

# 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

|                          |                                               |
|--------------------------|-----------------------------------------------|
| <b>Category</b>          | 4 according to EN ISO 13849-1                 |
| <b>Performance level</b> | PL <sub>e</sub> according to EN ISO 13849-1   |
| <b>MTTF<sub>d</sub></b>  | >93 years for LH5946<br>>222 years for UG6946 |
| <b>DC<sub>avg</sub></b>  | 99%                                           |

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

|                                         |                                                                            |
|-----------------------------------------|----------------------------------------------------------------------------|
| <b>SIL CL</b>                           | 3 per IEC/EN 62061                                                         |
| <b>SIL</b>                              | 3 per IEC/EN 61508                                                         |
| <b>HFT (Hardware Failure Tolerance)</b> | 1                                                                          |
| <b>DC<sub>avg</sub></b>                 | 99%                                                                        |
| <b>PFH<sub>D</sub></b>                  | 4.10 x 10 <sup>-10</sup> for LH5946<br>4.20 x 10 <sup>-10</sup> for UG6946 |

## Safety Standstill Monitor Relays Selection Chart

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

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

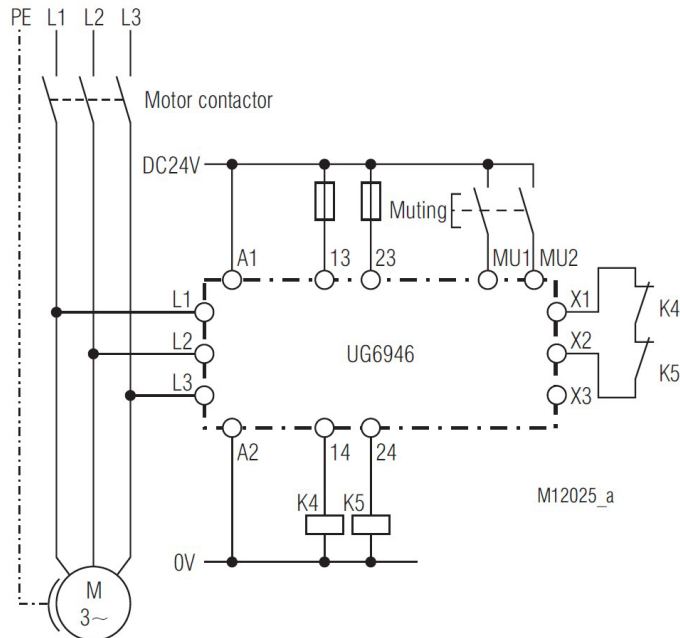
| General Specifications                       |                                                                                                                                                                                                                                                                                                     | LH5946 |     |     |                                                                                                     | UG6946 |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----|-----|-----------------------------------------------------------------------------------------------------|--------|------|----|----------------------|----|-----|-----|-----|-----|----|------|----|-------------------------|-----|-----|-----|-----|-----|-----|---|---|
| Temperature                                  | Storage: -40°C to 75°C [-40°F to 167°F] ]                                                                                                                                                                                                                                                           |        |     |     |                                                                                                     |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Altitude                                     | < 2,000m [6562ft]                                                                                                                                                                                                                                                                                   |        |     |     |                                                                                                     |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Vibration Resistance                         | Amplitude: 0.35 mm<br>Frequency: 10 to 55 Hz (IEC/EN 60068-2-6)                                                                                                                                                                                                                                     |        |     |     | Amplitude: 0.075 mm<br>Frequency: 10 to 57 Hz (IEC/ EN 60068-2-6)                                   |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Degree of Protection                         | Housing: IP40<br>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<br>2x AWG 20-14 solid or stranded                                                                                                                                                                                                                                    |        |     |     | 1x AWG 24-12 solid or stranded<br>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 <math>U_{an}</math></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 $U_N$<br>At 10% residual ripple: 0.9 to 1.1 $U_N$<br>DC: 0.9 to 1.2 $U_N$<br>At 10% residual ripple: 0.9 to 1.1 $U_N$                                                                                                                                                                |        |     |     | DC: 0.9 to 1.2 $U_N$<br>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 <sup>5</sup> switching cycles IEC/EN 60 947-5-1                                                                                                                                                                                                                           |        |     |     |                                                                                                     |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Mechanical Life                              | 50 x 10 <sup>6</sup> switching cycles                                                                                                                                                                                                                                                               |        |     |     | 20 x 10 <sup>6</sup> switching cycles                                                               |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Contact Type                                 | 3 NO positively driven and 1 NC relay contacts<br>(NO contacts are safety contacts)                                                                                                                                                                                                                 |        |     |     | 2 NO positively driven and 1 NC relay contacts<br>(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)<br>24VDC (for NC contacts)                                                 |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Thermal Current ( $I_{th}$ )                 | 5A per contact<br>See continuous current limit curve in manual.                                                                                                                                                                                                                                     |        |     |     | 5A (for NO contacts)<br>2A (for NC contacts)<br>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<br>NC contacts: 1A/230VAC<br>DC13: 4A/24V                                                                                                                                                                                                                               |        |     |     | AC 15: NO contacts: 3A/230V<br>DC13: 4A/24V                                                         |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Switching Frequency                          | Max. 1,200 switching cycles/hr                                                                                                                                                                                                                                                                      |        |     |     |                                                                                                     |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |
| Semiconductor Monitoring                     | 100 mA DC 24V; supply via A3+/A4                                                                                                                                                                                                                                                                    |        |     |     | N/A                                                                                                 |        |      |    |                      |    |     |     |     |     |    |      |    |                         |     |     |     |     |     |     |   |   |

# Dold UG6946

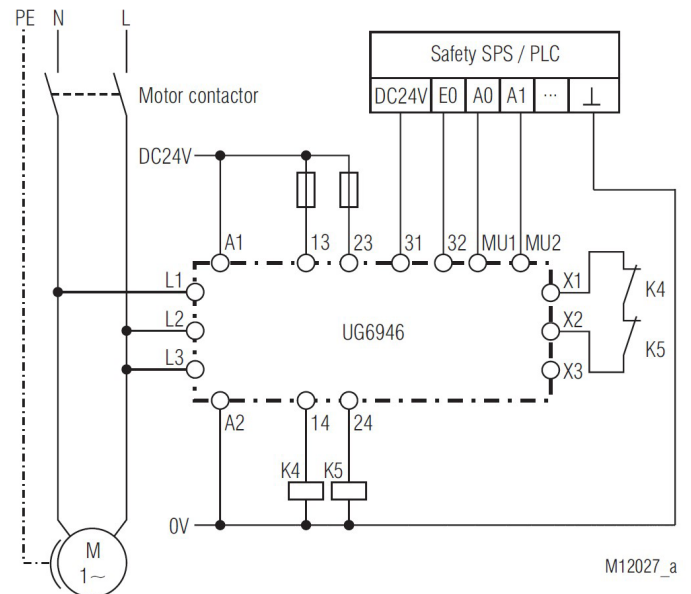
## Standstill Monitor Relays



### Applications

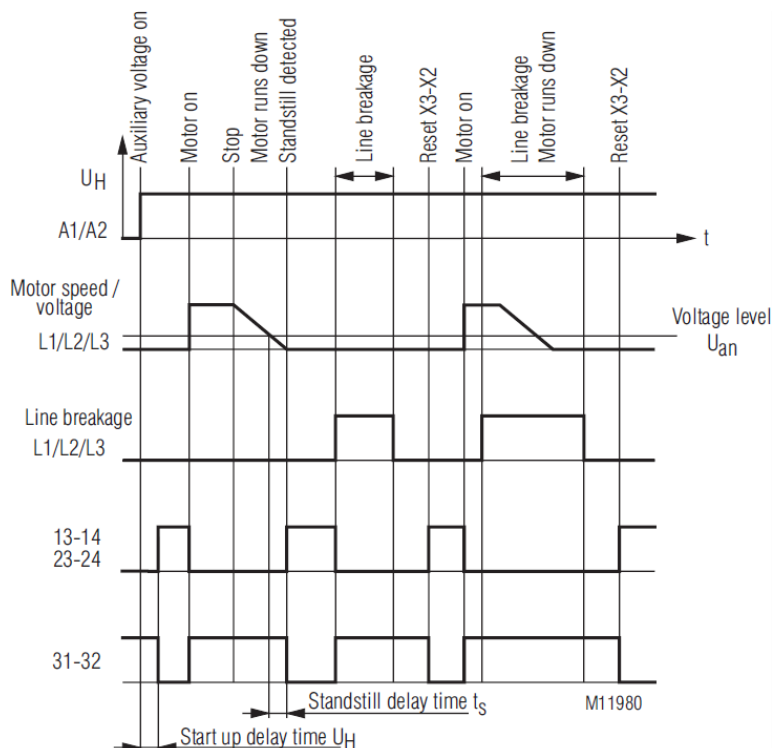


With 3-phase motor



With single-phase motor

### Function Diagram



### Connection Terminals

| Terminal Designation | Signal Description                                       |
|----------------------|----------------------------------------------------------|
| <b>L1-L2-L3</b>      | Connection to monitored motor                            |
| <b>31-32</b>         | Forcibly guided indicator output                         |
| <b>13-14, 23-24</b>  | Forcibly guided NO contacts for release circuit          |
| <b>X1-X2</b>         | Connection of feedback circuit (for external contactors) |
| <b>X2-X3</b>         | Manual reset for external faults                         |
| <b>A1-A2</b>         | Auxiliary supply ( $U_H$ )                               |
| <b>MU1, MU2</b>      | Muting inputs                                            |

### Setting

|                                          |                                                               |
|------------------------------------------|---------------------------------------------------------------|
| <b>Potentiometer <math>U_{an}</math></b> | Adjustment of voltage level for standstill detection          |
| <b>Potentiometer <math>t_s</math></b>    | Adjustment of time delay before activation of safety contacts |

# Safety Products



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