

Characteristics:

General Description:

The D5094S is a relay module suitable for the switching of safety related circuits, up to SIL 3 level according to IEC 61508:2010 Ed. 2 for high risk industries. It provides isolation between input and output contacts. A wide compatibility towards different DCS/PLC is guaranteed: driving line pulse testing, executed by DCS/PLC, is permitted by a dedicated internal circuit, to prevent relay and LED flickering. D5094S has 2+2 SPST relay contacts connected in parallel and then in series to avoid spurious trip and to increase availability (see function diagram). High availability SIL 3 Safety Function for both NE load and F&G / ND load is available. Load can be isolated from supply on both polarities: +AC, -AC. Mounting on standard DIN-Rail or on customized Termination Boards, in Safe Area or in Zone 2.

Functional Safety Management Certification:

G.M. International is certified by TÜV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.



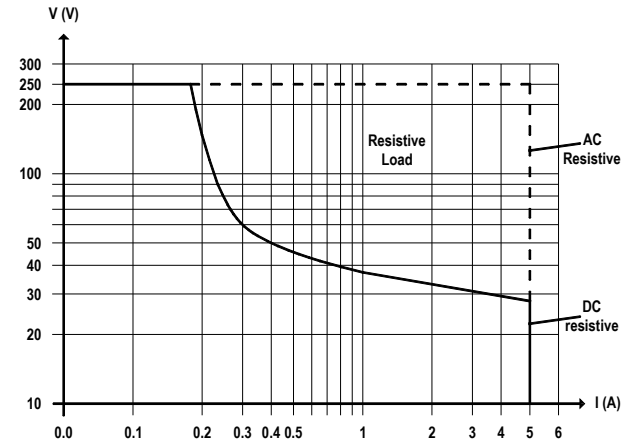
Front Panel and Features:



- SIL 3 (low demand mode of operation) for NE Load according to IEC 61508:2010 Ed.2 with Tproof = 14 / 20 yrs ($\leq 10 / >10$ % of total SIF) and PFDavg (1 year) = 7.02 E-06, SFF = 99.37 %.
- SIL 3 (low demand mode of operation) for F&G / ND Load according to IEC 61508:2010 Ed.2 with Tproof = 6 / 20 yrs ($\leq 10 / >10$ % of total SIF) and PFDavg (1 year) = 1.51 E-05, SFF = 97.49 %.
- SIL 3 (high demand mode of operation) for NE Load according to IEC 61508:2010 Ed.2 with PFH = 1.60 E-09 h⁻¹.
- SIL 3 (high demand mode of operation) for F&G / ND Load according to IEC 61508:2010 Ed.2 with PFH = 3.45 E-09 h⁻¹.
- Systematic capability SIL 3.
- Installation in Zone 2.
- Compatible with DCS/PLC pulse testing.
- 5 A high availability to avoid spurious trip SIL 3 contacts for NE or F&G/ND load.
- 6 A inrush current at 24 Vdc / 250 Vac.
- Input/Output isolation.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- ATEX, IECEx, TÜV Certifications.
- TÜV Functional Safety Certification.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks or customized Termination Boards.

Technical Data:

Isolation (Test Voltage): Output/Input 2.5 KV;
Input: 24 Vdc nom (21.6 to 27.6 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.
Current consumption @ 24 V: 45 mA typical.
Power dissipation @ 24 V: 1.1 W.
Output: voltage free 2+2 SPST relay contact (2 paralleled contacts in series) at terminals 7-11 and 8-12, close when relay energized, open in de-energized condition.
Contact material: Ag Alloy (Cd free), gold plated.
Contact rating: 5 A 250 Vac 1250 VA, 5 A 250 Vdc 140 W (resistive load). Min. switching current 1 mA.
Contact inrush current: 6 A at 24 Vdc, 250 Vac.
DC and AC Load breaking capacity:



Mechanical / Electrical life: 5 * 10⁶ / 3 * 10⁴ operation, typical.
Operate / Release time: 30 ms / 30 ms typical.
Frequency response: 10 Hz maximum.
Compatibility: CE mark compliant, conforms to Directive: 2014/34/EU ATEX, 2014/30/EU EMC, 2014/35/EU LVD, 2011/65/EU RoHS.
Environmental conditions: **Operating:** temperature limits - 40 to + 70 °C, relative humidity 95 %, up to 55 °C. **Storage:** temperature limits - 45 to + 80 °C.

Safety Description:

ATEX: II 3G Ex nA nC IIC T4 Gc.
IECEx: Ex nA nC IIC T4 Gc
 non-sparking electrical equipment.
 -40 °C \leq Ta \leq 70 °C.

Approvals: BVS 10 ATEX E 114 X conforms to EN60079-0, EN60079-15. IECEx BVS 10.0072X conforms to IEC60079-0, IEC60079-15. TÜV Certificate No. C-IS-272994-01 SIL 3 conforms to IEC61508:2010 Ed. 2. TÜV Certificate No. C-IS-236198-09, SIL 3 Functional Safety Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.
Mounting: T35 DIN-Rail according to EN50022 or on customized Termination Board.
Weight: about 125 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².
Location: installation in Safe Area or Zone 2, Group IIC T4
Protection class: IP 20.
Dimensions: Width 12.5 mm, Depth 123 mm, Height 120 mm.

Ordering Information:

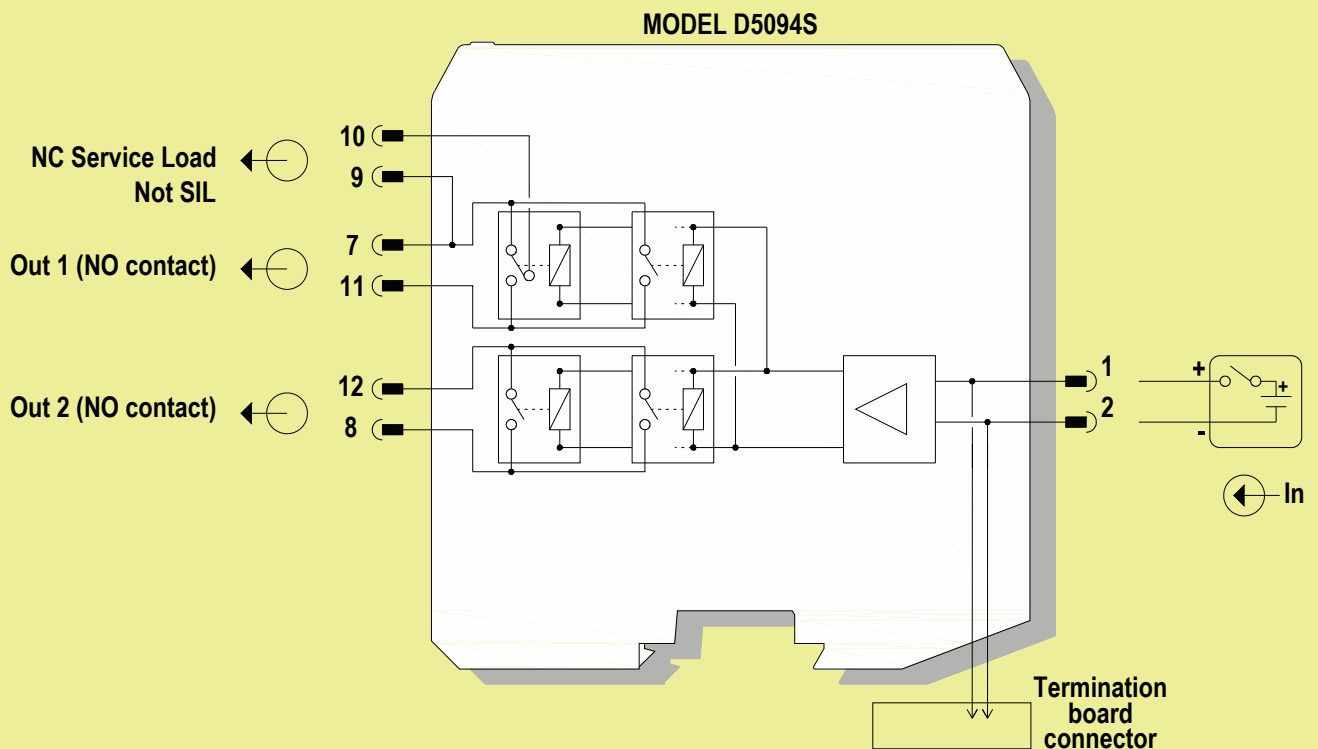
Model: D5094S

Image:



Function Diagram:

SAFE AREA, ZONE 2 GROUP IIC T4



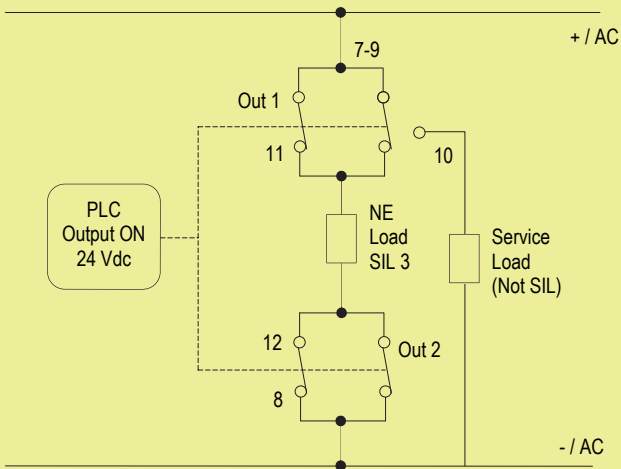
See the following pages for Functional Safety applications with related SIL value.

To prevent relay contacts from damaging, connect an external protection (fuse or similar), chosen according to the relay breaking capacity diagram.

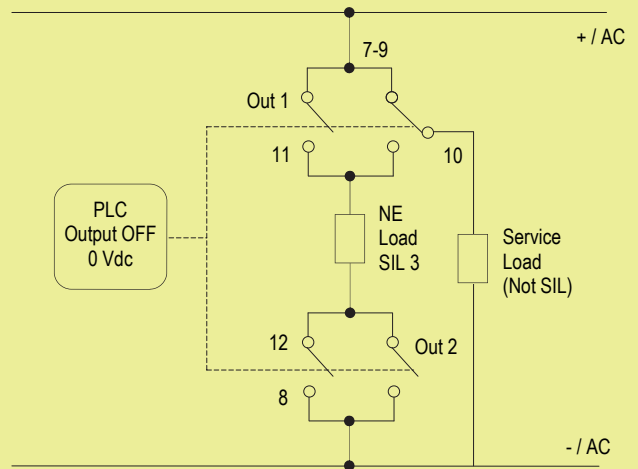
All relay contacts are shown in de-energized position

Application for D5094S - SIL 3 for NE Load with bipolar load interruption

Normal state operation



De-energized to trip operation

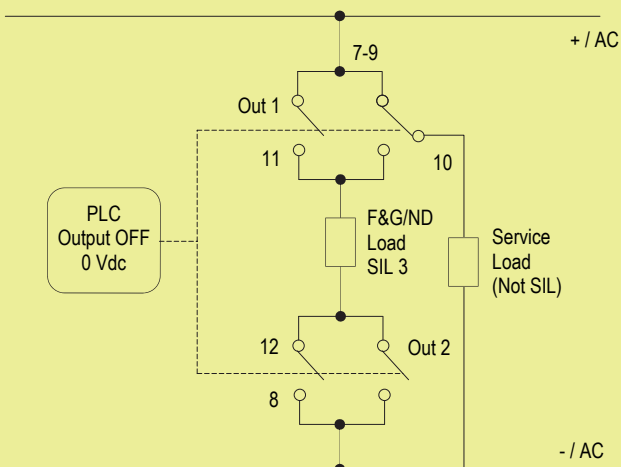


Contacts 7-11 and 8-12: in normal operation the relay is energized, contacts are closed, load is energized.
Contact 9-10: in normal operation relay is energized, contact is open, service load for NE load is de-energized.

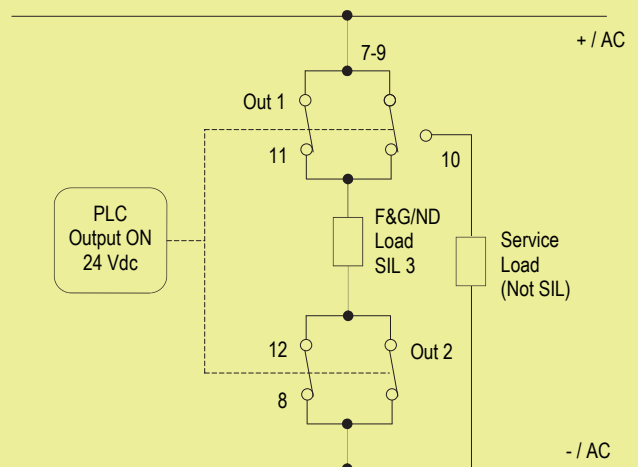
Contacts 7-11 and 8-12: the SIL 3 Safety Function is met when the relay is de-energized, contacts are open, load is de-energized.
Contact 9-10: in safe state the relay is de-energized, contact is closed, service load for NE load is energized.

Application for D5094S - SIL 3 for F&G/ND Load with bipolar load interruption

Normal state operation



Energized to trip operation

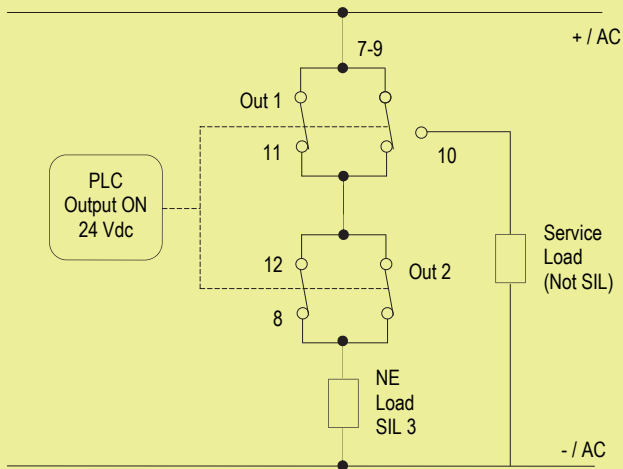


Contacts 7-11 and 8-12: in normal operation the relay is de-energized, contacts are open, load is de-energized.
Contact 9-10: in normal operation relay is de-energized, contact is closed, service load for F&G/ND load is energized.

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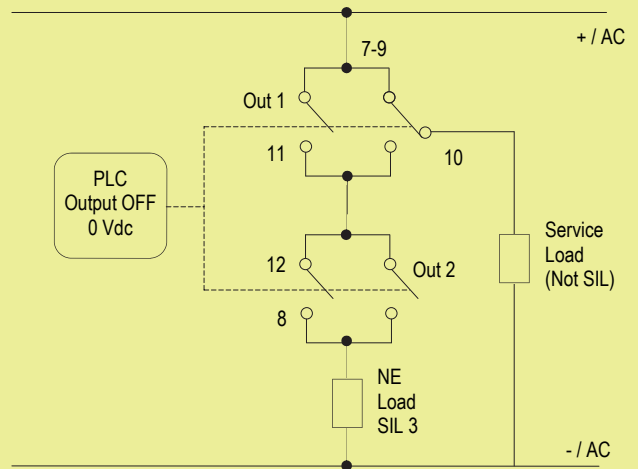
Application for D5094S - SIL 3 for NE Load with unipolar load interruption

Normal state operation



Contacts 7-11 and 8-12: in normal operation the relay is energized, contacts are closed, load is energized.
Contact 9-10: in normal operation relay is energized, contact is open, service load for NE load is de-energized.

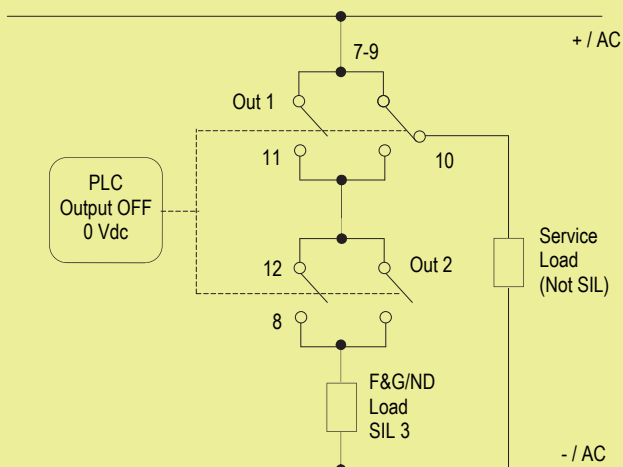
De-energized to trip operation



Contacts 7-11 and 8-12: the SIL 3 Safety Function is met when the relay is de-energized, contacts are open, load is de-energized.
Contact 9-10: in safe state the relay is de-energized, contact is closed, service load for NE load is energized.

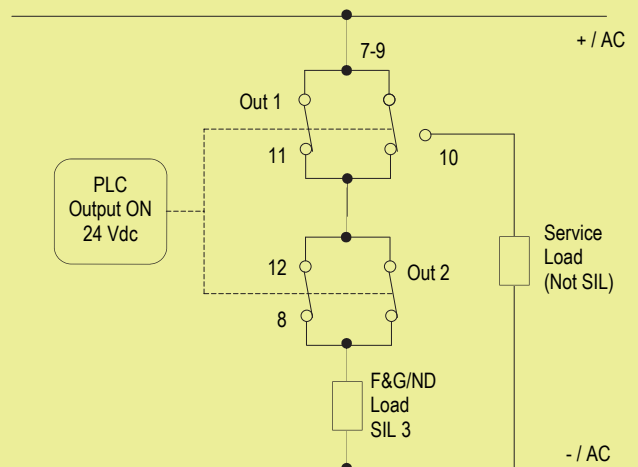
Application for D5094S - SIL 3 for F&G/ND Load with unipolar load interruption

Normal state operation



Contacts 7-11 and 8-12: in normal operation the relay is de-energized, contacts are open, load is de-energized.
Contact 9-10: in normal operation relay is de-energized, contact is closed, service load for F&G/ND load is energized.

Energized to trip operation



Contacts 7-11 and 8-12: the SIL 3 Safety Function is met when the relay is energized, contacts are closed, load is energized.
Contact 9-10: in safe state the relay is energized, contact is open, service load for F&G/ND load is de-energized.