

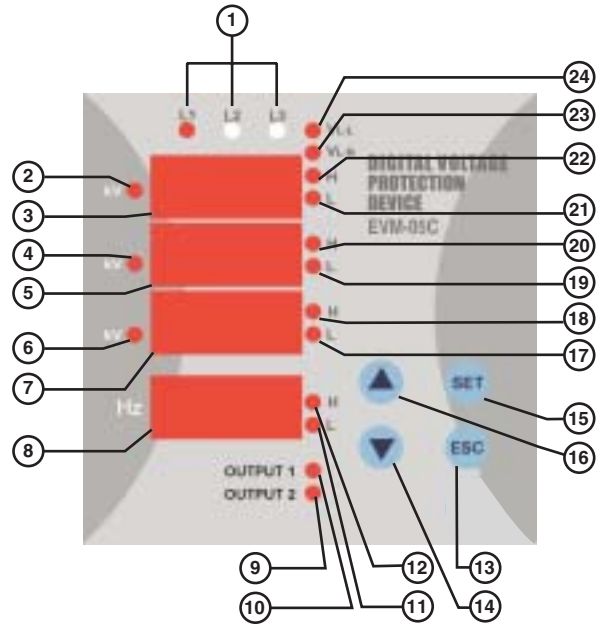
DIGITAL VOLTAGE PROTECTION DEVICE

EVM-05C

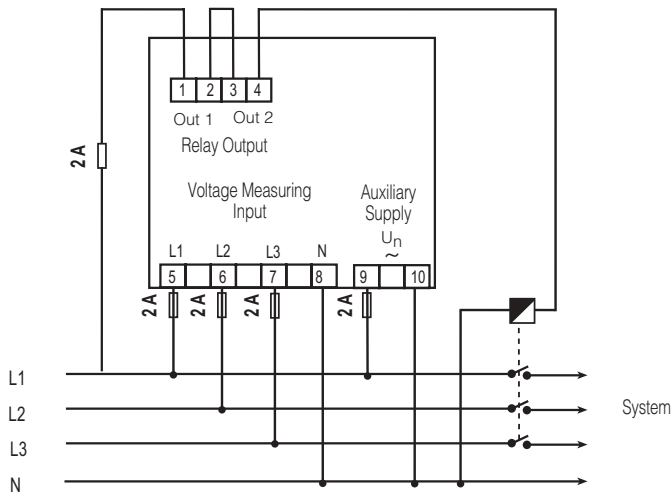
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Front Panel And Usage of Buttons



Connection Diagram



Precautions For Installation And Safe Use

- Failure to follow those instructions will result in death or serious injury.
- Disconnect all power before working on equipment.
- When the device connected to the network, do not remove the front panel
- Do not try to clean the device with solvent or the like.Only clean the device with dried cloth.
- Verity correct terminal connections when wiring.
- Electrical equipment should be serviced only by your component seller.
- Only for rack panel mounting.
- The fuse should be used F type and should be 1A
- No responsibility is assured by ENTES A.S or any of its subsidiaries for any consequences arising out of the use of this material.

- 1... Phase LEDs:The LEDs turn on when all phases are connected to the system and correct phase sequence.(If phase sequence warning is activated and there is a false phase sequence,these LEDs blink.)
- 2... kV LEDs of 1.Display: If this LED turns on, the unit of voltage is kV
- 3... Display of L-1 Phase:It shows L-1 phase-neutral voltage and L1-L2 phase-phase voltage.
- 4... kV LEDs of 2.Display: If this LED turns on, the unit of voltage is kV
- 5... Display of L-2 Phase:It shows L-2 phase-neutral voltage and L2-L3 phase-phase voltage.
- 6... kV LEDs of 3.Display: If this LED turns on, the unit of voltage is kV
- 7... Display of L-3 Phase:It shows L-3 phase-neutral voltage and L3-L1 phase-phase voltage.
- 8... Frequency Display:The frequency is measured from L-1 phase
- 9... Output Relay 2 LED
- 10...Output Relay 1 LED
- 11...Low Frequency Warning LED
- 12...High Frequency Warning LED
- 13...ESC Button
- 14...DOWN Button
- 15...SET Button
- 16...UP Button
- 17...Low Voltage Warning LED of L-3 Phase (Low voltage warning of L3-L1 when phase-phase measurement is selected)
- 18...High Voltage Warning LED of L-3 Phase (High voltage warning of L3-L1 when phase-phase measurement is selected)
- 19...Low Voltage Warning LED of L-2 Phase (Low voltage warning of L2-L3 when phase-phase measurement is selected)
- 20...High Voltage Warning LED of L-2 Phase (High voltage warning of L2-L3 when phase-phase measurement is selected)
- 21...Low Voltage Warning LED of L-1 Phase(Low voltage warning of L1-L2 when phase-phase measurement is selected)
- 22...High Voltage Warning LED of L-1 Phase(High voltage warning of L1-L2 when phase-phase measurement is selected)
- 23...V L-N LED: Phase-Neutral Voltage
- 24...V L-L LED: Phase-Phase Voltage

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General Information

EVM - 05C is designed to measure the phase-phase voltage, phase-neutral voltage and the frequency of system.

It contains 2 output relays to warn the user against under/over voltage and frequency.

Out 1 relay changes position according to the max.voltage or max.frequency value set.

Out 2 relay changes position according to the min.voltage or min.frequency value set.

The device contains the features of Instantaneous trip, Latch function and adjustable delay time.


Network connection can be used with neutral or without neutral by selecting **star** or **delta connection** in setup menu.


Application of EVM-05C

- 1-) It can measure voltage for each phase and frequency in 3 phase systems with neutral and without neutral.
- 2-) You can observe the existence of phases by following the L1-L2-L3 LEDs on the device.
- 3-) Min and max. values measured are recorded and displayed.
- 4-) It warns the user through Output 1 and Output 2 relays when the measured voltage and frequency values exceed the set value.
- 5-) It warns the user through Output 2 relay and LED caution by turning on and off when there is a false phase sequence,
- 6-) Voltage transformer ratio can be adjusted between 1 ... 2000.
- 7-) A password can be arranged from pin menu in order to prevent change of the setting by unauthorized person.

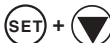
Specific Functions of Buttons:



While the device shows the Instantaneous value, pressing:


 :Displays max. Phase-phase voltage, while VL-L LED is on.
Displays max. Phase-neutral voltage, while VL-N LED is on.

 :Displays min. Phase-phase voltage, while VL-L LED is on.
Displaying min. Phase-neutral voltage, while VL-N LED is on.

 :Displays max. Voltage value set .

 :Displays min. Voltage value set.

 +  If the Latch function is selected ON, relay activates when the value exceeds the adjusted value. Even if the voltage is below the set value, output relay remains activated until pressing these buttons at the same time.

 Provides transition between VL-L and VL-N voltages.

Note: High Voltage values are adjusted for each phase-neutral and phase-phase voltages separately. However Hi Hys(hysteresis), Hi ond(delay on time) and Hi ofd (delay off time) are same values for all phase and phase-phase voltages.
When the connection type is set, Hi L-1,Hi L-2, Hi L-3 and Hi Hys values change automatically according to the new connection.

Example: Hi Hys:10 V, Hi L-1:250 V, Hi L-2:255 V, Hi L-3:260 V in star connection.If the connection type is changed to the delta connection, the device calculates these values as phase-phase voltage.

Hi L-1: L1-L-2 phase phase voltage:433 V
Hi L-2: L2-L-3 phase phase voltage:441 V
Hi L-3: L3-L-1 phase phase voltage:450 V
Hi Hys :17 V

SP Lo Menu (Low Setpoint)



Low Set points can be adjusted for each phase-neutral or phase-phase voltages separately.

If the voltage of phase-neutral or phase-phase is over the low set value (Lo),output 2 relay is not activated,output 2 LED is on and low LEDs are off.

If any voltage of the phase-neutral or phase-phase is under the Low set value, Low LED blinks,output 2 relay activates at the end of adjusted time(Lo Ond),output 2 LED turns off and low LEDs turn on continuously.

If all phases-neutral and phase-phase voltages are over the low set value (Lo) as a hysteresis(Lo Hys), output 2 relay releases

Note: at the end of the adjusted time (Lo Ofd), output 2 LED turns on and Low LEDs turn off.

Low Voltage values are adjusted for each phase and phase-phase voltages separately.However Lo Hys(hysteresis), Lo ond(delay time) and Lo ofd are same values for all phase-neutral and phase-phase voltages.

When the connection type of system is entered, Lo L-1,Lo L-2 Lo L-3 and Lo Hys values change automatically according to the new connection.

Example: Lo Hys:10 V, Lo L-1:180 V, Lo L-2:175 V, Lo L-3:170 V is adjusted in star connection.If the connection type is changed to the delta connection, the device calculates these values as phase-phase voltage.


Lo L-1: L1-L-2 phase phase voltage:311 V
Lo L-2: L2-L-3 phase phase voltage:303 V
Lo L-3: L3-L-1 phase phase voltage:294 V
Lo Hys :17 V

Note: The voltage value for set points can be adjusted 0...300 V in star connection and 0...500V in delta connection

If the set point value is set to zero (0) for any phase, the warning is cancelled for the related phase.

SP Menu (Set points)

SP Hi Menu (High Setpoint)

 "High" Setpoints can be adjusted for each phase-neutral or phase-phase voltages separately.

If the voltage of phase-neutral or phase-phase is under the high set value (Hi),output 1 relay is not activated,output 1 LED is on and Hi LEDs are off.

If any voltage of the phase-neutral or phase-phase exceeds the high set value, Hi LED blinks, output 1 relay activates at the end of adjusted time(Hi Ond), Output 1 LED turns off and Hi LED turns on continuously.

If all phase-neutral or phase-phase voltages are below the high set value (Hi) as a hysteresis(Hi Hys), output 1 relay releases at the end of the adjusted time (Hi Ofd), output 1 LED turns on and Hi LED turns off.

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Hi L-1 Menu (High Setpoint for L-1)

Hi L-1 The max. voltage value that is requested for L-1 phase in star connection and for L-1 L-2 phase-phase in delta connection. The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection. If the value is set to zero (0), the high voltage warning is cancelled.

Lo L-1 Menu (Low Setpoint for L-1)

Lo L-1 The min. voltage value that is requested for L-1 phase in star connection and for L-1 L-2 phase-phase in delta connection. The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection. If the value is set to zero (0), the low voltage warning is cancelled.

Hi L-2 Menu (High Setpoint for L-2)

Hi L-2 The max. voltage value that is requested for L-2 phase in star connection and for L-2 L-3 phase-phase in delta connection. The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection. If the value is set to zero (0), the high voltage warning is cancelled.

Lo L-2 Menu (Low Setpoint for L-2)

Lo L-2 The min. voltage value that is requested for L-2 phase in star connection and for L-2 L-3 phase-phase in delta connection. The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection. If the value is set to zero (0), the low voltage warning is cancelled.

Hi L-3 Menu (High Setpoint for L-3)

Hi L-3 The max. voltage value that is requested for L-3 phase in star connection and for L-3 L-1 phase-phase in delta connection. The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection. If the value is set to zero (0), the high voltage warning is cancelled.

Lo L-3 Menu (Low Setpoint for L-3)

Lo L-3 The min. voltage value that is requested for L-3 phase in star connection and for L-3 L-1 phase-phase in delta connection. The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection. If the value is set to zero (0), the low voltage warning is cancelled.

Hi Hys Menu (Hysteresis for High Setpoint)

Hi Hys The required voltage value for releasing the output relay after the output relay is activated. If the high voltage value falls as a hysteresis, the relay releases at the end of the adjusted delay time (Hi Ofd). The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection.

Lo Hys Menu (Hysteresis for Low Setpoint)

Lo Hys The required voltage value for releasing the output relay after the output relay is activated. If the low voltage value increases as a hysteresis, the relay releases at the end of the adjusted delay time (Lo Ofd). The voltage value can be adjusted 0...300 V in star connection and 0...500 V in delta connection.

SETTING HIGH/LOW SETPOINT VALUE FOR PHASES



Press SET button for 3 secs.

Find SP menu by scrolling UP/DOWN buttons.

Press SET button. (SP Hi is displayed)

Find SP Hi/SP Lo menu by scrolling UP/DOWN buttons.

Press SET button. (Hi L-1/Lo L-1 is displayed)

Press SET button
Enter 1st digit value by scrolling UP/DOWN buttons (If you set 1st digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter 2nd digit value by scrolling UP/DOWN buttons (If you set 2nd digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter 3rd digit value by scrolling UP/DOWN buttons (If you set 3rd digit value incorrect, you can set again by pressing ESC button.)

Press SET button after you enter the value

Press ESC button one by one until SAU SET YES is displayed

Press SET button while SAU SET YES is displayed.

You can set high and low set point values of other phases like above.

SETTING HYSTERESIS VALUE (Hi Hys/Lo Hys) FOR PHASES:



Press SET button for 3 secs.

Find SP menu by scrolling UP/DOWN buttons.

Press SET button. (SP Hi is displayed)

Find SP Hi/SP Lo menu by scrolling UP/DOWN buttons.

Press SET button. (Hi L-1/Lo L-1 is displayed)

Find Hi Hys / Lo Hys menu by scrolling UP/DOWN buttons.

Press SET button

Enter 1st digit value by scrolling UP/DOWN buttons (If you set 1st digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter 2nd digit value by scrolling UP/DOWN buttons (If you set 2nd digit value incorrect, you can set again by pressing ESC button.)

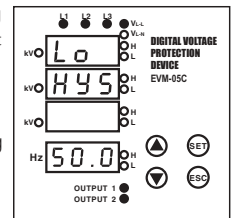
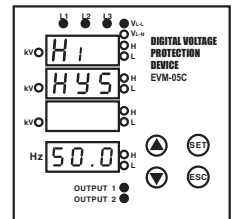
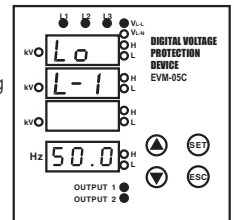
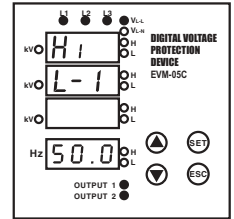
Press SET button

Enter 3rd digit value by scrolling UP/DOWN buttons (If you set 3rd digit value incorrect, you can set again by pressing ESC button.)

Press SET button after you enter the value (Hi Hys/Lo Hys is displayed)

Press ESC button one by one until SAU SET YES is displayed

Press SET button while SAU SET YES is displayed.



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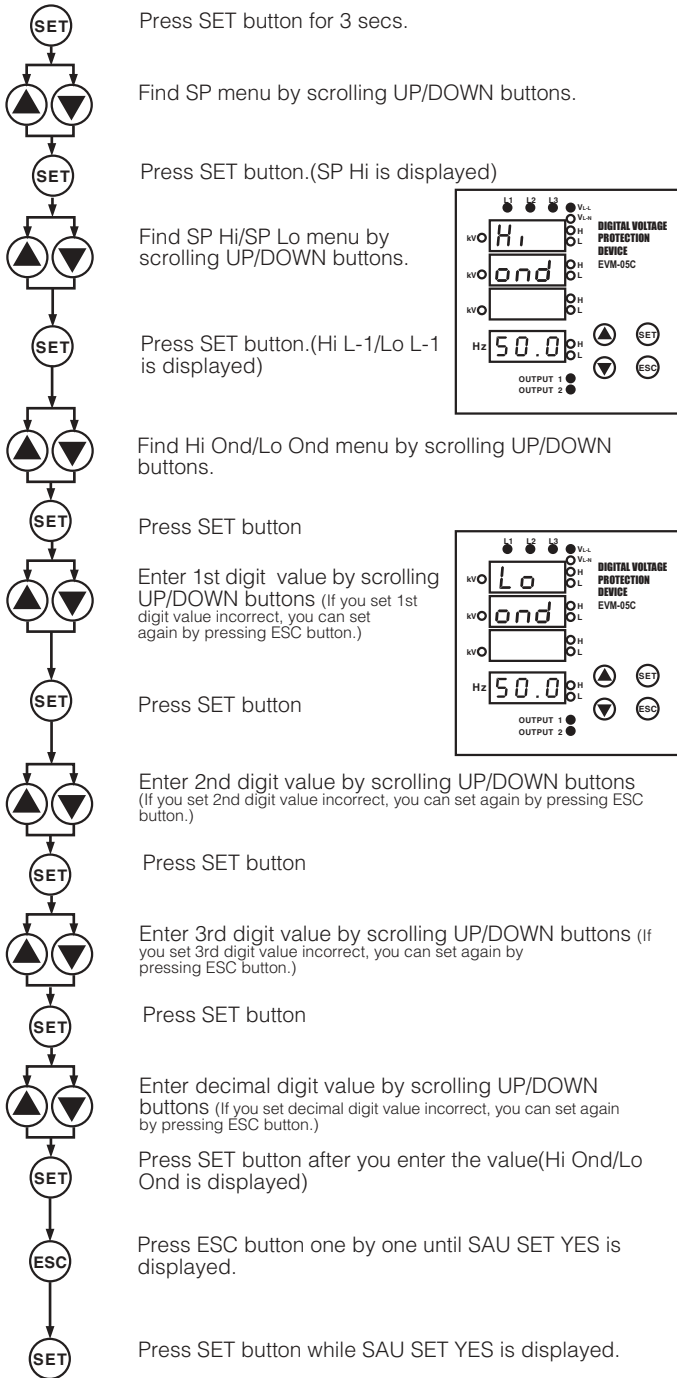
Hi Ond Menu (Delay-On Time For High Setpoint)

Hi
ond The delay time for activating the output relay for high voltage warning. It is common for all phase-neutral and phase-phase voltages.
The value can be adjusted between 000,0 and 999,9 in terms of seconds

Lo Ond Menu (Delay-On Time For Low Setpoint)

Lo
ond The delay time for activating the output relay for low voltage warning. It is common for all phase-neutral and phase-phase voltage.
The value can be adjusted between 000,0 and 999,9 in terms of seconds

SETTING DELAY-ON TIME (Hi OND/Lo OND) FOR PHASES:



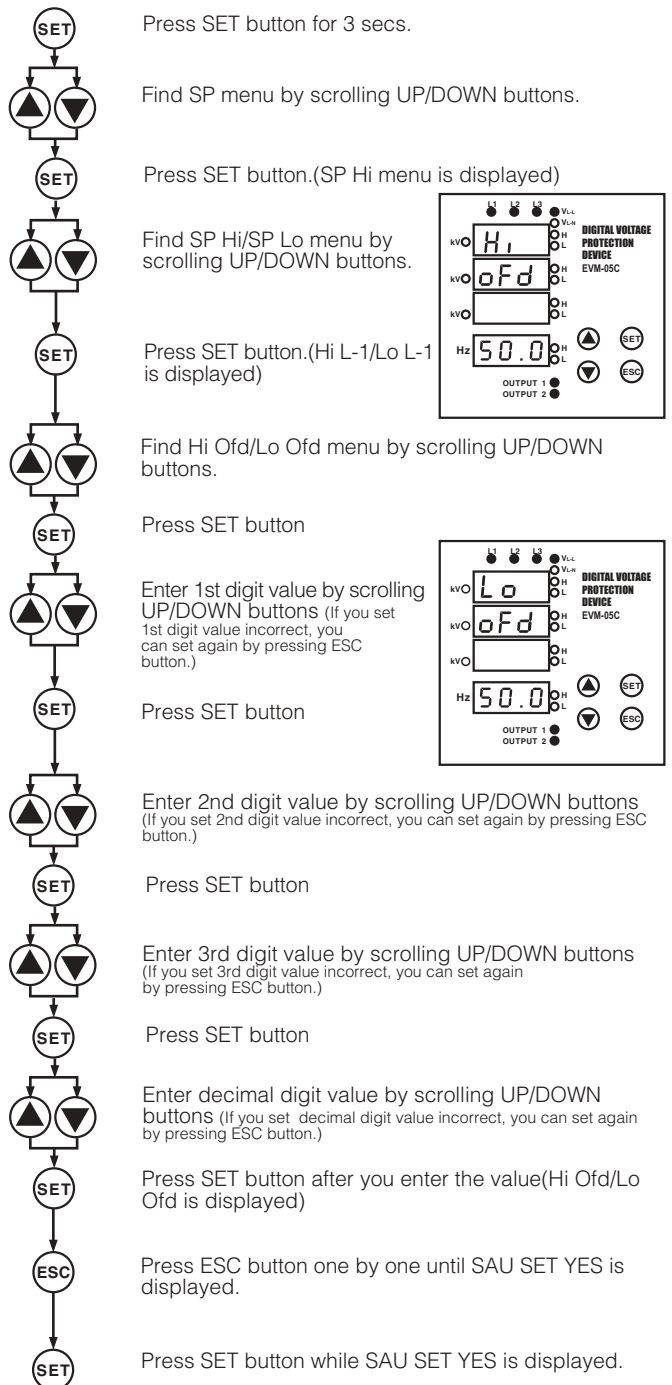
Hi Ofd Menu (Delay-Off Time For High Setpoint)

Hi
ofd The delay time for releasing the output relay for high voltage warning. It is common for all phase-neutral and phase-phase voltage.
The value can be adjusted between 000,0 and 999,9 in terms of seconds

Lo Ofd Menu (Delay-Off Time For Low Setpoint)

Lo
ofd The delay time for releasing the output relay for low voltage warning. It is common for all phase-neutral and phase-phase voltage.
The value can be adjusted between 000,0 and 999,9 in terms of seconds

SETTING DELAY-OFF TIME (Hi OFD/Lo OFD) FOR PHASES:



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SP Frq Menu (Setpoints For Frequency)

SP
Frq

The frequency of the system is measured from L-1. If the frequency of system is under the high set value (Frq Hi), output 1 relay is not activated, output 1 LED is on and Hi LEDs are off.

If the frequency of the system exceeds the high set value, Hi LED relating to frequency blinks, output 1 relay activates at the end of adjusted time (Frq Ond), output 1 LED turns off and Hi LEDs turn on continuously.

If the frequency of system are under the high set value (Frq Hi) as a hysteresis (Frq Hys), output 1 relay releases at the end of the adjusted time (Frq Ofd), output 1 LED turns on and Hi LEDs turn off.

If the frequency of the system is over the low set value (Frq Lo), output 2 relay is not activated, output 2 LED is on and Low LED related to frequency is off.

If the frequency of system is under the low set value, Low LED blinks, output 2 relay is activated at the end of adjusted time (Frq Ond), output 2 LED turns off and Low LEDs turn on continuously. If the frequency of the system is over the low set value (Frq Lo) as a hysteresis (Frq Hys), output 2 relay releases at the end of the adjusted time (Frq Ofd), output 2 LED is on and Low lights are out.

Frq Hi Menu (High Setpoints For Frequency)

Frq
Hi

The max. frequency value of system that is requested for L-1 phase. The frequency value can be adjusted 0...99,9 Hz. If the value is set to zero (0), the high frequency warning is cancelled.

Frq Lo Menu (Low Setpoints For Frequency)

Frq
Lo

The min. frequency value of system that is requested for L-1 phase. The frequency value can be adjusted 0...99,9 Hz. If the value is set to zero (0), the low frequency warning is cancelled.

SETTING HIGH/LOW SETPOINT VALUE FOR FREQUENCY

Press SET button for 3 secs.

Find SP menu by scrolling UP/DOWN buttons.

Press SET button. (SP Hi is displayed)

Find SP FrEq menu by scrolling UP/DOWN buttons.

Press SET button. (Frq Hi is displayed)

Find Frq Hi/Frq Lo menu by scrolling UP/DOWN buttons.

Press SET button

Enter 1st digit value by scrolling UP/DOWN buttons (If you set 1st digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter 2nd digit value by scrolling UP/DOWN buttons (If you set 2nd digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter decimal digit value by scrolling UP/DOWN buttons (If you set decimal digit value incorrect, you can set again by pressing ESC button.)

Press SET button after you enter the value

Press ESC button one by one until SAU SET YES is displayed

Press SET button while SAU SET YES is displayed.

Frq Hys Menu (Hysteresis For Frequency)

Frq
Hys

The required frequency value for releasing the output relay for both high frequency warning and low frequency warning after the output relay is activated. If the high frequency value falls or low frequency increases as a hysteresis, the relay releases at the end of the adjusted delay time (Frq Ofd). The hysteresis value can be adjusted 0...99,9 Hz.

SETTING HYSTERESIS VALUE FOR FREQUENCY

Press SET button for 3 secs.

Find SP menu by scrolling UP/DOWN buttons.

Press SET button. (SP Hi is displayed)

Find SP FrEq menu by scrolling UP/DOWN buttons.

Press SET button. (Frq Hi is displayed)

Find Frq Hys menu by scrolling UP/DOWN buttons.

Press SET button

Enter 1st digit value by scrolling UP/DOWN buttons (If you set 1st digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter 2nd digit value by scrolling UP/DOWN buttons (If you set 2nd digit value incorrect, you can set again by pressing ESC button.)

Press SET button

Enter decimal digit value by scrolling UP/DOWN buttons (If you set decimal digit value incorrect, you can set again by pressing ESC button.)

Press SET button after you enter the value

Press ESC button one by one until SAU SET YES is displayed

Press SET button while SAU SET YES is displayed.

Frq Ond Menu (Delay-On Time For Frequency)

Frq
ond

The delay time for activating the output relay for high frequency and low frequency warning. The value can be adjusted between 000,0 and 999,9 in terms of seconds.

Frq Ofd Menu (Delay-Off Time For Frequency)

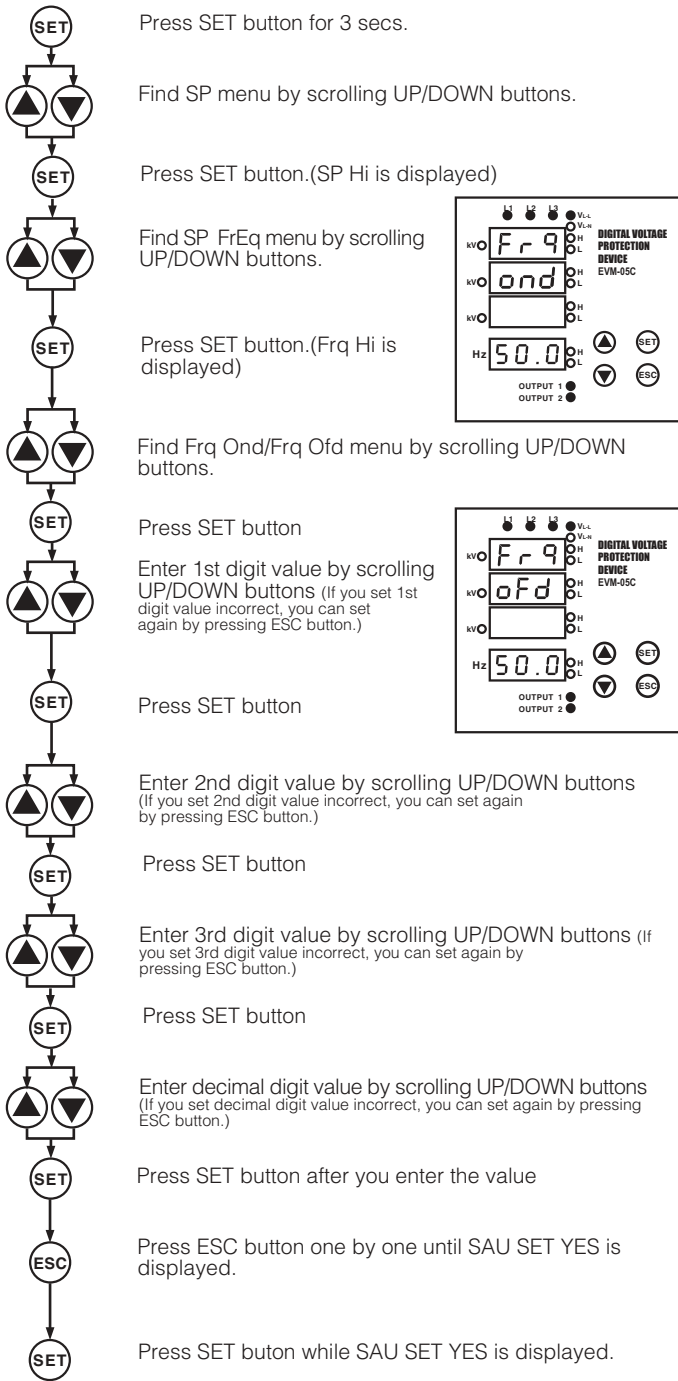
Frq
ofd

The delay time for releasing the output relay for high frequency and low frequency warning. The value can be adjusted between 000,0 and 999,9 in terms of seconds.

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SETTING DELAY TIME (OND/OFD) FOR FREQUENCY:

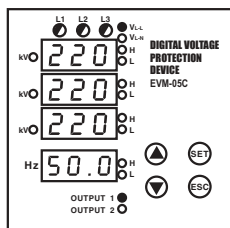


PHASE SEQUENCE

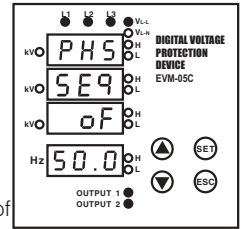
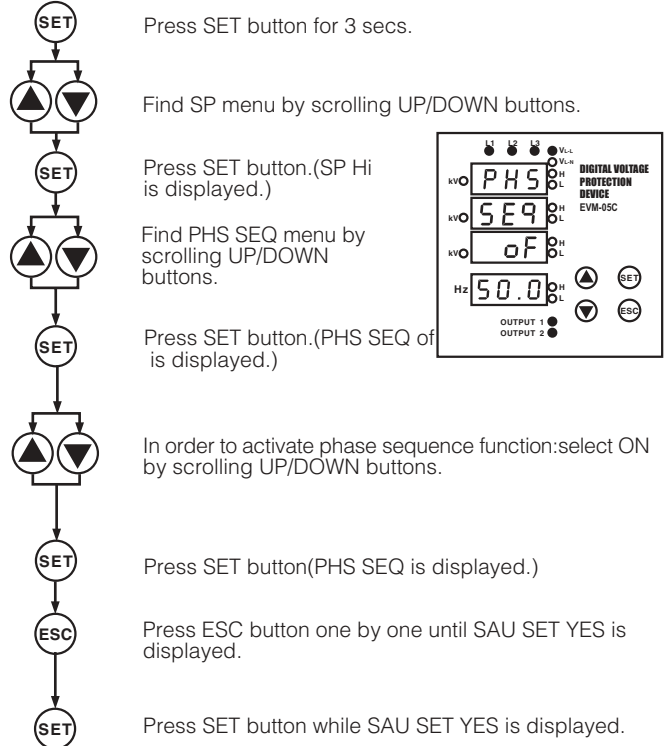
PHS
SEQ

EVM-05C checks phase sequence. If the phase sequence is altered by any reason, L1 L2 L3 LEDs blink, the output relay 2 activates immediately and Out 2 LED turns off. This function should be selected ON if we request that the device warns the user in case of false phase sequence. The phase sequence function is canceled when selected OFF.

Note: You pay attention that the output relay 2 is commonly used both phase sequence warning and low voltage and frequency warnings



ACTIVATING PHASE SEQUENCE FUNCTION

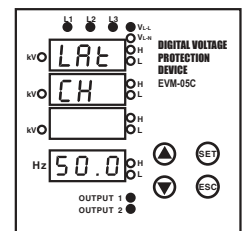
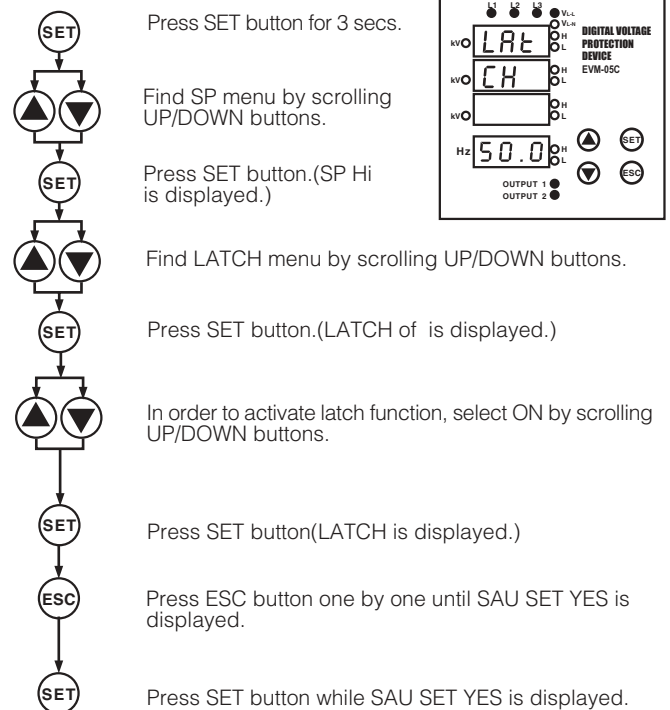


LATCH FUNCTION

LAt
CH

Latch function is used to control the output relays when the voltage and frequency value return to the normal value. It can be selected ON or OFF. At position OFF: If the voltage and frequency value return to the normal values, output relays release automatically. At position ON: Even if the voltage and frequency value return to the normal values, output relays remain locked. The output relays release by pressing these buttons (▲▼) at the same time.

ACTIVATING LATCH FUNCTION



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INSTANT TRIPPING FUNCTION

Ins
trP

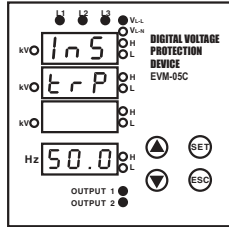
At position ON: If any voltage of phase-neutral or phase-phase or frequency exceed 1.5 times of set value, the output relay 1 is activated without any delay time, out 1 LED turns off and related phase of Hi LEDs turn off.

If any voltage of phase-neutral or phase-phase or frequency fall 1.5 times of set value, the output relay 2 is activated without any delay time, out 2 LED turns off and related phase of Hi LEDs turn off.

At position OFF: Instant Tripping function is canceled.

ACTIVATING INSTANT TRIPPING FUNCTION

1. Press SET button for 3 secs.
2. Find SP menu by scrolling UP/DOWN buttons.
3. Press SET button. (SP Hi is displayed)
4. Find INS TRP menu by scrolling UP/DOWN buttons.
5. Press SET button. (INS trP of is displayed)
6. In order to activate instant tripping function, select ON by scrolling up/down buttons.
7. Press SET button (INS trP is displayed)
8. Press ESC button one by one until SAU SET YES is displayed.
9. Press SET button while SAU SET YES is displayed.



CONNECTION TYPE OF SYSTEM

Con

The menu that is selected the connection type of system. Two connection type is defined in the device.

Con
S
trR

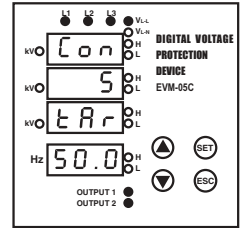
If the system is 3 phases with neutral, we should select the Star connection.

Con
DE
Ltr

If the system is 3 phases without neutral, we should select the Delta connection.

SETTING THE CONNECTION TYPE OF SYSTEM

1. Press SET button for 3 secs.
2. Find Con menu by scrolling UP/DOWN buttons.
3. Press SET button (Con STAR is displayed)
4. Select connection type by scrolling UP/DOWN buttons
5. Press SET button (Con is displayed)
6. Press ESC button one by one until SAU SET YES is displayed.
7. Press SET button while SAU SET YES is displayed.



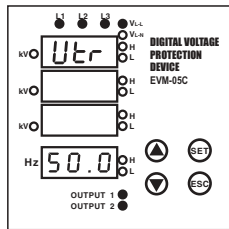
VOLTAGE TRANSFORMER RATIO:

Utr

The menu that the voltage transformer ratio is adjusted. You can adjust the value between 1...2000. If the voltage transformer is not used, the ratio is selected 1.

For example; voltage transformer ratio :34500/100
:345 is setted.

1. Press SET button for 3 secs.
2. Press SET button
3. Enter 1st digit value by scrolling UP/DOWN buttons (if you set 1st digit value incorrect, you can set again by pressing ESC button.)
4. Press SET button
5. Enter 2nd digit value by scrolling UP/DOWN buttons (If you set 2nd digit value incorrect, you can set again by pressing ESC button.)
6. Press SET button
7. Enter 3rd digit value by scrolling UP/DOWN buttons (if you set 3rd digit value incorrect, you can set again by pressing ESC button.)
8. Press SET button
9. Enter 4th digit value by scrolling UP/DOWN buttons (if you set 4th digit value incorrect, you can set again by pressing ESC button.)
10. Press SET button after you enter the value
11. Press ESC button one by one until SAU SET YES is displayed.
12. Press SET button while SAU SET YES is displayed.

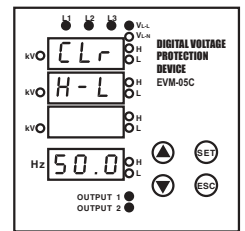


CLEARING MINIMUM AND MAXIMUM VOLTAGES

Clr
H-L

The menu that is cleared the min. and max values measured.

1. Press SET button for 3 secs.
2. Find Clr H-L menu by scrolling UP/DOWN buttons.
3. Press SET button (Clr No is displayed)
4. Select YES by scrolling UP/DOWN buttons
5. Press SET button (Clr H-L is displayed)
6. Press ESC button



USER PASSWORD MENU

Pin

The menu that is defined the user password and activated the user password.

It is prevented to change the settings of the device by unauthorized people by activating password. If you want to use this function of device, you should activate the user password.

Pin menu contains 2 sub-menus.

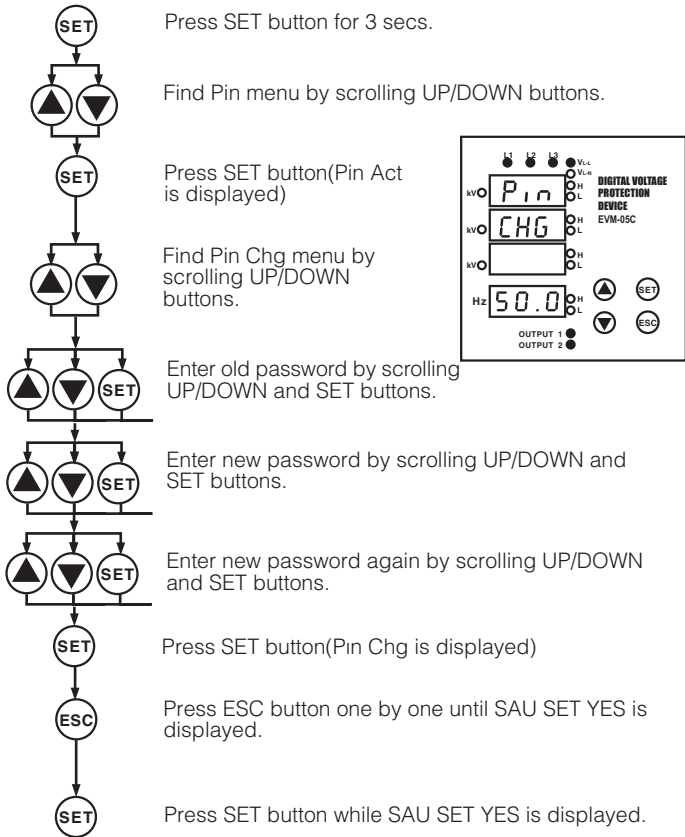
Pin
CH9

The menu that is changed the user password According to the factory settings, the password is set to 1234.

DIGITAL VOLTAGE PROTECTION DEVICE

EVM-05C

CHANGING USER PASSWORD



The menu that the user password is activated. After user password is activated, it will be asked when entered menus. If the user password is entered wrong, the device will not be locked. According to the factory settings, the password is set to 1234.

TECHNICAL SPECIFICATIONS

Rated Voltage (Un)	: 110 VAC, 220 VAC, 380VAC
Operating Frequency	: 45-65 Hz
Auxiliary Supply Power Consumption	: < 4 VA
Measuring Input Power Consumption	: < 1 VA
Voltage Inputs	: 10-300 VAC (L-N) 10-500 VAC (L-L)
Measurement Range	: 0...200kV
Class	: 1 ± 1 digit $[(\%10 - \%100) \times \text{full scale}]$
Voltage Transformer Ratio	: 1...2000
Output Contact	: 2 NO, 5A 1250 VA
Ambient Temperature	: -5 °C; +50 °C
Display	: Red LED Display
Dimensions	: PR-19 PR-16
Equipment Protection Class	: Double Isolation Class II
Box Protection Class	: IP 40
Terminal Protection Class	: IP 00
Box Material	: Nonflamable
Installation	: Panel Mounted
Wire Thickness For Terminal Block	: 2.5 mm ²
Weight	: 0.45 kg (PR-19) 0.8 kg (PR-16)
Installation Category	: Class III
Panel Size	: 139x139 mm (PR-16) 91x91 mm (PR-19)

ACTIVATING USER PASSWORD

