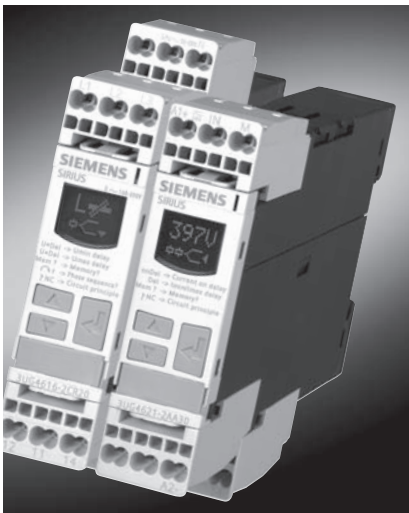


# 3UG Monitoring Relays

For line, single-phase voltage and insulation monitoring

The new 3UG4 line monitoring relays permit a maximum degree of protection to be achieved for machines, plants and systems. This means that line and voltage faults can be detected early on and the appropriate response is initiated before far more significant subsequent damage can occur.



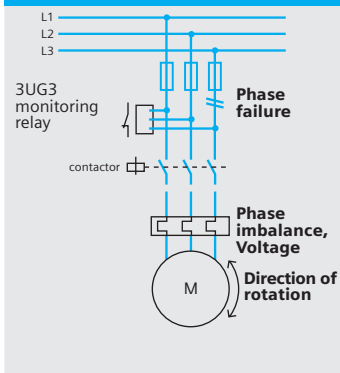
**Your advantages:**

- Thanks to the wide voltage range, it can be used on all line supplies around the world – from 160 V to 690 V – without an auxiliary voltage
- Can be variably set to above range, below range or window monitoring
- Freely parameterizable delay times and reset behavior
- Reduced width for all versions for line and voltage monitoring
- For the digital versions, the actual value and fault type are permanently displayed
- Automatic direction of rotation correction by differentiating between line faults and incorrect phase sequence
- All versions have removable terminals
- All versions have either screw terminals or alternatively innovative Cage Clamp terminals

**Applications:**

The applications are listed in the following table. These tables indicate the various plant system conditions that can be detected using the monitoring parameters.

**Configuration of a 3-phase monitoring function**



Measured quantity	Possible plant or system fault
<b>Phase sequence</b>	<ul style="list-style-type: none"> <li>• Direction of rotation of the drive</li> </ul>
<b>Phase failure</b>	<ul style="list-style-type: none"> <li>• A fuse has blown</li> <li>• Control supply voltage has failed</li> <li>• Single-phase operation of a motor with the corresponding overheating</li> </ul>
<b>Phase dissymmetry</b>	<ul style="list-style-type: none"> <li>• Motor overheating as a result of non-symmetrical voltages or phase failure</li> <li>• Line supplies with non-symmetrical load are detected</li> <li>• A phase failure is detected in spite of regenerative feedback</li> </ul>
<b>Undervoltage</b>	<ul style="list-style-type: none"> <li>• Motor draws an increased current and in turn overheats</li> <li>• A device is undesirably reset</li> <li>• Line supply dips, especially when supplied from a battery</li> <li>• Threshold value switch for analog signals 0 to 10 V</li> </ul>
<b>Overvoltage</b>	<ul style="list-style-type: none"> <li>• A plant is protected against destruction due to supply overvoltages</li> <li>• A plant or system switches-in above a certain voltage</li> <li>• Threshold value switch for analog signals 0 to 10 V</li> </ul>
<b>Insulation monitoring</b>	<ul style="list-style-type: none"> <li>• The insulation resistance for non-grounded plants and systems is monitored</li> </ul>

# 3UG Monitoring Relays

For line, single-phase voltage and insulation monitoring

3UG4 Monitoring relays for the line supply and three-phase voltages											
Phase sequence	Phase failure	Phase imbalance	Hysteresis	Under-voltage	Over-voltage	N-conductor monitoring	Delay time	Contacts	Line supply voltage	Order No.	List Price \$
22.5 mm wide 3UG4514 to 3UG3518 can be digitally set, with fault memory and with LCD display											
Yes	–	–	–	–	–	–	–	1 CO	160–260 320–500 420–690	3UG4511-□AN20 3UG4511-□AP20 3UG4511-□AQ20	
								2 CO	160–260 320–500 420–690	3UG4511-□BN20 3UG4511-□BP20 3UG4511-□BQ20	
Yes	Yes	10%	–	–	–	–	–	1 CO	160–690	3UG4512-□AR20	
								2 CO	160–690	3UG4512-□BR20	
Yes	Yes	20%	5%	160–690 V	–	–	Off delay 0–20 s	2 CO	160–690	3UG4513-□BR20	
Selectable	Yes	0–20%	1–20 V	160–690 V	–	–	On and off delay 0–20 s	2 CO	160–690	3UG4614-□BR20	
Selectable	Yes	Using threshold values	1–20 V	160–690 V	160–690 V	–	0–20 s for $V_{min}$ and $V_{max}$	1 CO for $V_{min}$ and $V_{max}$	160–690	3UG4615-□CR20	
Selectable	Yes	Using threshold values	1–20 V	160–690 V	160–690 V (90–400 w.r.t. N)	Yes	0–20 s for $V_{min}$ and $V_{max}$	1 CO for $V_{min}$ and $V_{max}$	160–690 (90–400 w.r.t. N)	3UG4616-□CR20	
Autom. correction	Yes	0–20%	1–20 V	160–690 V	160–690 V	–	Off delay 0–20 s	1 CO for line faults and 1 W for phase sequence	160–690	3UG4617-□CR20	
Autom. correction	Yes	0–20%	1–20 V	160–690 V	160–690 V (90–400 w.r.t. N)	Yes	Off delay 0–20 s	1 CO for line faults and 1 W for phase sequence	160–690 (90–400 w.r.t. N)	3UG4618-□CR20	

Screw Terminal **1**

Spring-type Terminal **2**

### Return voltage due to coupling between the individual phases

Loads connected to the three-phase line supply – such as motor windings, lamps, transformers – result in a coupling between the individual phases.



As a result of this coupling, there is always a return voltage at the equipment terminal of the phase that has failed.

Single-phase voltage monitoring						
Measuring range	Hysteresis	Contacts	Delay time	Auxiliary voltage	Order No.	List Price \$
22.5 mm wide, all of the devices can be digitally set and have an LCD display, a fault memory that can be switched-in, simultaneous monitoring for overvoltage and undervoltage over the complete measuring range						
17–275 V AC DC	0.1–150 V	1 CO	0–20 s	Selfsupplied	3UG4633-□AL30	
0.1–60 V AC DC	0.1–30 V	1 CO	0–20 s	24 V AC DC	3UG4631-□AA30	
				24–240 V AC DC	3UG4631-□AW30	
10–600 V AC DC	0.1–300 V	1 CO	0–20 s	24 V AC DC	3UG4632-□AA30	
				24–240 V AC DC	3UG4632-□AW30	

Screw Terminal **1**

Spring-type Terminal **2**

## Technical specifications

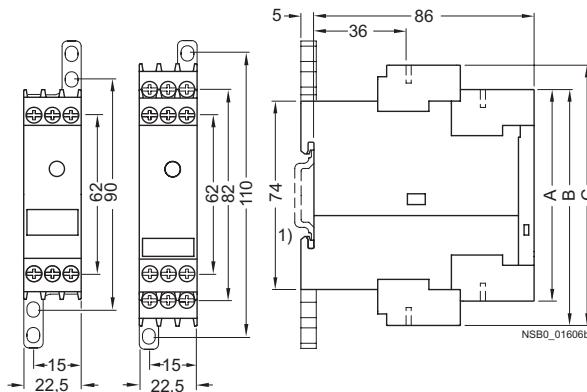
Type		3UG45 11- ..N20	3UG45 11- ..P20	3UG45 11- ..Q20	3UG45 12	3UG45 13	3UG46 14	3UG46 15 3UG46 17	3UG46 16 3UG46 18	
<b>General data</b>										
<b>Rated control supply voltage <math>U_s^{1)}</math></b>	V	160 ... 260	320 ... 500	420 ... 690	160 ... 690				90 ... 400	
<b>Rated frequency</b>	Hz	50/60								
<b>Rated power</b> , typical										
• At AC 230 V	W/VA	2/4	--	--	2/2.5					
• At AC 400 V	W/VA	--	2/8	--	2/3.5					
• At AC 460 V	W/VA	--	--	2/8	2/4					
<b>Width</b>	mm	22.5								
<b>RESET</b>		Auto-RESET					Automatic/manual			
<b>Principle of operation</b>		Closed-circuit					Closed-circuit, open-circuit (3UG46 17/3UG46 18: closed-circuit)			
<b>Availability time</b> after application of $U_s$	ms	200			1.000					
<b>Response time</b> once a switching threshold is reached	ms	Max. 450								
<b>Unbalance</b>	%	--			10	20	0; 5 ... 20	3UG46 15/3UG46 16: Through threshold values 3UG46 17/3UG46 18: 0; 5 ... 20		
<b>Adjustable tripping delay time</b>	s	--				0.1 ... 20				
<b>Adjustable ON-delay time</b>	s	--				0.1 ... 20		--		
<b>Mains buffering time</b> , minimum	ms	10			30					
<b>Rated insulation voltage <math>U_i</math></b> Degree of pollution 3 Overtoltage category III acc. to EN 60664-1	V	690								
<b>Rated impulse withstand voltage</b>	kV	6								
<b>Permissible ambient temperature</b>										
• During operation	°C	-25 ... +60								
• During storage	°C	-40 ... +85								
<b>EMC tests<sup>2)</sup></b>		IEC 60947-/IEC 61000-6-2/IEC 61000-6-4								
<b>Degree of protection</b>										
• Enclosure		IP40								
• Terminals		IP20								
<b>Vibration resistance</b> acc. to IEC 60068-2-6		1 ... 6 Hz: 15 mm; 6 ... 500 Hz: 2 g								
<b>Shock resistance</b> acc. to IEC 60068-2-27		12 shocks (half-sine 15 g/11 ms)								
<b>Connection type</b>		 <b>Screw terminals</b>								
• Terminal screw		M 3 (standard screwdriver, size 2 and Pozidriv 2)								
• Solid	mm <sup>2</sup>	1 x (0.5 ... 4)/2 x (0.5 ... 2.5)								
• Finely stranded with end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)/2 x (0.5 ... 1.5)								
• AWG cables, solid or stranded	AWG	2 x (20 ... 14)								
• Tightening torque	Nm	0.8 ... 1.2								
<b>Connection type</b>		 <b>Spring-type terminals</b>								
• Solid	mm <sup>2</sup>	2 x (0.25 ... 1.5)								
• Finely stranded, with end sleeves acc. to DIN 46228	mm <sup>2</sup>	2 x (0.25 ... 1.5)								
• Finely stranded	mm <sup>2</sup>	2 x (0.25 ... 1.5)								
• AWG cables, solid or stranded	AWG	2 x (24 ... 16)								
<b>Measuring circuit</b>										
<b>Measuring range</b> AC 50/60 Hz rms value	V	160 ... 260	320 ... 500	420 ... 690	160 ... 690					
<b>Setting range</b>	V					200...690	160...690	90...400		
<b>Measuring accuracy</b>	%	--				±5				
<b>Repeat accuracy</b> At constant parameters	%	--				±1				
<b>Setting accuracy</b>		--				±10 % referred to setting	±1 V			
<b>Accuracy of digital display</b>		--						±1 digit		
<b>Deviations</b> for temperature fluctuations	%/°C	--				±0.1				
<b>Hysteresis</b> for voltage	V	--				5 % from setting	1 ... 20 V			
<b>Hysteresis</b> for unbalance	%	--						(setting - 2)	3UG46 17/3UG46 18: (setting - 2)	
<b>Deviation for frequency fluctuation</b>	%	--				±1				

1) Absolute limit values.

2) Important: This is a Class A product. In the household environment this device may cause radio interference. In this case the user must introduce suitable measures.

	3UG45 11- ..N20	3UG45 11- ..P20	3UG45 11- ..Q20	3UG45 12	3UG45 13	3UG46 14	3UG46 15 3UG46 17	3UG46 16 3UG46 18
<b>Control circuit</b>								
<b>Load capacity of the output relay</b> • Conventional thermal current $I_{th}$	A	5						
<b>Rated operational current <math>I_e</math> at</b> • AC-15/24 ... 400 V • DC-13/24 V • DC-13/125 V • DC-13/250 V	A	3						
	A	1						
	A	0.2						
	A	0.1						
<b>Minimum contact load at 17 V DC</b>	mA	5						
<b>Output relay with DIAZED fuse</b> gL/gG operational class	A	4						
<b>Electrical endurance AC-15</b>	Million operating cycles	0.1						
<b>Mechanical endurance</b>	Million operating cycles	10						

### Dimensional drawings



Type	3UG45 11-A 3UG45 12-A	3UG45 11-B 3UG45 12-B 3UG45 13 3UG46 14 3UG46 15 3UG46 17	3UG46 16 3UG46 18
	A	B	C

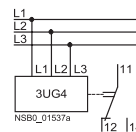
### Removable terminal

Screw-type terminal	83	92	102
Spring-loaded terminal	84	94	103

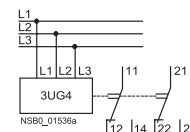
1) For standard mounting rail according to EN 60715.

### Schematics

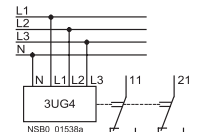
3UG45 11-A  
3UG45 12-A



3UG45 11-B  
3UG45 12-B  
3UG45 13  
3UG46 14  
3UG46 15  
3UG46 17



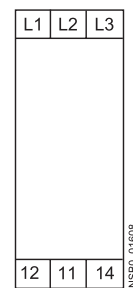
3UG46 16  
3UG46 18



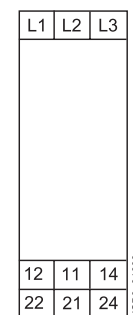
*Note: It is not necessary to protect the measuring circuit for device protection. The protective device for line protection depends on the cross-section used.*

### Position of the terminals

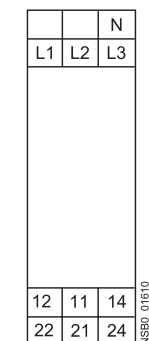
3UG45 11-A  
3UG45 12-A





3UG45 11-B  
3UG45 12-B  
3UG45 13  
3UG46 14  
3UG46 15  
3UG46 17



3UG46 16  
3UG46 18



## Technical specifications

		3UG46 31- .AA	3UG46 31- .AW	3UG46 32- .AA	3UG46 32- .AW	3UG46 33
<b>General data</b>						
Rated control supply voltage $U_s$	V	24 AC/DC	24...240 AC/DC	24 AC/DC	24...240 AC/DC	17 ... 275 <sup>1)</sup> AC/DC
Rated frequency for AC	Hz	50/60				40 ... 500
Operating range	V	20.4 ... 27.6	20.4 ... 264	20.4 ... 27.6	20.4 ... 264	17...275
Rated power in W/VA	VA	2/4				
Width	mm	22.5				
RESET		Automatic/manual				
Availability time after application of $U_s$	ms	1000				
Response time once a switching threshold is reached	ms	Max. 450				
Adjustable tripping delay time	s	0.1 ... 20				
Adjustable ON-delay time	s	--				
Mains buffering time, minimum	ms	10				
Rated insulation voltage $U_i$ Degree of pollution 3 Overvoltage category III acc. to EN 60664-1	V	690				
Rated impulse withstand voltage $U_{imp}$	kV	6				
Protective separation acc. to EN 60947-1, Annex N	V	300				
Permissible ambient temperature	°C	-25 ... +60				
• During operation	°C	-40 ... +85				
• During storage						
EMC tests <sup>2)</sup>		IEC 60947-1/IEC 61000-6-2/IEC 61000-6-4				
Degree of protection		IP40				
• Enclosure		IP20				
• Terminals						
Vibration resistance acc. to IEC 60068-2-6		1 ... 6 Hz: 15 mm; 6 ... 500 Hz: 2 g				
Shock resistance acc. to IEC 60068-2-27		12 shocks (half-sine 15 g/11 ms)				
Connection type		 <b>Screw terminals</b>				
• Terminal screw		M 3 (standard screwdriver, size 2 and Pozidriv 2)				
• Solid	mm <sup>2</sup>	1 x (0.5 ... 4)/2 x (0.5 ... 2.5)				
• Finely stranded with end sleeve	mm <sup>2</sup>	1 x (0.5 ... 2.5)/2 x (0.5 ... 1.5)				
• AWG cables, solid or stranded	AWG	2 x (20 ... 14)				
• Tightening torque	Nm	0.8 ... 1.2				
Connection type		 <b>Spring-type terminals</b>				
• Solid	mm <sup>2</sup>	2 x (0.25 ... 1.5)				
• Finely stranded, with end sleeves acc. to DIN 46228	mm <sup>2</sup>	2 x (0.25 ... 1.5)				
• Finely stranded	mm <sup>2</sup>	2 x (0.25 ... 1.5)				
• AWG cables, solid or stranded	AWG	2 x (24 ... 16)				
<b>Measuring circuit</b>						
Permissible measuring range single-phase AC/DC voltage	V	0.1 ... 68		10 ... 650		17 ... 275
Setting range single-phase voltage	V	0.1 ... 60		10 ... 600		17 ... 275
Measuring frequency	Hz	40 ... 500				40 ... 500
Measuring accuracy	%	5				
Repeat accuracy at constant parameters	%	1				
Accuracy of digital display		±1 digit				
Deviations for temperature fluctuations	%/°C	±0.1				
Hysteresis for single-phase voltage	V	0.1 ... 30		0.1 ... 300		0.1 ... 150
<b>Control circuit</b>						
Load capacity of the output relay						
• Conventional thermal current $I_{th}$	A	5				
Rated operational current $I_e$ at						
• AC-15/24 ... 400 V	A	3				
• DC-13/24 V	A	1				
• DC-13/125 V	A	0.2				
• DC-13/250 V	A	0.1				
Minimum contact load at 17 V DC	mA	5				
Output relay with DIAZED fuse gL/gG operational class	A	4				
Electrical endurance AC15	Million operating cycles	0.1				
Endurance with contactor relay	Million operating cycles	10				

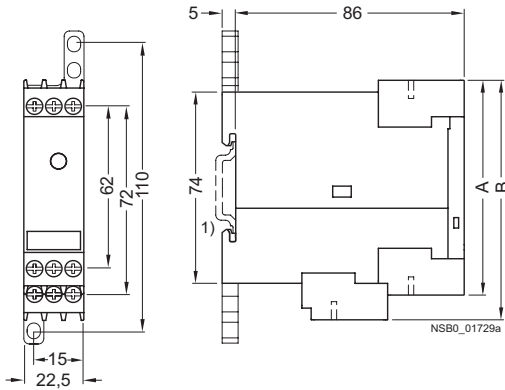
1) Absolute limit values.

2) Important: This is a Class A product. In the household environment this device may cause radio interference. In this case the user must introduce suitable measures.

# 3UG Monitoring Relays

## Voltage monitoring

### Dimensional drawings



Type	3UG46 31	
	3UG46 32	
	3UG46 33	
	A	B

#### Removable terminal

Screw-type terminal	83	92
Spring-loaded terminal	84	94

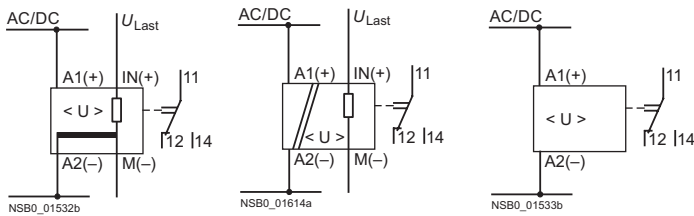
1) For standard mounting rail according to EN 60715.

### Schematics

3UG46 31-AA30  
3UG46 32-AA30

3UG46 31-AW30  
3UG46 32-AW30

3UG46 33



*Note: It is not necessary to protect the measuring circuit for device protection. The protective device for line protection depends on the cross-section used.*

#### Position of the terminals

3UG46 31  
3UG46 32

3UG46 33

