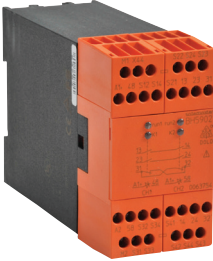# Dold Safety Relays
Multi-Function Light Curtain Controller

DOLD ⟨EDS⟩®

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

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}

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.

## 2-Channel Light Curtain Controller Specification Table

General Specifications	
Temperature	Storage: -25°C to 85°C (-13°F to 185°F) 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 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
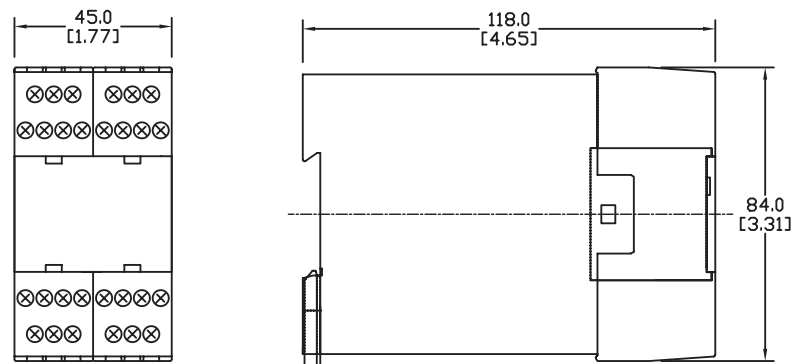
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Wiring

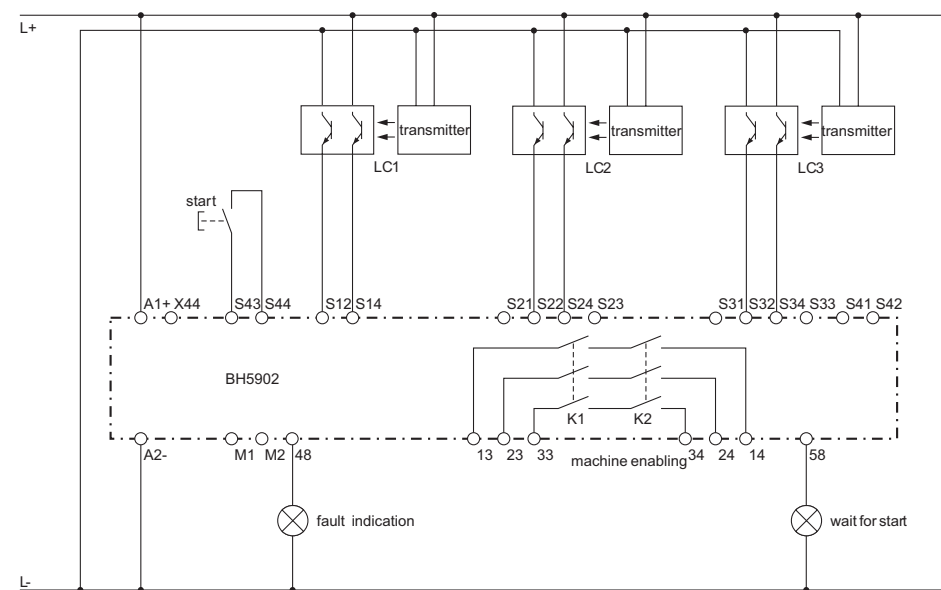**BH5902-22-01MF2-61** *Block Diagram*
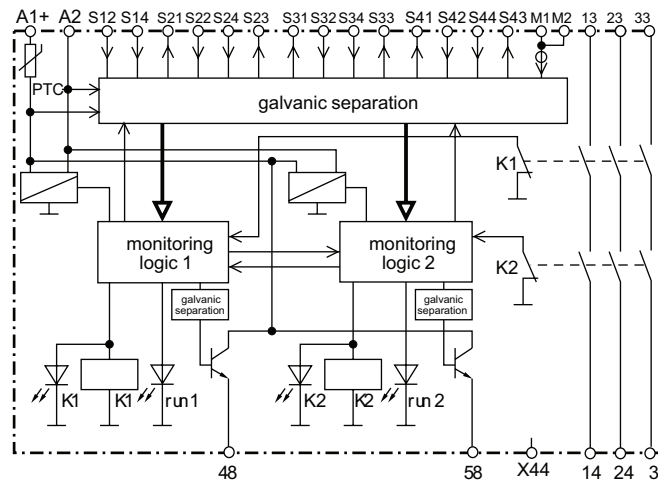
Note: All drawings are for a 3 N.O. configuration. The units will actually have a 2 N.O. and 1 N.C. configuration.

Dimensions

mm [in]

Applications

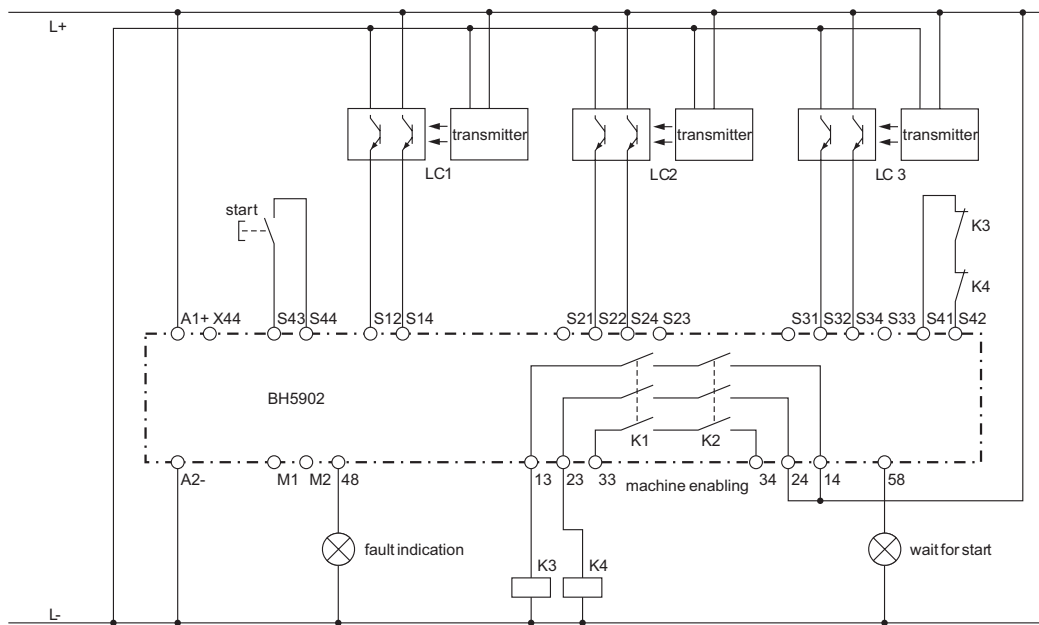Protective operation with 3 Light Curtains, manual or auto start, setting without feedback input

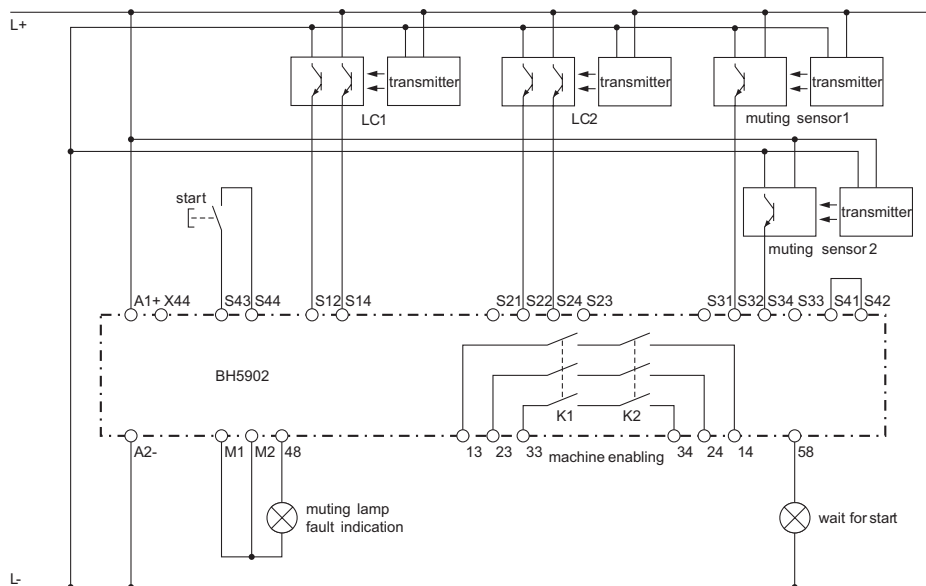*Note: When switching inductive loads, surge suppressors are recommended.*

Safety Electrical Components tESC-378

Dold Safety Relays
Multi-Function Light Curtain Controller

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Applications

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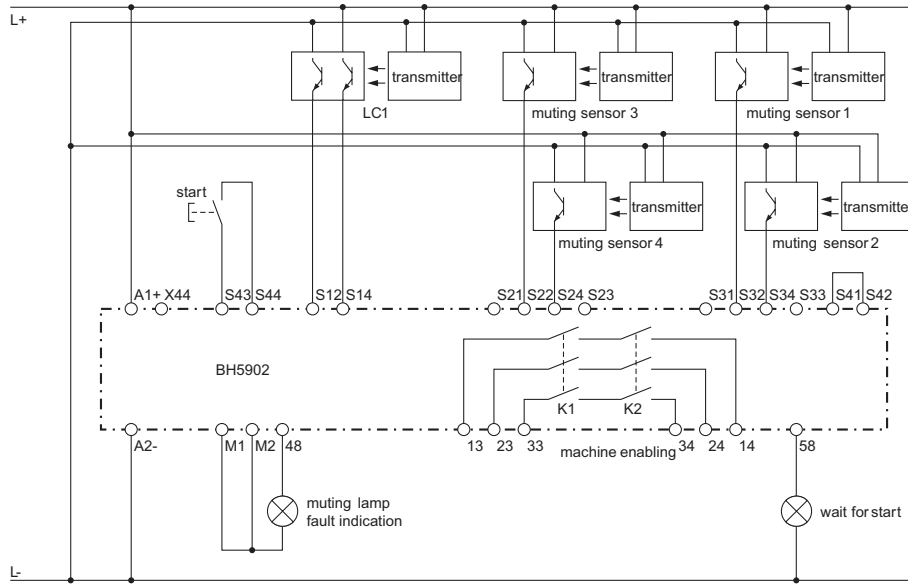

Protective operation with muting a light curtain via 2 muting sensors, 2 light curtains

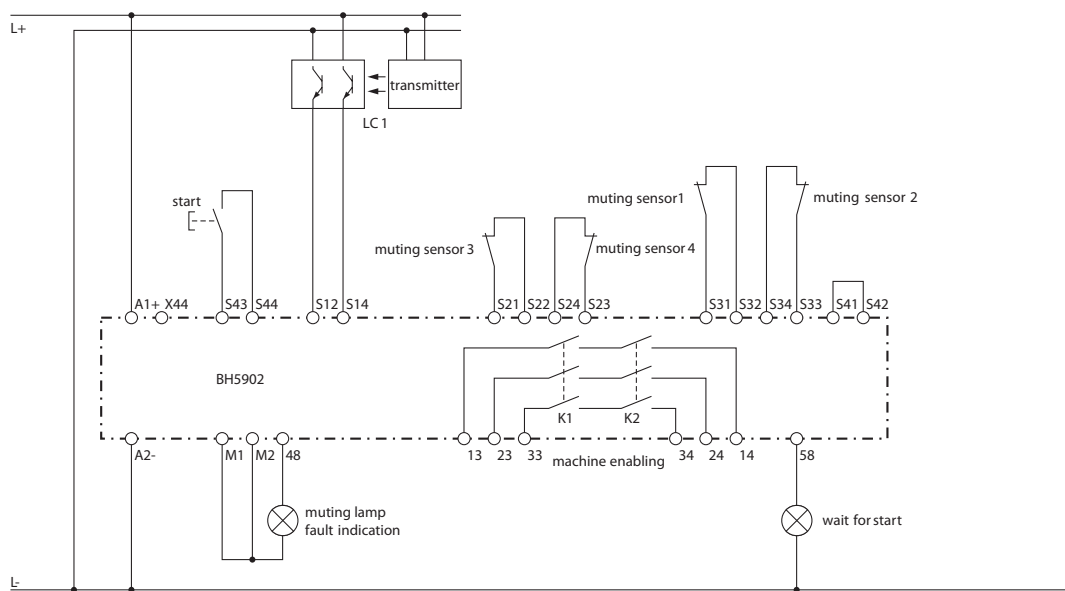*Note: When switching inductive loads, surge suppressors are recommended.*

Dold Safety Relays
Multi-Function Light Curtain Controller

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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.

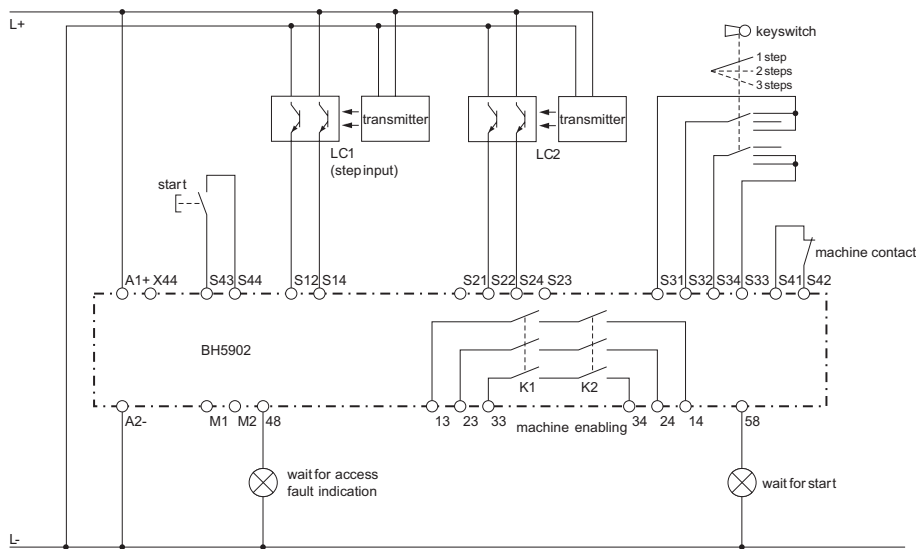*Note: When switching inductive loads, surge suppressors are recommended.*

Dold Safety Relays
Multi-Function Light Curtain Controller
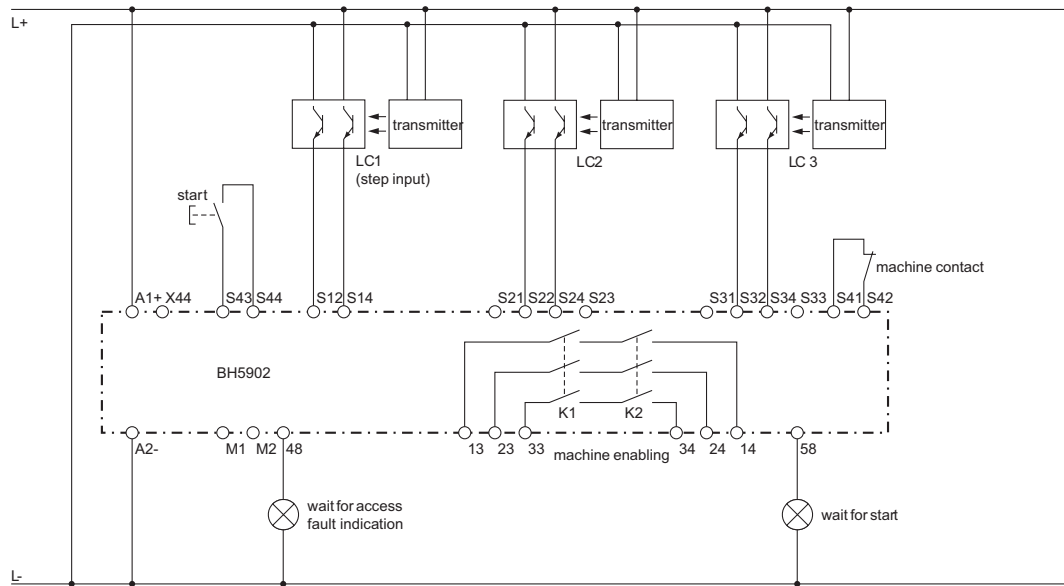
DOLD ⬧

Applications
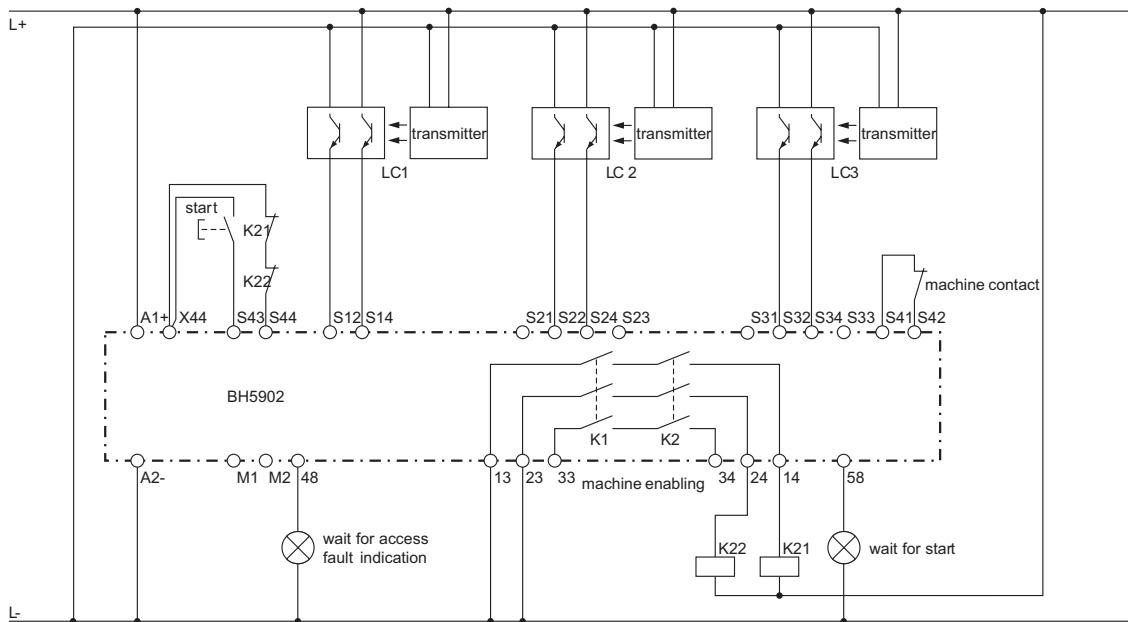

Stepping operation with 3 light curtains

Stepping operation with key switch

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

Dold Safety Relays
# Multi-Function Light Curtain Controller

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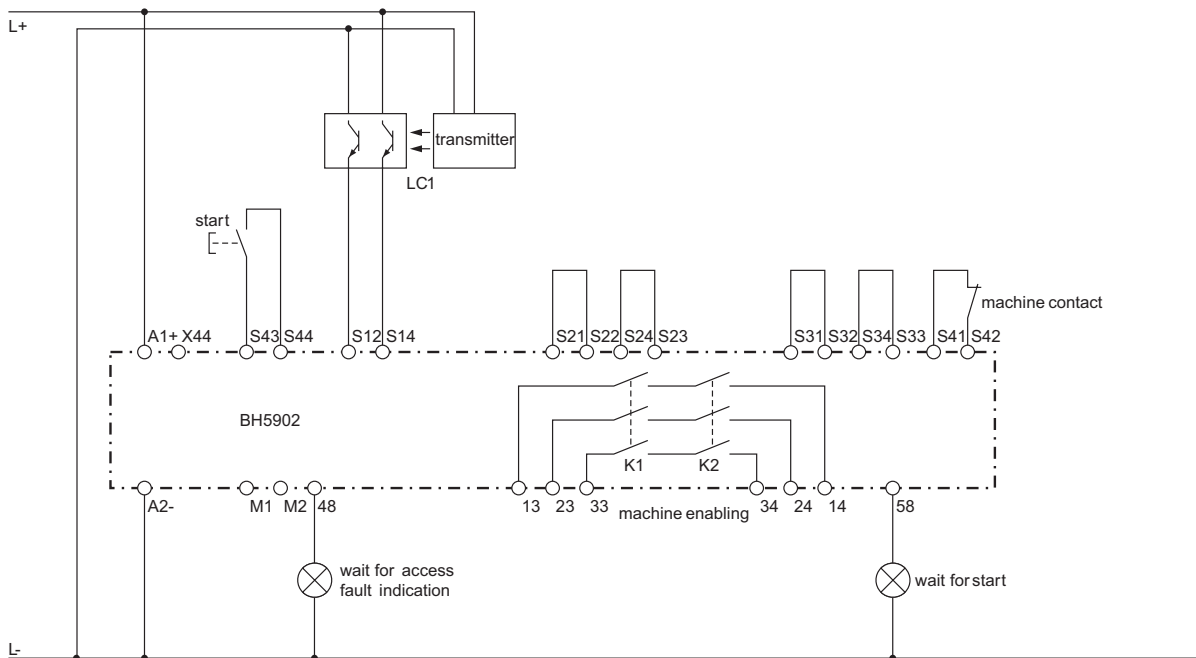
Stepping operation with one light curtain (with all operating modes, unused inputs must be jumpered).

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

Dold LG5929 Extension Module

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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 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 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 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 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 DC 13: N.O. contacts: 4A/24V; N.C. contacts: 4A/24VDC; N.O. contact: 8A/24V >25x10^3 ON: 0.4s, OFF: 9.6s
Switching Frequency	Max. 1,200 switching cycles/hr

Dold LG5929 Extension Module

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Wiring

Dimensions mm [in]

LG5929 Block Diagram

Applications

Contact multiplication with LG 5929/100
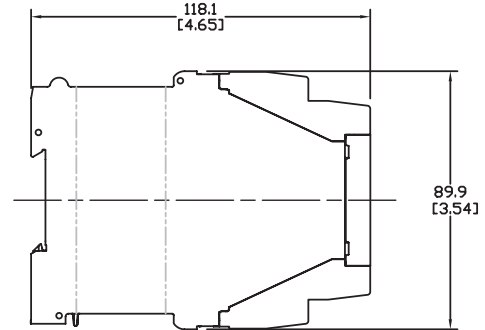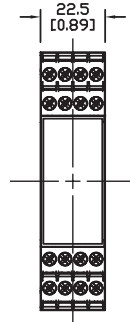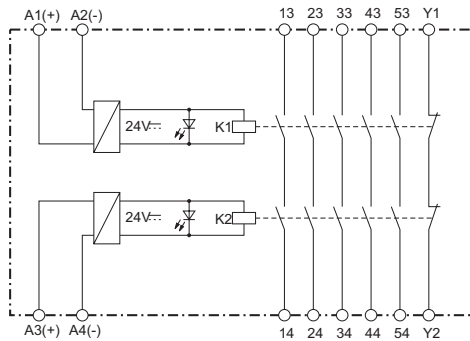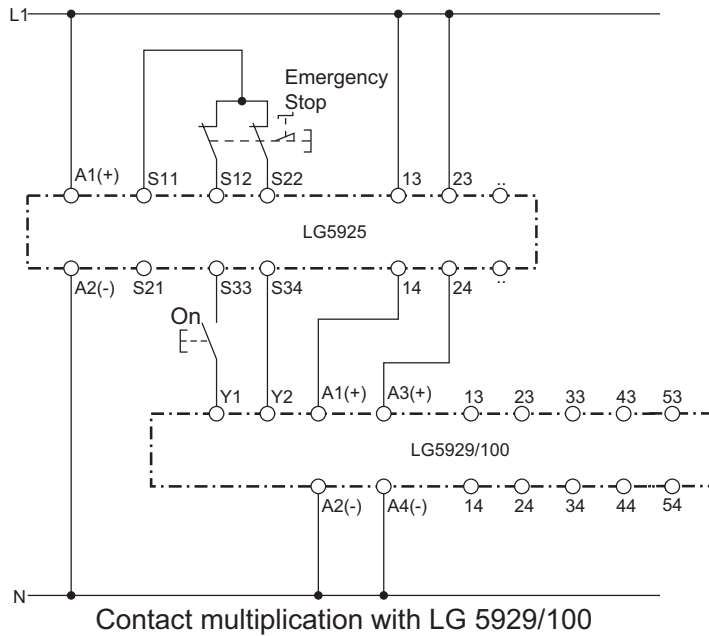
Note: This is a representative drawing. Depending on the LG5925 safety relay you select, different voltage sources may be required.

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

Safety Products

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