

# Voltage monitoring relay DigiTOP VP-3F40A, VP-3F63A three-phase, digital

## Operating manual

### 1. Purpose

Voltage monitoring relay DigiTOP VP-3F40A / VP-3F63A (hereinafter - the device) is designed to protect industrial and household single-phase and three-phase equipment from over- or under-voltage, voltage loss, phase asymmetry, as well as control of phase sequence.

### 2. Technical specifications

|                                                       |                                          |
|-------------------------------------------------------|------------------------------------------|
| Operating voltage, V                                  | 50-400                                   |
| Operating frequency, Hz                               | 45-65                                    |
| Upper voltage threshold, V                            | 230-270                                  |
| Lower voltage threshold, V                            | 120-220                                  |
| Voltage hysteresis, V                                 | 1-10                                     |
| Phase asymmetry control, V                            | 20-99/OFF                                |
| Disconnect time at upper threshold, sec               | 0.02                                     |
| Disconnect time at lower threshold, sec, no more than | 1(120-170V)<br>0,02(<120V)               |
| Disconnect time at phase asymmetry, sec               | 20                                       |
| Voltmeter accuracy, %, no more than                   | 1                                        |
| Nominal current on relay contacts*, A                 | <b>VP-3F40A</b> 40<br><b>VP-3F63A</b> 63 |
| Power consumption, W, no more than                    | 1                                        |
| Permissible pollution                                 | II                                       |
| Electric shock protection class                       | II                                       |
| Degree of device protection                           | IP20                                     |
| The moment of tightening the screws of terminals, Nm  | 2,2±0,2                                  |
| Operating temperature, °C                             | -25... +50                               |
| Overall dimensions, mm                                | 90/105/67                                |

### User-configurable parameters:

|                                           |                                             |
|-------------------------------------------|---------------------------------------------|
| - Operating mode                          | Single-phase / Three-phase (Single-phase**) |
| - Upper voltage threshold (step 1V)       | 230-270V (250**)                            |
| - Lower voltage threshold (step 1V)       | 120-220V (170**)                            |
| - Voltage hysteresis, V                   | 1-10 (3**)                                  |
| - Switch-on delay time (step 5 sec)       | 5-600 sec (15**)                            |
| - Phase asymmetry, V                      | 20-99/OFF (50**)                            |
| - Phase sequence control                  | on/off (off**)                              |
| - Frequency control mode selection        | 50Hz/Auto (50Hz**)                          |
| - Shutdown delay time ("Auto" mode), msec | 0-900(200)                                  |
| - Indicator brightness level              | 1-9 (7**)                                   |
| - Automatic button lock                   | On/OFF (OFF**)                              |

\*- Under active load, \*\*- factory settings

### 3. Supply kit: Voltage monitoring relay; Operation manual; Packaging

### 4. Design and principle of operation

The device is controlled by a microcontroller, which analyzes the voltage in the three-phase power supply and displays the effective values on digital indicators for each phase. The output is switched to the load by electromagnetic relays. The device is powered by the phases being monitored. The permissible tripping limits, voltage hysteresis, switch-on delay time, phase asymmetry control and phase sequence control are set by the user.

When three-phase voltage is applied to the device, the indicators will display the effective voltage values for each phase. If the values are blinking, it means that the relay at the output of the device is off.

The device can operate in one of two modes - Three-phase or Single-phase. The selection of the device operation mode is described below.

**Three-phase mode** is designed for protection of three-phase consumers, with phase sequence control and phase asymmetry control.

Variants of indication of alarm states in **Three-phase mode**:

If the voltage value on the indicators is flashing, it means an emergency situation on one of the phases. There is no voltage at the device output. If the voltage value of any of the phases is not within the set range, the relays on all phases will not turn on until the voltage comes within the set limits.

If the phase asymmetry is higher than the set value, flashing phase designations "L1", "L2" and "L3" are displayed on the corresponding indicators.

If the phase sequence is incorrect, the first display will show the current voltage value flashing on the first indicator and the other two will alternately show "L2" and "L3". The relay on all phases will not turn on until the wiring error is corrected. This error can be corrected by swapping any two phases at the input of the device. Phase sequence control can be disabled (see below).

The **Single-phase mode** is used to protect single-phase consumers in a three-phase network (similar to the operation of three independent voltage relays operating on each phase), for example, in the case of a three-phase input in a residential building.

Variants of alarm indication in **Single-phase mode**:

If the voltage indication flashes on any of the indicators, this means an alarm condition on that phase. There is no voltage at the output of that phase. This situation is possible on one, two or three phases because the voltage is outside the set trip limits. If the voltage value of any of the phases is not within the set range, the relay on that phase will not switch on until the voltage comes within the set limits. The LED indicates switching of the device relay on the output of the corresponding phase.

### 5. Device installation and configuration

The device is mounted on the TH-35 mounting profile (DIN rail). The device housing occupies six 17.5 mm modules. Connect the wires according to the diagram (see below). The cross-section of the power wire should not exceed 16 mm<sup>2</sup>. When using stranded wire, cable lugs must be used.

When installing the device in wet areas (bathroom, sauna, swimming pool, etc.), it is necessary to place it in a mounting box with a degree of protection of at least IP55 (partial protection against dust and protection against splashing in any direction).

To change the default parameters, select the appropriate parameter in the menu. The sequence of parameter setting is shown in the figure below.

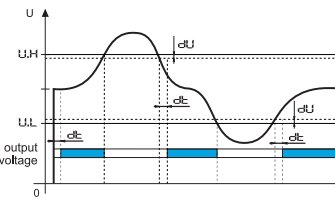
The selection of the parameter for setting is carried out by the **S** button, changing the value - by the **↓** **↑** buttons. Exit the setting mode **⏻** button.

In the setting mode the set value flashes. All set values are stored in the non-volatile memory of the device.

### Parameter setting sequence

Select the relay operation mode - Three-phase or Single-phase.

To configure the surge protection, you need to set the upper and lower voltage limits, voltage hysteresis, and the switch-on delay time. In three-phase mode, these parameters are common to the three phases. The voltage hysteresis is necessary to prevent multiple tripping when the voltage fluctuates around the set limit value.



### Work logic

U.H - upper voltage limit  
U.L - lower voltage limit  
dU - voltage hysteresis  
dE - switch-on delay time

When the set voltage limit is reached, the load is disconnected. The load will turn on automatically when the voltage returns to the set voltage minus (for the upper limit) or plus (for the lower limit) the hysteresis value. That is, with a set upper limit of 250 and a hysteresis of 3 volts, the load will be disconnected at 250 volts and turned on at 247 volts.

In addition to these parameters, in synchronous mode it is necessary to set phase asymmetry control - from 20 to 99 V or "OFF" - asymmetry is not controlled. Phase sequence control "On" - enabled, "OFF" - disabled.

In synchronous mode the device can work with voltage sources with unstable frequency, such as generators. For this purpose there is a function for selecting the frequency control mode: "50.H" or "Auto". The "50.H" mode is intended for operation in a household electrical network, the "Auto" mode is an automatic adjustment of voltage measurement when working from sources with unstable frequency and irregular sine wave shape, such as generators, inverters. Stable operation is not guaranteed in case of significant deviations (below 45 Hz or above 65 Hz) of frequency. In the "Auto" mode it is possible to set the switch-off delay time in milliseconds "Fr.d": "000"- "900". This may be necessary when operating with generators where large variations in engine speed are encountered when switching large loads. When "000" is set, there is no delay (switch-off time of 20 msec).

Next, set the parameters common for both modes of operation.

The brightness of the "brt" indicator can be selected from nine values - 1-9.

The device has an automatic button lock, which locks the buttons 30 seconds after the last press of the button: "Loc.On" - lock is on, "Loc.OFF" - lock is off. To unlock - long press **⏻** button.

The device is equipped with an internal temperature control function to protect against overheating. If the temperature exceeds 70°C, the load is switched off - "Hot" is displayed on the indicator. The load will automatically turn on if the device cools down below 60°C. In the next menu item, you can display the temperature inside the appliance "t.in" in °C.

The temperature monitoring function can be deactivated:

- t.in - 35°C - On - the function is enabled;
- t.in - 35°C - OFF - the function is disabled.

Next, the fault log (load disconnection) is displayed, which stores the last 25 events. The left display shows the sequence number of the event "E. 2", the middle display shows the phase in which the event occurred, and the right display shows the voltage that caused the trip.

Resetting the values to factory settings is performed by the "RESET" function, press and hold **⏻** button in this menu item until the device is rebooted (the countdown will be displayed on the indicator).

### 6. Safety precautions

Installation and maintenance of the device must be carried out by qualified specialists who have studied this operating manual. During operation and maintenance, it is necessary to adhere to the requirements of regulatory documents: - Rules for the technical operation of users' electrical installations; - Safety rules for the operation of electrical installations of users; - Occupational safety during the operation of electrical installations.

The device uses dangerous voltage -

**DO NOT CONNECT THE DEVICE DISASSEMBLED!!!**

### 7. Storage, transportation and operation conditions

Devices in the manufacturer's packaging must be stored in enclosed spaces with natural ventilation. Climatic factors of storage conditions: air temperature: - 50°C... +50°C; relative average annual humidity: 75% at +15°C.

The device is operational in any location in space.

The device is not intended for operation in conditions of vibration and shocks, as well as in explosive environments.

Do not allow moisture to enter the input contacts of the terminal clamps and internal elements of the device. It is prohibited to use it in aggressive environments containing acids, alkalis, oils, etc. in the atmosphere.

The correct operation of the device is guaranteed at ambient temperatures from -25°C to +50°C and relative humidity from 30 to 80%.

To operate the device at subzero temperatures, it is necessary to install it in a moisture-proof housing to avoid the formation of condensation due to temperature changes.

### 8. Warranty

The warranty period for the device is 5 years from the date of sale.

During the warranty period, the manufacturer will repair the device in the event of a malfunction, provided that the consumer has followed the rules of storage, connection, and operation.

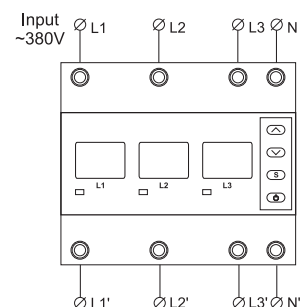
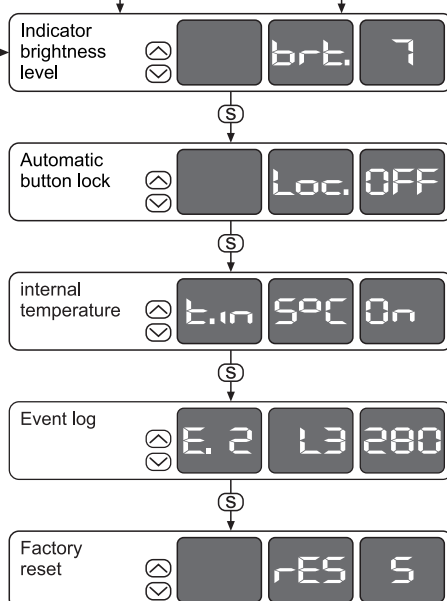
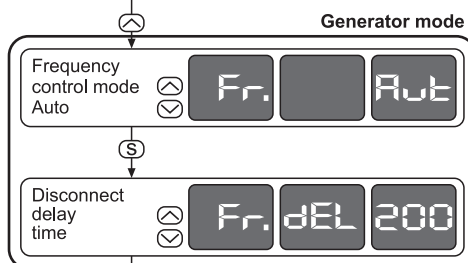
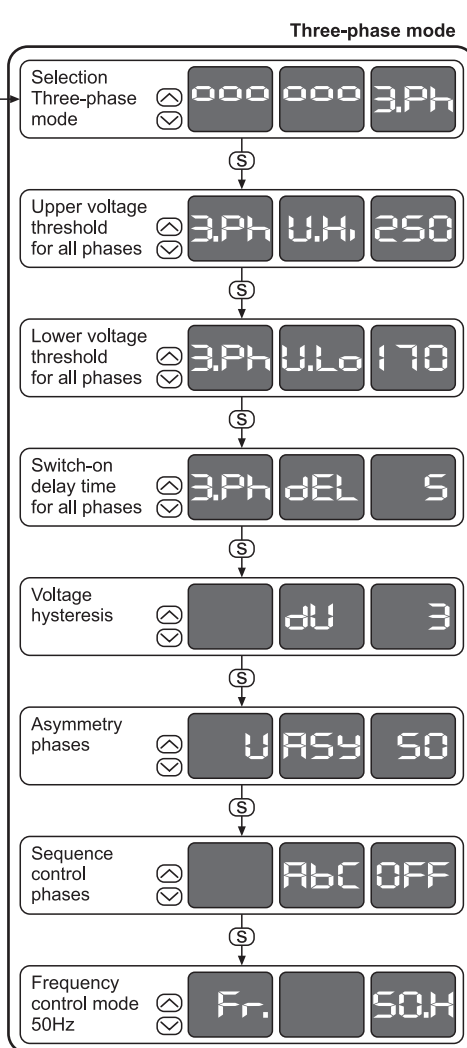
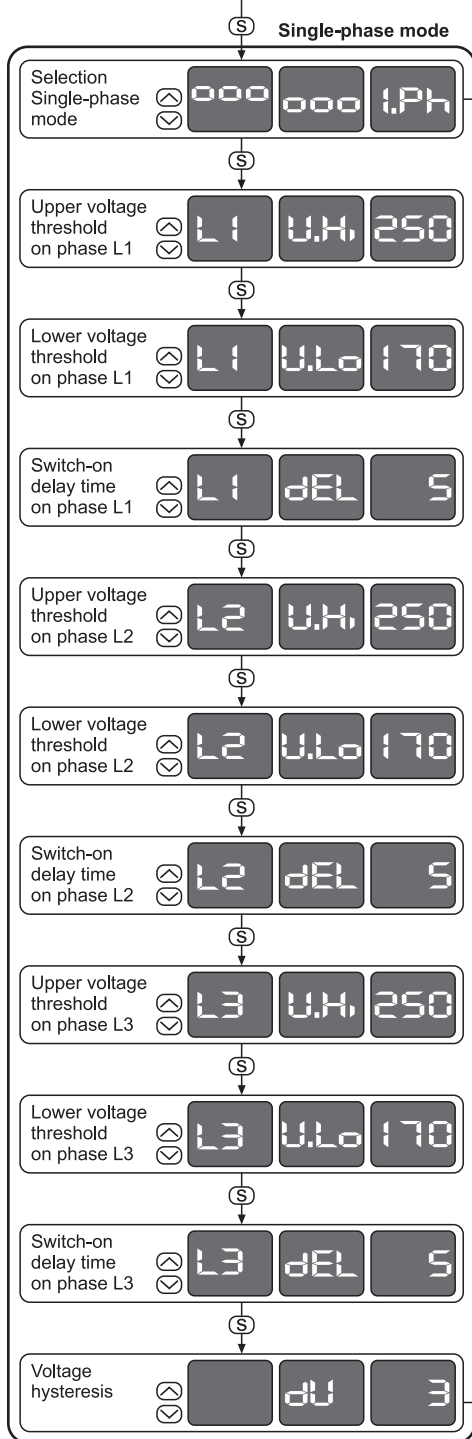
Warranty servicing of the device is carried out with the presence of a marking from the selling organization.

The device is not eligible for warranty servicing in the following cases:

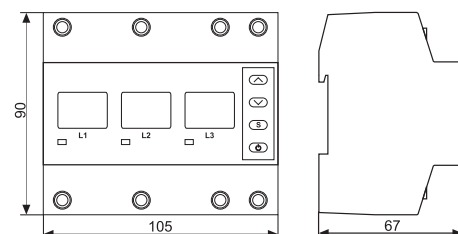
1. Expiry of the warranty period.
2. Operating conditions and electrical connection do not comply with the "Operating manual" provided with the device.
3. User-performed self-repair.
4. The presence of signs of mechanical damage (violation of seals, unauthorized appearance, scorching of power terminals from the external side).
5. The presence of signs of exposure to moisture, foreign objects, dust, dirt inside the device (including insects).
6. Lightning strike, fire, flooding, lack of ventilation, and other causes beyond the manufacturer's control.

# Parameter setting sequence

## Menu entry



Wiring diagram



Dimensions

## Acceptance certificate

The device has passed acceptance tests.

Batch number \_\_\_\_\_

Release date \_\_\_\_\_

Warranty and post-warranty service is provided by  
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