

SIL 2/3 Relays for all applications, with or without Line & Load Diagnostics

Product presentation



SIL Certified Safety Relays

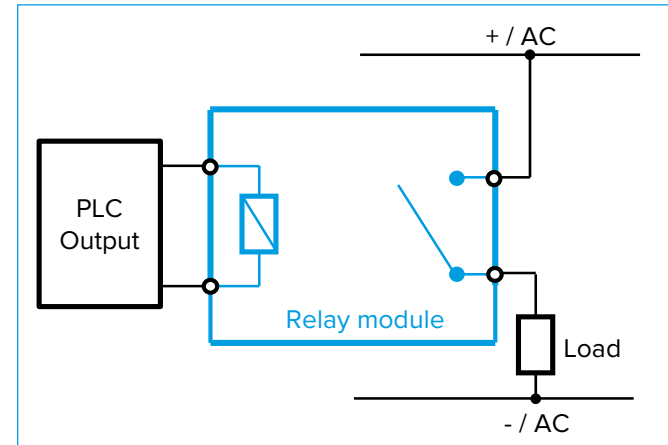
- A standard relay CANNOT be used in a SIF!
- A **SIL** certified relay (Safety Relay) is a relay with a known and guaranteed ability to perform a given **Safety Function**
- Safety Function aim is to reach a specific **Safe State** on demand (i.e. open a relief valve or activate a Fire Extinguishing System)
- Most of the time (i.e ESD, HIPPS, BMS etc...) the Safety Function is **NE** (Normally Energized) → **DTS** (De-Energize To Safety)
- In F&G/FF applications most of the Safety Functions are **ND** (Normally De-Energized) → **ETS** (Energize To Safety)

Typical applications

On the field side a generic load is connected to the relay module, together with its power supply. The contacts are activated by a DCS/PLC DO.

Typical Safety Relays applications:

- Solenoid Valves (SOV) in ESD and Fire & Gas systems
- Beacons, Horns, Beamers and other signaling devices
- Burner Management Systems (BMS)
- AC or DC Motors



Safety Relays for any critical application

Any time a relay is required and must be used in a **SIF, it must conform and adhere to IEC 61508** and to the relevant industry standard (i.e. 61511).

Typical cases :

- Controller cannot meet power requirement (V or A)
- Multiplication of contacts is required
- Controller Safety Function must be inverted

SIL certified relays are not used exclusively in Oil & Gas or Petrochemical industries; they are also a **must in many other industries:**

- Railways
- Cars and Lift
- Power Distribution
- Any time a failure of the relay can cause a serious accident

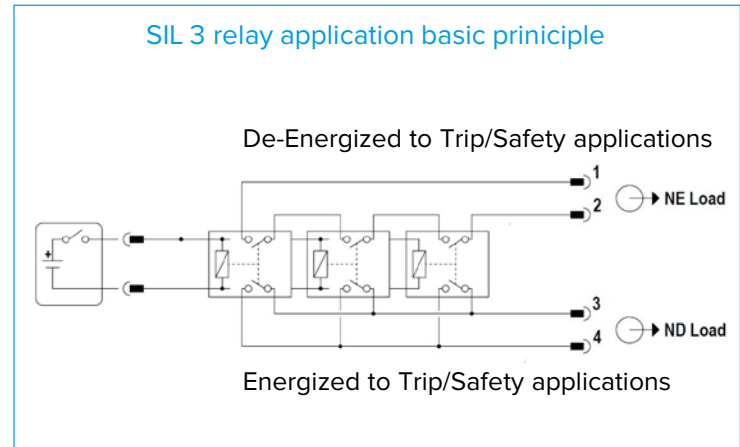
Safety Functions

Safety Functions can be basically divided in two main groups:

- ETS, Energize to Safety
- DTS, De-Energize to Safety

From which **four operating conditions:**

- NE Relay Coil – NE Load (NO Relay Contacts)
- ND Relay Coil – ND Load (NO Relay Contacts)
- NE Relay Coil - ND Load (NC Relay Contacts)
- ND Relay Coil – NE Load (NC Relay Contacts)



SIL 3 Safety Relays with or without Line and Load Monitoring Function



STRENGTHS

- **Reduced Foot Print:** High Density: 12,5/22,5 mm per Ch.
- **Full 3rd Party Certification:** Coil-to-Contact SIL2/3 TÜV certified
- **True Reliability:** Compatible to DO Card LM Pulses
- **Reduced Space/Eng. Costs:** Smart Line/Load Monitoring with transparent Fault Indication (no additional contacts)
- **Lower Ownership/Maintenance Cost:** T-proof Times: 10/20 years
- **Reduced Spare Inventory:** Universal Mounting: DIN-Rail and Termination Boards
- **Higher Reliability In & Outdoor:** Certified -40° to + 70° C
- **Totally independent Dual Ch.:** Dual circuits
- **Full Application Coverage:** Modules available with 5 & 10 Amps Contact, NE/ND application

Manufacturing excellence

ENCLOSURE

Dimensions

A scalable dimension; 12,5 mm width optimizes cabinet space

Density

Up to 6 mm per channel

Foot print

160 Channels in only 1 mt

Installation

Also available for Universal and Customized Termination Board



Manufacturing excellence

WIDE TEMPERATURE RANGE

Operating temperature certified from -40°C to $+70^{\circ}\text{C}$

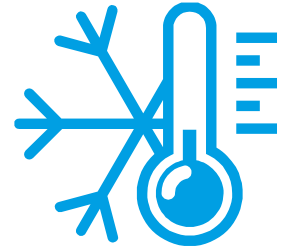
Very high reliability in extreme environment applications.

Reduced cabinet dimensions, require less ventilation.

Longer lifetime

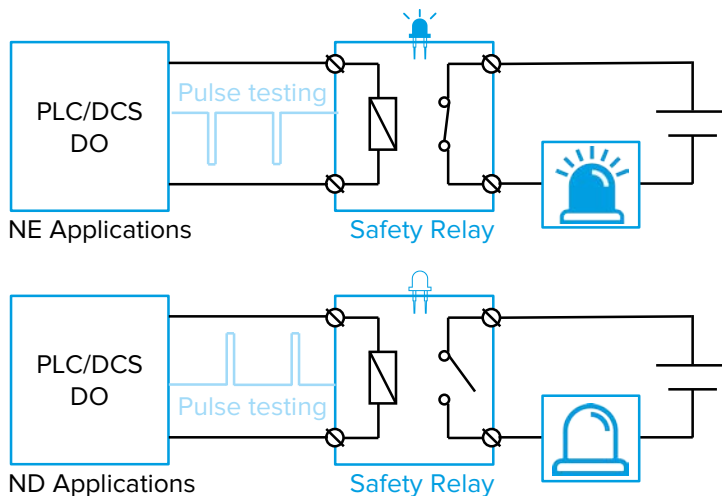
Capability to withstand higher temperatures, improves the lifetime in normal conditions (i.e. 30°C).

Two devices with different temperature rating (i.e. $+60^{\circ}\text{C}$ and $+70^{\circ}\text{C}$) operating in the same environment (i.e. $+50^{\circ}\text{C}$) have different life expectancy; where the lower rated is significantly shorter.



LM pulses compatibility

Line Monitoring Pulses are generated by DO cards to verify the integrity of the Line and Load, in either Energized or De-Energized State.



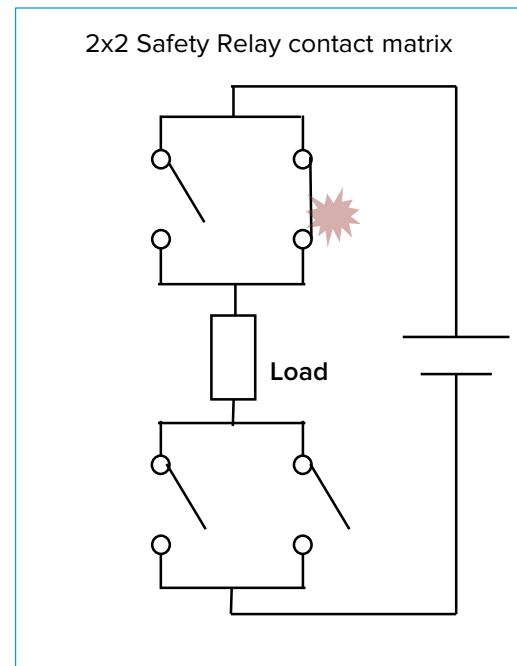
Designed to prevent

- Contact chattering
- Spurious load activation/deactivation
- Premature damage of the Relay unit.

Safety and increased availability

Thanks to specific contact arrangement, GMI relay modules maintain higher level of safety while improving process availability.

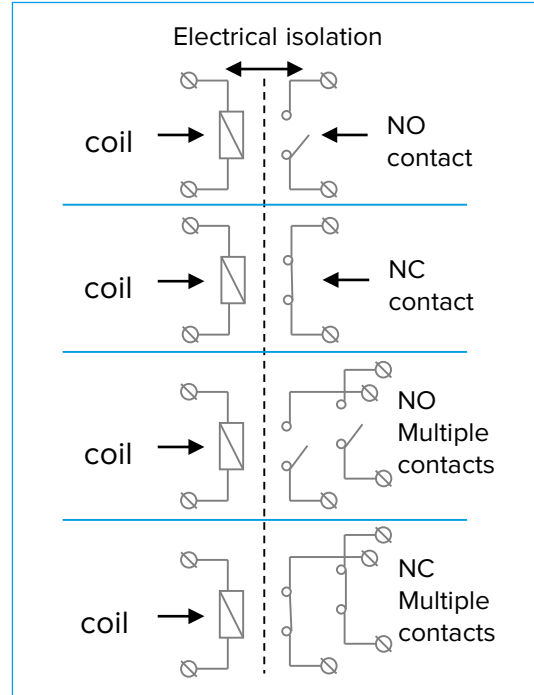
- **SIL 3 safety:** one relay fault is not sufficient for a dangerous failure
- **Availability:** one relay fault is not sufficient for a spurious trip of the load



A wide range of choices

Relay coils can be:

- 24 Vdc
- 48 Vdc
- 110 Vdc
- 115 Vac
- 230 Vac



Our contacts can be:

- 3 A
- 5 A
- 10 A

Safety Relays overview

D5090/91, D5290/91,
D5094/95,



General tech features



Typical

- Input: 24 Vdc **reverse polarity protected**
- Isolation (Test Voltage): Input / Output **2.5 KV**
- Up to **SIL 3**
- Up to **20 years T-Proof**
- Installation Safe Area or **Zone 2**
- **Single / Dual** Channel
- Driven Load: **NE / ND**
- Contact Arrangement: **NO / NC**

Also available...

- **Input Voltage:** 48 Vdc, 110 Vdc, 115 Vac, 230 Vac

Typical Example

D5090/91



D5090S

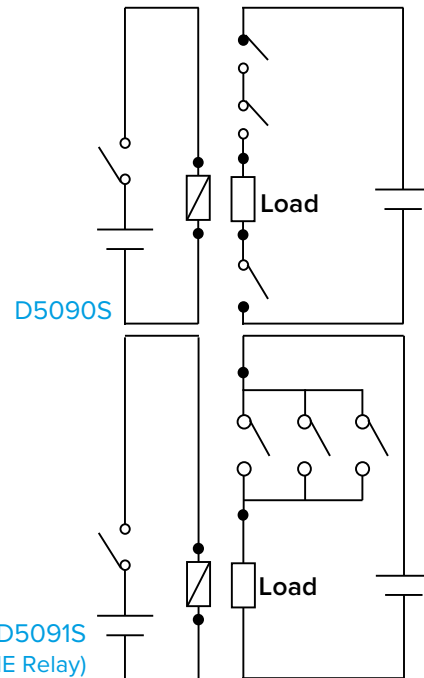
- NE Load – NO Contact Relay
- Two phase interruption

D5091S

- ND Load – NO/NC Contact Relay
- ND/NE Relay Condition

Contact rating:

- 5 A 250 Vac (1250 VA)
- 5 A, 250 Vdc (max 140W)



Typical Example

D5290/91



D5290S

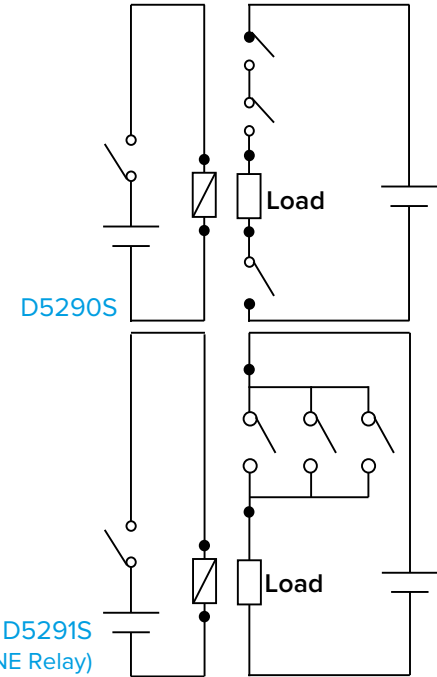
- NE Load – NO Contact Relay
- Two phase interruption

D5291S

- ND Load – NO/NC Contact Relay
- ND/NE Relay Condition

Contact rating:

- 10 A 250 Vac 2500 VA,
- 10 A, 250 Vdc (Max 300 W)



Typical Example

D5094/95



D5094S

- NE/ND Loads – NO Contact Relay

D5095S

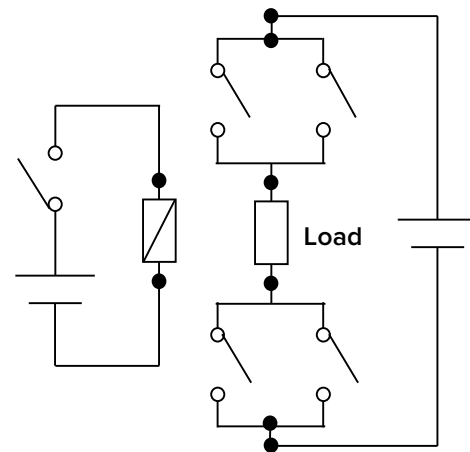
- NE/ND Loads – NC Contact Relay

Contact rating:

- 5 A 250 Vac 1250 VA,
- 5 A, 250 Vdc (max 140W)

High Process Availability:

- Relay Contact Matrix



Smart Relays overview

D5096/97, D5294/95



General tech features



- Input: 24 Vdc **reverse polarity protected**
- Isolation (Test Voltage): Input / Output **2.5 KV**
- Up to **SIL 3**
- up to **20 years T-Proof**
- Installation Safe Area or **Zone 2**
- In-built **Full Diagnostics** of Line & Load for both NE or ND Applications:
 - Open & Short Circuit
 - Power Supply Failure
 - Ground Leakage (where applicable)
 - Internal Failure (where applicable)
- **Transparent Diagnostics** for LM functionality.
- **Remote Alarm Function through** contacts and/or Modbus (where applicable)

Safety relays with integrated line & load diagnostics

Load config	NE/ND		NE/ND		NE	NE/ND	
	D5094S	D5095S	D5096S	D5097S	D5293S	D5294S	D5295S
Load earth leakage	-	-	-	-	-	•	•
Modbus	-	-	-	-	•	•	•
Configurable thresholds	-	-	-	-	•	•	•
Internal coil integrity	-	-	-	-	•	•	•
Line open & short circuit	-	-	•	•	•	•	•
Load open & short circuit	-	-	•	•	•	•	•
Load supply monitoring	-	-	•	•	•	•	•

Typical Example

D5096/97



D5096S

- NE/ND Loads – NO Contact Relay

D5097S

- NE/ND Loads – NC Contact Relay

Contact rating:

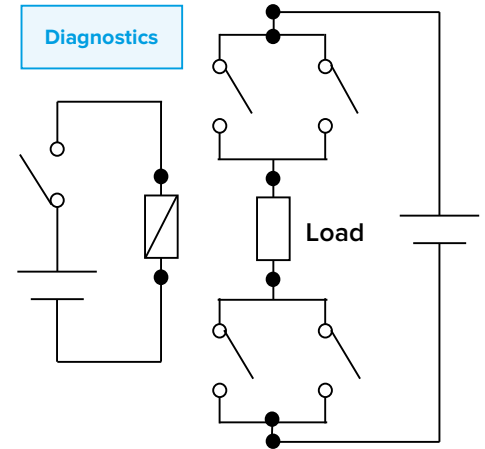
- 5 A 250 Vac 1250 VA
- 5 A, 250 Vdc (max 140W)

High Process Availability:

- Relay Contact Matrix

Diagnostics capability

- Transparent Line Monitoring
- Full Line & Load Diagnostics



Typical Example D5294/95



D5294S

- NE/ND Loads – NO Contact Relay

D5295S

- NE/ND Loads – NC Contact Relay

Contact rating:

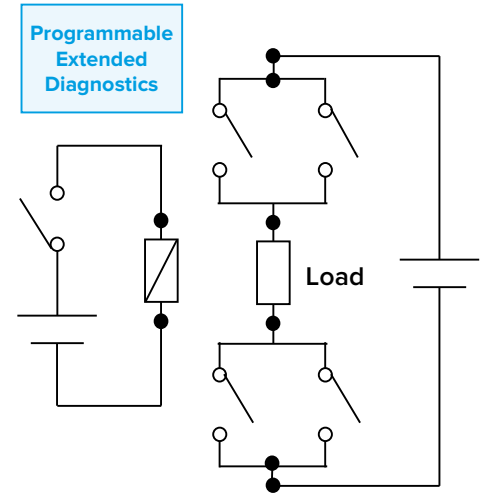
- 5 A 250 Vac 1250 VA
- 5 A, 250 Vdc (max 140W)

High Process Availability:

- Relay Contact Matrix

Diagnostics capability

- Transparent Line Monitoring
- Full Line & Load Programmable Diagnostics



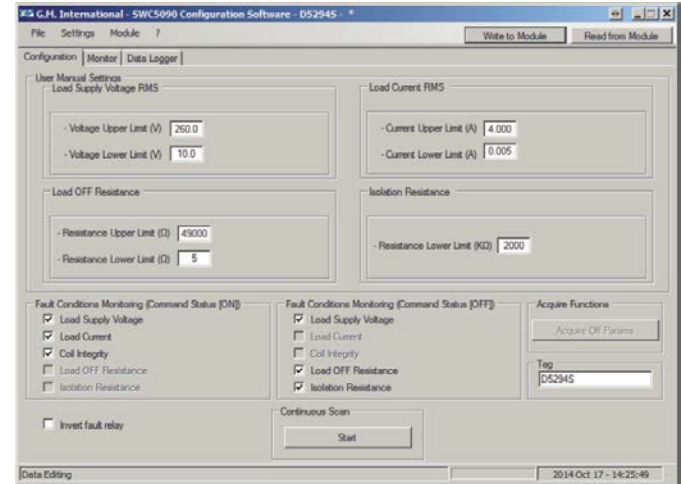
Typical Example D5294/95

Further Diagnostics capability

- Relay coil short circuit detection
- Earth leakage detector available
- Additional circuits verify the supply voltage and current consumption
- Patented Diagnostics operates in both energized or de-energized status, for DC or AC supply systems

Fully configurable via Modbus or GM International software

- User can configure the limits for min/max values of load resistance, as well as supply voltage and load current consumption
- RS-485 Modbus Port



Configuration software swc5090

Safety Relays selection

Product tables



5 Amps

	Relay status	Load status	NO/NC contact	Coil/input voltage	High availability	Compatible pulse test
D5090S	NE	NE	NO	24 Vdc	-	✓
D5090S-086	ND	NE	NC	24 Vdc	-	✓
D5091S	ND	ND	NO	24 Vdc	-	✓
	ND	NE	NC	24 Vdc	-	✓
D5094S	NE	NE	NO	24 Vdc	✓	✓
	ND	ND	NO	24 Vdc	✓	✓
D5095S	NE	ND	NC	24 Vdc	✓	✓
	ND	NE	NC	24 Vdc	✓	✓
D5098S	NE	NE	NO	24 Vdc	-	✓
D5098D	NE	NE	NO	24 Vdc	-	✓
D5290S-078	NE	NE	NO	24 Vdc	-	✓
	NE	NE	NO	24 Vdc	-	✓
	NE	ND	NC	24 Vdc	-	✓
	ND	ND	NO	24 Vdc	-	✓
	ND	ND	NO	24 Vdc	-	✓
D5290S-078/SA	NE	NE	NO	24 Vdc	-	-
	NE	NE	NO	24 Vdc	-	-
	NE	ND	NC	24 Vdc	-	-

5 Amps

	Relay status	Load status	NO/NC contact	Coil/input voltage	High availability	Compatible pulse test
D5290S-079	NE	NE	NO	115 Vac	-	-
	NE	NE	NO	115 Vac	-	-
	NE	ND	NC	115 Vac	-	-
D5290S-084	NE	NE	NO	110 Vdc	-	-
	NE	NE	NO	110 Vdc	-	-
	NE	ND	NC	110 Vdc	-	-
D5292S	NE	NE	NO	24 Vdc	-	✓
	ND	ND	NO	24 Vdc	-	✓
D5292D	NE	NE	NO	24 Vdc	-	✓
	ND	ND	NO	24 Vdc	-	✓
D5292S-093	NE	NE	NO	24 Vdc	-	✓
	NE	ND	NC	24 Vdc	-	✓
D5292D-093	NE	NE	NO	24 Vdc	-	✓
	NE	ND	NC	24 Vdc	-	✓

10 Amps

	Relay status	Load status	NO/NC contact	Coil/input voltage	Compatible pulse test	High availability	Compatible pulse test
D5290S	NE	NE	NO	24 Vdc	✓	-	-
D5290S/SA	NE	NE	NO	24 Vdc	-	-	-
D5290S-080	NE	NE	NO	115 Vac	-	-	-
D5290S-091	NE	NE	NO	230 Vac	-	-	-
D5290S-092	NE	NE	NO	48 Vdc	-	-	-
D5291S	ND	ND	NO	24 Vdc	✓	-	-
	NE	ND	NC	24 Vdc	✓	-	-

3 Amps

	Relay status	Load status	NO/NC contact	Coil/input voltage	High availability	Compatible pulse test
D1092S	NE	NE	NO	24 Vdc	-	-
	ND	ND	NO	24 Vdc	-	-
D1092D	NE	NE	NO	24 Vdc	-	-
	ND	ND	NO	24 Vdc	-	-
D1092S-069	NE	NE	NO	24 Vdc	-	-
	NE	ND	NC	24 Vdc	-	-
D1092D-069	NE	NE	NO	24 Vdc	-	-
	NE	ND	NC	24 Vdc	-	-

Smart relays

	Relay status	Load status	NO/NC contact	Coil/input voltage	High availability	Modbus	Diagnostics	Compatible pulse test
D5096S	NE	NE	NO	24 Vdc	✓	-	✓	✓
	ND	ND	NO	24 Vdc	✓	-	✓	✓
D5097S	NE	ND	NC	24 Vdc	✓	-	✓	✓
	ND	NE	NC	24 Vdc	✓	-	✓	✓
D5293S	NE	NE	NO	24 Vdc	-	✓	✓	✓
D5294S	NE	NE	NO	24 Vdc	✓	✓	✓	✓
	ND	ND	NO	24 Vdc	✓	✓	✓	✓
D5295S	NE	ND	NC	24 Vdc	✓	✓	✓	✓
	ND	NE	NC	24 Vdc	✓	✓	✓	✓
D1093S	NE	NE	NO	24 Vdc	-	-	✓	-
	ND	ND	NO	24 Vdc	-	-	✓	-