

NETWORK ANALYSER MPR-53CS

Technical Data

Operating Voltage (Un)	: Please look behind the device.
Operating Frequency (f)	: 45-65 Hz
Auxiliary supply Power Consumption	: < 4 VA
Measuring Input Power Consumption	: < 1 VA
V_{In}	: 10-300 V AC 45-65 Hz. (L-N)
	: 10-500 V AC 45-65 Hz. (L-L)
I_{In}	: 0.05 - 5.5 A~
	: 1-120 A~ (for CT-25)
Measuring Range	: 10V...200 kV AC
	: 0...215 M (W, VAR, VA)
	: 9999999999.9 kWh, kVAh
Class	: 1% ± 1 digit [(10%-110%) x Full Scale]
Voltage Transformer ratio (Vtr)	: 0.1 ... 4000.0
Current Transformer Ratio (Ctr)	: 1 ... 2000
Max. Ctr x Vtr	: 40.000
Hour SP	: 1-9999 hour (programmable)
Demand Time	: 1-60 min. (programmable)
Serial Interface	: MODBUS RTU (RS 485)
	: Optically Isolated, programmable
Baud Rate	: 2400-38400 bps
Address	: 1-247
Parity	: No, Odd, Even, 8 Data Bits, 2 Stop Bits
Relay Output	: 2 NO, 5 A, 1250 VA
Pulse Output	: NPN Transistor
Switch Period	: Min. 100 msec. pulse period
	: 80 msec. pulse width
Operating Current	: Max. 50 mA
Operating Voltage	: 5...24 V DC, max. 30 VDC
Input	: 12...48 V AC / DC
Ambient Temperature	: -5°C; +50°C
Display	: Red LED Display
Dimensions	: PR-19, PK-26
Equipment Protection Class	: Double Installation-Class II (□)
Box Protection Class	: IP 40 (front panel)
Box Material	: Non-flammable
Installation	: Panel Mounted (PR-19)
	: Rail Mounted (PK-26)
Wire Crosssection For Terminal Block	: 2.5 mm ²
Weight	: 0.45 kg (PR-19, PK-26)
Installation Class	: Class III
Panel Size	: 91x91 mm (PR-19)
	: 46x107 mm (PK-26)

Factory Settings Transformer :

Ctr (Current Transformer Ratio) : 0001
trn (Turn number for CT-25): 01
Utr (Voltage Transformer Ratio) : 0001.0
CAL (Calculation Method) : 1

Pin : 0000 (Not activated)

RS-485 :

Adr (Address) : 1
Bau (Baud Rate) : 9600
PAr (Parity) : no

PRECAUTIONS FOR INSTALLATION AND SAFE USE

⚠ In CT-25 (120A) compliant models, only CT-25 current transformer must be used. Other type of CT's have a high risk to damage to device.

- Failure to follow those instructions will result in death or serious injury.
- Disconnect all power before working on equipment.
- When the device is connected to the network, do not remove the front panel.
- Do not try to clean the device with solvent or the like. Only clean with dry cloth.
- Control the connections.
- Electrical equipment should be serviced only by your component seller.
- Device is only for rack panel mounting.
- The type of the circuit breaker must be F and current limit value must be 1 A.
- No responsibility is taken on by manufacturer or any of its subsidiaries for any conditions about the wrong using of this device.

⚠ No responsibility is assured by the manufacturer or any of its subsidiaries for any consequences arising out of the use of this material.

Eng Cnt :

E-1 (Energy Counter 1) : on
E-2 (Energy Counter 2) : on

PULSE :

rAt io (Ratio) : 1k
o-1 (output 1) : A-I
o-2 (output 2) : r-L

dEt i (Delay Time) : 15

hoU r :

hoU r SP (Setpoint) : 0000
Act : on
out : 1

PULSE Cnt :

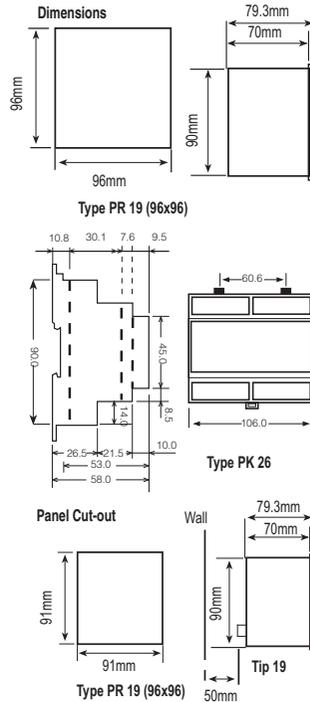
C-1 Act (Puls Counter 1) : on
C-2 Act (Puls Counter 2) : on
C-1 rAt io (Ratio) : 0001
C-2 rAt io (Ratio) : 0001

LAT Ch :

bUt ton : on
in (PUT) : oFF
AUT o : oFF

Set point :

SP -01....-16 Act : oFF



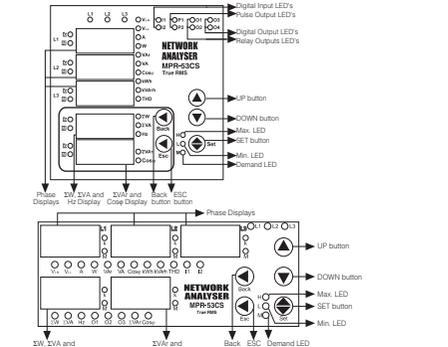
NETWORK ANALYSER MPR-53CS

General

MPR-53CS measures all the electrical parameters that belong to network. MPR-53CS is designed for protection of electrical system. Measured parameters are shown in 5 separate displays. This allows to monitor more than 50 parameters at the same time. MPR-53CS has also MODBUS serial interface feature.

The table below shows the parameters that are measured by MPR-53CS:

V_{Ln} (Phase Voltage)	CoS ϕ	Hz (Frequency)
V_{LL} (Phase to Phase Voltage)	AI (kWh) (Import Active Energy I)	ΣW (Total Active Power)
A (Phase Current, Neutral Current)	AE (kWh) (Export Active Energy)	ΣVAR (Total Reactive Power)
W (Active Power)	fI (kVAh) (Import Reactive Energy)	ΣVA (Total Apparent Power)
VAR (Reactive Power)	rE (kVAh) (Export Reactive Energy)	C (Digital Input Pulse Counter)
VA (Apparent Power)	THD (Total Harmonic Distortion)	h (Run Hours)



Functions of Buttons

- UP** Used for switching between (V_{Ln} , V_{LL} , A, W, VAR, VA, CoS ϕ , kWh, kVAh, THD, C-1, C-2, tot-h, run-h) parameters in the monitoring mode.
- DOWN** Used for switching between previous (\odot) or next (\odot) menu in main menu or submenu and also use for changing chosen values.
- SET** (SET) Used for switching between min., max demand and instant values in the monitoring mode. In display when run hour (run-h) is displayed, if SET button is pressed, it shows setpoint hours (SP-h) counted time. In latch function when button feature is used, with SET button latch position operation is done. Switching to the programming mode if it pressed for 3 sec. It is used for switching to the menu and saving changes for the parameters in programming mode.
- ESC** (Back) Used for switching between ΣW , ΣVA and Hz parameters in the monitoring mode. Used for switching previous digit in submenu.
- Min. LED** (ESC) Used for switching between ΣVAR and CoS ϕ values in the monitoring mode. Used for entering to upper menu or it is used to quit from the programming mode without saving values in the programming mode.

⚠ When Pin is activated, after pressed "SET" button for 3 seconds, PIN is required; after entering correct PIN code, you can enter to menu.

Use of MPR-53CS:

By using Up/Down buttons parameters are shown in L1, L2, L3 displays (V_{Ln} , V_{LL} , A, W, VAR, VA, CoS ϕ , kWh, kVAh, THD, C-1, C-2, tot-h, run-h). Total Active (ΣW), Total Apparent Power (ΣVA) and Frequency (Hz) are selected by Back button. Total Reactive Power (ΣVAR) and CoS ϕ are selected by Esc button.

Digital Inputs

MPR-53CS has 2 digital inputs. Digital inputs have 2 functions :
- If remote control is activated (battery, thermostat, circuit breaker, engines status) the status of devices connected to digital input will be seen according to datas in time registers.
- When digital inputs of energy count, run hour and latch menus are selected, digital inputs controls these menu's functions (Example: It is used for measuring of energy separately at the using of network and generator).
I1 (digital input 1) and I2 (digital input 2) lights on the front panel are "off" when there aren't any signal in digital inputs. Otherwise "on".

Energy Pulse Outputs

MPR-53CS has 2 energy pulse outputs. Pulse outputs give the pulses only for E-1 (energy counter). Pulse outputs can be programmed one by one. When pulse outputs give pulse "P1" (Pulse 1) and "P2" (Pulse 2) lights (Not included in the PK-26 box) are "on" and until the next pulse output, it stays "off".
Pul1 ve Pul2 : There are sub menus o-1 (pulse 1) and o-2 (pulse 2) in pulse out menu. Device gives pulse outputs to chosen energy parameters [Active energy (Act, A, AE), Reactive energy (rEA, r-L, r-C)]. For energy count values, look at the pulse menu.

Pulse Counter

MPR-53CS has 2 pulse counters (C-1, C-2). C-1 counts the pulses from digital input 1 and C-2 counts the pulses from digital input 2.
Pulse counter detect the pulses which are in condition of signal 1. When the number of pulses reach "pulse C1/2 ratio" value, related pulse counter is increase by 1. When C-1/C-2 counters are not activated in pulse counter menu, instant values of C-1/C-2 are not displayed.
Note: DC signals must be use supplied in order to use this menu.

Digital Outputs

MPR-53CS has 6 digital outputs. Only 2 of them have LED on the front panel. These are "O-3" and "O-4" LEDs ("O-4" light is not available in the PK-26 box). When digital outputs are activated, related addresses can be displayed with "xxx" values, only "O-3" and "O-4" LEDs are lighted for digital outputs 1 and 2 on front panel. Digital output on devices menu's output parameters; 1/2/3/4/5/6 correspond to "3/4/5/6/7/8" parameters.
User can check the digital output register for fault about set parameters by communicating with the device.

Relay Outputs

MPR-53CS has 2 NO contact outputs. On front panel, MPR-53CS has o-1 and o-2 LEDs. When alarm parameters are selected 1 (out 1) and 2 (out 2) to output, device gives alarm. Related contact outputs will close and LEDs will be on.

Total Hours

Shows running time of MPR-53CS from the beginning. User can not reset this counter.

Run Hours

Shows MPR-53CS's running hour. This can be resetted and can be controlled by digital inputs different from Total Hour. When selected the control with digital inputs, it runs if there is a signal in digital inputs. It does not run if there is no signal in digital inputs.

Setpoint Hours

By pressing SET button during monitoring of Run Hour, set point hour can be monitored. Setpoint hour runs according to run hour. When run hour runs actively, setpoint hour runs. When set time value reaches to "hoU r SP" which set by user, selected output will be active (1) and give an alarm and setpoint hour continues to count. This alarm can be erased by resetting setpoint hour or getting out from locked position. When setpoint output is required to remove by using latch function, "latch auto" function can't be used. If MPR-53CS returned to normal operation from failure by using latch function, it automatically starts the time from zero. To make setpoint hour passive, the value of SP hour is set "0000". This setting only closes the setpoint output, doesn't effect the counting of the setpoint hour.

Note: Total hour and run hour do not count during electric interruptions. Total hour and run hour is saved to memory and is not affected by electric interruptions. During measurement mode, by scrolling UP and DOWN buttons, user can see running time. Run hour display is shown as "HH:HH:HH.HH" (H=Hour) form. All the values shown on the display are in terms of hour. For example, if displayed value is 00 000 1.75, means that device worked for 1.75 hours. If the user wants to convert last digit to minutes, **last digit 0.6** (75x0.6=45 minutes) formula is used conversion. Device worked 1 hour 45 minutes.

Important: In "hoU r SP" menu when chosen output is activated and devices is set for giving an alarm at the end of one hour. After counting to 99 on display, devices gives an alarm (1 hour = 60 min. for MPR-53CS on display "99" corresponds to "59").

Monitoring of Min.- Max. and Max. Demand Values:

Min. and Max. values are defined for; V_{Ln} , V_{LL} , A, W, VAR, VA, ΣW , ΣVAR , ΣVA ; demand values are defined for; A, W, VAR, VA, ΣW , ΣVA , ΣVAR . If measured instant value is smaller than min. value, they are saved as new min. and if measured instant value is bigger than instant max. value, new max. value is saved. During demand time (example 15 min.) demand value is got max. demand.

If press SET button when the device is in any parameter (example "A") min., max. or max. demand values are displayed. If SET button is pressed when an undefined parameter (example "CoS ϕ ") is displayed, the device continues to display instant values because min., max. and max. demand values are undefined for that parameters.

Monitoring THD Values

If "VLN" and "THD" LED's light on together, voltage "THD" is monitored. And if "A" and "THD" LEDs light on, current "THD" is monitored.

Monitoring Neutral Current

When instant current values of 3 phases are shown on the display, by pressing the "DOWN" button, I-n (neutral current) is displayed. "A" LED continues light on. When connection form is chosen as delta, this display will be closed.

Monitoring Setpoint Parameters Fault Warning

Device activates the selected output if there is a failure because of any causes. User can set more than one parameters to output, so outputs can be monitored depending which parameter and this parameters protection type (low, high, both of them) even in failure situation when "run-h" menu is displayed, pushing "DOWN" button or when VLN is displayed pushing "UP" button, failure parameter will be seen as "SP-xx h/L/IL/x-x x-x". If there is a no failure, you will not see such a display. After pressing SET button you can see other failure parameter.

Calculation Methods for Active / Reactive Values

If the dot on the right down corner blinks it shows that active power and reactive powers directions are negative. There are 2 methods for calculating total active and total reactive powers.

- 1) Active and reactive powers are calculated by summing import and export values and shown as a single value.
- 2) Active and reactive powers are calculated one by one according to import/export condition.

Note :

- 1) During ΣW LED is displayed, if the dot at the most right down digit of the fourth display lights on, it represents that displayed value is export active power value. If not, it represents that displayed value is import active power value.
- 2) During ΣVAR LED is displayed, if the dot at the most right down of the fifth display lights on, it represents that displayed value is capacitive reactive power value. If not, it represents that displayed value is inductive reactive power value.
- 3) The displayed parameter will not change if power is off after 30 seconds of stand by.



A4396/Rev.2

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Current Transformer Ratio Setup:

In this menu current transformer ratio is set (There is no in CT-25 models).
Current transformer ratio can be set between 1 2000.

Note: If the current transformer is not used between the system and the device, current transformer ratio is entered as "1".

Example: If between the device and the system there is a 30A/5A current transformer is used;
Current transformer ratio = 30/5 = 6 must be setup.

Press SET button for 3 sec. (trA Fo menu is displayed)

Press SET button, trA Fo Ctr menu is displayed (For CT-25 models trA Fo trm menu is displayed).
(Note: trA Fo Utr / Con nEC to n menu can be displayed by scrolling UP/DOWN buttons.)

trA Fo Ctr / trn / Utr

Press SET button. Blinking the first digit of displayed value appears. (trA Fo Utr or Con nEC to n menus can be programmed similarly.)

Using the UP/DOWN buttons and program the blinking digit. Switch to other digits by using SET button, use BACK button to go to previous digit. After programming last digit press SET button. "trA Fo Ctr" is displayed. (Data is entered but is not activated yet. For activating new data please follow the below steps.)

Press ESC button one by one until "SAU E SET yES" is displayed on display.

When "SAU E SET yES" is displayed, press SET button. 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.

Entering Turn Number:

This menu is available for CT-25 adapted devices. Turn number is chosen from CT-25 current transformer (How many tour the current cable has rounded). The values between 1 and 20 can be written. Greater the number of turn means greater the sensitivity.

trm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
min(A)	1.00	0.50	0.33	0.25	0.20	0.16	0.14	0.12	0.11	0.10	0.09	0.08	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.05
max(A)	120	60	40	30	24	20	17	15	14	13	12	10	9	10	9	8	7	5	6	6

Voltage Transformer Ratio Setup:

In this menu, voltage transformer ratio setup is set.

Voltage Transformer ratio is set between 0000.1 - 4000.0.

Note: If the voltage transformer is not used between the system and the device. The voltage transformer ratio is entered as "1".

Example: Between the voltage transformer and the device, if there is a 34.5kV/100V voltage transformer is used;
Voltage transformer ratio = 34500/100 = 345 can be entered.

Chosing connection option:

In this menu connection option is selected. There are 2 options as "delta" and "star".

When "Star" connection is chosen, the device makes a protection between phase-neutral for voltage.

When "Delta" connection is chosen, the device makes a protection between phase-phase for voltage.

NOTE: When "Delta" is chosen Neutral Current (In) and Phase-Neutral Voltage (VLN) values can not be shown in instant values. Functions that belong to this parameters are inactive.

Reactive Energy Calculation Method Settings:

Informations about Reactive energy calculation method is explained in below table. The method of active and reactive energy calculation of mechanic and electrical counters must be chosen from the table.

Mechanical Energymeter (vector summation of 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.

Press SET button for 3 sec. (trA Fo menu is displayed.)

Press SET button (trA Fo Ctr menu is displayed.)

By using UP/DOWN buttons find "CAL CUL At i" menu.

Press SET button (Most right digit of 5th display blinks)

By using UP/DOWN buttons select energy calculation method.

Press SET button, "CAL CUL At i on" is displayed. (Data is entered but is not activated yet, for activating new data please follow below steps.)

Press ESC button one by one until "SAU E SET yES" is displayed.

When "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, new data will be cancelled and previous value will be activated.)

Max. Demand Time Setup:

In this menu, Max. demand time is set between 01 - 60 minutes.

Press SET button for 3 sec. (trA Fo menu is displayed.)

By using UP/DOWN buttons find "de ti" menu.

Press SET button (Most right digit of 5th display blinks)

By using UP/DOWN buttons, blinking digit value can be programmed. By using SET button, switch respectively to the digits. Use BACK button go to go previous digit. After you entered last digit, press SET button, "de ti" is displayed in the display. (Data is entered but is not activated yet. For activating new data please follow the below steps.)

Press ESC button one by one until "SAU E SET yES" is displayed.

When "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, new data will be cancelled and previous value will be activated.)

Reset Menu (hL, dE, E-1, E-2, C-1, C-2, rUn hoUr, SP hoUr r):

In this menu value of min., max., max. demand, energy values, pulse counters, run hour and alarm clock are erased. It saves the instant measured min., max., max. demand energy values, the devices running time, time after the device is set into its memory. In this menu when you enter "rES Et hL/dE/E-1/E-2/C-1/C-2/rUn hoUr/SP hoUr r" menu then press "yES" parameter, then quit from all menus if you confirm the changes all the values are erased at the same time.
Note: Measured values which are saved in memory are not affected from power cut.

Reset Menu (hL, dE, E-1, E-2, C-1, C-2, rUn hoUr, SP hoUr r):

Press SET button for 3 sec. (trA Fo menu is displayed.)

By using UP/DOWN buttons find "rES Et" menu.

Press SET button (rES Et hL menu is displayed.)

By using UP/DOWN buttons "rES Et hL/dE/E-1/E-2/C-1/C-2/rUn hoUr r/SP hoUr r" menu.

Press SET button (rES Et hL/dE/E-1/E-2/C-1/C-2/rUn hoUr r/SP hoUr r is displayed).

By using UP/DOWN buttons, if you want to delete, the min., max., max. demand, energy values, the running time of the device and the running time after the device is set; select "yES" otherwise select "no" option.

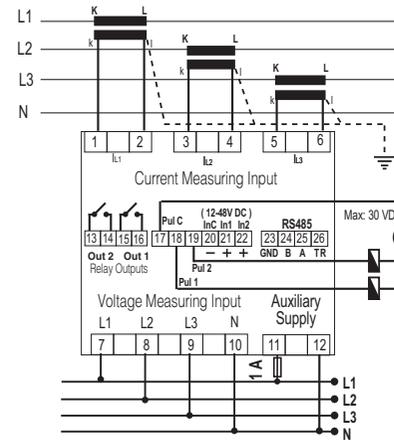
Press SET button, "rES Et hL/dE/E-1/E-2/C-1/C-2/rUn hoUr r/SP hoUr r" is displayed. (Data is entered but is not activated yet. For activating new data please follow the below steps)

Press ESC button one by one until "SAU E SET yES" is displayed.

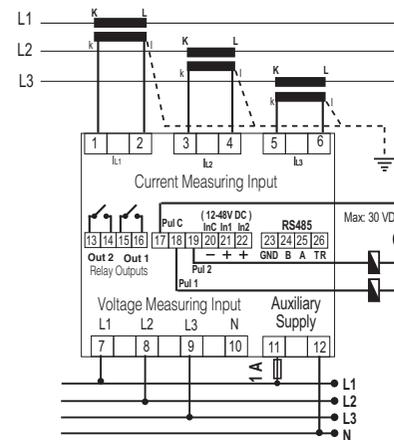
When "SAU E SET yES" is displayed, press SET button (When "SAU E SET yES" is displayed. If you press ESC button or choose "no" option instead of "yES" option, new data will be cancelled and previous value will be activated.)

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PR 19 Box Connection Diagram

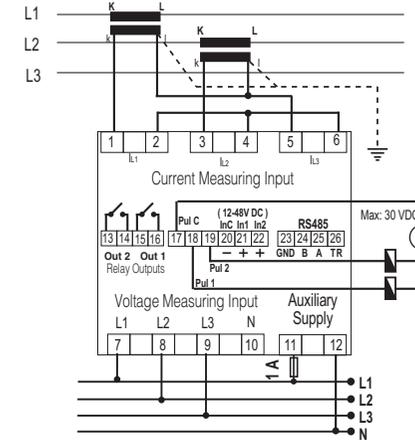


3 Phase neutral

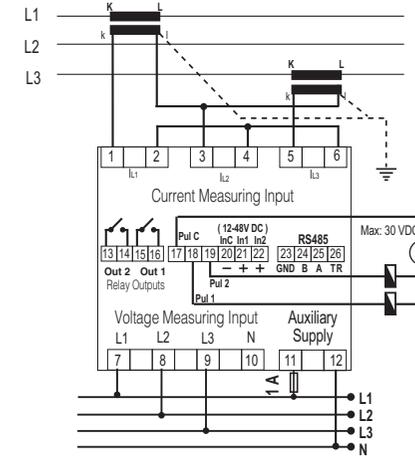


3 Phase without neutral

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.



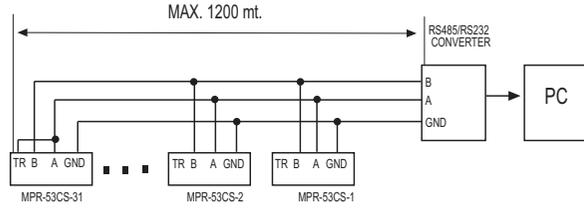
3 Phase without neutral current input with Aron wiring configuration



3 Phase without neutral current input with Aron wiring configuration

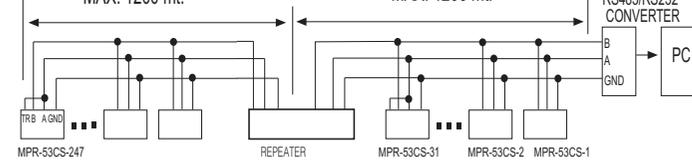
NETWORK ANALYSER MPR-53CS

31 DEVICES CAN BE CONNECTED AT THE SAME LINE

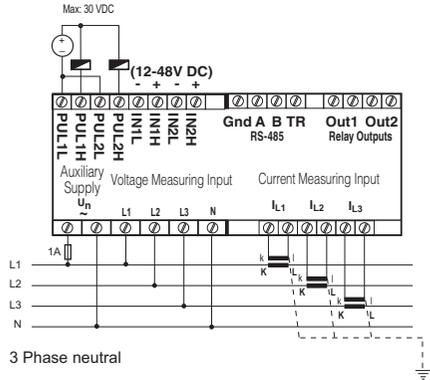


MAX. 1200 mt.

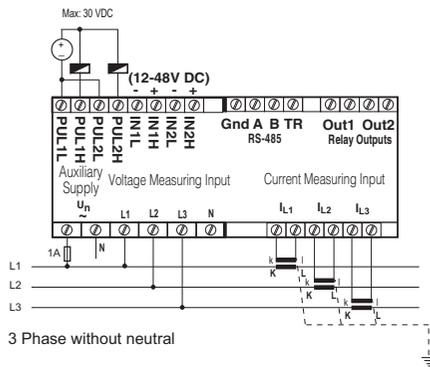
MAX. 247 DEVICES CAN BE CONNECTED AT SAME LINE BY USING REPEATER.



PK 26 Box Connection Diagram

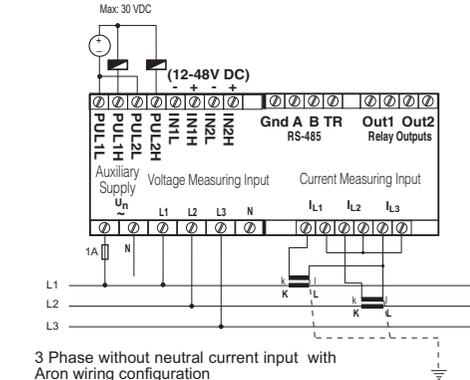


3 Phase neutral

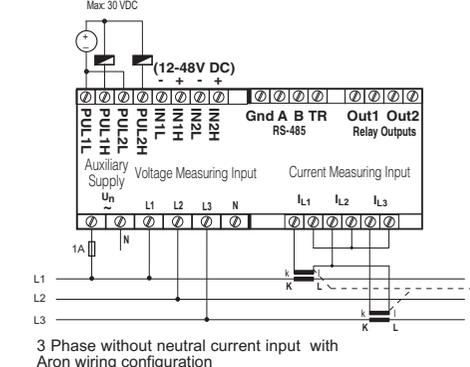


3 Phase without neutral

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



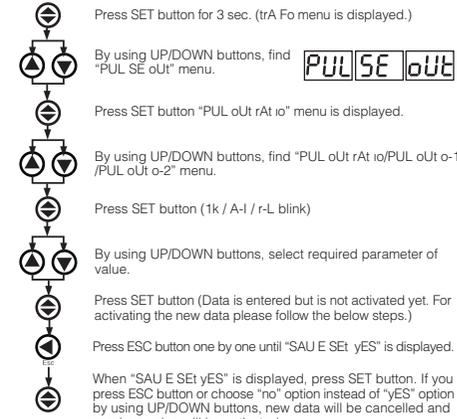
3 Phase without neutral current input with Aron wiring configuration

NETWORK ANALYSER MPR-53CS

Pulse Menu

In this menu, 3 parameter can be selected. "PUL oUt rAt io, PUL oUt o-1, PUL oUt o-2"
PUL oUt rAt io : In this menu, the pulse ratio of pulse outputs is defined. The values below can be defined.
 1, 10, 100 (Wh/VArh); 1, 10, 100 (kWh/kVArh); 1 MWh/MVArh.
PUL oUt o-1 / PUL oUt o-2 : Pulse is taken for respected consumption which assigned in "PUL oUt rAt io". o-1/o-2 parameters can be set the below settings;

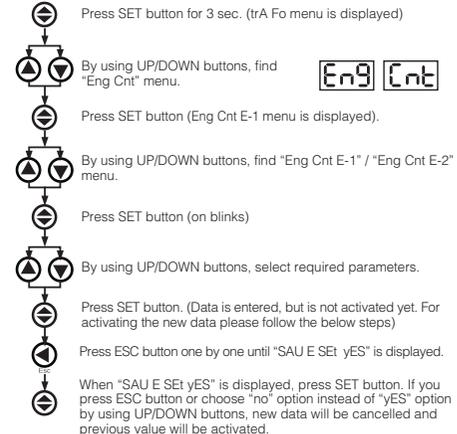
ACt (Export/Import), A-I (Active Import), A-E (Active Export), rEA (Inductive / Capacitive), r-L (Reactive Inductive), r-C (Reactive Capacitive).



Energy Counter (Eng Cnt) Menu:

MPR-53CS has 2 energy counters:
 Energy Counter 1 (E-1), Energy Counter 2 (E-2).
 "E-1 / E-2" have 4 parameters:
 on : "E-1 / E-2" counters count without depending on any parameters.
 r-1 : It counts when "E-1 / E-2" counter is "on" in digital input 1 (Activated)
 E-1/E-2 counters, when digital input 1 is on).
 r-2 : It counts when "E-1 / E-2" counter is "on" in digital input 2.
 E-2: When "E-2" counter is active, "E-1" counter do not count. (It is only "E-1" counters parameter)
 E-1: When "E-1" counter is active, "E-2" counter do not count. (It is only "E-2" counters parameter)

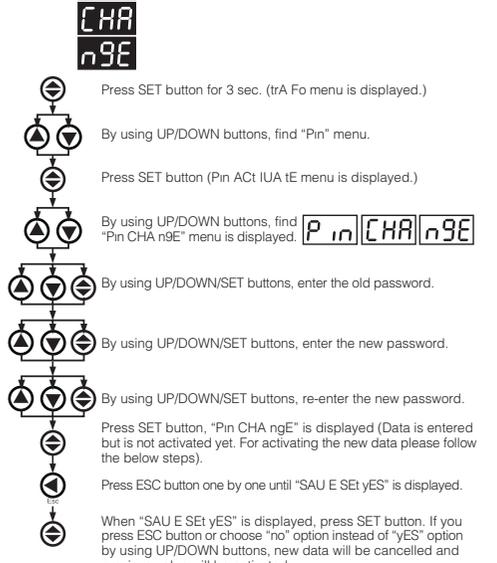
Note: When "E-2" is chosen in "E-1" counter and when "E-1" is chosen in "E-2" counter the counting status is undefined. When counters are set with this parameters, if digital inputs hasn't got the information "1" both of the counters count but if one or both of the counters has got the information, both of the counters don't count.



User Password Setup :

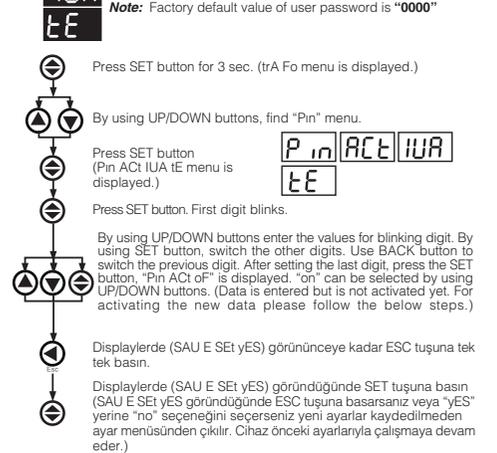
In this menu user password is defined and activated. You must define and activate a 4 digit user password for preventing device setting from the illegal usage.
 There are 2 sub menu under "Pin" menu.

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



Activating User Password :

This menu is used for activating the user password. After the user password is activated for entering to the menus; if the button is pressed for 3 sec., while the instant values are observed, user password is required. If the user password is entered wrong device does not latch.
Note: Factory default value of user password is "0000"



MODBUS REGISTER MAP

ADDRESS	ADDRESS (HEX)	REGISTER	R/W	RANGE	UNIT	MULTIPLIER	FORMAT
0	0000	L1 PHASE VOLTAGE	R	(0-3000)xUT	Volt	0.1	unsigned int
2	0002	L2 PHASE VOLTAGE	R	(0-3000)xUT	Volt	0.1	unsigned int
4	0004	L3 PHASE VOLTAGE	R	(0-3000)xUT	Volt	0.1	unsigned int
6	0006	L1 PHASE CURRENT	R	(0-6000)xCT	Amper	0.001	unsigned int
8	0008	L2 PHASE CURRENT	R	(0-6000)xCT	Amper	0.001	unsigned int
10	000A	L3 PHASE CURRENT	R	(0-6000)xCT	Amper	0.001	unsigned int
12	000C	NEUTRAL CURRENT	R	(0-6000)xCT	Amper	0.001	unsigned int
14	000E	L1-L2 PHASE-PHASE VOLTAGE	R	(0-5000)xUT	Volt	0.1	unsigned int
16	0010	L2-L3 PHASE-PHASE VOLTAGE	R	(0-5000)xUT	Volt	0.1	unsigned int
18	0012	L3-L1 PHASE-PHASE VOLTAGE	R	(0-5000)xUT	Volt	0.1	unsigned int
20	0014	L1 PHASE ACTIVE POWER	R	(-18000 - 18000)xCTxVT	Watt	0.1	int
22	0016	L2 PHASE ACTIVE POWER	R	(-18000 - 18000)xCTxVT	Watt	0.1	int
24	0018	L3 PHASE ACTIVE POWER	R	(-18000 - 18000)xCTxVT	Watt	0.1	int
26	001A	L1 PHASE REACTIVE POWER	R	(-18000 - 18000)xCTxVT	Var	0.1	int
28	001C	L2 PHASE REACTIVE POWER	R	(-18000 - 18000)xCTxVT	Var	0.1	int
30	001E	L3 PHASE REACTIVE POWER	R	(-18000 - 18000)xCTxVT	Var	0.1	int
32	0020	L1 PHASE APPARENT POWER	R	(0 - 18000)xCTxVT	VA	0.1	unsigned int
34	0022	L2 PHASE APPARENT POWER	R	(0 - 18000)xCTxVT	VA	0.1	unsigned int
36	0024	L3 PHASE APPARENT POWER	R	(0 - 18000)xCTxVT	VA	0.1	unsigned int
38	0026	L1 PHASE COS _φ	R	(-1000 - 1000)	-	0.001	int
40	0028	L2 PHASE COS _φ	R	(-1000 - 1000)	-	0.001	int
42	002A	L3 PHASE COS _φ	R	(-1000 - 1000)	-	0.001	int
44	002C	TOTAL IMPORT ACTIVE POWER	R	(0 - 54000)xCTxVT	Watt	0.1	int
46	002E	TOTAL EXPORT ACTIVE POWER	R	(0 - 54000)xCTxVT	Watt	0.1	int
48	0030	TOTAL INDUCTIVE REACTIVE POWER	R	(0 - 54000)xCTxVT	Var	0.1	int
50	0032	TOTAL CAPACITIVE REACTIVE POWER	R	(0 - 54000)xCTxVT	Var	0.1	int
52	0034	TOTAL APPARENT POWER	R	(0 - 54000)xCTxVT	VA	0.1	unsigned int
54	0036	AVERAGE INDUCTIVE COS _φ	R	(-1000 - 1000)	-	0.001	int
56	0038	AVERAGE CAPACITIVE COS _φ	R	(-1000 - 1000)	-	0.001	int
58	003A	FREQUENCY	R	(4000 - 7000)	Hz	0.01	unsigned int
60	003C	L1 PHASE VOLTAGE ANGLE	R	0-360	Degree	1	unsigned int
62	003E	L2 PHASE VOLTAGE ANGLE	R	0-360	Degree	1	unsigned int
64	0040	L3 PHASE VOLTAGE ANGLE	R	0-360	Degree	1	unsigned int
66	0042	L1 PHASE CURRENT ANGLE	R	0-360	Degree	1	unsigned int
68	0044	L2 PHASE CURRENT ANGLE	R	0-360	Degree	1	unsigned int
70	0046	L3 PHASE CURRENT ANGLE	R	0-360	Degree	1	unsigned int
72	0048	L1 PHASE VOLTAGE THD	R	0-999	%	0.1	unsigned int
74	004A	L2 PHASE VOLTAGE THD	R	0-999	%	0.1	unsigned int
76	004C	L3 PHASE VOLTAGE THD	R	0-999	%	0.1	unsigned int
78	004E	L1 PHASE CURRENT THD	R	0-999	%	0.1	unsigned int
80	0050	L2 PHASE CURRENT THD	R	0-999	%	0.1	unsigned int
82	0052	L3 PHASE CURRENT THD	R	0-999	%	0.1	unsigned int
84	0054	DIGITAL OUTPUT STATUS	R	-	-	-	-
85	0055	DIGITAL INPUT STATUS	R	-	-	-	-
86	0056	IMPORT ACTIVE ENERGY-1	R/W	0-FFFFFFFFFFFFFF	Wh	1	long int
88	0058	EXPORT ACTIVE ENERGY-1	R/W	0-FFFFFFFFFFFFFF	Wh	1	long int
90	005A	INDUCTIVE REACTIVE ENERGY-1	R/W	0-FFFFFFFFFFFFFF	VArh	1	long int
92	005C	CAPACITIVE REACTIVE ENERGY-1	R/W	0-FFFFFFFFFFFFFF	VArh	1	long int
94	005E	IMPORT ACTIVE ENERGY-2	R/W	0-FFFFFFFFFFFFFF	Wh	1	long int
96	0060	EXPORT ACTIVE ENERGY-2	R/W	0-FFFFFFFFFFFFFF	Wh	1	long int
98	0062	INDUCTIVE REACTIVE ENERGY-2	R/W	0-FFFFFFFFFFFFFF	VArh	1	long int
100	0064	CAPACITIVE REACTIVE ENERGY-2	R/W	0-FFFFFFFFFFFFFF	VArh	1	long int
102	0066	L1 PHASE MIN. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
104	0068	L2 PHASE MIN. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
106	006A	L3 PHASE MIN. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
108	006C	L1-L2 PHASE-PHASE MIN. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
110	006E	L2-L3 PHASE-PHASE MIN. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
112	0070	L3-L1 PHASE-PHASE MIN. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
114	0072	L1 PHASE MIN. CURRENT	R/W	(0-6000)xCT	Amper	0.001	unsigned int
116	0074	L2 PHASE MIN. CURRENT	R/W	(0-6000)xCT	Amper	0.001	unsigned int
118	0076	L3 PHASE MIN. CURRENT	R/W	(0-6000)xCT	Amper	0.001	unsigned int
120	0078	L1 PHASE MIN. ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
122	007A	L2 PHASE MIN. ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
124	007C	L3 PHASE MIN. ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
126	007E	L1 PHASE MIN. REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
128	0080	L2 PHASE MIN. REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
130	0082	L3 PHASE MIN. REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
132	0084	TOTAL MIN. IMPORT ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
134	0086	TOTAL MIN. EXPORT ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
136	0088	TOTAL MIN. IMPORT REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
138	008A	TOTAL MIN. EXPORT REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
140	008C	TOTAL MIN. IMPORT APPARENT POWER	R/W	(-18000 - 18000)xCTxVT	VA </td <td>0.1</td> <td>int</td>	0.1	int
142	008E	TOTAL MIN. EXPORT APPARENT POWER	R/W	(-18000 - 18000)xCTxVT	VA </td <td>0.1</td> <td>int</td>	0.1	int
144	0090	TOTAL MIN. IMPORT CAPACITIVE REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
146	0092	TOTAL MIN. EXPORT CAPACITIVE REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
148	0094	TOTAL MIN. IMPORT INDUCTIVE REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
150	0096	TOTAL MIN. EXPORT INDUCTIVE REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
152	0098	TOTAL MIN. IMPORT APPARENT REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
154	009A	TOTAL MIN. EXPORT APPARENT REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
156	009C	TOTAL MIN. IMPORT TOTAL REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
158	009E	TOTAL MIN. EXPORT TOTAL REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
160	00A0	TOTAL MIN. IMPORT TOTAL APPARENT POWER	R/W	(-18000 - 18000)xCTxVT	VA </td <td>0.1</td> <td>int</td>	0.1	int
162	00A2	TOTAL MIN. EXPORT TOTAL APPARENT POWER	R/W	(-18000 - 18000)xCTxVT	VA </td <td>0.1</td> <td>int</td>	0.1	int
164	00A4	L1 PHASE MAX. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
166	00A6	L2 PHASE MAX. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
168	00A8	L3 PHASE MAX. VOLTAGE	R/W	(0-3000)xUT	Volt	0.1	unsigned int
170	00AA	L1-L2 PHASE-PHASE MAX. VOLTAGE	R/W	(0-5000)xUT	Volt	0.1	unsigned int
172	00AC	L2-L3 PHASE-PHASE MAX. VOLTAGE	R/W	(0-5000)xUT	Volt	0.1	unsigned int

MODBUS REGISTER MAP

ADDRESS	ADDRESS (HEX)	REGISTER	R/W	RANGE	UNIT	MULTIPLIER	FORMAT
174	00AE	L3-L1 PHASE-PHASE MAX. VOLTAGE	R/W	(0-5000)xUT	Volt	0.1	unsigned int
176	00B0	L1 PHASE MAX. CURRENT	R/W	(0-6000)xCT	Amper	0.001	unsigned int
178	00B2	L2 PHASE MAX. CURRENT	R/W	(0-6000)xCT	Amper	0.001	unsigned int
180	00B4	L3 PHASE MAX. CURRENT	R/W	(0-6000)xCT	Amper	0.001	unsigned int
182	00B6	L1 PHASE MAX. ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
184	00B8	L2 PHASE MAX. ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
186	00BA	L3 PHASE MAX. ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
188	00BC	L1 PHASE MAX. REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
190	00BE	L2 PHASE MAX. REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
192	00C0	L3 PHASE MAX. REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
194	00C2	L1 PHASE MAX. APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
196	00C4	L2 PHASE MAX. APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
198	00C6	L3 PHASE MAX. APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
200	00C8	TOTAL MAX. IMPORT ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
202	00CA	TOTAL MAX. EXPORT ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
204	00CC	TOTAL MAX. IMPORT REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
206	00CE	TOTAL MAX. EXPORT REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
208	00D0	TOTAL MAX. APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
210	00D2	L1 PHASE MAX. CURRENT DEMAND	R/W	(0-6000)xCT	Amper	0.001	unsigned int
212	00D4	L2 PHASE MAX. CURRENT DEMAND	R/W	(0-6000)xCT	Amper	0.001	unsigned int
214	00D6	L3 PHASE MAX. CURRENT DEMAND	R/W	(0-6000)xCT	Amper	0.001	unsigned int
216	00D8	L1 PHASE IMPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
218	00DA	L1 PHASE EXPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
220	00DC	L2 PHASE IMPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
222	00DE	L2 PHASE EXPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
224	00E0	L3 PHASE IMPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
226	00E2	L3 PHASE EXPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
228	00E4	L1 PHASE IMPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
230	00E6	L1 PHASE EXPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
232	00E8	L2 PHASE IMPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
234	00EA	L2 PHASE EXPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
236	00EC	L3 PHASE IMPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
238	00EE	L3 PHASE EXPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
240	00F0	L1 PHASE MAX. DEMAND APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
242	00F2	L2 PHASE MAX. DEMAND APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
244	00F4	L3 PHASE MAX. DEMAND APPARENT POWER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
246	00F6	TOTAL IMPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
248	00F8	TOTAL EXPORT MAX. DEMAND ACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Watt	0.1	int
250	00FA	TOTAL IMPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
252	00FC	TOTAL EXPORT MAX. DEMAND REACTIVE POWER	R/W	(-18000 - 18000)xCTxVT	Var	0.1	int
254	00FE	TOTAL MAX. DEMAND APPARENT POWER	R/W	(-18000 - 18000)xCTxVT	VA	0.1	unsigned int
256	0100	C1 (PULSE METER 1) COUNTER	R/W	(0 - 18000)xCTxVT	VA	0.1	unsigned int
258	0102	C2 (PULSE METER 2) COUNTER	R/W	-	-	-	-
260	0104	RUN HOUR COUNTER	R/W	-	Hour	0.01	HEX
262	0106	SETPOINT HOUR COUNTER	R/W	-	Hour	0.01	HEX
264	0108	TOTAL HOUR COUNTER	R	-	Hour	0.01	HEX

ADDRESS	ADDRESS (HEX)	REGISTER	R/W	RANGE	UNIT	MULTIPLIER	FORMAT
32768	8000	VOLTAGE TRANSFORMER RATIO	R/W	0-40000	-	0.1	short-int
32769	8001	CURRENT TRANSFORMER RATIO	R/W	0-2000	-	1	short-int
32770	8002	CALCULATION METHOD	R/W	0-1	-	-	short-int
32771	8003	DEMAND TIME	R/W	1-60	minute	1	short-int
32772	8004	PULSE RATIO	R/W	0-6	-	-	short-int
32773	8005	PULSE OUTPUT 1 PARAMETER SETTING	R/W	0-5	-	-	short-int
32774	8006	PULSE OUTPUT 2 PARAMETER SETTING	R/W	0-5	-	-	short-int
32775	8007	ENERGY COUNTER 1 SELECTION	R/W	0-3	-	-	short-int
32776	8008	ENERGY COUNTER 2 SELECTION	R/W	0-3	-	-	short-int
32777	8009	COMMUNICATION ADDRESS	R/W	0 - 247	-	-	short-int
32778	800A	BAUD RATE	R/W	1 - 5	-	-	short-int
32779	800B	PARITY	R/W	0 - 2	-	-	short-int
32780	800C	PASSWORD ENABLE	R/W	0 - 1	-	-	short-int
32781	800D	PASSWORD	R/W	0-9999	-	-	short-int
32782	800E	CONNECTION TYPE	R/W	0 - 1	-	-	short-int
32783	800F	CANCEL THE LATCH FUNCTION BY BUTTON	R/W	0 - 1	-	-	short-int
32784	8010	CANCEL THE LATCH FUNCTION BY DIGITAL INPUT	R/W	0 - 3	-	-	short-int
32785	8011	CANCEL THE LATCH FUNCTION ACCORDING TO PROGRAMMED TIME	R/W	0 - 180	minute	-	short-int
32786	8012	SETPOINT TIME SET VALUE	R/W	0 - 9999	hour	-	short-int
32787	8013	SETPOINT TIME ACTIVE / PASSIVE AND WARNING OUTPUT SELECTION	R/W	AABB*	-	-	HEX
32788	8014	PULSE COUNTER 1 ACTIVE / PASSIVE SELECTION	R/W	0 - 1	-	-	short-int
32789	8015	PULSE COUNTER 1 PULSE COUNT RATIO	R/W	0 - 9999	-	-	short-int
32790	8016	PULSE COUNTER 2 ACTIVE / PASSIVE SELECTION	R/W	0			