

6.5 3UG4614 line monitoring relay

6.5.1 Operator controls and connection terminals

Front view / terminal labeling 3UG4614

Front view	Description	
	Position digits	
	①	Terminal block (removable): Connection is possible using screw terminals or spring-loaded terminals.
	②	Arrow keys for menu navigation
	③	SET key for menu navigation
	④	Device article number
	⑤	Label
	⑥	Legend for menu
	⑦	Display for parameterization, actual-value indication, and diagnostics
	Terminal labels	
	L1, L2, L3	Rated control supply voltage
	12	Output relay K1 CO contact NC contact
	11	Output relay K1 CO contact root
	14	Output relay K1 CO contact NO contact
22	Output relay K2 CO contact NC contact	
21	Output relay K2 CO contact root	
24	Output relay K2 CO contact NO contact	

You can find additional information on the connection terminals and the permissible conductor cross-sections in the Chapter "Connection methods (Page 21)".

You can find information on connecting in the Chapter "Circuit diagrams (Page 137)".

6.5.2 Functions

General functionality

The 3UG4614 line monitoring relays monitor a three-phase system for **phase asymmetry**, **undervoltage**, **phase failure**, and **phase sequence**.

The devices feature a wide-range voltage input and are **self-powered** (measuring voltage = rated control supply voltage). The 3UG4614 line monitoring relays monitor all phases of three-phase AC networks from 160 to 690 V through terminals L1 / L2 / L3 and also draw power from all three phases simultaneously.

The 3UG4614 line monitoring relays feature 2 output relays (output relay K1 and output relay K2). The relays work synchronously.

You will find the setting ranges and factory settings of the available parameters in Chapter "Operation (Page 135)."

You will find a description of the individual parameters in Chapter "Parameters (Page 363)."

Note

The specified voltages represent the absolute thresholds.

Monitoring

The output relays respond in accordance with the set relay switching behavior (closed-circuit principle NC or open-circuit principle NO) if the following conditions are met:

- Correct phase sequence at terminals L1-L2-L3
- The monitored voltage (U_{x-y}) is larger than the set value
- The voltage symmetry (A_{sy}) is smaller than the set value

If a fault occurs (phase failure, incorrect phase sequence, or phase asymmetry), the output relays switch in accordance with the relay switching behavior.

In the case of incorrect direction of rotation, the 3UG4614 line monitoring relays immediately shut down. Thanks to a special measuring method, a phase failure is detected with certainty despite wide-range voltage from 160 to 690 V AC and reverse power of up to 80 % from the load in the case of regenerative power recovery.

On failure of one of the phases, the output relays drop out immediately to protect the application from any damage that may result. Set delay times have no effect on the phase failure monitoring.

Note

The 3UG4614 line monitoring relays are only suitable for line frequencies of 50 / 60 Hz!

Startup delay


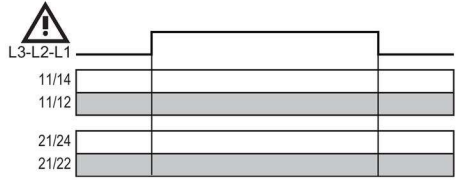
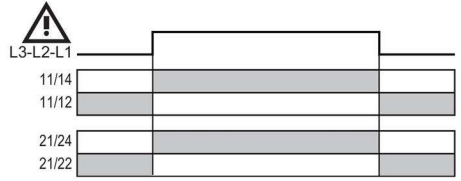

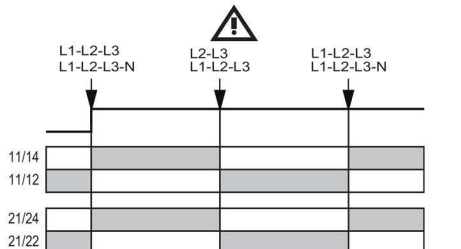
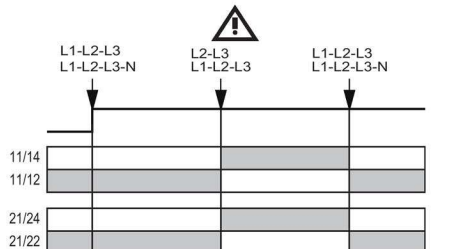

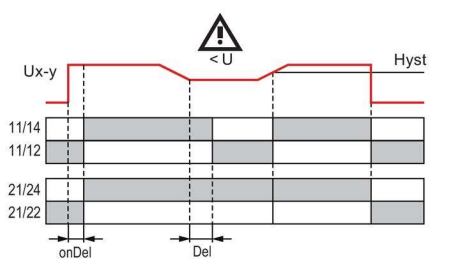
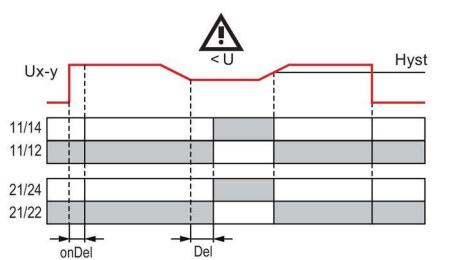

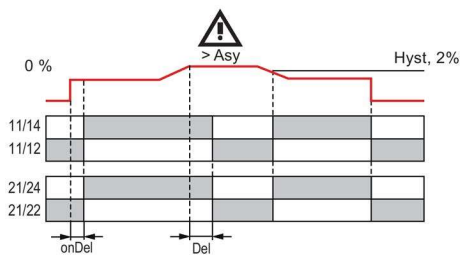
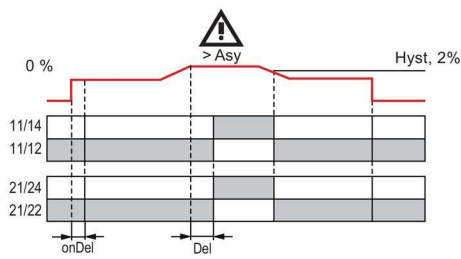
After applying the supply voltage or resetting the monitoring relays, the set ON-delay begins (onDel). During this time, undershooting or overshooting of the set threshold values will not cause the CO contact to respond but instead will result in a restart of the ON-delay.

Tripping delay

If the measured value overshoots or undershoots the set threshold after expiry of the ON-delay time (onDel), the set tripping delay time (Del) and the relay symbol will flash. After expiry of this time, the output relays change the switching state. On the display, the current measuring value and the symbol for undershoot or overshoot flash.

You will find the switching states of the output relays below in section "Function diagrams" and in Chapter "Diagnostics (Page 136)."

Function diagrams 3UG4614

Display	Memory = no Relay switching behavior = NC (closed-circuit principle)	Memory = no Relay switching behavior = NO (open-circuit principle)
		
		
		
		

6.5.3 Operation

Parameters


Parameterization of the devices is possible locally using the display and the three keys.



Parameter information

The table below shows the settable parameter information of the 3UG4614 line monitoring relays:

Table 6- 3 Parameter information, 3UG4614 line monitoring relays with digital setting

Menu level	Parameters	Setting range		Increment	Factory setting
		Minimum value	Maximum value		
"RUN"	Threshold for undershoot (U ∇)	160 V	690 V	1 V	375 V
"RUN"	Threshold for voltage asymmetry (Asy)	5 % or OFF	20 %	1 %	5 %
"SET"	Hysteresis (Hyst)	1 V	20 V	1 V	5 V
"SET"	Stabilization delay (onDel)	0.1 s	20 s	0.1 s	0.1 s
"SET"	Tripping delay time (Del) (on undervoltage or overshoot of the asymmetry value)	0.1 s	20 s	0.1 s	0.1 s
"SET"	Reset response (Mem)	no = Autoreset	yes = HandRESET	--	no = Autoreset
"SET"	Phase sequence monitoring 	no	yes	--	yes
"SET"	Relay switching behavior (closed-circuit principle NC / open-circuit principle NO)	NC	NO	--	NC

The parameters are described in Chapter "Parameters (Page 363)."

Menu-based operation is described in Chapter "Menu-based operation (Page 39)."

6.5.4 Diagnostics

6.5.4.1 Indications on the display

Display information

The display is divided into three different areas.



- ① Voltage measured value or fault symbol
- ② Type of monitoring
- ③ Symbols of the changeover contacts

Meaning of the information on the display

Note

Indications in the event of a fault

The symbols on the display flash to indicate an error.

The following statuses and line faults are indicated as a diagnostics message with flashing symbols:

Display area	Symbol	Meaning
①	200V	Measured line-to-line voltage (L1 - L2) is displayed
①	L ⚡	Flashing: Phase failure detected
①	↷!	Flashing: Incorrect phase sequence detected
①	Asym	Flashing: Voltage asymmetry detected
②		Monitoring for overshoot of the voltage asymmetry
②		Monitoring for voltage undershoot
②	◀	Voltage is in correct range
②	▲	A voltage overshoot has occurred
②	▼	A voltage undershoot has occurred
③		<ul style="list-style-type: none"> • Not flashing: Relay contact 11/12 open, relay contact 11/14 closed • Flashing: Delay time (ON-delay or tripping delay) running • Masked out: Relay contact 11/12 closed, relay contact 11/14 open
③		<ul style="list-style-type: none"> • Not flashing: Relay contact 21/22 open, relay contact 21/24 closed • Flashing: Delay time (ON-delay or tripping delay) running • Masked out: Relay contact 21/22 closed, relay contact 21/24 open

You will find more information about the switching behavior of the output relays in Chapter "Functions (Page 132)".

6.5.4.2 Reset

RESET



How the outputs are reset depends on the "Reset response" parameter (see Chapter "Reset response (Page 363)").

The following settings can be selected:

- Automatic reset (Memory = 0 / Mem = no)

The device is reset automatically as soon as a previously occurring error has been dealt with.

- Manual RESET (Memory = 1 / Mem = yes)

To reset the devices with digital setting, it is necessary to press both arrow keys   simultaneously for more than 2.5 s after removal of the cause of error. If the cause of the error has not been removed, a new error message appears immediately. Alternatively, the devices can be reset by switching the rated control supply voltage on and off.

6.5.5 Circuit diagrams

Internal circuit diagrams 3UG4614 line monitoring relay

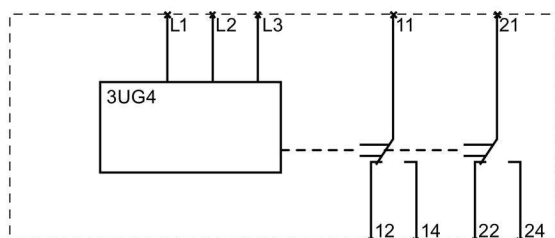


Image 6-1 3UG4614

Note

It is not necessary to fuse the measuring circuit to protect the device. Fusing for line protection depends on the cross-section used.

6.5.6 Technical data

Measuring circuit

		3UG4614-.....
Type of voltage for monitoring		AC
Number of poles for main current circuit		3
Measurable voltage		
• for AC	V	160 ... 690
Adjustable voltage range		V 120 ... 690
Adjustable response delay time		
• when starting	s	0.1 ... 20
• with lower or upper limit violation	s	0.1 ... 20

General technical details

		3UG4614-.....
Product function		Phase monitoring relay
Type of display LED		No
Product function		
• undervoltage recognition		Yes
• overvoltage recognition		No
• phase sequence recognition		Yes
• phase disturbance recognition		Yes
• asymmetry recognition		Yes
• overvoltage recognition of 3 phases		No
• undervoltage recognition of 3 phases		Yes
• tension window recognition of 3 phases		No
• reset external		—
• self-reset		Yes
• open-circuit or closed-circuit current principle		Yes
Starting time after the control supply voltage has been applied	s	1
Response time maximum	ms	450
Precision of digital display		+/-1 Digit
Relative metering precision	%	5
Relative adjustment accuracy	%	0.2
Relative repeat accuracy	%	1

		3UG4614-.....
Voltage type of control feed voltage		AC
Control supply voltage		
• at 50 Hz at AC rated value	V	160 ... 690
• at 60 Hz at AC rated value	V	160 ... 690
Operating range factor control supply voltage rated value		
• at 50 Hz for AC		1
• at 60 Hz for AC		1
Impulse voltage resistance rated value	kV	6
Recorded real power	W	2
Protection class IP		IP20
Electromagnetic compatibility		IEC 60947-1 / IEC 61000-6-2 / IEC 61000-6-4
Operating current at 17 V minimum	mA	5
Continuous current of the DIAZED fuse link of the output relay	A	4
Resistance against vibration according to IEC 60068-2-6		1 ... 6 Hz: 15 mm, 6 ... 500 Hz: 2g
Shock resistance according to IEC 60068-2-27		sinusoidal half-wave 15g / 11 ms
Current carrying capacity of output relay		
• at AC-15		
– at 250 V at 50/60 Hz	A	3
– at 400 V at 50/60 Hz	A	3
• at DC-13		
– at 24 V	A	1
– at 125 V	A	0.2
– at 250 V	A	0.1
Installation altitude at a height over sea level maximum	m	2 000
Conductor-bound parasitic coupling BURST according to IEC 61000-4-4		2 kV
Conductor-bound parasitic coupling conductor-earth SURGE according to IEC 61000-4-5		2 kV
Conductor-bound parasitic coupling conductor-conductor SURGE according to IEC 61000-4-5		1 kV
Electrostatic discharge according to IEC 61000-4-2		6 kV contact discharge / 8 kV air discharge
Field-bound parasitic coupling according to IEC 61000-4-3		10 V/m
Thermal current of the contact-affected switching element maximum	A	5
Insulation voltage for overvoltage category III according to IEC 60664 with degree of pollution 3 rated value	V	690

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		3UG4614-.....
Degree of pollution		3
Ambient temperature		
• during operating	°C	-25 ... +60
• during storage	°C	-40 ... +85
• during transport	°C	-40 ... +85
Galvanic isolation between entrance and outlet		Yes
Galvanic isolation between the outputs		Yes
Mechanical operating cycles as operating time typical		10 000 000
Electrical operating cycles as operating time at AC-15 at 230 V typical		100 000
Operating cycles with 3RT2 contactor maximum	1/h	5 000

Mechanical design

		3UG4614-1....	3UG4614-2....
Width	mm	22.5	
Height	mm	92	94
Depth	mm	91	
Built in orientation		any	
Distance, to be maintained, to earthed part			
• forwards	mm	0	
• backwards	mm	0	
• sideways	mm	0	
• upwards	mm	0	
• downwards	mm	0	
Distance, to be maintained, to the ranks assembly			
• forwards	mm	0	
• backwards	mm	0	
• sideways	mm	0	
• upwards	mm	0	
• downwards	mm	0	
Distance, to be maintained, conductive elements			
• forwards	mm	0	
• backwards	mm	0	
• sideways	mm	0	
• upwards	mm	0	
• downwards	mm	0	
Type of mounting		snap-on mounting	
Product function removable terminal for auxiliary and control circuit		Yes	
Design of the electrical connection		screw-type terminals	spring-loaded terminals
Type of the connectable conductor cross-section			
• solid		1x (0,5 ... 4 mm ²), 2x (0,5 ... 2,5 mm ²)	2x (0.25 ... 1.5 mm ²)
• finely stranded			
– with wire end processing		1x (0,5 ... 2,5 mm ²), 2x (0,5 ... 1,5 mm ²)	2 x (0.25 ... 1.5 mm ²)
– without wire end processing		—	2x (0.25 ... 1.5 mm ²)
• for AWG conductors			
– solid		2x (20 ... 14)	2x (24 ... 16)
– stranded		2x (20 ... 14)	2x (24 ... 16)
Tightening torque			
• with screw-type terminals	N·m	0.8 ... 1.2	— ...
Number of change-over switches delayed switching		2	