

#### Overview



Solid-state line monitoring relays provide maximum protection for mobile machines and plants or for unstable networks. Network and voltage faults can be detected early and rectified before far greater damage ensues.

Depending on the version, the relays monitor phase sequence, phase failure with and without N conductor monitoring, phase unbalance, undervoltage or overvoltage.

Phase unbalance is evaluated as the difference between the greatest and the smallest phase voltage relative to the greatest phase voltage. Undervoltage or overvoltage exists when at least one phase voltage deviates by 20 % from the set rated system voltage or the directly set limit values are overshoot or undershot. The rms value of the voltage is measured.

With the 3UG46 17 or 3UG46 18 relay, a wrong direction of rotation can also be corrected automatically.

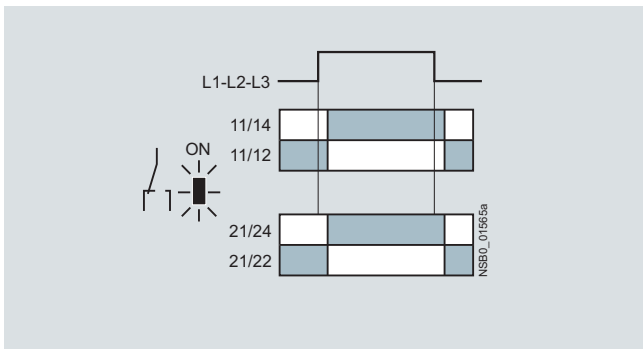
#### Function

##### 3UG45 11 monitoring relays

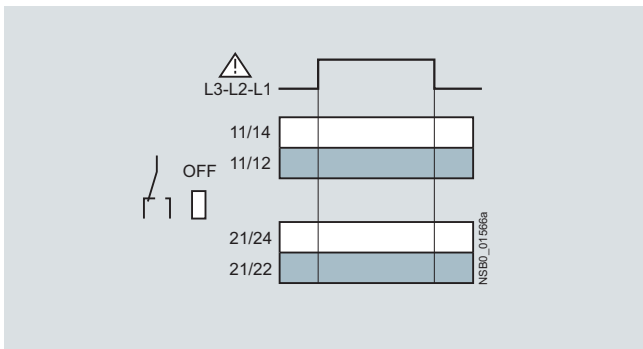
The 3UG45 11 phase sequenced relay monitors the phase sequence in a three-phase network. No adjustments are required for operation. The device has an internal power supply and works using the closed-circuit principle. If the phase sequence at the terminals L1-L2-L3 is correct, the output relay picks up after the delay time has elapsed and the LED is lit. If the phase sequence is wrong, the output relay remains in its rest position.

*Note: When one phase fails, connected loads (motor windings, lamps, transformers, coils, etc.) create a feedback voltage at the terminal of the failed phase due to the network coupling. Because the 3UG45 11 relays are not resistant to voltage feedback, such a phase failure is not detected. Should this be required, then the 3UG45 12 monitoring relay must be used.*

##### Correct phase sequence



##### Wrong phase sequence

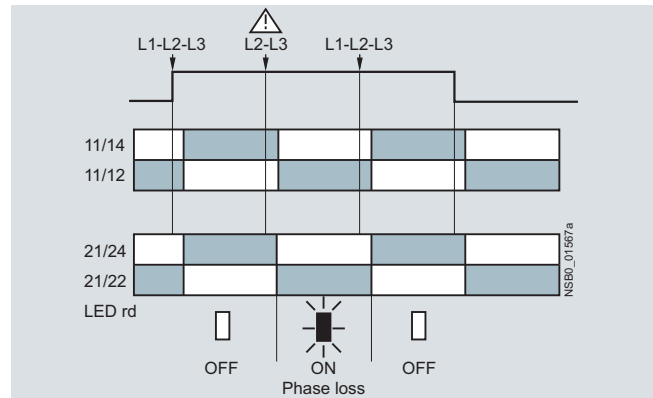


##### 3UG45 12 monitoring relays

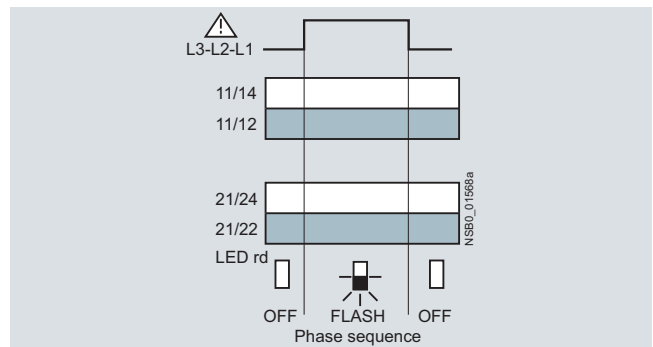
The 3UG45 12 line monitoring relay monitors three-phase networks with regard to phase sequence, phase failure and phase unbalance of 10 %. Thanks to a special measuring method, a phase failure is reliably detected in spite of the wide voltage range from 160 ... 690 V AC and feedback through the load of up to 90 %. The device has an internal power supply and works using the closed-circuit principle. No adjustments are required. When the mains voltage is switched on, the green LED is lit. If the phase sequence at the terminals L1-L2-L3 is correct, the output relay picks up. If the phase sequence is wrong, the red LED flashes and the output relay remains in its rest position. If a phase fails, the red LED is permanently lit and the output relay drops.

*Note: The red LED is a fault diagnostic indicator and does not show the current relay status. The 3UG45 12 monitoring relay is suitable for line frequencies of 50/60 Hz.*

##### Phase failure



##### Wrong phase sequence



# Monitoring Relays

## 3UG Monitoring Relays for Electrical and Additional Measurements

### Line monitoring

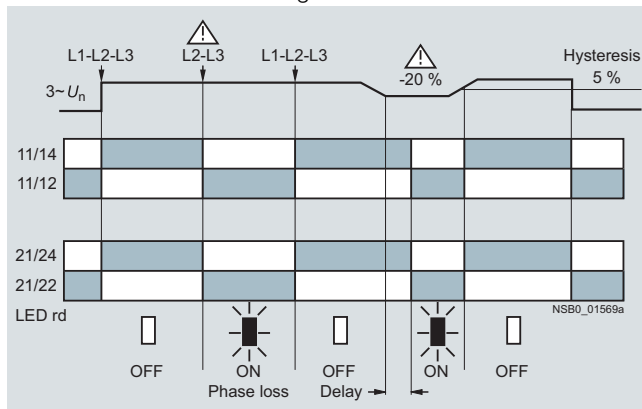
#### 3UG45 13 monitoring relays

The 3UG45 13 line monitoring relay monitors three-phase networks with regard to phase sequence, phase failure, phase unbalance and undervoltage of 20 %. The device has an internal power supply and works using the closed-circuit principle. The hysteresis is 5 %. The integrated response delay time is adjustable from 0 ... 20 s and responds to undervoltage. If the direction is incorrect, the device switches off immediately. Thanks to a special measuring method, a phase failure is reliably detected in spite of the wide voltage range from 160 ... 690 V AC and feedback up to 80 % through the load. When the mains voltage is switched on, the green LED is lit. If the phase sequence at the terminals L1-L2-L3 is correct, the output relay picks up. If the phase sequence is wrong, the red LED flashes and the output relay remains in its rest position. If a phase fails, the red LED is permanently lit and the output relay drops.

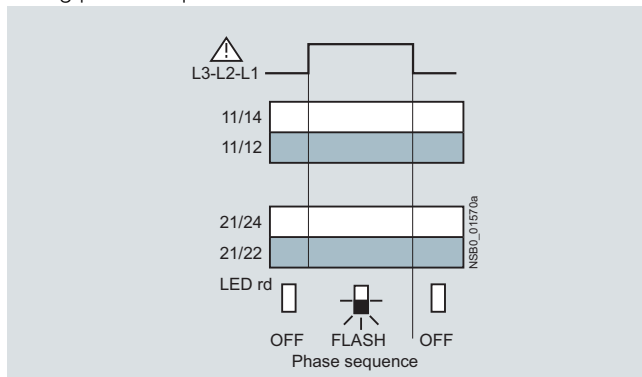
#### Note:

The red LED is a fault diagnostic indicator and does not show the current relay status. The 3UG45 13 monitoring relay is suitable for line frequencies of 50/60 Hz.

#### Phase failure and undervoltage



#### Wrong phase sequence



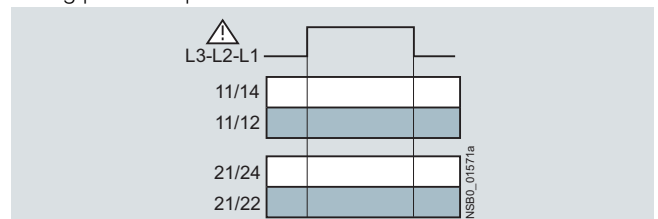
#### 3UG46 14 monitoring relays

The 3UG46 14 line monitoring relay has a wide voltage range and an internal power supply. The device is equipped with a display and is parameterized using three buttons. It monitors three-phase networks with regard to phase unbalance from 5 ... 20 %, phase failure, undervoltage and phase sequence. The hysteresis is adjustable from 1 ... 20 V. In addition the device has a response delay and ON-delay from 0 ... 20 s in each case. The integrated response delay time responds to phase unbalance and undervoltage. If the direction is incorrect, the device switches off immediately. Thanks to a special measuring method, a phase failure is reliably detected in spite of the wide voltage range from 160 ... 690 V AC and feedback up to 80 % through the load.

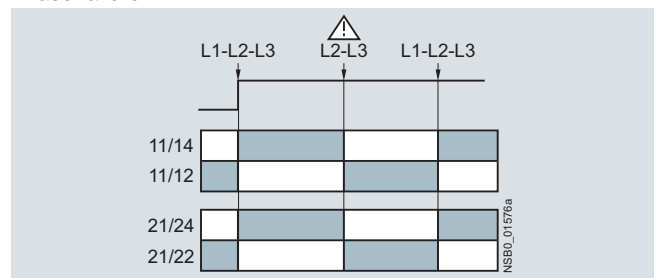
The 3UG46 14 monitoring relay can be operated on the basis of either the open-circuit or closed-circuit principle and with manual or auto RESET.

#### With the closed-circuit principle selected

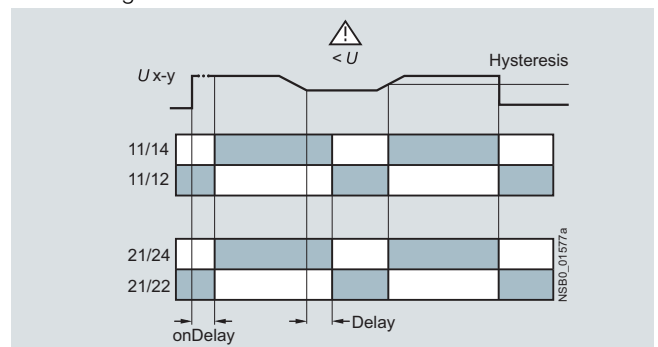
##### Wrong phase sequence



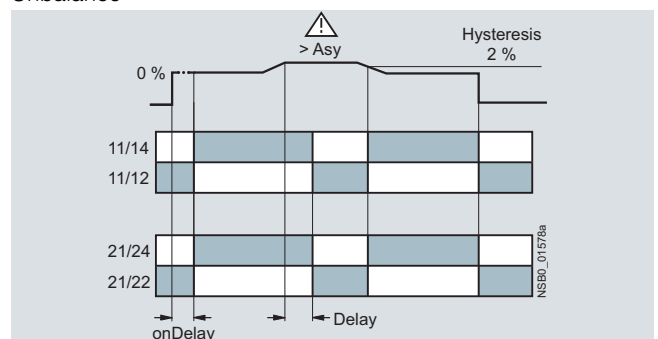
##### Phase failure



##### Undervoltage



##### Unbalance



# Monitoring Relays

## 3UG Monitoring Relays for Electrical and Additional Measurements

Line monitoring

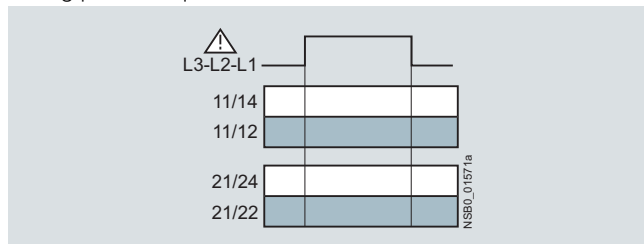
### 3UG46 15/3UG46 16 monitoring relays

The 3UG46 15/3UG46 16 line monitoring relay has a wide voltage range and an internal power supply. The device is equipped with a display and is parameterized using three buttons. The 3UG46 15 device monitors three-phase networks with regard to phase failure, undervoltage, overvoltage and phase sequence. The 3UG46 16 monitoring relay monitors the neutral conductor as well. The hysteresis is adjustable from 1 ... 20 V. In addition the device has two separately adjustable delay times for overvoltage and undervoltage from 0 ... 20 s in each case. If the direction is incorrect, the device switches off immediately. Thanks to a special measuring method, a phase failure is reliably detected in spite of the wide voltage range from 160 ... 690 V AC and feedback through the load of up to 80 %.

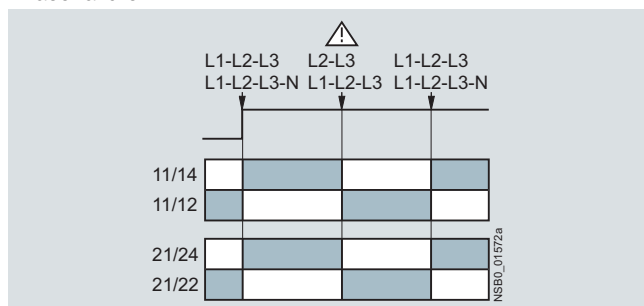
The 3UG46 15/ 3UG46 16 monitoring relay can be operated on the basis of either the open-circuit or closed-circuit principle and with manual or auto RESET.

#### With the closed-circuit principle selected

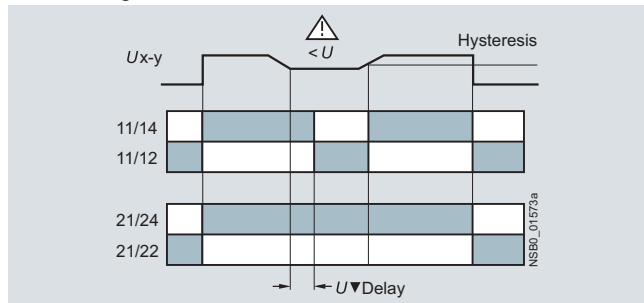
##### Wrong phase sequence



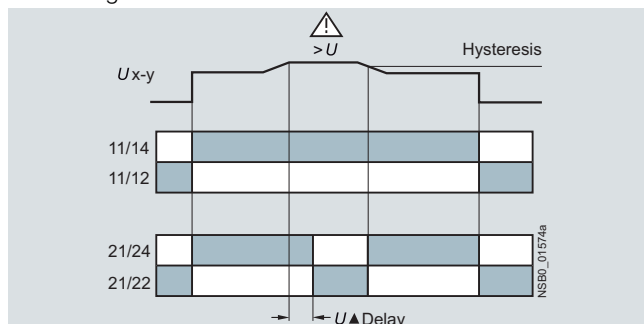
##### Phase failure



##### Undervoltage



##### Overvoltage

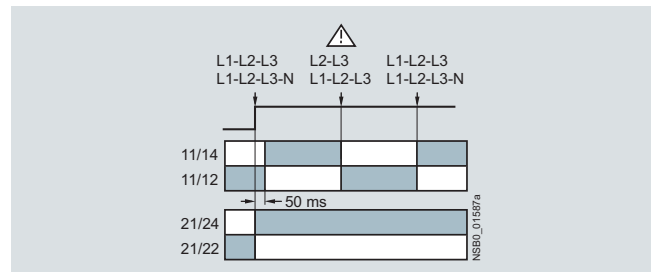


### 3UG46 17/3UG46 18 monitoring relays

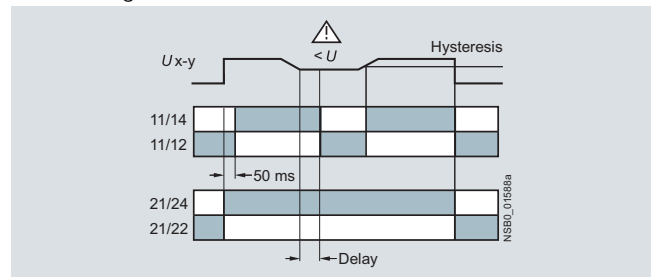
The 3UG46 17/ 3UG46 18 line monitoring relay has an internal power supply and can automatically correct a wrong direction of rotation. Thanks to a special measuring method, a phase failure is reliably detected in spite of the wide voltage range from 160 ... 690 V AC and feedback through the load of up to 80 %. The device is equipped with a display and is parameterized using three buttons. The 3UG46 17 line monitoring relay monitors three-phase networks with regard to phase sequence, phase failure, phase unbalance, undervoltage and overvoltage. The 3UG46 18 monitoring relay monitors the neutral conductor as well. The hysteresis is adjustable from 1 ... 20 V. In addition the device has delay times from 0 ... 20 s in each case for overvoltage, undervoltage, phase failure and phase unbalance. The 3UG46 17/ 3UG46 18 monitoring relay can be operated on the basis of either the open-circuit or closed-circuit principle and with manual or auto RESET. The one changeover contact is used for warning or disconnection in the event of power system faults (voltage, unbalance), the other responds only to a wrong phase sequence. In conjunction with a contactor reversing assembly it is thus possible to change the direction automatically.

#### With the closed-circuit principle selected

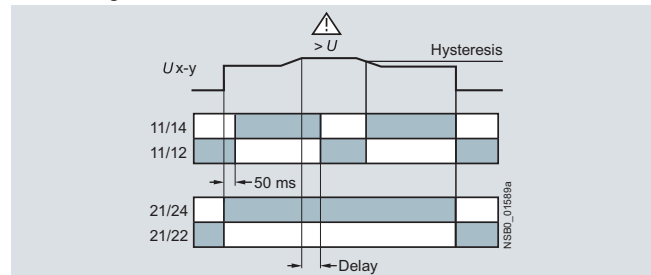
##### Phase failure



##### Undervoltage



##### Overvoltage



##### Unbalance

