SAFEMASTER
Emergency Stop Module
LG 5925

Translation
of the original instructions

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Contents

Before installing, operating or maintaining this device, these instructions must be carefully read and understood.

Keep instructions for future reference

The installation must only be done by a qualified electrican!

Do not dispose of household garbage!
The device must be disposed of in compliance with nationally applicable rules and requirements.

To help you understand and find specific text passages and notes in the operating instructions, we have important information and information marked with symbols.

Symbol and Notes Statement

DANGER:
Indicates that death or severe personal injury will result if proper precautions are not taken.

WARNING:
Indicates that death or severe personal injury can result if proper precautions are not taken.

CAUTION:
Indicates that a minor personal injury can result if proper precautions are not taken.

INFO:
Referred information to help you make best use of the product.

ATTENTION:
Warns against actions that can cause damage or malfunction of the device, the device environment or the hardware / software result.

General Notes

The product hereby described was developed to perform safety functions as a part of a whole installation or machine. A complete safety system normally includes sensors, evaluation units, signals and logical modules for safe disconnections. The manufacturer of the installation or machine is responsible for ensuring proper functioning of the whole system. DOLD cannot guarantee all the specifications of an installation or machine that was not designed by DOLD. The total concept of the control system into which the device is integrated must be validated by the user. DOLD also takes over no liability for recommendations which are given or implied in the following description. The following description implies no modification of the general DOLD terms of delivery, warranty or liability claims.

Designated Use

The LG 5925 is used to interrupt a safety circuit in a safe way. It can be used to protect people and machines in applications with e-stop buttons and safety gates.
When used in accordance with its intended purpose and following these operating instructions, this device presents no known residual risks. Non-observance may lead to personal injuries and damages to property.

Safety Notes

Risk of electrocution!
Danger to life or risk of serious injuries.

- Disconnect the system and device from the power supply and ensure they remain disconnected during electrical installation.
- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed.
- The contact protection of the elements connected and the insulation of the supply cables must be designed in accordance with the requirements in the operating instructions / data sheet.
- Note the VDE and local regulations, particularly those related to protective measures.

Risk of fire or other thermal hazards!
Danger to life, risk of serious injuries or property damage.

- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed. In particular, the current limit curve must be heeded.
- The device may only be installed and put into operation by experts who are familiar with this technical documentation and the applicable health and safety and accident prevention regulations.

Functional error!
Danger to life, risk of serious injuries or property damage.

- The device may only be used for the applications described in the mutually applicable operating instructions / data sheet. The notes in the respective documentation must be heeded. The permissible ambient conditions must be observed.
- The device may only be installed and put into operation by experts who are familiar with this technical documentation and the applicable health and safety and accident prevention regulations.
- The unit should be panel mounted in an enclosure rated at IP 54 or superior. Dust and dampness may lead to malfunction.

Installation fault!
Danger to life, risk of serious injuries or property damage.

- Make sure of sufficient protection circuitry at all output contacts for capacitive and inductive loads.

Attention!

- The safety function must be triggered during commissioning.
- If a line fault occurs after the voltage has been connected to S12, S22, the unit will be activated because this line fault is similar to the normal On-function.
- Switch S1 must not be set while device is under supply voltage.
- AUTOMATIC START !
  According to IEC/EN 60204-1 part 9.2.5.4.2 and 10.8.3 it is not allowed to restart automatically after emergency stop.
  Therefore the machine control has to disable the automatic start after emergency stop.
- Opening the device or implementing unauthorized changes voids any warranty

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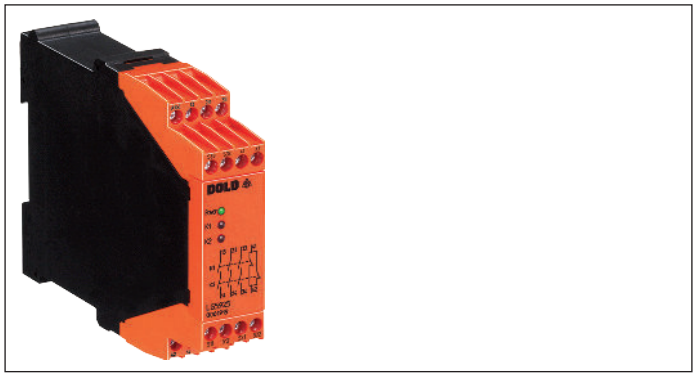
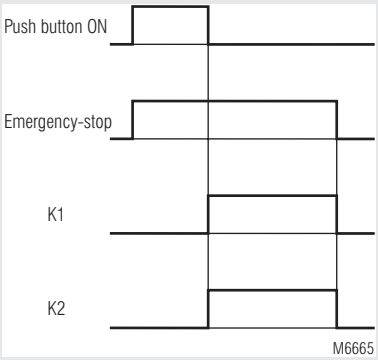


- **According to**
  - **Performance Level (PL) e and category 4 to EN ISO 13849-1**
  - **SIL Claimed Level (SIL CL) 3 to IEC/EN 62061**
  - **Safety Integrity Level (SIL) 3 to IEC/EN 61508 and IEC/EN 61511**
- According to EN 50156-2 for furnaces
- Output: Max. 4 NO contacts, see contacts
- LG 5925.54: 1 semiconductor output
- Single and 2-channel operation
- Line fault detection on On-button
- Manual restart or automatic restart, switch S2
- With or without cross fault monitoring in the E-stop loop, switch S1
- LG 5925.54: With cross fault monitoring in the E-stop loop
- LED indicator for channel 1, 2 and supply voltage
- Removable terminal strips
- Wire connection: Also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46228-1/-2/-3/-4
- As option with pluggable terminal blocks for easy exchange of devices
  - With screw terminals
  - Or with cage clamp terminals
- Width: 22.5 mm

Function Diagram



Approvals and Markings

Product Safety Functional Safety
TÜVRheinland CERTIFIED
www.tuv.com ID 0600000000
c UL us LISTED
Canada / USA

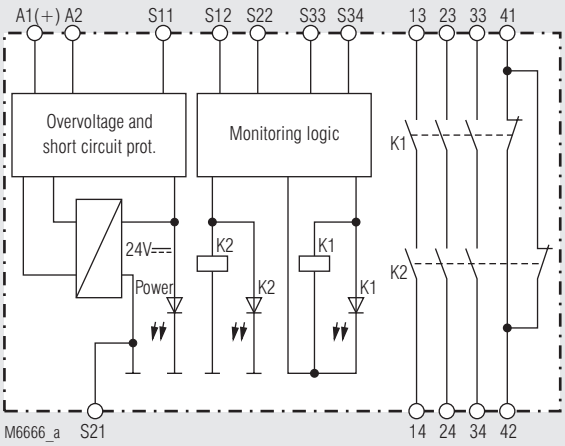
Applications

Protection of people and machines
- Emergency stop circuits on machines
- Monitoring of safety gates
- Usage in furnace application in continuous operation acc. to EN 50156-1
- Safe disconnection of the complete fuel supply in furnace applications according to EN 50156-1 section 10.5.5.2

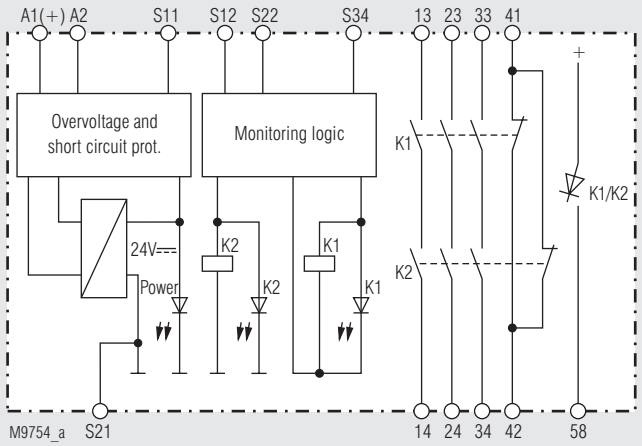
Indicators

LED Power:	On when supply connected
LED K1/K2:	On when relay K1 and K2 energized

Block Diagrams

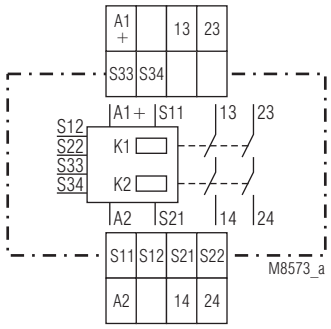


LG 5925

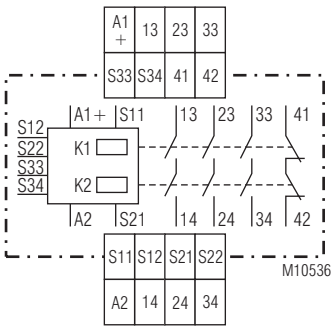


LG 5925.54

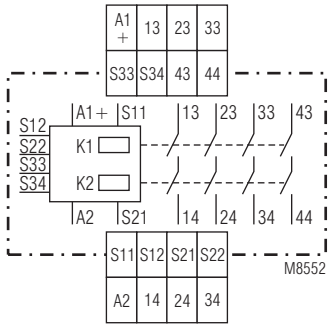
Circuit Diagrams



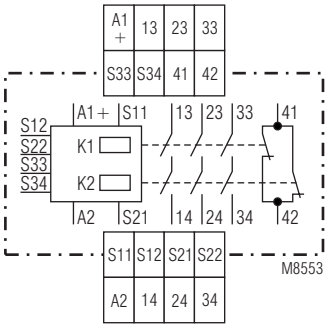
LG 5925.02



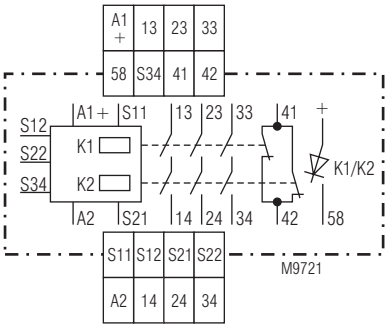
LG 5925.03



LG 5925.04



LG 5925.48



LG 5925.54

Connection Terminals

Terminal designation	Signal description
A1+	+ / L
A2	- / N
S12, S22, S33, S34	Inputs
S11, S21	Outputs
13, 14, 23, 24, 33, 34, 43, 44	Forcibly guided NO contacts for release circuit
41, 42	Forcibly guided indicator output

Notes

Line fault detection on On-button:
The line fault detection is only active when S12 and S22 are switched simultaneously. If The On-button is closed before S12, S22 is connected to voltage (also when line fault across On-Button), the output contacts will not close. A line fault across the On-button which occurred after activation of the relay, will be detected with the next activation and the output contacts will not close.

The terminal S21 permits the operation of the device in IT-systems with insulation monitoring, serves as a reference point for testing the control voltage and is used to connect the E-stop loop when cross fault monitoring is selected.
Connecting the terminal S21 to the protective ground bridges the internal short-circuit protection of Line A2 (-). The short-circuit protection of line A1 (+) remains active.

To alter the functions automatic start - manual start and with or without cross fault monitoring, the switches S1 and S2 are used. These are located behind the front cover (see unit programming).
The setting with or without cross fault monitoring on E-stop buttons is made with S1 (not for LG 5925.54). The LG 5925.54 has always cross fault monitoring.

S2 is used to change between automatic an manual restart. On automatic start also the terminals S33 - S34 have to be linked. For connection please see application examples.

Technical Data

Input circuit

Nominal Voltage U_N:
LG 5925: AC/DC 24 V, AC 110 ... 115 V, AC 230 V
LG 5925.54: AC/DC 24 V
Voltage range
AC / DC
at 10% residual ripple: 0.9 ... 1.1 U_N
AC: 0.85 ... 1.1 U_N
Nominal consumption at U_N: DC approx. 1.5 W
AC approx. 3.7 VA
Min. Off-time: 250 ms
Control voltage on S11 at U_N: DC 22 V at AC/DC units
DC 24 V at AC units

Control current typ. over S12, S22:
LG 5925: 30 mA at U_N
LG 5925.54: 25 mA at U_N
Min. voltage on S12, S22 when relay activated: DC 20 V at AC/DC units
DC 19 V at AC units
Short-circuit protection: Internal PTC
Overvoltage protection: Internal VDR

Output

Contacts
LG 5925.02: 2 NO contacts
LG 5925.04: 4 NO contact
LG 5925.03 ,
LG 5925.48, LG 5925.54: 3 NO, 1 NC contact

The NO contacts are safety contacts.
The NC contacts 41-42 can only be used for monitoring.

Operate delay typ. at U_N:
Manual start: 30 ms
Automatic start: 350 ms
Release delay typ. at U_N:
Disconnecting the supply: 150 ms at AC units
50 ms at DC units
Disconnecting S12, S22: 130 ms at AC units
50 ms at DC units
Contact type: Forcibly guided
Nominal output voltage: AC 250 V
DC: See arc limit curve
Thermal current I_{th}: Max. 8 A per contact
see quadratic total current limit curve

Technical Data

Switching capacity
to AC 15:
NO contacts: 3 A / AC 230 V IEC/EN 60947-5-1
NC contacts: 2 A / AC 230 V IEC/EN 60947-5-1
to DC 13:
NO contacts: 2 A / DC 24 V IEC/EN 60947-5-1
NC contacts: 2 A / DC 24 V IEC/EN 60947-5-1
to DC 13:
NO contact: 4 A / DC 24 V at 0.1 Hz
NC contact: 4 A / DC 24 V at 0.1 Hz
Electrical contact life
to 5 A, AC 230 V cos φ = 1: > 2.2 x 10^5 switching cycles
Permissible operating frequency: Max. 1200 operating cycles / h
Short circuit strength
max. fuse rating: 10 A gG / gL IEC/EN 60947-5-1
Line circuit breaker: B 6 A
Mechanical life: > 20 x 10^6 switching cycles
Semiconductor output 58: DC 24 V 100 mA, plus switching

General Data

Operating mode: Continuous operation
Temperature range
Operation: - 25 ... + 60 °C
(see quadratic total current limit curve)
At an altitude of > 2000 m the maximum permissible temperature reduces by 0.5 °C / 100 m
Storage : - 40 ... + 85 °C
Altitude,
Clearance and creepage distances
Rated impuls voltage / pollution degree: IEC 60664-1

≤ 2000 m	> 2000 m up to ≤ 4000 m
4 kV / 2	2.5 kV / 2

EMC EN 61326-3-1, EN 61000-6-7
Interference suppression: Limit value class B EN 55011
Degree of protection
Housing: IP 40 IEC/EN 60529
Terminals: IP 20 IEC/EN 60529
Housing: Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance: Amplitude 0.35 mm IEC/EN 60068-2-6
frequency 10 ... 55 Hz
Climate resistance: 25 / 060 / 04 IEC/EN 60068-1
Terminal designation: EN 50005
Wire fixing: Plus-minus terminal screws M 3.5
box terminals with wire protection or cage clamp terminals
Mounting: DIN rail IEC/EN 60715
Weight:
LG 5925, AC/DC 24 V: 210 g
LG 5925.54, AC/DC 24 V: 220 g
LG 5925, AC 230 V: 275 g
LH 5925, AC/DC 24 V: 375 g

Dimensions

Width x height x depth:
LG 5925: 22.5 x 90 x 121 mm
LG 5925 PC: 22.5 x 111 x 121 mm
LG 5925 PS: 22.5 x 104 x 121 mm

UL-Data

The safety functions were not evaluated by UL. Listing is accomplished according to requirements of Standard UL 508, "general use applications"

Nominal voltage U_N:
LG 5925.02, .03, .04, .48, .54: AC/DC 24 V, AC 110 ... 115 V
AC 230 V

Ambient temperature
LG 5925.02, .03, .04, .48, .54: - 25 … + 55 °C

Altitude: ≤ 2000 m

Switching capacity:
LG 5925.04
Ambient temperature 35 °C: Pilot duty B300
8A 250Vac Resistive
8A 24Vdc Resistive or G.P.
LG 5925.04
Ambient temperature 55 °C: Pilot duty B300
4A 250Vac Resistive
4A 24Vdc Resistive or G.P.

Switching capacity:
LG 5925.02, .03, .48, .54
Ambient temperature 45 °C: Pilot duty B300
8A 250Vac Resistive
8A 24Vdc Resistive or G.P.
LG 5925.02, .03, .48, .54
Ambient temperature 55 °C: Pilot duty B300
6A 250Vac Resistive
6A 24Vdc Resistive or G.P.

Wire connection: 60 °C / 75 °C copper conductors only
Screw terminals fixed: AWG 20 - 12 Sol/Str Torque 0.8 Nm
Plug in screw: AWG 20 - 14 Sol Torque 0.8 Nm
AWG 20 - 16 Str Torque 0.8 Nm
Plug in cage clamp: AWG 20 - 12 Sol/Str

Technical data that is not stated in the UL-Data, can be found in the technical data section.

Standard Type

LG 5925.48/61 AC/DC 24 V
Article number: 0061919
LG 5925.54/61 AC/DC 24 V
Article number: 0064882
- Output: 3 NO contacts, 1 NC contact
- Nominal voltage U_N: AC/DC 24 V
- Width: 22.5 mm

Ordering Example

LG 5925 ._ _ _ _ /_ _ /61 AC 230 V

- AC 230 V: Nominal voltage
- /61: UL-approval
- /_ _: Without designation: Standard; CO (on request): With partially laquered solder side of the PCB
- _ _: Type of terminals; Without indication: Terminal blocks fixed with screw terminals; PC (plug in cage clamp): Pluggable terminal blocks with cage clamp terminals; PS (plug in screw): Pluggable terminal blocks with screw terminals
- ._ _: Contacts
- LG 5925: Type

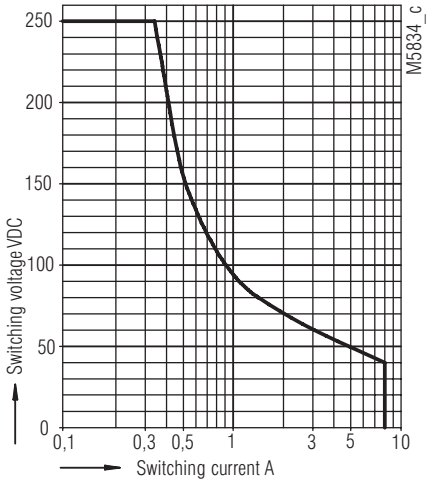
Troubleshooting

Failure	Potential cause
LED "Power" does not light up	- Power supply not connected - Cross fault between S11 and S21
LED "K1" lights up, but "K2" remains off	- Safety relay K1 is welded (replace device) - A 1-channel switch-off occurred on S12 (switch channel off on S22)
LED "K2" lights up, but "K1" remains off	- Safety relay K2 is welded (replace device) - A 1-channel switch-off occurred on S22 (switch channel off on S12)
Device cannot be activated	Manual start mode: - Line fault on start-button (disconnect power supply and remove fault) Automatic start mode: - S33-S34 not bridged - A safety relay is welded (replace device) - Incorrect setting of switch S1

Maintenance and Repairs

- The device contains no parts that require maintenance.
- In case of failure, do not open the device but send it to manufacturer for repair.

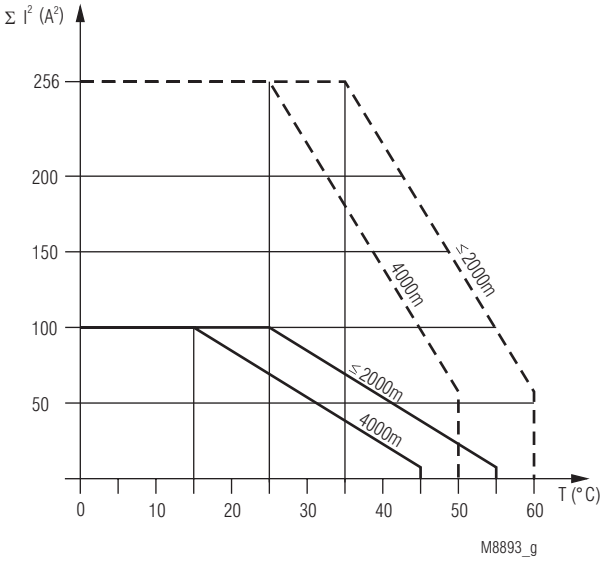
Characteristics



Safe breaking, no continuous arcing,
max. 1 switching cycle / s

Arc limit curve under resistive load

Characteristics



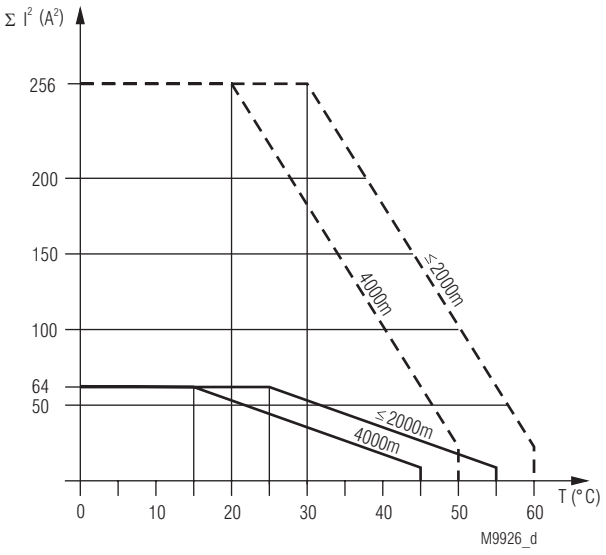
Device mounted away from heat generation components.
Max. current at 60°C (≤ 2000m) or 50°C (4000m) over 4 contact path = 3,8A ≙ $4x3{,}8^2A^2 = 58A^2$

Device mounted without distance heated by devices with same load.
Max. current at 55°C (≤ 2000m) or 45°C (4000m) over 4 contact path = 1A ≙ $4x1^2A^2 = 4A^2$

$$\Sigma I^2 = I_1^2 + I_2^2 + I_3^2 + I_4^2$$

I_1, I_2, I_3, I_4 - Current in contact paths

Quadratic total current limit curve LG 5925; AC/DC 24 V
From an altitude of > 2000 m the curve is adjusted by -0.5 °C / 100 m (see example for 4000 m).



Device mounted away from heat generation components.
Max. current at 60°C (≤ 2000m) or 50°C (4000m) over 4 contact path = 2,4A ≙ $4x2{,}4^2A^2 = 23A^2$

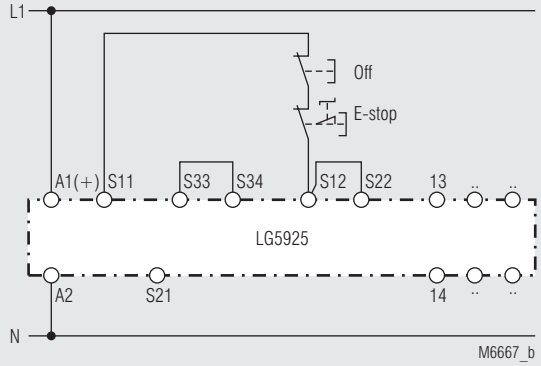
Device mounted with 5mm distance.
Max. current at 55°C (≤ 2000m) or 45°C (4000m) over 4 contact path = 1A ≙ $4x1^2A^2 = 4A^2$

$$\Sigma I^2 = I_1^2 + I_2^2 + I_3^2 + I_4^2$$

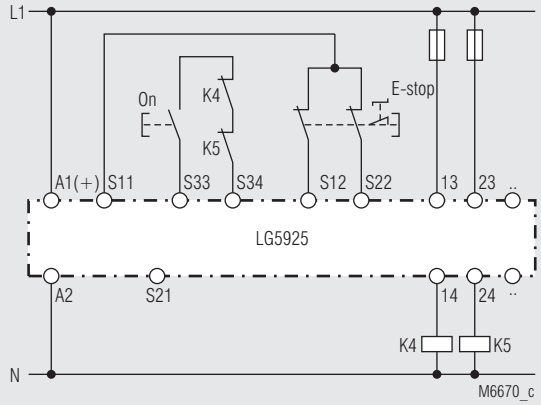
I_1, I_2, I_3, I_4 - Current in contact paths

Quadratic total current limit curve LG 5925; AC 110 ... 115 V, AC 230 V
From an altitude of > 2000 m the curve is adjusted by -0.5 °C / 100 m (see example for 4000 m).

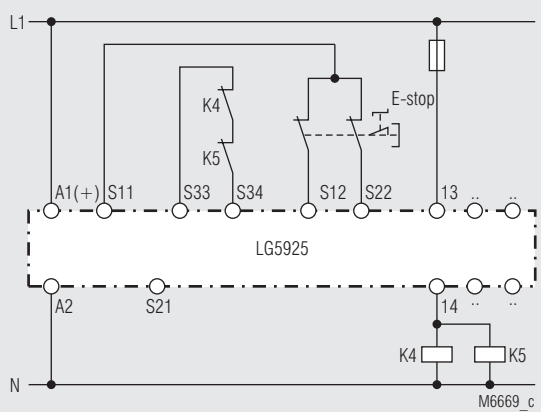
Application Examples



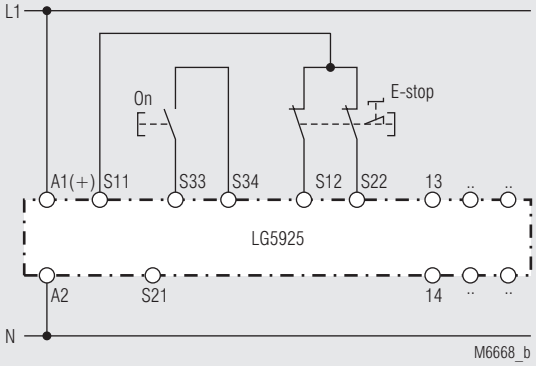
Single channel emergency stop circuit. This circuit does not have any redundancy in the emergency-stop control circuit.
Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 automatic start
Suited up to SIL2, Performance Level d, Cat. 3



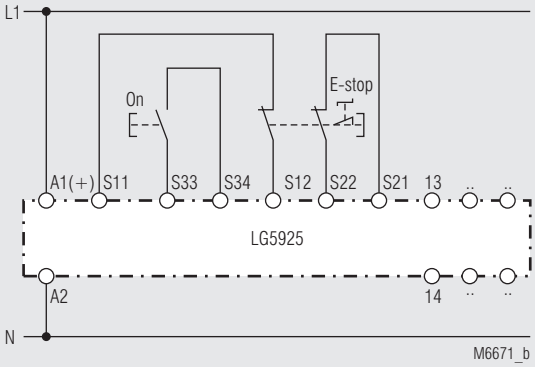
Contact reinforcement by external contactors, 2-channel controlled.
The output contacts can be reinforced by external contactors with forcibly guided contacts for switching currents > 8 A.
Functioning of the external contactors is monitored by looping the NC contacts into the closing circuit (terminals S33-S34).
Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start
Suited up to SIL3, Performance Level e, Cat. 4



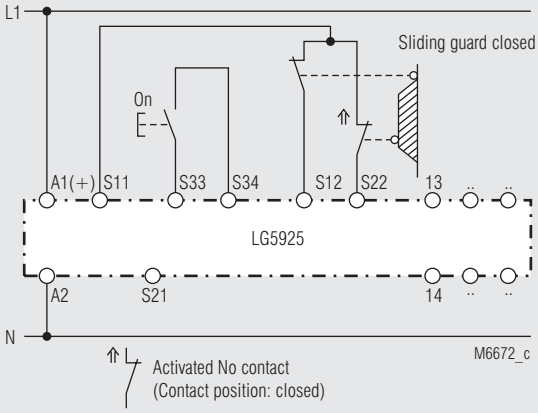
Contact reinforcement by external contactors controlled by one contact path.
Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 automatic start
Suited up to SIL3, Performance Level e, Cat. 4



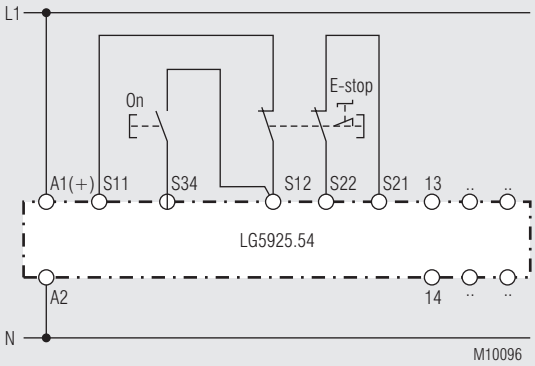
2-channel emergency stop circuit without cross fault monitoring.
Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start
Suited up to SIL3, Performance Level e, Cat. 4



2-channel emergency stop circuit with cross fault detection
Note: Refer to "Unit programming"!
Switches in pos.: S1 cross fault detection
S2 manual start
Suited up to SIL3, Performance Level e, Cat. 4



2-channel safety gate monitoring.
Note: Refer to "Unit programming"!
Switches in pos.: S1 no cross fault detection
S2 manual start
Suited up to SIL3, Performance Level e, Cat. 4



2-channel emergency stop circuit with cross fault detection
Note: Refer to "Unit programming"!
Switches in pos.: S2 manual start
Suited up to SIL3, Performance Level e, Cat. 4