

Characteristics:

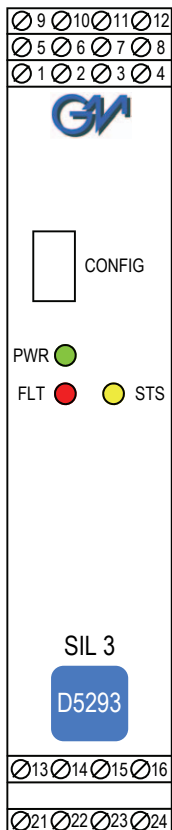
General Description: The D5293S is a relay module suitable for the switching of safety related circuits, up to SIL 3 level according to IEC 61508, for high risk industries. It provides isolation between input and output contacts. Line input monitoring, to allow DCS/PLC line monitoring function, permits 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. Relay coil short circuit is detected from module.

D5293S provides 1+1 SPST contact for normally energized load. SIL 3 Safety Function for NE load (de-energized in fail safe state) is available at Terminal Blocks 13-14; When the driving signal is high (24 Vdc), the relay is energized (normal state), SIL 3 contacts at terminals 13-15 and 14-16 are closed, the load is energized. The safety function is met when the driving signal is low (0 Vdc), the relay is de-energized (fail safe state), SIL 3 contacts at terminals 13-15 and 14-16 are opened, the load is de-energized. Load is isolated from supply on both polarities: +/AC, -/AC.

Load and Line Diagnostic: Line and load short/open circuit detection is provided, with solenoid resistance measurement, even in presence of series connected diodes. A patent pending proprietary resistance measuring technique performs the load short and open circuit diagnosis in de-energized load status, for DC or AC supply systems. Load RMS voltage (before and after its energization) and current are measured from module. Voltage, current and solenoid resistance values are automatically acquired at start up. User configurable limits set the minimum and maximum values of load resistance, supply voltage (DC or AC) and load current consumption. An external resistor can be added to reflect diagnostic conditions on the PLC Input. The resistance value can be tailored according to the PLC requirements. All diagnostic conditions, that detect a fault on line and load, open the fault relay contacts and are also available from a RS485 Modbus output to identify specific fault.

Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area or in Zone 2.

Front Panel and Features:



- SIL 3 according to IEC 61508 for Tproof = 10 / 20 yrs (10 / 20 % of total SIF).
- SIL 2 according to IEC 61508 for Tproof = 20 yrs (10 % of total SIF).
- PFDavg (1 year) 7.01 E-06, SFF 99.60 % for NE Load.
- Installation in Zone 2.
- Line input monitoring.
- Relay coil short circuit detection.
- Line and Load short/open circuit detection.
- Solenoid resistance measurement even in presence of serial connected diodes (proprietary patent pending resistance measuring technique).
- RMS measurement of voltage (before and after load energization) and current supplied to the load via relay contacts.
- Automatic acquisition of voltage, current and solenoid resistance values at start up.
- 4 A SIL 3 contacts for NE load.
- 6 A inrush current at 24 Vdc / 250 Vac.
- Input/Output/Supply isolation.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- ATEX, IECEx, Russian and Ukrainian Certifications.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without Power Bus, or customized Termination Boards.

Ordering Information:

Model: D5293S

Operating parameters are programmable from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software.

Power Bus and DIN-Rail accessories:

Connector JDFT050 Cover and fix MCHP196
Terminal block male MOR017 Terminal block female MOR022

Technical Data:

Supply: 24 Vdc nom (21.6 to 27.6 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.
Current consumption @ 24 V: 50 mA typical, with channel energized and no fault.
Power dissipation: 1.2 W typical.

Isolation (Test Voltage): Output/Input 2.5 KV; Output/Supply 2.5 KV; Output/Fault Outputs 2.5 KV; Output/RS485 Modbus 2.5 KV; Input/Supply 500 V; Input/Fault Output 1 500 V; Input/Fault Output 2 2.5 KV; Input/RS485 Modbus 500 V; Supply/Fault Output 1 500 V; Supply/Fault Output 2 2.5 KV; Supply/RS485 Modbus 500 V.

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

Line input monitoring: to allow DCS/PLC line monitoring function (pulse test).

Current consumption @ 24 V: 45 mA with relay energized, typical.

Power dissipation: 1.1 W with 24 V input voltage, relay energized, typical.

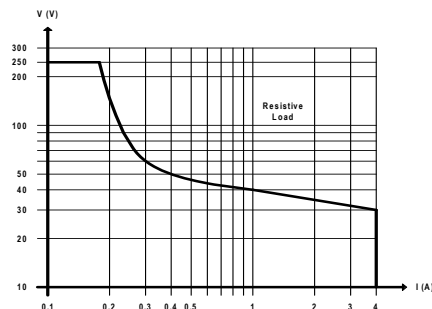
Output: voltage free 1 + 1 SPST relay contact at terminals 13-15 and 14-16, opens when relay de-energized (fail safe state), close in energized condition.

Contact material: Ag Alloy (Cd free) or AgSnO₂.

Contact rating: 4 A 250 Vac 1000 VA, 4 A 250 Vdc 120 W (resistive load).

Contact inrush current: 6 A at 24 Vdc, 250 Vac.

DC Load breaking capacity:



Mechanical / Electrical life: $5 * 10^6 / 3 * 10^4$ operation, typical.

Bounce time NO / NC contact: 3 / 8 ms, typical.

Frequency response: 10 Hz maximum.

Fault detection: load and line short/open circuit monitoring

Short output detection: programmable load resistance (30 Ω to 5 K Ω typical).

Open output detection: programmable load resistance (30 Ω to 5 K Ω typical).

Fault signaling: voltage free NE 1 + 1 SPST relay contacts (closed in normal status), output de-energized (contacts opened) in fault condition.

Fault 1 output rating: 500 mA 30 Vac 15 VA, 500 mA 50 Vdc 25 W (resistive load).

Fault 2 output rating: 3 A 250 Vac 750 VA, 3 A 125 Vdc 120 W (resistive load).

Response time: 1 sec typical.

Modbus Output: measure data, load and line diagnostic monitoring.

Modbus RTU protocol up to 115.2 Kbit/s with RS-485 connection on terminal blocks and Power Bus connector.

Terminating impedance: 100 Ω DIP-switch selectable, pull-up and pull-down resistor DIP-switch selectable in addition to termination resistor.

Transmission speed: 4.8, 9.6, 19.2, 38.4, 57.6, 115.2 Kbit/s.

Transmission cable length: ≤ 1200 m up to 93.75 Kbit/s, ≤ 1000 m up to 115.2 Kbit/s.

Compatibility:

CE 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 $^{\circ}$ C, relative humidity 95 %, up to 55 $^{\circ}$ C.

Storage: temperature limits - 45 to + 80 $^{\circ}$ C.

Safety Description:



ATEX: II 3G Ex nA nC IIC T4 Gc,

IECEx: Ex nA nC IIC T4 Gc

non-sparking electrical equipment.

-40 $^{\circ}$ C \leq Ta \leq 60 $^{\circ}$ 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 2ExnAnCIIC T4 X.

Ukraine according to GOST 12.2.007.0, 22782.0, 22782.3, 22782.5 2ExsIIT4 X.

SIL 2 / SIL 3 conforms to IEC61508.

Mounting: T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.

Weight: about 170 g.

Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

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.

Programming:

The module is fully programmable to set the operation parameters from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software. Measured values and diagnostic alarms can be read on both serial configuration or Modbus output line.

Measuring and Set limits:

- working voltage and load characteristics to indicate normal working condition. Parameters are:
- Line Voltage value from 10 to 250 Vdc or Vac.
 - Load Current for energized condition.
 - Load Resistance for de-energized condition.

Type of Faults:

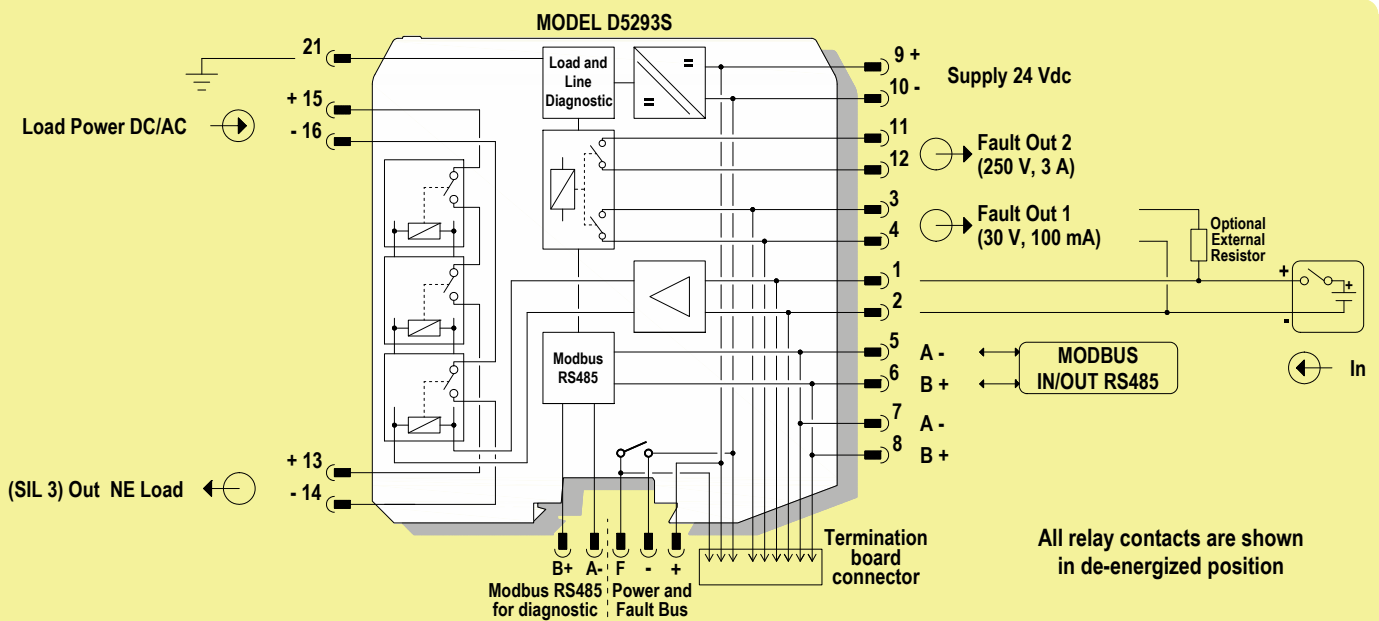
- programmability of which type of faults can deactivate the diagnostic relay output. Each of the fault condition can be programmed to de-energize the fault relay output. Faults are:
- Relay coil short circuit.
 - Line Voltage value out of boundary range.
 - Load Current value, in energized condition, out of boundary range.
 - Load Resistance value, in de-energized condition, out of boundary range.

Image:

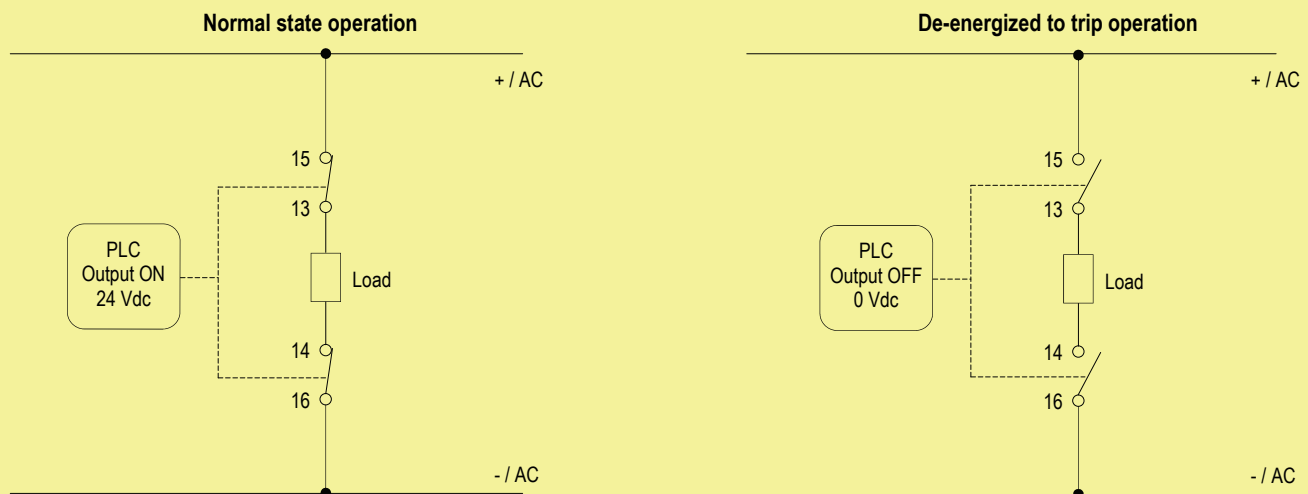


Function Diagram:

SAFE AREA, ZONE 2 GROUP IIC T4



Application for D5293S - SIL 3 Load Normally Energized Condition (NE)



Contacts 13-15 and 14-16: in normal operation the relay is energized, contacts are closed, load is energized.

Contacts 13-15 and 14-16: the SIL 3 Safety Function is met when the relay is de-energized, contacts are open, load is de-energized.