

RKR S12 / RKR S18 USER MANUAL



Proper Use and Safety Requirements

- ⚠ Cut off all power when the device is connected to and disconnected from the panel.
- ⚠ The device works with current transformers. Never leave the current transformer terminals unattended! Dangerously high voltages can occur.
- ⚠ The installation, assembly, commissioning and operation of this device must be carried out and used only by suitably qualified persons, in accordance with safety regulations and instructions.
- ⚠ When a technical problem is encountered, please intervene in the device and contact the technical service as soon as possible.
- ⚠ Do not clean the device with solvent or similar substance. Only use dry cloth!
- ⚠ In case of disregarding the warnings mentioned above our company or authorized dealer from the negative consequences that may arise cannot be held responsible in any way.
- ♻ Do not throw the device in the trash, it should be taken to the device collection centers (electronic waste recycling points). It should be recycled or destroyed without harming nature and human health.



For more information in other languages, please scan the QR code by mobile device or visit gruparge.com/rkrsvc

General Features

While RKR S12 / S18 Relays compensate each phase of the operation independently from each other, they can calculate the currents of 3 phases, phase-neutral and phase-phase voltages, frequencies, active and reactive powers, current/voltage harmonics, angle differences between current and voltage and many similar line sizes. It gives the opportunity to measure and watch on the screen.

The demand and peak values for these measured quantities are also recorded in the Reactive Control Relay and displayed on the device.

Many necessary adjustments related to the device (Current transformer value, Measurement and busbar voltages, Response times, etc. dozens of parameter values) can be made via the menu.

Thanks to the communication feature, all read parameters can be monitored remotely over the standard Modbus protocol and adjustments can be made for the writable ones.

Technical Specifications

- 32bit ARM Core based 180MHz microcontroller
- High efficiency with operating ambient temperature between -10 °C and +55 °C
- Easy access to step recognition, setup and basic parameters via Quick Menu
- Automatic current - voltage matching in setup
- Automatic current direction correction at installation
- Options for installation with capacitor or reactor steps
- Ability to set up with SVC steps
- Easy assembly and easy installation
- Ability to install with 3-phase or mono-phase compensators available in each phase
- Installation and compensation option with a single current transformer
- Ability to detect that C.T.s are looping on the secondary side during installation
- Possibility to determine the desired reactive ratio with the target $\text{Cos}(\varphi)$ feature
- Possibility to add virtual inductive / capacitive power to the enterprise with the Additional Power feature
- Ability to check and display whether the relevant tier group is active with the feature of detecting tier partners
- Smart step recognition, individual step recognition, SVC step recognition and group recognition feature
- Ease of communication with RS-485 Modbus RTU protocol and 247 different modbus addresses
- Data rate from 4800 bps to 115200 bps
- Modbus protection option in writing and reading
- Testing of capacitors/reactors, related fuses and related contactors for each step can be done in manual step control section.
- Adjustable response times

- Adjustable inductive and capacitive limit values
- Adjustable hysteresis limit values
- Possibility of installation according to the compensator characteristics
- Option to disable compensation in production
- Adjustable current transformer value, adjustable line and measuring voltage
- Ability to save energy, demand, export, minimum and maximum values to the permanent memory and delete them when desired
- Slim ergonomic design with a depth of 48 mm that allows narrow panel design
- Positioned terminal structure suitable for easy cable assembly
- Safe C.T. secondary assembly with constant current terminal input that allows the use of 4 mm² cable for long distances.
- Correct measurement and compensation capability with correction ratios of each phase, even when all 3 current transformers have different conversion ratios.
- 0.5 mA measuring accuracy with automatic gain
- 0.5 mA - 6.5 A current measuring range
- 0 - 285 VAC phase neutral measuring voltage range
- Safe operation in the 80 - 285 VAC supply voltage range
- Being able to be fed from any phase (only one of the 3 voltage inputs has voltage is enough for the relay to work)
- Safe hardware against voltage connection failure
- Phase - Neutral faulty connection detection
- SVC +12 and +18 step options
- SVC steps with a resolution of 10000 steps
- SVC usage option that can be adjusted according to the active power ratio
- Ability to automatically match SVC drive trigger control signals
- SVC shunt reactor thermal input and warnings protected against high voltage and wrong connections
- Measuring up to 63rd harmonic for current and voltage and displaying on screens
- Capacitive compensation capability with only SVC steps
- Detection of transmission errors that occur over time in current transformer secondary connections
- Detection of various faulty connections and improper connections for voltage inputs, step partners, generator inputs and current transformers in the installation
- Smart compensation response algorithm
- Ability to use mono-phase reactor/capacitor steps simultaneously with capacitor/reactor steps for compensation solution
- Smart/sequential/fast range recognition in adaptive mode for all options recognizing
- All steps recognition
- Single step recognition
- Recognizing SVC steps
- Recognizing the groups (1-7, 8-12, 13-18) steps

- Recognizing a stepper in 1.5 - 2 seconds
- Ability to recognize monophasic, diphasic, triphasic capacitor and reactor
- Automatic detection of uninsured partners of step Groups and warning messages
- Easy display for manual step value entry
- Co-aging and settings for steps
- Detection of faulty steps during compensation and automatic recognition orientation
- During compensation, C.T. automatic detection of secondary disconnections
- AC/DC supply control, setting and warnings for grouped step partners
- Terminal structure with different pin numbers that cannot be replaced for step groups
- Feed control of grouped step partners
- Capacitor and reactor can be freely connected to each step
- 3.5 inch TFT color screen with 320x480 Resolution
- Screen saver that can be changed by remote monitoring and customer/company contact information displayed on the status line
- Smart key information line showing which menu will be brought to the screen when the keys are pressed.
- Warning and information messages on pop-up screens
- Informative messages on the status line for setup, step recognition, warnings and operating states
- Status line whose background color changes according to exceeding the inductive and capacitive limits
- Ability to freely connect capacitors or reactors to each step
- Timed and indefinite target $\cos(\varphi)$ setting and warning
- Option to disable compensation with generator control input
- Different $\cos(\varphi)$ setting in generator usage
- Inductive of MV transformer or capacitive effect of long cables etc. 3-phase balanced and indefinite additional reactive power input, which can be determined as optional time / indefinitely, and each phase can be entered independently against unbalance.

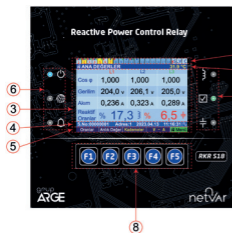
According to the energy/time/inductive/capacitive/ratio required for the panel step arrangement ranked Reactive Power Profile (RGP) analysis

- Safe shutdown that prevents data loss by detecting power cuts early
- Safe device reset for steps
- Real time clock
- Measurement and warning of approximate panel temperature
- Internal supply voltage measurement and warning of the relay
- Ability to see and remotely read the reactive powers drawn by the enterprise on the phase-by-phase screen
- Ability to see and remotely read the total power of the active steps on the phase-by-phase display
- Responding with SVC within 1-2 seconds of being energized

- High resolution with 32-bit Modbus data width for line parameters and 64-bit for energy indices
- Rich event/warning/fault codes with date and time signature
- Rich content menus and screens with useful visual design that works very fast
- Easily see the status of the relay with colors and icons
- Detailed main values and compensation screen
- Phasor diagram
- Four-zone detailed vector representation for Powers
- Colored and rich range information bar/row for all ranges
- All energy indices compatible with meter modes
- Smart menu with quick access to setup and step recognition when necessary
- Turkish and English language support
- Show current access step in main menu
- Option to enable and disable password protection
- Various parameter settings and function calls from the menu
- Device information menus with identification information such as serial number and hardware version
- Ability to detect phase sequence change and direct to automatic installation
- Short-term Power Failure detection and warning message
- Over and under voltage, over harmonic / temperature protection and warning messages in compensation
- Display of step details (use time, number of usage, phase phase powers) and status

INTRODUCTION

Front Panel View



- 1) Step Information Bar
- 2) Title Bar
- 3) Main Value Display Screen
- 4) Device Status Bar
- 5) Functional Key Information Line
- 6) Feeding, Communication and Alarm Indicator Led Section
- 7) Instant Reactive Limit Exceeded Indicator Led Section
- 8) Functional Key Section

1) Step Information Bar

Except for the power and statistical values of the compensation steps, It is the section where all kinds of information and status can be observed.

Group 2, Group 3 and SVC Group divided into 4 subsections. Information and status of the steps can be easily understood from the background colors and the color and quantity of the numbers and phase bars. Whether the steps are recognized, whether the type is a capacitor or a reactor, whether it is single-phase or three-phase, in which phases it is located, whether it is balanced or unbalanced, whether it is activated, whether it is in discharge or ready, whether its value has changed, whether it is cancelled. It can be easily observed from this section whether there is a new one, whether it is added or not and whether it is manually activated. In addition, it can be followed from this section which step is selected or not during single step recognition, manual step input and step control.

2) Title Bar

In this line, the title names that indicate what the values and graphics displayed on the main screen mean are displayed with a visual effect. On the right side of the bar, the internal temperature of the device, the common voltage values of the step groups and SVC status are displayed. When the menu is entered, the menu title name is written here.

3) Main Value Display Screen

This is the section where all kinds of line, step, analysis, energy and statistical information and sizes, graphics and tables presented to the user by the device are displayed in the main and sub-windows of these main screens. You can navigate on the main screens with the **F3** and **F4** keys, and the sub screens of the selected main screen with the **F1** and **F2** keys. The information on which screen will be displayed on the right, left, above and below the displayed screen is followed on the key information line (5). The name of the current screen that the user is observing is displayed in the Title Bar (2).

4) Device Status Bar

The serial number of the device, CT rate, Modbus Address, Date and Time are displayed here. On the far right of the bar, different icons give information about the status of the device. In addition, in this status bar, very detailed information about all kinds of information and warning statuses of the device is presented to the user. With Customer Information Line via remote monitoring and control customized 40 letter message is also displayed here alternately. By looking at the background color of the status bar, it is understood with the help of this bar whether the device exceeds the inductive and capacitive limits over the total energies of the device. If the background is blue, it is understood that inductive and capacitive limits are exceeded. In normal condition, the background color of the status bar is green.

5) Functional Button Information Line

It is the information line where the functions of the **F1** to **F5** keys are dynamically displayed with short description texts above each key. The information on which screen to go to on the right, left, top and bottom of the screen is briefly displayed on this key information line.

6) Supply, Communication and Alarm Indicator LED Section

From the LED's in this section, the upper LED indicates whether there is power in the device, the middle LED indicates whether the device is communicating, and the lower LED indicates the warning and error status of the device. whether or not it occurs.

7) Instant Reactive Limit Excess Indicator LED Section

The device lights the top of these three LEDs in case of exceeding the inductive limit, the bottom one in case of exceeding the capacitive limit, and the middle one in case of not exceeding the limit. If additional reactive load or target $\text{Cos}(\phi)$ is defined, these leds will flash and the user will be informed.

8) Functional Keypad

F1 - F4 keys are used for the user to navigate easily on the main and sub screens of the device. By pressing the **F5** key for a short time, the menu of the device is accessed, if pressed for a long time, the main screen is directly accessed from the current screen. Available even if pressed for too long the main screen shown is assigned as the default screen. The **F5** key assumes the cancel function during setup and step recognition processes. The ongoing recognition or setup process can be canceled by long pressing the **F5** key. The **F3** and **F4** keys are used to navigate the main screens, while the **F1** and **F2** keys are used to navigate the sub screens. The **F1** and **F2** keys are customized according to the selected main screen. They are used to achieve different purposes in step groups and details, power profile examples, event and warning list, harmonics and similar functions.

SETUP

- After the device connections are made in accordance with the connection diagram, the device is energized.
- When the device is energized, the "Current-Transformer Ratio (C.T)" pop-up appears on the screen. After the current transformer ratio is entered and confirmed with the help of the **F4** and **F5** keys, the first installation starts automatically.
- If the installation is skipped at this step, the device warns regularly and automatically directs the user to the installation option in the quick menu when the menu screen is opened.
- If you want to re-install after the first installation, the installation can be started by selecting the desired installation option from the installation menu of the device.

Connection Diagram

