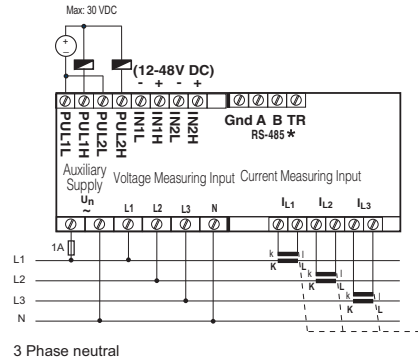
Monitoring and Erasing of minimum, maximum and energy values:

rES In this menu, values of min., max. or energy counters are erased. It saves the instantaneously measured min. and max. values of EPM-07/07S into its memory. Please kindly look at to the section of **FUNCTIONS OF BUTTONS** for min. and max. values.
Et Note : Measured electrical parameters which are saved to the memory are not affected from the electric interruptions. In the "rESEt" menu; when you quit from all menus, if you confirm the changes, min. and max. values of all parameters or energy counter values are erased at the same time.

- For erasing the values of min. and max. or energy counter, In the measurement mode :**
- Press SET button for 3 seconds (trA Fo menu is displayed)
 - By using UP-DOWN buttons, find "rES Et" menu. **rES Et**
 - Press SET button. ("rESEt HL" menu is displayed) **rES Et HL**
 - By using UP-DOWN buttons, select which parameter you want to reset. **rES Et dE**
 - Press SET button **rES Et E-1**
 - By using UP-DOWN buttons, if you want to delete the parameter select "yES" option otherwise select "no" option. **rES Et E-2**
 - Press SET button. ("rES Et" is displayed)
 - Press ESC button one by one until (SAU E SET yES) is displayed.
 - Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

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PK 26 Box Connection Diagram

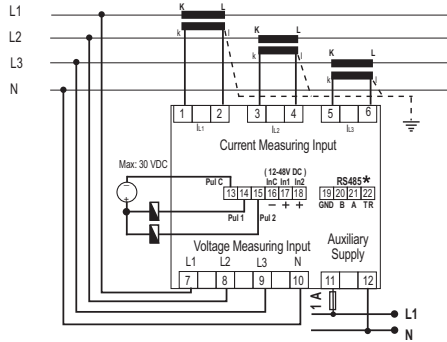


*Available only for EPM-07S

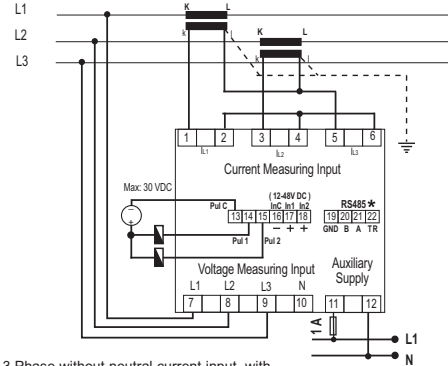
Note: For CT-25 models:
k: When CT-25 is used, Red cable is connected to k terminal.
I: When CT-25 is used, Black cable is connected to I terminal.

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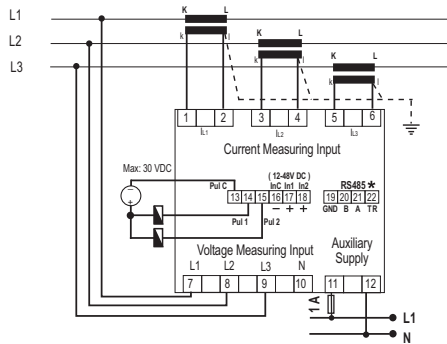
PR 19 Box Connection Diagram



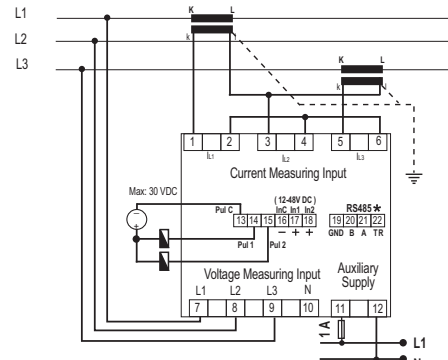
3 Phase neutral



3 Phase without neutral current input with Aron wiring configuration



3 Phase without neutral



3 Phase without neutral current input with Aron wiring configuration

*Available only for EPM-07S

Note: For CT-25 models:

- k:** When CT-25 is used, Red cable is connected to k terminal.
- l:** When CT-25 is used, Black cable is connected to l terminal.

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Pulse Menu

In this menu, three parameters can be selected: "PUL SE rAt io", "PUL SE o-1", "PUL SE o-2"
PUL SE rAt io: Pulse ratio can be set as : 1, 10, 100 (wh/VArh); 1, 10, 100 (kwh/kVArh); 1 Mwh/MVArh.

PUL SE o-1: If this parameter is selected, in every increase in output 1, one pulse is counted. Output 1 parameter can be set as : ACt (Export/Import), A-I (Active Import), A-E (Active Export), rEA (Inductive / Capacitive), r-L (Reactive Inductive), r-C (Reactive Capacitive).
PUL SE o-2: If this parameter is selected, in every increase in output 2, one pulse is counted. Output 2 parameter can be set as : ACt (Export/Import), A-I (Active Import), A-E (Active Export), rEA (Inductive / Capacitive), r-L (Reactive Inductive), r-C (Reactive Capacitive).

- Press SET button for 3 seconds (trA Fo menu is displayed)
- By using UP-DOWN buttons, find "PULSE" menu.
- Press SET button ("PUL SE rAt io" menu is displayed)
- By using UP-DOWN buttons, select "PUL SE rAt io", "PUL SE o-1" or "PUL SE o-2".
- Press SET button.
- By using UP-DOWN buttons, select required parameter. **PUL SE**
- Press SET button.
- Press ESC button one by one until "SAU E SET yES" is displayed.
- Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

Energy Counter (Eng Cnt) Menu

EPM-07/07S has 2 energy counters :
 Energy counter 1 (E-1), Energy counter 2 (E-2).
 E-1 / E-2" have 4 parameters :
on: Activate "E-1 / E-2" counters for energy counting without depending on any parameter.
 i-1: Activate "E-1 / E-2" counters, when digital input 1 is on (=1).
 i-2: Activate "E-1 / E-2" counters, when digital input 2 is on (=1).
 E-2: "E-1" does not count when "E-2" is activated. (Only for "E-1")
 E-1: "E-2" does not count when "E-1" is activated. (Only for "E-2")

Note: Counting status is undefined if E-2 is selected on E-1 and if E-1 is selected on E-2. When the status is defined as above, both energy counters count while digital input is not on (=1), but if either one or both digital inputs are on (=1) then counters will not count.

- Press SET button for 3 seconds (trA Fo menu is displayed)
- By using UP-DOWN buttons, find "Eng Cnt" menu.
- Press SET button ("Eng Cnt E-1" menu is displayed)
- By using UP-DOWN buttons, select "E-1" or "E-2".
- Press SET button.
- By using UP-DOWN buttons, select "on", "i-1", "i-2" or "E-1 / E-2". **Eng Cnt**
- Press SET button.
- Press ESC button one by one until "SAU E SET yES" is displayed.
- Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

User password Setup:

Pin In this menu user password is defined and activated. You must define and activate a 4 digit user password for preventing device settings from the illegal usage. There are 2 sub menu under the "Pin" menu.

Changing of User Password:

Pin This menu is used to change the user password.
CHA **Note:** Factory default value for user password is "0000"

nGE To change the user password, in the monitoring mode :

- Press SET button for 3 seconds (trA Fo menu is displayed)
- By using UP-DOWN buttons, find "Pin" menu.
- Press SET button ("Pin Act IUA tE" menu is displayed)
- By using the UP-DOWN buttons, find "Pin CHA nGE" menu.
- By using UP-DOWN-SET buttons, enter the old password
- By using UP-DOWN-SET buttons, enter the new password
- By using UP-DOWN-SET buttons, re-enter the new password.
- Press SET button, "Pin CHA nGE" is displayed. (Data is entered but is not activated yet. For activating the new data please follow the below steps).
- Press ESC button one by one until "SAU E SET yES" is displayed. **Pin CHA nGE**
- Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

Activating the user password:

Pin This menu is used for activating the user password. After the user password is activated, while the instant values are observed, user password is required in order to enter to the menu. If the wrong user password is entered, user can not enter to the menu.
Note: Factory default value of user password is "0000"

- Press SET button for 3 seconds (trA Fo menu is displayed)
- By using UP-DOWN buttons, find "Pin" menu.
- Press SET button ("Pin Act IUA tE" menu is displayed) **Pin Act IUA tE**
- Press SET button. First digit of the displayed value is blinking.
- Enter the blinking digit value by scrolling UP/DOWN buttons. Switch to the other digits by using SET button, use ESC button to go to previous digit. After you entered the last digit press SET button, "Pin Act oF" is displayed. "on" can be selected by scrolling UP/DOWN buttons. (Data is entered but is not activated yet. For activating the new data please follow the below steps).
- Press ESC button one by one until "SAU E SET yES" is displayed.
- Press SET button. When "SAU E SET yES" is displayed, if you press ESC button or choose "no" option instead of "yES" option by using UP-DOWN buttons, new data will be cancelled and previous value will be activated.

MULTIMETER EPM-07 / EPM-07S

Serial Communication (Available only for EPM-07S)

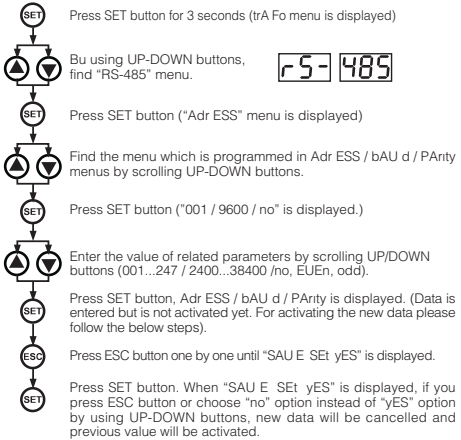
EPM-07S has MODBUS RTU communication protocol which is optical isolated. All measured parameters can be transfer to the computer. Transformer ratios and communication parameters can be set. Saved demand and energy values can be reset.

Parameter Settings

Address Parameters : Value can be enter between 001-247.

Baud Rate Parameters : Value can be selected as 2400, 4800, 9600, 19200 and 38400 bps.

Parity Parameters : "no", "odd" and "EUEn" can be selected.



MODBUS RTU PROTOCOL (Available only for EPM-07S)

Standart MODBUS RTU message is shown below.

| T | ADDRESS 8 BIT | FUNCTION 8 BIT | DATA NX8BIT | CRCH | CRCL | T |
|---|------------------|-------------------|----------------|------|------|---|
|---|------------------|-------------------|----------------|------|------|---|

The T times corresponds to a time in which data must not be exchanged on the communication bus to allow the connected devices to recognize the end of one message and the beginning of another. This time must be at least 3.5 characters at the selected baud rate. Address range (1-247) is address of the connected device. The data field contains data sent to the slave by master or data sent to master by slave. CRC is a error check method by using MODBUS RTU protocol and consists of 2 bytes.

Available Modbus Function:

| | |
|-----|---------------------------|
| 03H | READ HOLD REGISTERS |
| 06H | PRESET SINGLE REGISTER |
| 10H | PRESET MULTIPLE REGISTERS |

Read Hold (03) function is used for reading measured values and set value. If any request of reading of a register, excepted mentioned in register table, device will send an error message. For example to read phase1 voltage by sending a message to the device.

```
01 03 00 00 00 02 XX XX
01 Device address
03 Function
00 MSB address
00 LSB address
02 Register number MSB
02 Register number LSB
XX CRC MSB
XX CRC LSB
```

Preset Single Register (06) function is used for writing the setting values, erasing the energy counter or resetting the min., max., demand values. Current transformers ratio can be set 0-2000, voltage transformer ratio can be set 1-40000. Min., Max. and Demand values can be only clear. If sent value is outside of this range device responds with an error message.

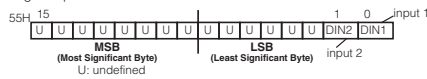
Example. Setting CT as 100;
01 06 80 02 00 64 XX XX
01 Device address
06 Function
80 MSB address
02 LSB address
00 Data MSB
64 Data LSB
XX CRC MSB
XX CRC LSB

Preset Multiple Register(10H) is used to set more then one register at same time.

Example. Setting CT as 100, Ut as 20.0;
01 10 80 00 00 02 04 00 C8 00 64 XX XX
01 Device Address
10 Function
80 MSB address
00 LSB address
00 Register number MSB
02 Register number LSB
04 Byte count
00 Data MSB
C8 Data LSB
00 Data MSB
64 Data LSB
XX CRC MSB
XX CRC LSB

Digital Inputs (Available only for EPM-07S)

Digital input are sent in 16 bit hexadecimal format as below:



If 12-48 V AC / DC is applied to **In1** (Input 1), 0 (zero) bit of DIN register is set as "1". Otherwise, 0 (zero) bit is set as "0".
If 12-48 V AC / DC is applied to **In2** (Input 2), 1st bit of DIN register is set as "1". Otherwise, 1st bit is set as "0".

The Parameters are sent in 32bit Hexadecimal format. For Example, 230.0V voltage will be sent as 000008FCH. Cosφ values shall be divided to 1000.
0.980 Cosφ will be sent as 000003D4H. Energy values are sent in 64 bytes.
1234567890123456789 Wh = AB 54 A9 8C EB 1F 0A D2 Wh

Specifications for data cable :

- 24 AWG or thicker
- Less than 100 ohm/km
- Nominal characteristic impedance at 100 kHz of 100 ohms
- Less than 60 pF/m mutual capacitance (between two wires in a pair)
- Less than 120 pF/m mutual pair capacitance (the capacitance between one wire and all others connected to earth).
- Twisted Pair

ERROR CODES (Available only for EPM-07S)

Slave device (EPM-07S) sends error message when receive any missing query. Error codes are given below.

01 Invalid Function: If any message except given above is used, then 01 error messages will be sent.

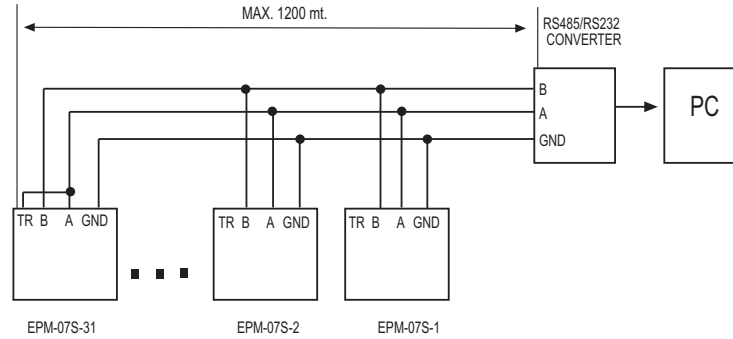
02 Invalid Register: Error 02 will be send when a reading of a register is requested, except the registers which mentioned in table.

03 Invalid data: If any different value is been set for dedicated Transformer values and nonzero for demand value, then error message 03 will be sent.

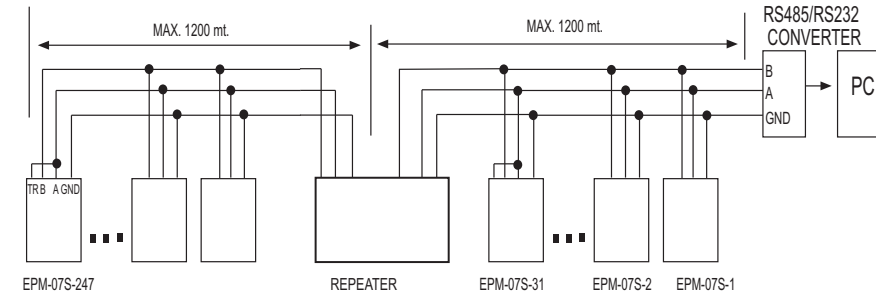
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EPM-07S COMPUTER CONNECTION

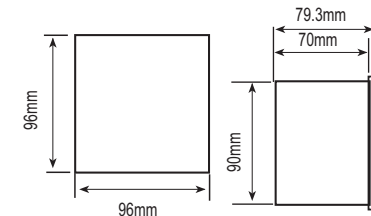
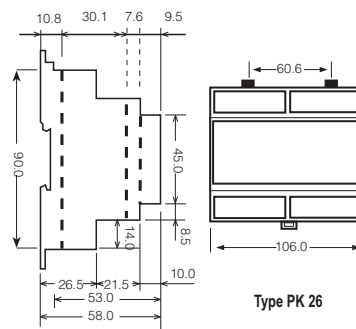
31 DEVICES CAN BE CONNECTED AT THE SAME LINE



MAX. 247 DEVICES CAN BE CONNECTED AT SAME LINE BY USING REPEATER.

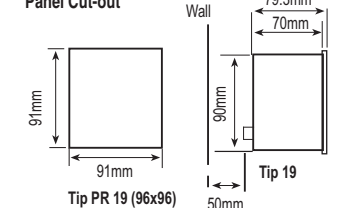


Dimensions



Type PR 19

Panel Cut-out



Tip PR 19 (96x96)