RKR Series
Reactive Power Control Relay
User Manual

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Version 1.2

CONTENTS

PROPER USE AND SAFETY REQUIREMENTS

Cihaz panoya bağlanırken ve panodan sökülürken tüm enerjiyi kesiniz.

Cut all the power when connecting and disconnecting the device to a panel.

Do not clean the device with a solvent or similar material. Only use a dry cloth.

Please do not intervene to the device when a technical problem is encountered and get in contact with a technical service within the shortest time.

If the warnings are not taken into account, our company or the authorized dealer shall not be held responsible for the negative consequences.
Do not dispose in the trash, the device must be delivered to the collection centers (electronic device recycling centers). It should be recycled or disposed of without harming human health and environment.

The installation, assembly, activation and operation of the device should be done and used by only expert professionals and in accordance with safety regulations and instructions.

The device operates with current transformers. Do not strictly leave current transformer tips unattached. Dangerous high voltage can occur.

The common supplies of the stage terminals must be connected to any phase with a 6 Ampere fuse separately. We absolutely do not recommend parallel connection! When separate fuses are connected to the partners, the fuse protection will be activated in the event of a short circuit in the contactors over time, and only the relevant stage blocks will be deactivated, allowing the device to continue compensation with other blocks. Otherwise (when a single fuse is used with parallel connection), all stages will be deactivated due to a problem occurring in one contactor!

Current transformers should be placed immediately at the output of the main switch of the enterprise.

(See: RKR 12/18/24 current transformer connection diagram, sf:22)

INTRODUCTION

Preliminary information

- Enter the main menu by pressing the Input Button.
- The user can change the flashing selections using the Ok Buttons.
- You can enter a desired sub-menu with the Enter button.
- The Exit button is used to return to the next menu.

- In order to follow the sub-menus, the numbering at the top of the screen is used.
    - For example, when the Input Button is pressed immediately after the device is switched on, the numbering 1--- will appear at the top of the screen.
        - When the up arrow button is pressed, the top line will change to 2---
        - When the Enter Button is pressed, 2.1-- will appear on the top line, indicating that a sub-menu has been entered.
        - Press the exit button to return to the top menu in the form of 2---
        - The numbering at the top of the screen can be followed in the user manual to make it easier to understand the manual.
            - For example; if you want to recognize all stages sequentially with the help of the submenu in 4.2.1.2' it will be enough to follow the path 4.2.1.2 yfrom the device screen.

IMPORTANT NOTE: Each heading number in the manual also refers to the menu numbering in the device.

Recommendations for Installation with Capacitors:

- In order to get results in a shorter time during installation with capacitors, it is recommended to connect capacitors to the first stages starting with three-phase large power capacitors and reactors to the last stages.

- If compensators (capacitor or reactor) are placed in stages in a complex way, without taking into account their characteristics, it is recommended to switch off the supply fuses of the reactors before installation with capacitors.

Recommendations for Installation with Reactors:

- During installation with reactors, it is recommended to connect the reactors to the first stages, starting with the three-phase high power reactors, and the capacitors to the last stages, in order to obtain results in a shorter time.

- If compensators (capacitor or reactor) are placed in a complex way in stages, without taking into account their characteristics, it is recommended to switch off the supply fuses of the capacitors before the installation with reactors.

The factory default installation setting is set as installation with capacitors.

We are Starting the Installation (Setup)

After the device connections are made in accordance with the connection diagram, the device is energized.

When the device is energized, the "Serial Number" screen shown in Figure 1 appears. By pressing the Enter Button or after 3 seconds, it automatically switches to the next screen. "Current Transformer" screen appears as shown in Figure 2. Select the current transformer value using the Up/Down Ok Buttons and press the Enter Button.

Figure 1. The first opening screen showing the "Serial Number" of the device

Figure 2. Screen display that shows the current transformer value (Current Transformer Value) in X/5 format

- The device then automatically starts setup, the flashing red "Setup" LED positioned on the left side of the device lights up steadily after the setup starts. During the setup, the device checks the line parameters such as current control, voltage control, voltage-current matching and current directions as shown in Figure 3 and Figure 4. If no faulty situation is encountered, the "StupxbAsArili" text appears on the screen and the relay automatically switches to stage recognition.

Figure 3. Matching during installation Screenshot showing “Voltage-Current Pairs”

Figure 4. Screenshot of "Current Transformer Secondary Directions" detected by the device during installation

- When the device automatically moves to the stage recognition test after the installation is complete
- The "Setup" LED turns off and the red " Stage Recognition" LED lights up as shown in Figure 6.

- The stage recognition process as shown in Figure 7 continues with the display of each recognized stage value on the screen, while the information of which stage is activated can be followed from the green colored Stage LEDs bar at the top of the device as shown in Figure 5, and after the recognition process of the last stage is completed, the "Stage Recognition" LED turns off and the green "Compensate" LED lights up. The device now starts to compensate with the stages it recognizes.

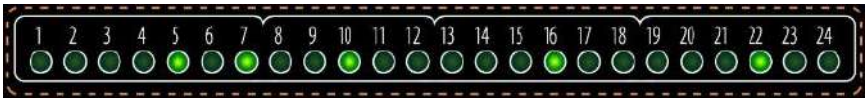


Figure 5. Stage LEDs at the top of the device showing the status of the stages

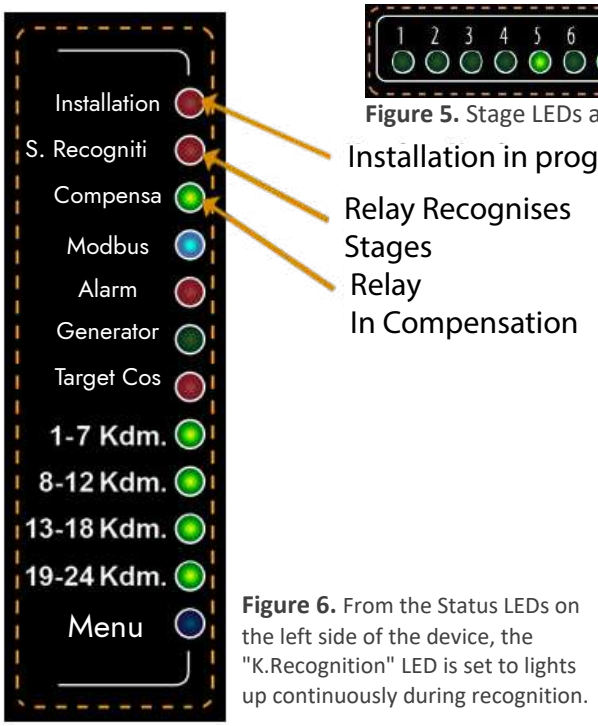


Figure 6. From the Status LEDs on the left side of the device, the "K.Recognition" LED is set to lights up continuously during recognition.

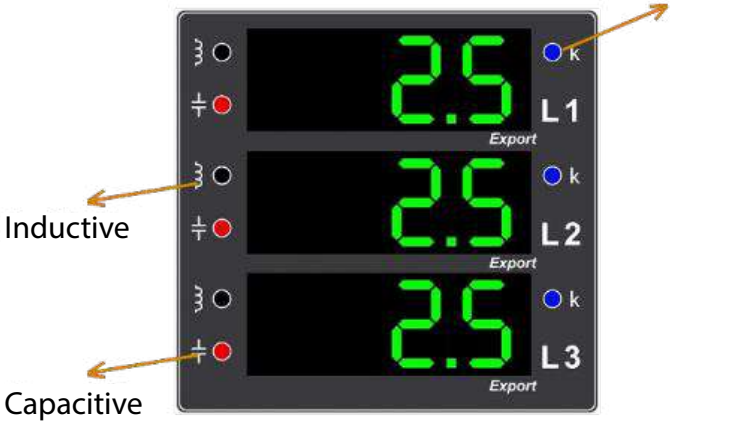


Figure 7. The value of a stage containing a capacitive characteristic load screenshot showing

- If the compensator connected to the recognized stage is a capacitor, the capacitive red LED on the left side of the device (as in Figure 7) and if it is a shunt reactor, the inductive blue LED on the left side of the device lights up.
- **NOTE:** During setup and stage recognition operations, if the Exit Key is held down for 4 seconds, the current operation is canceled and terminated.
- **If an incorrect situation is encountered during installation;** The device automatically corrects some errors (e.g. voltage-current mismatch). In cases of incorrect connections that the device cannot correct, the device stops the installation without completing the installation by reporting the incorrect status as shown in Figure 8.

Example Error 4. The screenshot showing that the voltage input of the first phase is empty
(Check the voltage connection of the first phase.)

Some Faulty Situations During Installation

Example Error 1. Screenshot showing that the current of the third phase is high
(Check the third phase current input and current transformer value).

Example Error 2. Screenshot showing that the currents of the second and third phases are high
(Check the current inputs of the second and third phases and the current transformer value).

Example Error 3. Screenshot showing that the currents of all phases are high
(Check the current inputs of all phases and all current transformer values).

Example Error 4. Screenshot showing that the voltage input of the first phase is empty
(Check the voltage connection of the first phase.)

Example Error 5. Screenshot showing that the voltage inputs of the second and third phases are empty
(Check the voltage connections of the second and third phases).

Example Error 6. Screenshot showing that the voltage inputs of the first and third phases are empty
(Check the voltage connections of the first and third phases.)

Example Error 7. Screenshot showing that the voltage of the first phase is low
(Check the voltage of the first phase.)

Example Error 8. Screenshot showing that the voltages of the second and third phases are low
(Check the voltages of the second and third phases).

Example Error 9. Screenshot showing that the voltages of the first and third phases are low
(Check the voltages of the first and third phases.)

Example Error 10. Screen display showing that the current input of the second phase is empty
(Check the current connection of the second phase.)

Example Error 11. Screenshot showing that the current inputs of the first and third phases are empty
(Check the current connections of the first and third phases.)

Example Error 12. Screenshot showing that the current inputs of all phases are empty
(Check the current connections of all phases.)

Example additional Error 13. Screen display showing Phase/ Neutral connection error
(Check phase inputs and neutral connection.)

Example Error 14. Screenshot showing stage connection error
(Check the stage connections.)

Example Error 15. Screen display showing that the current transformer is not connected
(Please connect the current transformer.)

Example Error 16. Screenshot showing that the current transformer terminals of the first and second phases are connected by mixing them to form a loop
(Check the terminals of the current transformers of the first and second phases).

Example Error 17. Screenshot showing that the current transformer terminals of all phases are connected by mixing them to form a loop among themselves
(Check the terminals of the current transformers of all phases.)

Example Error 18. Screenshot indicating that the installation could not be completed with the available stages
(Check the connections and steps and repeat the installation).

Example Error 19. Screenshot showing that the voltages connected for the first and second phases are in the same phase

(Make the correct voltage connection to the first and second phases.)

Example Error 20. Screenshot showing that the operating load is not stable

(Perform your test when the operating load is more stable.)

Example Error 21. Screenshot showing that all stage partners are empty

(Check the commonality of the stages to be used.)

Example Error 22. Screen display showing that the voltage-current terminals of the 1st and 2nd phases are not matched when automatic voltage-current matching is off

(Make sure that the voltage and current terminals of the 1st and 2nd phases are connected in the correct order).

Example Error 23. When automatic current-voltage matching is off; screenshot showing that the voltage-current terminals of all phases are not matched

(Make sure that the voltage and current terminals of all phases are connected in the correct order).

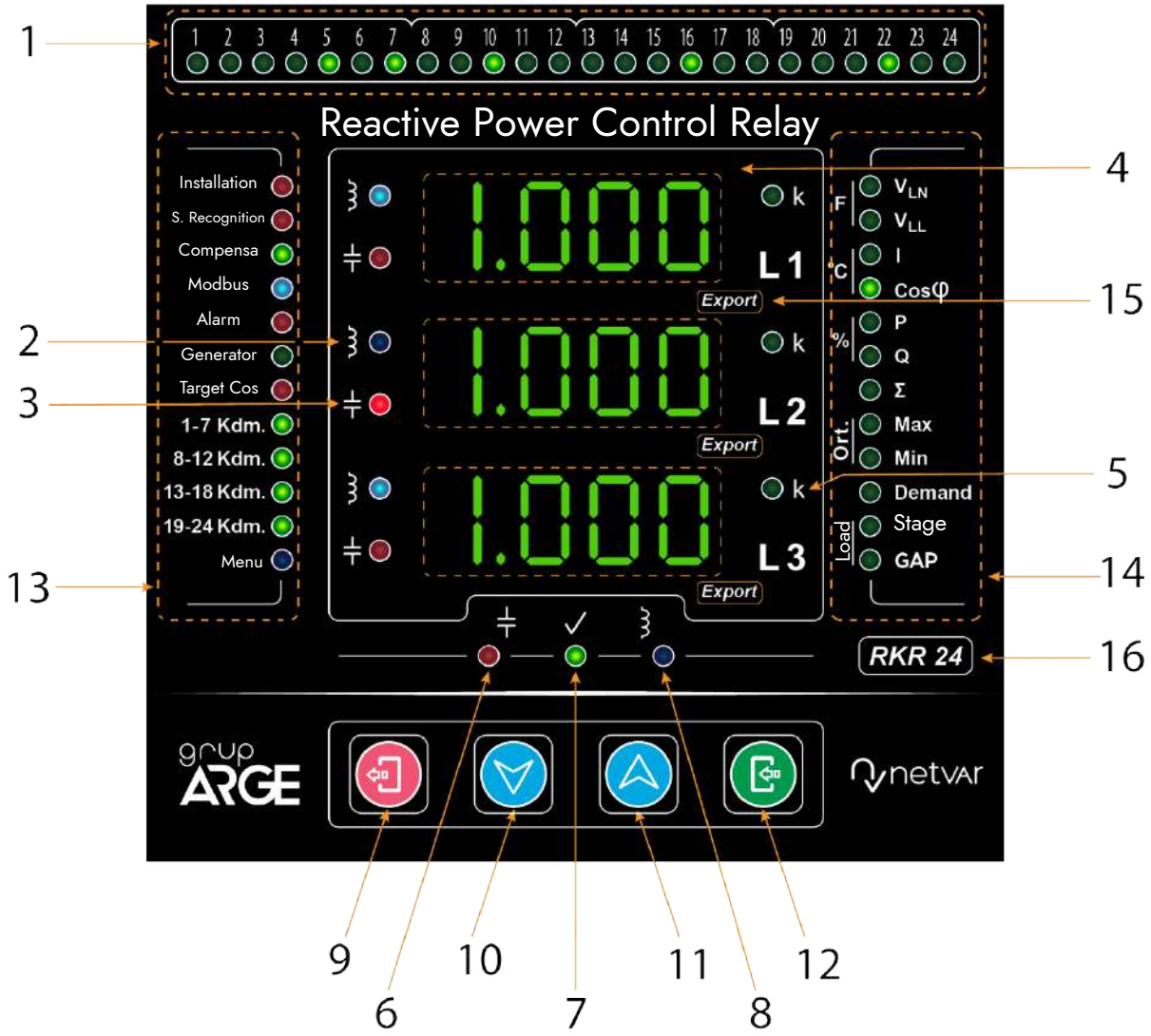
Example Error 24. Screenshot indicating that the stage has exceeded the pull-up/ release limit

(Check the connections and repeat the process at more stable current).

- In cases of faulty connections that the device cannot correct automatically, the operator corrects these errors by taking into account the warnings of the device and when the device is re-energized, the device automatically starts the installation and automatically switches to the stage recognition step if it does not encounter any errors.

NOTE: During setup and stage recognition operations, pressing and holding the Exit Key for 4 seconds will cancel and terminate the operation.

Reactive Power Control Relay Front Panel View



1 - Stage LEDs: These are the LEDs where all stage states are monitored. The LED of the tapped stage is switched on. The blinking LED indicates that the discharge time of the relevant stage is running. When the LED of the relevant stage turns off, the stage is ready to be activated.

2 - Inductive Load LED: When this LED is on, it means that the load drawn from the network is inductive.

3 - Capacitive Load LED: When this LED is on, it means that the load drawn from the network is capacitive.

4 - Seven Segment Display: All powers, ratios, values, warnings and menu parameters are monitored from this screen.

5 - K (x1000) LED: When this LED is lit, the values shown on the display must be multiplied by 1000. (kWatt, kVAr, kA...)

6 - Capacitive LED: It is the LED indicated by the sign on the lexan ≒. If the ratio of the reactive power drawn from any phase to the active power exceeds the determined capacitive limit, this red LED lights up.
7 - Normal LED: It is the LED indicated with its sign on the lexan ☑ . If the ratio of the reactive power drawn from all three phases to the active power is between the End / Close limits of the relay, the green colored normal LED lights up.
8 - Inductive LED: It is the LED indicated by the sign on the lexan } . If the ratio of the reactive power drawn from any phase to the active power exceeds the determined inductive limit, this blue LED lights up.
9 - Exit Key: It allows to return to a previous operation in the menu and return to a sub-menu.
10 - Down OK Key: Allows downward movement on the operation screen and in the menu.
11 - Up OK Key: Allows upward movement on the operation screen and in the menu.
12 - Enter Key: Allows to enter the menu and move to a sub-menu.

13 - Status LEDs:

Setup: Indicates that the device is in the setup state. If this LED flashes, it means that the device needs to be set up.
Stage Recognition: Indicates that the device is in stage recognition. If this LED flashes, it is understood that the stage recognition process of the device should be done.
Compensation: This LED indicates that the device is in compensation state and the best response is produced.

Modbus: This LED flashes when communication via Modbus occurs.

Alarm: This is the red LED that informs the user about warnings or problems occurring in the system. This LED turns off when alarms are deleted from the alarm menu.
Generator: This LED indicates that the system is fed from the generator.

Target Cos(φ): This LED lights when the default value of target cos(φ) of 1.00 is changed.

Common Feeding 1-7 Stage Terminal: Indicates that stages 1 to 7 are suitable to be used for compensation response. If this LED is not on, the stages in this group cannot be used.
Common Supply 8-12 Stage Terminal: Indicates that stages 8 through 12 are available for compensation response. If this LED is not lit, the stages in this group cannot be used.
Common Supply 13-18 Stage Terminal (for RKR18 and RKR24 devices): Indicates that steps 13 to 18 are available for compensation response. If this LED is not on, the stages in this group cannot be used.

Common Supply of 19-24 Stage Terminals (RKR24 only): Indicates that stages 19 to 24 are available to be used for compensation response. If this LED is not on, the stages in this group cannot be used.

Menu: This LED is on when you are in a menu. It flashes during editing.

Additional Power (RKR12 and RKR18 devices): This LED lights when the device adds additional reactive power in the compensation response.

Add Step (RKR12 only): Indicates that the total stage power is insufficient for the compensation response of the device and indicates that a stage should be added.

14 - Value LEDs:
VLN: Phase-neutral voltage values of L1, L2 and L3 phases are displayed.
VLL: Phase-phase (L-L) voltage values of L1-L2, L2-L3 and L3-L1 phases are displayed.

VLN and VLL (F): Frequency values for L1, L2 and L3 phases are shown.

I: Current values of L1, L2 and L3 phases are shown.

Cos(φ): Cos(φ) values of L1, L2 and L3 phases are shown.

P: Active power values of L1, L2 and L3 phases are shown.

Q: Reactive power values of L1, L2 and L3 phases are shown.

Q and Load: When these LEDs are on at the same time, the total reactive load drawn by the operation is displayed on the screen.
Q, ∑ and Step: It shows the total reactive power of the stages activated by the relay.

VLN, VLL, I, Max and Min: Top to bottom;

Line 1: Average voltage values of L1, L2 and L3 phases are shown.
Line 2: Average current values of L1, L2 and L3 phases are shown.
Row 3: Average frequency values of L1, L2 and L3 phases are shown.

P, Q, Max and Min: Top to bottom;

Line 1: Average active power values of L1, L2 and L3 phases are shown.
2nd Line: Average reactive power values of L1, L2 and L3 phases are shown.

Line 3: Average apparent power values of L1, L2 and L3 phases are shown.

P and Q: These LEDs turn on when the capacitive/inductive instantaneous ratios of each phase are shown on the display.

P, Q and ∑: Top-down;

Line 1: Inductive percentage ratio value is displayed.
Line 2: "%"
Line 3: The capacitive percentage ratio value is displayed.

P, ∑: The first line shows the total active energy  The lines below this line show the total active energy values.

NOTE: Since the lines have 4 characters, the digits after the first 4 digits of the active energy values will be displayed on the bottom line to avoid overflowing the bottom line.

If the active energy value is greater than an 8-digit number, the K(x1000) LEDs on the left side of the display will light up. For example, if a display like the one in Figure 2.1 appears, it should be understood that the active energy value is 435410 W.

Şekil 2.1 Toplam aktif enerjinin cihaz ekranındaki görüntüsü

Q, ∑: This index shows the total reactive energies (capacitive and inductive). Firstly, in the first line,  is shown. In the lines below this text, total inductive energies are displayed. To display the total capacitive energies, press the down arrow key. When this is done,  is displayed on the first line. In the lines below this text, total capacitive energy values are read.

NOTE: The display of total reactive energy values on the screen is the same as the display of total active energy values.

I and Cos(φ) (oC): When these two LEDs are lighted together, the approximate temperature of the panel is displayed instantaneously.

VLN and Demand: Voltage demand values of L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are blinking, then the values shown on the display are Export values.

I and Demand: Demand values of I1, I2 and I3 currents are displayed.

NOTE: If the Export LEDs are blinking, then the values shown on the display are Export values.

P and Demand: Demand values for P1, P2 and P3 powers are shown.

NOTE: If the Export LEDs are blinking, then the values shown on the display are Export values.

Q and Demand: Demand values for Q1, Q2 and Q3 powers are shown.

NOTE: If the Export LEDs are flashing, the values shown on the display are Export values.

VLN and Max: Maximum voltage (VMAX) values for L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

VLN and Min: The minimum voltage (VMIN) values for L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

I and Max: Maximum current (lMAX) values in phases L1, L2 and L3 are displayed.

NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

I and Min: The minimum current (lMIN) values in the phases of L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

P and Max: Maximum active power (PMAX) values of L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are flashing, the values shown on the display are Export values.

P and Min: The minimum active power (PMIN) values for L1, L2 and L3 phases are displayed. NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

Q and Max: Maximum reactive power (QMAX) values for L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

Q and Min: Minimum reactive power (QMIN) values for L1, L2 and L3 phases are displayed.

NOTE: If the Export LEDs are blinking, the values shown on the display are Export values.

Stage: This LED lights when the display shows information about the stages.

GAP: This LED lights when power samples are monitored. To access the power samples, the sub-menu must be entered from the menu.

15 - Export LED: When this LED flashes, it indicates that the relevant phase of the device is in export status.
16 - Product Model Number: Indicates the model of the product.

Reactive Power Control Relay Front Panel Key Functions

Enters menus and submenus, and also performs confirmation operations.

In the menu, it allows you to go back one step and exit the menu. On the work screen, it allows you to return to the main worksheet.

Allows navigation in the work screen detail pages and menus. It performs the process of increasing the values of the parameters.

Allows to navigate the work screen detail pages and menus. Performs the process of reducing the values of the parameters.

General Features

Reactive Control Relays: 3 phase current, phase-neutral and phase-phase voltages, frequency, active and reactive powers, angle difference between current and voltage can be measured and displayed on the screen. In addition, it measures and records active and reactive energies.

Demand and peak values for these measured quantities are also recorded by the Reactive Control Relay and can be displayed on the device.

Many necessary adjustments related to the device (Current Transformer Value, Measurement and Busbar Voltages etc.) can be made via the menu.

Thanks to the communication feature, all read parameters can be monitored remotely via the standard MODBUS protocol and various adjustments can be made.

It can give output in the value range for the quantities (Current, Voltage, Active and Reactive Power, Cos(φ) etc.) set via the device menu.

Technical Features

- 32-bit based microcontroller
- High efficiency with operating ambient temperature from -10 °C to +55 °C
- Easy access to stage recognition, setup, C.T value, MODBUS address, response time with Quick Menu
- Ability to set the desired value with the target Cos(φ) feature
- Ability to add virtual power to the business with the Additional Power feature
- Ability to check and display whether the relevant tap block is active or not with the ability to detect step partners
- Intelligent stage recognition and individual stage recognition
- Adjustable response time (with inductive, capacitive and normal options)
- RS-485 Standard MODBUS RTU protocol for ease of communication
- - 247 different Modbus addresses
- - Baud rate from 4800 bps up to 256000 bps
- - Modbus protection option for writing and reading
- Manual stage control for testing capacitor/reactor and related fuses and even related contactors
- Adjustable inductive and capacitive limit
- Adjustable hysteresis limit
- Automatic voltage-current matching
- Three different user modes (Lean, Master and Advanced modes)
- Ability to create a special PIN for high security needs
- Possibility of installation according to compensator characteristics (capacitive or inductive)
- Possibility of installation according to business profile (production or consumption)
- Adjustable current transformer value, adjustable line and measuring voltage
- Automatic finding and correction of current transformer connection directions
- Possibility to adjust the polarity direction of current transformers with three different modes (automatic, manual and reverse)
- Ability to save energy, demand, export, minimum and maximum values in permanent memory and delete them when desired
- Ability to synthesize stages thanks to the ability to view and analyze the power flow profile of the enterprise with the Power Flow Profile feature
- Thinnest ergonomic design with a depth of 48 mm allowing for narrow enclosure design
- Terminal block structure positioned for easy cable assembly
- Secure C.T. secondary installation with constant current terminal input allowing the use of 4 mm2 cables for long distances
- 0.5 mA measurement accuracy with automatic gain
- 0.5 mA - 6.0 A current measuring range

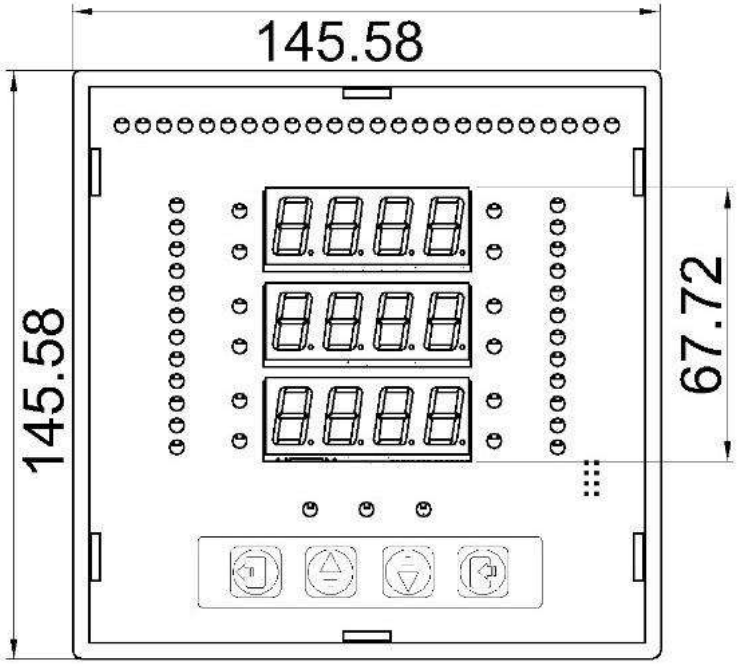
- 80 - 265 VAC voltage measurement range
- Ability to feed from any phase
- Safe operation in 80 - 280 VAC supply voltage range
- Equipment safe against voltage connection failure
- Phase - Neutral faulty connection detection
- 12, 18 and 24 Stage options
- Easy assembly and easy installation
- Ability to install monophase, diphase, triphase stages
- Installation options with capacitor or reactor stages
- Installation and compensation option with single current transformer
- Detection of various connection errors for current transformers
- Intelligent compensation response algorithm
- Ability to use single-phase reactor/capacitor stages simultaneously with capacitor/ reactor stages for compensation solution
- Intelligent/sequential/fast stage recognition in Adaptive mode
- Single stage recognition
- Recognize 1 stage in under 1 second
- Monophase, diphase, triphase capacitor and reactor recognition
- Manual stage input
- Non-interchangeable terminal block structure with different pin numbers for stage groups
- Feed control of grouped stage partners
- Capacitor and reactor can be freely connected to each stage
- 7 Segment LED display in bright green color
- Status and value indicators with Blue, Green and Red LEDs
- Determining the target Cos(φ)
- Ability to be fed via generator and different Cos(φ) setting in generator use
- Additional reactive power setting for inductive effect of MV power transformers or capacitive effect of long cables, which can be set for an optional period of time
- Power Flow Profile analysis sorted by energy/time/inductive/capacitance/ratio for stage synthesis
- Easy and fast operation
- Various warning/alarm codes
- Smart menu with 3-level access
- Indexed menu heading for technical support
- Turkish, English language options
- Show current access level in the main menu

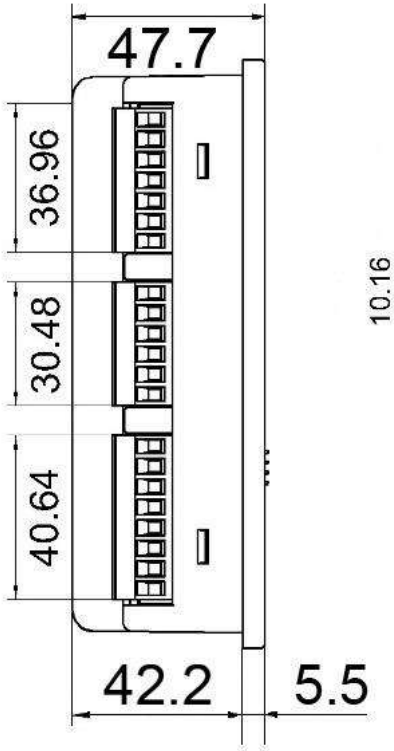
- PIN protection and different reset pins for each relay
- Various parameter settings and function calls from the menu
- Information menus with identification information such as serial number, software and hardware version, etc.

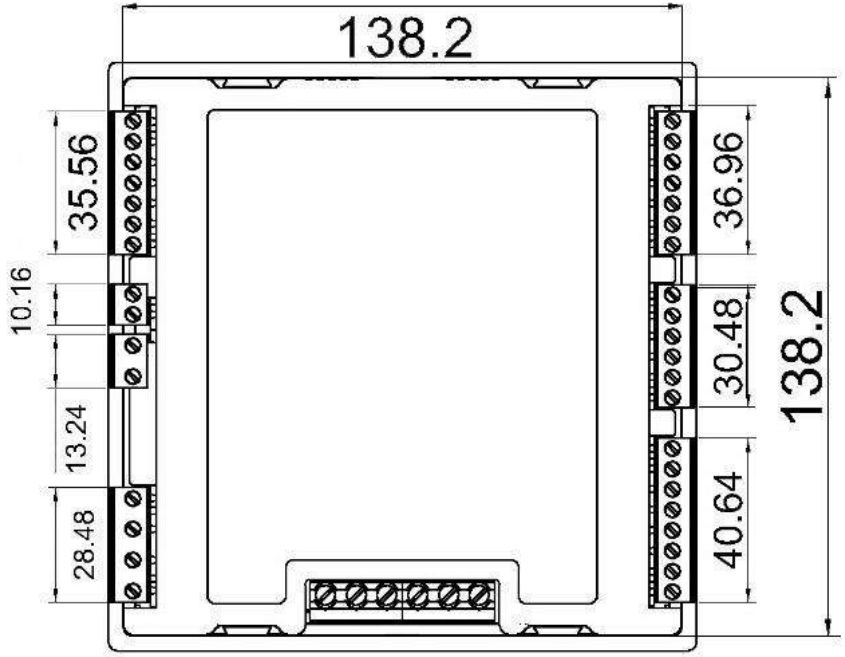
Observable Values:

- VLL, VLN, I, F, P, Q, Cos(φ), Q/P
- Instantaneous and Accumulated Inductive/Capacitive Q/P Ratio (%)
- Demand, Min, Max, Average values
- Active, Inductive/Capacitive energy indexes
- Export indexes, demand, mininum, maximum values
- Total phase-to-phase power of the drawn stages
- Instantaneous reactive loads drawn by the enterprise from each phase
- Approximate temperature of the panel
- Stage powers, number of uses
- Examples of Power Flow Profile

RKR 12/18/24 RELAY TECHNICAL DRAWING

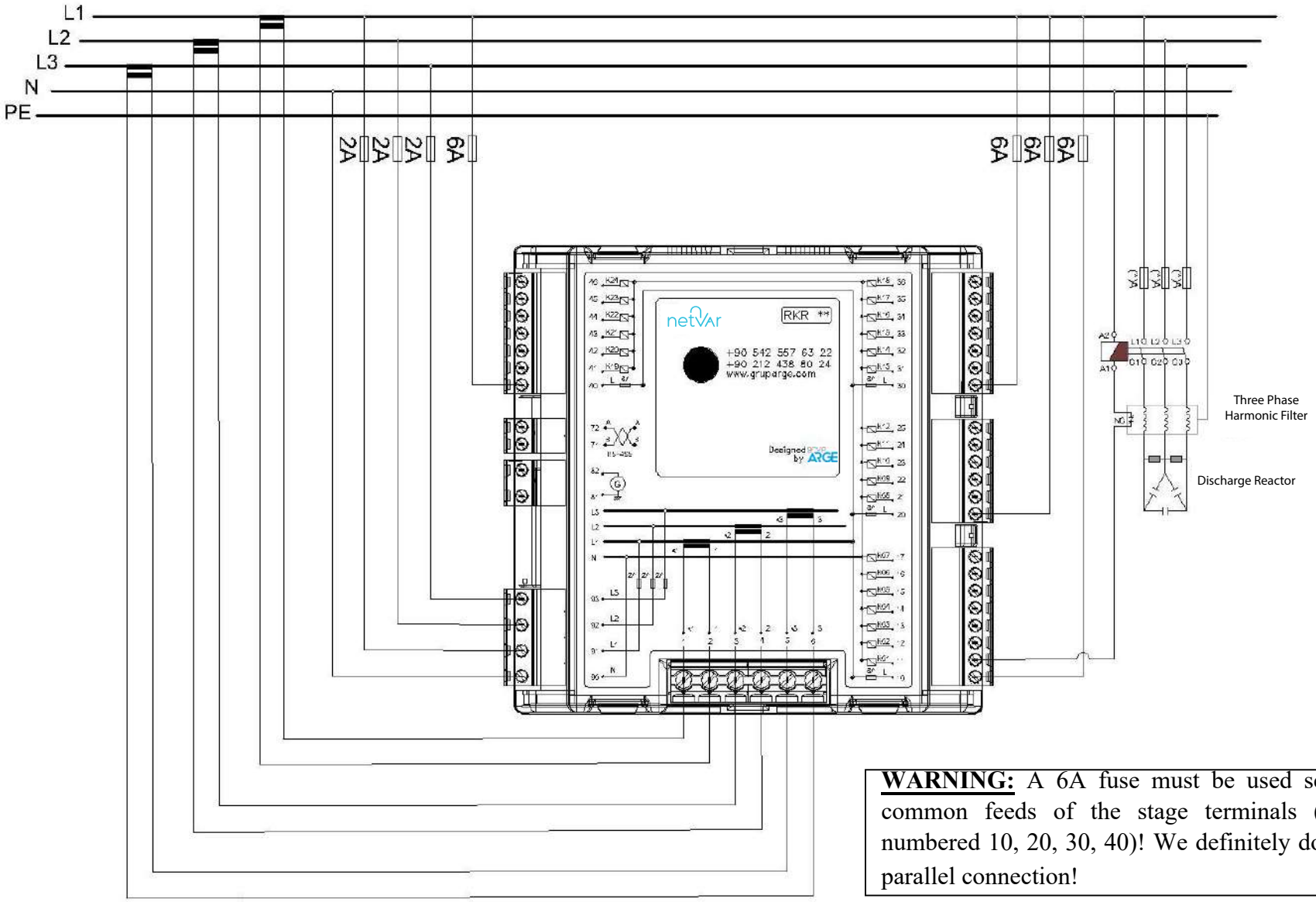






FRONT VIEW **SIDE VIEW** **BACK VIEW**

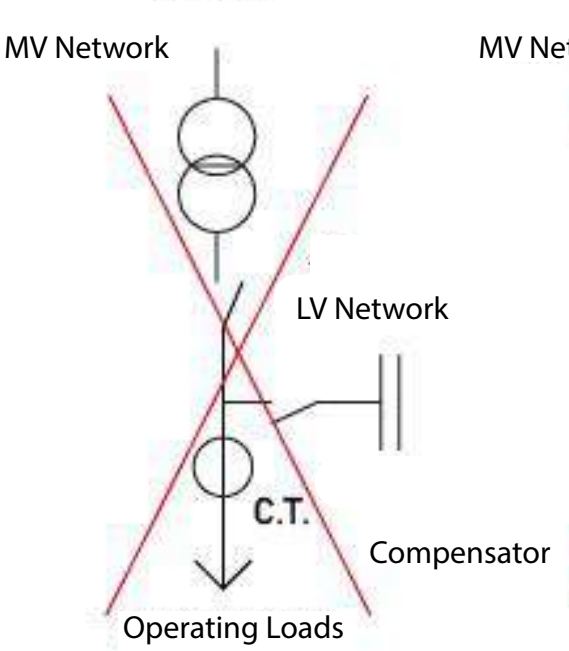
RKR 12/18/24 RELAY CONNECTION Diagram



WARNING: A 6A fuse must be used separately for the common feeds of the stage terminals (terminal entries numbered 10, 20, 30, 40)! We definitely do not recommend parallel connection!

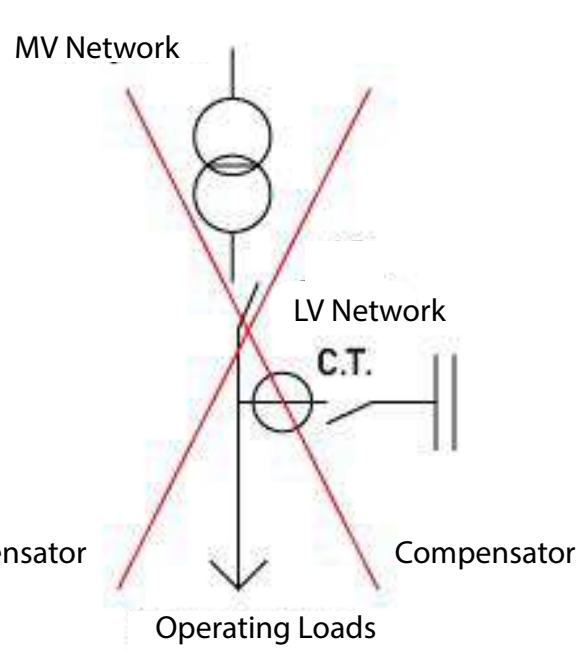
RKR 12/18/24 CURRENT TRANSFORMER CONNECTION DIAGRAM

Figure 1



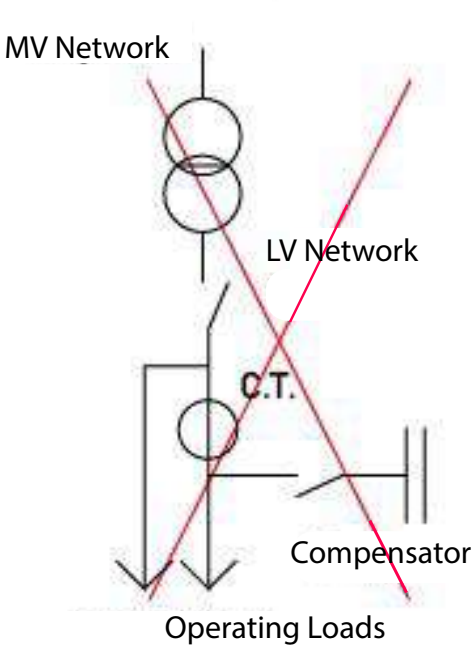
Incorrect Connection

Figure 2



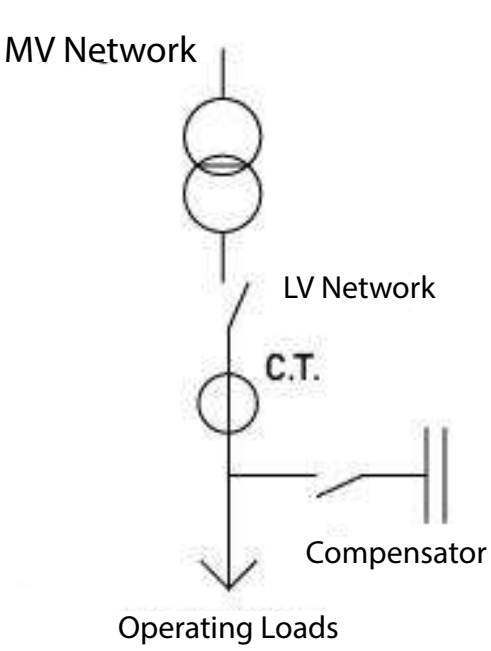
Incorrect Connection

Figure 3



Incorrect Connection

Figure 4



Correct Connection

If the feeds of the compensator stages in the panel have already been taken from the current transformer connection points, the device will naturally not be able to see the current of the stages since the currents of the compensators (capacitor or reactor) do not pass through the primary of the current transformers. In this case, installation will not be possible. Current transformers must be connected as shown in Figure 4.

Current transformers must be placed at the immediate output of the main switch of the plant.

User Access Levels

The device offers the user three different access levels. These access levels are shown on the first line when entering the menu and on the second line when entering subsequent sub-menus. In addition, the user can easily identify the selection on line 3, which flashes at regular intervals. In total there are three different user access levels:

Simple Level: The simplest user mode. After initial setup, the device starts to operate in this mode. If "Master" or "Advanced" access level PINs are entered, the device exits this mode. In this mode the user's ability to view and change settings is restricted. The user can only observe the read electrical quantities, step powers, alarms.

Figure 2.1. "Lean" access level seen in the first line when entering the menu

Figure 2.2. "Master" access level seen on the first line when entering the menu

Master Level: This is the mode where some settings can be made on the device in addition to the user mode. You can switch from "Lean" mode to "Master" mode by entering the 4-digit "Master" PIN. If desired, this PIN can be changed from the PIN settings menu.
The default PIN is set as "0000".

Advanced Level: The most advanced user mode. It is the mode where all settings related to the device can be made. You can switch from "Lean" and "Master" mode to "Advanced Access Level" by entering the 4-digit "Advanced Level" PIN. If desired, this PIN can be changed from the PIN settings menu.
When the device is in "Master Level" or *"Advanced Level" mode, it automatically switches to "Lean Level" 5 minutes after exiting the menu. The default PIN is set to "1000".*

Figure 2.3. "Advanced" access level seen on the first line when entering the menu

1. Quick Menu

This menu is a main menu where the most commonly used sub-menus are grouped together for quick access. It includes stage powers, stage menu with stage recognition and control, response time, setup and Modbus Address menus.

1.1. Stage (Step) Menu

It is the menu where operations such as displaying the power values related to the stages, starting the stage recognition processes, manually activating and deactivating the stages can be easily performed.

1.1.1. Stage (Step) Powers

Stage Powers menu is the menu that shows which stages are in the system and their stage powers. All stages can be displayed in order by using the Up and Down Arrow keys.

1.1.2. Stage (Step) Recognition

With stage recognition, the capacitor and reactor groups connected to the system are recognized. It is possible to recognize all or a selected one of the stages in the menu.

1.1.2.1. Recognizing All Stages

With stage recognition, all capacitor and reactor groups connected to the system are recognized. It works with automatic recognition method.

1.1.2.2. Single Stage Recognition

With this submenu, the desired stage is selected and the recognition of this selected stage is performed.

1.1.3. Manual Step Control

By activating the selected stage, compensator in the stage (capacitor or reactor), the fuse and contactor connected to that stage are also used to check whether they are working or not.

1.2. Response Time

With the response time menu, the number of seconds in which the device will respond to the system in the inductive and capacitive region is set. As the response time increases, the response speed of the device decreases, as it decreases, the speed increases. For example; response time is kept low in places with fast load changes. The default response time is 2 seconds.

1.3. Modbus Address

Modbus Address menu is the menu where the Modbus Address required for the device to communicate with Modbus protocol is displayed and set.

NOTE: Modbus Address can be set in the range of 1-247. User access level must be "Advanced" to make changes in this menu. The default Modbus Address is "1".

1.4. Setup

With the installation, voltage, current and tap connections are checked, and if there is a situation that may prevent the system from working properly, the user is informed about this situation. Installation is performed with this menu.

2. PIN

The PIN menu is used to switch between different user types or to set a new PIN.

2.1. Enter PIN

Enter menu where the PIN used to switch between different user types is entered.

2.2. New PIN

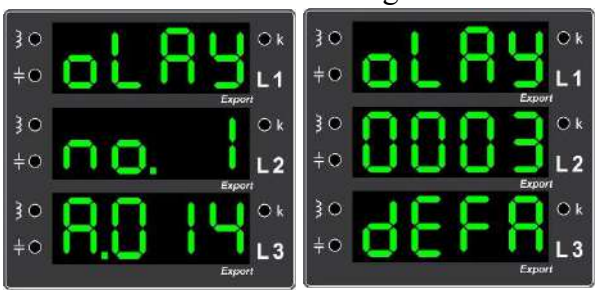
New menu where PINs can be changeYEn 1. In the PIN change process, the digits are changed between 0-9 with the direction keys starting from the first digit and the selected digit is confirmed with the Enter Key. This process is repeated for all 4 digits and finally the PIN is confirmed by pressing the Enter Key again.

3. Events

The device generates alarms and warnings to inform the user about certain situations. Details of the generated alarms are given in the sub-menus.

3.1. List

This menu lists which event (alarm or warning) occurred and how many times it occurred. When you enter this submenu with the Enter Key, the error codes of the events that have occurred can be displayed. The screen in this menu changes at certain intervals.



The second line of the first screen displays the sequence number of the event (this number is not the alarm error code, do not confuse it), and the third line displays the error code of the event.

The second screen shows the number of times this error is repeated. The meaning of the error codes can be found in the "Alarm Error Codes Table" (p. 48).

3.2. Set Values

In this menu, the alarm generation values of some alarm conditions (Low Voltage, High Voltage, High Temperature) can be seen and changed.

NOTE: You must be in "Advanced" mode to make changes in this menu.

3.2.1. Low Voltage Limit

This is the menu where the necessary settings are made for the device to alarm below the specified voltage value.
As factory output, this value is set to 180 V.

3.2.2. High Voltage Limit

This is the menu where the necessary settings are made for the device to alarm above the specified voltage value.
As factory default, this value is set to 250 V.

3.2.3. High Temperature Limit

This is the menu where the necessary setting is made for the device to alarm above the set temperature value.
As factory default, this value is set to 50 V.tır.

3.3. Delete

This menu deletes event records saved in the device.

4. Stage (Step)

It is the menu where operations such as displaying the power values related to the stages, manually changing the power values, performing stage recognition operations, and manually activating the stages can be easily performed.

4.1. Stage (Step) Power

Step Powers menu is the menu where the steps in the system and the step powers are displayed. All stages can be displayed in order by using the Up and Down Arrow keys. The power of the relevant stage can be changed manually with the Enter Key.
For manual step input, the access level of the device must be "advanced".

4.2. Stage (Step) Recognition

Stage Recognition Menu consists of 3 submenus.

4.2.1. All Levels

With this submenu, recognition of all levels is performed. It offers three different recognition methods to the user. To enter the menu, enter the main menu with the Enter Key. Enter the StEP menu from the main menu and navigate to the tAn submenu with the arrow keys. Enter with the Enter Key. Then, enter the HEP submenu.

4.2.1.1. Intelligent (Automatic) Recognition

This method first recognizes the idle steps that are not drawn and then recognizes the steps that are used for compensation. Thus, compensation and step recognition can be performed at the same time.

4.2.1.2. Sequential Recognition

When sequential recognition is started with the stages pulled, the device starts the recognition process starting from the first stage. When it reaches the drawn stage, it releases the relevant stage and continues. After the discharge time of the relevant stage is over, it performs the recognition process by pulling again.

4.2.1.3. Series Recognition

It is a serial recognition method. All stages used for compensation are left and recognition is performed sequentially.

4.2.2. Single Stage Recognition

With this submenu, the desired level is selected and only the selected level is recognized. To access the menu, enter by following the path 4.2.2. Select the desired step number with the arrow keys on the screen and press the Enter key to start the recognition of the desired step.

4.3. Stage (Step) Control

By activating the selected step, it is used to check whether the step and the related fuse and even the related contactors are working.

4.4. Stage (Step) Settings

It is the menu where some adjustments related to the stages are made.

4.4.1. Discharge Time

It is the menu where the discharge waiting time required for the capacitive characteristic stages to be reactivated after being deactivated is set.

4.4.2. Stage Partner

It is the menu where it is set whether the common contactor feeds of the step groups will be controlled automatically or not. The relay performs automatic control by default.

4.4.3. Simultaneous Aging

This menu is used to equalize the operating life of capacitor stages as much as possible for increased life and efficiency.

4.4.3.1. Control

In order to extend the life of the co-capacitors, it is the menu in which the feature of equalizing their in-circuit time is activated or deactivated.

4.4.3.2. Percentage

It is the menu where the percentage of the difference between the phase powers is set to accept the capacitors as equal.

4.4.4. Stage Interval Time

It is the menu where the time between the change of two steps during compensation is set.

4.4.5. Automatic Stage Recognition Setting

When the auto-recognition setting is enabled, when the relay statistically observes a problem with the stages during compensation, it switches to stage recognition and recognizes the stages and detects stage problems in the panel. By default, the automatic recognition setting is disabled.

5.Settings

Settings menu is the menu where many settings such as compensation, Modbus, display settings of the device are made and some information about the device can be displayed.

5.1. Transformer

Current and voltage transformers can be edited in the menu.

5.1.1. Current Transformer Value

Current Transformer Value can be displayed in the menu.S. 1. 1. can be entered by following the path. Using the up and down arrow keys, the current transformer can be set to the desired value. Select the desired value by pressing the Enter Key.

Values can be set according to the "Current Transformer Table" on page 46. Factory default current transformer value is set as 5/5 A.

5.1.2. Voltage - Current Matching

The menu shows which phase voltage matches which phase current. By paying attention to the reference information in this menu, it is determined where the relevant phase is physically connected.

5.1.3. Current Transformer Direction

The menu displays the direction of the currents. If the current direction is negative, it is expressed with - sign and if it is positive, it is expressed with !.

5.1.4. Line Voltage

Menüde bulunan değerler arasından hat gerilimi ayarlanır.

The line voltage is set from the values available in the menu.
The values can be set according to the "Line Voltage Table" on page 47. The factory default line voltage value is set to 400 V.

5.1.5. Measurement Voltage

The measuring voltage is set from the values available in the menu.

The values can be set according to the "Measuring Voltage Table" on page 47. The factory default measuring voltage value is set to 400 V.

5.1.6. Current Transformer Mode Menu

In the menu, the current transformer mode can only be monitored. There are 4 different modes available here. In the menu; If Pozt mode is selected, current directions are considered positive. If oto mode is selected, current directions will be detected automatically.If nEGt mode is selected, current directions are considered negative. If tErS mode is selected, current current direction is reversed.

5.2. Program

In this menu, the settings related to compensation can be programmed.

5.2.1. Penalty Limits

Penalty Limits menu is the menu in which the device sets which reactive limits the device will make compensation by considering. Inductive / If the capacitive percentage is out of these limit values, the device changes its stages by generating the compensation response after the normal response time has expired, if it is within these limit values and if there is a more suitable solution. The reason for this is to prevent unnecessary tap changes.

NOTE: Inductive and Capacitive limit can be set between 1% and 50%.

5.2.1.1. Inductive Limit Value

This is the menu where the inductive limit is set. After entering the menu with the Enter key, the desired value is selected with the direction keys and this value is saved again with the Enter key.

Factory default inductive limit value is set as 8%.

5.2.1.2. Capacitive Limit Value

This is the menu where capacitive limit is set. After entering the menu with the Enter key, the desired value is selected with the direction buttons and this value is saved again with the Enter key.
The factory set capacitive limit value is 12%.

5.2.2. Response Time

With the response time menu, the time intervals at which the device will generate compensation response to the system are set. It consists of three submenus. As the response time increases, the response speed of the device decreases; as the response time decreases, the response speed increases.
For example; response time should be decreased in places with fast load changes.

5.2.2.1. Inductive Response Time

This is the menu where the time required for a new response of the device against inductive loads is determined.
Factory default inductive response time is set as 2 seconds.

5.2.2.2.2. Capacitive Response Time

This is the menu where the time required for a new response of the device against capacitive loads is determined.
Factory default capacitive response time is set as 2 seconds.

5.2.2.3. Normal Response Time

This is the menu where the time required for the device to activate the better response, if any, in the normal state is determined.
Factory default normal response time is set to 120 seconds.

5.2.3. Additional Power

It consists of two submenus where you can define an additional load on the device and specify how long this additional load should be active.

5.2.3.1. Power

This menu allows the device to define additional reactive load. If an additional reactive load is defined, which can be entered as the total power of three phases (kVAr), the device compensates by considering this additional load.

5.2.3.2. Duration

If an additional reactive load is defined in the system and this load is desired to be active for a certain period of time, it can be set using the additional reactive load duration menu. If the value is 0, the additional power is defined indefinitely.
NOTE: You must be in "Advanced" mode to make changes in this menu.

5.2.4. Target Cos(φ)

This menu allows you to set the cos(φ) value that the device should reach when the device is connected to the mains. The device compensates according to this set target cos(φ) value. The default factory default cos(φ) value is 1.000.

5.2.5. Generator

This menu sets how the device will compensate when the generator is switched on.

5.2.5.1. Program

This menu is the menu that shows and sets whether the compensation feature of the device in "Generator" mode is activated or deactivated when the generator is activated.

5.2.5.2. Generator Cos(φ)

In generator mode, the device compensates according to the Generator Cos(φ) value set in this menu. Select the relevant cos(φ) value with the up and down buttons.

5.2.6. Hysteresis

Hysteresis ratio can be set for "Inductive", "Capacitive" and "Normal" states with the hysteresis menu. The device shows tolerance up to the hysteresis value entered with the hysteresis menu and does not change the current compensation status. Thus, the life of the stages is extended.

NOTE: Inductive, Capacitive and Normal Hysteresis ratios can be displayed in "Master" mode and changes can only be made in "Advanced" mode.

5.2.6.1. Inductive Hysteresis Ratio

This is the menu where the inductive hysteresis ratio can be displayed and changed. After entering the menu with the Enter key, the desired value is selected with the direction keys and this value is saved again with the Enter key.

NOTE: Inductive Hysteresis Ratio can be adjusted between 5% and 50%. Factory default inductive hysteresis ratio is set to 20%.

5.2.6.2.Capacitive Hysteresis Ratio

This is the menu where the capacitive hysteresis ratio can be displayed and changed. After entering the menu with the Enter key, the desired value is selected with the direction buttons and this value is saved with the Enter key again.

NOTE: Capacitive Hysteresis Ratio can be adjusted between 5% and 50%. Factory default capacitive hysteresis ratio is set to 20%..

5.2.6.3. Normal Hysteresis Rate

This is the menu where the normal hysteresis ratio can be displayed and changed. After entering the menu with the Enter key, the desired value is selected with the direction buttons and this value is saved with the Enter key again.
NOTE: Normal Hysteresis Rate can be adjusted between 3% and 50%. The factory default hysteresis rate is normally set to 10%.

5.2.7. Compensation Hysteresis

With this menu, the minimum value of the compensation hysteresis is set. For example; If the Minimum Compensation Hysteresis is set to 25 VAr, the device will not respond to hysteresis changes less than 25 VAr.
NOTE: You must be in "Advanced" access level mode to make changes in this menu.

5.2.8. Minimum Raw Hysteresis Value

This is the menu where the minimum raw hysteresis value can be displayed. It is provided for experts.

5.3. MODBUS

Modbus menu is the menu where Modbus settings required for the device to communicate with Modbus protocol are displayed and changes are made.

5.3.1. Modbus Address

Modbus Address menu is the menu where the Modbus address required for the device to communicate with the Modbus protocol can be displayed and changed.
NOTE: Modbus Address can be set in the range of 1-247. User level must be "Advanced" to make changes in this menu. The factory default Modbus Address of the device is 1.

5.3.2. Baud Rate Speed

In the Speed menu, the Modbus communication speed (Baud Rate) of the device is determined. The speeds can be changed with the direction keys and the desired communication speed can be selected with the Enter Key.
"4.8" if selected, the communication speed will be 4800 bps.
"9.6" if selected, the communication speed will be 9600 bps.
"19.2" if selected, the communication speed will be 19200 bps.
"38.4"if selected, the communication speed will be 38400 bps.
"57.6"if selected, the communication speed will be 57600 bps.
"115.2" if selected, the communication speed will be 115200 bps.
"256" if selected, the communication speed will be 256000 bps.

NOTE: The factory default Modbus speed of the device is 19200 bps.

5.4. Screen Settings

Display settings menu is the menu where the settings related to the display of the electrical quantities shown on the device are made.

5.4.1. Screen Display Index

This is the menu where the size to be observed permanently on the device screen is determined.

5.4.2. Language Menu

With this menu, various languages can be selected and the device can be used according to the selected language. The language option is set to Turkish at the factory.

5.4.3. Screen Type Selection

In the type menu, settings are made for the display of electrical quantities on the operation screen. There are three modes in this menu, Pro (Professional), FuLL (Full) and sAdE (Simple). If Pro mode is selected, all electrical parameters can be displayed on the work screen by changing them with the direction keys. If FuLL mode is selected, all parameters except export values can be displayed on the operation screen. If SAdE mode is selected, all electrical parameters except demand, min-max values are displayed on the operation screen.

Values shown on the work screen in Plain Mode:

- Phase-neutral voltage, Phase-phase voltage, Phase current and Frequency
- Active power (P), Reactive power (Q) (Inductive-Capacitive)
- Cos(φ), Phase phase instantaneous reactive ratios, Total reactive energy ratio, Display of activated step powers
- Inductive/Capacitive ratio, Total active energy, Total reactive energy (Inductive-Capacitive)

NOTE: The factory default operating screen of the device is plain mode. Values added to the operation screen in Advanced Mode:

- Phase-Neutral Voltage Demands, Current Demands, Active Power (P) Demands, Reactive Power
- (Q) Demands (Inductive-Capacitive)
- Phase-Neutral Maximum-Minimum Voltages
- Maximum-Minimum Current Values
- Maximum-Minimum Active Power(P), Maximum-Minimum Reactive Power(Q) (Inductive-Capacitive)

Values added to the work screen in Full Mode:

- Total Active Energy Export Values, Total Reactive Energy Export Values (Inductive-Capacitive)
- Export Values of Phase-Neutral Voltage Demands
- Export Values of Current Demands
- Export Values of Active Power (P) Demands, Export Values of Reactive Power (Q) Demands (Inductive-Capacitive)
- Export Values of Phase-Neutral Maximum-Minimum Voltages
- Maximum-Minimum Current Export Values, Maximum-Minimum Active Power (P) Export Values, Maximum-Minimum Reactive Power (Q) Export Values (Inductive-Capacitive)

5.4.4. Ekran Döngüsü

In this menu, settings related to the transition times of the indices on the working screen are made. When you enter the menu, you will see oto (automatic), Logo (logo) and SurE(duration) options.

5.4.4.1. Automatic

If EuEt **is selected in this menu, the work screens will change automatically.**

5.4.4.2. Logo

If EuEt is selected in this menu, the work screens will automatically change to the business logo.

5.4.4.3. Duration

Automatic changeover time (between 1 - 180 sec.) can be set with the Duration mode.
At the factory this value is set to 180 seconds.

5.5. Professional Settings

This menu contains more advanced settings.

5.5.1. Device Off-On

This menu allows the device to be turned off and restarted via the menu. When this is done, the pulled stages are released in a controlled manner.

5.5.2. Factory Settings

The factory settings of the device can be restored with the help of this menu.

5.5.3. Device Reset

This is the menu for resetting the device. After resetting, the device is restored to its unboxed state and works starting from the setup phase.

5.5.4. Earnings Multiplier

This is the menu where the current gain multiplier can be displayed. It is provided for access by experts.

5.5.5. Reset Response Time

When the device is within the reactive limits, it is the menu with the parameter that sets the time after which the inductive and capacitive response times will be reset. It is provided for experts.

5.5.6. Next Response Time

It is the menu with the parameter that sets how long the relay will wait for the next solution when the response produced by the relay is outside the set reactive limit values. It is provided for experts.

5.5.7. New Response Time

It is the menu with the parameter where the response generation period after the first normal response time within the device reactive limits is set. It is provided for experts.

5.5.8. Developer Menu

This is the menu where the developer will make adjustments. Do not navigate and make adjustments in this menu without technical knowledge and expert control.

5.6. Information

This menu contains the serial number Sr.no, software version YSur, hardware version dSur, parameter version PArU,access level ErSE, language settings d.L, operating hours CASA, reset status rSt.S .

6. Power Flow Profile

Power Flow Profile menu is the section where the reactive power samples drawn by the company are listed. This list can be accessed with the "Power Samples" submenu. These samples can be sorted "According to Duration", "According to Inductance", "According to Capacitance", "According to Energy" and "According to Rate" with the Enter Key.

6.1. Example

This is the menu where the powers and percentages of Power Flow Profile instances are observed.

6.2. Delete

A submenu where saved Power Flow Profile samples are deleted.

6.3. Percentage Limit

Samples in the Power Flow Profile are allocated according to this percentage limit value. If the percentage difference between samples is greater than this percentage limit, the device allocates a new recording place for the current sample in the power flow profile. As the GAP fills up, the instrument automatically increases the percentage and re-evaluates the samples to make room for new samples in the profile.

7. Analyzer

This menu is used to delete the saved values of various variables.

7.1. Delete Energy Values

If you want to reset the energy values, select the  option with the direction keys and confirm this option with the Enter Key. Thus, energies are deleted.

7.3. Delete Peak Values

This is the menu where the minimum and maximum values of electrical quantities are deleted. In this menu, if YES is selected with the Enter Key, the minimum and maximum values of the current electrical quantities will be deleted.

7.4. Delete Demand Values

This is the menu where the current demand values are deleted. If YES is selected here, you will see two options, EvEt and HAYr. If EvEt is selected, demand values are deleted.

8. Installation

With the installation, current, voltage and tap connections are checked and if there is a situation that may prevent the system from working properly, the user is informed about this situation. With this menu, installation settings are changed and installation is performed.

Recommendations for Installation with Capacitors:

- In order to get results in a shorter time during installation with capacitors, it is recommended to connect capacitors to the first stages starting with three-phase large power ones and reactors to the last stages.
- If compensators (capacitor or reactor) are placed in stages in a mixed way, without taking into account their characteristics, it is advisable to switch off the supply fuses of the reactors before starting the installation with capacitors.

Recommendations for Installation with Reactors:

- In order to get results in a shorter time during installation with reactors, it is recommended to connect the reactors to the first stages starting with the three-phase large power ones and the capacitors to the last stages.
- If compensators (capacitor or reactor) are mixed in stages without taking into account their characteristics, it is advisable to switch off the supply fuses of the capacitors before starting the installation with reactors.

The factory default installation setting is set to installation with capacitors.

8.1. Start Setup

Manual installation is started with the SEt option under the YAP menu.

8.2. Setup Settings

This is the menu where all settings of the installation are made.

8.2.1. Type

This is the submenu where it can be determined whether the installation will be done with capacitors or reactors. It is factory set to install with capacitors.

NOTE: Installation with reactors is required in panels where inductive characteristic compensators are mainly used; installation with capacitors is required in panels where capacitive characteristic compensators are mainly used.

8.2.2. Automatic Voltage - Current Matching

When this menu is activated by selecting the EuEt option, the voltage inputs and current inputs are automatically matched by the device during setup. As factory default, automatic matching is enabled.

8.2.3. Number of Tests

This is the menu where the decision is made after how many successful measurements are made during installation.

8.2.4. Automatic Control

It is the menu where it is determined whether the relay is automatically checked for connection changes and errors after installation. This setting is disabled as factory default.

8.2.5. Skip Setup

When necessary, this menu can be used to permanently skip the installation after three installation attempts. In this way, step recognition can be switched to. In this case, the operator is responsible.

8.2.6. Measurement Current Reference

This is the menu where the phase or phases of the current reference of the device can be displayed and adjusted. With this parameter, L1, L2 or L3 phase current can be taken as reference and the relay can be operated as single phase.

8.2.7. Measurement Error Percentage for Installation

This is the menu where the measurement error of the device during installation can be set as a percentage.

8.3. Installation (Setup) Professional Settings

This is the menu with professional settings for installation and basic settings of the device. It includes parameters that can only be changed by experts.

8.3.1. ÇMultiplier Value

This is the menu where the sensitivity multiplier for step recognition and setup is set. This multiplier value can be changed by experts.

8.3.2. Installation Sensitivity

This is the expert menu from which the sensitivity value at which the setup starts is set.

8.3.3. Active Power Limit Percentage

This is the menu with the percentage parameter where the minimum active power change valid in the installation is determined. This parameter can be changed by experts.

8.3.4. Reactive Power Limit Percentage

It is the menu with the percentage parameter where the minimum reactive power change valid in the installation is determined. This parameter can be changed by experts.

8.3.5. Current Difference Percentage

This is the menu with the percentage parameter where the minimum current change valid in the installation is determined. This parameter can be changed by experts.

8.3.6. Current Limit Percentage

This is the menu with the percentage parameter where the minimum current limit value valid in the installation is determined. This parameter can be changed by experts.

EVENT (WARNING, ALARM) CODES and DESCRIPTIONS

	Event Code	Event Names		Event Code	Event Names
WARNING	U.011	1. Line Weak	ALARMLAR	A.510	1. Stage Block Error
	U.012	2. Line Weak		A.511	1. Stage Block Phase 1 Error
	U.013	3. Line Weak		A.512	1. Stage Block Phase 2 Error
	U.021	1. Line Voltage Zero		A.513	1. Stage Block Phase 3 Error
	U.022	2. Line Voltage Zero		A.520	2. Stage Block Error
	U.023	3. Line Voltage Zero		A.521	2. Stage Block Phase 1 Error
	U.041	Installation Started		A.522	2. Stage Block Phase 2 Error
	U.042	Stage Recognition Initiated		A.523	2. Stage Block Phase 3 Error
	U.050	All Stages Deleted		A.530	3. Stage Block Error
	U.051	Energy Indices Deleted		A.531	3. Stage Block Phase 1 Error
	U.052	Min-Max. Values Deleted		A.532	3. Stage Block Phase 2 Error
	U.053	Demands Deleted		A.533	3. Stage Block Phase 3 Error
	U.054	Rates Deleted		A.540	4. Stage Block Error
	U.055	GAP Values Deleted		A.541	4. Stage Block Phase 1 Error
	U.061	GAP Compressed		A.542	4. Stage Block Phase 2 Error
	U.071	Manual Step Entered		A.543	4. Stage Block Phase 3 Error
	U.072	Recognition Stopped		...	...
	U.073	Installation Stopped		A.600	Over Current
	U.074	Default Values Set		A.601	1. Line High Current
	U.081	Incorrect PIN Entered		A.602	2. Line High Current
	U.082	PIN Changed		A.603	3. Line High Current
	U.083	Private PIN Entered		A.611	1. Line Low Voltage
	U.101	Stage 1 Added		A.612	2. Line Low Voltage
	U.102	Stage 2 Added		A.613	3. Line Low Voltage
	U.103	Stage 3 Added		A.621	1. Line High Voltage
	...	...		A.622	2. Line High Voltage
ALARMLAR	A.201	Stage 1 Changed		A.623	3. Line High Voltage
	A.202	Stage 2 Changed		A.630	Over Inductive
	...	...		A.631	Over Capacitive
	A.301	Stage 1 Broken		A.632	Add Capacitor
	A.302	Stage 2 Broken		A.633	Add Reactor
	...	...		A.634	Current Transformer Value Error
	A.401	Stage 1 Imbalance		A.635	Current Transformer Direction Changed.
	A.402	Stage 2 Imbalance		A.636	Current Transformer Connection Error
	...	...		A.637	Voltage - Current Unmatched
	A.501	Stage Common 1 Error		A.638	Initial Setup Stopped.
	A.502	Stage Common 2 Error		A.639	First Installation Canceled
	A.503	Stage Common 3 Error		A.700	Excess Harmonics
	A.504	Stage Common 4 Error		A.701	Extreme Temperature
	...	...		A.710	Modbus Access Denied
	A.507	No Stage		A.720	GAP Table Full
	A.508	Stage Connection Error		S.Err	System Error

MODBUS MAP

Communication Parameters

BAUDRATE : 19200 BPS (default)

DATA BITS : 8

PARITY : NONE

STOP BITS : 1

Parameters that can be read, written and deleted via Modbus in remote access are shown in the Modbus Maps table. In the table, in the R/W/E column;

R → Parameter values can be read,

W → Parameter can be written to,

E → Indicates that the parameter value can be deleted.

Note: The parameter can have more than one feature at the same time. For example, if R/W is written in the column, it indicates that the parameter can be both read and written.

To access the Modbus Map:

https://www.gruparge.com/wp-content/uploads/2022/10/rkr-serisi-modbus-haritasi.pdf

TABLES

CURRENT TRANSFORMER PRIMARY VALUE (X/5 A) TABLE

Index	Other	Index	Other	Index	Other
0	5 A	23	240 A	47	1500 A
1	10 A	24	250 A	48	1600 A
2	15 A	25	300 A	49	1800 A
3	20 A	26	330 A	50	2000 A
4	25 A	27	350 A	51	2200 A
5	30 A	28	360 A	52	2400 A
6	40 A	29	400 A	53	2500 A
7	50 A	30	450 A	54	2600 A
8	60 A	31	500 A	55	3000 A
9	70 A	32	520 A	56	3200 A
10	75 A	33	550 A	57	3500 A
11	80 A	34	600 A	58	3600 A
12	90 A	35	630 A	59	4000 A
13	100 A	36	650 A	60	4500 A
14	120 A	37	700 A	61	5000 A
15	125 A	38	730 A	62	5500 A
16	130 A	39	750 A	63	6000 A
17	150 A	40	800 A	64	6500 A
18	160 A	41	900 A	65	7000 A
19	175 A	42	1000 A	66	7500 A
20	180 A	43	1100 A	67	8000 A
21	200 A	44	1200 A	68	8500 A
22	225 A	45	1250 A	69	10000 A
		46	1400 A		

Current Transformer Table: The values indicated by the indices in this table used for Menu and Modbus are divided by 5, the nominal value of the secondary current, to calculate the current transformer value. Ex: Current transformer value with index 12 is 90/5=18,
The 35th index current transformer value is 630/5=126.

LINE VOLTAGE VALUE TABLE

Index	Other	Index	Other	Index	Other
0	173 V	17	850 V	33	28500 V
1	190 V	18	900 V	34	29250 V
2	200 V	19	1000 V	35	30000 V
3	208 V	20	3600 V	36	30750 V
4	220 V	21	6300 V	37	30800 V
5	380 V	22	7200 V	38	31500 V
6	400 V	23	10500 V	39	32000 V
7	415 V	24	11000 V	40	32800 V
8	440 V	25	12000 V	41	33000 V
9	480 V	26	13800 V	42	33600 V
10	500 V	27	14000 V	43	34500 V
11	525 V	28	15000 V	44	35000 V
12	550 V	29	15800 V	45	35400 V
13	650 V	30	17000 V	46	36000 V
14	690 V	31	17500 V	47	36200 V
15	725 V	32	24000 V	48	38500 V
16	800 V			49	46000 V

Line Voltage Table: This table is used for Menu and Modbus and the values indicated by the indices in this table can be selected for line voltage. For example: 17th index line voltage is 850 V, 23rd index line voltage is 10500 V.

MEASUREMENT VOLTAGE VALUE TABLE

Index	Other	Index	Other	Index	Other
0	22 V	8	110 V	16	400 V
1	25 V	9	120 V	17	415 V
2	30 V	10	173 V	18	440 V
3	33 V	11	190 V	19	480 V
4	36 V	12	200 V	20	525 V
5	40 V	13	208 V	21	600 V
6	50 V	14	220 V	22	690 V
7	100 V	15	380 V	23	725 V

Measuring Voltage Table: This table is used for Menu and Modbus and the values indicated by the indices in this table can be selected for the measurement voltage. For example: Measuring voltage with index 9 is 120 V, measuring voltage with index 16 is 400 V.