

DV - 72 - 03C



DIGITAL VOLTAGE & FREQUENCY MONITORING DEVICE

- ▶ True RMS
- ▶ Triphase controlled



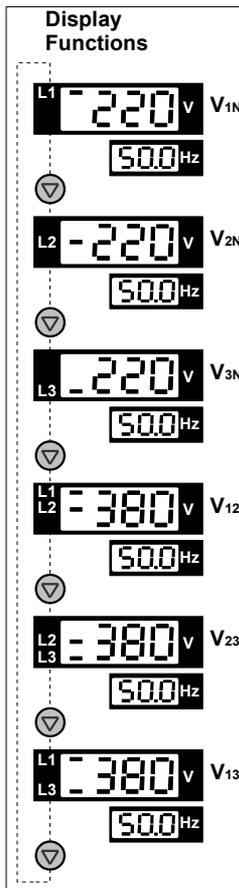
General

The device measures the True RMS value of the voltage and frequency in tri-phase systems accurately. It is possible to observe the voltage value in the upper screen and the frequency value in the bottom screen simultaneously. Using the buttons, phase - neutral and phase - phase voltages can be observed as shown in the figure in the right side.

The device contains many protections as follows:

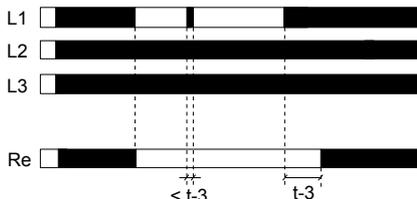
- Phase failure.
- Phase sequence.
- Over Voltage protection.
- Under voltage protection:
- Unbalanced voltage protection.
- Over frequency protection.
- Under frequency protection.

As the device is being installed it closes its output contact if the voltage and frequency values are within the adjusted ranges and phase sequence is correct. In case of any previous mentioned faults (except of phase failure where opening is sudden) the device opens its output contact at the end of delay adjusted by user. When the values return within the adjusted ranges the device closes its output contacts at the end of an adjusted delay. Note: L1-N is the device's power supply inputs. Thus, the applied voltage must be the rated voltage of the system. The measured frequency also must be the frequency of the system.



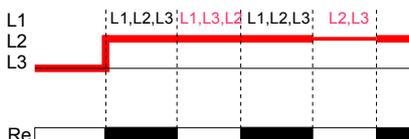
Phase Failure: (u-U)

When at least on of the three phases L1,L2,L3 is missing **u-U** is shown on the bottom screen and the device opens its output contact immediately.



Phase Sequence: (Seq)

In case of wrong phase sequence, **Seq** is shown on the bottom screen and the device does not close its output contact. If the the sequence is corrected the device closes its output contacts

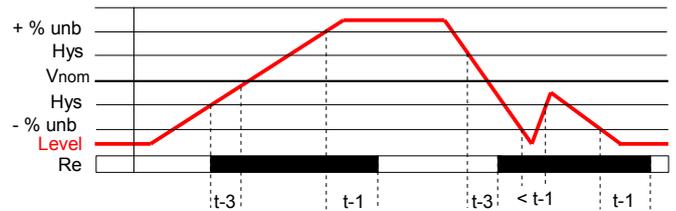


Unbalanced Voltage: (unb)

The phase - phase voltage unbalance limit can be adjusted between (%5 - %20). When it exceeds the adjusted limit **unb** is shown on the bottom screen and the device opens its output contact at the end of $t - 1$ delay. It is needed for the device to close its output contact again that the voltage unbalance drops below the hysteresis percentage (%20). Thus, the device closes its output contact at the end of $t - 2$ delay.
Example: In tri-phase system where phase - phase voltage is 380 V. The voltage unbalance limit is adjusted to %15, then the opening occurs at: $(380 - (380 \times 0,15)) = 323$ V. In order to close the output contact again the voltage should reach $323 + (380 \times \%15 \times \%20) = 334$ V.

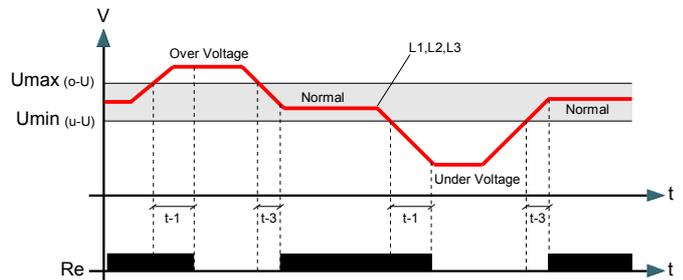
$$\% \text{ unb} = \frac{(V_{\max} - V_{\min})}{380} \times 100$$

$$\text{Hys} = 380 \times (\% \text{ Asm}) \times (\% 20)$$



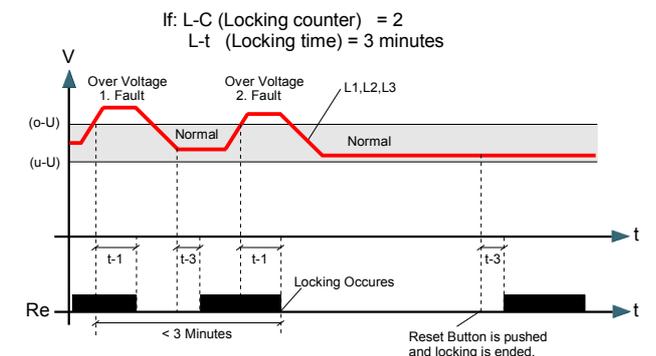
Over&Under Voltage : (o-U) (u-U)

Over voltage (o-U), it can be adjusted between $U_{\max} = (390 - 460$ V). Under voltage (u-U), it can be adjusted between $U_{\min} = (300 - 370$ V). Mentioned values are phase - phase voltages. If the voltage drops below the adjusted under voltage limit then **u-U** shows on the screen and the device closes its output contact after $t-1$ delay. If the voltage exceeds the adjusted over voltage limit then **o-U** shows on the screen and the device closes its output contact after $t-1$ delay. The hysteresis value is 6V.



Locking Property :

It can be controlled by two parameters; Locking Time and Locking Counter. If the number of opening reaches the adjusted locking counter within the adjusted locking time then the device opens its output contact and locks its functions until the user pressed **Reset** button. If the locking counter is adjusted to **oto** then this function is inactive and the device never locks itself
L-t : Locking Time (001 - 060 minutes)
 It is well known that the frequently occurring faults may damage the system. For that the device locks itself when the number of faults reaches the adjusted locking number within this locking time. This way the system is protected and the user has the chance to investigate the problem.
L-C : Locking Counter (oto , 001 - 010)
 The number of the faults allowed within the period L-t. If the number of the faults exceeds this adjusted counter value then the device locks itself. The user must press Reset button after the fault passes in order to unlock the device. If L-C is set to **oto** then this property is inactive.



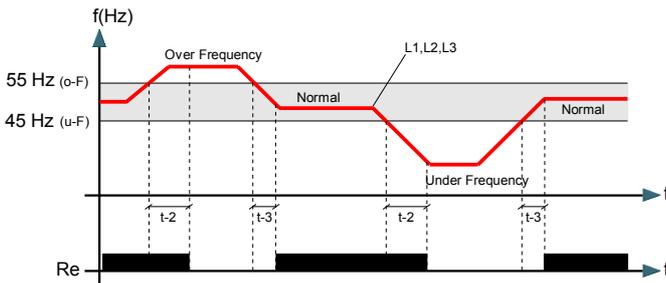
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Over and/or Under Frequency Protection : (40 – 70 Hz)

Under frequency can be adjusted between (u-F) = 40 Hz [(o-F)-0,4]
 Over frequency can be adjusted between (o-F) = [(u-F) + 0,4]..... 70 Hz.
 It is possible to activate one or two of these protections or deactivate them both.
 ■ If o-F = 55 Hz and u-F = oFF then the device protects from over frequency (if the frequency exceeds 55Hz then the device shows **o-F** on the bottom screen and opens its output contact at the end of t-2 delay).
 ■ If o-F = oFF and u-F = 45 Hz then the device protects from under frequency (if frequency drops below 45Hz then the device shows **u-F** on the bottom screen and opens its output contact at the end of t-2 delay).
 If o-F = oFF and u-F = oFF then the frequency protection is disabled.



Parameters :

The menu where protection functions are adjusted. To enter this menu press set button until set is shown on the bottom screen. Parameters are as follow:

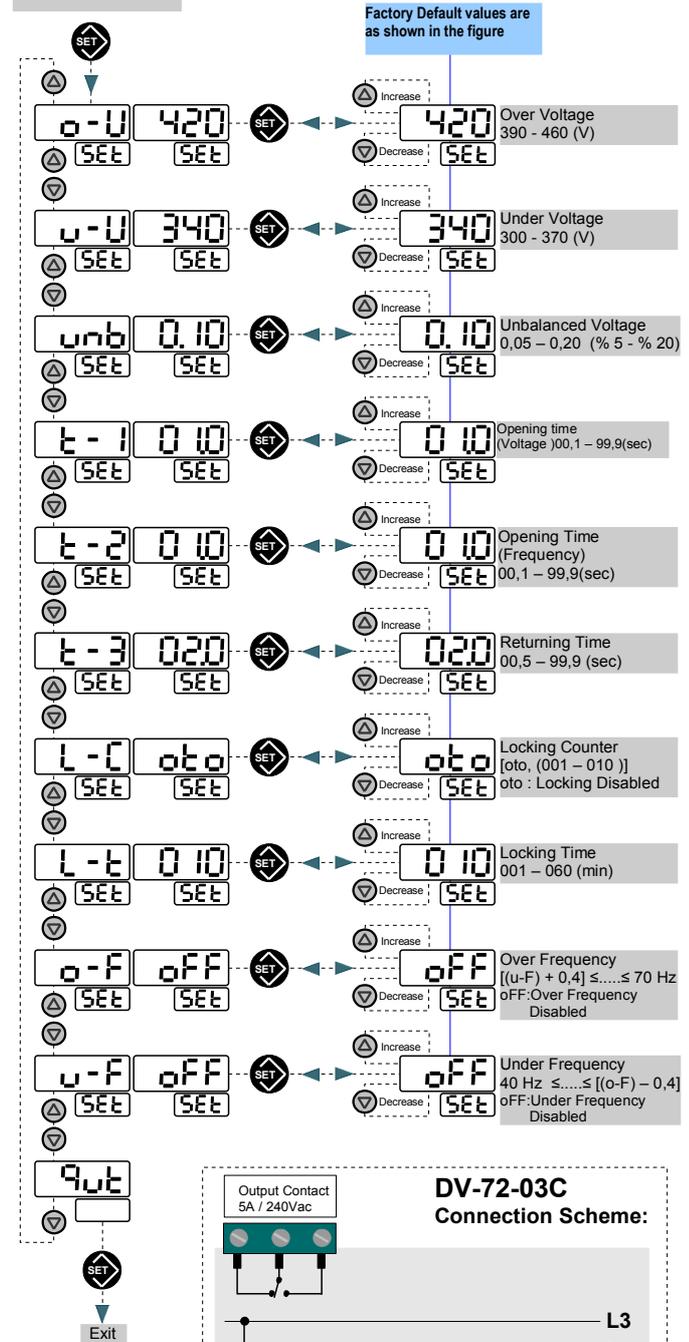
- ▶ **o-U : Over Voltage Adjustment** (390 V – 460 V)
If the phase – phase voltage exceeds the adjusted value then the device opens its output contacts at the end of t – 1 delay.
- ▶ **u-U : Under Voltage Adjustment** (300 V – 370 V)
If the phase – phase voltage drops below the adjusted value then the device opens its output contacts at the end of t – 1 delay.
- ▶ **unb : Voltage Unbalance Adjustment** (0,05 – 0,20)%5 - 20
Unbalance between the phase – phase voltages, when the unbalance exceeds the adjusted value then the device opens its output contacts at the end of t – 1 delay.
- ▶ **t-1 : Opening Delay (Voltage)** (00,1 – 99,9 seconds)
If any of voltage faults occurs, and if it lasts for t-1 period then the device opens its output contact.
- ▶ **t-2 : Opening Delay (Frequency)** (00,1 – 99,9 seconds)
If any of frequency faults occurs, and if it lasts for t-2 period then the device opens its output contact.
- ▶ **t-3 : Returning Delay (Voltage and Frequency)**(00,1 – 99,9 seconds)
To close the output contact after opening because of both voltage and frequency faults, the values should return to the normal ranges and after t-3 delay the device closes its output contact.
- ▶ **L-t : Locking Time** (001 – 060 minutes)
The device locks itself when the number of faults reaches the adjusted locking number within this locking time. This way the system is protected and the user has the chance to investigate the problem.
- ▶ **L-C : Locking Counter** (oto , 001 – 010)
The number of the faults allowed within the period L-t. If the number of the faults exceeds this adjusted counter value then the device locks itself. The user must press Reset button after the fault passes in order to unlock the device. If L-C is set to oto then this property is inactive.
- ▶ **o-F : Over Frequency Adjustment**
It can be set between (o-F) = [(u-F) + 0,4]..... 70 Hz.
If it is set to o-F = oFF then this protection is disabled.
- ▶ **u-F : Under Frequency Adjustment**
It can be set between (u-F) = 40 Hz [(o-F) – 0,4] .
If it is set to u-F = oFF then this protection is disabled.
- ▶ **quit : Quit**
If Set button is pressed there then the device goes back to the measurement screen.

Warning !!!

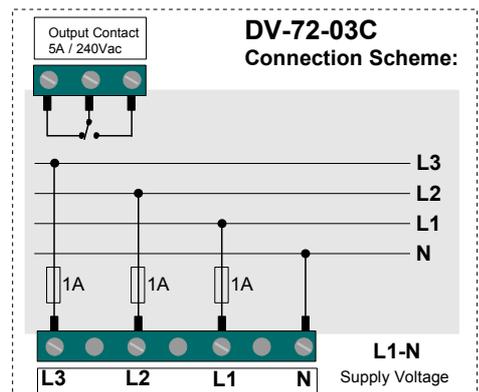
- The message Er1 or Er2 on the screen means that the device has got a failure
- Clean the device using dry dust cloth after de-energizing the device
- Read and understand the instruction on this manual and attached label.

Accessing Parameter Menu

Press Set until Set is shown on the button screen.



Factory Default values are as shown in the figure



TECHNICAL DATA:

| | |
|--------------------------------|---|
| Rated Voltage (Un) | : 230Vac (L1-N) |
| Operating Range | : (0,8-1,1) x Un |
| Frequency | : 50 / 60 Hz |
| Supply Power Consumption | : < 4VA |
| Voltage Measurement | : 10 – 500 Vac |
| Frequency Measurement | : 40 / 100 Hz |
| Measurement Power Consumption: | <1VA |
| Measurement Sensitivity | : %1±1 digit |
| Measurement Catagory | : CAT III |
| Display | : 3 Digit x 2 line LED |
| Contact Current | : Max. 5A / 240Vac |
| Protection Class | : IP 20 |
| Connector Protection Class | : IP 00 |
| Temperature | : - 5 °C + 50 °C |
| Humidity | : %15 %95 (without condensation) |
| Connection Type | : To front panel tap |
| Dimensions | : 72x72x80 mm |