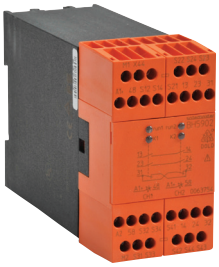
# Dold Safety Relays
# Multi-Function Light Curtain Controller



Designed to protect people and machinery in applications with light curtains; can be operated in protection, muting and stepping modes.

- Connect up to 3 light curtains
- Broken wire detection on light curtain input
- Multifunction device - different functions selectable by rotational switches: protective, muting, stepping
- Suitable to connect light curtains of type 4 or self-testing light curtains type 2 according to IEC/EN 61 496-1, cross-fault monitoring in the light curtain
- Undervoltage and overvoltage detection and indication
- LED indicators for RUN and Status Outputs 1 and 2
- Two PNP sensor inputs only

## Selection Chart

| Part Number | Price | Marking Type | Voltage | Outputs |
|---|---|---|---|---|
| BH5902-22-01MF2-61 | $456.00 | Light curtain controller, with 2-channel operation and selectable standard, with protective, muting or stepping modes | 24 VDC | 2 N.O. and 1 N.C. |

## Safety Data – Values per EN ISO 13849-1

| | |
|---|---|
| Category | 4 according to EN 954-1 |
| Performance level | PLe according to EN 13849-1 |
| $MTTF_d$ | 31.5 years |
| $DC_{avg}$ | 98.9% |

## 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 |
| $DC_{avg}$ | 98.9% |
| SFF | 99.6% |
| $PFH_D$ | $7.80E^{-9}$ $h^{-1}$ |

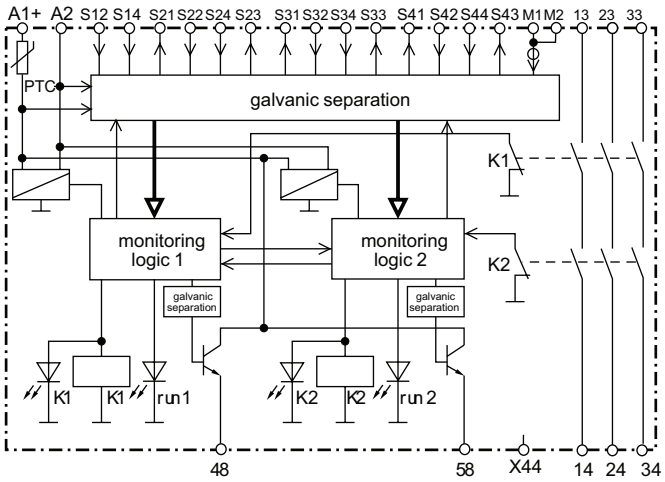
## 2-Channel Light Curtain Controller Specification Table

| | |
|---|---|
| **General Specifications** | |
| Temperature | Storage: -25°C to 85°C (-13°F to 185°F)<br>Operating: 0°C to 50°C (32°F to 122°F) |
| Altitude | < 2,000 meters |
| Vibration Resistance | Amplitude: 0.35mm, Frequency: 10 to 55 Hz (IEC/EN 60-068-2-6) |
| Degree of Protection | Per IEC/EN 60 529. Housing: IP40; Terminals IP20 |
| Housing | UL 94V-0 Thermoplastic; Din mount 35 mm x 7.5 mm |
| Weight | 320 g (11.29 oz.) |
| Agency Approvals and Standards | cULus file E107778, CE, RoHS, TUV |
| Terminal Designation per EN 50 005 Wire Connections | 1x4 $mm^2$ solid or 1 x 2.5 $mm^2$ stranded ferruled (isolated) or 2 x 1.5 $mm^2$ stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4 or 2 x 2.5 $mm^2$ stranded ferrruled DIN 46 228-1/-2/-3 |
| Wire Fixing | Terminal screws M3.5 box terminals with wire protection or cage clamp terminals. |
| **Input Specifications** | |
| Nominal Voltage | 24VDC |
| Voltage Range | At 5% residual ripple: 0.85 to 1.15 UN |
| Maximum Consumption | 170 mA (no load on semiconductor outputs) |
| Control Voltage - S21, S23, S31, S33, S41, S43, S48, S58 | 23VDC at UN |
| Control Current on S12, S14, S22, S24, S32, S34, S42, S44 | Each 4.5 mA at UN |
| Minimum Voltage on Terminals S12, S14, S22, S24, S32, S34, S42, S44 | 16VDC |
| Minimum Current on M1, M2 | 25mA with active lamp |
| Short Circuit Protection | Internal with PTC (Positive Temperature Coefficient resistor) |
| Overvoltage Protection | Internal VDR (Voltage Dependent Resistor) |
| **Output Specifications** | |
| Electrical Contact Life | To AC 15 at 2A, AC 230V: $10^5$ switching cycles IEC/EN 60 947-5-1 |
| Mechanical Life | 10 x $10^6$ switching cycles |
| Contact Type | 2 N.O., positively driven and 1 N.C relay contacts; (N.O. contacts are safety contacts) |
| Operate Delay | Operate delay typ. at UN: manual start 50 ms; automatic start: 1.5 s.; automatic restart: max. 55ms.; |
| Release Delay | Release delay typ at UN: Max: 30 ms (max 50ms when failure on LC and only one input channel de-energizes) |
| Nominal Output Voltage | AC: 250V; DC: See continuous current limit curve in manual. |
| Thermal Current (Ith) | Max. 5A. See continuous current limit curve in manual. |
| Switching of Low Loads | M100 mV; (contacts with 5µ Au) M 1mA |
| Short Circuit Strength | Max fuse rating: 6A gl (IEC/EN 60 9470-5-1); Line circuit breaker: C 8 A |
| Switching Capacity | AC 15: N.O. contacts: 3A/230V; N.C. contacts: 2A/230V AC<br>DC 13 at 0.1 Hz: N.C. contacts: 8A/24V DC |
| Switching Frequency | Max. 1,200 switching cycles/hr |
| Semi-conductor Output Type (over-temperature and overload protected) | Transistor plus switching, max 100mA continuous; 400mA for 0.5 sec. |

# Dold Safety Relays
# Multi-Function Light Curtain Controller

## Wiring

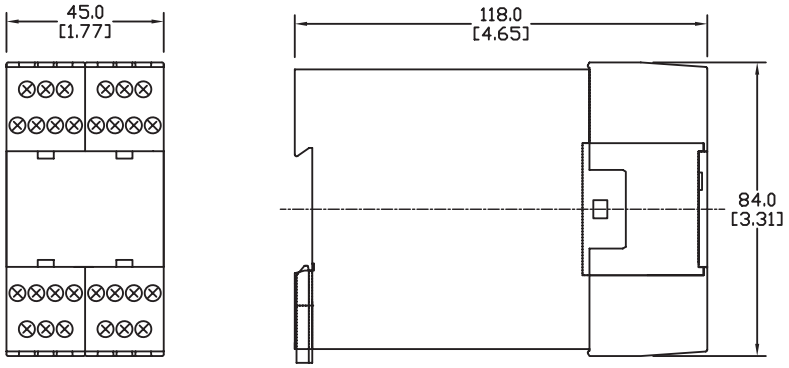
***BH5902-22-01MF2-61 Block Diagram***



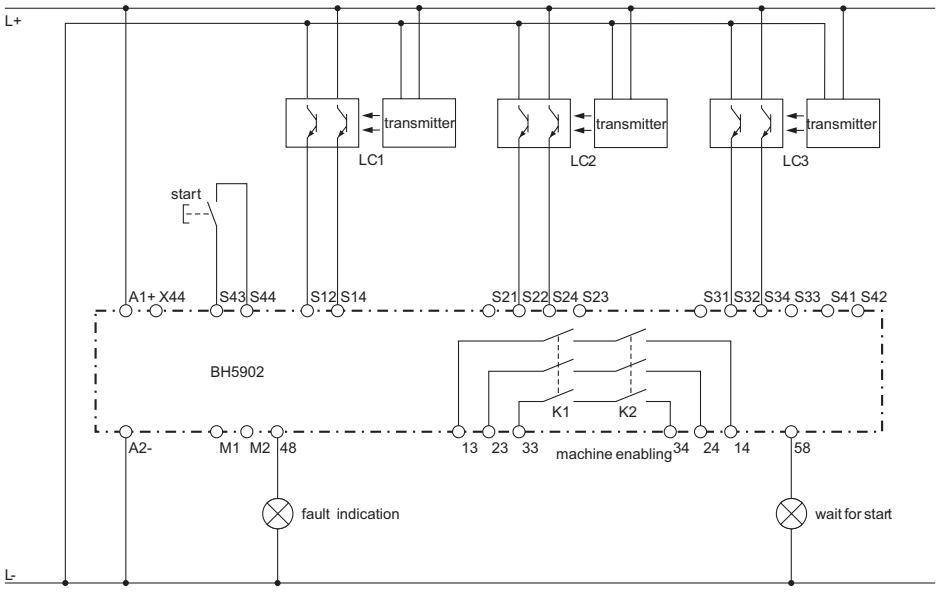

*Note: All drawings are for a 3 N.O. configuration. The units will actually have a 2 N.O. and 1 N.C. configuration.*

## Dimensions

***mm [in]***




## Applications

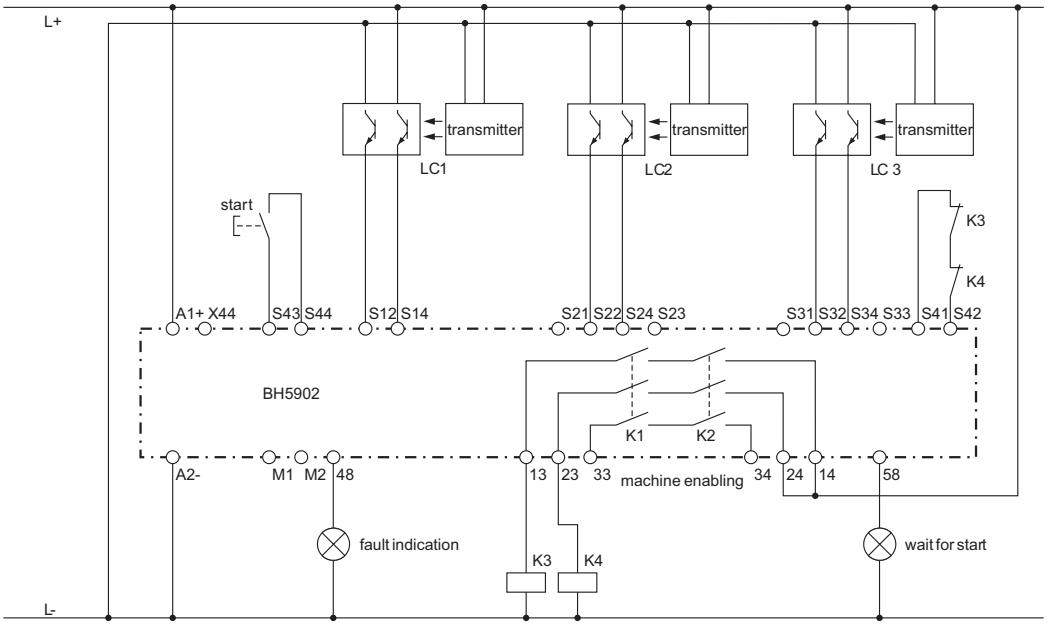



Protective operation with 3 Light Curtains, manual or auto start, setting without feedback input

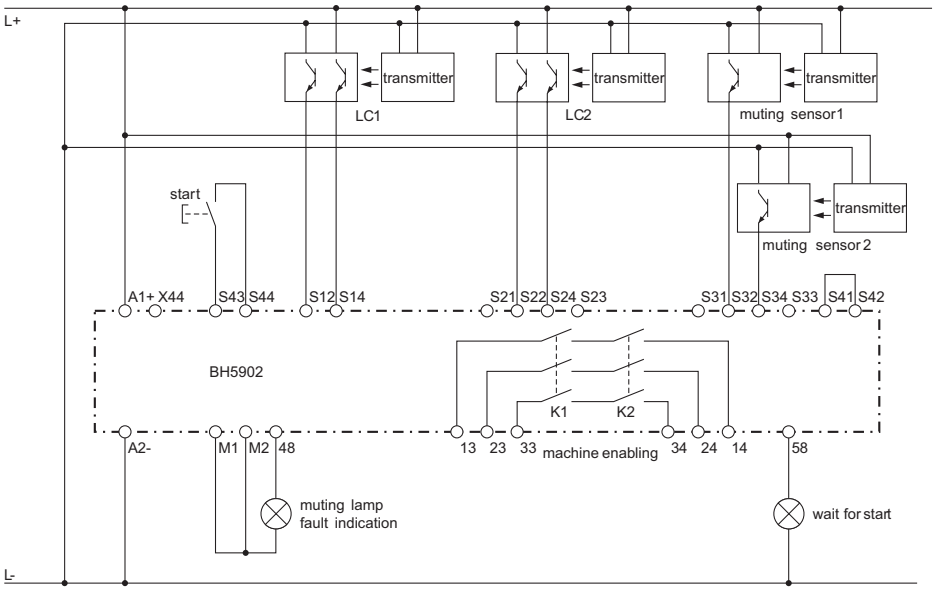
**Note: When switching inductive loads, surge suppressors are recommended.*

# Dold Safety Relays
# Multi-Function Light Curtain Controller

## Applications




Protective operation with 3 Light Curtains, manual or autostart, setting with contact reinforcement and feedback input

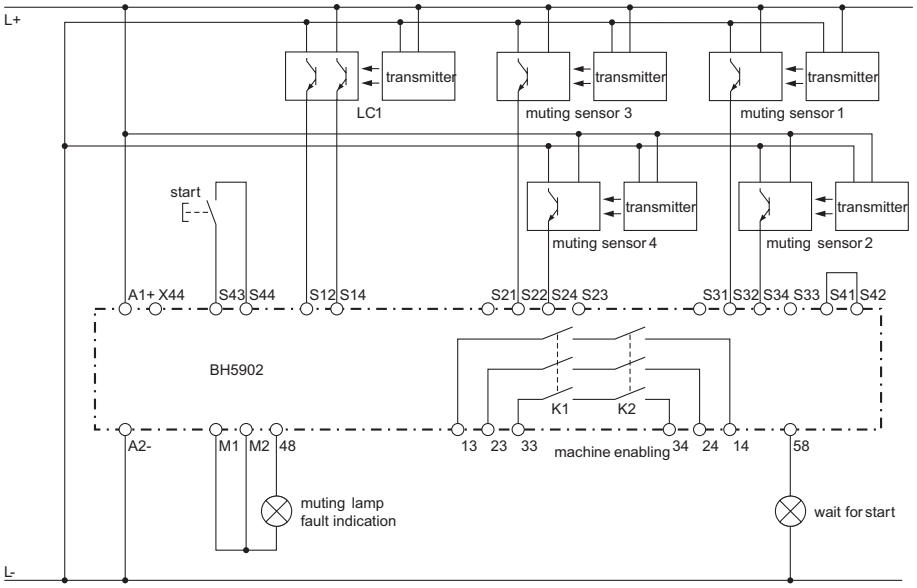



Protective operation with muting a light curtain via 2 muting sensors, 2 light curtains

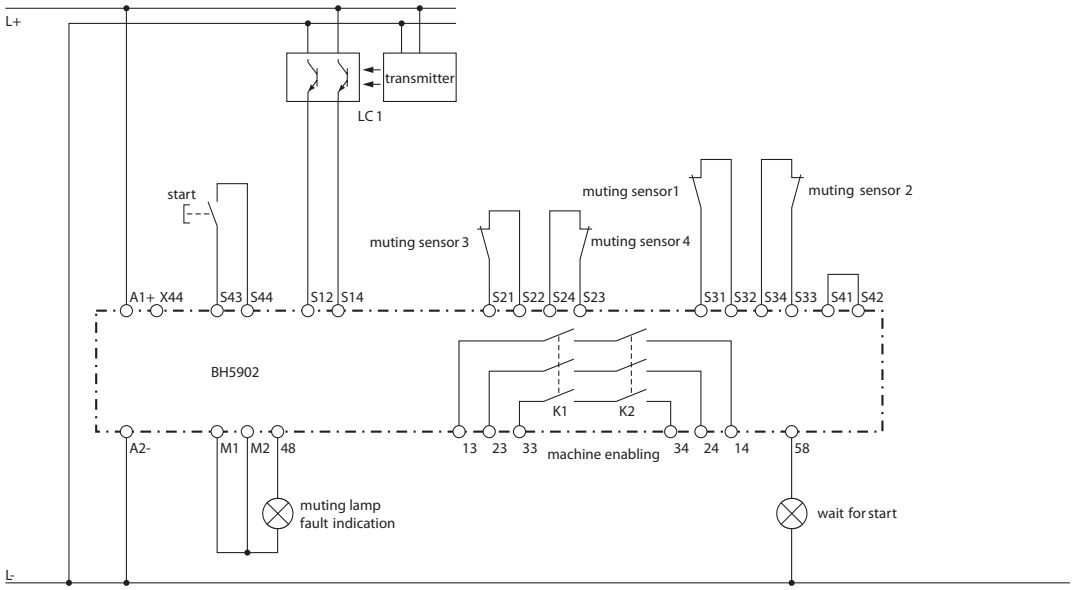
***Note: When switching inductive loads, surge suppressors are recommended.***

# Dold Safety Relays
# Multi-Function Light Curtain Controller

## Applications




Protective operation with muting, 1 light curtain, 4 muting sensors




Protective operation with muting via 4 muting sensor contacts

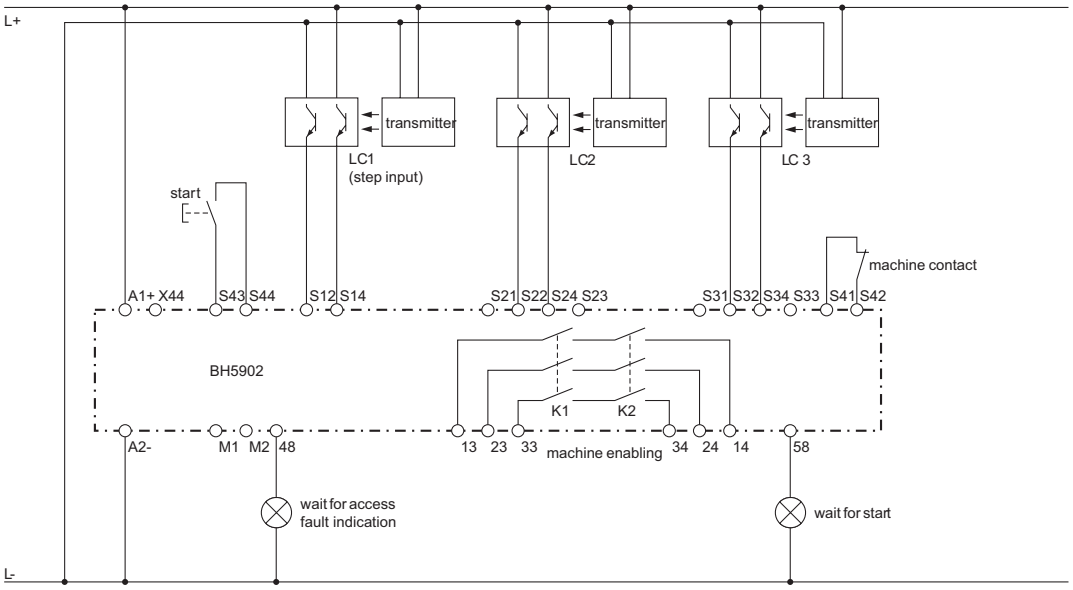
**Contact reinforcement**

If external relays or contactors are used to reinforce or multiply the contacts of the safety relays, these must be monitored by feeding back one N.C. contact from each relay/contactor into the feedback inputs.

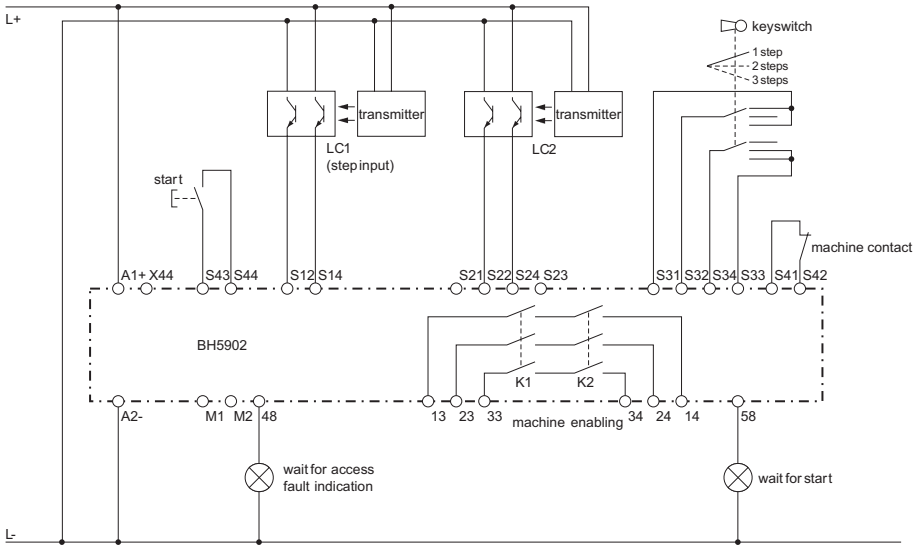
***Note: When switching inductive loads, surge suppressors are recommended.***

# Dold Safety Relays
# Multi-Function Light Curtain Controller

## Applications




Stepping operation with 3 light curtains

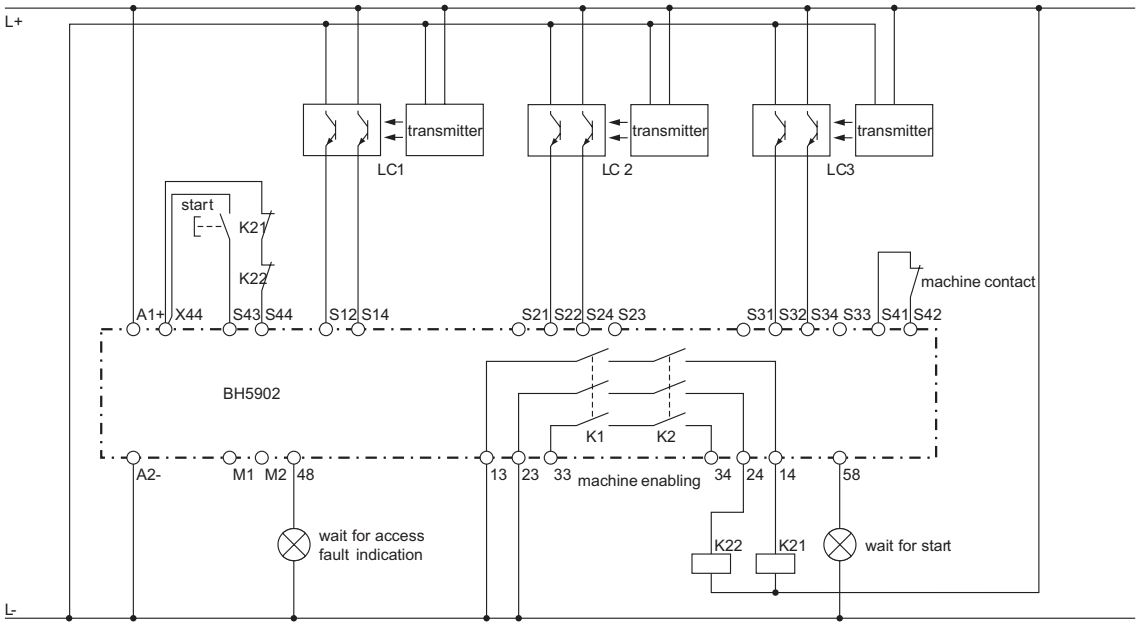



Stepping operation with key switch

***Note: When switching inductive loads, surge suppressors are recommended.***

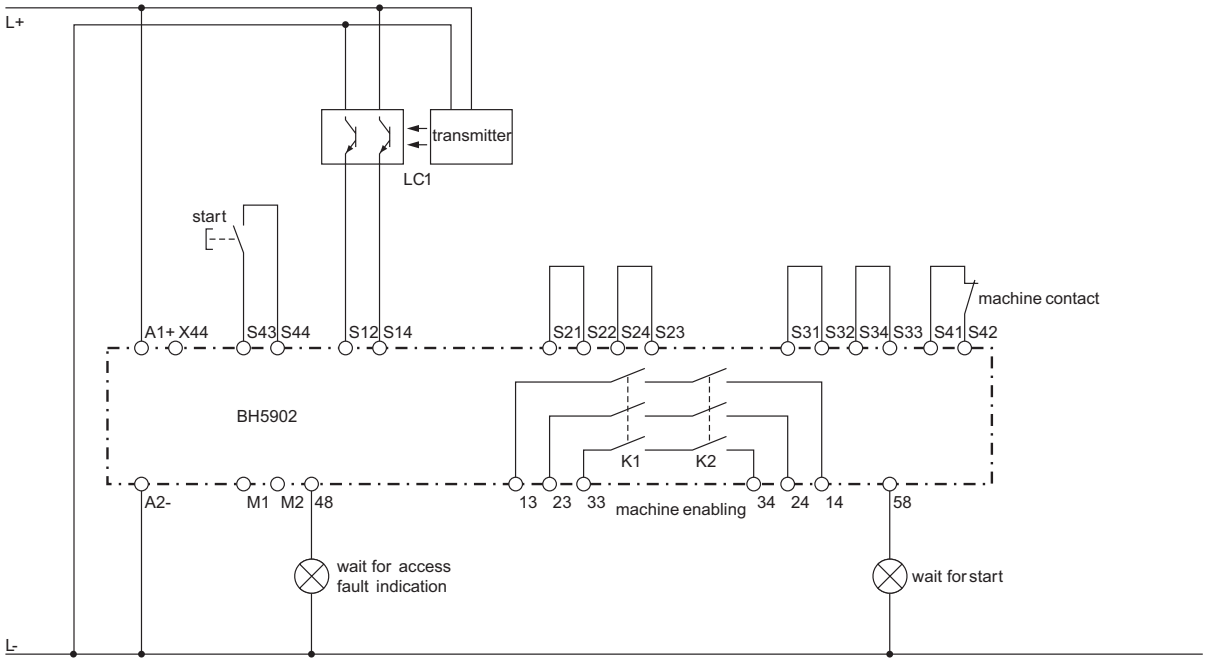
# Dold Safety Relays
# Multi-Function Light Curtain Controller

## Applications




Stepping operation with 3 light curtains and contact reinforcement by external contactors, 2-channel operation (switching of feedback input can also be used at protective operation with muting)

The feedback circuit of the external relays is only tested when the module is started by pressing the pushbutton. When using this circuit, the safe function has to be tested at regular intervals. This can be done by interrupting a light curtain so that a reset requires activation of the START button. Activating the module is only possible when all external relays are de-energized.




Stepping operation with one light curtain (with all operating modes, unused inputs must be jumpered).

***Note: When switching inductive loads, surge suppressors are recommended.***

# Dold LG5929 Extension Module

Additional contacts for emergency-stop modules and safety gate monitors.

- 1-channel or 2-channel connection
- LED indication for operation
- Output: 5 N.O. and 1 N.C. contacts

## Safety Relays Selection Chart

| Part Number | Price | Marking Type | Voltage | Outputs |
|---|---|---|---|---|
| LG5929-60-100-61 | $136.00 | Safety relay extension module | 24 VAC/VDC | 5 N.O./1 N.C. |

## Safety Data – Values per EN ISO 13849-1

| | |
|---|---|
| Category | 4 according to EN 954-1 |
| Performance level | PLe according to EN 13849-1 |
| $MTTF_d$ | >100 years |
| $DC_{avg}$ | 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% |
| SFF | 99.7% |
| $PFH_D$ | $4.68E^{-10}$ $h^{-1}$ |

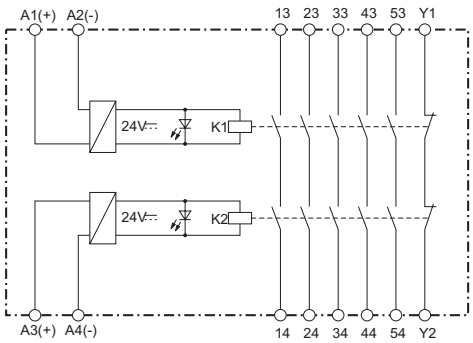
## Safety Relay Extenson Module Specification Table

| | |
|---|---|
| **General Specifications** | |
| Temperature | Storage: -25°C to 85°C (-13°F to 185°F) Operating: -15°C to 55°C (5°F to 131°F) |
| Altitude | < 2,000 meters |
| Vibration Resistance | Amplitude: 0.35mm, Frequency: 10 to 55 Hz (IEC/EN 60-068-2-6) |
| Degree of Protection | Per IEC/EN 60 529. Housing: IP40; Terminals IP20 |
| Housing | UL 94V-0 Thermoplastic; Din mount 35 mm x 7.5 mm |
| Weight | 205g (7.23 oz.) |
| Agency Approvals and Standards | CSA, cULus file E107778, CE, RoHS, TUV |
| Terminal Designation per EN 50 005 Wire Connections | 1x4 $mm^2$ solid or 1 x 2.5 $mm^2$ stranded ferruled (isolated) or 2 x 1.5 $mm^2$ stranded ferruled (isolated) DIN 46 228-1/-2/-3/-4 or 2 x 2.5 $mm^2$ solid per DIN 46 228-1/-2/-3 /-4 |
| Wire Fixing | Plus-minus terminal screws M3.5 box terminals with wire protection or cage clamp terminals. |
| **Input Specifications** | |
| Nominal Voltage | 24V AC/DC |
| Voltage Range | AC: 0.85 to 1.1 $U_N$<br>At 10% residual ripple: 0.9 to 1.1 $U_N$; At 48% residual ripple: 0.85 to 1.1 $U_N$ |
| Maximum Consumption | 24VAC/DC: 1.8VA |
| Nominal Frequency | 50 to 60 Hz |
| Control Current | Control current typ. at 24V over 2 relays: 75 mA |
| Overvoltage Protection | Internal VDR (Voltage Dependent Resistor) |
| **Output Specifications** | |
| Electrical Contact Life | To AC15 at 2 A,230V: $10^5$ switching cycles IEC/EN 60 947-5-1 |
| Mechanical Life | 20 x $10^6$ switching cycles |
| Contact Type | 5 N.O. positively driven and 1 N.C. relay contacts (N.O. contacts are safety contacts) |
| Operate/Release Time | Operate typ at $U_N$: 20 m.; Release typ at $U_N$: 35 ms. |
| Nominal Output Voltage | 250VAC |
| Thermal Current ($I_{th}$) | Max. 5A per contact. See continuous current limit curve in installation manual. |
| Short Circuit Strength | Max fuse rating:10A gl (IEC/EN 60 9470-5-1); Line circuit breaker: B6A |
| Switching Capacity IEC/EN 60 947-5-1 | AC 15: N.O. contacts: 3A/230V; N.C. contacts: 2A/230VAC<br>DC 13: N.O. contacts: 4A/24V; N.C. contacts: 4A/24VDC; N.O. contact: 8A/24V >25x$10^3$<br>ON: 0.4s, OFF: 9.6s |
| Switching Frequency | Max. 1,200 switching cycles/hr |

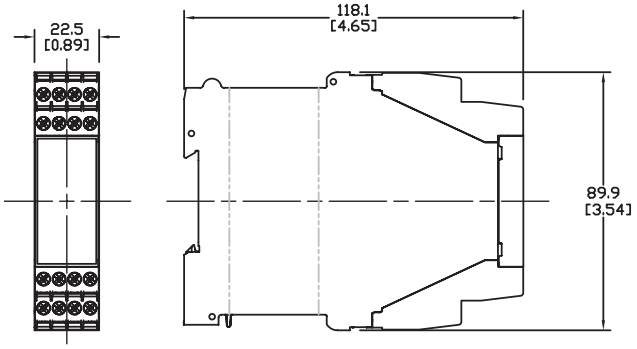
# Dold LG5929 Extension Module

## Wiring

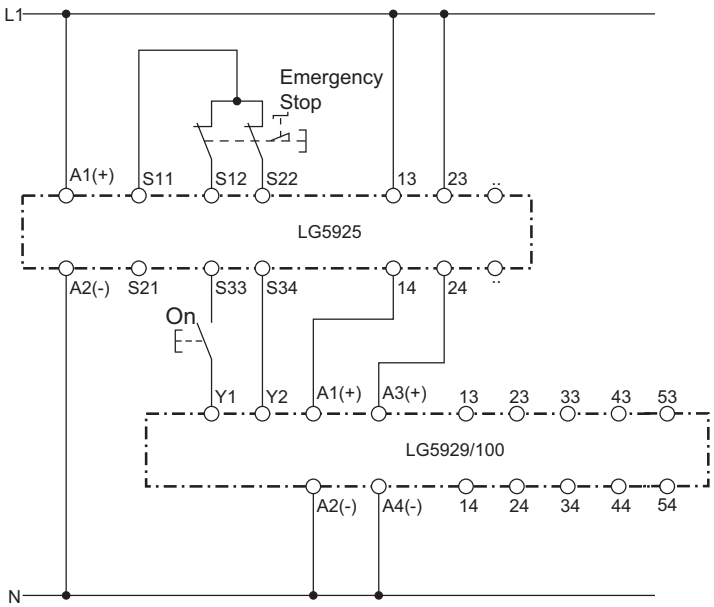
***LG5929 Block Diagram***




## Dimensions mm [in]




## Applications




Contact multiplication with LG 5929/100

***Note: This is a representative drawing. Depending on the LG5925 safety relay you select, different voltage sources may be required.***

***Note: When switching inductive loads, surge suppressors are recommended.**

# 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.*

*AutomationDirect does not provide design or consulting services, and cannot advise whether any specific application or use of our products would ensure compliance with the safety requirements for any application.*