

G.M. International Process Safety Relays



Know what kind of process safety relay you need. Understanding these two commonly-used terms will help you determine the correct safety relay for your process application.

DTT (De-energized To Trip)

Also known as ESD (Emergency Shutdown) and NE (Normally Energized)

Purpose: Brings a process to a safe state by de-energizing equipment (pumps, valves, compressors) when a hazardous condition is detected.

Load Type: Typically NE (Normally Energized). The relay coil is held energized during normal operation; tripping de-energizes the output.

Fail-Safe Behavior: Loss of power = trip. The safe state is reached automatically on power or signal failure.

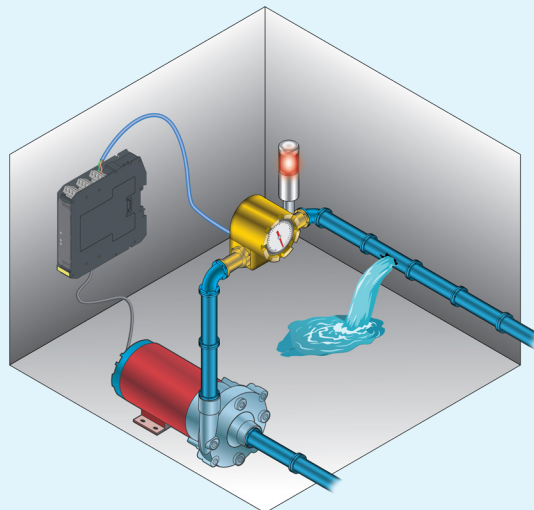
Typical Applications: HIPPS (High Integrity Pressure Protection), wellhead control, pipeline isolation, compressor shutdown.

Relay Mode: N.C. contacts open on trip; load disconnected on both supply lines for maximum isolation.

*Application
Example:*

Powering a pump

In the event of an emergency, the pump must shut down to avoid pumping hazardous material into a room.



ETT (Energized To Trip)

Also known as F&G (Fire and Gas Detection) and ND (Normally De-Energized)

Purpose: Detects fire, smoke, or toxic/flammable gas and activates alarm or suppression systems — often energizing outputs to trigger a response.

Load Type: Typically, ND (Normally De-Energized). The relay is not activated during normal operation; a detection event energizes the output to trigger alarms or deluge.

Fail-Safe Behavior: Loss of power results in a non-activated state; a nuisance trip could mask real events, so diagnostics such as Line Fault Detection (LFD) are critical.

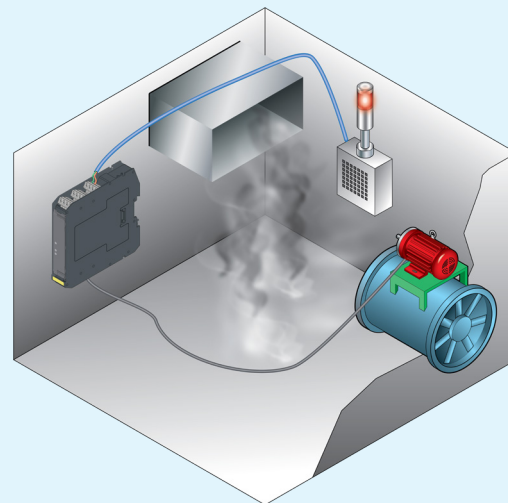
Typical Applications: Deluge valve actuation, PA/GA (Public Address/General Alarm), fire suppression panel interfaces, HVAC isolation.

Relay Mode: N.O. contacts close on detection event; models with LFD (D5096S) continuously monitor wiring for open/short-circuit faults.

*Application
Example:*

Powering an exhaust fan

In the event of an emergency, the exhaust fan must turn on to bring fresh air into a room.



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**D5096S****D5290S**

Overview

GMI's D5000 Series safety relay modules provide up to SIL 3 certified relay output switching for safety instrumented systems (SIS) in oil and gas, petrochemical, marine, pharmaceutical, and process industries.

All modules mount on standard DIN rail, offer complete input/output galvanic isolation.

Features

- Up to 5A (or 10A) functional switching current
- NE (Normally Energized) and ND (Normally De-energized) configurations
- TÜV certified to be up to SIL 3
- DCS/PLC pulse testing compatible (no flickering)
- Dual-channel LFD (Line Fault Detection) on select models
- Suitable for indoor and outdoor use -40 to +70 °C [-40 to 158 °F]
- Installation in Zone 2 / Division 2 hazardous areas
- G3 Conformal coating for use in harsh environment
- Gold-plated relay contacts

G.M. International Process Safety Relays Selection Guide

Part Number	Price	Relay Type	Control Voltage	Safety Output Type	Safety Contact Load Current	Monitoring Output Type	Drawing
<u>D5090S</u>	\$194.00	De-energized to safe	Loop powered	(1) N.O.	5A	(1) N.C.	<u>PDF</u>
<u>D5091S</u>	\$194.00	Energized to trip	Loop powered	(1) N.C. or (1) N.O.	5A	(1) N.O. or (1) N.C.	<u>PDF</u>
<u>D5094S</u>	\$238.00	De-energized to safe OR energized to trip	Loop powered	(1) N.O.	5A	(1) N.C.	<u>PDF</u>
<u>D5096S</u>	\$434.00	De-energized to safe OR energized to trip with line monitoring and diagnostics	24 VDC	(1) N.O.	5A	(1) N.C.	<u>PDF</u>
<u>D5290S-078</u>	\$227.00	De-energized to safe OR energized to trip	Loop powered	(4) N.O.	5A	(2) N.C.	<u>PDF</u>
<u>D5290S</u>	\$202.00	De-energized to safe	Loop powered	(1) N.O.	10A	(1) N.C.	<u>PDF</u>
<u>D5291S</u>	\$202.00	Energized to trip	Loop powered	(1) N.C. or (1) N.O.	10A	(1) N.O. or (1) N.C.	<u>PDF</u>

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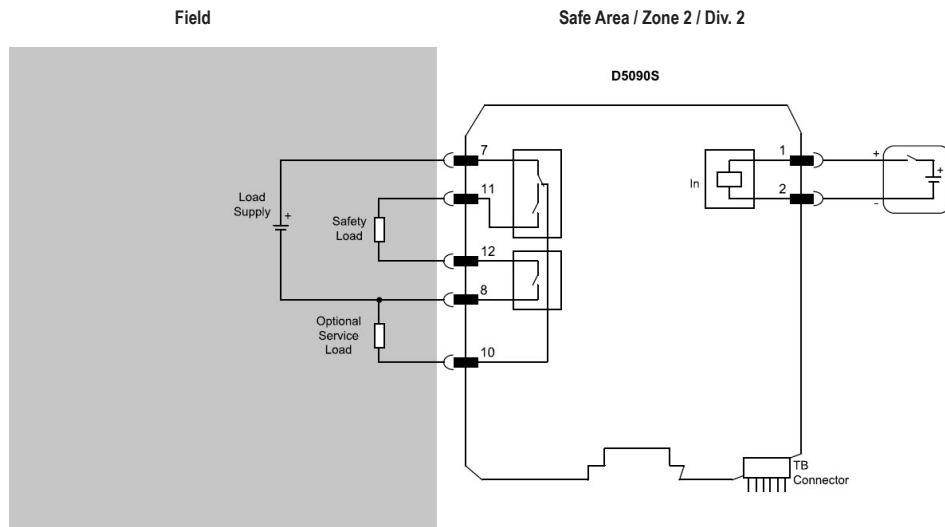
G.M. International Process Safety Relays Specifications							
	D5090S	D5091S	D5094S	D5096S	D5290S-078	D5290S	D5291S
General Specifications							
Operating Temperature	-40 to +70 °C [-40 to +158 °F]				-40 to +60 °C [-40 to +140 °F]		
Degree of Protection	IP20						
Housing	Polyamide 66						
Weight	125g [4.41 oz]	125g [4.41 oz]	125g [4.41 oz]	125g [4.41 oz]	145g [5.11 oz]	145g [5.11 oz]	165g [5.82 oz]
Agency Approvals and Standards	UL, ATEX, FM, IECEx, TÜV, Maritime (DNV)		UL, ATEX, IECEx, TÜV, Maritime (DNV)		FM, ATEX, IECEx, TÜV, Maritime (DNV)		
Vibration Location Class Per DNV	A						
EMC Location Class Per DNV	A						
Humidity Location Class Per DNV	B						
Temperature Location Class Per DNV	D						
Enclosure Location Class Per DNV	Required protection according to DNV Rules shall be provided upon Installation on board						
Wire Size	24 to 14 AWG [0.25 to 2.5 mm²]						
Torque Specifications For Wire	0.5–0.6 N•m						
Operating Voltage Range	Powered by input (loop powered)			18–30 VDC	Powered by input (loop powered)		
Safety Data per IEC/EN 61508							
Safety Integrity Level (SIL) Systematic Capability (SC)*	Up to SIL3 / SC 3	Up to SIL3 / SC 3	Up to SIL3 / SC 3	Up to SIL3 / SC 3	Up to SIL3 / SC 3	Up to SIL3 / SC 3	Up to SIL3 / SC 3
HFT*	0	0	0	0	0	0	0
Input Specifications							
Nominal Voltage	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
Voltage Range	21.6–27.6 VDC	21.6–27.6 VDC	21.6–27.6 VDC	21.6–27.6 VDC	21.6–27.6 VDC	21.6–27.6 VDC	21.6–27.6 VDC
Maximum Consumption (At 24 VDC)	45 mA	45 mA	45 mA	45 mA	60 mA	60 mA	60 mA
Power Dissipation (At 24 VDC)	1.1W	1.1W	1.1W	1.1W	1.5W	1.5W	1.5W
Output Specifications							
Electrical Contact Life	30,000 operations				50,000 operations		
Mechanical Life	5,000,000 operations				10,000,000 operations		
Contact Type	Silver [Ag] alloy (cadmium [Cd] free) gold plated				Silver [Ag] alloy (cadmium [Cd] free) or silver tin oxide [AgSnO ₂]		
Operate Delay	55 ms	55 ms	30 ms	30 ms	55 ms	50 ms	40 ms
Release Delay	30 ms	30 ms	30 ms	30 ms	25 ms	15 ms	25 ms
Contact Rating	5A @ 250 VAC, 1250 VA 5A @ 28 VDC, 140W 180 mA @ 250 VDC				5A @ 250 VAC, 1250 VA 5A @ 35 VDC, 175W 250 mA @ 250 VDC	10A @ 250 VAC, 2500 VA; 10A @ 30 VDC, 300W 300 mA @ 250 VDC	
Contact Min Switching Current	1 mA				100 mA		
Contact Inrush Current	6A @ 24 VDC, 250 VAC				8A @ 30 VDC, 250 VAC	16A @ 24 VDC, 250 VAC	

* Safety calculations are dependent on specific application. See manual for calculations of example applications.

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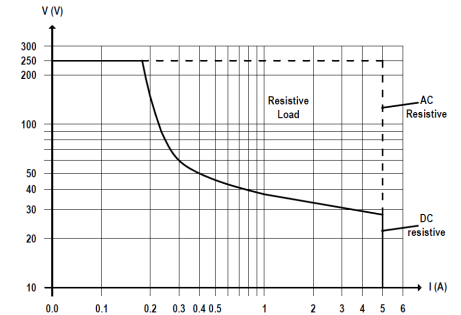


Connection Diagram (D5090S)

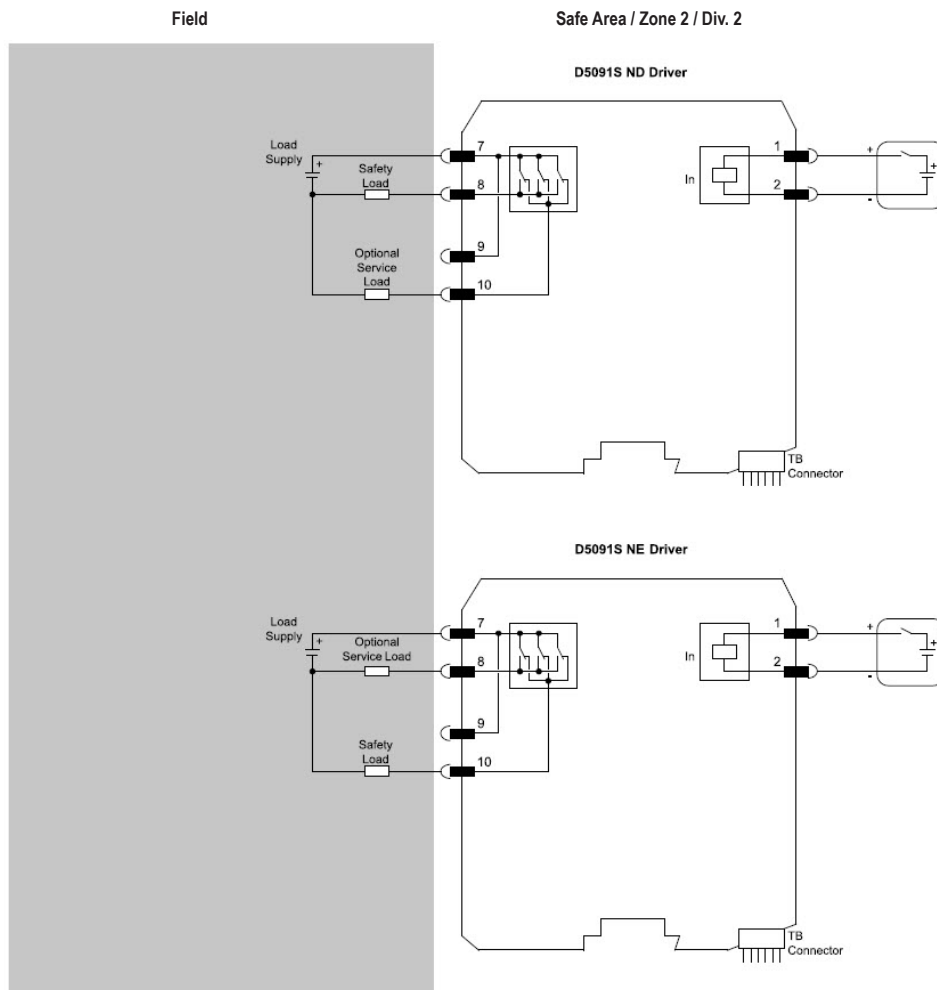


NOTE: The **D5090S** process safety relay is configurable using DIP switches located under a removable panel on the side of the unit. For details on how to configure these DIP switches, please consult the product manual.

AC / DC Load breaking capacity:

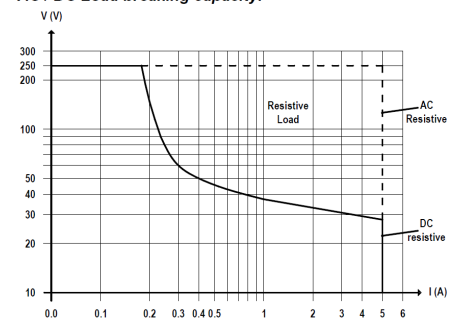


Connection Diagram (D5091S)



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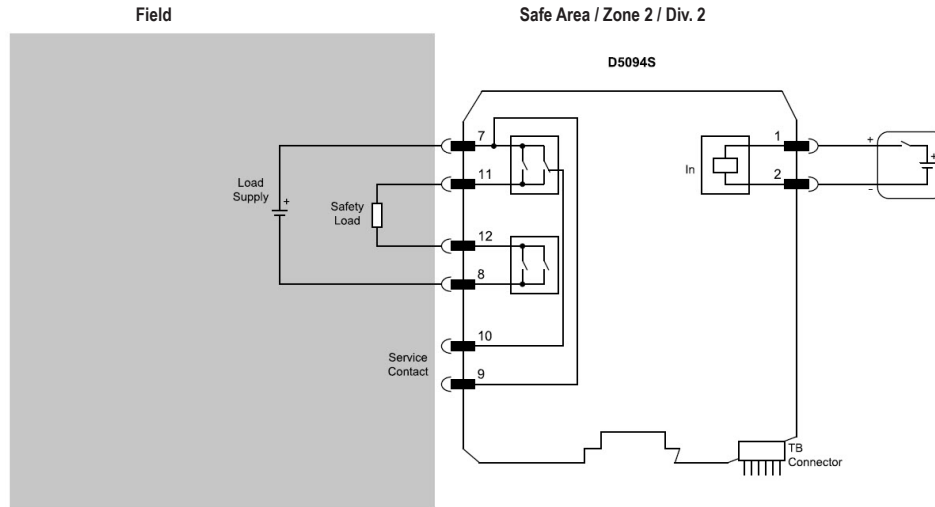
AC / DC Load breaking capacity:



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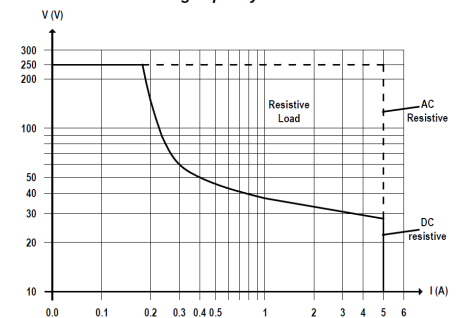


Connection Diagram (D5094S)

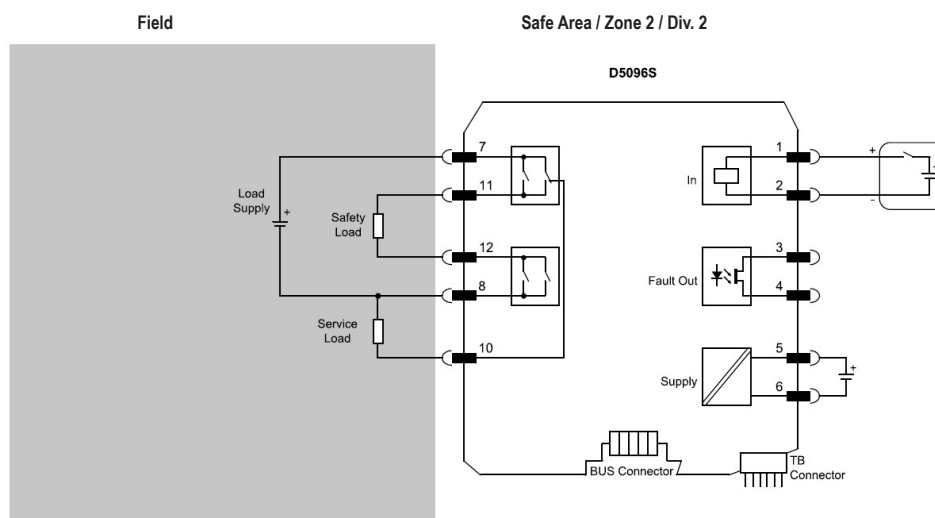


NOTE: The D5094S process safety relay is configurable using DIP switches located under a removable panel on the side of the unit. For details on how to configure these DIP switches, please consult the product manual.

AC / DC Load breaking capacity:

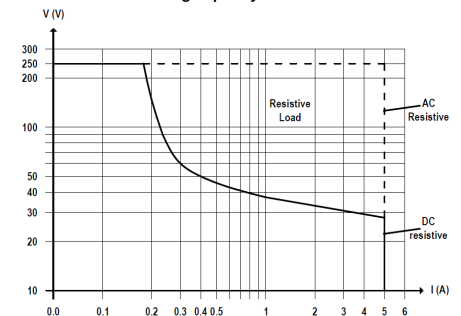


Connection Diagram (D5096S)



NOTE: The D5096S process safety relay is configurable using DIP switches located under a removable panel on the side of the unit. For details on how to configure these DIP switches, please consult the product manual.

AC / DC Load breaking capacity:



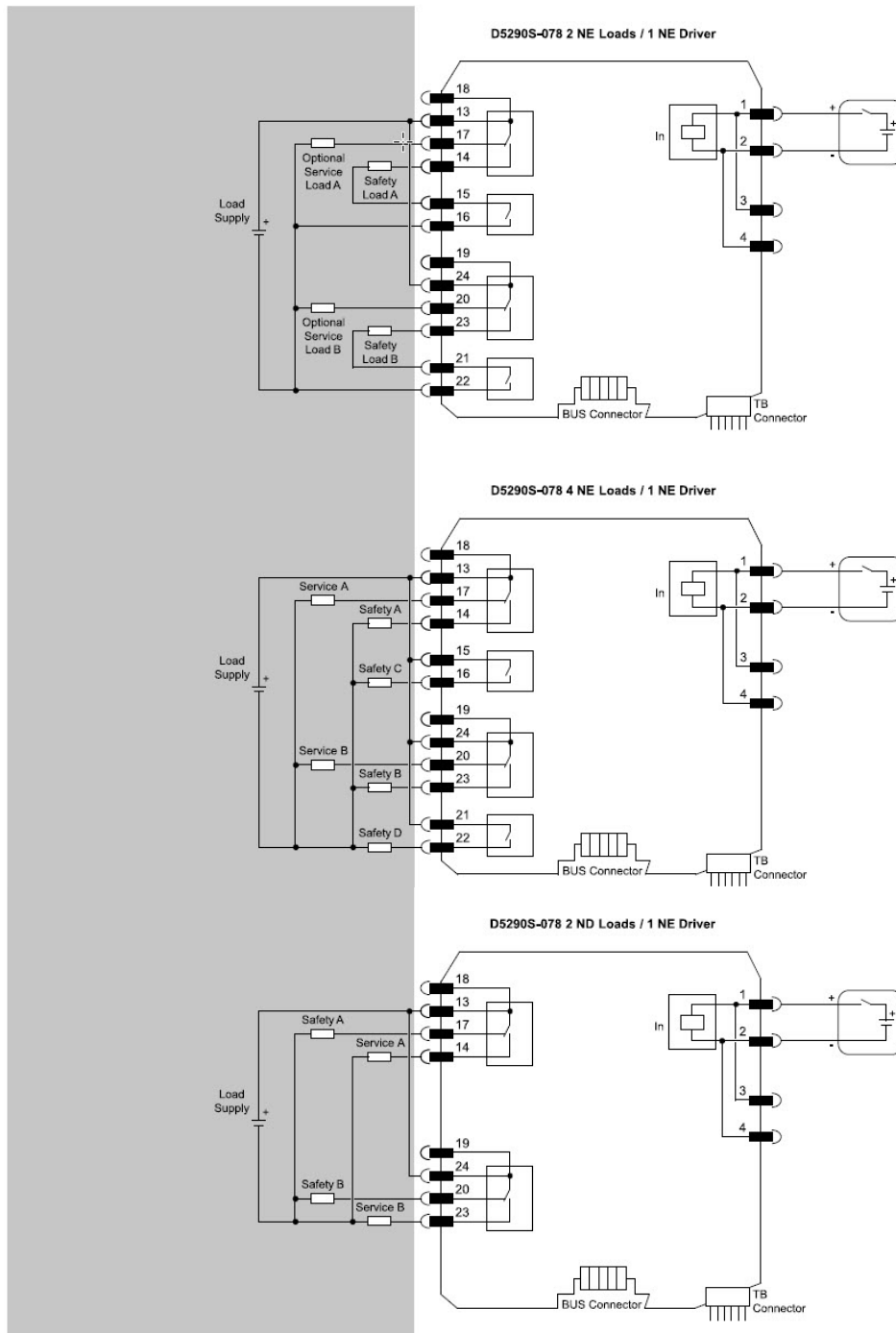
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Connection Diagrams (D5290S-078)

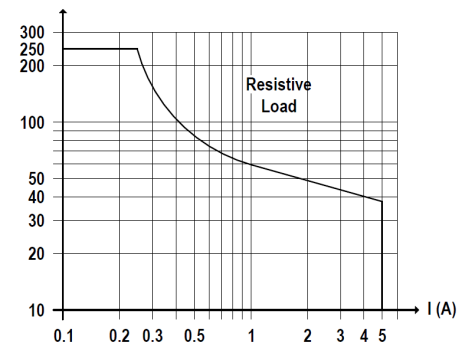
Field

Safe Area / Zone 2 / Div. 2



NOTE: The **D5290S-078** process safety relay is configurable using DIP switches located under a removable panel on the side of the unit. For details on how to configure these DIP switches, please consult the product manual.

DC Load breaking capacity:
V (V)



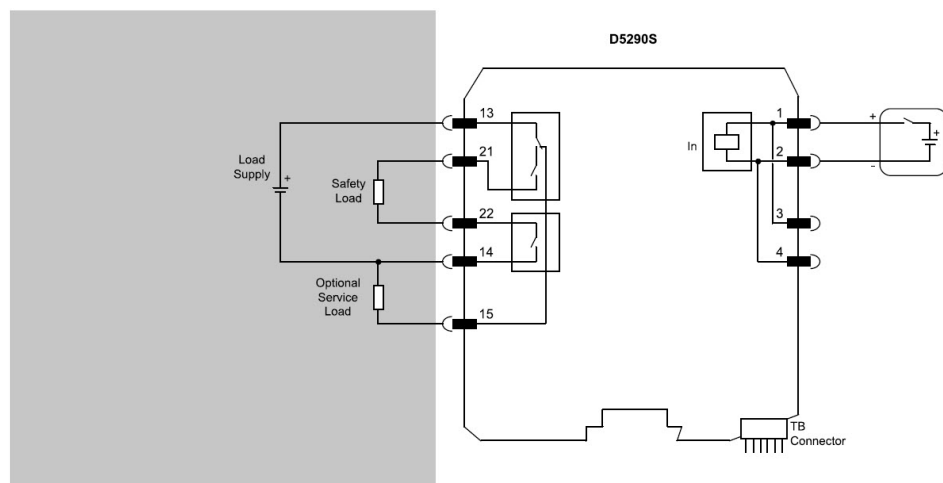
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Connection Diagram (D5290S)

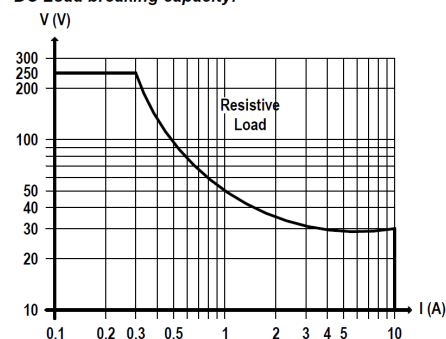
Field

Safe Area / Zone 2 / Div. 2



NOTE: The **D5290S** process safety relay is configurable using DIP switches located under a removable panel on the side of the unit. For details on how to configure these DIP switches, please consult the product manual.

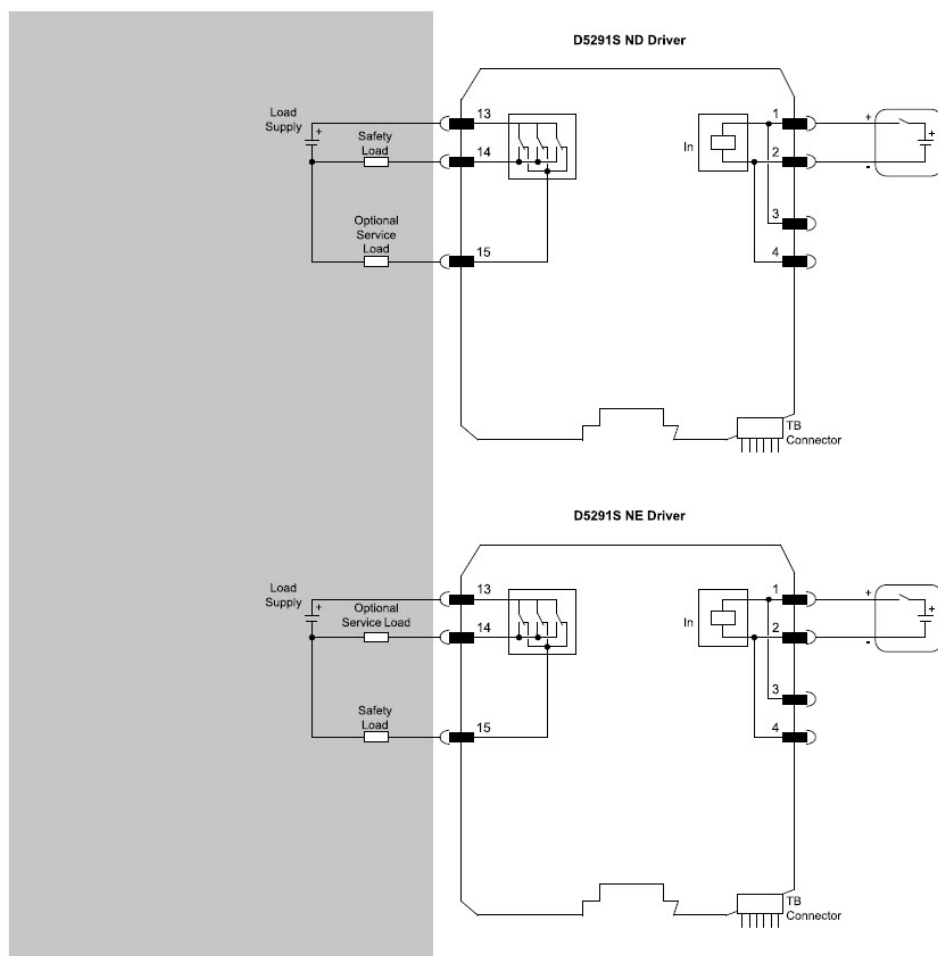
DC Load breaking capacity:



Connection Diagrams (D5291S)

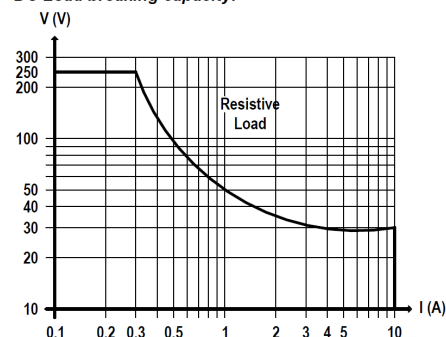
Field

Safe Area / Zone 2 / Div. 2



NOTE: The **D5291S** process safety relay is configurable using DIP switches located under a removable panel on the side of the unit. For details on how to configure these DIP switches, please consult the product manual.

DC Load breaking capacity:



Safety Products



Warning: Safety products sold by AutomationDirect are Safety components only. The purchaser/installer is solely responsible for the application of these components and ensuring all necessary steps have been taken to assure each application and use meets all performance and applicable safety requirements and/or local, national and/or international safety codes as required by the application. AutomationDirect cannot certify that our products, used solely or in conjunction with other AutomationDirect or other vendors' products, will assure safety for any application. Any person using or applying any products sold by AutomationDirect is responsible for learning the safety requirements for their individual application and applying them, and therefore assumes all risks, and accepts full and complete responsibility, for the selection and suitability of the product for their respective application.

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