D5291

10 A SIL 3 Relay Output Module for ND Load with ND or NE Relay condition DIN-Rail & Termination Board, Model D5291S

Characteristics:

General Description:

The single channel Relay Output, D5291S is a relay module suitable for the switching of safety related circuits, up to SIL 3 level according to IEC 61508 for high risk industries.
It provides isolation between input and output contacts.
Two mutually exclusive (by DIP-Switch programming) monitoring circuits are provided:

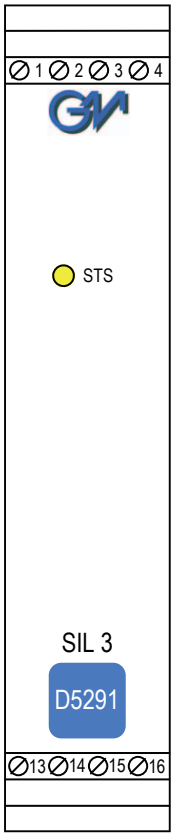
1) line input monitoring, to allow DCS/PLC line monitoring function: when enabled, the module permits a wide compatibility towards different DCS/PLC. Driving line pulse testing, executed by DCS/PLC, is permitted by a dedicated internal circuit, to prevent relay and LED flickering.
2) low voltage input monitoring: when enabled, the module reflects a high impedance state to the control unit when the driving voltage is below the specified threshold.

D5291S provides 1 SPDT contact for two different safety functions:

1) SIL 3 Safety Function for Normally De-Energized load (energized in fail safe state) is available at Terminal Blocks 13-14. The driving signal is normally low (0 Vdc), the relay is normally de-energized, contact is open and load is de-energized. The safety function is met when the driving signal is high (24 Vdc), the relay is energized, contact is closed and load is energized. At Terminal Blocks 13-15 is also available a service contact (for service load) with opposite (not SIL) function.
2) SIL 3 Safety Function for Normally De-Energized load (energized in fail safe state) is available at Terminal Blocks 13-15. The driving signal is normally high (24 Vdc), the relay is normally energized, contact is open and load is de-energized. The safety function is met when the driving signal is low (0 Vdc), the relay is de-energized, contact is closed and load is energized. At Terminal Blocks 13-14 is also available a service contact (for service load) with opposite (not SIL) function.

Mounting on standard DIN-Rail or on customized Termination Boards, in Safe Area or in Zone 2.

Front Panel and Features:



- SIL 3 according to IEC 61508 for Tproof = 6 / 12 yrs (10 / 20 % of total SIF) for ND load with ND relay (terminals 13-14).
- SIL 3 according to IEC 61508 for Tproof = 10 / 20 yrs (10 / 20 % of total SIF) for ND load with NE relay (terminals 13-15).
- SIL 2 according to IEC 61508 for Tproof = 20 yrs (10 % of total SIF).
- PFDavg (1 year) 1.58 E-05, SFF 99.10 % for ND load with ND relay.
- PFDavg (1 year) 7.01 E-06, SFF 99.60 % for ND load with NE relay.
- Installation in Zone 2.
- 10 A SPDT contact for 2 different Safety Functions:
  1) SIL 3 for ND load (energized in fail safe state) with ND relay condition (energized in fail safe state)
  2) SIL 3 for ND load (energized in fail safe state) with NE relay condition (de-energized in fail safe state)
- Line input monitoring in-field DIP Switch selectable.
- Driving input voltage monitoring.
- Input/Output isolation.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- ATEX, IECEx Certifications.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks or customized Termination Boards.

Ordering Information:

Model: D5291S

Technical Data:

Input: 24 Vdc nom (21.6 to 27.6 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.

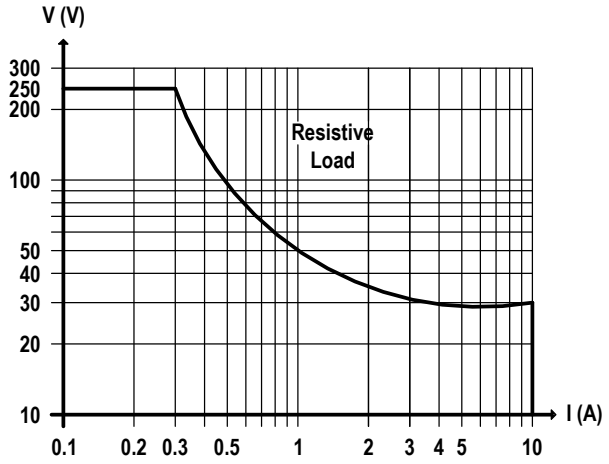
The following monitoring circuits are mutually exclusive:

1) ***Line input monitoring (DIP-Switch selectable):*** to allow DCS/PLC line monitoring function (pulse test).
2) ***Voltage monitoring (DIP-Switch selectable):*** ≥ 21.6 Vdc for normal operation, ≤ 17 Vdc reflects a high impedance (≤ 10 mA consumption) to the control device.

Current consumption @ 24 V: 60 mA with relay energized, typical.
Power dissipation: 1.5 W with 24 V input voltage and relay energized, typical.

Isolation (Test Voltage): Input/Output 2.5 KV.

Output: voltage free SPDT relay contact.
Terminals 13-14, open when relay de-energized, close in energized condition.
Terminals 13-15, close when relay de-energized, open in energized condition.
Contact material: Ag Alloy (Cd free) or $AgSnO_2$.
Contact rating: 10 A 250 Vac 2500 VA, 10 A 250 Vdc 300 W (resistive load).
DC Load breaking capacity:



Mechanical / Electrical life: 10 * 10^6 / 5 * 10^4 operation, typical.
Bounce time NO / NC contact: 4 / 6 ms, typical.
Frequency response: 10 Hz maximum.

Compatibility:
CE mark compliant, conforms to 94/9/EC Atex Directive and to 2004/108/CE EMC Directive.

Environmental conditions:
Operating: temperature limits - 40 to + 60 °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 ≤ Ta ≤ 60 °C.

Approvals:
BVS 10 ATEX E 114 conforms to EN60079-15,
IECEx BVS 10.0072 X conforms to IEC60079-15.
Russia according to GOST 12.2.007.0-75, R 51330.0-99, R 51330.10-99, R 51330.14-99 2ExnAnCIICT4 X.
Ukraine according to GOST 12.2.007.0, 22782.0, 22782.3, 22782.5 2ExsIIT4 X.
TUV Certificate No. C-IS-204194-01, SIL 2 / SIL 3 conforms to IEC61508.

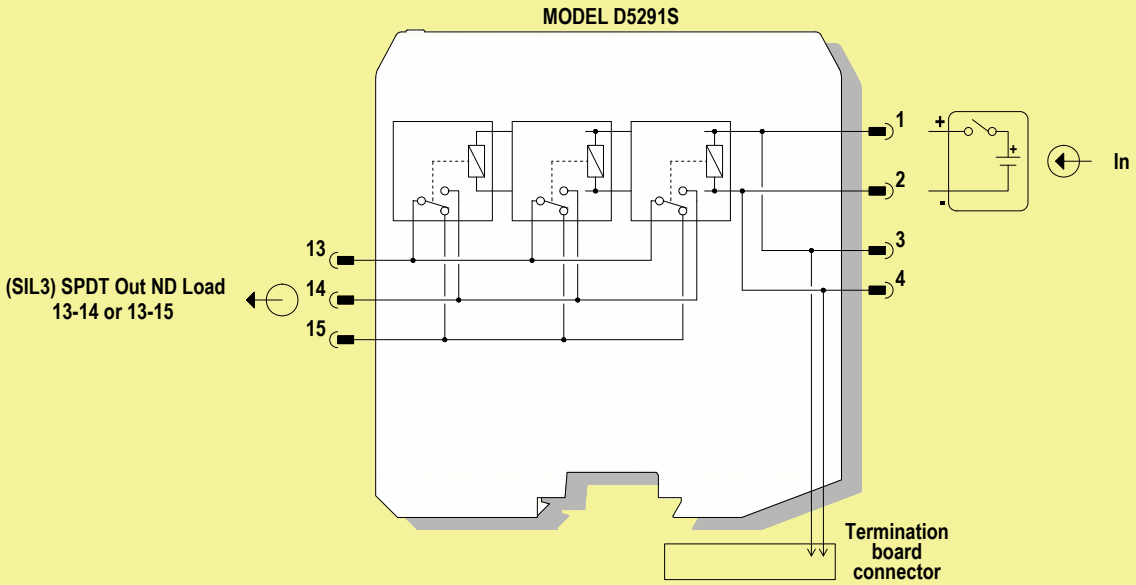
Mounting:
T35 DIN-Rail according to EN50022 or on customized Termination Board.
Weight: about 145 g.
Connection: by polarized plug-in disconnect screw terminal blocks to accomodate terminations up to 2.5 mm^2.
Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 installation.
Protection class: IP 20.
Dimensions: Width 22.5 mm, Depth 123 mm, Height 120 mm.

DIN-Rail accessories: Cover and fix MCHP196

Image:

Function Diagram:

SAFE AREA, ZONE 2 GROUP IIC T4



Relay contact shown in de-energized position
Terminals 13-14 open, terminals 13-15 close.

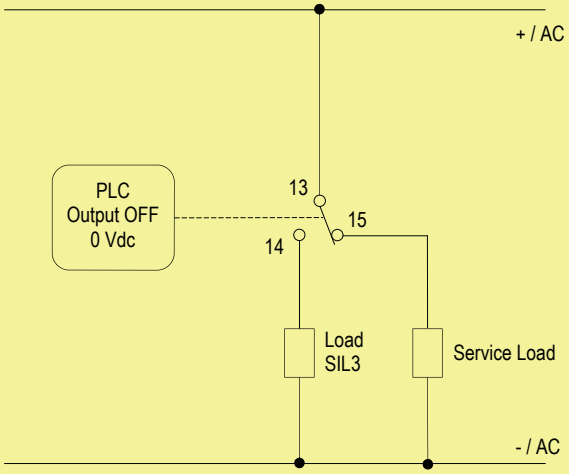
SIL3 Safety Function for ND load (energized in fail safe state) is available at terminal blocks 13-14;
In this case, the Safety Function is met when the relay is energized (closed contact).

SIL3 Safety Function for ND load (energized in fail safe state) is available at terminal blocks 13-15;
In this case, the Safety Function is met when the relay is de-energized (closed contact).

Applications:

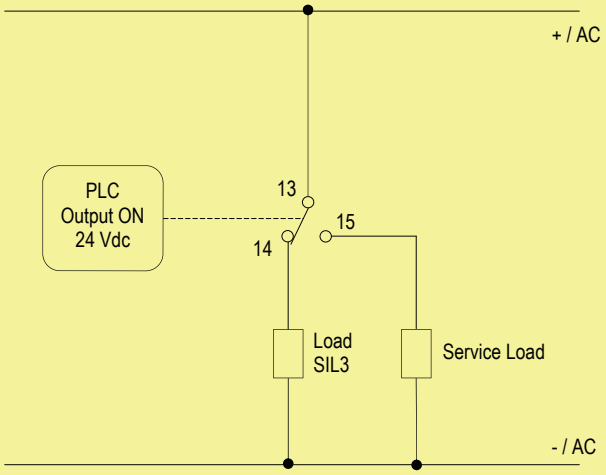
Application for D5291S - SIL Load Normally De-Energized Condition (ND) and Normally De-Energized Relay

Normal state operation



Contact 13-14: in normal operation the relay is de-energized, contact is open, load is de-energized
Contact 13-15: in normal operation the relay is de-energized, contact is closed, service load is energized.

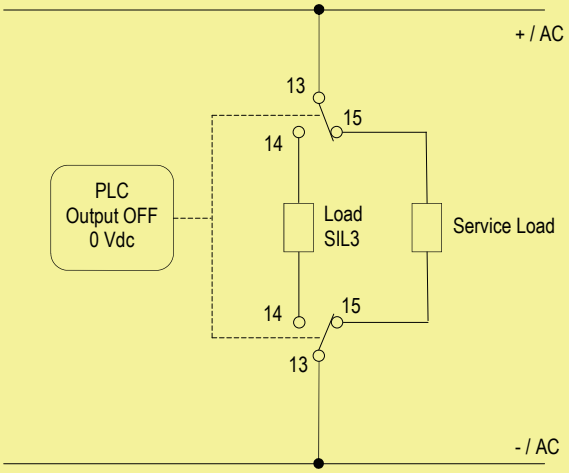
Energized to trip operation



Contact 13-14: the SIL 3 Safety Function is met when the relay is energized, contact is closed, load is energized.
Contact 13-15: relay is energized, contact is open, service load is de-energized.

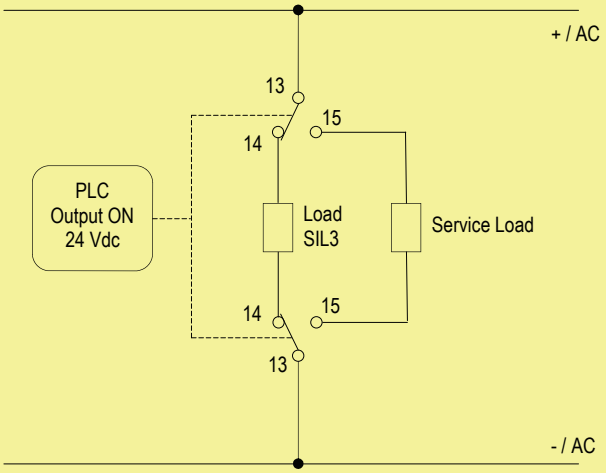
Application for two D5291S - SIL Load Normally De-Energized Condition (ND) and Normally De-Energized Relay with one common driving signal from PLC for the two relays

Normal state operation



Contacts 13-14: in normal operation relays are de-energized, contacts are open, load is de-energized
Contacts 13-15: in normal operation relays are de-energized, contacts are closed, service load is energized.

Energized to trip operation

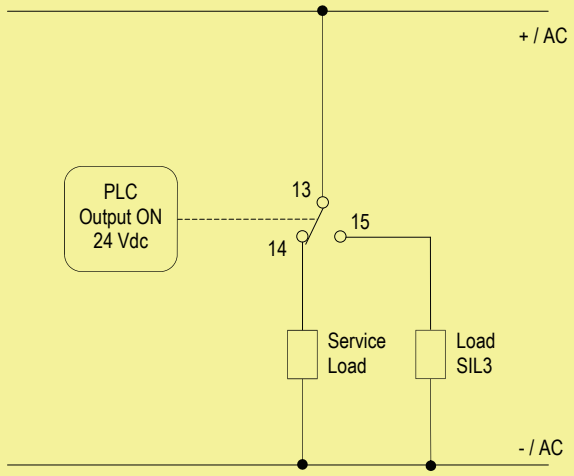


Contacts 13-14: the SIL 3 Safety Function is met when the relays are energized, contacts are closed, load is energized.
Contacts 13-15: relays are energized, contacts are open, service load is de-energized.

Applications:

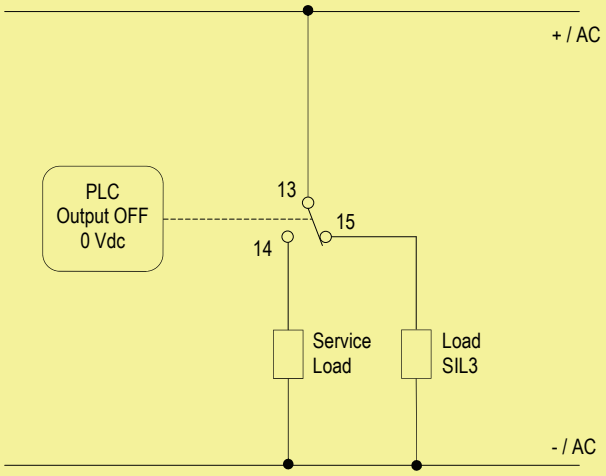
Application for D5291S - SIL Load Normally De-Energized Condition (ND) and Normally Energized Relay

Normal state operation



Contact 13-14: in normal operation the relay is energized, contact is closed, service load is energized
Contact 13-15: in normal operation the relay is energized, contact is open, load is de-energized.

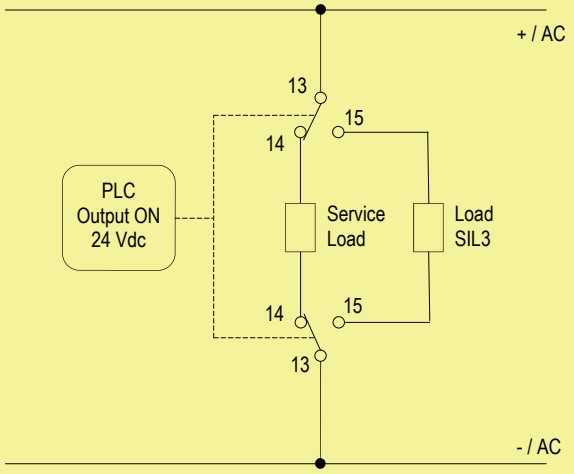
De-energized to trip operation



Contact 13-14: relay is de-energized, contact is open, service load is de-energized.
Contact 13-15: the SIL 3 Safety Function is met when the relay is de-energized, contact is closed, load is energized.

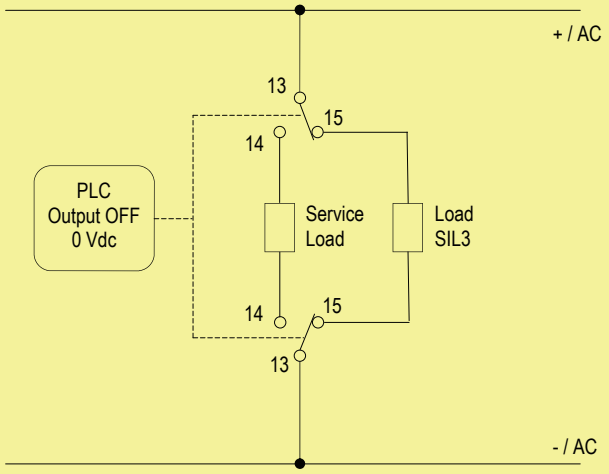
Application for two D5291S - SIL Load Normally De-Energized Condition (ND) and Normally Energized Relay with common driving signal from PLC for the two relays

Normal state operation



Contacts 13-14: in normal operation relays are energized, contacts are closed, service load is energized
Contacts 13-15: in normal operation relays are energized, contacts are open, load is de-energized.

De-energized to trip operation



Contacts 13-14: relays are de-energized, contacts are open, service load is de-energized.
Contacts 13-15: the SIL 3 Safety Function is met when the relays are de-energized, contacts are closed, load is energized.