

# VARko-106-TFT

6 Steps



## Reactive Power Control Relay

- ✓ Banks
- ✓ Markets
- ✓ Oil Stations
- ✓ Schools
- ✓ Workshops
- ✓ Hotels



[www.kael.com.tr](http://www.kael.com.tr)



KAEL Mühendislik Elektronik  
Tic. ve San. Ltd.Şti.

# Specifications

- ✓ Easy to use with English menu
- ✓ Advanced software
- ✓ Easy to commissioning
- ✓ Color LCD screen ( 320 x 240 pixel 2.4" )
- ✓ Enough number of steps needed ( 6 steps )
- ✓ Quickly and accurately detection power of capacitors
- ✓ Total current and voltage harmonics, THD-I and THD-V
- ✓ Making compensation even at low currents (min. 10 mA)
- ✓ Operating system is used in the micro-processor
- ✓ Password protected
- ✓ Measuring temperature
- ✓ Following electrical parameters of three phases at the same time

■	Voltage of phase	V( L – N)
■	Current of phase	I
■	<b>Cos<math>\Phi</math></b> value	Cos $\Phi$
■	Frequency	Hz
■	Total harmonic distortion of current	THD-I
■	Total harmonic distortion of voltage	THD-V

- ✓ Alarms
  - Over voltage
  - Under voltage
  - Over Temperature
  - Over Current
  - Over Compensation
  - Under Compensation
  - THD on voltage
  - HD on voltage
  - THD on current
  - HD on current

- ✓ Step Protections
  - Over voltage
  - Over Temperature
  - Over Harmonic

## Introduction

All the information you need to know and the warnings regarding single phase controlled VARko-106-TFT reactive power factor controller is described in the user manual.

Prior to taking the circuit for the device read this booklet carefully for your system and your own safety. Do not act without getting touch with our company for the issues that can not be understood.

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## Warnings

- 1- The device should be commissioned and programmed by the authorized and certificated persons. If necessary, checks should be made by that person again.
- 2- As compensation is a complex system, subscriber's system are advised to keep under control by licensed - professional electrical engineers and technicians that company owned or agreed.
- 3- Do not open the device and not let it open. There are not any parts in the device that the user or someone can cut in.
- 4- Prior to making electrical connections to the terminals of the device, make sure that there is no energy in the cable and terminals. There shouldn't be energy at the control panel.
- 5- Do not use the device for different purposes other than compensation system.
- 6- Fix the device tightly on the control panel with the apparatus given on the device without hanging around.
- 7- Do not interfere to the keys on the front panel with an object other than your fingers.
- 8- Wipe your device with dry cloth being sure to disconnect the power. Water or chemicals used for cleaning damage to the device.
- 9- Make sure that the terminal connections are made in accordance with the connection scheme and without causing contact problem (loose binding or multiple copper cables touching to each other, etc.), prior to commissioning (supplying energy) of your device.
- 10- Use compensation contactors compatible to the power of the capacitor in your compensation system. Select the fuses in the power line of the capacitor compatible to the current of the capacitor.
- 11- Select the current value of the fuses connected to the C1 terminal input of contact phase considering the sum of the current drawn by the coils of connectors in each group (senary). In case of using connector with high current coil, auxiliary relay must be used to prevent damage to the contact outputs of the device.
- 12- The alerts and the warnings above are just for your security. In case of not applied, KAEL Elektronik Ltd. or its seller is not responsible for undesirable conditions.

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■	Voltage of phase	V( L – L)
■	Current of phase	I
■	<b>CosΦ</b> value	CosΦ
■	Frequency	Hz
■	Total harmonic distortion of current	THD-I
■	Total harmonic distortion of voltage	THD-V

## Step Indicator

A step indicator made by symbols that can be easily realized by the user, is located on the upper part of the screen of VARko-106-TFT. No matter which part of the user in, this panel is always located on the top of the screen.



LCD screen is used in VARko-106-TFT to provide it to be more easier in use and be intelligible. In case the keys are not pressed for a long time, the device switch to the screen saver mode to extend the life of the display, and only the step indicator shown on the the top scrolls down step by step from the top to the bottom of the screen. Thus, the condition of the steps can be continued to be monitored. In case of pressing on any key, the main screen image appears again.

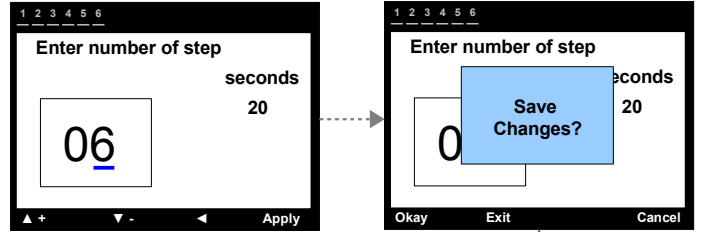
## Making the Connections

- The connections of the device should be made while the system is energy-free.
- VARko-106-TFT should be connected as shown in the connection diagram.
- Current transformer and voltage connection should be made according to Scheme.
- The value of the selected current transformers should not be under the real load values but should be X/5 amper. It is also advised to choose 0.5 class.
- Connect the "C1" common phase input to the same phase with FF type fuses separately. Select the fuses to be used according to the specified current value.
- Do not energize the device without ensuring the connections checked by measurement instruments.

# Commissioning

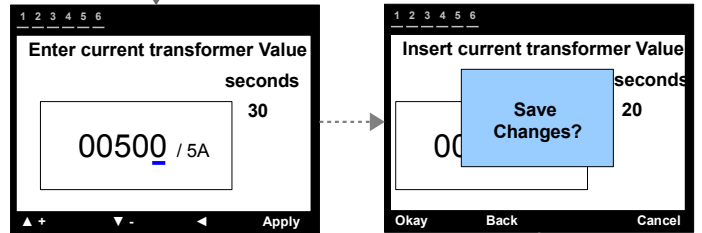
## 1. Step : Number of Steps

When commissioning the first time, start values are loaded into the device. Then it requires to enter the number of steps. In this case, the screen on the right side will be displayed. The number of step is set-up to the required value by the direction keys and "Apply" is selected. In case "Okay" key is pressed, saves the change. Or, in case no key is pressed, when the time is over on the screen, it switches to the section in which the current transformer ratio is inserted by taking 6 steps in the memory.



## 2. Step : Current Transformer Ratio

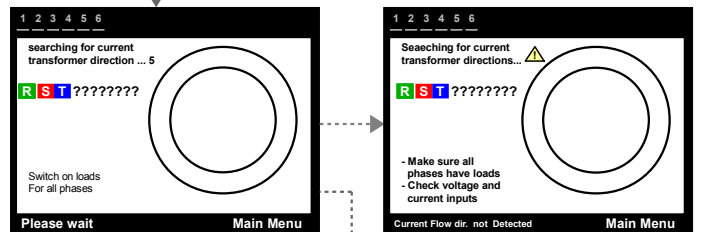
The line on which the blue bar locates, is set-up to the required value by using the direction keys and switch to the next side by pressing the left direction key. Inserting the complete primary value, "Apply" key is pressed. In case of pressing "Okay" key, the change is saved.



## 3. Step : Determine of Current Transformer Directions

The device automatically switches to the internalization of current polarity direction mode. In this case, it is required to draw enough current from each phase. If enough current can not be drawn from any phase, the device warns as "current flow direction not detected" and shows the phase or phases which are not internalized by ??? marks. When the current polarity direction are internalized, the device switches to the automatic capacitor power internalization mode.

P.S.: There is no need to press on the main screen key normally.

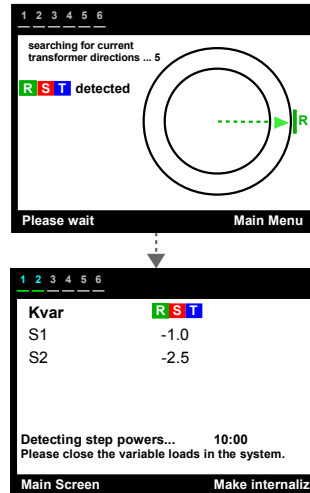


## 4. Step : Learning of step powers

Device tries to identify capacitor powers, by activating and then removing the steps in sequence. It is recommended the closure of variable loads in the system to ensure instant internalization during this process. If required, the user presses the "Make the steps internalize" key and can make the system internalize by himself. The automatic internalization is put on hold in the meantime. The step is not internalized automatically as long as the user is in the "Make the steps internalize" menu.

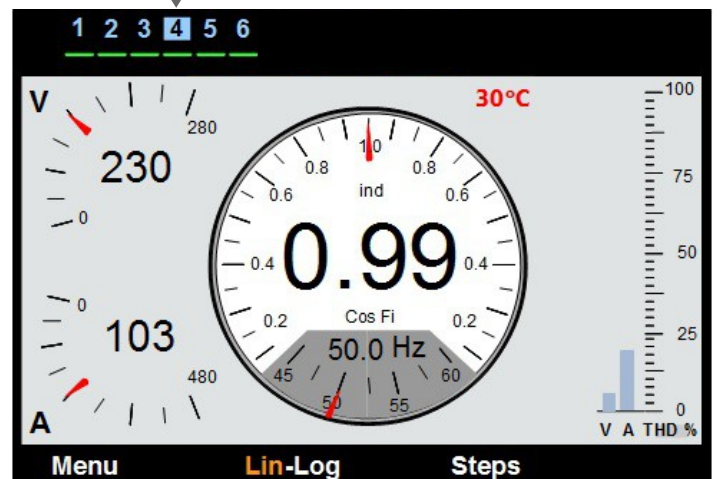
P.S.1: There is no need to press on the main screen key normally.

P.S.2: Despite of the variable loads are disabled, the connections of the device should be checked again in case any power of the steps and their connections are not internalized for a long time.

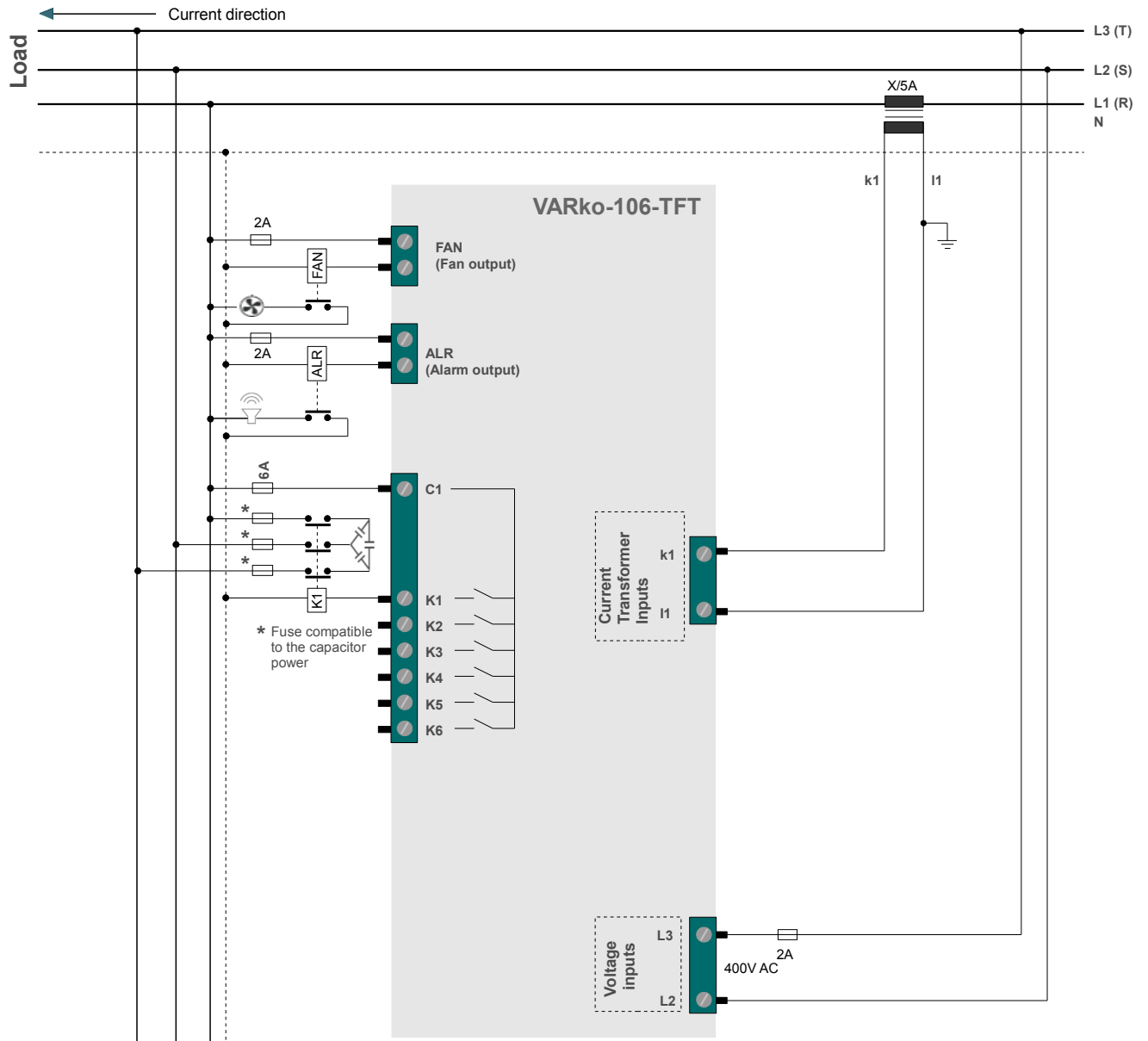


## 5. Step (Main Screen)

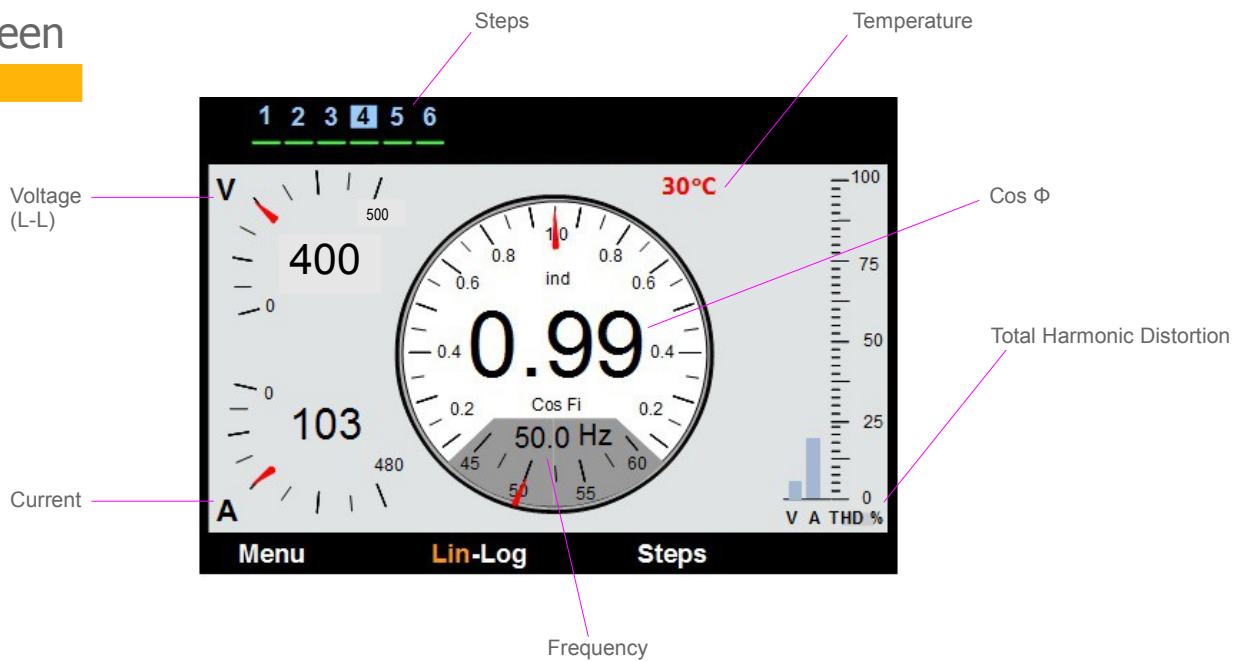
When all the steps are internalized, the main screen page comes up and the device starts operating in automatic mode.



# Connections

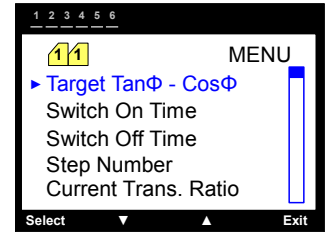


# Main Screen



# 1. MENU

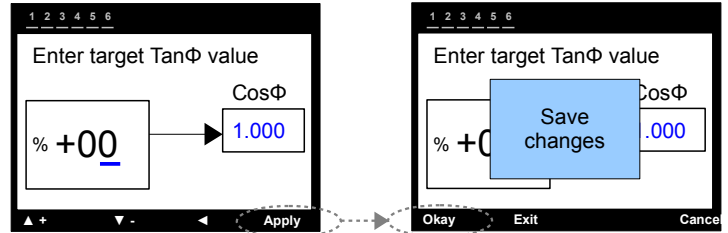
This is the section in which many of the electrical measurements are monitored and set-up are made. The parameters are accessed by direction keys in the menu, parameters are inserted by "Select" key and exit from the parameters by "Exit" key.



## 1 1 Target TanΦ - CosΦ

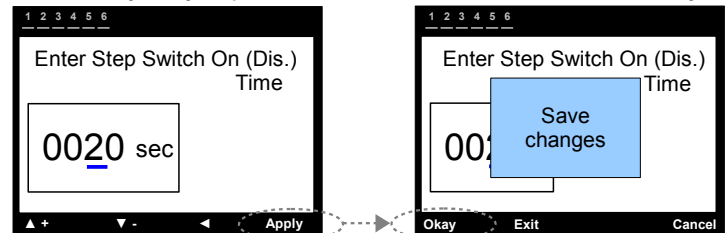
This is the section in which the required % value of the system is entered. CosΦ value corresponding to the % value is displayed automatically on the other side. The value is setup to the required step by using up and down keys starting from the digit where the blue line is. Then, left key is pressed and the blue line moves next to left digit. All values are entered in the same way by using the up and down keys. Moving the blue sub-line to the digit where the sign is by using left key, the sign can be changed by pressing upwards key. (+) expresses inductive, (-) expresses capacitive sections..

"Apply" key is pressed to take the target value into memory. "Save Changes" message will appear on the screen. When "Okay" key is pressed, the value is taken into the memory.



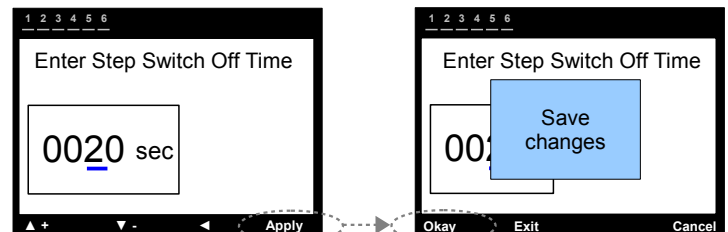
## 1 2 Switch on Time ( 1 – 3600 sec)

Delay time to switch on any step. The value is setup to the required step starting from the digit under which the blue line is, by using up and down keys. Then left key is pressed and the blue line moves next to left digit. All the values are entered in the same way by using up and down keys. Press "Apply" key in order to take the period of step activating into memory. "Save changes" message will appear on the screen. When "Okay" key is pressed, the value is taken into memory.



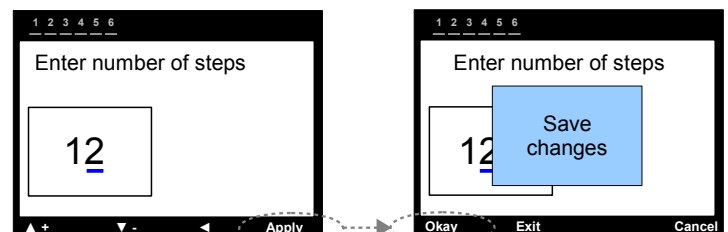
## 1 3 Switch Off Time ( 1 – 3600 sec)

Delay time to switch Off any step. The value is setup to the required step starting from the digit under which the blue line is, by using up and down keys. Then left key is pressed and the blue line moves next to left digit. All the values are entered in the same way by using up and down keys. Press "Apply" key in order to take the period of step activating into memory. "Save changes" message will appear on the screen. When "Okay" key is pressed, the value is taken into memory.



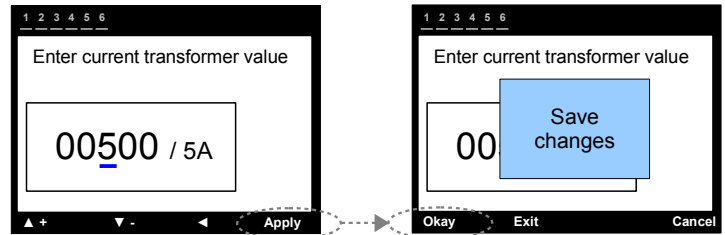
## 1 4 Number of Steps ( 3 – 12)

This is the section in which the number of steps will be used for compensation, is entered. The value is setup to the required step by using up and down keys starting from the digit where the blue line is. Then, left key is pressed and the blue line moves next to left digit. All values are entered in the same way by using the up and down keys. Press "Apply" key in order to take the number of steps into memory. "Save changes" message will appear on the screen. When "Okay" key is pressed, the value is taken into memory.



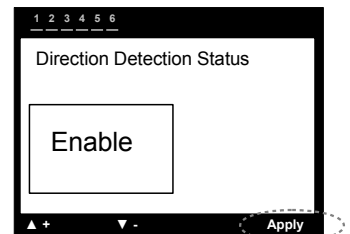
## 1 5 Current Trans. Ratio ( 5.....10000 / 5A )

This is the section in which the primary value of current transformers in compensation system, is entered. The value is setup to the required step by using up and down keys starting from the digit where the blue line is. Then, left key is pressed and the blue line moves next to left digit. All values are entered in the same way by using the up and down keys. Press "Apply" key in order to take the current transformer (primary) value into memory. "Save changes" message will appear on the screen. When "Okay" key is pressed, the value is taken into memory.

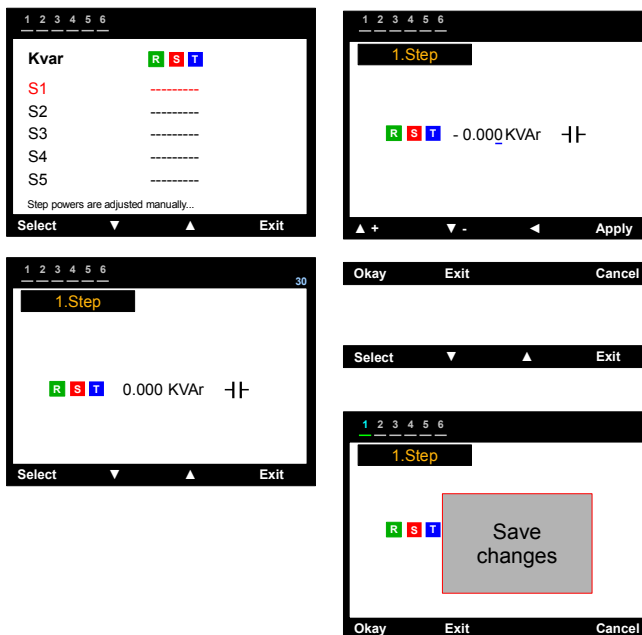


## 1 6 Current Flow Direction

This is the section in which the function of searching of current transformer polarity directions are activated or de-activated. In case "Enable" is selected, internalization of current transformer direction is always "On", and only checks the directions when the device is powered. If "disable" is selected, then the device internalize the current transformer directions at once and do not change it. The "disable" choice should be selected for some loads (producing negative active load). The required status for function is selected by using the up and down keys. Press "Apply" key in order to take this parameter into memory. "Save changes" message will appear on the screen. When "Okay" key is pressed, the value is taken into memory.



## 1 7 Enter Power of Steps



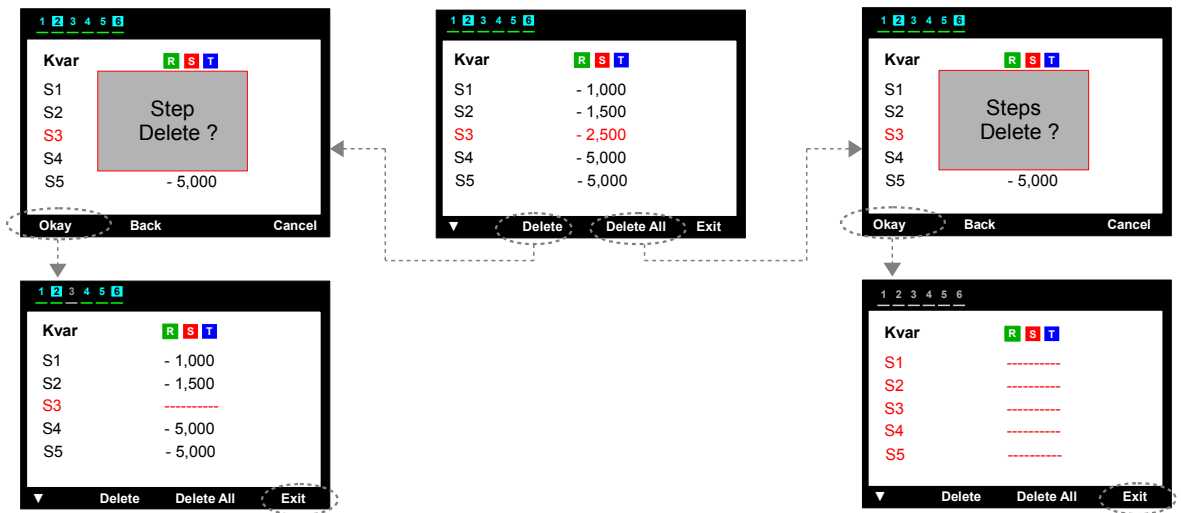
This is the section in which the step powers are entered. The device directs the user with subcommand display continuously. It is moved on the step of which the power is required to be entered by using the up and down keys. In the meantime, that line are in red colour. Select key is pressed.

The selected step number comes to screen. The "Select" key is pressed and a blue underline appears on the last digit inside of the frame. The value is setup by using the up and down keys starting from the digit where the blue line is. Then, left key is pressed and the blue underline moves next to the left digit. All the values are entered in the same way by using up and down keys. The "Apply" key is pressed to take them into memory. The sub-command screen changes and "Okay", then "Exit" key is pressed. "Save Changes" will appear on the screen. When "Okay" key is pressed, the value is taken into memory.

## 1 8 Delete Power of Steps

This is the section in which the step parameters are deleted one by one, or all. In case the reactive load is changed in any step, the power of that step must be deleted to let the device internalize the the power of new step. The device forwards the user continuously by sub-command screen. Moving onto the step of which power required to be deleted, the up or down key is pressed. The line is in red colour in the meantime. In case of deleting only that step, "Delete" key is pressed; in case of deleting all steps (if a device used in somewhere else is connected to a new plant), "Delete All" key is pressed. If "Delete" key is pressed, "Step Delete?" warning appears on the screen. When "Okay" key is pressed, the power of that step would be deleted. The device will automatically try to internalize the power of that step again. You can exit the menu by "Exit" key. In case "Delete All?" key is pressed, "Steps Delete?" warning appears on the screen. When "Okay" key is pressed, the power of all steps would be deleted. The device will automatically try to internalize the power of that step again. You can exit the menu by "Exit" key.





## 1 9 Alarm & Protection Parameters

### 1 9 1 Alarm Control

#### 1 9 1 1 Phase alarms

Over voltage  
Under voltage  
Over current  
Over compensation  
Under compensation  
No phase  
THD on voltage  
HD on voltage  
THD on current  
HD on current

#### 1 9 1 2 General Alarms

1st Connector Error  
Total over compensation  
Total under compensation  
System Error  
Over temperature  
Voltage connection  
Step Change  
Step Zero  
Modbus security Error

#### 1 9 1 1 Phase alarms

##### 1 9 1 1 1 Phase Alarms – Over Voltage (enable)

In case of over voltage during the activation of alert, alert is given and device warns the user. In this case;  
- capacitors and devices in the system may be damaged.  
- “Voltage protection activated” may be preferred in the step protection function

##### 1 9 1 1 2 Phase Alarms – Under Voltage (enable)

In case of under voltage during the activation of alert, alert is given and device warns the user. In this case;  
- capacitors and devices in the system may be damaged or may not be operated properly.  
- “Voltage protection activated” may be preferred in the step protection function

##### 1 9 1 1 3 Phase Alarms – Over Current (enable)

In case over current is drawn from the system during the activation of alert, alert is given and device warns the user. In this case;  
- Inputs of the device may be damaged any moment. This case is out of warranty.  
- Please stop the system and replace the current transformers with the larger ones.

##### 1 9 1 1 4 Phase Alarms – Over Compensation (enable)

In case the system falls into over compensation in any phase during the activation of alert, device warns the user. In this case;  
- Review the capacitor power distribution in the steps, especially in the phase where the alert is given.  
- Please allow less powerful capacitors which can reach buffer power values.

##### 1 9 1 1 5 Phase Alarms – Under Compensation (enable)

In case the system falls into under compensation in any phase during the activation of alert, device warns the user. In this case;  
- Review the capacitor power distribution in the steps, especially in the phase where the alert is given.  
- Please insert the capacitors which the phase or the phases need.

##### 1 9 1 1 7 Phase Alarms – THD on Voltage (enable)

In case total harmonic failure in the phase voltage exceeds the set value during the activation of alert, device warns the user. In this case;  
- You should install harmonic filter to protect your devices.



#### Phase Alarms – HD on Voltage (enable)

In case the failure of any harmonics between 3...31 in the phase voltage exceeds the set value during the activation of alert, device warns the user.

In this case;

- You should install harmonic filter to protect your devices.



#### Phase Alarms – THD on Current (enable)

In case total harmonic failure in the phase of system exceeds the set value during the activation of alert, device warns the user.

In this case;

- You should install harmonic filter to protect your devices.



#### Phase Alarms – HD on Current (enable)

In case the failure of any harmonics between 3...31 in the phase voltage exceeds the set value during the activation of alert, device warns the user.

In this case;

- You should install harmonic filter to protect your devices.



### General Alarms



#### General Alarms – 1. connector failure (K1...K6) (enable)

In case of this alarm;

- (C1) common phase input may not be connected.
- The fuse of (C1) common phase input may blowed out.
- Compensation connection may be made prior to current transformers.
- Removing the failure, steps internalized zero should be internalized again.



#### General Alarms – Total Over Compensation (enable)

In case of this alarm ;

- The system may be kept in penalty.
- Review the capacitor power distribution in the steps.
- Please allow less powerful capacitors which can reach buffer values.



#### General Alarms – Total Under Compensation (enable)

In case of this alarm ;

- The system may be kept in penalty.
- Review the capacitor power selection in the steps.
- Please insert the capacitors which the phase or the phases need.



#### General Alarms – System Error (enable)

In case of this alarm;

- (C1) common phase input may not be connected.
- The fuse of (C1) common phase input may blowed out.
- The fuses in the power line of capacitors may blowed out.
- Removing the failure, steps internalized zero should be internalized again.



#### General Alarms – Over Temperature (enable)

In case of this alarm;

- The temperature in the board exceeds the value setted.
- Please empower the panel cooling.
- "Temperature protection enable" may be preferred in the step protection function (Chapter 179641)



#### General Alarms – Step Change (enable)

In case of this alarm;

- The old capacitor may be replaced with the new one, but power value is not entered, or the power of capacitor may be decreased 50%.



#### General Alarms – Step Zero (enable)

In case of this alarm;

- The fuses in the power line of capacitors may blowed out or contactor may be damaged.
- Removing the failure, steps internalized zero should be internalized again.

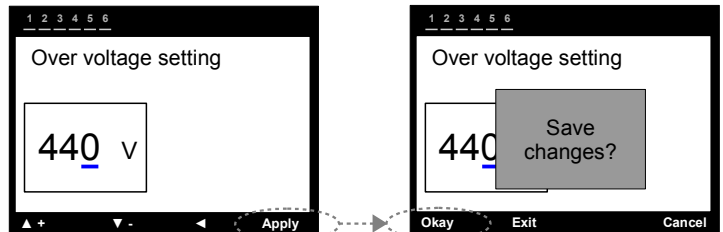
## 1 9 2 Alarm Setting Values

This is the section in which the alarm setup values are entered.

### 1 9 2 1 Over Voltage (420 – 500V)

This is the section in which the value of over voltage are entered. You may enter a value between 440 and 500 Volts. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys. “Select” key is pressed to take them into the memory.

“Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



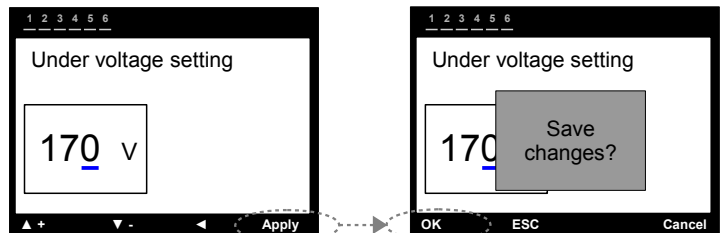
In case voltage protection is activated in the level protection function (Chapter 19111), all levels are de-activated one by one to protect the capacitors when over voltage setup value is exceeded.

### 1 9 2 2 Under Voltage (300 – 380 V)

This is the section in which the value of under voltage are entered. You may enter a value between 300 and 380 Volts. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys.

“Select” key is pressed to take them into the memory.

“Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



In case voltage protection is activated in the step protection function (Chapter 19112), all steps are de-activated one by one to protect the capacitors when under voltage setup value is exceeded.

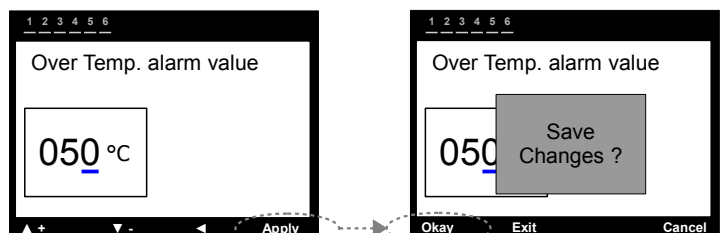
The contactors are in difficulty to stay drawn especially under a certain voltage and, therefore the capacitor as well as contactor are exposed to operate in undesirable overload and arc. For this reason, activating voltage protection function is recommended.

### 1 9 2 3 Over Temperature (5 – 85 °C)

This is the section in which the value of over temperature are entered. You may enter a value between 5 and 85 °C. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys.

“Select” key is pressed to take them into the memory.

“Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



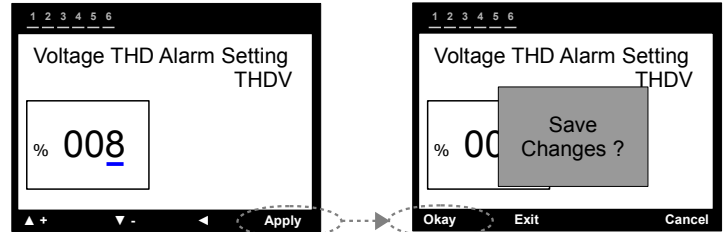
In case the temperature exceeds the setup value, the value displayed in light blue color becomes red on the upper right of screen.

In case temperature protection is activated in the step protection function (Chapter 19114), all steps are de-activated one by one to protect the capacitors when over temperature setup value is exceeded.

### 1 9 2 4 THD Voltage Setting (% 1 – 100)

This is the section in which total harmonic distortion value (THDV) are entered for voltage. You may enter a value between 1% and 100%. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.

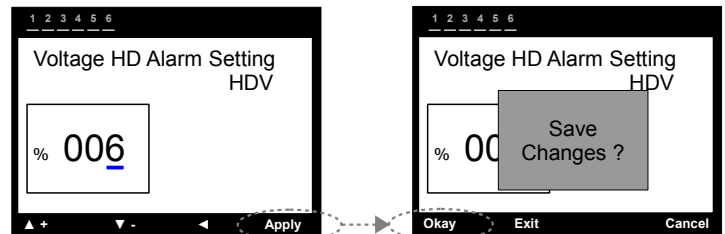
⚠ In case harmonic protection is activated in the step protection function (Chapter 19117), all steps are de-activated one by one to protect the capacitors when THDV setup value is exceeded.



### 1 9 2 5 HD Voltage Setting (% 1 – 100)

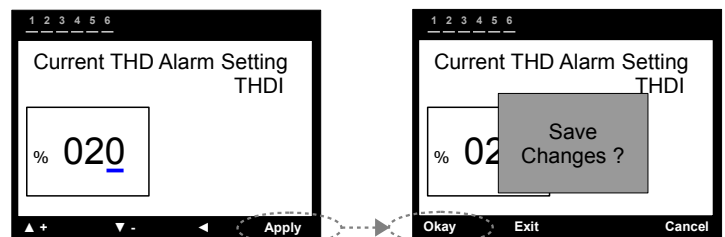
This is the section in which harmonic distortion value (HDV) are entered for voltage. You may enter a value between 1% and 100%. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.

⚠ In case harmonic protection is activated in the step protection function (Chapter 19118), all steps are de-activated one by one to protect the capacitors when HDV setup value is exceeded.



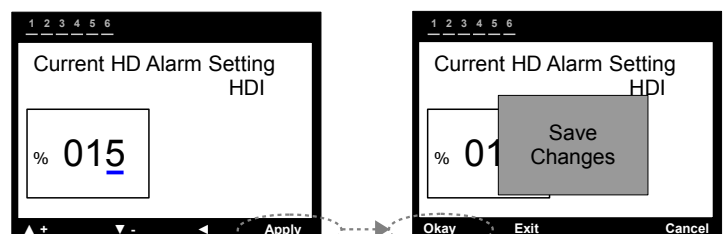
### 1 9 2 6 THD Current Setting (% 1 – 100)

This is the section in which total harmonic distortion value (THDI) are entered for current. You may enter a value between 1% and 100%. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



### 1 9 2 7 HD Current Setting (% 1 – 100)

This is the section in which harmonic distortion value (HDI) are entered for current. You may enter a value between 1% and 100%. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



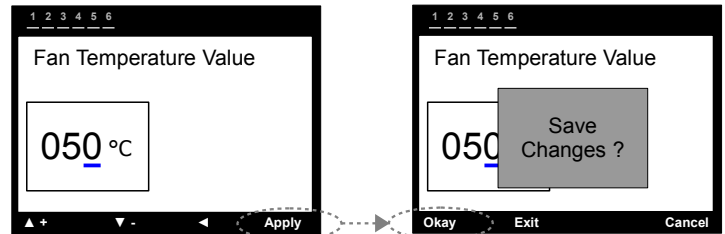
## 1 9 3 Fan Settings

This is section in which the setup values of fan inputs are entered.

### 1 9 3 1 Fan Temperature Value (5 – 85 °C)

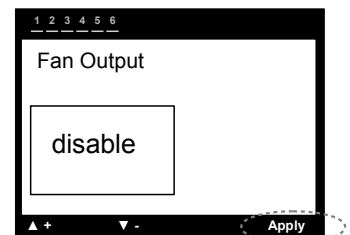
This is the section in which fan output activation value is entered. You may enter a value between 5 and 85 °C. The value is setup to the required value by using the up and down key starting from the digit where the blue line is. Then left key is pressed and the blue underline moves next to the left digit. All values are entered in the same way by using up and downkeys. “Select” key is pressed to take them into the memory.

“Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



### 1 9 3 2 Fan Output

The required condition is selected for function by using up or down keys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



### 1 9 4 6 4 Step Protection Function

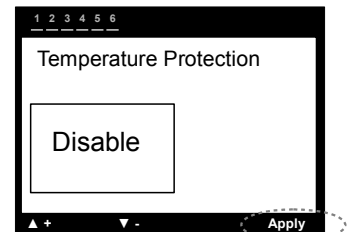
De-activation of the capacitors is recommended to protect them against temperature, voltage and harmonics. This is the section in which protection is permitted.

P.S.: In case the current connector moves out or there is a connection failure at the voltage inputs, protection is activated automatically and de-activates the steps one by one.

### 1 9 4 1 Temperature Protection

This is the section in which the temperature protection function is activated or de-activated. The over temperature alarm should also be activated to operate the protection function (Chapter 19127).

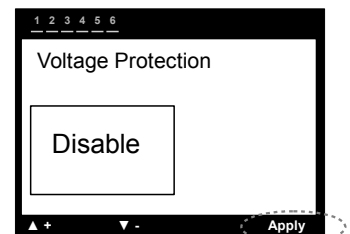
The required condition is selected for function by using up or down keys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



### 1 9 4 2 Voltage Protection

This is the section in which the voltage protection function is activated or de-activated. The voltage alarms should also be activated to operate the protection function (over voltage, under voltage, no phase).

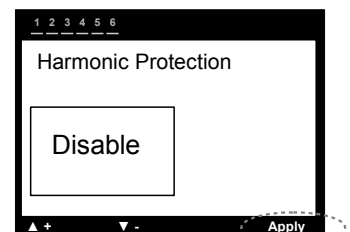
The required condition is selected for function by using up or down keys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “Okay” key, the value is taken into the memory.



### 1 9 4 3 Harmonics Protection

This is the section in which the protection function is activated or de-activated against voltage harmonics. Voltage harmonic alarms (THDV and/or HDV) should be activated in order to operate protection function.

The required condition is selected for function by using up or down keys. “Select” key is pressed to take them into the memory. “Save changes?” message will appear on the screen. Pressing “OK” key, the value is taken into the memory.

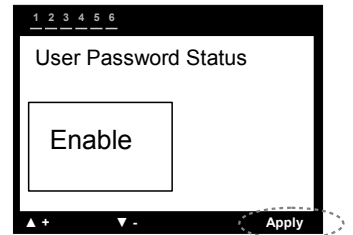


## 1 10 Password Settings

### 1 10 1 Password Enable/Disable

This is the section in which the use of device is activated or de-activated with password. Initial password is "0000". In case the user changes the password, old password is valid even if returned to the factory settings. In case of forgetting the password, our technical support team should be called.

The required condition is selected for function by using up or down keys. "Select" key is pressed to take them into the memory. "Save changes?" message will appear on the screen. Pressing "Okay" key, the value is taken into the memory.



### 1 10 2 Change Password

This is the section in which password is changed.

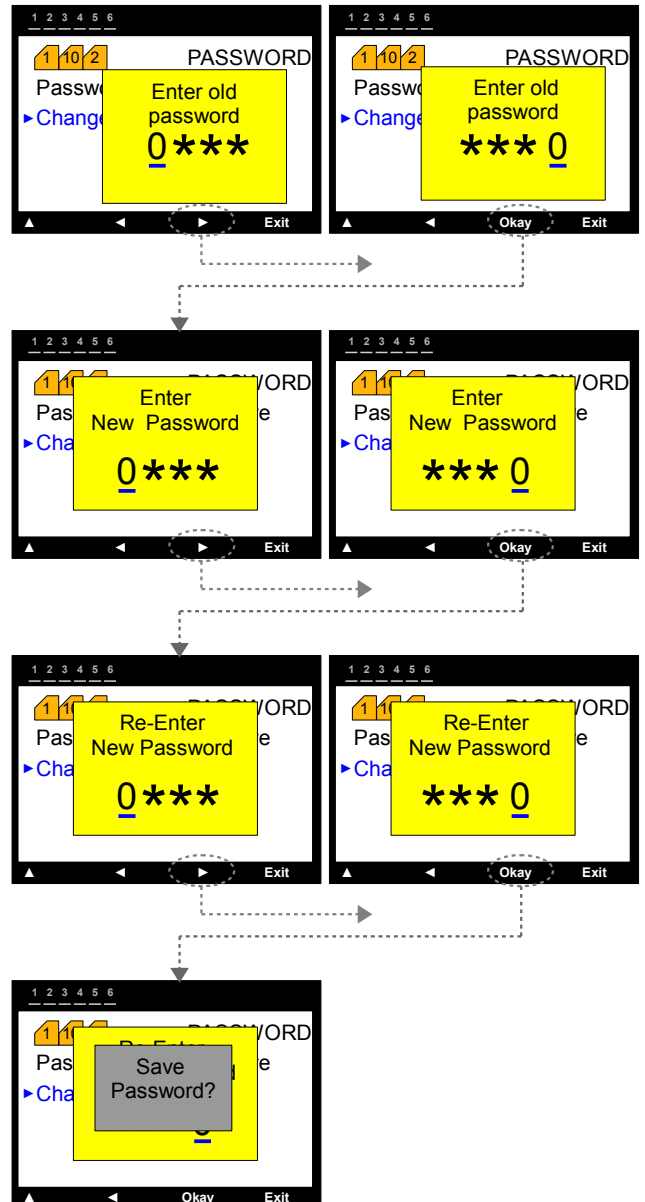
First, old password must be entered correctly.

Number value of the digit under which blue line is, is entered by using upwards key. You can move to the next digit by the right key. When the values of all digits are entered in the same way, "Okay" key is pressed.

In case the old password is entered correctly, the new password page is displayed in order to let the user change password.

New password is entered two times in the same way. In case two passwords are the same, "Password Correct" message displays on the screen.

When "Okay" key is pressed, the new password is taken into memory.

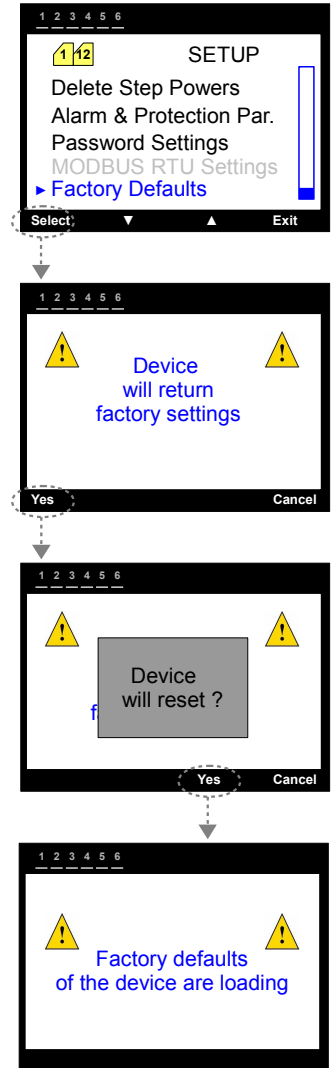


## 1 12 Factory Defaults

This is the section which is used to restore factory default values to the device.

### Factory Default Values :

Target TanΦ(cosΦ)	: % 0 (1,00)
Switch on Time	: 10 sec
Switch off Time	: 10 sec
Current Transformer (Primary) Value	: 5 / 5 A
Number of steps	: 06
Continuous Current Flow Direction Detection	: disable
Phase Alarms – Over Voltage	: disable
Phase Alarms – Under Voltage	: disable
Phase Alarms – Over Current	: disable
Phase Alarms – Over Compensation	: disable
Phase Alarms – Under Compensation	: disable
Phase Alarms – THD on Voltage	: disable
Phase Alarms – HD on Voltage	: disable
Phase Alarms – THD on Current	: disable
Phase Alarms – HD on Current	: disable
General Alarms – 1. connector failure	: enable
General Alarms – Total Over Compensation	: enable
General Alarms – Total Under Compensation	: enable
General Alarms – System Failure	: enable
General Alarms – Over Temperature	: enable
General Alarms – Step Change	: disable
General Alarms – Step Zero	: enable
Alarm Setting Values – Over Voltage	: 450V
Alarm Setting Values – Under Voltage	: 350V
Alarm Setting Values – Over Temperature	: 70 °C
Alarm Setting Values – THD Voltage	: % 4
Alarm Setting Values – HD Voltage	: % 4
Alarm Setting Values – THD Current	: % 30
Alarm Setting Values – HD Current	: % 30
Fan Settings – Fan Temperature Value	: 50 °C
Fan Settings – Fan Output	: disable
Level Protection Function–Temperature Protection	: enable
Level Protection Function – Voltage Protection	: disable
Level Protection Function – Harmonic Protection	: disable
Password Procedure – Password Settings	: disable
Password Procedure – Default Password	: 0000 (refer to PS1)

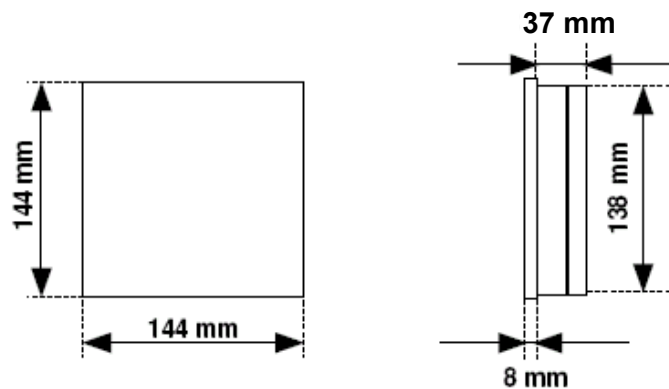


**PS 1 :** User password is defined as "0000" at first. However, after password is changed, password will not change even if returned to the factory settings. The last password that the user entered is valid.

In case of restoring factory settings, all the changes that the user made, except password, will be cancelled.

## Technical Info

Power supply (Operating Voltage) (Un)	: (Phase-Phase ) 400Vac
Operating Range	: (0,9-1,1) x Un
Operating Frequency	: 50/60 Hz
Supply Power Consumption	: < 6VA
Power Consumption of Measurement Inputs	: < 1VA
Contact Current	: Max.3A/240 Vac
I <sub>in</sub>	: (as the secondary current of the current transformer) 0,01 - 6 Amp AC
Display Range	: (Power Factor) 0,000 - 1,000 ind.and cap.
Mimimum Current Measurement Value	: 10 mA
Measurement Accuracy	: %1±1 digit
Current Transformer Ratio	: 5/5.....10000/5 A
Display	: 2,4" coloured LCD
Device Protection Class	: IP 20
Terminal Protection Class	: IP 00
Environment Temperature	: - 5 °C .... + 50 °C
Humudity	: %15 ..... %95 (without condensation)
Connection Type	: On the front cover of the panel
Dimensions	: 144x144x45 mm



## Installation

- 1- An outlet in square form by 140 mm x 140 mm will be made on the panel where the assembly of the device will be made.
- 2- Prior to the assembly of the device, remove the apparatus of the panel.
- 3- Insert the device from the front window drilled at the panel.
- 4- Fix the device to the panel by using panel holding apparatus at the back of the device.

**!** Make the assembly as to leave a 50 mm space between the wall and the back of the device for ventilation.

### PANEL OUTLET MEASUREMENT

