MULTISER

01-TFT
01-PC-TFT
02-PC-TFT
03-PC-TFT
04-PC-TFT
05-PC-TFT
12-PC-TFT
TFT
11-PC-TFT
13-PC-TFT
21-PC-TFT
52-PC-TFT
53-PC-TFT

NETWORK ANALYSER & Data Logger

Micro SD
2 – 32 GB

www.kael.com.tr

KAEL Electronic Co.

Contents

Contents

MODEL

Measurements can be viewed by RS485 Modbus RTU

VL1,VL2,VL3
VL12,VL23,VL13
IL1,IL2,IL3, I_Neutral,Hz
P1,P2,P3,Q1,Q2,Q3,S1,S2,S3
CosΦ1,CosΦ2,CosΦ3
PFD1,PFD2,PFD3,ΣPF
ΣP,ΣQi,ΣQc,ΣQ,ΣS
imp-exp ΣkWh
imp-exp ΣkVARh(ind)
imp-exp ΣkVARh(cap)
ΣkVAh

Standard Features

- Voltage and Current
  Power Factor
  Frequency
  Active Power
  Reactive Power
  Apparent Power
  Active Energy
  Reactive Energy
  Neutral Current
  THD-V and THD-I
- Peak and Demands
- True RMS
- Current Transformer Ratio
- Voltage Transformer Ratio
- Password protection
- 3P&4W,3P&3W, ARON connection

	3 - 31. harmonics for current and voltage	3 - 63. harmonics for current and voltage	Current Unbalance %	Voltage Unbalance %	ALARMS(Over Voltage-Under Voltage and Voltage Unbalance)	ALARMS(Over Current-Under Current and Current Unbalance)	ALARMS(Phase Sequence-Phase Failure, Over THD-V and Over THD-I)	Energy tariff and number of production	Waveforms (signals of Voltage and Current)	Graphic Reports (power, current and voltage)	Graphic Reports (THD-I ve THD-V)	Alarm Reports by date	Energy Counter for Generator	Working Time	Relay outputs (2)	Digital Inputs (2)	Energy pulse ouputs (2)	2 Analogue Outputs (programmable) 4-20mA, 0-20mA, 0-10V, 2-10V, 0-5V, 1-5V	RS-485 MODBUS-RTU	Memory (up to MicroSD 32 GB)	Colour TFT (3,2")	Auxiliary Supply	96 x 96 x 56 mm
MULTISER-01-TFT																						230V	
MULTISER-01-PC-TFT																				4GB		230V	
MULTISER-02-PC-TFT																				4GB		230V	
MULTISER-03-PC-TFT																				4GB		230V	
MULTISER-04-PC-TFT																				4GB		230V	
MULTISER-05-PC-TFT																				4GB		85-265V	
MULTISER-12-PC-TFT																				4GB		85-265V	
New MULTISER-TFT																						230V	
MULTISER-11-PC-TFT																						230V	
MULTISER-13-PC-TFT																				4GB		230V	
MULTISER-21-PC-TFT																						230V	
MULTISER-52-PC-TFT																						85-265V	
MULTISER-53-PC-TFT																						85-265V	

Table -1

Introduction

The device was designed to measure, report and analyse the electrical magnitudes in the 3-phase electric network and both design and software were produced by KAEL engineers. The state-of-the-art technologies were inserted in this device and both menus which facilitate the use of the user and the required features were included. Coloured LCD screen (TFT) is used in the device. It is possible to extend memory up to 32GB with an SD card.

All the information and warnings you need to know concerning the device were described in the user operation manual. Please read this manual carefully before engaging the device. Please do not take any action before consulting with our company for any matters not clearly understood.

Tel: +90 232 877 14 84 (pbx) Fax: +90 232 877 14 49
Factory: Atatürk Mh. 78. Sok. No:10 Ulucak Köyü Kemalpaşa İzmir- TURKIYE

Warnings

1- The device shall be engaged by competent and licensed persons in conformity with the instructions set forth in the operation manual. In case required, controls shall be carried out by such persons also.

2-Do not open the inside of the device or cause to be opened. There are no parts inside the device which the user or anyone else may intervene.

3-Use the device according to assembly instructions

4- Before making electrical connection to the terminals of the device, make sure there is no electric power on the cables and terminals. The switchboard shall not have electric power on.

5- The fuses used in the device are of 1A FF type.

6- Make sure to fix the device on the switchboard firmly without swings with the apparatus given with the device.

7-Do not touch the keys on the front panel of the device with any substance other than your finger.

8-Wipe the device only with dry cloths after making sure the electric energy of the device is cut-off. Water or chemicals used for cleaning may cause damage to the device.

9- Before activating (energizing) your device please make sure that the terminal connections are made according to the connection scheme and without causing any contact problems (loose connection or contact of multiple copper cables).

10. The above measurements and warnings are for your safety. Kael Elektronic Ltd Şti or the dealer may not be held liable for any inconveniences when those warnings are not observed.

Features

- Easy use with menu
- Wide screen LCD (320 x 240 pixel 3,2")
- Many leading screen displays
- Operating system is used for the microprocessor
- Improved dynamic software
- Ability to enter current and voltage transformer rates
- True RMS
- Voltage, current and harmonic protection
- Multiple alarms
- Memory (upto Micro SD 32GB)
- Password protection
- Waveforms (power, current and voltage)
- Graphical reports (Powers, Voltages, Currents)
- Reports according to date
- 3P&4W, 3P&3W, ARON Connection

Measurements

- Voltage (V1N, V2N, V3N ve V12, V23, V13)
- Current (I1, I2, I3, ΣI)
- Power Factor (PF1, PF2, PF3)
- **cosΦ** values for the phases (CosΦ1, CosΦ2, CosΦ3, ΣcosΦ)
- Frequency (Hz)
- Active Power (P1, P2, P3, ΣP)
- Inductive Reactive Power [ΣQ(ind),Q1(ind),Q2(ind),Q3(ind)]
- Capacitive Reactive Power [ΣQ(kap),Q1(kap),Q2(kap),Q3(kap)]
- Apparent Power (ΣS,S1,S2,S3)
- Active Energy (ΣWh)
- Inductive Reactive Energy (ΣVARh(ind))
- Capacitive Reactive Energy (ΣVARh(kap))
- Neutral Current (I(N))
- Total harmonic distortion for current and voltage (THD-V ve THD-I)
- Peak and Demands
- Display as list or chart of harmonics for current and voltages
- % Current Unbalance
- % Voltage Unbalance

Inputs & Outputs

- Relay Output (2pcs)
- Pulse Output (2pcs)
- Digital Inputs (2pcs)
- Analogue Outputs (2pcs)
- RS-485 MODBUS-RTU

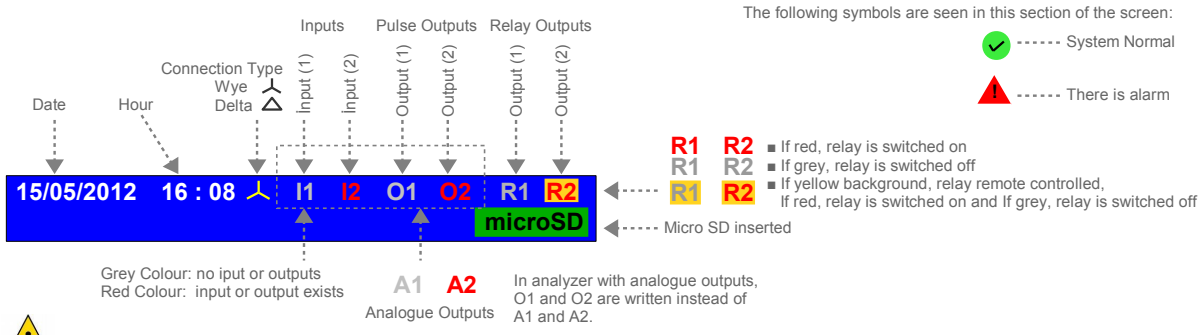
General

As in the whole world, efforts are implemented in our country in all sectors for the management and saving of electric power. Here the most significant issue is to have an energy analyser produced with today's technology which may carry out correct measurements and analysis.

KAEL Elektronik, combined its experiences n the sector and added a brand new energy analyser which is fully equipped in terms of functional richness and with improved software, into the electric sector . The device has a 3,2" colored LCD screen thus the users are provided many facilities with charts and animations. Moreover, it has a very fast microprocessor and an operating system. This enabes it to carry out all the operations simultanesouly. Moreover, the micro SD memory card which may be extended upto 32GB, is the first in the sector.

Information Panel

An Information Panel consisting of easily understandable symbols is placed on top of the screen. This panel, is always at the top irrespective of the section the user uses. Information as date, hour, inputs, pulse outputs, relay outputs, micro SD is inserted or not may be seen simultanesously in this panel.



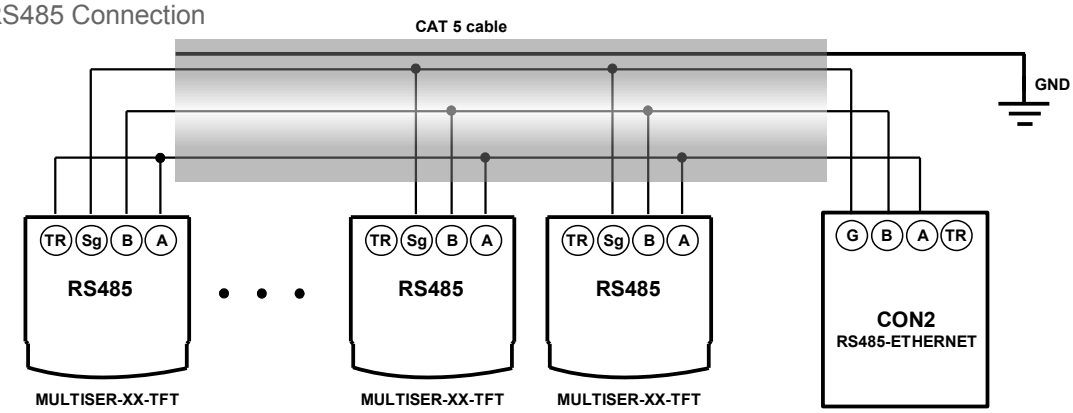
In order to make use easier and more understandable, coloured LCD screen was used. If the keys are not pressed for a long time, the device passes to screensaver mode to extend screen life and the information panel which is displayed only at the top may gradually slide down from the top. When any key is pressed, main screen view is restored.

Making the Connections

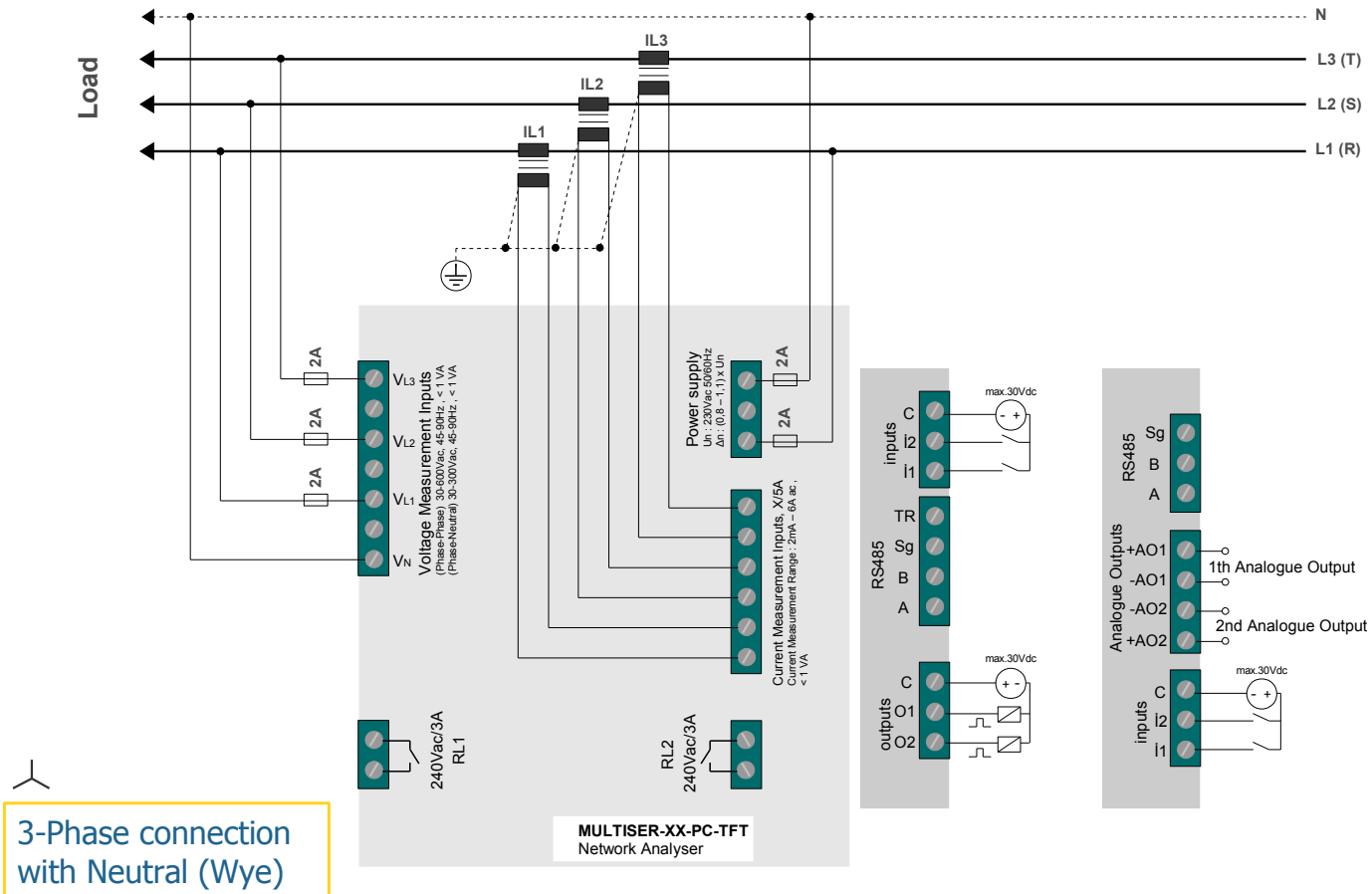
- The connections of the system must be made when it is out of power.
- The connections of the device shall be connected as shown in the connection scheme.
- The current and voltage connections shall be connected in a manner that they are placed on the same phase same current transformer and with the same direction. Connection scheme must be observed.
- The value of the current transformer chosen shall not be less than the real load value and X/5 amperes. Moreover, it is recommended to chose class 0,5.
- Fuses to be used shall be FF type. Fuses to be used shall be chosen according to given current values.
- RS485 connection shall be made.
- Do not supply power to the device before all the connections are checked by means of a measurement apparatus.

- The terminals for currents and voltage are suitable for cables with 2,5mm$_2$ cross- section.
- Pulse outputs, Inputs and RS485 terminals are suitable to max. 1,5 mm$_2$ cables
- CAT5 (category 5) cables are recommended for RS485 connection

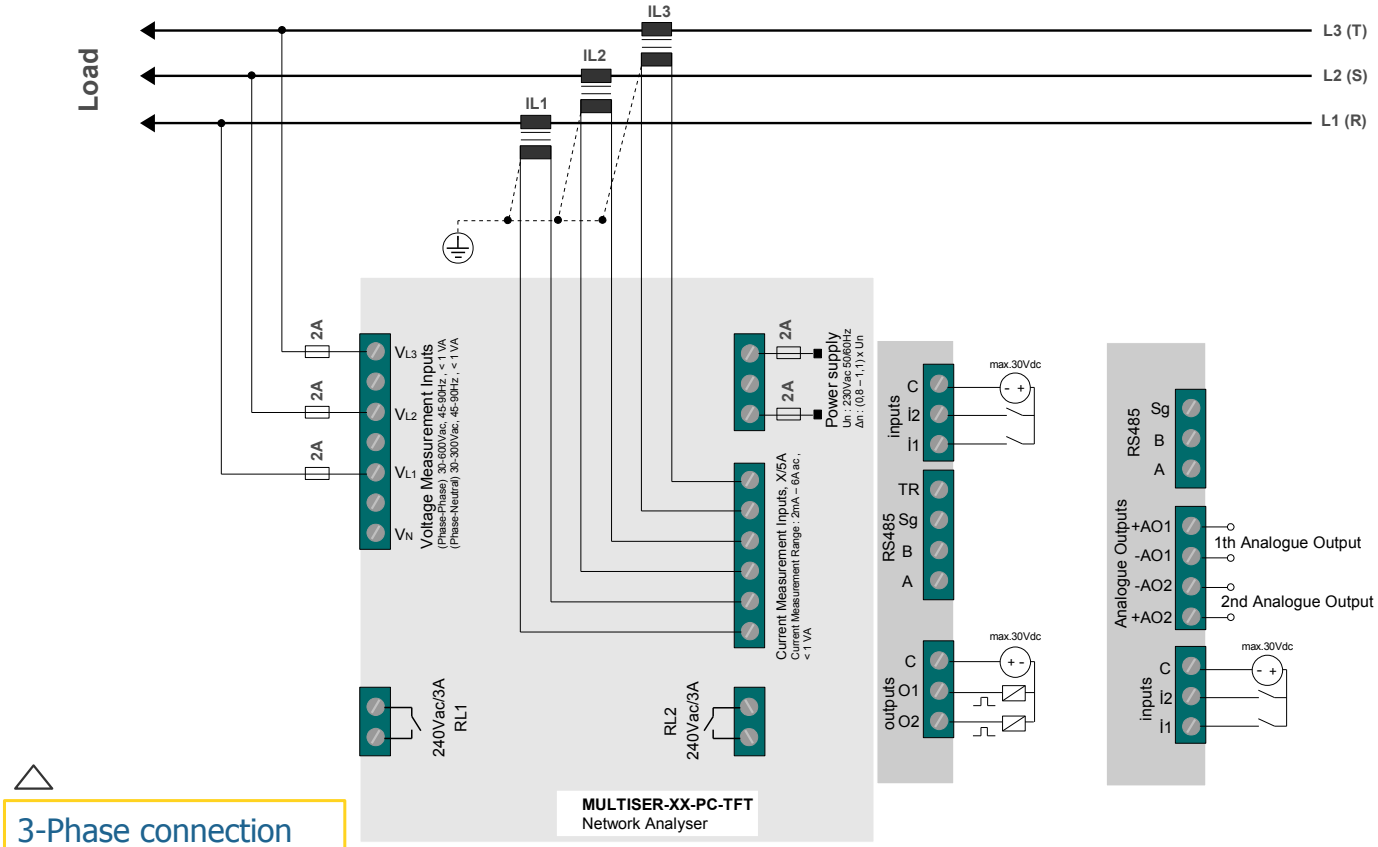
RS485 Connection



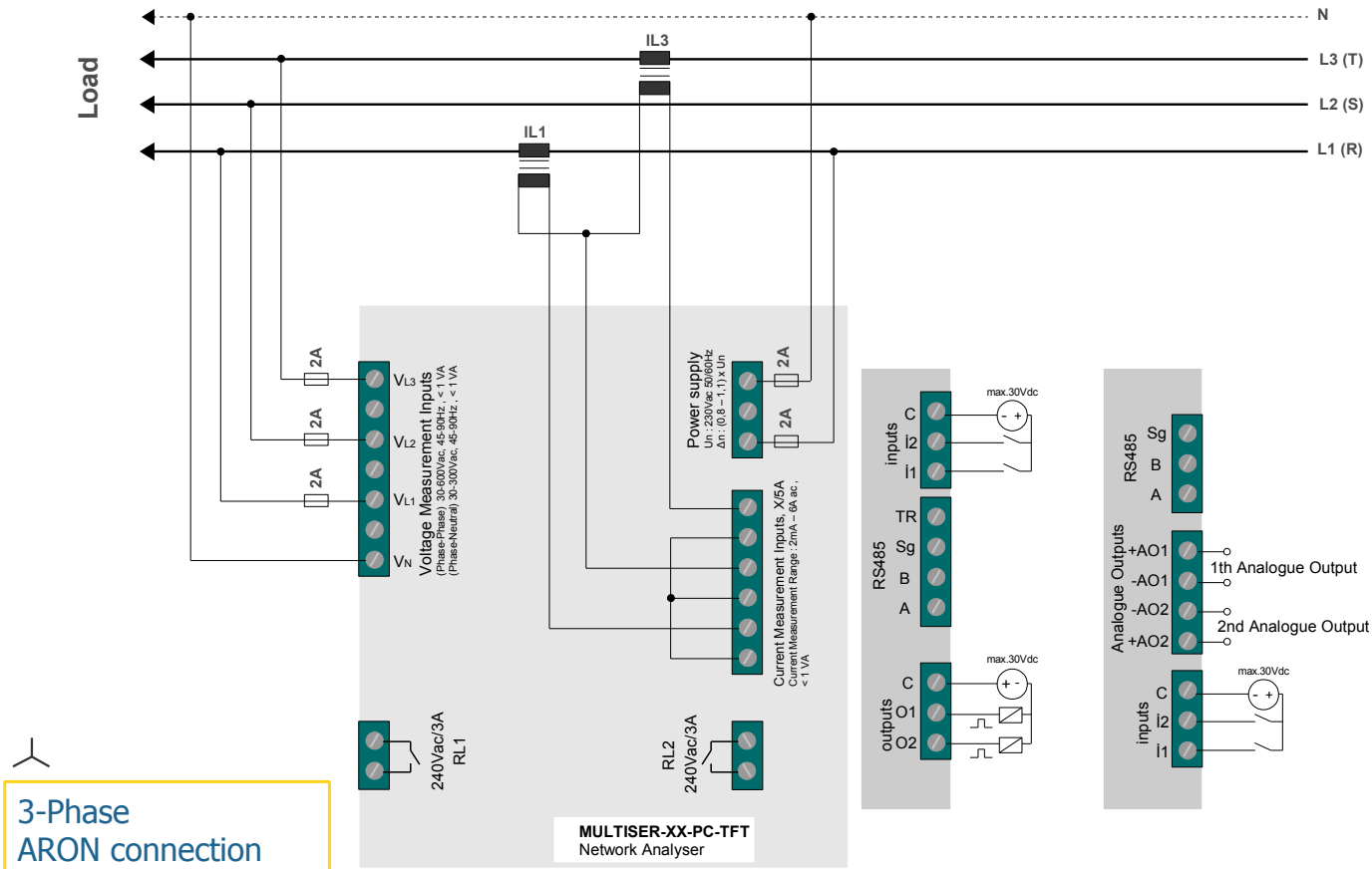
Connections



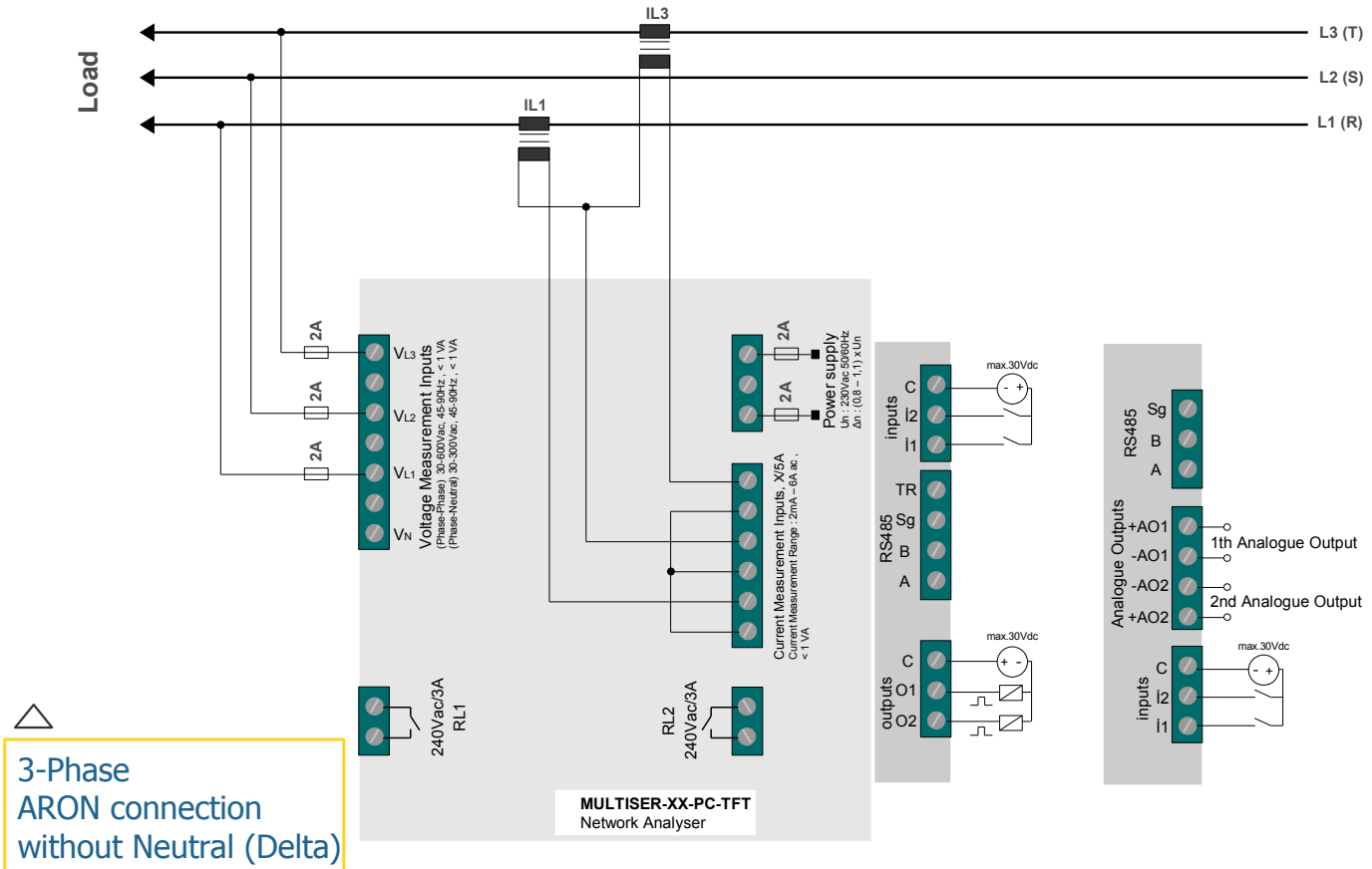
3-Phase connection with Neutral (Wye)



3-Phase connection without Neutral (Delta)



3-Phase
ARON connection
with Neutral (Wye)



3-Phase
ARON connection
without Neutral (Delta)

Operation

1.Step: Voltage Transformer Ratio Value

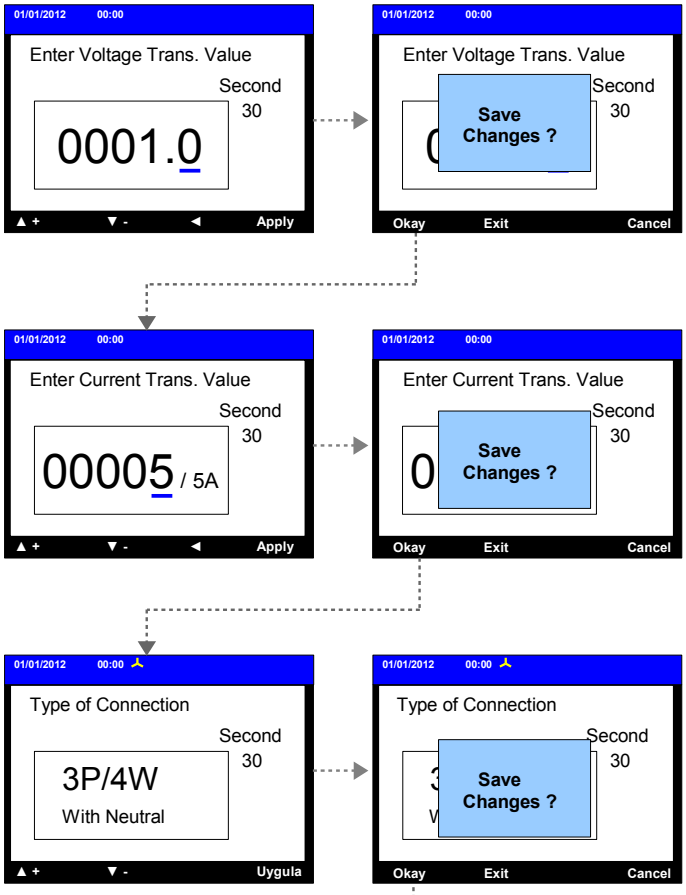
When operated for the first time, the screen at the right may appear. Voltage transformer ratio, the line with the blue bottom line may be set to desired value with the keys and left key is pressed and the next step appears. When all the rate value is entered, apply key is pressed. In this case if the OK key is pressed, the change is saved.If the apply key is not pressed, the voltage transformer ratio shall be saved as 1 in the memory when the time on the screen expires and the screen slides to current transformer ratio.

2.Step: Current Transformer Ratio

The line where the blue bottom bar is located is set to desired value with the direction keys and left key is pressed for the next step. When the entire primary value is entered, apply key is pressed. If apply key is not pressed, current transformer ratio is saved as 5/5A when the time countdown on the screen expires and the system proceeds to next step to determine connection type.

3.Step: Connection Type

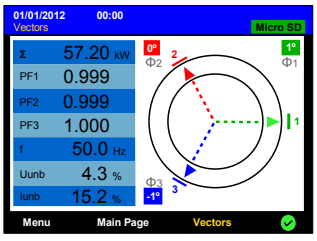
Suitable connection type between 3P&4W (3phase 4wires) with Neutral or 3P & 3W (3 phase 3 wires) without neutral is selected and apply key is pressed. When Ok key is pressed the change is saved. If apply key is not pressed than the connection is saved as 3P&4W with neutral when the time countdown expires and screen passes to vector page.



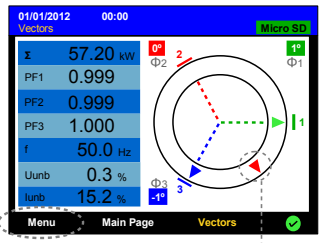
Vectors

In this page, the total active power, power factors for each phase, frequency, percentage of unbalance voltages percentage of unbalance between currents and angular display of currents and voltages on 3 phase vector diagram and angle (ø) may be followed.

In the first start up, it may be checked whether the connections are correct or not by observing the vector diagram. The total active power of the system may be monitored easily.
Information on whether the system is balanced in terms of current and voltage may also be followed.



An example of connection control

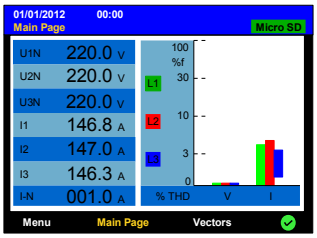


polarities of the output of the current transformer for L2 phase was reverse

⚠ Please check the time and date. If they are incorrect than make sure to adjust the real time-date from the settings part in the menu. Otherwise all reports may have incorrect timing.

Main Page

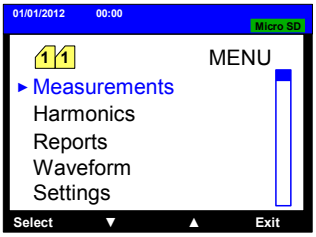
Voltage, neutral current, total harmonic distortion for currents and voltages which are among the electrical measurements mostly required by users may be followed in this screen.



1. MENU

This is the section where many electrical measurements and formed reports may be followed more exhaustively and settings are made. Parameters in the menu may be accessed with direction keys and the parameter is entered with selection key and parameter is left with the exit key.

NOTE: Settings may only be accessed by means of a password.

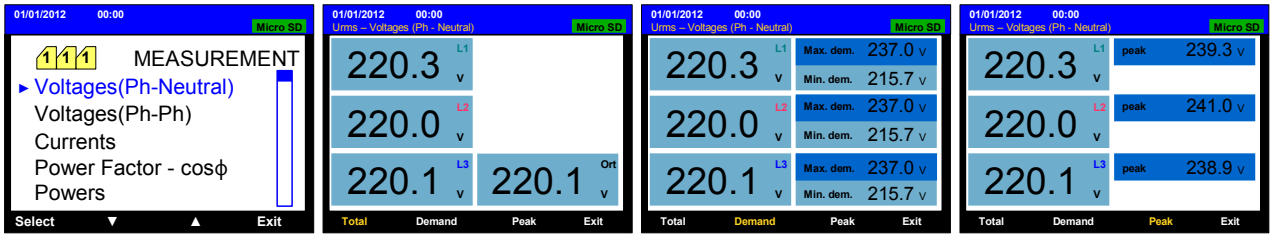


1 1 Measurements

Voltage and current for 3 phase and the peaks, demands, power factor, import and export energy may be monitored in details in the measurement menu.

1 1 1 Voltages (Phase-neutral)

Phase-neutral voltages for 3 phases, their averages, peak and demand values are found in this menu. Deletion of demand and peaks and setting the demand period may be done in the demand operations section in Settings menu.

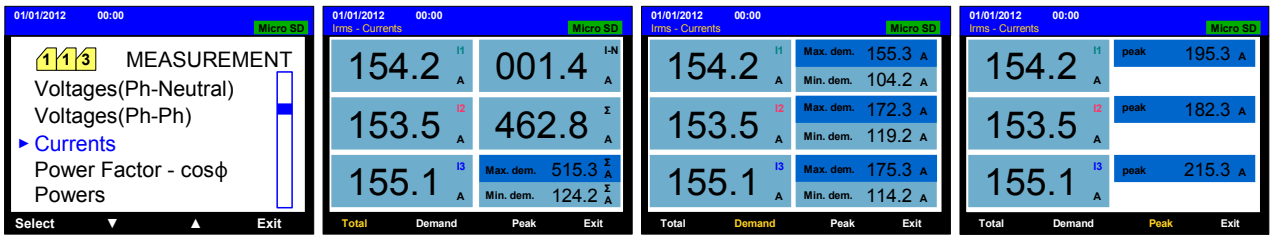


1 1 2 Voltages (phase-phase)

Phase-phase voltages for 3 phases, their averages, peak and demand values are found in this menu. Deletion of demand and peaks and setting the demand period may be done in the demand operations section in Settings menu.

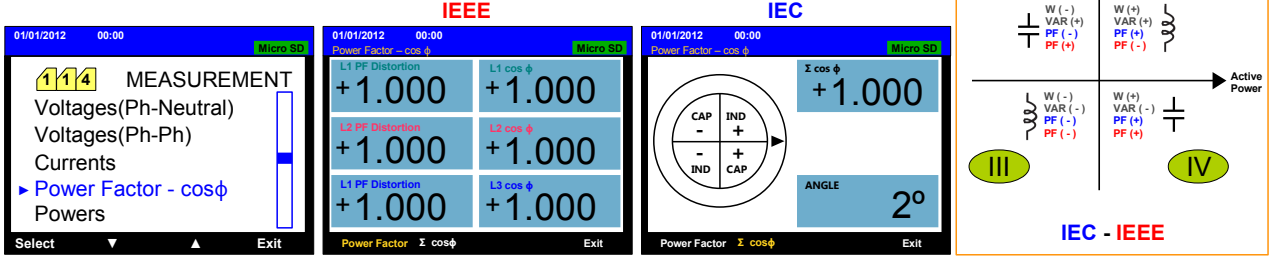
1 1 3 Currents

Currents for three phase, neutral current, total current and their peak-demand values are found in this menu. Deletion of demand and peaks and setting the demand period may be done in the demand operations section in Settings menu.



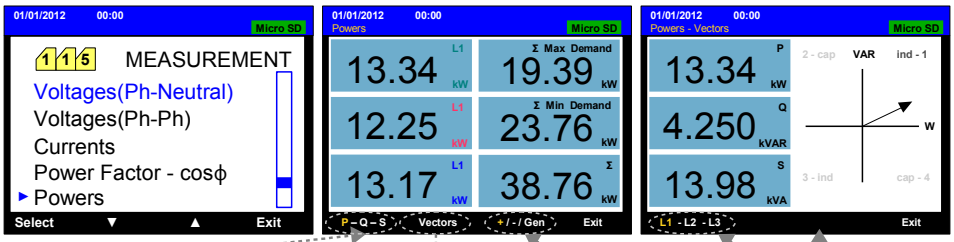
1 1 4 Power Factor - cosϕ

Both power factors and cosø and total cosø and angle values may be followed in this menu. It may be followed by a chart in which section the total cosø is.



1 1 5 Powers

This is the section where either for each section or total active, reactive, apparent powers and total demand may be followed. Import, export powers and powers of the generator may be accessed through “+/-Gen” key. Furthermore, active, reactive, apparent power values and their directions on vectoral plane for each phase may be monitored with each vector key. Deletion of demand and peaks and setting the demand period may be done in the demand operations section in Settings menu.



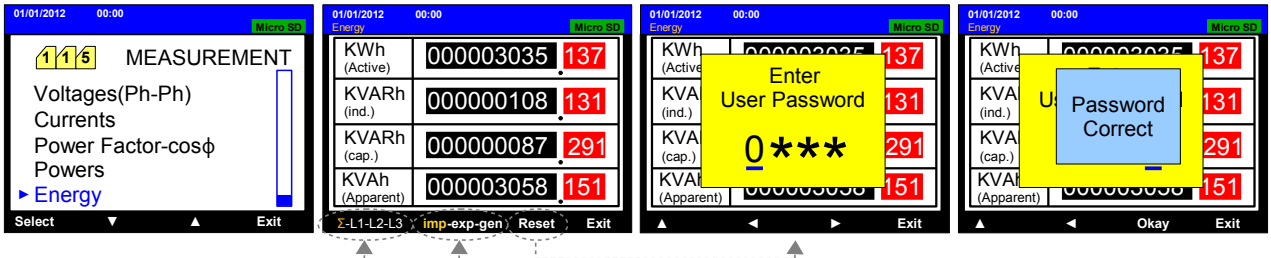
Yellow indicates to which power value it belongs, for ex: here “P”” is yellow and means that the power values on the screen belongs to active power. “Q” reactive power and “S” apparent power may be accessed by pressing the button respectively.

“+” : import
“-” : export
“Gen” :Generator

It means values of phase with yellow colour is indicated.

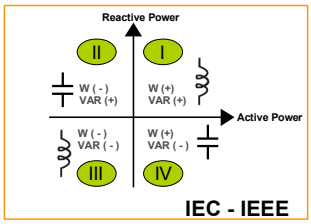
1 1 6 Energy

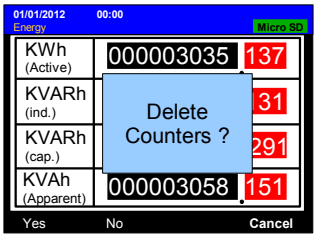
This is the section where active, reactive (inductive and capacitive) and apparent energies consumed per each phase and total active, total reactive (inductive and capacitive) and total apparent energies consumed by the whole system is followed. Counters will be zero When reset key is pressed . The screen where user password is entered appears. When password is entered, the question “Delete counters?” appears on the screen. If yes is pressed all counters are deleted.
For operations of entering the password, please see the password operations section in the SETTINGS menu.



Σ : Total Energy
L1 : Energy for L1
L2 : Energy for L2
L3 : Energy for L3

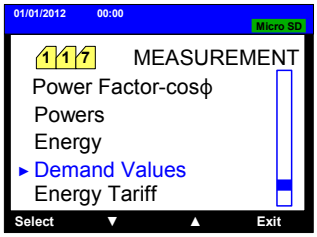
“+” : import
“-” : export
“Gen” :Generator





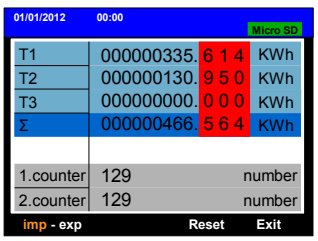
1 1 7 Demand Values

All electrical measurements instant demand values shown in this page.
At the end of each Demand time, these values are refreshed.



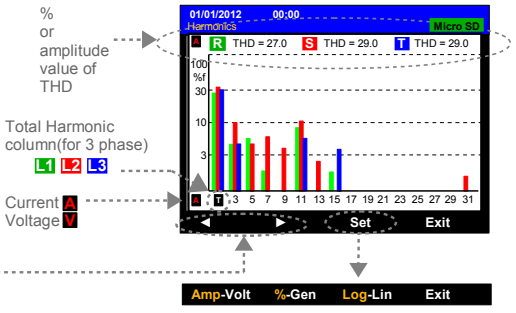
1 1 8 Energy Tariff

If input setting is selected as counter input (in section 1.5.10) T1,T2 and T3 tariffs can be monitored in energy tariff page.
Also, the number of pulse inputs can be monitored at same page.
Energies and input counters can be deleted by user.
With this feature, the unit cost of the product produced in a machine can be easily calculated.



1 2 Harmonics

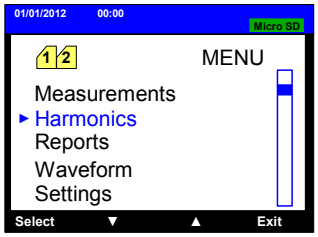
This displays harmonic amplitude of both current and voltage values and % values for the three phases in coloured graphic screen in linear or logarithmic form upto 31st harmonic. NOTE: You may choose the devices measuring to 63rd harmonics from table 1

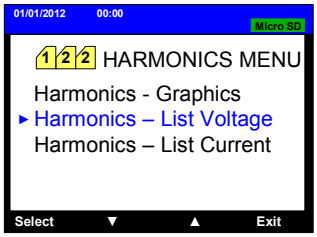


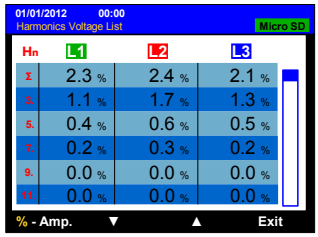
Harmonics allows to switch between. when (►) button is pressed one more time after 31. harmonics, other harmonic values will be displayed in the next page.

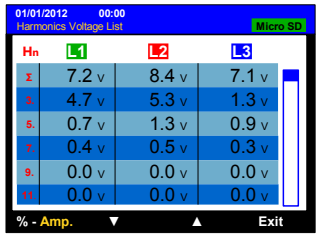
Amp-Volt : Current or voltage
% - Gen : % or amplitude
Log – Lin : linear or logarithmic.

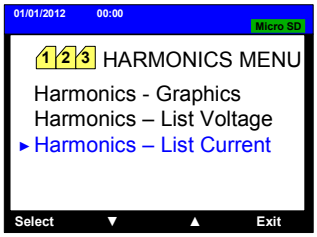
This displays harmonic amplitude of both current and voltage values and % values for the three phases as a list up to 31st harmonic. NOTE: You may choose the devices measuring to 63rd harmonics from table 1

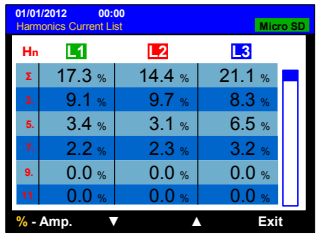


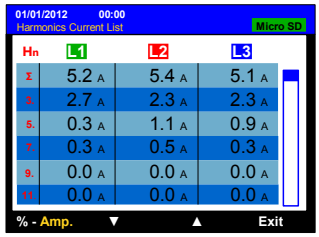






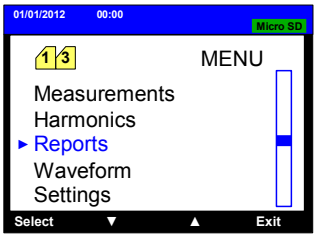






1 3 Reports

In the reports menu which contains most useful information for users, it is possible to have access to below reports in graphical or list form.



Note: Micro SD card shall be inserted.

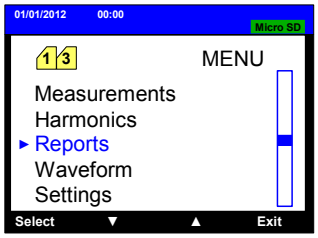
- Graphical power reports (active, reactive and apparent)
- Graphical voltage reports
- Graphical current reports
- Demand-peak reports
- Alarm reports

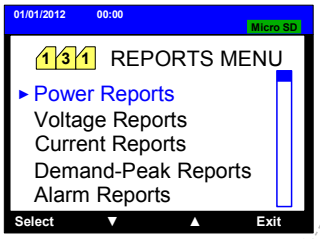
1 3 1 Power Reports

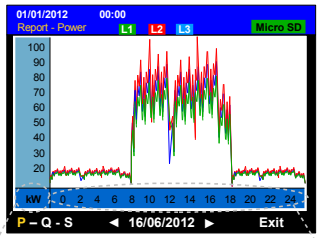
It is used to observe the power values (active, reactive and apparent) saved in the memory of the device (micro SD 4 GB) chronologically in graphical form. The 3 colours in the screen symbolize 3 phases separately thus

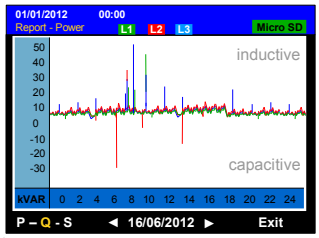
- Maximum loading status of distribution transformers
- First start-up and operation-stop hours of the machinery in the plant
- Maximum power consumption for all operations
- Determination of machinery or devices left operating during night time
- THours of elongated electricity cut-off for all operations

may easily be monitored and it constitutes a ground for taking the required measurements. Note: Date may be changed with keys ◄ and ►









Power Unit

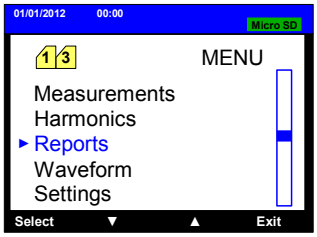
Hours of day

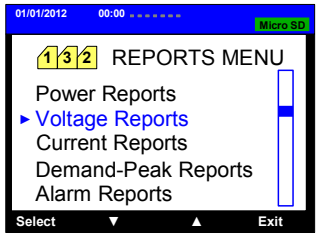
1 3 2 Voltage Reports

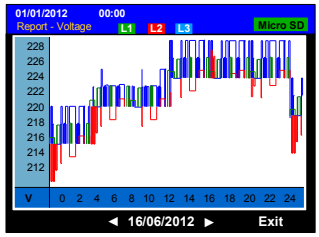
It is used to observe the voltage values per phase saved in the memory of the device (micro SD 4 GB) chronologically in graphical form. The 3 colours in the screen symbolize 3 phases separately thus;

- whether very high or very low voltage values are achieved in various times of the day (in particular in there are devices that frequently get broken, network voltage is monitored)
- Hours of elongated electricity cut-off may easily be monitored and it constitutes the ground for the required measurements.

NOTE : Date may be changed with keys ◄ and ►





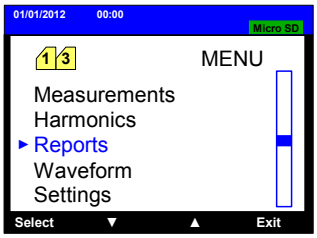


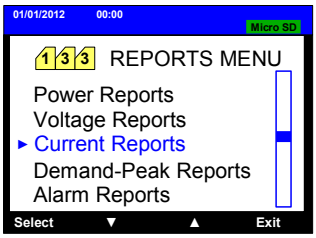
1 3 3 Current Reports

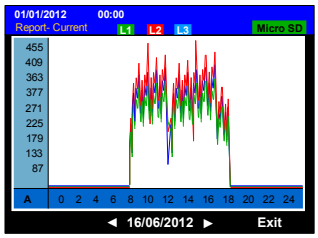
It is used to observe the current values saved in the memory of the device (micro SD 4 GB) chronologically in graphical form. Thus:

- Maximum load currents of the distribution transformers
- Maximum current value determination for all operations may be possible (it may be used to determine whether the existing power switch and fuse values are suitable or not)

NOTE : Date may be changed with keys ◄ and ►



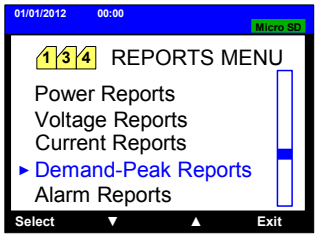


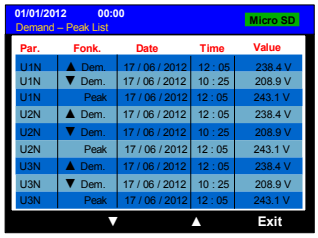


1 3 4 Demand - Peak Reports

This is the menu where maximum demand, minimum demand and peak values of the below given electrical magnitudes may be accessed. It is used to monitor latest formation date, time and value of those parameters saved in the memory of the device as a list.

For deletion of demand and peaks and determination of demand time may be done from the demand operations section of the SETTINGS menu. Other parameter pages may be accessed with ▲ and ▼ keys.





▲ Dem. : maximum demand
▼ Dem. : minimum demand
Peak : peak value

Demand Values, Calculated Parameters and Meanings

U1N: Phase – neutral voltage of L1 phase
U2N: Phase – neutral voltage of L2 phase
U3N: Phase – neutral voltage of L3 phase
U12: Voltage between L1-L2
U13: Voltage between L1-L3
U23: Voltage between L2-L3
I1 : Current of L1 phase
I2 : Current of L2 phase
I3 : Current of L3 phase
P1+ : Import active power for L1 phase
P2+ : Import active power for L2 phase
P3+ : Import active power for L3 phase
P1- : Export active power for L1 phase
P2- : Export active power for L2 phase
P3- : Export active power for L3 phase

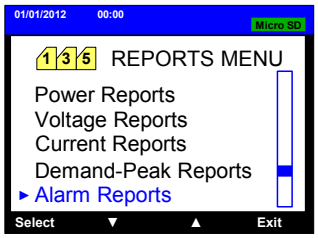
Q1+: Ind. Reactive power of L1 phase
Q2+: Ind. Reactive power of L2 phase
Q3+: Ind. Reactive power of L3 phase
Q1- : Cap. Reactive power for L1 phase
Q2- : Cap. Reactive power for L2 phase
Q3- : Cap. Reactive power for L3 phase
S1 : Apparent power for L1 phase
S2 : Apparent power for L2 phase
S3 : Apparent power for L3 phase

U1thd : THD of voltage for L1 phase
U2thd : THD of voltage for L2 phase
U3thd : THD of voltage for L3 phase
I1thd : THD of current for L1 phase
I2thd : THD of current for L2 phase
I3thd : THD of current for L3 phase
IN : Neutral current
ΣP+ : Total import active power
ΣP- : Total export active power
ΣQ+ : Total ind. reactive power
ΣQ- : Total cap. reactive power
ΣQV+ : Total ind. reactive power (vectoral)
ΣQV- : Total cap. reactive power (vectoral)
ΣS : Total apparent power

1 3 5 Alarm Reports

It is used to monitor the alarms saved in the memory of the device (micro SD 4Gb) chronologically. Thus problems in the system may be solved taking the nature, number and values of the alarms into consideration. For the set values of the alarms that may be monitored in this screen, see Relay-Alarm Settings in the SETTINGS menu.

NOTE: Date may be changed with keys ◄ and ► .
▼ İs used to pass to the other alarm page if there are any with the same date.



It is not assigned to any relays (relay is off) in the alarm-relay settings for over Frequency (f). LOG is on therefore it only keeps records (LOG).

Over current is assigned to 2.relay. Over current of L2 is normal anymore **(green).** Relay switches off.
Over current is assigned to 2.relay in alarm –relay settings (relay on) It is above set value and relay 2 switched on **(red)**

Over voltage is assigned to 1.relay. Over current of L3 is normal anymore. **(green)** Relay switches off.

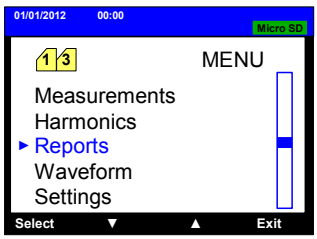
Over voltage is assigned to 2.relay in alarm –relay settings (relay on) It is above set value and relay 2 switched on **(red)**

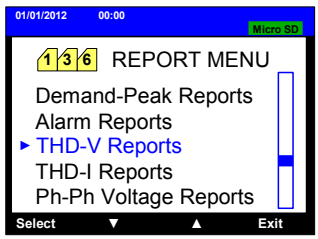
1 3 6 THD-V Reports (Choose a device from table 1 for this characteristic.)

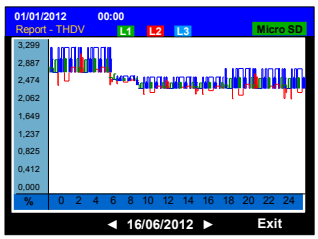
It is used to observe the THD-V values per phase saved in the memory of the device (micro SD 4 GB) chronologically in graphical form. The 3 colours in the screen symbolize 3 phases separately thus;

- The total harmonic voltage distortion (THD-V) can be monitored.

Note: Date may be changed with keys ◄ and ►





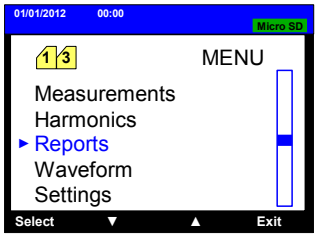


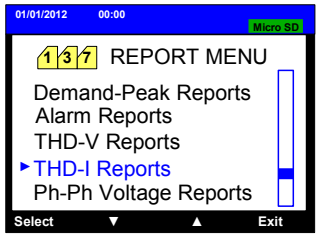
1 3 7 THD-I Reports (Choose a device from table 1 for this characteristic.)

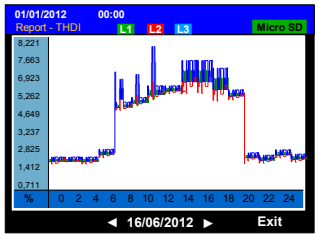
It is used to observe the THD-I values per phase saved in the memory of the device (micro SD 4 GB) chronologically in graphical form. The 3 colours in the screen symbolize 3 phases separately thus;

- The total harmonic current distortion (THD-I) can be monitored.

Note: Date may be changed with keys ◄ and ►





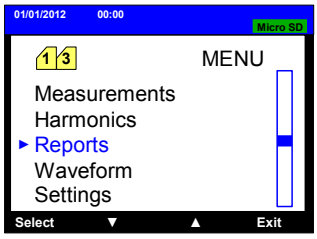


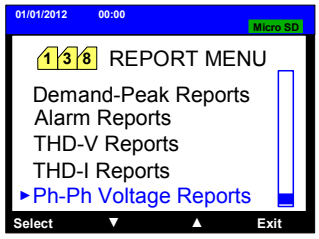
1 3 8 Phase – Phase Voltage Reports (Choose a device from table 1 for this characteristic.)

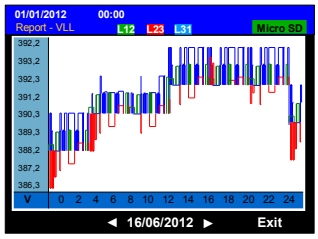
It is used to observe the ph-ph voltage values saved in the memory of the device (micro SD 4 GB) chronologically in graphical form. The 3 colours in the screen symbolize (1-2) ,(2-3) , (3-1) phases separately thus;

- Phase to phase voltages can be monitored.

Note: Date may be changed with keys ◄ and ►

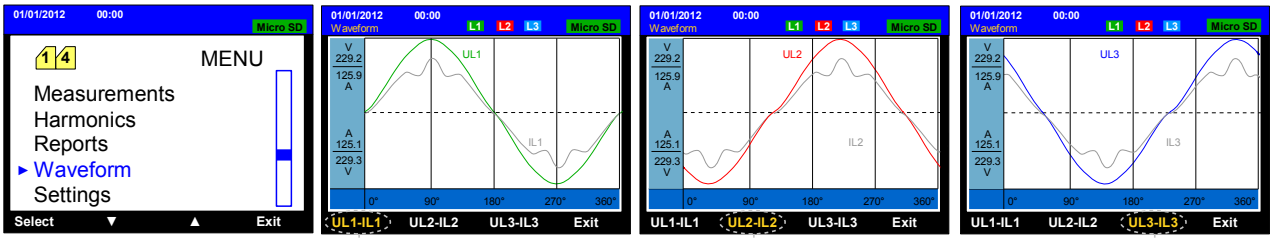






1 4 Waveforms

This is section where the current and voltage forms per each phase are monitored. If UL1 – IL1 key is pressed, it indicates voltage and current wave forms for Phase 1, If UL2 – IL2 key is pressed, it indicates voltage and current wave forms for Phase 2, If UL3 – IL3 key is pressed, it indicates voltage and current wave forms for Phase 3.
The peak current and voltage values are displayed on the left side of the screen.



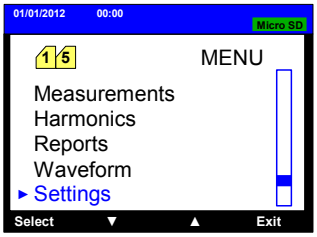
Voltage and current wave forms for phase1

Voltage and current wave forms for phase2

Voltage and current wave forms for phase3

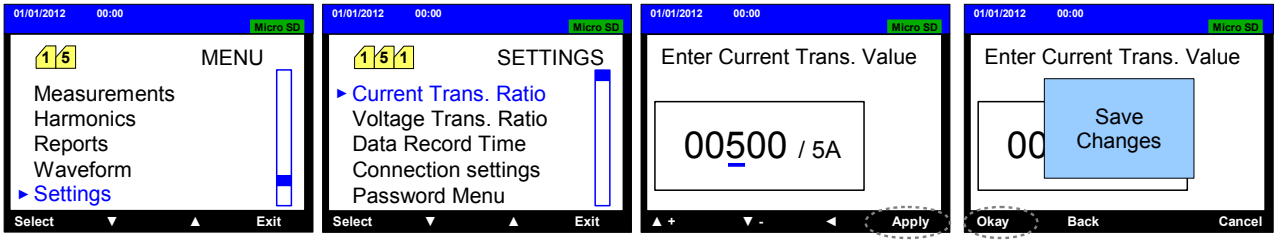
1 5 SETTINGS

This is the section where settings on the device are made. It is entered with a password. Current transformer ratio, voltage transformer ratio, data saving times, password operations, date-time, RTU settings, demand operations, pulse settings, entry input settings, relay alarm settings may be carried out respectively. Moreover, micro SD card information may be accessed within SETTINGS menu.



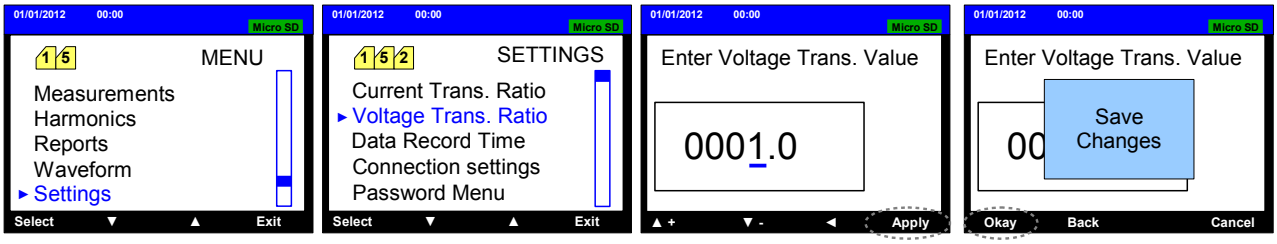
1 5 1 Current Transformer Ratio (entry of primary value)

This is the section where the primary values of current transformers used in electric network or facilities are entered. The value may be set to desired value by using up and down keys starting from the grid where the blue bottom line exists. Subsequently, left key is pressed and blue bottom line passes to the next grid. Similarly, all the values are entered by pressing up or down keys. Apply key is pressed to save the current transformer primary value. Save changes message will appear on the screen. When OK is pressed, the value is saved.



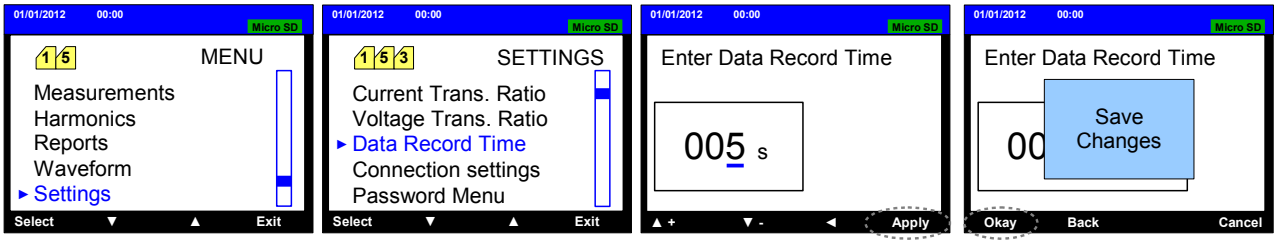
1 5 2 Voltage Transformer Ratio

This is the section where the ratio of voltage transformers used in electric network or facilities are entered. The value may be set to desired value by using up and down keys starting from the grid where the blue bottom line exists. Subsequently, left key is pressed and blue bottom line passes to the next grid. Similarly, all the values are entered by pressing up or down keys. Apply key is pressed to save the current transformer primary value. Save changes message will appear on the screen. When OK is pressed, the value is saved.



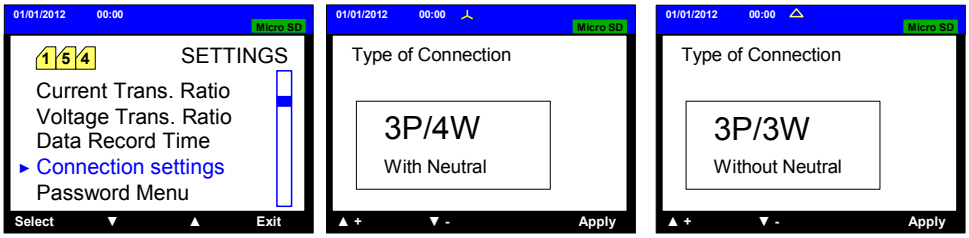
1.5.3 Data Record Time

Savings are made in every five seconds with micro SD cards. Since the memory used is 4GB, the memory will become full in 3 months. To extend such period, the capacity of the memory card may be increased to 32GB and also saving time may be extended from the menu as well. It may set to 5-100 seconds.



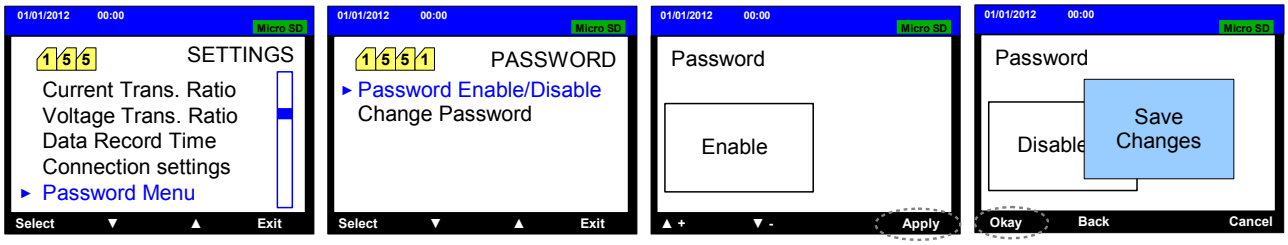
1.5.4 Connection Settings ⅄ or △

The device may be connected as 3 Phase and 3 Phase 4 wires (3P&4W) with neutral or 3Phase without neutral and 3 Phase 3 Wires (3P&3W). Both connection types are suitable for ARON connection. Connections without neutral also display phase-neutral voltages correctly thanks to specially designed software.



1.5.5 Password Settings

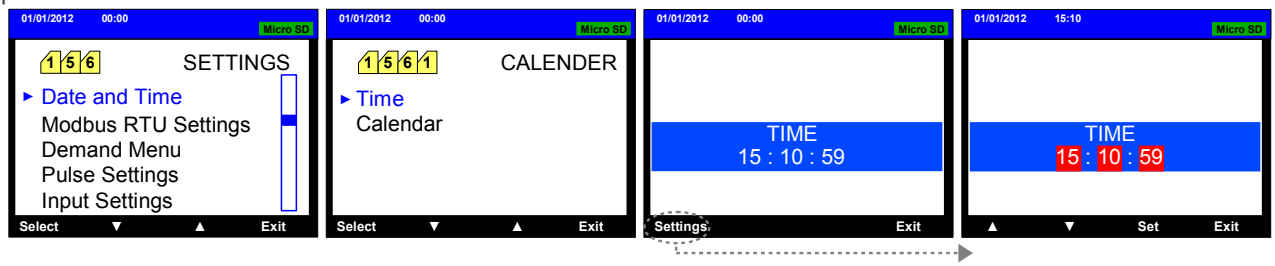
This is the section used to change password or to activate or deactivate password use.
Factory set value for the password is: **0000**



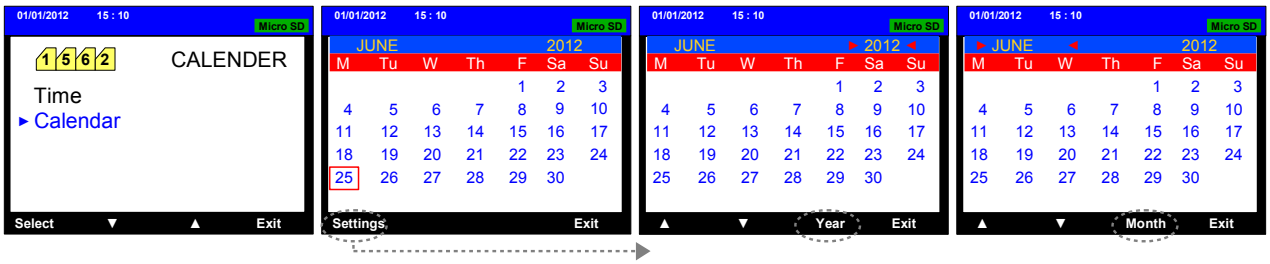
First of all the former password shall be entered correctly. The numeral value of the digit where the blue bottom line exists is entered by using up key. The next digit is switched with the right key. Similarly when values of all digits are entered press OK key. If the former password is entered correctly a new section for the user to change the password appears. Similarly the new password is entered twice. If both passwords match, password saved message appears on the screen. When OK is pressed, new password is saved.

1 5 6 Date-Hour

Correctness of the measurements and reportings saved is only possible by correct entry of the real hour and date data in the device. When the device is out of power the real time works correctly for 7 days. Make sure to check the correctness of the hour-date data of the device which was out of power for an extended period of time.

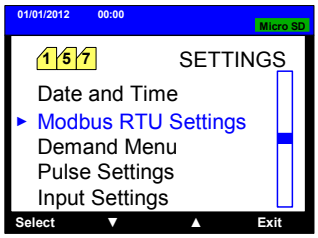


Press SETTINGS to enter hour. First, set the hour value by pressing ▲ and ▼ keys and press set key. Thus minutes section will appear. Do the same and press set key.



Choose SETTINGS to set the date. First set the year value by pressing ▲ and ▼ keys and press set year key. Thus month section appears. Similarly set the current month and press set month key. Finally, day section of the device appears. Here choose the day and press set day key and exit settings menu. New date and hour information set appear on the top line of the screen.

1 5 7 Modbus RTU Settings



MODBUS – RTU PROTOCOL

ADDRESS 8 BITS	FUNCTION 8 BITS	DATA 8 BITS	CRCL 8 BITS	CRCH 8 BIT	T 3,5 characters waiting period

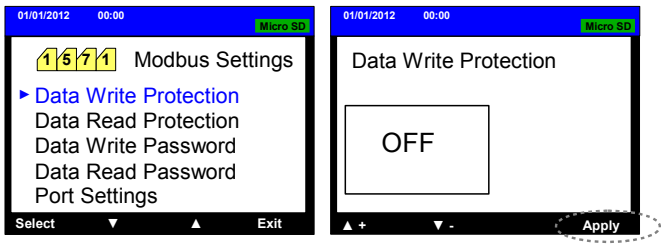
Max. length of this package is 255 bytes.

MODBUS – RTU Functions

03H	register reading
06H	single registry writing
10H	multiple registry writing

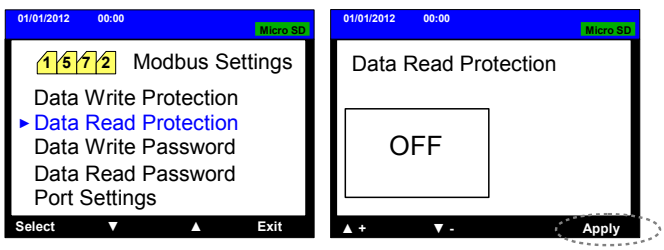
1 5 7 1 Data Write Protection

This is the section used for giving permission of writing to device parameters for connection through MODBUS RTU externally. The status desired for function is selected by using up or down keys. Apply is chosen to save this parameter to the memory. Save changes message will appear on the screen. When OK key is pressed, the value is saved in the memory.

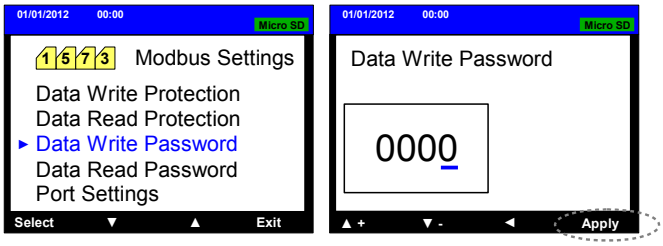


1 5 7 2 Data Read Protection

This is the section used for giving permission of reading to device parameters and data for connection through MODBUS RTU externally. The status desired for function is selected by using up or down keys. Apply is chosen to save this parameter to the memory. Save changes message will appear on the screen. When OK key is pressed, the value is saved in the memory.



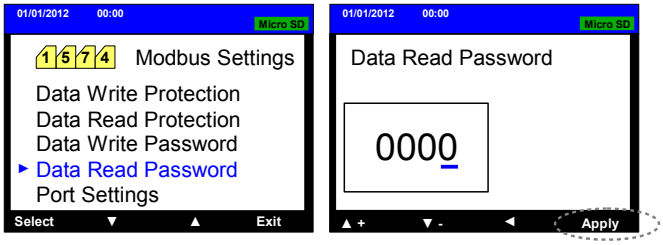
1573 Data Write Password



Password is required for writing data. This is the section where password is entered. The value is set to the desired level starting from the grid where the blue bottom line exists by using the up or down keys. Afterwards, left key is pressed and switched to the next grid on the left. Similarly all values are set by using the up or down keys. Apply key is pressed to save in the memory. Save changes message will appear on the screen. When OK key is pressed, the value is saved in the memory.

NOTE: Setting different passwords for data write and read will improve safety.

1574 Data Read Password



Password is required for reading data. This is the section where password is entered. The value is set to the desired level starting from the grid where the blue bottom line exists by using the up or down keys. Afterwards, left key is pressed and switched to the next grid on the left. Similarly all values are set by using the up or down keys. Apply key is pressed to save in the memory. Save changes message will appear on the screen. When OK key is pressed, the value is saved in the memory.

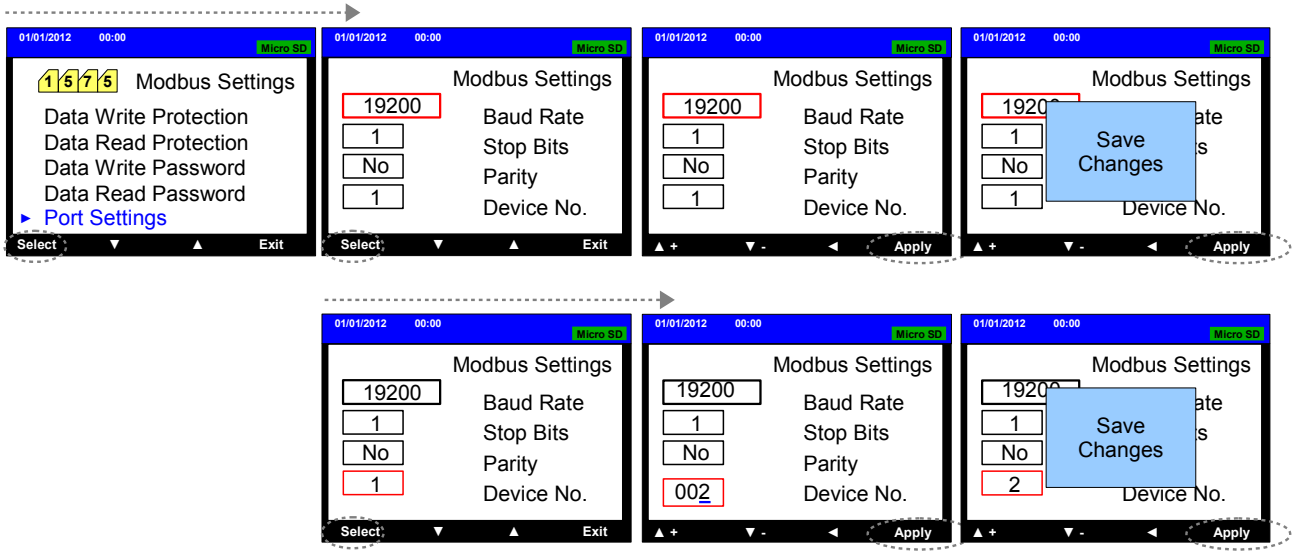
NOTE: Setting different passwords for data write and read will improve safety.

1575 Port Settings

This is the section where Modbus port settings are entered.
Baud rate: 2400,4800,9600,19200,28800,38400,57600 or 115200 may be set.
Stop Bits : (0.5) , (1) , (1.5) or (2) may be set.

Parity : no , even , odd
Up or down keys may be used to enter the above parameters. Apply key is chosen to save in the memory. Save changes message will appear on the screen. When OK is pressed, the value is saved in the memory.

Device No : 001 255
The value is set to the desired value starting from the digit where the blue bottom line appears by using the up or down keys. Then, left key is pressed and the blue bottom line passes to the next digit Apply key is chosen to save in the memory. Save changes message will appear on the screen. When OK is pressed, the value is saved in the memory.

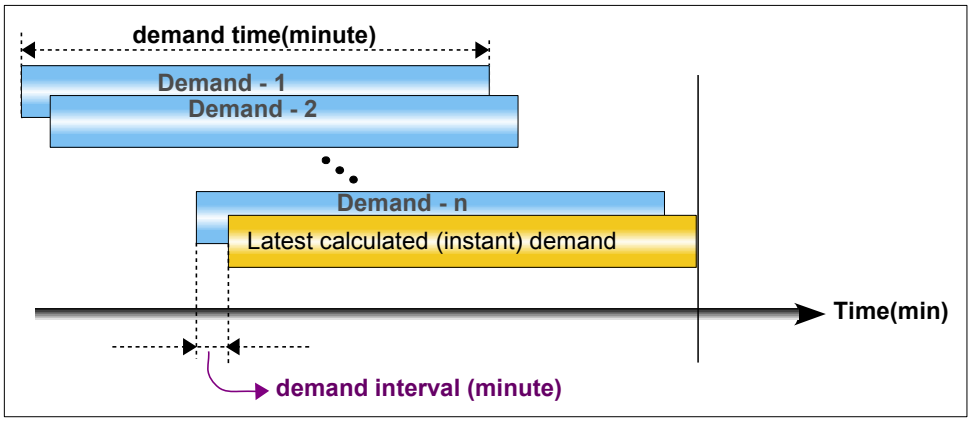


1 5 8 Demand Settings

This is the section where demand calculation time is entered and / or precalculated demand values are deleted.

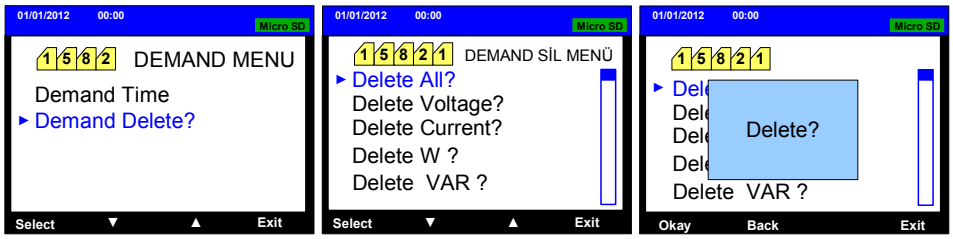
1 5 8 1 Demand Time

While demand values are calculated, two parameters are required. Those are displayed in the below chart
Demand Time : A value between the demand range and 60 min. If a value is desired to be entered choose key is pressed. The value of the digit with blue cursor inside the red frame is changed by using **(▲ +)** and **(▼ -)** keys. The next digit may be selected with **(◄)** key. Similarly the value of this digit is changed. Finally apply key is pressed. Thus the demand time is saved in the memory.
Demand interval : A value between 1 min and demand time may be selected. If a value is desired to be entered choose key is pressed. The value of the digit with blue cursor inside the red frame is changed by using **(▲ +)** and **(▼ -)** keys. The next digit may be selected with **(◄)** key. Similarly the value of this digit is changed. Finally apply key is pressed. When OK key is pressed demand range is saved in the memory and you exit from this menu.
Ex: demand time: 15 min and demand interval: 3 min
Demand value for the last 15 min is calculated in every 3 mins. This method enables precise calculation of demand value and quick updating.



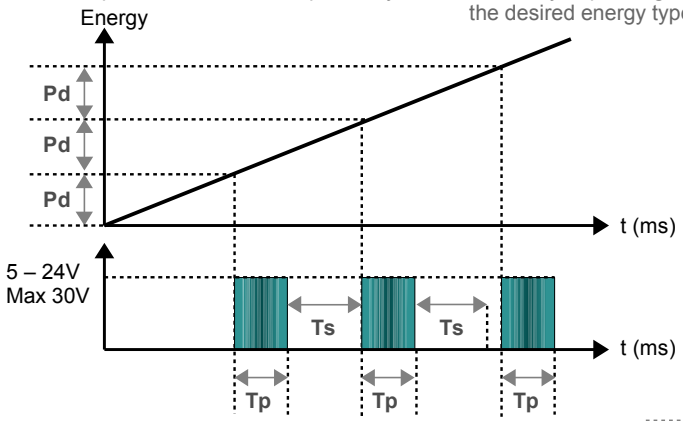
1 5 8 2 Deleting Demands

This is the section where the max and min demand values can be deleted individually and collectively.
Values which may be deleted individually:
Voltages, currents, active power, reactive power, apparent power, THD-V, THD-I



1 5 9 Pulse Settings (Choose a device from table 1 for this characteristic.)

The device has two digital pulse outputs. Menu and functions for both outputs are different. Outputs may be set differently depending on the desired energy type.



If Active Energy Output is selected:

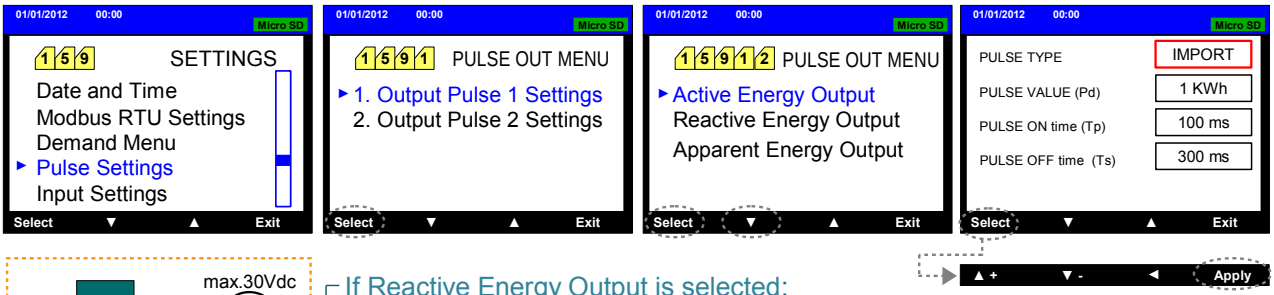
Pulse Type: may be selected as import-export-OFF

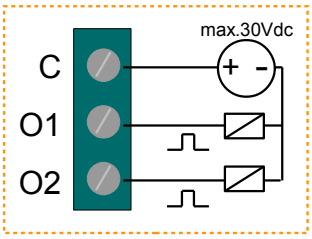
Pd : energy quantity equal to 1 pulse.
May be selected among
0,1kWh – 1kWh – 10kWh – 100kWh –
1MWh – 10MWh – 100MWh - 1GWh

Tp : Pulse on time
may be set between 50ms – 900 ms

Ts : Pulse off time
may be set between 50ms – 900 ms

When each energy amount set (Pd) is generated, a pulse equal to the pulse time (Tp) from the relevant output is produced and this waits for a period of (Ts). Min Pulse period may be 100 ms.





If Reactive Energy Output is selected:

Pulse Type: may be selected as import(ind)-import(cap)-export(ind)-export(cap)-OFF

Pd : energy quantity equal to 1 pulse. May be selected among 0,1kVARh – 1kVARh – 10kVARh – 100kVARh – 1MVARh – 10MVARh – 100MVARh - 1GVARh

Tp : Pulse on time may be set between 50ms – 900 ms

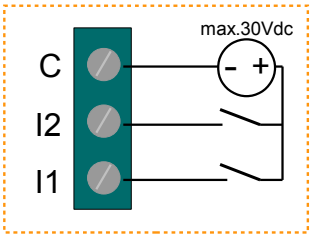
Ts : Min. Pulse off time may be set between 50ms – 900 ms

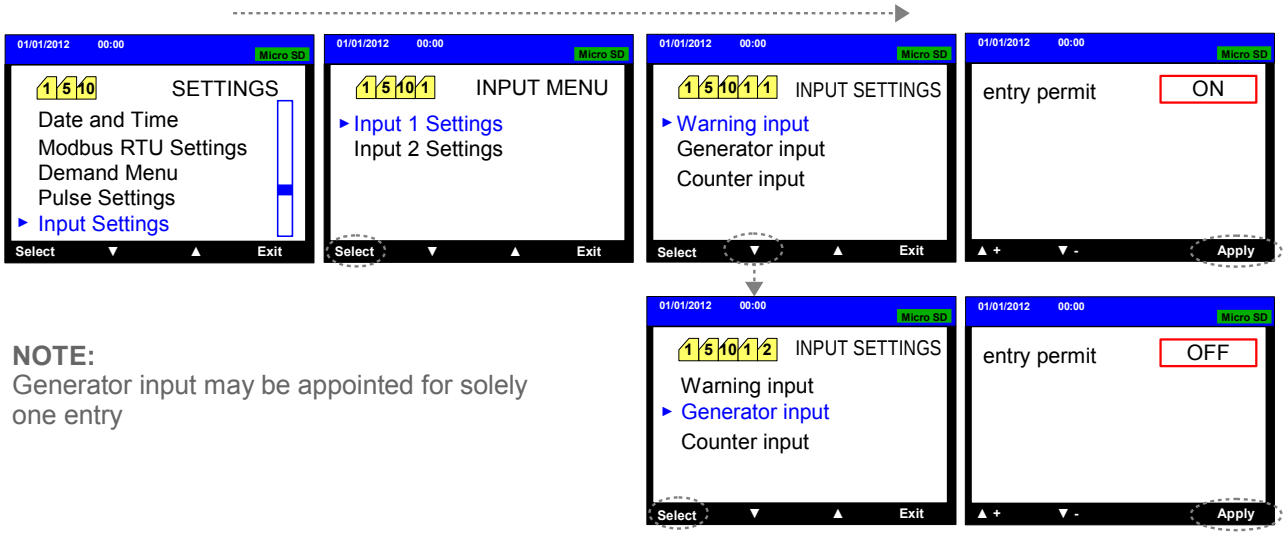
1 5 10 Input Settings (Choose a device from table 1 for this characteristic.)

The device has two digital input with same features.

■ If warning entry is selected, it may be used to determine the digital signals. Ex: It may be monitored from the screen whether the circuit breaker is opened or not from the upper screen as “I1” No and “I1” Yes. Moreover, if generator entry is selected from the parameters, when the generator is activated, (may be monitored from the screen as “G1” inactive and “G1” active) it measures the energies of the generator and collects in a different counter.

Thereby, there is no need to use 2 energy analysers at the business owners having generator.





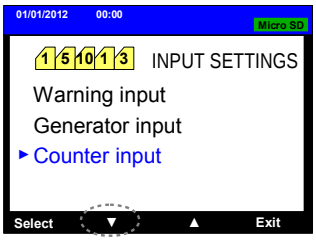
NOTE:
Generator input may be appointed for solely one entry

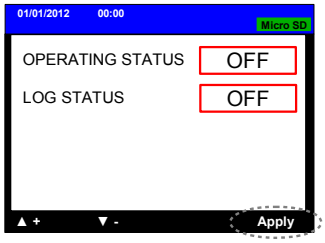
(only available in MULTISER-04-05-52-53-PC-TFT)

If operating status is selected as ON, alarm or generator can not be available.

If log status is selected as OFF, counter values can not be saved in memory.
If one of the operation status is selected as ON, energy tariff starts to work in measurement menu.

Counters are monitored on page of energy tariff



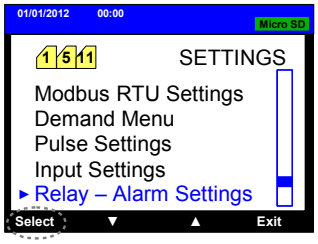


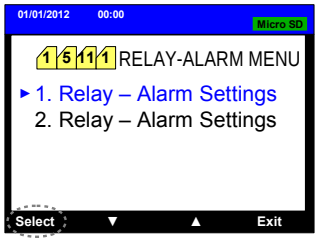
NOT: If energy tariffs are deleted, energies in section 1.1.6 are not effected.

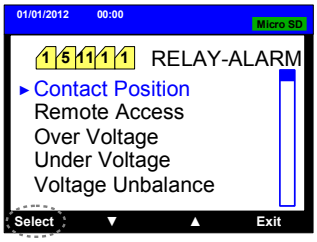
1 5 11 Relay-Alarm Settings (Choose a device from table 1 for this characteristic.)

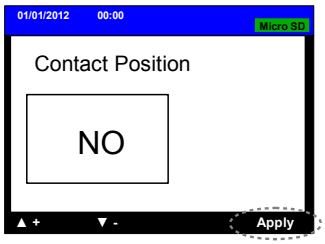
The device has two relay outputs. Since both outputs have the same features, here only one will be described. Multiple alarm parameters may be set. These alarms may not only be saved in the memory as a LOG but may be assigned to a relay.

Contact Position : It may be selected as Normally Open (NO) or Normally Closed(NC)

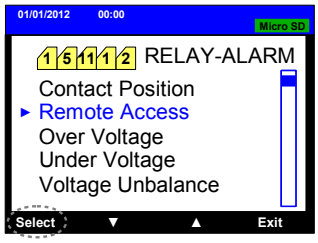


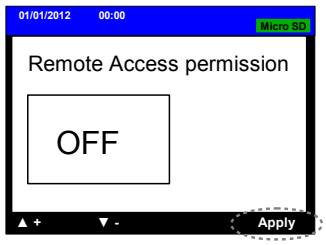






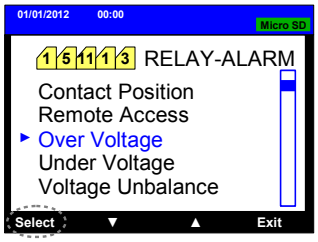
Remote Access Permission : It may be set as Off or Active. If active is selected all the existing parameters concerning the relay will be deactivated. Relay may be activated or deactivated solely by remote access. It is not managed by the device. Factory set value is Off.

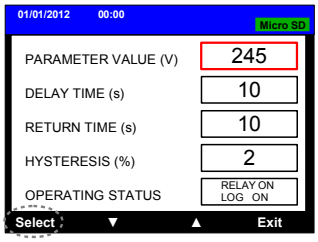


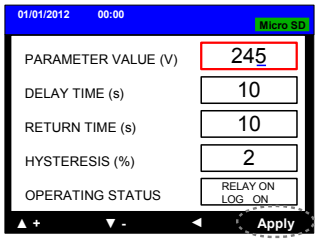


Over Voltage : To enable this alarm or the relay to open, the below menu is used.If voltage of any phases in the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the voltage value measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured voltage falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



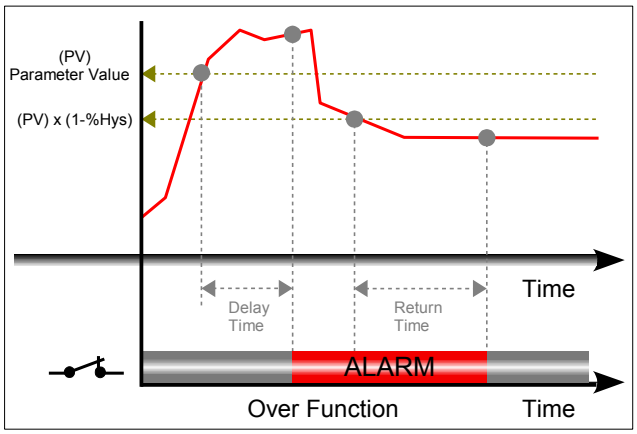




Parameter Value: Opening or alarm set value for over voltage. The value of this parameter changes depending on the voltage transformer ratio. While voltage transformer ratio is 1; it may set between 110 V and 260V. Factory set value is 255V.
Delay Time: This describes the time which starts by one of the measured network voltages exceeding the parameter value and the period during which the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis(%): It is used to determine the voltage value where a failure can be corrected after the formation of opening. For ex: if the parameter value is 245V and hysteresis value is (0,02) 2%, the device disable the alarm below 245V x (1-0,02): 240,1V. It may be set between 1% and 10%. Factory set value is 5 secs.

Return Time: If after the opening, all the network voltages are decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over voltage failure.

It may be set between 1 sec. to 300 sec. Factory set value is 5 sec

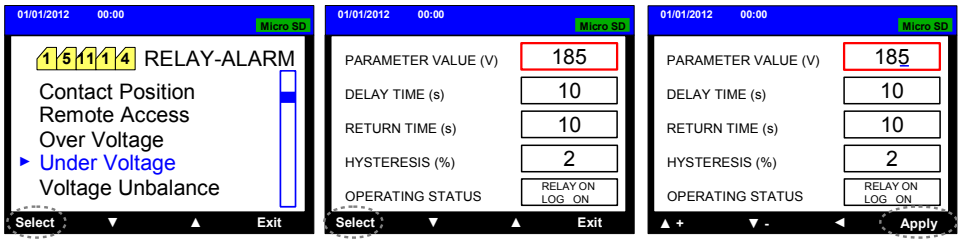


Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

Factory set value is RELAY OFF - LOG OFF

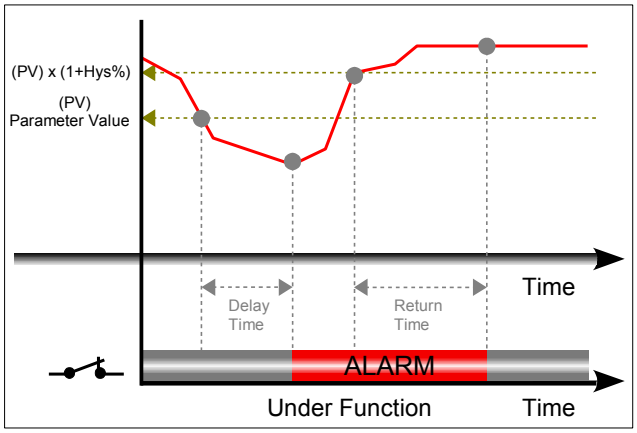
Under Voltage : To enable this alarm or the relay to open, the below menu is used. If voltage of any phases in the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the voltage value measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured voltage raise above the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



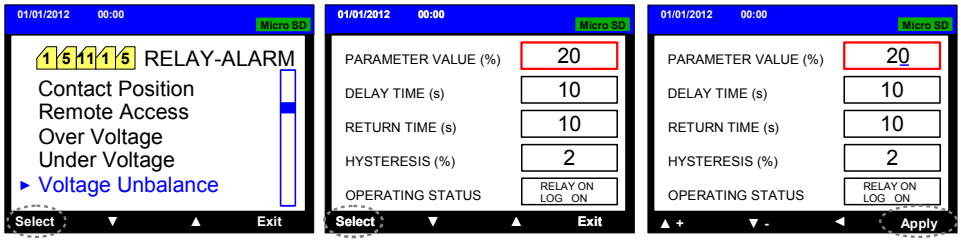
Parameter Value: Opening or alarm set value for under voltage. The value of this parameter changes depending on the voltage transformer ratio. While voltage transformer ratio is 1; it may set between 80V and 210 V. Factory set value is 185V.
Delay Time : This describes the time which starts by one of the measured network voltages exceeding the parameter value and the period during which the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the voltage value where a failure can be corrected after the formation of opening. For ex: if the parameter value is 185V and hysteresis value is (0,02) 2%, the device disable the alarm below 185V x (1+0,02): 188,7V. It may be set between 1% and 10%. Factory set value is 2%.
Return Time: If after the opening, all the network voltages are increased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over voltage failure. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec

Factory set value is RELAY OFF - LOG OFF



Voltage Unbalance (Asymmetry) : To enable this alarm or the relay to open, the below menu is used. Voltage unbalance may be set to (1%-50%)
If voltage unbalance exceeds the set parameter value, the output relay contact is switched off at the end of delay time. The asymmetry value shall fall below % hysteresis value for the alarm to be disabled.
In this case, relevant the output relay contact is switched on at the end of return time. If voltage unbalance falls below the set value in a shorter time than the delay time, alarm will be disabled and output relay contact is not switched off.

Contact Position :
as Normally Closed(NC)



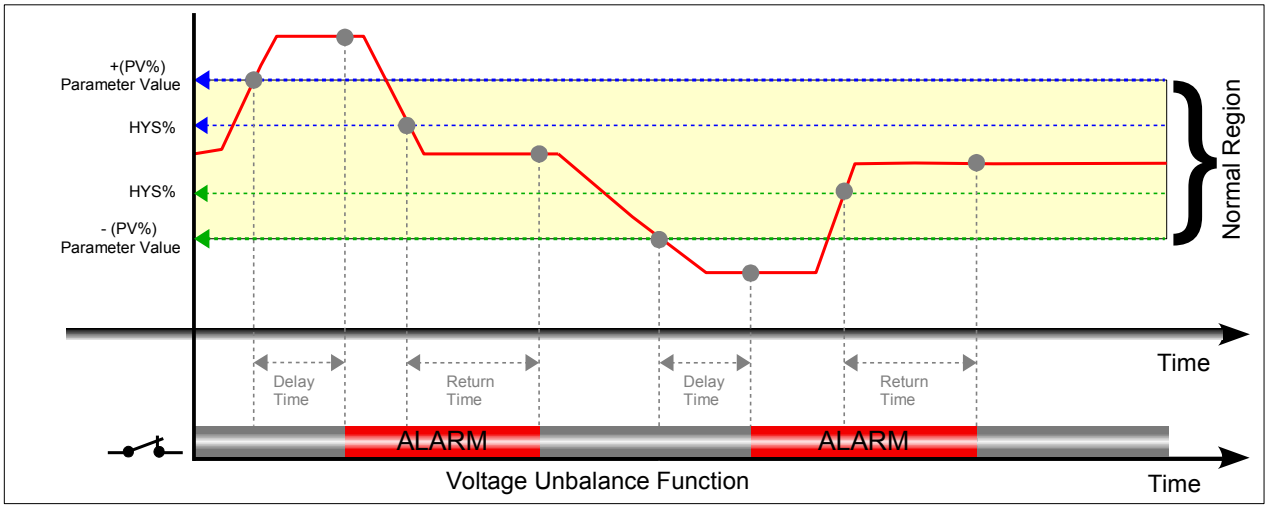
Parameter Value: Opening or alarm set % value for voltage unbalance. It may be set between 1% and 50%. Factory set value is: 10%

Delay Time: This describes the time which starts with the voltage unbalance exceeding the parameter value and at which the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Hysteresis(%): It is used to determine the % unbalance value where a failure can be corrected after the formation of opening. It may be set between 1% and 30%. Factory set value is 2%.

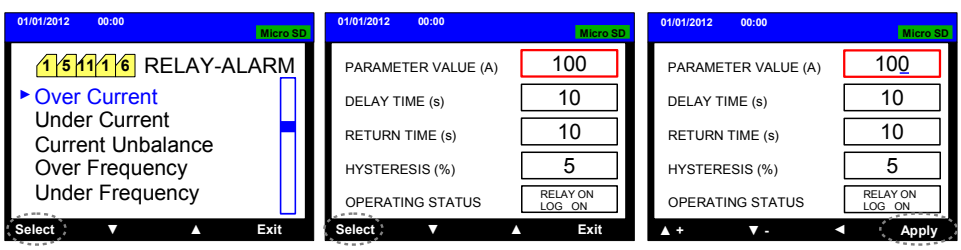
Return Time: The voltage unbalance alarm will be disabled if the measured % unbalance increases as much as the hysteresis value after the opening and remains at this position as long as the return time. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Operating Permission:
Factory set value is RELAY OFF - LOG OFF



Over Current : To enable this alarm or the relay to open,the below menu is used. If current of any phases in the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the current value measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured current falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

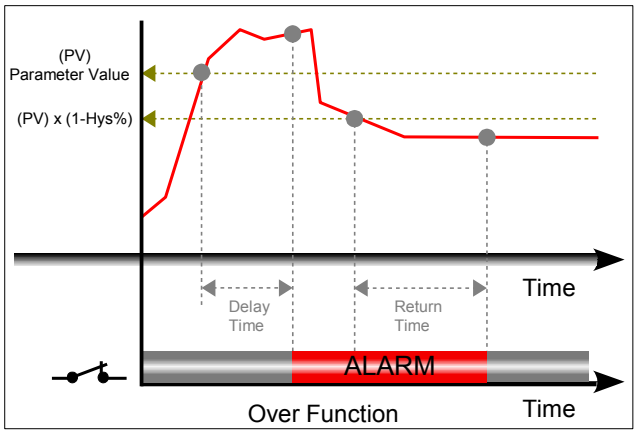
Contact Position :
as Normally Closed(NC)



Parameter Value: Opening or alarm set value for over current. The value of this parameter changes depending on the current transformer primary value. While the current transformer primary value is 5A, it may be set between 0,1 and 5,0A. Factory set value is 5,0A.
Delay Time: This describes the time which starts by one of the measured network currents exceeding the parameter value and the period during which the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis(%): It is used to determine the current value where a failure can be corrected after the formation of opening. For ex: if the parameter value is 100A and hysteresis value is (0,02) 2%, the device disable the alarm below 100A x (1-0,02): 98,0A. It may be set between 1% and 50%. Factory set value is 10%.

Return Time: If after the opening, all the network currents are decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over current failure.

It may be set between 1 sec. to 300 sec. Factory set value is 5 sec

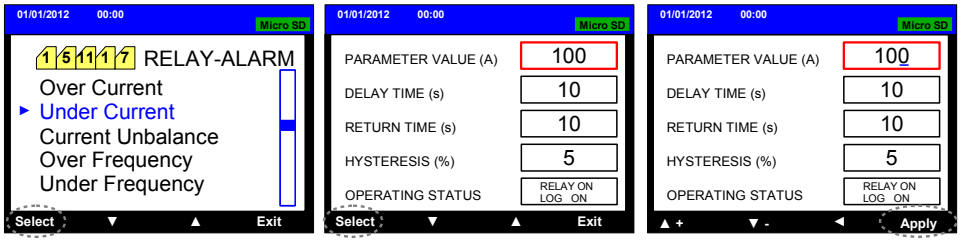


Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

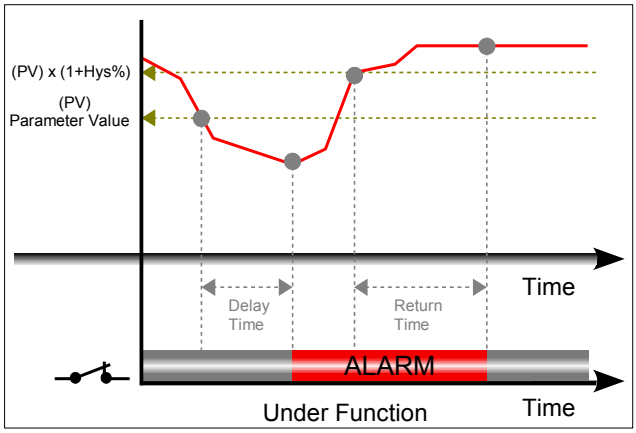
Factory set value is RELAY OFF - LOG OFF

Under Current : To enable this alarm or the relay to open, the below menu is used. If current of any phases in the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the current value measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured current raise above the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)

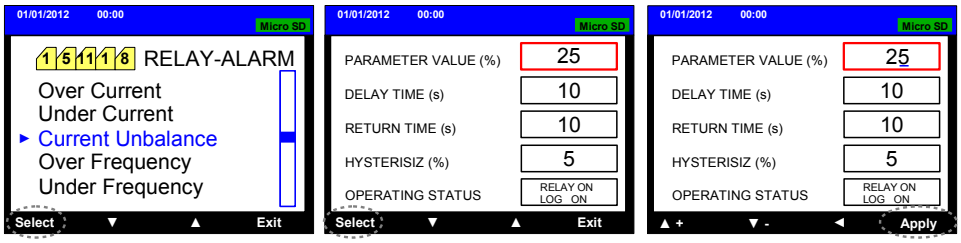


Parameter Value: Opening or alarm set value for under current. The value of this parameter changes depending on the current transformer primary value. While the current transformer primary value is 5A, it may be set between 0,1 and 5,0A. Factory set value is 1,0A.
Delay Time : This describes the time which starts by one of the measured network current exceeding the parameter value and the period during which the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the current value where a failure can be corrected after the formation of opening. For ex: if the parameter value is 100A and hysteresis value is (0,02) 2%, the device disable the alarm below 100A x (1+0,02): 102,0A.
It may be set between 1% and 50%.
Factory set value is 5%.
Return Time: If after the opening, all the network current are increased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over current failure.
It may be set between 1 sec. to 300 sec. Factory set value is 5 sec
Operating Permission:
Factory set value is RELAY OFF - LOG OFF



Current Unbalance (Asymmetry) : To enable this alarm or the relay to open, the below menu is used. Current unbalance may be set to (1%-50%). If current unbalance exceeds the set parameter value, the output relay contact is switched off at the end of delay time. The asymmetry value shall fall below % hys value for the alarm to be disabled. In this case, relevant the output relay contact is switched on at the end of return time. If current unbalance falls below the set value in a shorter time than the delay time, alarm will be disabled and output relay contact is not switched off.

Contact Position :
as Normally Closed(NC)



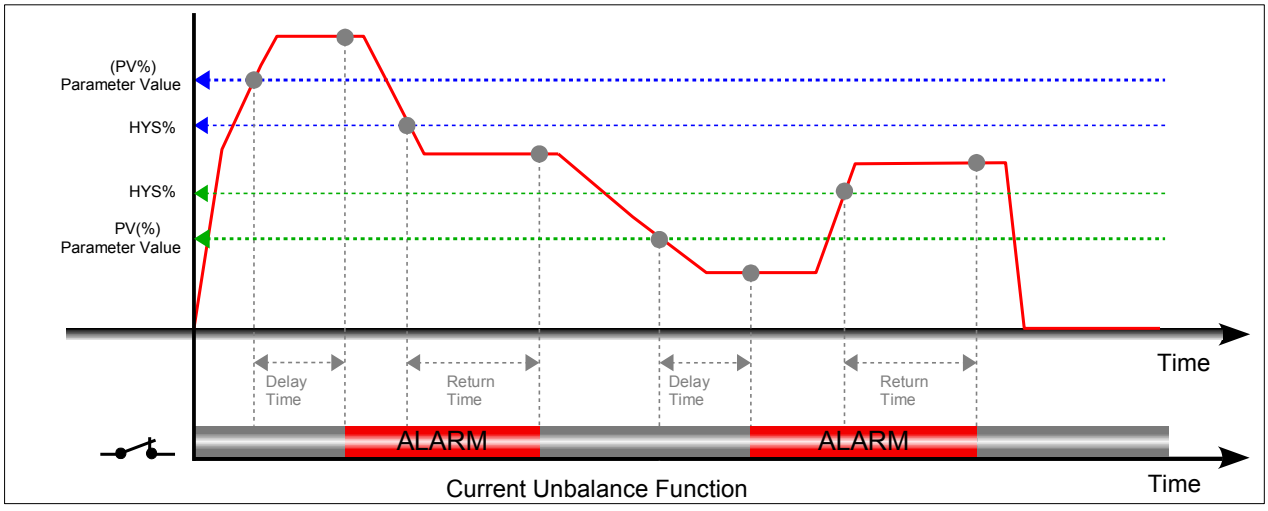
Parameter Value (%) : Opening or alarm set % value for current unbalance. It may be set between 1% and 50%. Factory set value is: 50%

Delay Time: This describes the time which starts with the current unbalance exceeding the parameter value and at which the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Hysteresis(%): It is used to determine the % unbalance value where a failure can be corrected after the formation of opening. It may be set between 1% and 30%. Factory set value is 2%.

Return Time: The current unbalance alarm will be disabled if the measured % unbalance increases as much as the hysteresis value after the opening and remains at this position as long as the return time. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

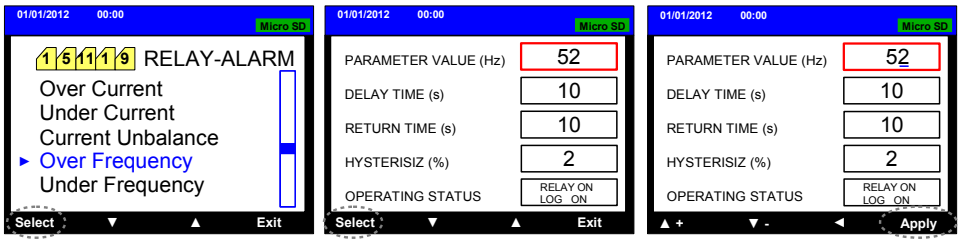
Operating Permission:
Factory set value is RELAY OFF - LOG OFF



Current Unbalance Function

Over Frequency : To enable this alarm or the relay to open, If the system frequency exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the frequency value measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured frequency falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

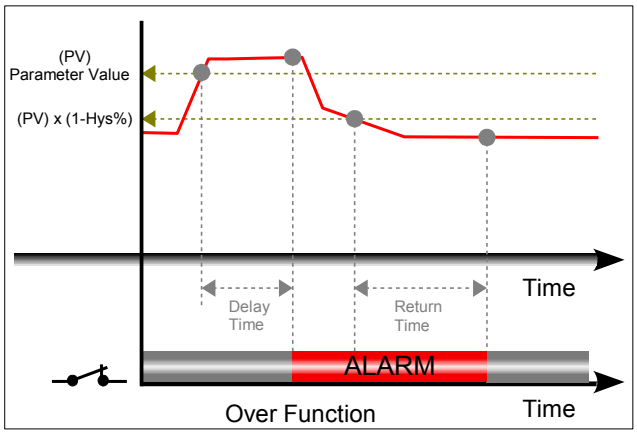
Contact Position :
as Normally Closed(NC)



Parameter Value: Opening or alarm set value for over frequency.It may be set between 50 and 75 Hz. Factory set value is 53 Hz.
Delay Time: It describes the period which starts with at least one of the measured network frequency exceed the parameter value and where the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis(%): It is used to determine the frequency value where a failure can be corrected after the formation of opening. For ex: if the parameter value is 52Hz and hysteresis value is (0,02) 2%, the device disable the alarm below 52Hz x (1-0,02): 50,1 Hz. It may be set between 1% and 20%.
Factory set value is %2.

Return Time: If after the opening, measured network frequency is decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over frequency failure.

It may be set between 1 sec. to 300 sec. Factory set value is 5 sec

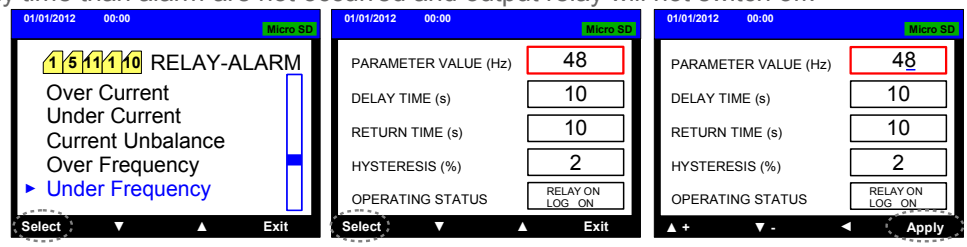


Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

Factory set value is RELAY OFF - LOG OFF

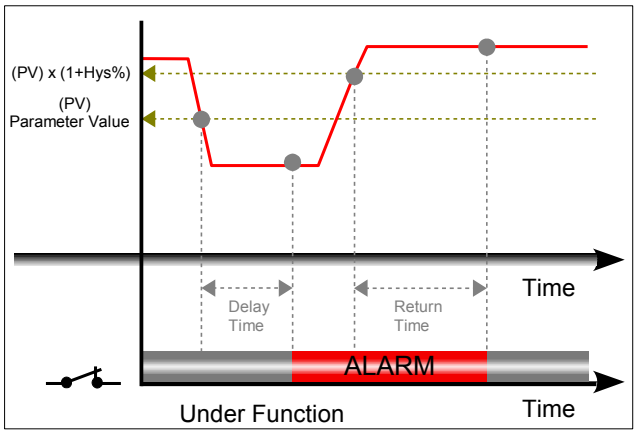
Under Frequency : To enable this alarm or the relay to open, the below menu is used. If system frequency exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the frequency value measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured frequency raise above the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



Parameter Value: Opening or alarm set value for under frequency. It may be set between 40 to 60Hz. Factory set value is 48Hz.
Delay Time : It describes the period which starts with at least one of the measured network frequency exceed the parameter value and where the failure will be accepted. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the frequency value where a failure can be corrected after the formation of opening. For ex: if the parameter value is 48Hz and hysteresis value is (0,02) %2, the device disable the alarm below 48Hz x (1+0,02): 48,9Hz.
It may be set between %1 and %20.
Factory set value is %2.

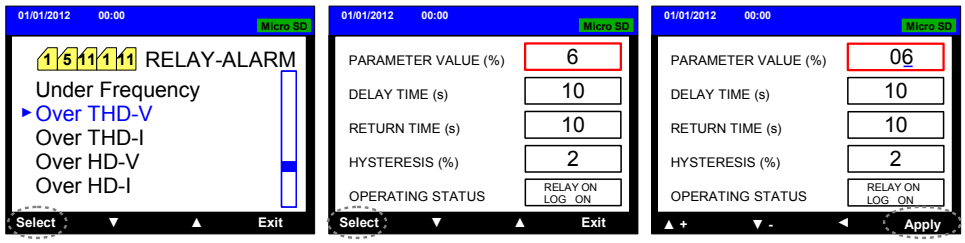
Return Time: If after the opening, measured frequency is increased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over frequency failure.
It may be set between 1 sec. to 300 sec. Factory set value is 5 sec



Operating Permission:
Factory set value is RELAY OFF - LOG OFF

Over THD-V : The following menu is used to enable this alarm or to open the relay. If the % total harmonic distortion of the voltages of the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the THD-V measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured THD-V falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



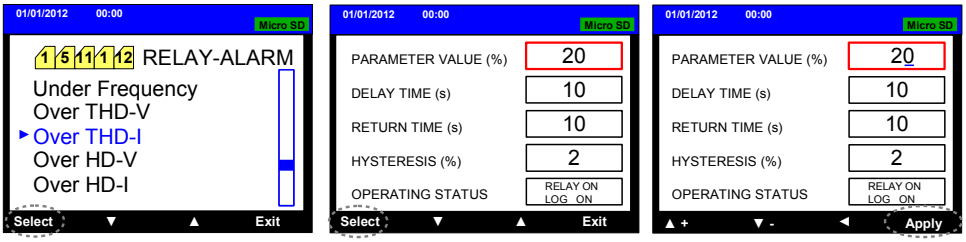
Parameter Value : Opening or alarm set value for over THD-V. It may be set between 1% and 99%. Factory set value is %6.
Delay Time: It describes the period which starts with measured THD-V to exceed the parameter value. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the THD-V where a failure can be corrected after the formation of opening. It may be set between %1 and %20. Factory set value is %2.
Return Time: If after the opening, measured THD-V is decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over THD-V failure.
It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

Factory set value is RELAY OFF - LOG OFF

Over THD-I : The following menu is used to enable this alarm or to open the relay. If the % total harmonic distortion of the current of the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the THD-I measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured THD-I falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



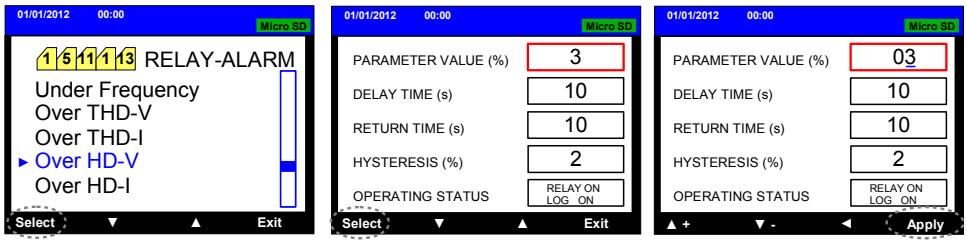
Parameter Value : Opening or alarm set value for over THD-I. It may be set between 1% and 99%. Factory set value is %6.
Delay Time: It describes the period which starts with measured THD-I to exceed the parameter value. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the THD-I where a failure can be corrected after the formation of opening. It may be set between %1 and %20. Factory set value is %2.
Return Time: If after the opening, measured THD-I is decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over THD-I failure.
It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

Factory set value is RELAY OFF - LOG OFF

Over HD-V : The following menu is used to enable this alarm or to open the relay. If one of the % single harmonic distortions of the voltages of the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the HD-V measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured HD-V falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



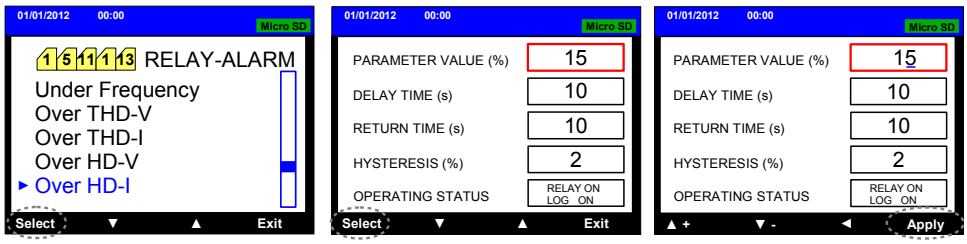
Parameter Value : Opening or alarm set value for over HD-V. It may be set between 1% and 99%. Factory set value is %6.
Delay Time: It describes the period which starts with measured HD-V to exceed the parameter value. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the HD-V where a failure can be corrected after the formation of opening. It may be set between %1 and %20. Factory set value is %2.
Return Time: If after the opening, measured HD-V is decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over HD-V failure. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

Factory set value is RELAY OFF - LOG OFF

Over HD-I : The following menu is used to enable this alarm or to open the relay. If one of the % single harmonic distortions of the current of the system exceeds the set parameter value, the output relay contact is switched off at the end of delay time. For the alarm to be disabled, the HD-I measured shall fall below % hysteresis value. In this case, the output relay is switched on at the end of return time. If measured HD-I falls below the set value in a shorter time than the delay time than alarm are not occurred and output relay will not switch off.

Contact Position :
as Normally Closed(NC)



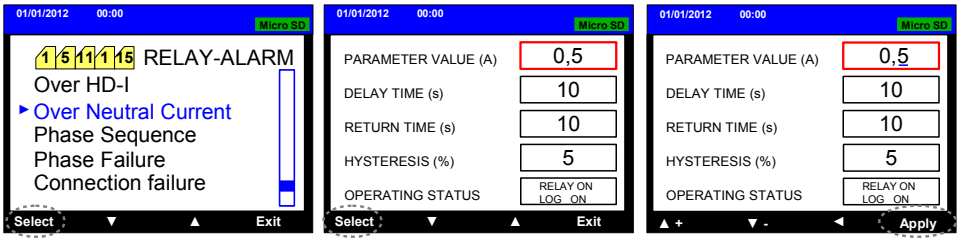
Parameter Value : Opening or alarm set value for over HD-I. It may be set between 1% and 99%. Factory set value is %6.
Delay Time: It describes the period which starts with measured HD-I to exceed the parameter value. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis (%): It is used to determine the HD-I where a failure can be corrected after the formation of opening. It may be set between %1 and %20. Factory set value is %2.
Return Time: If after the opening, measured HD-I is decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over HD-I failure. It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.

Operating Permission: Consists of 4 different options.
RELAY ON - LOG ON : Alarm is both saved in the memory and controls the relay.
RELAY ON - LOG OFF : Alarm only controls the relay. It is not saved in the memory.
RELAY OFF - LOG ON : Alarm is only saved in the memory. It does not control the relay.
RELAY OFF - LOG OFF : The alarm neither is saved in the memory nor controls the relay.

Factory set value is RELAY OFF - LOG OFF

Over Neutral Current : To enable this alarm or the relay to open, the below menu is used.

Contact Position :
as Normally Closed(NC)

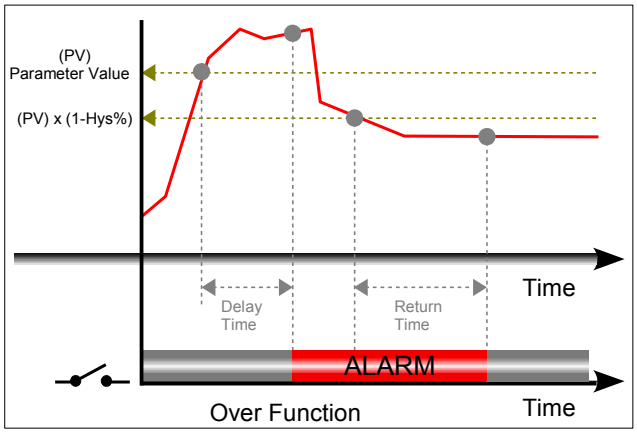


Parameter Value: Opening or alarm set value for over neutral current. The value of this parameter changes depending on the current transformer primary value. While the current transformer primary value is 5A, it may be set between 0,1 and 5,0A. Factory set value is 3,0A.
Delay Time: It may be set between 1 sec. to 300 sec. Factory set value is 5 sec.
Hysteresis(%): It may be set between 1% and 50%. Factory set value is 5%.

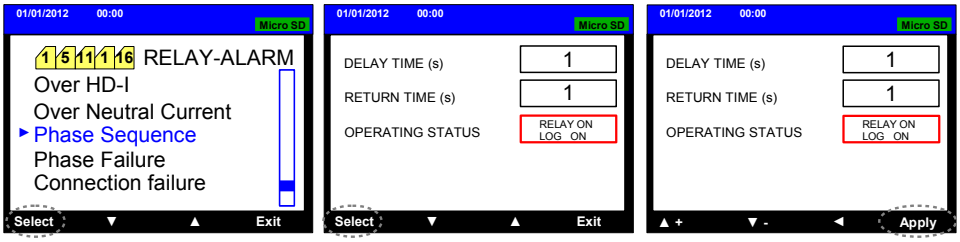
Return Time: If after the opening, neutral current is decreased by a number equal to hysteresis value and stays at this level as long as the return time, device disables over current failure.

It may be set between 1 sec. to 300 sec. Factory set value is 5 sec

Operating Permission:
Factory set value is RELAY OFF - LOG OFF

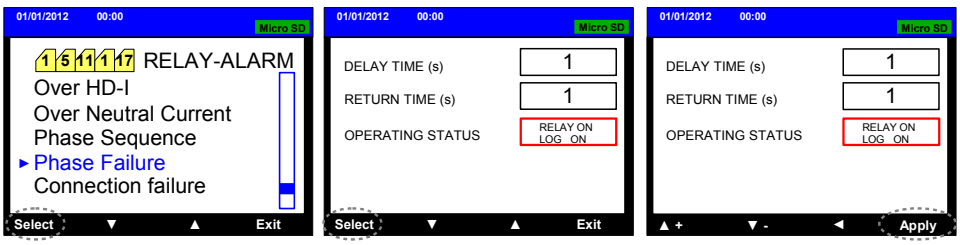


Phase Sequence Failure : To enable this alarm or the relay to open, the below menu is used. If there is a failure of phase sequences in the system, this alarm is enabled.



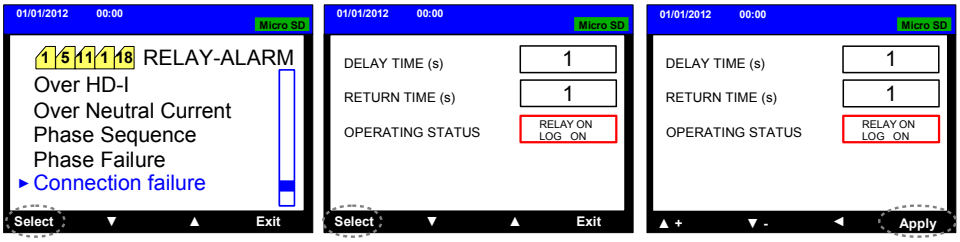
Delay Time: May be set from 0sec to 10 sec. Factory set value is 5 sec.
Return Time of Fault : It may bet set from 0sec to 10 sec. Factory set value is 5sec.
Operating Permission:
Factory set value is RELAY OFF - LOG OFF

Phase Failure : To enable this alarm or the relay to open, the below menu is used. If there is a failure of any phase in the system, this alarm is enabled.



Delay Time: May be set from 0sec to 10 sec. Factory set value is 5 sec.
Return Time of Fault : It may bet set from 0sec to 10 sec. Factory set value is 5sec
Operating Permission:
Factory set value is RELAY OFF - LOG OFF

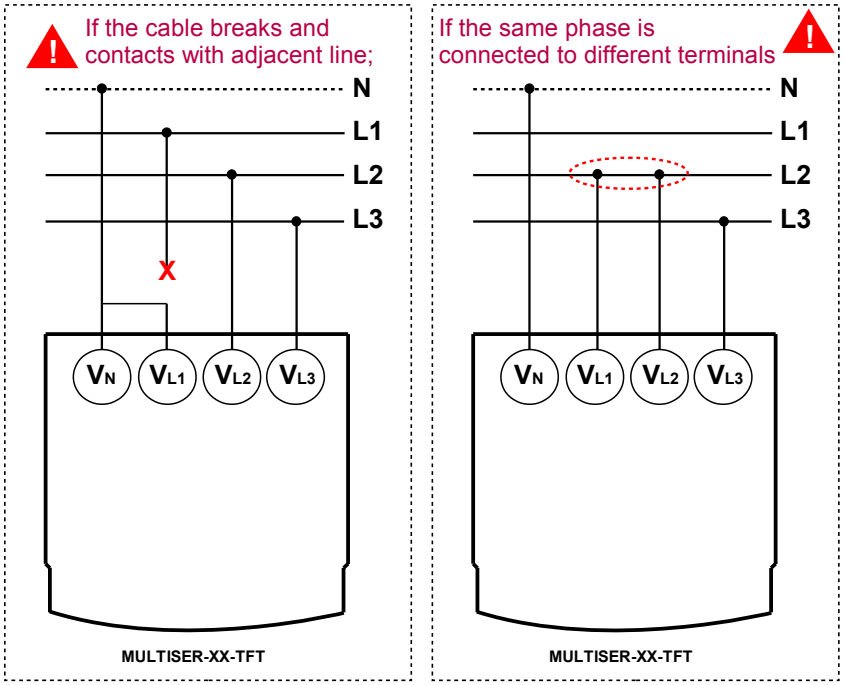
Connection Failure : To enable this alarm or the relay to open, the below menu is used.



Delay Time: May be set from 0sec to 10 sec.
Factory set value is 5 sec.

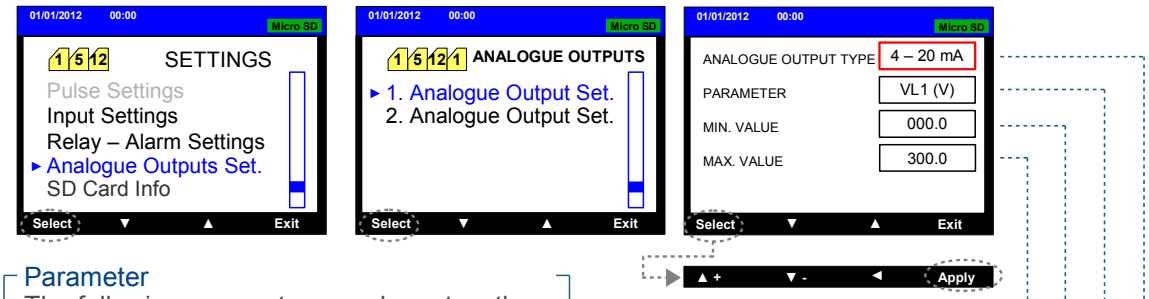
Return Time of Fault :
It may bet set from 0sec to 10 sec.
Factory set value is 5sec.

Operating Permission:
Factory set value is
RELAY OFF - LOG OFF



1 5 12 Analogue Output settings (voltage or current)

The devices (MULTISER-05-52-53-PC-TFT) has two analogue outputs.
They can be configured as voltage or current output.



Parameter

The following parameters can be set as the analogue output.

V_{L1}, V_{L2}, V_{L3} (V)	.... Voltages (phase-neutral)
$V_{L12}, V_{L23}, V_{L31}$ (V)	.... Voltages (phase-phase)
$V_{LN\ (ort)}$ (V)	.... Average Phase-Neutral Voltage
$V_{LL\ (ort)}$ (V)	.... Average Phase-phase Voltage
Fr (Hz)	.... Frequency
I_{L1}, I_{L2}, I_{L3} (A)	.... Phase Currents
THD $V_{L1, L2, L3}$ %	.... Total Harmonic Distortion for voltage
THD $I_{L1, L2, L3}$ %	.... Total Harmonic Distortion for current
± $P_{L1, L2, L3}$ (kW)	.... Active Power (import-export)
± $Q_{L1, L2, L3}$ (kVAR)	.... Reactive Power
$S_{L1, L2, L3}$ (kVA)	.... Apparent Power
total P (kW)	.... Total Active Power
total +Q (kVAR)	.... Total Positive Reactive Power
total -Q (kVAR)	.... Total Negative Reactive Power
total S (kVA)	.... Total Apparent Power

Min. Value

The minimum value of the analogue output of the selected type (here 20mA), which represents the value corresponding to VL1.
4mA --------> 0 V

Max. Value

The maximum value of the analogue output of the selected type (here 20mA), which represents the value corresponding to VL1.
20mA --------> 300 V

Analogue Output Type

4-20mA
0-20mA,
0-10V
2-10V
0-5V
1-5V

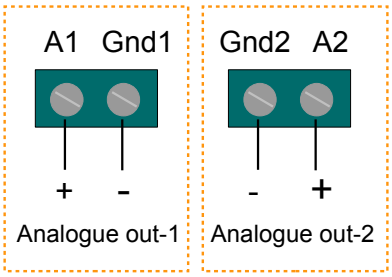
Example:
If the analogue output settings of the device is made up as follows;
VL1 value when measured as 0V, the analogue output will be 4 mA current drain.
VL1 value when measured as 270V, the analogue output will be 20 mA current drain.

ANALOGUE OUTPUT TYPE	4 – 20 mA
PARAMETER	VL1 (V)
MIN. VALUE	000.0
MAX. VALUE	270.0

$$I_{(analogue)} = \frac{\{(\text{Max. Analogue output value}) - (\text{Min. analogue output value})\} \times \{(\text{measured value}) - (\text{Min. value})\}}{\{(\text{Max. Value}) - (\text{Min. Value})\}} + 4$$

Accordingly, while VL1 value is 230V, the analogue output is;

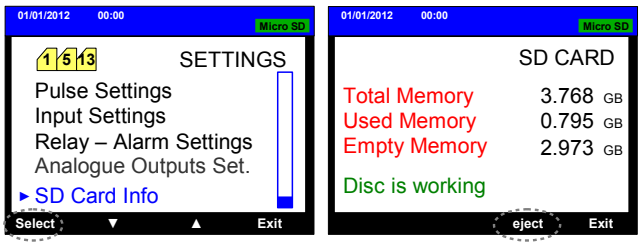
$$I_{(analogue)} = \frac{(20\text{ mA} - 4\text{ mA}) \times (230\text{V} - 0\text{V})}{(270\text{V} - 0\text{V})} + 4 = 17.62\text{ mA}$$



Voltage Output Type : 0-10V, 2-10V, 0-5V, 1-5V
Current Output Type : 0-20mA, 4-20mA
Accuracy : 0.5%
Load Capacity : Current type, max. load resistance: 750 Ohm
: Voltage type, max. load current: 20 mA
Update time : 200ms

1 5 13 SD Card Information

The device supports micro SD card up to 32 GB. Capacity utilization information for 4GB micro SD card given as a bonus with the device is given in this menu. Moreover, do not eject the card from its slot without selecting the eject option from the menu to enable safe ejection.



⚠ When **eject** is pressed, the device will cut off power for the SD card therefore it will not continue saving.

1 6 Factory Settings

When restore to factory settings option is pressed, the device is restored to the settings when it was first supplied. Current, voltage and transformer information are entered respectively. Connection type is determined. Date and time must be checked.

NOTE: the latest password determined by user does not change.

Factory Settings

Current Transformer(Primary) Value	: 5 / 5 A
Voltage Transformer Ratio	: 1
Data Saving Time	: 5 sec.
Password	: if not changed by user (0000) NOTE 1
Password use	: Off (disabled)
Date-Hour	: must be set
Connection Type	: 3P&4W
MODBUS RTU	
Data Write Protection (MODBUS RTU)	: off
Data Read Protection (MODBUS RTU)	: off
Data Write Password (MODBUS RTU)	: 0000 NOTE 2
Data Read Password (MODBUS RTU)	: 0000 NOTE 2
Port Settings (Baud Rate)	: 9600
Port Settings (Stop Bits)	: 1
Port Settings (Parity)	: No
Port Settings (Device No)	: 1
Demand Time	: 15 minutes
Demand Interval	: 1 min
PULSE OUTPUTS	
Pulse Type for 1.Pulse Output	: import ACTIVE Energy
Pulse Value for 1. Pulse Output (Pv)	: 1 KWh
Pulse Duration for 1.Pulse Output(Tp)	: 100 ms
Pulse OFF Time for 1.Pulse output (Ts)	: 200 ms
Pulse Type for 2.Pulse Output	: import (ind) REACTIVE Energy
Pulse Value for 2. Pulse Output (Pv)	: 1 KVARh
Pulse Duration for 2.Pulse Output(Tp)	: 100 ms
Pulse OFF Time for 2.Pulse output (Ts)	: 200 ms
1.Digital Input	: Alarm Input
2.Digital Input	: Alarm Input
1th RELAY OUTPUT	
Contact Position	: N.O Normally Open
Remote Access Permit	: off
Over Voltage	: 255V Relay off – LOG off
Under Voltage	: 185V Relay off – LOG off
Voltage Unbalace	: 10 % Relay off – LOG off
Over Current	: 5A Relay off – LOG off
Under Current	: 1A Relay off – LOG off
Current Unbalance	: 50% Relay off – LOG off
Over Frequency	: 53Hz Relay off – LOG off
Under Frequency	: 48Hz Relay off – LOG off
Over THD-V	: % 6 Relay off – LOG off
Over THD-I	: % 15 Relay off – LOG off
Over HD-V	: % 6 Relay off – LOG off
Over HD-I	: % 15 Relay off – LOG off
Over Neutral Current	: 3A Relay off – LOG off
Phase Sequence Failure	: Relay off – LOG off
Phase Failure	: Relay off – LOG off
Connection Failure	: Relay off – LOG off
2nd RELAY OUTPUT	
Contact Position	: N.O Normally Open
Remote Access Permit	: off
Over Voltage	: 255V Relay off – LOG off
Under Voltage	: 185V Relay off – LOG off
Voltage Unbalace	: 10 % Relay off – LOG off
Over Current	: 5A Relay off – LOG off
Under Current	: 1A Relay off – LOG off
Current Unbalance	: 50% Relay off – LOG off
Over Frequency	: 53Hz Relay off – LOG off
Under Frequency	: 48Hz Relay off – LOG off
Over THD-V	: % 6 Relay off – LOG off
Over THD-I	: % 15 Relay off – LOG off
Over HD-V	: % 6 Relay off – LOG off
Over HD-I	: % 15 Relay off – LOG off
Over Neutral Current	: 3A Relay off – LOG off
Phase Sequence Failure	: Relay off – LOG off
Phase Failure	: Relay off – LOG off
Connection Failure	: Relay off – LOG off
1th Analogue Output	
Analogue Output Type	: 4 – 20mA
Parameter	: total P (kW)
Min. Value	: 000.0 (kW)
Max. Value	: 001.1 (kW)
2nd Analogue Output	
Analogue Output Type	: 4 – 20mA
Parameter	: total Q (kVAR)
Min. Value	: 000.0 (kVAR)
Max. Value	: 001.1 (kVAR)

Note 1 : The password is primarily defined as 0000. However the password will not change even in the event that factory values are restored after having amended the password. The latest password entered by the user is valid.
Note 2 : It is different than user password of the device. However it is entered manually and may not be changed by remote access. 0000 is assigned to MODBUS passwords when factory settings are restored.
Note 3 : When factory settings are restored, powers are set to zero.

Working Time

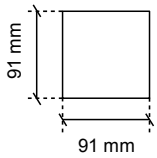
It is the page which indicates the period of time during which the device works with power.
The working time may be set to zero if desired.

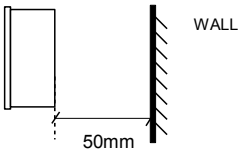
Installation Instructions

1- A space with a dimension of 92mm * 92mm shall be emptied on the panel where the device will be mounted.
2- Before assembly of the device, remove panel fixing apparatuses.
3- Place the device from front into the window opened in the panel as flush.
4- -Fix the device on to the panel by using fixing apparatuses from back part.

Make the assembly in a manner to assure 50 mm space between the device and the wall to enable good ventilation of the device.

PANEL SPACING DIMENSIONS





Formulas

RMS Voltage	$V_{RMS} = \sqrt{\frac{1}{N}\sum_{i=0}^{N} V_i^2}$
RMS Current	$I_{RMS} = \sqrt{\frac{1}{N}\sum_{i=0}^{N} I_i^2}$
Active Power	$P = \frac{1}{N}\sum_{i=0}^{N} P_i$
Reactive Power	$Q = \frac{1}{N}\sum_{i=0}^{N} Q_i$
Apparent Power	$S = \sqrt{P^2 + Q^2}$
Power Factor	$PF = \frac{P}{S}$

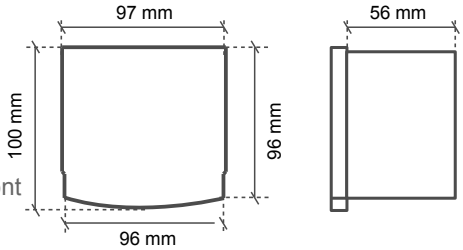
$$V_{THD}\,\% = \frac{\sqrt{\sum_{i=2}^{N} V_i^2}}{V_1} \times 100$$

$$I_{THD}\,\% = \frac{\sqrt{\sum_{i=2}^{N} I_i^2}}{I_1} \times 100$$

Technical Specifications

Operating Voltage (Un)	: (Phase-Neutral) 230Vac
Operating Range	: (0,8-1,1) x Un
Operating Frequency	: 50/60 Hz
Supply Power Consumption	: < 6VA
Power Consumption of Measurement Inputs:	: < 1VA
V_{in}	: 1 – 300 Vac (L-N) : 2 – 600 Vac (L-L)
I_{in}	: (as the secondary current of the current transforme) 0,01 - 6 Amp AC
Measurement Class	: CAT III
Voltage Transformer Ratio:	: 1 4000
Current Transformer Ratio	: 1 ..... 5000 (25000/5A)
Connection Type	: 3P&4W , 3P&3W , ARON
Measurement range	: 1,0V - 400,0 kV : 0,001A ..... 25000 A : 0 – 9,9 G (W,VAR,VA) : 0 – 999,9 M (W,VAR,VA) : 0 – 999,9 k (W,VAR,VA) : 0 – 999.999.999,$_{999}$ (GWh,GVARh,GVAh)
accuracy	
Voltage	: 0,5 class
Current	: 0,5 class
Active Power	: 1 class
Reactive Power	: 2 class
Apparent Power	: 1 class
Relay Outputs (2 pcs)	: 2 NO and max.3A/240 Vac

Pulse Outputs (2 pcs)	
Operating Voltage	: 5 – 24Vdc max. 30Vdc
Operating Current	: max 50 mA
Demand Time	: 1 – 600 min
Min. Switching Time	: 100 ms
Digital Inputs (2 pcs)	
Operating Voltage	: 5 – 24Vdc max. 30Vdc
Function	: Alarm and generator counter
Indicator	: 3,2” coloured LCD
Analogue Outputs (2 pcs)	
Voltage Output Type	: 0-10V, 2-10V, 0-5V, 1-5V
Current Output Type	: 0-20mA, 4-20mA
Accuracy	: 0.5%
Load Capacity	: Current type, max. load resistance: 750 Ohm : Voltage type, max. load current: 20 mA
Update time	: 200ms
RS485	
Baud rate	: 2400,4800,9600,19200,28800,38400,57600 veya 115200
Stop Bits	: (0.5) , (1) , (1.5) veya (2)
Parity	: no , even , odd
Device No	: 1 255
Device Protection Class	: IP 40
Terminal protection class	: IP 00
Ambient temperature	: - 5 °C .... + 50 °C
Installation Type	: to panel cover from front
Dimensions	: 96x96x56 mm



NOTE: Operating Voltage (Un): ask price and delivery time for 85-256Vac/dc