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RGM-12S
USER MANUAL

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Index

About RGM-12S

RGM-12S reactive power control relay is designed to reduce inductive powers not used by loads but drawn from the network. If inductive reactive power is drawn from the network, it intervenes by activating capacitors of appropriate value. In this way, it tries to bring the Cos fi value to the desired level.

Features

- 7 Different Compensation Programs
- Manual Compensation Option
- Easy to Install and Use with 20mm. 4 Digit Led Display
- Can Only Compensate Inductive Systems
- Automatic Step Measurement
- Step Drive, Release and Discharge Times are Adjustable
- Voltage and Current Harmonic Alarm Values Adjustable
- Over and Under Compensation Alarm Values Can Be Set
- Voltage, Harmonic Voltage/Current, Over and Under Compensation Alarm Output
- Voltage, Current and Frequency Values Can Be Monitored
- Active Power, Reactive Power and Apparent Power Values Can be Monitored
- Up to the 15th harmonic THD-I Can Be Monitored
- Up to the 15th harmonic THD-V Can Be Monitored
- Cosine Value Can Be Monitored
- Power Factor Value Can Be Monitored
- Capacitive/Active and Inductive/Active Ratios Can Be Monitored
- Automatic Fan Output
- Step Values Can Be Monitored
- Same Aging in Steps (In Certain Compensation Programs)

Warnings

- Use the device in accordance with the instructions set by us.
- After the device is mounted, leave a space of at least 10 cm. behind it.
- Fix the device to the front cover of the panel with the accompanying apparatus.
- Balance the inside and outside temperature in metal panels. Otherwise, water droplets are formed on the ceiling of the panel due to the temperature difference in humid environments and this is dangerous for open connected busbars.
- Include a switch or circuit breaker in the assembly.
- Mark the switch or circuit breaker as the disconnection element of the device.
- Keep the switch and circuit breaker close to the device and within easy reach of the operator.
- During installation, there should be no electricity in the connection cables.
- Shielded and twisted cord cables should be used in input and output lines that are not connected to the network. These cables should not be passed near high power lines and devices.

Matters to be Considered in Power Factor Correction

- Compensation begins with the balanced arrangement of the load distribution in the electrical installation of the system.
- **For the current transformer test, connect three phase capacitors in 1/40 (*) of the current transformer value to the first two (C1 and C2) stages of the device.**
  (* : The total value of the first two steps.)
- It is recommended to add new stages with the same value in terms of the lifetime of contactors and capacitors in frequently used stages.
- While preparing the compensation panel, make sure that new steps can be easily added for changes that may occur later.
- Make sure that there is no rapid load change in the system while performing current transformer test and step measurement.
- Select the fuse current values used in the steps according to the capacitor power and mark the connection as a lifting element.
- Use separate fuses for supply coils of step contactors.
- Use compensation contactors and discharge coils in the steps.
- Single phase connection in three phase systems is only suitable for balanced load draws. Otherwise, the desired rates will not be achieved.

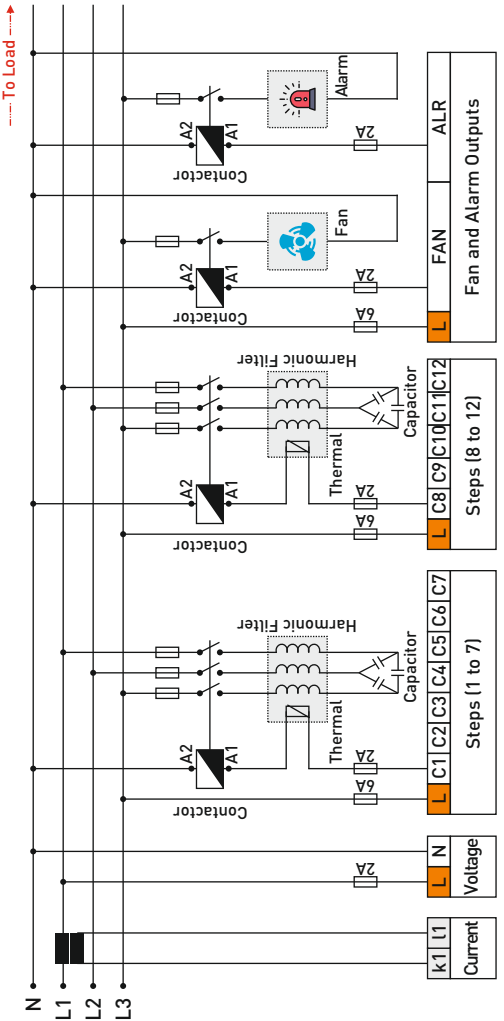
Considerations in Current Transformer Selection and Connection

- Make sure that the current transformer value is higher than the maximum current drawn from the system.
- It is recommended that the class of the current transformers to be used in compensation systems should be 0.5.
- Only X/5A current transformers can be connected to the RGM-12S.
- Make sure that there is no load before the current transformers. Otherwise, there will be differences in consumption and rates between the device and the electricity meter.
- The current transformer must be connected to the phase from which the voltage input of the device is received. Otherwise, the device will not be able to perform the current transformer test.
- Current transformer output cables should not be close to the high voltage line.
- It is recommended to use minimum 1.5mm² of cables to be connected to current transformer output ends. As the distance gets longer, it is recommended to thicken the cable or to use a current transformer with high output power.
- Fix the current transformer to the busbar, cable or rail so that it does not shake.
- The cable connected to the current transformer output ends should be made as one piece as possible. Otherwise, there may be errors in the measurements and the current transformer test may not be performed.

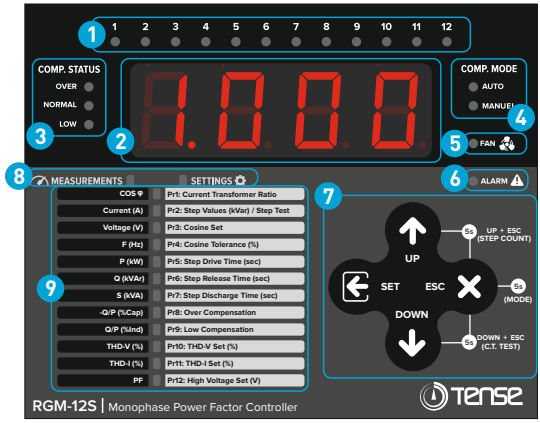
Maintenance of the Device

Power off the device and disconnect it from the connections. Clean the body of the device with a slightly damp or dry cloth. Do not use conductors or other chemicals that could damage the device as cleaning agents. After the device is cleaned, make its connections and make sure that the device is powered and working.

Single Phase Connection Diagram (L-N)



Screen Introduction



1- Step LEDs: These are the LEDs that light up when the steps are active.

2- LED Display: It is the screen where all measurements, settings and notifications regarding the device are transferred to the user.

3- Status LEDs: Compensation status notification LEDs.

OVER: If the cosine value is above the overcompensation value, this LED turns on.

NORMAL: If the cosine value is between the over and under compensation values, this LED will light.

LOW: If the cosine value is below the undercompensation value, this LED turns on.

4- Compensation Mode LED: Indicates the compensation mode of the device.

5- Fan LED: It is the LED that lights up to inform the user when the fan output is active.

6- Alarm LED: It is the LED that lights up to warn the user in alarm situations.

7- Buttons: They are used for monitoring measurements and making settings.

ESC Button: When pressed while in the menu, it returns to the upper menu without saving the values. When pressed outside the menu (on the measurement screens) it always brings up the Cosine measurement screen. When pressed for 5 seconds, Compensation Mode screen is entered.

SET Button: Enters the menu/parameter. If the parameter has been changed, it will save and exit the parameter.

UP Button: Scrolls through measured values outside the menu. Switches between parameters while in the menu. Increases the selected value while inside the parameters.

DOWN Button: Scrolls through measured values outside the menu. Switches between parameters while in the menu. Decreases the selected value while inside the parameters.

UP + ESC Button: Step Count screen is entered when these two buttons are pressed together for 5 sec.

DOWN + ESC Button: C.T. test screen is entered when these two buttons are pressed together for 5 sec.

8- Measurments & Settings LEDs: Indicates that the device is in the measurement or setting menu.

9- Value & Parameter LEDs: When the device is in the measurement menu, it informs that the measured value is displayed on the screen, and the parameter is displayed while in the setting menu.

Measurement Screens

Figure-1 (Cos φ)

Figure-2 (Current (A))

Figure-3 (Voltage (V))

Figure-12 (PF)

Figure-4 (F (Hz))

While on the measurement screen, the "MEASUREMENTS" led on the device lights up. While this LED is on, the values shown on the screen are the values of the measurements. If you move by pressing the down button while the MEASUREMENTS led is on, the following measurement values will be displayed sequentially. Pressing the up button will display the previous measurement parameter. While showing these values, the led for the related measurement value lights up.

Figure-11 (THD-I (%))

Figure-5 (P (kW))

Figure-1: It shows the cosine value.
Figure-2: It shows the current value.
Figure-3: It shows the voltage value.
Figure-4: It shows the frequency value.
Figure-5: It shows the active power value.
Figure-6: It shows the reactive power value.
Figure-7: It shows the apparent power value.
Figure-8: It shows the capacitive/active ratio (%) value.
Figure-9: It shows the inductive/active ratio (%) value.
Figure-10: It shows the THD-V (%) value.
Figure-11: It shows the THD-I (%) value.
Figure-12: It shows the power factor value.

Figure-10 (THD-V (%))

Figure-6 (Q (kVAr))

Figure-9 (Q/P (%Ind))

Figure-8 (-Q/P (%Cap))

Figure-7 (S (kVA))

Setting Screen

Figure-1 SET (2sec.)

The device shows the Cosine value on the measurements screen on the left. While on any measurement screen, the SET button is pressed for 2 seconds in order to enter the menu.

Figure-13 (Pr.1)

Figure-14 (Pr.2)

Figure-15 (Pr.3)

In order to enter the setting screen, "SET" button must be pressed for 2 seconds while in the measurements screen. "SETTINGS" led on the device lights up while on the setting screen. While this LED is on, the values shown on the screen are the values of the device settings. If you move by pressing the down button while the SETTINGS led is on, the values of the following setting parameters will be displayed sequentially. While showing these values, the led for the related measurement value lights up. To change the value of a parameter in the menu, enter the menu and reach the relevant parameter with the help of up / down buttons. Then press the SET button to enter the relevant parameter, when you enter the parameter, the led of the parameter will start to blink. Then adjust the value you want with the up / down buttons and press the SET button to save it. The device will save the value and return to the upper menu. After this process, the parameter led will stop flashing and turn on steady.

Figure-24 (Pr.12)

Figure-16 (Pr.4)

Figure-23 (Pr.11)

Figure-17 (Pr.5)

Figure-22 (Pr.10)

Figure-18 (Pr.6)

Figure-21 (Pr.9)

Figure-20 (Pr.8)

Figure-19 (Pr.7)

Figure-13: Pr1: Current Transformer Ratio
Figure-14: Pr2: Step Values
Figure-15: Pr3: Cosine Set Value
Figure-16: Pr4: Cosine Tolerance Value
Figure-17: Pr5: Step Drive Time (sec.)
Figure-18: Pr6: Step Release Time (sec.)
Figure-19: Pr7: Step Discharge Time (sec.)
Figure-20: Pr8: Over Compensation Value
Figure-21: Pr9: Under Compensation Value
Figure-22: Pr10: THD-V Set Value (%)
Figure-23: Pr11: THD-I Set Value (%)
Figure-24: Pr12: High Voltage Set Value

Changing the Program: The device has 7 different compensation programs. The first 6 of these modes operate automatically and when one of these modes is activated, the "AUTO" led on the device turns on. The 7th mode is manual program and works in manual mode. When this mode is active, the "MANUAL" led on the device lights up.

In order to change the program, when you press the "ESC" button for 5 seconds while on the measurement screen (while MEASUREMENTS led is on), it enters the compensation program selection screen and the default compensation program is displayed on the screen. While the compensation program is displayed on the screen (auto, rot.1, rot.2, rot.3, rot.4, babb or noAt (manual)), you can switch between programs with the Down and Up buttons. While the program you want to select as a compensation program is displayed on the screen, you can save the selection by pressing the SET button. After the compensation program selection is saved, the device returns to the cosine screen and starts compensation according to the selected compensation program.

Auto: It intervenes according to the step values. It activate the required step. Works in accordance with same aging. While the device is in this program, the "Auto" led turns on.

! After the program selection, the 1st step measurement should be done.

Rotation-1: In this mode, all steps must have the same value. It is sufficient to measure only the 1st step in step measurement. It automatically saves the next steps at the value of this step and compensates accordingly. (For example: If the first step is 5kVAr, it records all other steps as 5kVAr.) It works in accordance with same aging. When the device is in this mode, the "Auto" led turns on.

! After the program selection, the 1st step measurement should be done.

Rotation-2: In this mode, the 2nd and subsequent steps must have the same value and twice the value of the 1st step. It is sufficient to measure only the 1st step in step measurement. It automatically saves the next steps at 2 times the value of the 1st step and compensates accordingly. (For example: If the first stage is 10kVAr, it records all other steps as 20kVAr.) It works in accordance with same aging. When the device is in this mode, the "Auto" led turns on.

! After the program selection, the 1st step measurement should be done.

Rotation-3: In this mode, the 2nd step should be 2 times the value of the 1st step and the 3rd and next steps must be twice the value of the 2nd step. It is sufficient to measure only the 1st step in step measurement. It automatically saves the next steps according to the above rule and compensates accordingly. (For example: If the 1st step is 5kVAr, it records the 2nd step as 10kVAr and all the other stages as 20kVAr.) It works in accordance with same aging. When the device is in this mode, the "Auto" led turns on.

! After the program selection, the 1st step measurement should be done.

Rotation-4: In this mode, the 2nd step must be 2 times the 1st step, the 3rd step must be 2 times the 2nd step, the 4th step and the next steps must be 2 times the 3rd step. It is sufficient to measure only the 1st step in step measurement. It automatically saves the next steps according to the above rule and compensates accordingly. (For example: If the 1st level is 5kVAr, it records the 2nd step as 10kVAr, the 3rd step as 20kVAr, the 4th step and all the other steps as 40kVAr.) It works in accordance with same aging. When the device is in this mode, the "Auto" led turns on.

Settings ☛ Program (Intervention Logic) Change

Start Over and Drop Mode: In this mode, steps should be at the lowest value in the first step and at the highest value in the last step. (From small to large value) Compensation is not made according to the step value, therefore there is no need for step measurement. When the step is to be activated, it always starts with the first step and activates the other steps one by one. When the step is to be deactivated, it always starts with the first step and deactivates the other steps one by one. It does not works in accordance with same aging. When the device is in this mode, the "Auto" led turns on.

Manuel Mode: In this mode, the cosine value is displayed on the screen. Each time the "UP" button is pressed, one step is activated, starting from the first step. Whenever the "DOWN" button is pressed, one step is deactivated sequentially, starting from the last activated step. It does not works in accordance with same aging. When the device is in this mode, the "Manuel" led turns on.

Note: When the manual mode is selected, if there are steps that are activated, these steps are deactivated sequentially.

Not2: In this mode, the "ESC" button should be used to switch between measurement screens.

Settings ☛ Determining the Step Count

Determining the Step Count to be Used: It determines with how many steps the device will compensate. In order to determine the step count to be used, while the device is on the measurement screen (while MEASUREMENTS led is on). When you press the "ESC" and "UP" buttons together for 5 seconds, it enters the step count determination screen and the default step count (current setting of the device) is displayed on the screen. With the DOWN and UP buttons you can determine the step count to be used. While the step count to be used is displayed on the screen, you can save the selection by pressing the SET button or exit without saving by pressing the ESC button. After the selection is saved, the device returns to the cosine screen and starts compensation according to the selected step count.

For example: If you save by pressing the SET button while St.8 is written on the screen, the device starts to compensate with only the first 8 steps. It does not use other steps.

Performing Current Transformer Test: For the current transformer test, it is necessary to enter the Current Transformer Ratio first. Please examine the section "Current Transformer Ratio" in the manual to enter the current transformer ratio.

In order to make a current transformer test, when you press the "ESC" and "DOWN" buttons together for 5 seconds while on the measurement screen (while MEASUREMENTS led is on), "test" written will appear on the screen. When you press the "SET" button, the device starts the current transformer test. SETTINGS led and Pr1: Current Transformer led turns on steadily. The device performs the current transformer connection test by activating and deactivating the 1st and 2nd stages respectively. If there is no problem in the connection (reverse connection of current transformer k-l terminals is not important) "true" written is displayed on the screen. Press the SET button to save the test and press the ESC button to return to the previous menu without saving.

Err0 Error: If you get an "Err0" error in the current transformer test, it means the voltage value that feeds the device is lower than 160V. Check the connections and perform a current transformer test again after eliminating the error.

Err1 Error: If you get an "Err1" error in the current transformer test, there may be a loose contact in the current transformer output connections (s1 (k) and s2 (l). Check the connections and perform a current transformer test again after eliminating the error.

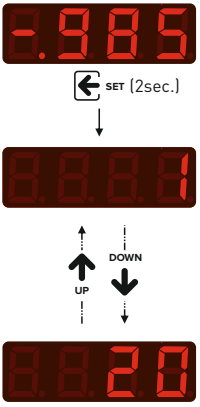
Err2 Error: If you get an "Err2" error in the current transformer test, it means that the step current is insufficient. In order for the current transformer test to be completed successfully, the total value of the 1st and 2nd step must be 1 in 40 of the current transformer value.

(For example: For a 50 / 5A current transformer, the total value of the capacitors connected to the 1st and 2nd step must be at least 1.2kVAr (three phase).)

For the Err2 error, please make sure that; The life of the capacitors may be over, the capacitors may not be energized, the capacitor feeding may have been taken before the current transformer, the current transformer ratio may not be entered to the device.

Err3 Error: If you get an "Err3" error in the current transformer test, it means there is an error in the current and voltage sequence. The phase to which the current transformer is connected and the phase that feeds the device may not be the same. In addition, fast load changes in the system, defective contactors/capacitors, loose connections at the current ends/steps outputs may also cause this error Check the connections and perform current transformer test again after eliminating the error.

Settings ☛ Current Transformer Ratio



Entering Current Transformer Ratio: In order to change the Current Transformer Ratio, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. While this parameter is displayed on the screen, the led (Pr1: Current Transformer Ratio) of the parameter also lights up steadily. To change the value of this parameter, press the "SET" button and see that the led for the parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Example: If the Current Transformer Value is 100/5A, the ratio value to be entered in Pr1 is "20". (100/5 = 20)

Settings ☛ Monitoring Step Values

Monitoring Step Values: In order to see the step values that the device measures automatically, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr2: Step Values parameter. To see the step values, press the "SET" button and see that the led of the Pr2 parameter is blinking.

While the parameter led is blinking, you can see the step values by using the DOWN and UP buttons. While the step value is displayed on the screen, the information of which step this value belongs to is associated with the step leds on the top of the screen. Press the DOWN and UP buttons to switch between the step values and press the ESC button to return to the previous menu.

NOTE: When entering this menu, the device deactivates the activated steps one by one.

Making Automatic Step Measurement: In order to make an automaticly step measurement, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr2: Step Values parameter. To see the step values, press the "SET" button and see that the led of the Pr2 parameter is blinking.

Measuring a Single Step: If you press the SET button while the step value is on the screen, the device starts measuring the step for the selected step. When step measurement is started, on the screen shows the information for which step the measurement was made. (For example: St.1 = means 1st step.) After the step measurement is completed for the selected step, the step value is displayed on the screen. Press the SET button to save the measured value, then exit the menu by pressing the ESC button. Also, press the ESC button to cancel the operation during the measurement and return to the previous menu without saving the value after the measurement is completed.

Measuring All Steps: To have all the steps measured, switch between the steps by pressing the DOWN button. When you press the DOWN button again after the 12th step, "ALL" will appear on the display. When you press the SET button while the word "ALL" is displayed on the screen, the device starts from the 1st step and activates all the steps one by one and makes the step measurement. After each step measurement, the measured value is displayed on the screen for 2 seconds, and then the measurement is made for the next step. After the measurement is completed for all steps, press the SET button to save the measured step values, then exit the menu by pressing the ESC button. Also, press the "ESC" button to cancel the operation during the measurement and return to the previous menu without saving the value after the measurement is completed.

NOTE: The lowest capacitor value that can be connected to a step is 90 VAR and the highest is 250 kVAR.

NOTE: When entering this menu, the device deactivates the activated steps one by one.

Settings ☛ Cosine Set Value

Adjusting the Cosine Set Value: The target cosine set value for compensation is set with this parameter. In order to change the cosine value, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr3: Cosine Set parameter. To see the parameter value, press the "SET" button and see that the led of the Pr3 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Settings ☛ Cosine Tolerance Value

Adjusting the Cosine Tolerance Value: It is the movement area that will be given to the device in inductive and capacitive directions in order to ensure less on/off in order to extend the life of contactors, capacitors and reactors in the steps. The device will not change its current intervention for reactive power changes within the Cosine SET Value ± Cosine Tolerance Value area.

In order to change the cosine tolerance value, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr4: Cosine Tolerance parameter. To see the parameter value, press the "SET" button and see that the led of the Pr4 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Example: If the SET value is 0.940 and the tolerance value is ± 10, the device will not change its current intervention for reactive power changes between the cosine value of 0.930 and 0.950. If it is out of this value, the device continues its intervention if there is an appropriate step value in the system according to the drawn reactive power.

Settings ☛ Step Drive Time

Adjusting the Step Drive Time: It determines the step drive (activation) time to intervene in the power change in the system. In order to change this value, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr5: Step Drive Time parameter. To see the parameter value, press the "SET" button and see that the led of the Pr5 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Settings ☛ Step Release Time

Adjusting the Step Release Time: It determines the time to release the active step in order to intervene in the power change in the system. In order to change this value, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr6: Step Release Time parameter. To see the parameter value, press the "SET" button and see that the led of the Pr6 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Settings ☛ Step Discharge Time

Adjusting the Step Discharge Time: It determines the capacitor discharge (reactivate the same step) time. In order to change this value, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr7: Step Discharge Time parameter. To see the parameter value, press the "SET" button and see that the led of the Pr7 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Settings ☛ Over Compensation

Adjusting the Over Compensation Value: In case the Cosine value stays above the Over Compensation Value for 3 minutes although the device disables all steps, it enters an overcompensation error, the alarm relay is energized, the OVER led flashes while the alarm and SETTINGS leds are constantly lit. When the cosine value returns to the normal level for 10 seconds, the device disables the overcompensation error, the alarm relay is deactivated, the alarm and OVER led turn off, the cosine led turns on.

In order to change this value, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

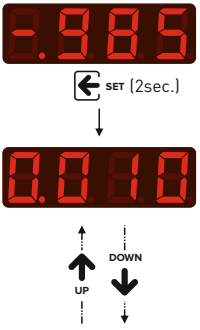
After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr8: Over Compensation parameter. To see the parameter value, press the "SET" button and see that the led of the Pr8 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Example: Let Cosine set: 0.940, Cosine tolerance: 10 and overcompensation: 10. If the cosine value stays above 0.960 for 3 minutes even though it deactivates all steps, this error occurs. If the cosine value goes below 0.950 for 10 seconds after the error, the error situation will disappear.

NOTE: This feature is disabled in manual mode.



Adjusting the Low Compensation Value: In case the Cosine value stays under the Low Compensation Value for 3 minutes although the device activates all steps, it enters an undercompensation error, the alarm relay is energized, the LOW led flashes while the alarm and SETTINGS leds are constantly lit. When the cosine value returns to the normal level for 10 seconds, the device disables the undercompensation error, the alarm relay is deactivated, the alarm and LOW led turn off, the cosine led turns on.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr9: Low Compensation Time parameter. To see the parameter value, press the "SET" button and see that the led of the Pr9 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily. When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Example: Let Cosine set: 0.940, Cosine tolerance: 10 and low compensation: 10. If the cosine value stays under 0.920 for 3 minutes even though it activates all steps, this error occurs. If the cosine value goes above 0.930 for 10 seconds after the error, the error situation will disappear.

NOTE: This feature is disabled in manual mode.

Settings ☛ Harmonic Voltage

Adjusting the THD-V Value: If the Total Harmonic Distortion Voltage (THD-V) value stays above the THD-V Set value for 15 seconds, the device enters a THD-V error, it stops compensation, the alarm relay isenergized (it deacitivates all steps), the alarm led turns on and the THDV led (Pr10: THD -V Set) flashes. When the THD-V value stays below 3% of the THD-V set value for 15 seconds, the device disables the THD-V error, the alarm relay is deenergized, the alarm and THD-V led (Pr10: THD-V Set) turns off, the Cosine led turns on. The device restarts compensation.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr10: TDH-V Set parameter. To see the parameter value, press the "SET" button and see that the led of the Pr10 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Settings ☛ Harmonic Current

Adjusting the THD-I Value: If the Total Harmonic Distortion Current (THD-I) value stays above the THD-I Set value for 120 seconds, the device enters a THD-I error, it stops compensation, the alarm relay isenergized (it deacitivates all steps), the alarm led turns on and the THDI led (Pr11: THD-I Set) flashes. When the THD-I value stays below 5% of the THD-I set value for 60 seconds, the device disables the THD-I error, the alarm relay is deenergized, the alarm and THD-I led (Pr11: THD-I Set) turns off, the Cosine led turns on. The device restarts compensation.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr11: TDH-I Set parameter. To see the parameter value, press the "SET" button and see that the led of the Pr11 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

Settings ☛ High Voltage

Adjusting the High Voltage Value: If the Voltage value stays above the High Voltage Set value for 5 seconds, the device enters a High Voltage error, it stops compensation, the alarm relay isenergized (it deacitivates all steps), the alarm led turns on and the High Voltage led (Pr12: High Voltage) flashes. When the Voltage value stays below 10V of the High Voltage set value for 5 seconds, the device disables the High Voltage error, the alarm relay is deenergized, the alarm and High Voltage led (Pr12: High Voltage) turns off, the Cosine led turns on. The device restarts compensation.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr12: High Voltage parameter. To see the parameter value, press the "SET" button and see that the led of the Pr12 parameter is blinking.

When the parameter led is blinking, you can change the value of the parameter by using the DOWN and UP buttons. After changing the value of the parameter, press the SET button to save and press the ESC button to return to the previous menu without saving.

When the changed parameter value is saved by pressing the SET button, the device returns to the previous menu, the parameter value is displayed on the screen and the parameter led does not blink, it lights up steadily.

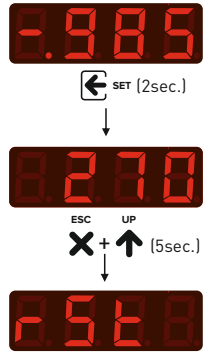
Settings ☛ Blocking Access to Settings

Blocking Access to Settings: You can use this feature to block the device's settings from being changed by unauthorized personnel.

To activate the feature: To activate this feature, press the "ESC" and "SET" buttons for 5 seconds while on the measurement screen (while MEASUREMENTS led is on). The word "b.oFF" appears on the screen and the feature is activated. When this feature is active, it is not possible to enter the setting menu.

To disable the feature: To disable this feature, press the "ESC" and "SET" buttons for 5 seconds while on the measurement screen (while MEASUREMENTS led is on). "B. on "will appear and the feature will be inactive. When this feature is disabled, it is possible to enter the setting menu.

Settings ☛ Returning to Factory Settings



Returning to Factory Settings: In order to return the factory settings, press the "SET" button for 2 seconds while on the measurement screen (while MEASUREMENTS led is on). When you enter the setting menu, the MEASUREMENTS led will turn off and the SETTINGS led will light up.

After entering the settings menu, the first parameter displayed on the screen is Pr1: Current Transformer Ratio. Press the DOWN button to access Pr12: High Voltage Set parameter. Press the "ESC" and "UP" buttons for 5 seconds while the led of the the Pr12 parameter is on steady. "RSt" word will appear on the screen for 2 seconds and the device will be back to factory settings. The device then returns to the measurements screen.

Note: Returning to factory settings requires a re-setup of the device! (All values and records such as current transformer value, step values, menu settings, etc. will be reset.)

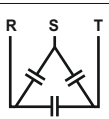
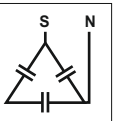
Fan Output

If any step remains active for 10 seconds, the fan output becomes energized. 1 minute after all steps are deactivated, the fan output becomes deenergized.

Alarm Output

Alarm output is energized in case of over compensation, undercompensation, high voltage, THD-I and THD-V error conditions. After these error conditions are eliminated, the alarm output is deenergized. Error entering delay and exit delay values are defined separately for each error parameter. The alarm output relay and the alarm led work synchronously.

Capacitor Calculation Table According to Connection Type

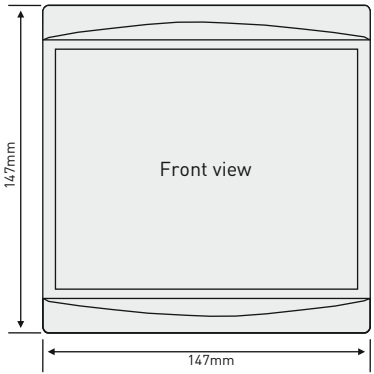
		
Capacitor Powers	3 Phase Connection (Q/3)	Phase-Netural Connection (Q/6)
0,5 KVAR	0,16 KVAR	0,08 KVAR
1 KVAR	0,33 KVAR	0,16 KVAR
1,5 KVAR	0,5 KVAR	0,25 KVAR
2,5 KVAR	0,83 KVAR	0,41 KVAR
5 KVAR	1,66 KVAR	0,83 KVAR
7,5 KVAR	2,5 KVAR	1,25 KVAR
10 KVAR	3,33 KVAR	1,66 KVAR
15 KVAR	5 KVAR	2,5 KVAR
20 KVAR	6,66 KVAR	3,33 KVAR
25 KVAR	8,33 KVAR	4,16 KVAR
30 KVAR	10 KVAR	5 KVAR

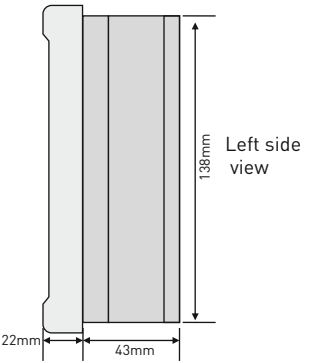
Factory Set Values

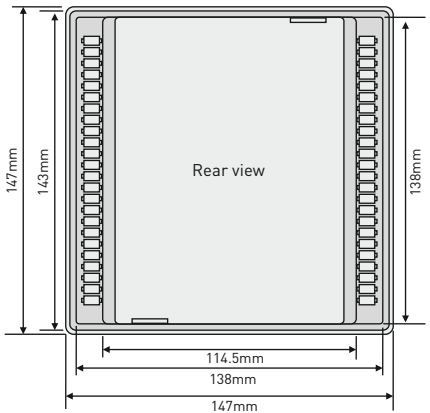
Menu	Parameter	Default Value	Min. value	Max. value	Unit
C.T. Settings	Current Transformer Ratio	10	1	2000	A
Compensation Settings	Cosine Set Value	1.000	0.800	1.000	-
	Cosine Tolerance Value	10	1	50	-
Step Time Settings	Drive Time	3	1	300	sec.
	Release Time	3	1	300	sec.
	Discharge Time	20	1	300	sec.
	Settling Time Fixed	1500	-	-	msec.
Compensation Alarm Settings	Over Compensation (A/P)	Passive	0.010	0.200	-
	Under Compensation (A/P)	Passive	0.010	0.200	-
	Delay Fixed	3	-	-	min.
Harmonic Voltage Settings	Harmonic Voltage	Passive	1	400	%
	Hysteresis Fixed	3	-	-	%
	Delay (To Enter the Error State) Fixed	15	-	-	sec.
	Delay (Exiting the Error State) Fixed	15	-	-	sec.
Harmonic Current Settings	Harmonik Akım	Passive	1	400	%
	Hysteresis	5	-	-	%
	Delay (To Enter the Error State) Fixed	120	-	-	sec.
	Delay (Exiting the Error State) Fixed	60	-	-	sec.
Voltage Settings	High Voltage (A/P)	270	Off+240	270	V
	Hysteresis Fixed	10	-	-	V
	Delay (To Enter the Error State) Fixed	5	-	-	sec.
	Delay (Exiting the Error State) Fixed	5	-	-	sec.
C/K Ratio	C/K Oranı Fixed	Auto	-	-	-
Operating Mode	Program	Auto	Otomatik, Rot1, Rot2, Rot3, Rot4, Baştan al baştan bırak ve Manuel		

(A/P): It can be active or passive.
(Fixed): The value cannot be changed.

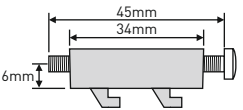
Dimensions







Screwed side ear (apparatus)



Side ear (apparatus)

Technical Specifications

Operating Voltage	100V - 300VAC
Operating Frequency	50/60 Hz.
Operating Power	<10VA
Operating Temperature	-20ºC.....+55ºC
Storage Temperature	-30ºC.....+80ºC
Operating Humidity	<%90 (Without condensation)
Voltage Measuring Range	10V - 300V AC
Current Measuring Range	10mA - 5,5A
Current Transfomer Ration	5/5A.....9995/5A
Cosine Measuring Range	±0.000 ile 1.000
Voltage, Current Accuracy	%±1
Cosine Accuracy	%±1
Active Power Accuracy	%±2
Reactive Power Accuracy	%±2
Display	20mm. 4 Digit LED Display and Notification LEDs
Connection Type	Plug-in terminal connection
Contacts (Step outputs)	3A/250V AC Resistive Load
Contacts (Fan and Alarm outputs)	3A/250V AC Resistive Load
Number of Steps	12
Cable Diameter	1.5mm², 2.5mm² (Voltage and C.T. connections)
Weight	<900Gr.
Mounting	Mounting on the panel front cover
Operating Altitude	<2000metre
Protection Class	IP41 (Front Panel), IP20 (Body)
Panel Hole Sizes	140mm x 140mm

Contact Information

Web: www.tense.com.tr
Mail: info@tense.com.tr

Muratpaşa Mh., Uluyol Cd., İşkent Sanayii Sitesi, E Blok, 1. Kat,
Bayrampaşa / İstanbul / TÜRKİYE
Tel: 0212 578 04 38 - 48 Fax: 0212 578 04 36

User Notes

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