CORRECT USAGE and SAFETY PRECAUTIONS

Failure to abide by the precautions below may result in
SERIOUS INJURY or DEATH.
- Cut all power before connecting the device.
- Once the device is online on the network, do not remove the front panel.
- Do not attempt to clean the device with a solvent or another similar agent.
  Only a dry piece of cloth is used..
- Check the connections.
- Electrical devices should be repaired only by your authorized seller.
- The device is for panel type installation only.
- The fuse used must be Type FF and the current limit value should be 1A.
- The production company or the authorized seller is not responsible for the
  consequences resulting from failure to comply with these precautions.

Warning :
- A switch or circuit breaker must be connected between the network and the
auxiliary supply input of device.
- Connected switch or circuit breaker must be in close proximity to the device.
- Connected switch or circuit breaker must be marked as the disconnecting
device for the equipment.

Standards which are applied to the device:
IEC 61000-6-2, IEC 61000-4-2 IEC 61010-1

GENERAL INFORMATION

MPR52S-10, based on DSP(Digital Signal Processor), is designed for the purpose of measuring all parameters in industry plants and recording these parameters to its memory.The measured parameters can be displayed on LCD screen which has dimension of 3.6 inch and can be read easily in dark environments by activating the Back-Light function. MPR52S-10 contains a MODBUS serial interface option.

FEATURES

1- Measurements of parameters given in the parameter table can be displayed on LCD screen.
2- Current and voltage transformer ratios can be programmed.
3- Parameters in 3 phase with neutral, 3 phase without neutral and Aron connection systems can be measured
4- Data communication with PC can be provided by using RS-485 outputs.
5- Recorded parameters can be transferred to a PC through the software.
6- It can assign 3 parameters each to the 1. Relay 1 and 2. Relay 2. If the parameter values are not within the adjusted limits, the output relay can be made to change contact (These outputs can be used for the purpose of alarm warnings).
7- 2 digital input.
8- The existence of 3 phases can be displayed as "VL1☉,VL2☉,VL3☉" on the right corner of the device at any time.
9- The values of the current and voltage total harmonics (THD) can be observed on the left side of the screen.
10- Outputs can be observed on the LCD screen to see which ones are active.
11- Unauthorized access to the device's settings can be prevented by setting up a password from the Setup Menu.

DIMENSIONS

Panel Cut Dimensions
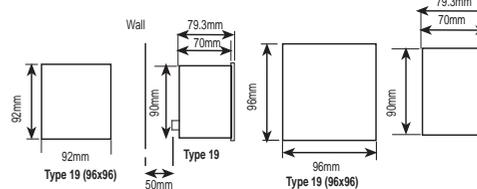
1. The device fits into a Type 19 square cut out (92 mm x 92 mm).
2. Remove the thumbscrews, then slide out the securing brackets from the rear panel.
3. Place the device through the panel cut-out, then slide the securing brackets back into the slots on each side of the device.
4. Tighten the thumbscrews so that the securing brackets bear on the rear of the panel into which the device has been placed.
5. The current and voltage connectors are designed for cables up to 2.5 mm^2, but can accept cables up to 4 mm^2
6. The digital inputs connector can accept cables up to 1.5 mm^2
7. Category 5 cable is suggested for RS-485 input connector

Excessive force can damage the device. The thumbscrews only need to be 'finger-tight' to hold the device in place.
Note: For 3 phase with neutral connection (Figure1) the neutral must be connected; otherwise the device will not function.
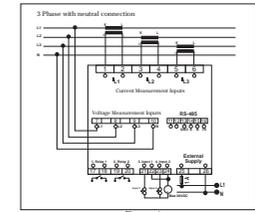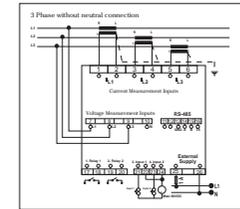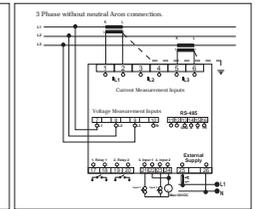
INSTALLATION DIAGRAM
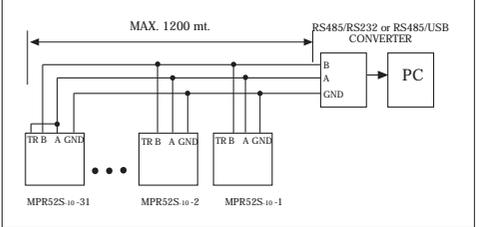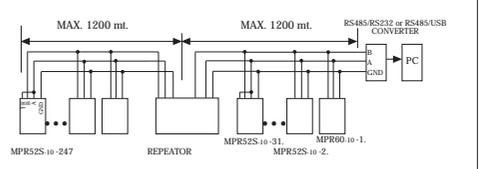

Figure 1

Figure 2

Figure 3

MPR52S-10 PC CONNECTION

A MAX. OF 31 DEVICES CAN BE CONNECTED TO THE SAME LINE.

BY USING A REPEATER, 247 DEVICES CAN BE CONNECTED TO THE SAME LINE.

Important note for making system connection;

First, connect the supply and voltage measurement inputs. Apply energy and measurement voltage to the device. Observe the existence of three phases from LCD screen. ❶❷❸ indicators must be seen. If ⚠ indicator (phase sequence is not correct) is seen in addition to these indicators, cut the energy and measurement voltage and change the direction of 2 phases.
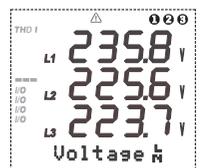
At next step, you can connect current and another connections as mentioned in the installation diagram.

* This box consists of 1 User Manual CD, 1 Installation Guide, 2 clamps and 2 screwed clamps.


CE

SETUP

Setting up MPR52S-10 on the Network and Configuring its Settings:
After connecting the device as mentioned in the user's manual, supply energy. In order for your measurement and applications to be correct, make the necesairy configurations in the SETUP menu.

"SETUP" To enter to the "SETUP" menu, while in the Instantaneous Values menu;

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.
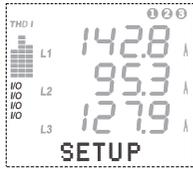
The image of screen is at side while in this menu

Sub-menus under the SETUP menu and what these sub-menu settings can be used for are explained in detail below.

NETWORK

In this menu, current transformer ratio, voltage transformer ratio and system connection type of MPR52S-10 are set.

It has 4 sub-menus.
"CT:……", "VT:……", "Net:……", "Eng:……."

CT: (Current transformer ratio) :
The current transformer ratio is set in this menu. It can be programmed between 1...2000.

"CT" To set the "CT" ratio, while in the Instantaneous Values menu;

Press the ENTER button. (ENERGY is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (The Network menu is displayed)

Press the ENTER button. (CT is displayed)

Press the ENTER button

Enter the appropriate "CT" ratio (between 1.....2000) by scrolling using the UP/DOWN buttons.

To record the new "CT" value, press ENTER button.

VT: (Voltage transformer ratio:)
The voltage transformer ratio can be programmed between 1,0...4000,0 Transformer ratio can set in1 step.
Please pay attention that voltage transformer ratio is entered directly instead of primary voltage value.

"VT" To set the "VT" voltage transformer ratio;
While in Instantaneous Values menu;
Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (The Network menu is displayed)

Press the ENTER button. (CT is displayed)

Find the "VT" Menu by scrolling using the UP/DOWN buttons.

Press the ENTER button.

Enter a "VT" value (between 1.0...4000.0) by scrolling using the UP/DOWN buttons.

To record the "VT" value, press the ENTER button.

Net: (Type of system connection)
The type of system connection is set in this menu.
"Net" To set the connection type;
while in the Instantaneous Values menu;
Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (The Network menu is displayed)

Press the ENTER button. (The CT menu is displayed)

Find the "Net" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button.

Enter the "Net" system connection type by scrolling using the UP/DOWN buttons.(3P4W, ARON, 3P3W)

To record the "Net" system connection type, press the ENTER button.
Note: 3P4W :   3 Phase + Neutral (Star connection)
ARON :   ARON connection
3P3W :   3 Phase No Neutral(Delta connection)
Eng: (Energy Calculation)
"Eng" To enter the connetion type that is being used;
While in the Instanteous Values menu,
Press the ENTER button (the ENERGY menu is displayed.)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button (The Network menu is displayed.)

Press the ENTER button (The CT menu is displayed.)

Find the "Eng" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button.

Using the UP/DOWN buttons enter the "Eng" value (Sprt, Tot)

To record the "Eng" value, press the ENTER button.

Note: If "Tot" menu is selected, MPR52S-10 measures the reactive powers of three phases. If total phase value is inductive, it records values to the inductive area. If total phase value is capacitive, it records values to the reactive area.
If "Sprt" menu is selected, MPR52S-10 measures the reactive powers of three phases for each phase seperately. If phase value is in the inductive area, it records values to the inductive reactive area. If phase values is in the capacitive area, it records values to the capacitive reactive area. Measurement for each phase seperately can be done for 3P4W (3 Phase with Neutral) systems.

RS-485

RS-485 (PC Communication Settings)
MPR52S-10 has a MODBUS RTU communication protocol. Parameters measured by MPR52S-10 can be transferred to a PC through the software. Using this software, all settings of MPR52S-10 can be configured by means of PC.
It is necessarry to set the Baud Rate,Address and Parity values to the MPR52S-10 device in order to communicate with a PC.
RS-485 has 3 sub-menus
"Addr: ..." ,   "Bd: ...",   "Prt: ..."
Addr: (Address Information)
"Addr" To enter the address information,
while in the Instantaneous Values menu;
Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button.(Network menu is displayed)

Find the "RS-485" menu by scrolling using the UP/DOWN buttons.

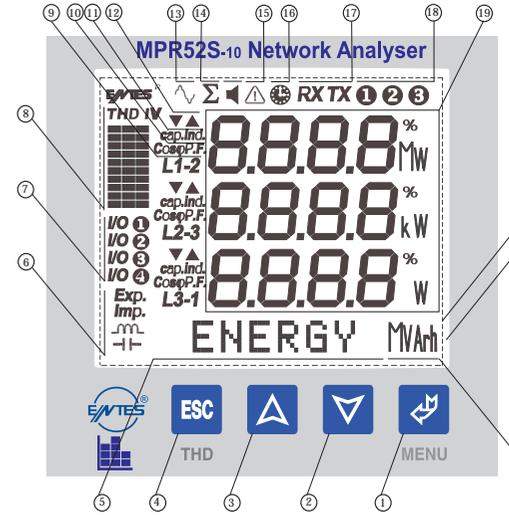Press the ENTER button. (The Addr menu is displayed)

Press the ENTER button.

Enter "Addr" information (1..247) by scrolling using the UP/DOWN buttons.

To record "Addr" information, press the ENTER button.

MPR52S-10 Network Analyser

FRONT PANEL PROPERTIES

1 .... Menu (ENTER) button.
2 .... Down button.
3 .... Up button.
4 .... ESC button. It is used to exit from a menu.
(THD I and THD V menus are choosed)
5 .... Menu and Energy line. Shows the present menu. It also shows the energy values.
6 .... Shows whether the value in the Energy Menu is Export, Import, Inductive or Conductive.
7 .... Shows which Output is active.
8 .... Harmonic bars: The total harmonics of the 3 phases are displayed graphically. The columns represents L1, L2 and L3 phases. Each step shows as percentage scale of 10%. V represents the voltages' harmonics and I represents the currents' harmonics.
9 .... Shows which phase / phase - phase that the measured parameter belongs to.
10.......... Expresses that the COSφ or PF (Power Factor) value of the related phase.
11 ....Shows the direction of the value for the related phase. Capacitive or Inductive. (PF, COSφ and Reactive Power light up while measuring.)
12 ....Min. and Max. symbols. They light up in the Demand menu.
13 ....Harmonic symbols. Means that harmonics are displayed on the screen.
14 ....Total symbol. Shows the total value of the related parameter.
15 ....Phase sequence failure
16 .... Demand symbol. Shows the demand value of the related parameter.
17 .... PC Communication symbols. Shows the existence of communication on the connection line.
18 .... Phase existence symbols.
19 .... Display lines for the measured parameters and their units.
(V, kV, MV, A, kA, MA, W, kW, MW, VA, kVA, MVA, VAr, kVAr, MVAr)
20 .... 3.6'' LCD Display
21 .... Backlight
22 .... Shows the units of the measured energy values (kWh, kVArh)

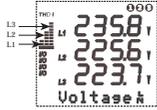## TECHNICAL DATA

Operating Voltage (Un)	: Please look behind the device.
Frequency	: 50 / 60 Hz
Power Consumption	: < 6 VA
Burden	: < 1 VA (Current burden)
	< 0,5 VA (Voltage burden)
Measurement Input	
Voltage	: 1,0 - 300,0 V AC (L-N)
	: 2,0 - 500,0 V AC (L-L)
Current	: 5 mA - 5.5 A
Measurement Ranges	
Voltage	: 1,0 V - 400,0 kV
Current	: 5 mA - 10.000 A
Frequency	: 45,0 - 65,0 Hz
Power	: 0 - 4000 M (W, VAr, VA)
Energy	: 0 - 99 999 999 kWh, kVArh
Measurement Category	: CAT III
Accuracy	
Voltage	: 0.5%±2 digit
Current	: 0.5%±2 digit
Active Power	: 1%±2 digit
Reactive Power	: 2%±2 digit
Apparent Power	: 2%±2 digit
Voltage Transformer Ratio	: 1,0...4000,0
Current Transformer Ratio	: 1...2000
Connection Type	: 3P-4W, 3P-3W, ARON
Relay Outputs	: 2 NO, 5A, 1250 VA
Demand Time	: 1 - 60 min. (programmable)
Communication Interface	: MODBUS RTU (RS-485)
Baud Rate	: 1200 - 38400 bps
Address	: 1 - 247
Parity	: None, Even, Odd Parity
Digital Inputs	
Functions	: Real Time / Latch
Input Pulse Width	: Min. 50 msec.
Operation Voltage	: 5....24 V DC, max. 30 V DC
Ambient Temperature	: -5°C ; +50°C
Display	: 3,6'' LCD with Backlight
Dimensions	: PR19
Equipment Protection Class	: Double Insulation-Class II (⧉)
Box Protection Class	: IP 40
Terminal Block Protection Class	: IP 00
Box Material	: Non-flammable
Installation	: Flush mounting with rear terminals
Wire Thickness for Voltage Connection	: 2,5 mm²
Wire Thickness for Current Connection	: 4,0 mm²
Wire Thickness for Digital Input Connection	: 1,5 mm² (max.)
RS-485 Connection	: Category 5 Cable
	(Shielded Twisted Pair)
Weight	: 0.75 kg
Installation Category	: Class II
Type	: PR 19
Package Dimensions	: 350x290x240 mm
Package Weight	: 6 kg
Pcs per Package	: 8 pcs

Bd : (Baud Rate Value)

"Bd" To set the Bd value,
while in the Instantaneous Values menu;

 Press the ENTER button. (The ENERGY menu is displayed)

 Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

 Press the ENTER button. (The Network menu is displayed)

 Find the "RS-485" menu by scrolling using the UP/DOWN buttons.

 Press the ENTER button.(Addr menu is displayed)

 Find the "Bd" Menu by scrolling using the UP/DOWN buttons.

 Press the ENTER button.

 Enter a "Bd" value (1200, 2400, 4800, 9600, 19200, 38400bps) by scrolling using the UP/DOWN buttons.

 To record the "Bd" value, press the ENTER button.

Prt: (Parity Settings)

"Prt" To set the Prt settings,
while in the Instantaneous Values menu;

 Press the ENTER button. (The ENERGY menu is displayed)

 Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

 Press the ENTER button.(Network menu is displayed)

 Find the "RS-485" menu by scrolling using the UP/DOWN buttons.

 Press the ENTER button. (Addr menu is displayed)

 Find "Prt" menu by scrolling using the UP/DOWN buttons.

 Press the ENTER button.

 Enter "Prt" settings (None, Odd, Even) by scrolling using the UP/DOWN buttons.

 To record the "Prt" settings press the ENTER button.

IMPORTANT NOTE: The "PARITY" should be selected as "None" in order to communicate with ENTES Software (MPR-SW)

PARAMETER TABLE

*$V_{L1, L2, L3}$	(Phase Voltages)	*$\Sigma Q.$ (ΣVAr)	(Total Reactive Power)	*$THD\ I\%_{L1, L2, L3}$	(Total Harmonic Values for Currents)
*$V_{L12, L23, L31}$	(Phase-Phase voltages)	*$\Sigma S.$ (ΣVA)	(Total Apparent Power)	Demand max.VLN	(Maximum Phase Voltages)
*$V.\underline{N}$ (Average)	(Total Phase Voltages Average)	*$COS\varphi_{L1, L2, L3}$	(Displacement Power Factor)	Demand min. VLN	(Minimum Phase Voltages)
*$V.\underline{L}$ (Average)	(Total Phase-Phase Voltages Average)	*$PF_{L1, L2, L3}$	(Power Factor)	Demand max. IL	(Maximum Phase Currents)
*$Freq.Hz$	(Frequency)	$\Sigma P.\ F$	(Total Power Factor)	Demand min. IL	(Minimum Phase Currents)
*$I_{L1, L2, L3}$	(Phase Currents)	Exp. (KWh)	(Export Active Energy)	Demand IL	(Demand Phase Currents)
*ΣI	(Total Phase Currents)	Imp. (KWh)	(Import Active Energy)	Demand ΣIL	(Total Demand Phase Currents)
*$P_{L1, L2, L3}(W)$	(Active Power)	Ind. (KVArh)	(Inductive Reactive Energy)	Demand ΣW	(Total Demand Active Powers)
*$Q_{L1, L2, L3}(VAr)$	(Reactive Power)	Cap.(KVArh)	(Capacitive Reactive Energy)	Demand ΣVAr	(Total Demand Reactive Powers)
*$S_{L1, L2, L3}(VA)$	(Apparent Power)	*$THD\ V\%_{L1, L2, L3}$	(Total Harmonic Values for Voltages)	Demand ΣVA	(Total Demand Apparent Powers)
*$\Sigma P.$ (ΣW)	(Total Active Power)			In	(Neutral Current)

1. RELAY 1 / 2. RELAY 2

1. Relay 1 and 2. Relay 2 :

MPR52S-10 contains two output relays (NO Normally open). 1.Relay 1 and 2.Relay 2 are used for alarm output or for digital input. Active relays can be seen on LCD.
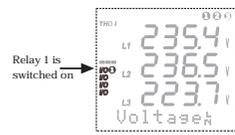
Relay 1 is switched on →
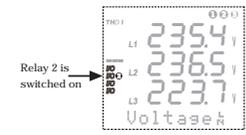
Relay 2 is switched on →

1. Relay 1

3 parameters can be assigned to this output. "Hi" High and "Lo" low value desired for each selected parameter can be adjusted.If the measurement value of any parameter exceeds the setting value, the output relay activates

Relay 1 has 16 sub-menus.
Cfg: By this parameter, relays can be configured as "Alarm Output" (Cfg: Alarm) or as "Digital Output" (Cfg: Dout).
Menus of 1st Parameter
"Pr1:...", "Hi1:...", "Lo1:...", "Hs1:...", "Dly1:..."

Menus of 2nd Parameter
"Pr2:...", "Hi2:...", "Lo2:...", "Hs2:...", "Dly2:..."

Menus of 3rd Parameter
"Pr3:...", "Hi3:...", "Lo3:...", "Hs3:...", "Dly3:..."

Pr1: (1st Parameter)
This is the menu in which the 1st parameter is assigned to the Relay 1. The parameters that can be set are marked with an * in parameter tables.
If no parameter is desired to be assigned to the menu, "Off" option must be selected.

"Pr1" To set Pr1,
while in the Instantaneous Values menu;

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Network menu is displayed)

Find the "1. Relay1" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (The Pr1: menu is displayed)

Press the ENTER button

Enter "Pr1" parameter marked with an * in the parameters table by scrolling using the UP/DOWN buttons.

To record the new "Pr1", press the ENTER button.

Hi1: (Highest value for the 1st parameter)
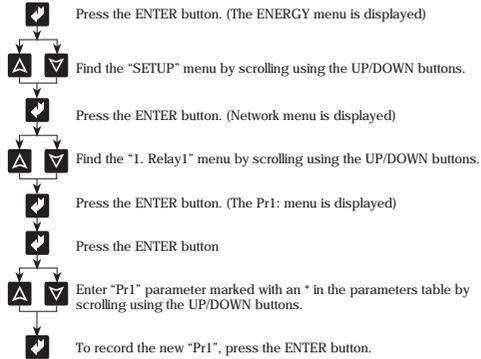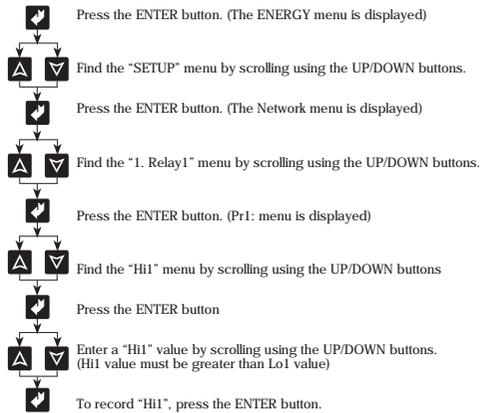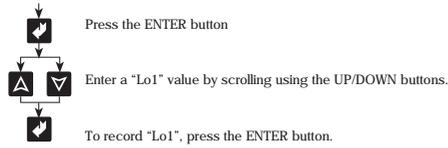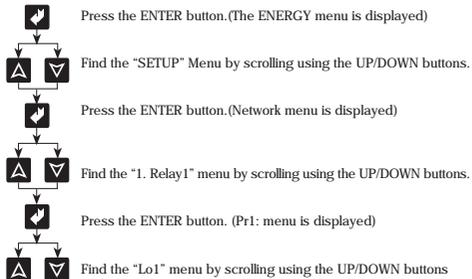It is the highest value the 1st parameter is desired to reach. When the measured value is over the adjusted value, Relay 1 activates.

"Hi 1" To set the Hi 1 value,
while in the Instantaneous Values menu;

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (The Network menu is displayed)

Find the "1. Relay1" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Pr1: menu is displayed)

Find the "Hi1" menu by scrolling using the UP/DOWN buttons

Press the ENTER button

Enter a "Hi1" value by scrolling using the UP/DOWN buttons. (Hi1 value must be greater than Lo1 value)

To record "Hi1", press the ENTER button.

Lo1 (Lowest value for the 1st parameter)
It is the lowest value that the 1st parameter is desired to reach. When the measured value is under the adjusted value, Relay 1 activates.

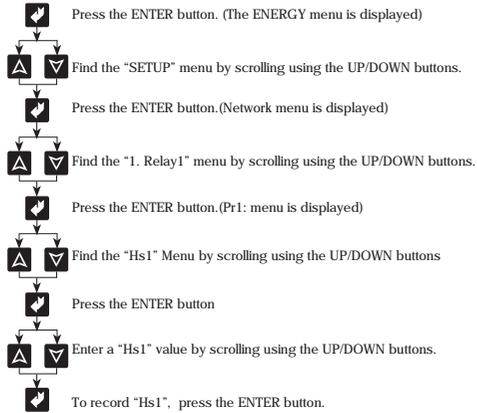"Lo1" To set the Lo 1 value,
while in the Instantaneous Values menu;

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" Menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Network menu is displayed)

Find the "1. Relay1" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Pr1: menu is displayed)

Find the "Lo1" menu by scrolling using the UP/DOWN buttons

Press the ENTER button

Enter a "Lo1" value by scrolling using the UP/DOWN buttons.

To record "Lo1", press the ENTER button.

Hs1: (Hysteresis value for the 1st parameter)
When the interval is exceeded which is limited with Hi and Lo values, for releasing Relay 1 which is already switched on:
If the warning is caused due to exceeding the Hi value, it is required that the value must decrease as much as Hs (hysteresis) value.
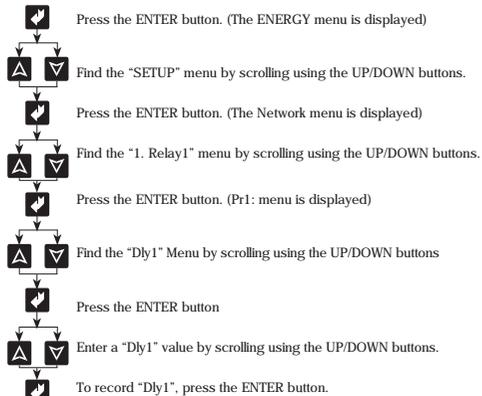If the warning is caused due to becoming less than the Lo value, it is required that the value must increase as much as Hs (hysteresis) value.

"Hs1" To set the Hs 1 value,
while in the Instantaneous Values menu;

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Network menu is displayed)

Find the "1. Relay1" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Pr1: menu is displayed)

Find the "Hs1" Menu by scrolling using the UP/DOWN buttons

Press the ENTER button

Enter a "Hs1" value by scrolling using the UP/DOWN buttons.

To record "Hs1", press the ENTER button.

Dly1: (Delay value for the 1st parameter)
For switching on the Relay 1, value of parameter which is assigned to this output, must exceed determined intervals and this event must continue for a time period which is entered at the Dly1 menu.

To set the Dly 1 value,
while in the Instantaneous Values menu;

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (The Network menu is displayed)

Find the "1. Relay1" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Pr1: menu is displayed)

Find the "Dly1" Menu by scrolling using the UP/DOWN buttons

Press the ENTER button

Enter a "Dly1" value by scrolling using the UP/DOWN buttons.

To record "Dly1", press the ENTER button.

Note:
The 2nd and 3rd parameter settings of Relay 1 such as Hi, Lo, Hs, Dly values can be adjusted like the 1st parameter.

Digital Inputs

Digital Inputs
MPR52S-10 has 2 digital inputs. User can monitor the applied voltage to the input on the LCD display.
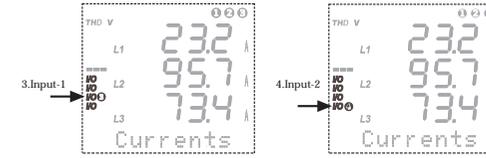
● In order to configure Input-1 function, in H 0165 register:
- "0" has to be entered for Real Time and
- "1" has to be entered for Latch.

● In order to configure Input-2 function, in H 0166 register:
- "0" has to be entered for Real Time and
- "1" has to be entered for Latch.
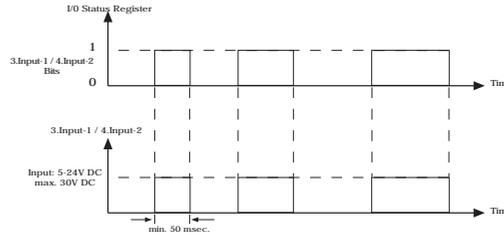
Real Time function operation

● In order to reset input registers, which are set in latch function, "0" bit has to be written in I/O status register.
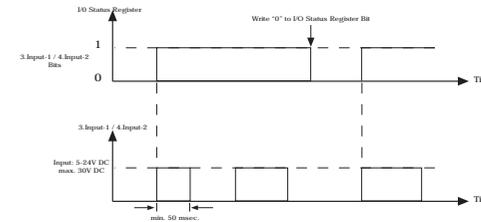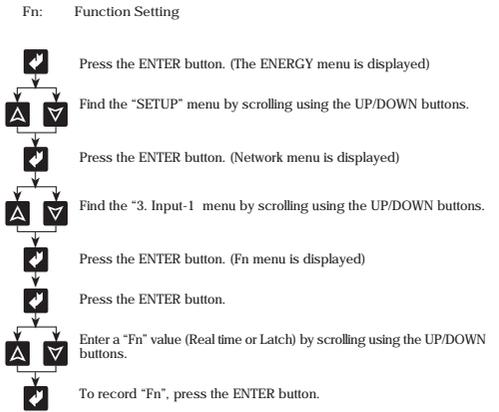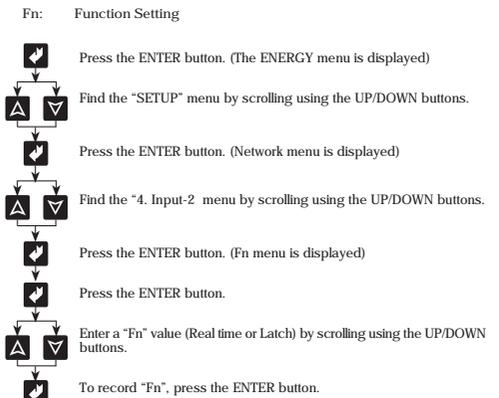

Latch function type operation.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	Input2	Input1	Relay2	Relay1

Input 1 and Input 2 register bits show inputs status.

3. INPUT-1

Fn: Function Setting

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Network menu is displayed)

Find the "3. Input-1 menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Fn menu is displayed)

Press the ENTER button.

Enter a "Fn" value (Real time or Latch) by scrolling using the UP/DOWN buttons.

To record "Fn", press the ENTER button.

4. INPUT-2

Fn: Function Setting

Press the ENTER button. (The ENERGY menu is displayed)

Find the "SETUP" menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Network menu is displayed)

Find the "4. Input-2 menu by scrolling using the UP/DOWN buttons.

Press the ENTER button. (Fn menu is displayed)

Press the ENTER button.

Enter a "Fn" value (Real time or Latch) by scrolling using the UP/DOWN buttons.

To record "Fn", press the ENTER button.

DISPLAY

(LCD Display Settings)
In this menu, LCD display settings are configured. It has 3 sub-menus.
"Loop: ..." , "Cont: ..." , "BL: ..."

Loop:
In this menu, the duration of displaying instantaneous value is adjusted automatically, while in the Instantaneous Values menu. The Loop duration can be adjusted between 1... 600 in terms of seconds.

For example;
The Loop duration is set 10 sec. In the Instantaneous Values menu, if any button is not pressed during 10 sec, the Instantaneous values are displayed in sequence for 10 seconds periods.
By using this function all instantaneous values can be observed one after the other without pressing any buttons.
This function can be cancelled by selecting "No" option in the Loop Menu.