

Dold Standstill Monitor Relays



UG6946-02PS-40

Dold speed monitoring safety relay modules provide safe standstill detection on 3-phase and single-phase motors by monitoring remanence voltage.

- Can monitor motor voltages up to 690 VAC or VDC
- No external sensors necessary
- Independent of direction
- Broken wire detection
- Monitors rotation and linear movement
- 2-channel operation for standstill monitoring
- Up to 3 NO and 1 NC positive-guided safety contacts
- LED status indicator
- Adjustable voltage setting
- Adjustable standstill time delay
- Semiconductor outputs for monitoring

Safety Data – Values per EN ISO 13849-1

Category	4 according to EN ISO 13849-1
Performance level	PL _e according to EN ISO 13849-1
MTTF_d	>93 years for LH5946 >222 years for UG6946
DC_{avg}	99%

Safety Data – Values per IEC/EN 62061 /IEC/EN 61508

SIL CL	3 per IEC/EN 62061
SIL	3 per IEC/EN 61508
HFT (Hardware Failure Tolerance)	1
DC_{avg}	99%
PFH_D	4.10 x 10 ⁻¹⁰ for LH5946 4.20 x 10 ⁻¹⁰ for UG6946

Safety Standstill Monitor Relays Selection Chart

Part Number	Price	Marking Type	Voltage Monitor Range	Voltage	Outputs	Connection	Muting	Drawing
LH5946-48-24-04	\$526.00	Standstill-monitoring safety relay module	20mV to 400mV	24 VDC	3 NO / 1 NC	Fixed screw terminals	No	PDF
LH5946-PC-24-04	\$526.00			24 VDC		Push-in cage clamp	No	PDF
LH5946-48-115-04	\$526.00			115 VAC		Fixed screw terminals	No	PDF
LH5946-PC-115-04	\$526.00			115 VAC		Push-in cage clamp	No	PDF
UG6946-02PS-04	\$347.00			24 VDC	2 NO / 1 NC	Pluggable screw terminals	No	PDF
UG6946-02PS-001-04	\$367.00			24 VDC		Pluggable screw terminals	Yes	PDF
LH5946-48-24-40	\$526.00		200mV to 4V	24 VDC	3 NO / 1 NC	Fixed screw terminals	No	PDF
LH5946-PC-24-40	\$526.00			24 VDC		Push-in cage clamp	No	PDF
LH5946-48-115-40	\$526.00			115 VAC		Fixed screw terminals	No	PDF
LH5946-PC-115-40	\$526.00			115 VAC		Push-in cage clamp	No	PDF
UG6946-02PS-40	\$347.00			24 VDC	2 NO / 1 NC	Pluggable screw terminals	No	PDF
UG6946-02PS-001-40	\$367.00			24 VDC		Pluggable screw terminals	Yes	PDF

Note: The -04 models are recommended for applications where motors are controlled directly from contactors.

The -40 models are recommended for applications involving VFDs or soft starters where OFF-state leakage is present and higher voltage settings are required.

Dold Standstill Monitor Relays

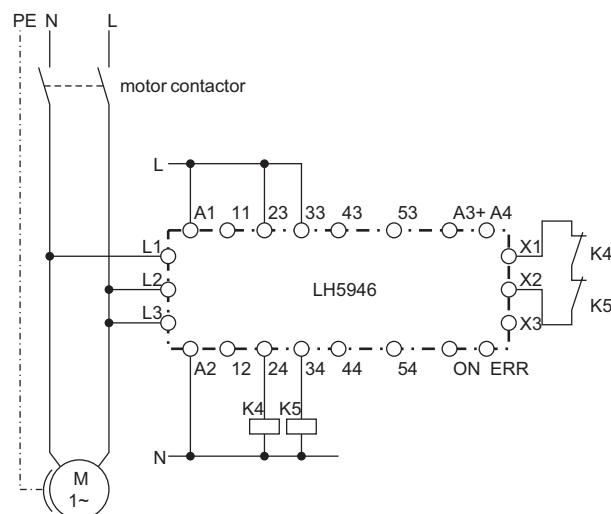


Safety Standstill Monitor Relays Specification Table

General Specifications	LH5946	UG6946																		
Temperature	Storage: -40°C to 75°C [-40°F to 167°F]]																			
Altitude	< 2,000m [6562ft]																			
Vibration Resistance	Amplitude: 0.35 mm Frequency: 10 to 55 Hz (IEC/EN 60068-2-6)	Amplitude: 0.075 mm Frequency: 10 to 57 Hz (IEC/ EN 60068-2-6)																		
Degree of Protection	Housing: IP40 Terminals: IP20																			
Housing	Thermoplastic with VO behavior; DIN rail mount																			
Weight	400g [14.11 oz.]	295g [10.41 oz.]																		
Agency Approvals and Standards	cULus file E107778, CE, TUV																			
Wire Connections	1x AWG 20-12 solid or stranded 2x AWG 20-14 solid or stranded	1x AWG 24-12 solid or stranded 2x AWG 24-18 solid or stranded																		
Wire Fixing	Plus-minus terminal screws M3.5 box terminals with wire protection. Torque 0.8 Nm [7 lb•in]	Captive slotted screw. Torque 0.8 N•m [7 lb•in]																		
Input Specifications																				
Nominal Voltage	24VDC, 115VAC, 230VAC	24VDC																		
Measuring/Motor Voltage	690 VAC/VDC (for UL applications, max 600 VAC/VDC)																			
Input Resistance	500KΩ																			
Response Value U_{an}	20mV to 400mV, adjustable or 0.2 V to 4V adjustable																			
Response Value Dependent on Frequency	<table><tr><th>Input Frequency (Hz)</th><td>50</td><td>100</td><td>200</td><td>400</td><td>600</td><td>1k</td><td>1.5k</td><td>2k</td></tr><tr><th>Response Value U_{an}</th><td>1.0</td><td>1.1</td><td>1.2</td><td>1.5</td><td>2.0</td><td>2.8</td><td>5</td><td>8</td></tr></table>		Input Frequency (Hz)	50	100	200	400	600	1k	1.5k	2k	Response Value U_{an}	1.0	1.1	1.2	1.5	2.0	2.8	5	8
Input Frequency (Hz)	50	100	200	400	600	1k	1.5k	2k												
Response Value U_{an}	1.0	1.1	1.2	1.5	2.0	2.8	5	8												
Voltage Range	AC: 0.8 to 1.1 U_N At 10% residual ripple: 0.9 to 1.1 U_N DC: 0.9 to 1.2 U_N At 10% residual ripple: 0.9 to 1.1 U_N	DC: 0.9 to 1.2 U_N At 10% residual ripple: 0.9 to 1.1 U_N																		
Nominal Consumption	3W																			
Nominal Frequency	50 to 60 Hz. Frequency range: 45 to 65 Hz	N/A																		
Control Current	Control current typical at 24V over two relays: 75mA																			
Overvoltage Protection	Internal VDR (Voltage Dependent Resistor)																			
Output Specifications																				
Electrical Contact Life	To AC15 at 3A, 230V: 2x10 ⁵ switching cycles IEC/EN 60 947-5-1																			
Mechanical Life	50 x 10 ⁶ switching cycles	20 x 10 ⁶ switching cycles																		
Contact Type	3 NO positively driven and 1 NC relay contacts (NO contacts are safety contacts)	2 NO positively driven and 1 NC relay contacts (NO contacts are safety contacts)																		
Operate Delay on Standstill	Depends on setting; adjust by potentiometer																			
Release Delay for Detection of Running Motor	< 100ms																			
Nominal Output Voltage	250VAC	250VAC (for NO contacts) 24VDC (for NC contacts)																		
Thermal Current (I_{th})	5A per contact See continuous current limit curve in manual.	5A (for NO contacts) 2A (for NC contacts) See quadratic total current limit curves in manual.																		
Short Circuit Strength	Max fuse rating: 4 AGL (IEC/EN 60 9470-5-1), line circuit breaker C6A																			
Switching Capacity IEC/EN 60 947-5-1	AC 15: NO contacts: 3A/230V NC contacts: 1A/230VAC DC13: 4A/24V	AC 15: NO contacts: 3A/230V DC13: 4A/24V																		
Switching Frequency	Max. 1,200 switching cycles/hr																			
Semiconductor Monitoring	100 mA DC 24V; supply via A3+/A4	N/A																		

DOLD

With 3-phase motor



With single-phase motor

The timing diagram illustrates the sequence of events for the motor control system. The horizontal axis represents time (t). The vertical axis shows various signals:

- auxiliary voltage on U_H** : A step function that transitions from low to high at the start of the sequence and remains high throughout.
- motor on**: A signal that transitions from low to high at the start of the sequence.
- stop**: A signal that transitions from low to high, indicating the motor is stopped.
- motor runs down**: A signal that transitions from low to high, indicating the motor is running down.
- standstill detected**: A signal that transitions from low to high, indicating the motor has reached standstill.
- line breakage**: A signal that transitions from low to high, indicating a line breakage event.
- reset X3-X2**: A signal that transitions from low to high, indicating a reset event.
- Motor on**: A signal that transitions from low to high, indicating the motor is running.
- line breakage**: A signal that transitions from low to high, indicating a line breakage event.
- motor runs down**: A signal that transitions from low to high, indicating the motor is running down.
- reset X3-X2**: A signal that transitions from low to high, indicating a reset event.

The diagram also shows the motor speed/voltage ($L1/L2/L3$) and the voltage level (U_{an}) over time. The motor speed/voltage signal is a ramp function that increases from zero to a peak and then decreases back to zero. The voltage level (U_{an}) is a constant signal.

Key timing parameters are indicated:

- start up delay time t_{UH}** : The time delay between the start of the auxiliary voltage and the start of the motor speed ramp.
- standstill delay time t_s** : The time delay between the standstill detected signal and the start of the motor speed ramp.
- $t_E = 2 \dots 2.5s$** : The time delay between the line breakage signal and the start of the motor speed ramp.

Connection Terminals	
<i>Terminal Designation</i>	<i>Signal Description</i>
L1-L2-L3	Connection to monitored motor
11-12	Safety contacts (NC)
23-24, 33-34, 43-44	Safety contacts (NO)
<u>53-54</u>	Monitoring contact (NO)
X1-X2	Connection of feedback circuit (for external contactors)
X2-X3	Manual reset for external faults
A1-A2	Auxiliary supply (UH)
<u>A3(+)</u> - A4	Supply for semiconductor outputs
<u>ON:</u>	Semiconductor output indicates state of safety contacts
<u>ERR:</u>	Semiconductor output indicates failures

Note: The outputs 53-54, ON and ERR are only monitoring outputs and must not be used in safety circuits.

Setting	
Potentiometer U_{an}	Adjustment of voltage level for standstill detection
Potentiometer t_s	Adjustment of time delay before activation of safety contacts

Safety Products



Warning: Safety products sold by AutomationDirect are Safety components only. The purchaser/installer is solely responsible for the application of these components and ensuring all necessary steps have been taken to assure each application and use meets all performance and applicable safety requirements and/or local, national and/or international safety codes as required by the application. AutomationDirect cannot certify that our products, used solely or in conjunction with other AutomationDirect or other vendors' products, will assure safety for any application. Any person using or applying any products sold by AutomationDirect is responsible for learning the safety requirements for their individual application and applying them, and therefore assumes all risks, and accepts full and complete responsibility, for the selection and suitability of the product for their respective application.

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