

POWMETER EPR-04 / EPR-04S

Example: If a 30 A / 5 A current transformer is used between the system and EPR-04/04S, current transformer ratio must be entered as = 30/5 = 6

trA Ctr 0 006

Press SET button for 3 seconds (trA Fo menu is displayed).
Press SET button again. trA Fo Ctr menu is displayed (For devices with CT-25, trA Fo trn is displayed instead. Find trA Fo Ctr menu by using the UP/DOWN (▲/▼) buttons.). Press SET button to enter the menu.

trA Fo Ctr / trn / Utr

First digit of the 4 digit value that is displayed will start to blink. Set the blinking value by using UP/DOWN buttons. Switch to the next digit by using SET button or go back to the previous value by using ESC button. After you entered the last value, press SET button. (Data is entered but is not activated yet. Please refer to 1. Saving Parameter Changes to activate the changes.)

2.2. Entering Voltage Transformer Ratio:

Voltage transformer ratio is entered in this menu. It can be entered between 0000,1 - 4000,0.

trA Utr 0000,1 trA Utr 4000,0

Note: If there isn't a voltage transformer between EPR-04/04S and the system that is being measured, enter the voltage transformer ratio as 1.

Example: If a 34,5 kV / 100 V voltage transformer is used between the system and EPR-04/04S, voltage transformer ratio must be entered as = 34500/100 = 345

trA Utr 0345,0

2.3. Reactive Energy Calculation Method Setting

EPR-04S has three different methods for calculating reactive energy. Explanations for these methods are given in the table below.

Method for calculating the reactive energy of mechanical and digital electricity meters must be entered in accordance with the table. You can select a value between 0 and 5.

CAL CLt 0 CAL CLt 5

| Mechanical Meter (Vector summation of 3 phases) | Digital Meter (Separately for phases) | Reactive Energy (Q) | Description |
|--|--|--|---|
| 0 | 1 | Voltage is shifted 90° and then multiplied with current. | It is the most used reactive power calculation method. |
| 2 | 3 | $\sum V_n \cdot I_n \cdot \sin(\phi_n)$ | It is the summation of the multiplication of Vn and In harmonic values until 19th harmonic value. This method is especially used for network analyzers. |
| 4 | 5 | Power Triangle Method: According to this method; Q = S - P | Power Triangle Method: According to this method; Q = S - P (Q : Reactive Power, S : Apparent Power, P : Active Power) |

Example: If you are using a digital meter and you want to use the voltage shifting method for reactive energy calculation, you must select the value as 1.

CAL CLt 1

If you are using a digital meter and you want to use the power triangle method for reactive energy calculation, you must select the value as 5.

CAL CLt 5

2.4. 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

| 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 | 0,22 | 0,20 | 0,18 | 0,16 | 0,15 | 0,14 | 0,13 | 0,12 | 0,11 | 0,10 | 0,10 | 0,10 |
| max(A) | 120 | 60,0 | 40,0 | 30,0 | 24,0 | 20,0 | 17,1 | 15,0 | 13,3 | 12,0 | 10,9 | 10,0 | 9,23 | 8,57 | 8,00 | 7,50 | 7,05 | 6,66 | 6,31 | 6,00 |

3. Demand Time Setup:

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

dE 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. Please refer to 1. Saving Parameter Changes to activate the changes.)

4. Pulse Menu

There are 3 adjustable parameters in this menu as "PUL SE rAt", "PUL SE o-1" and "PUL SE o-2". The energy value to create one pulse at the outputs for the different energy kinds is set by selecting one of the following options under "PUL SE o-1" and "PUL SE o-2" menus.

ACT (Export+Import): The defined value to create one pulse (Please refer to Pulse Ratio - PUL SE rAt) is set for active energy. When the summation of import and export active energy values become the same as the defined pulse rate, one pulse is created.

A-I (Active Import): The defined value to create one pulse (Please refer to Pulse Ratio - PUL SE rAt) is set for import active energy. When only the active energy that is drawn from the system becomes the same as the defined pulse rate, one pulse is created.

A-E (Active Export): The defined value to create one pulse (Please refer to Pulse Ratio - PUL SE rAt) is set for export active energy. When only the active energy that is transferred to the system becomes the same as the defined pulse rate, one pulse is created.

rEA (Inductive+Capacitive): The defined value to create one pulse (Please refer to Pulse Ratio - PUL SE rAt) is set for reactive energy. When the summation of import and export reactive energy values become the same as the defined pulse rate, one pulse is created.

r-L (Reactive Inductive): The defined value to create one pulse (Please refer to Pulse Ratio - PUL SE rAt) is set for reactive inductive energy. When only the reactive inductive energy becomes the same as the defined pulse rate, one pulse is created.

r-C (Reactive Capacitive): The defined value to create one pulse (Please refer to Pulse Ratio - PUL SE rAt) is set for reactive capacitive energy. When only the reactive capacitive energy becomes the same as the defined pulse rate, one pulse is created.

4.1. Pulse Rate (PUL SE rAt):

The energy value to create one pulse is entered in this menu. PUL SE rAt can be set to one of the options below:

1, 10, 100 (Wh/VArh): These values are selectable when no LED is lit during parameter changing.

1, 10, 100 (kWh/kVArh): These values are selectable when 'K' LED is lit during parameter changing.

1 MWh/MVArh: These values are selectable when 'M' LED is lit during parameter changing.

4.2. Pulse Output-1 (Pulse o-1):

Each time the measured energy value increases by the value which is set in the "PUL SE rAt" menu, one pulse is created at the PUL 1 output. Please select which energy type will be used to create a pulse when the related energy increases by the adjusted pulse rate

ACT (Export+Import), A-I (Active Import), A-E (Active Export), rEA (Inductive+Capacitive), r-L (Reactive Inductive), r-C (Reactive Capacitive).

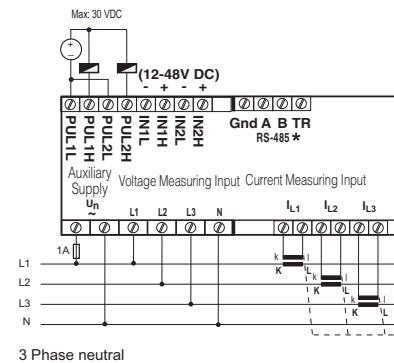
4.3. Pulse Output-2 (Pulse o-2):

Each time the measured energy value increases by the value which is set in the "PUL SE rAt" menu, one pulse is created at the PUL 2 output. Energy type will be used to create a pulse when the related energy increases by the adjusted pulse rate

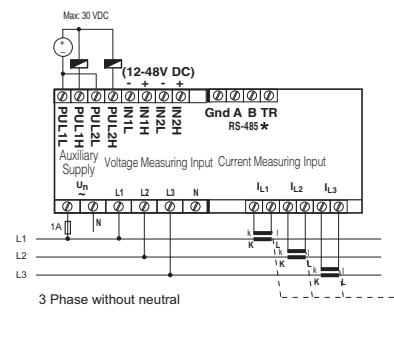
ACT (Export+Import), A-I (Active Import), A-E (Active Export), rEA (Inductive+Capacitive), r-L (Reactive Inductive), r-C (Reactive Capacitive).

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PK 26 Box Connection Diagram



3 Phase neutral

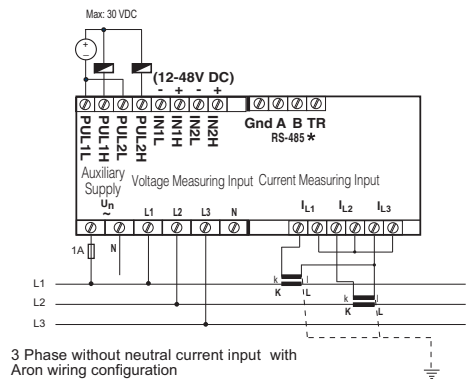


3 Phase without neutral

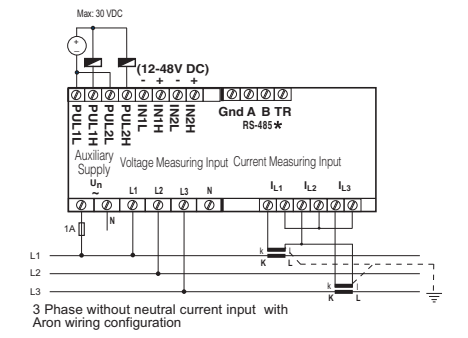
*Available only for EPR-04S

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.



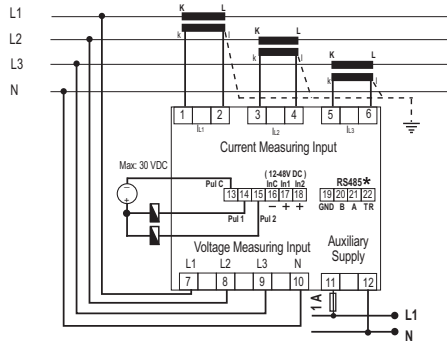
3 Phase without neutral current input with Aron wiring configuration



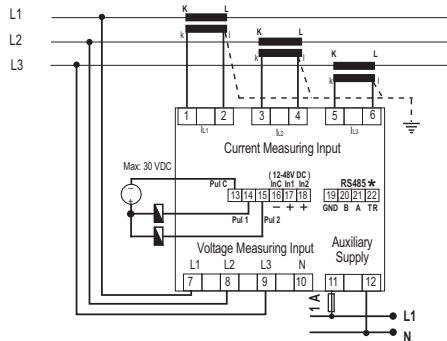
3 Phase without neutral current input with Aron wiring configuration

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PR 19 Box Connection Diagram



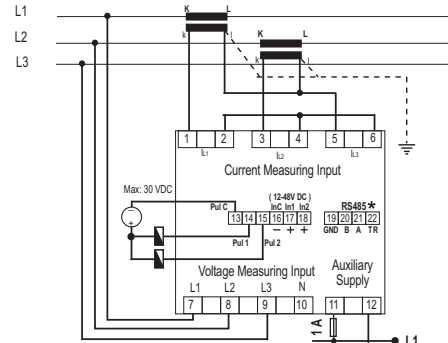
3 Phase neutral



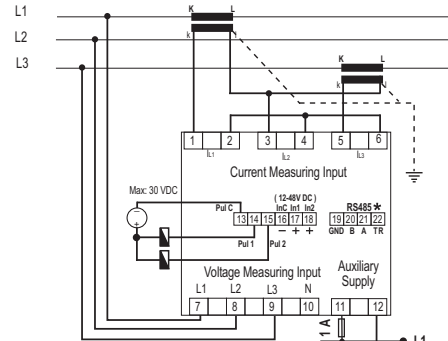
3 Phase without neutral

*Available only for EPR-04S

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.



3 Phase without neutral current input with Aron wiring configuration



3 Phase without neutral current input with Aron wiring configuration

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PUL SE rAt / PUL SE o-1 / PUL SE o-2

1. Press SET button for 3 seconds (trA Fo menu is displayed)
2. By using UP-DOWN buttons, find "PULSE" menu.
3. Press SET button ("PUL SE rAt" menu is displayed)
4. By using UP-DOWN buttons, select "PUL SE rAt", "PUL SE o-1" or "PUL SE o-2".
5. Press SET button.
6. By using UP-DOWN buttons, type the required value for selected parameter.
7. Press SET button. (Data is entered but is not activated yet. Please refer to 1. Saving Parameter Changes to activate the changes.)

5. Energy Counter (Eng Cnt) Menu

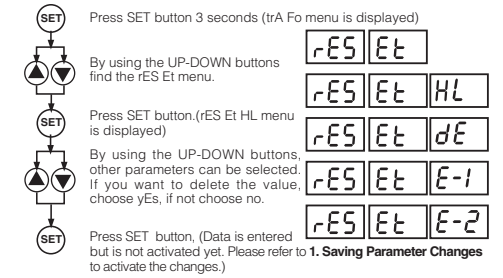
EPR-04/04S has 2 energy counters :
 Energy counter 1 (E-1), Energy counter 2 (E-2).
 "E-1 / E-2" have 4 parameters :
 on : Activate "E-1 / E-2" counters for energy counting without depending on any parameter.
 i-1 : Activate "E-1 / E-2" counters, when digital input 1 is on (=1).
 i-2 : Activate "E-1 / 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.

1. Press SET button for 3 seconds (trA Fo menu is displayed)
2. By using UP-DOWN buttons, find "Eng Cnt" menu.
3. Press SET button ("Eng Cnt E-1" menu is displayed)
4. By using UP-DOWN buttons, select "E-1" or "E-2".
5. Press SET button.
6. By using UP-DOWN buttons, select "on", "i-1", "i-2" or "E-1 / E-2".
7. Press SET button. (Data is entered but is not activated yet. Please refer to 1. Saving Parameter Changes to activate the changes.)

6. Monitoring and Erasing of minimum and maximum values:

In this menu, values of min., max., demand or energymeter's are erased. It saves the instantaneously measured min. and max. values of EPR-04/04S into its memory. Please kindly look at to the section of **FUNCTIONS OF BUTTONS** for min. and max. values.

Note: Measured electrical parameters which are saved to the memory are not affected from the electric interruptions.
 In the rES Et dE E-1 / E-2 menu; when you choose yES and quit from all menus, if you confirm the changes, min. and max. values of all parameters or values of energymeters are erased at the same time. **Follow the below steps in order to erasing the values of min., max., E-1 and E-2.** In the measurement position.

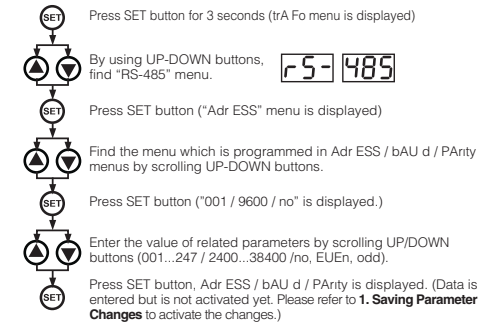


7. Serial Communication (Available only for EPR-04S)

EPR-04S 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.

7.1. 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 EPR-04S)

Standard 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.

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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
14 LSB address
00 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.

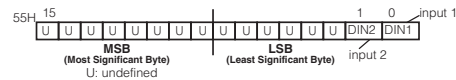
i.e. Setting CT as 100;
01 06 80 02 00 64 XX XX
01 Device address
06 Function
80 MSB address
02 LSB address
00 Data MSB
64 Data LSB
XX CRC MSB
XX CRC LSB

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

i.e. 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 EPR-04S)

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 1B 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 EPR-04S)

Slave device (EPR-04S) 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.

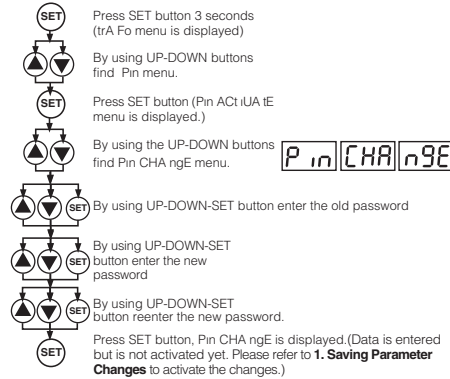
03 Invalid data: If any different value is been set for dedicated Transformer values and nonzero for demand value, then error message 03 will be sent.

8. 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.

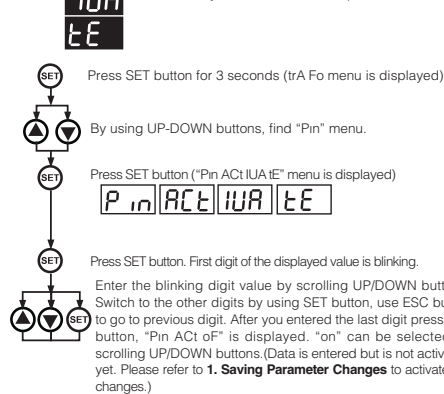
8.1. Changing of User Password:

This menu is used for changing the user password .
Note: Factory default value for user password is "0000"
For changing the user password,In the measurement mode,



8.2. Activating the user password:

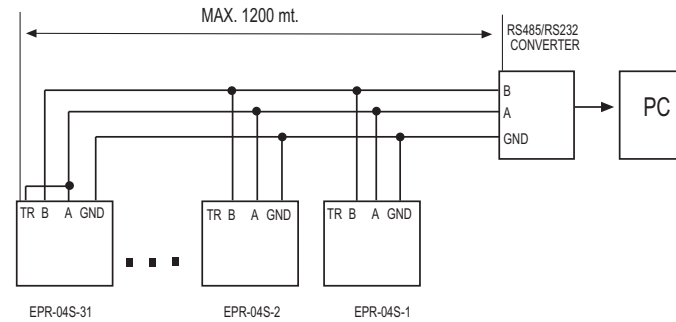
This menu is used for activating the user password. After the user password is activated, while the instant values are observed,user password is required in order to enter to the menu. If the wrong user password is entered, user can not enter to the menu.
Note: Factory default value of user password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



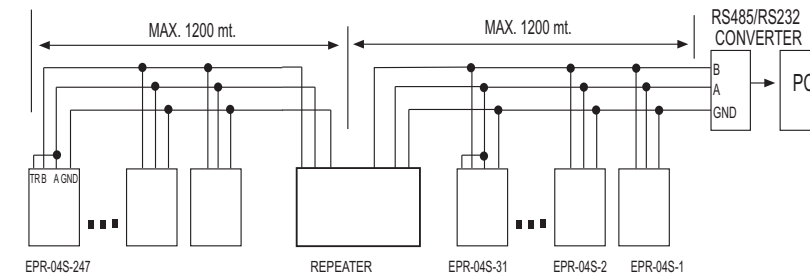
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EPR-04S COMPUTER CONNECTION

31 DEVICES CAN BE CONNECTED AT THE SAME LINE



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



Dimensions

