

The SDI range

IGBT based DC Solid State Relays



The **SDI Solid State Relay** is the ideal solution for the most demanding DC power switching applications, delivering the reliability and performance required by railway operators for both rolling stock and infrastructure.

Designed for controlling **high-voltage heating systems** supplied by a **third rail or catenary system**, the SDI range provides a reliable, maintenance-free alternative to electromechanical contactors. By eliminating mechanical wear, it significantly reduces maintenance requirements while improving the accuracy and stability of temperature control, resulting in increased system reliability and longer equipment life.

IGBT based DC SSR

In all operating conditions, the SDI Solid State Relay ensures safe and reliable operation thanks to its comprehensive built-in protection features:

- ▶ Diagnostics and Status outputs indicating to the user, in real time, the status of the relay and the installation
- ▶ 50A and 100A versions, control voltage 24Vdc, 48Vdc, 72Vdc, 96Vdc and 110Vdc
- ▶ Power elements rated and adapted to the extreme conditions of your demanding DC power switching applications.
- ▶ Continuous current monitoring (available on the 50 A version) for real-time detection of abnormal operating conditions.
- ▶ Integrated overvoltage and fast transient protection, providing excellent immunity against electrical disturbances.
- ▶ Built-in overload and short-circuit protection, ensuring effective protection of both the relay and the connected equipment.
- ▶ Integrated thermal protection: in the event of overheating, the relay automatically switches off to protect the installation and prevent equipment damage.



1- Typical Applications

Ideal for controlling **high-voltage heating systems** supplied by a **third rail** or **catenary system**.

The SDI range replaces electromechanical contactors, reducing maintenance requirements while providing more accurate temperature control, improved reliability, and longer service life.

2- Electrical characteristics

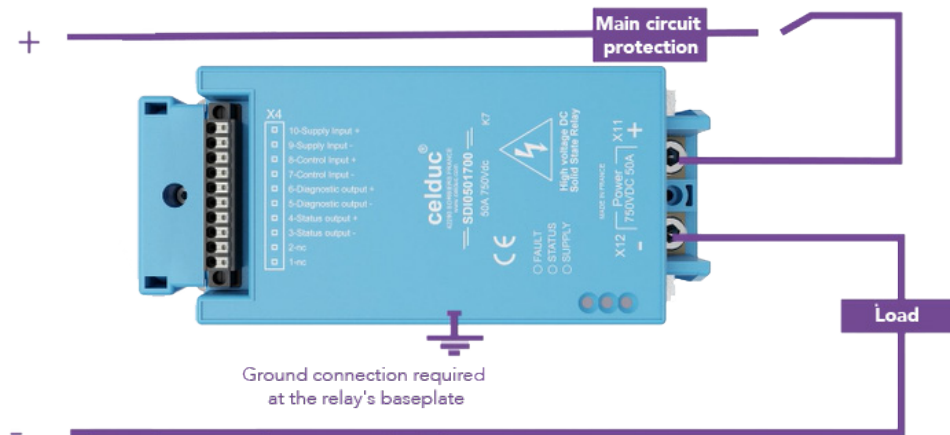
Supply input :

- SDIxxx1700 : 24Vdc and 48Vdc versions
- SDIxxx1710 : 72Vdc, 96Vdc and 110Vdc versions

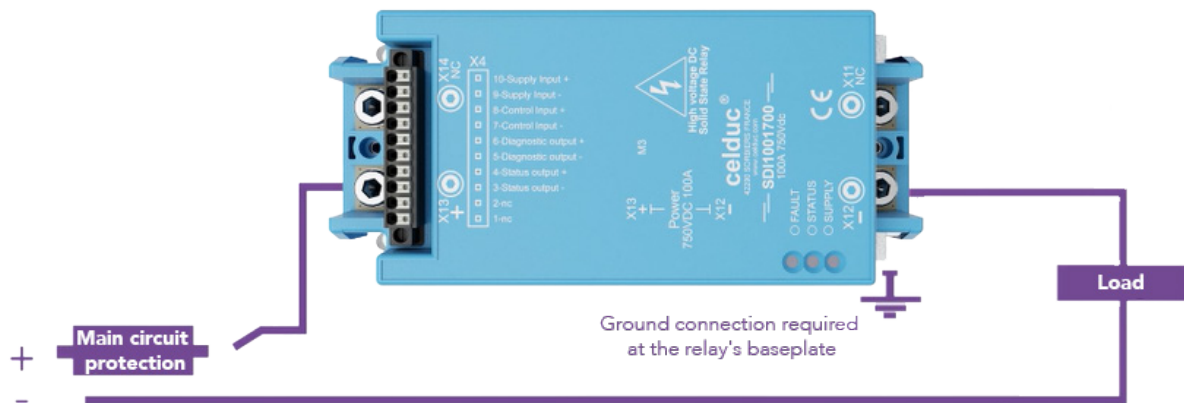
Output voltage : All products have a wide output voltage range with a typical value of 750Vdc

Switching current : Two models 50A et 100A (The load can be connected to – or to +)

SDI 50A



SDI 100A



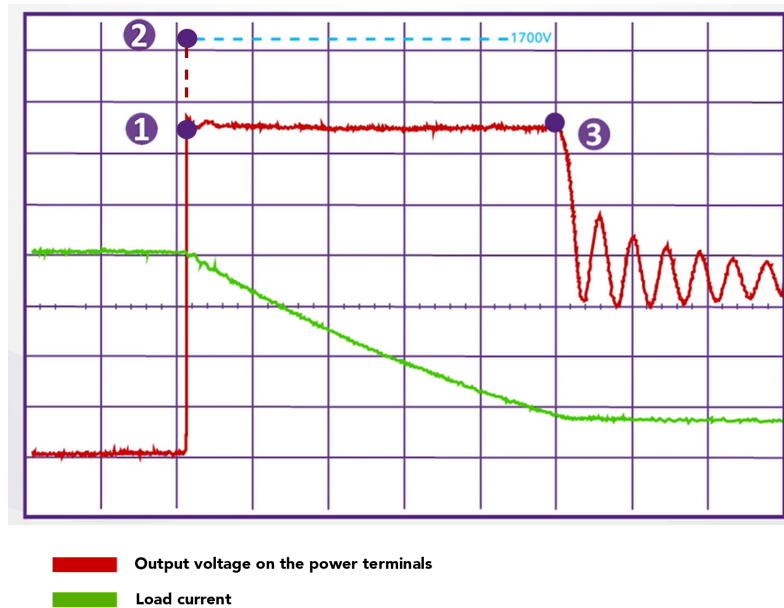
3- Main functions

The SDI SSR combines advanced protection and monitoring features to ensure safe, reliable, and maintenance-free operation:

- Active Clamp protection
- Integrated current monitoring
- Load short-circuit protection
- Integrated thermal protection

3.1 Active clamp protection

The active clamp protects the relay against surges and rapid transients.



1-In some cases opening the circuit generates an overvoltage caused by induction in the line and the load.

2-Without any protection, exceeding 1700V can be destructive. (1700V = breakdown voltage). The active clamp will limit the voltage at the relay output terminals.

3-During this overvoltage, the energy is redirected by the IGBT towards the load until it is completely absorbed. Then the IGBT is completely released and the circuit remains completely open.

3.2 Current monitoring

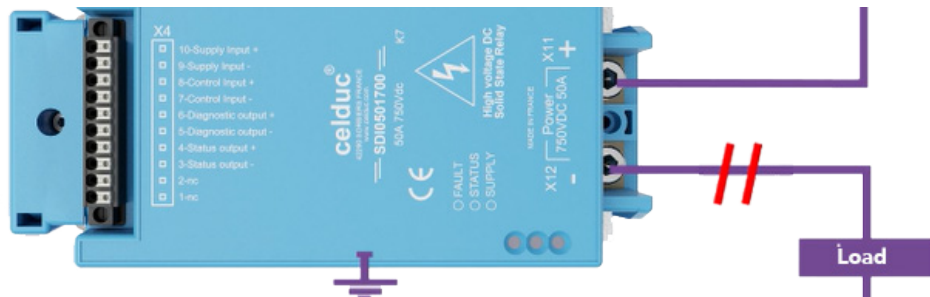
(or by voltage measurement when the relay is OFF)

A "Diagnostic" and a "Status" outputs indicates to the user, in real time, the status of the relay and of the installation.



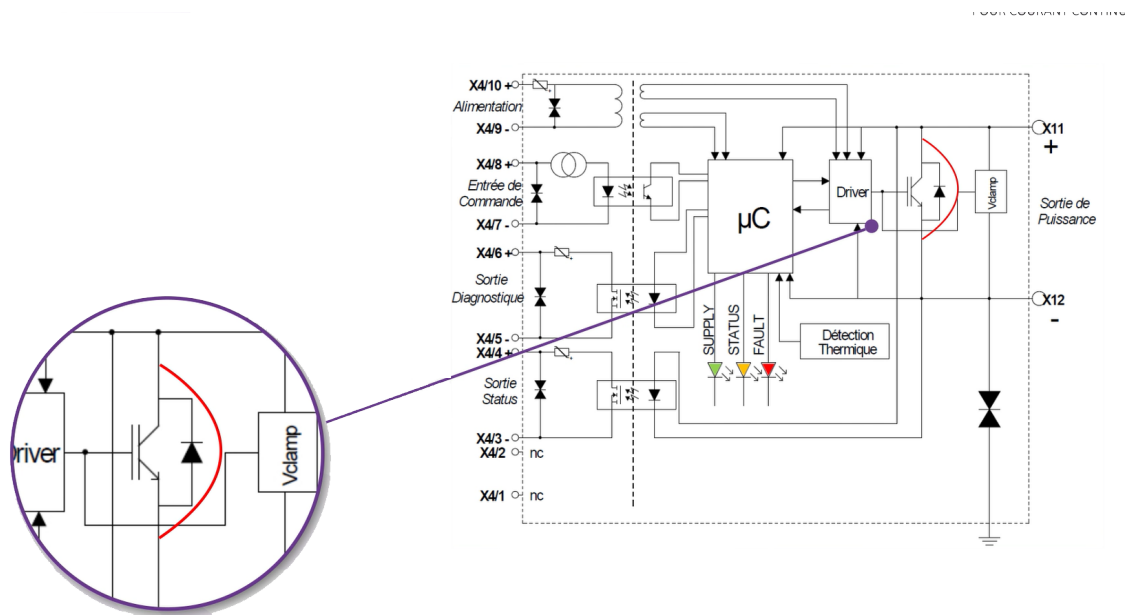
This function can detect several fault :

1-Open Mains or Open Load detection (or fuse or circuit breaker failure)



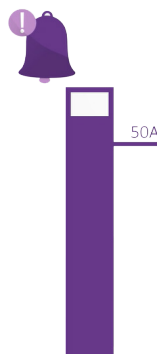
When this fault is detected, the Diagnostic output is activated (contact is closed).

2- Leakage current exceeded detection



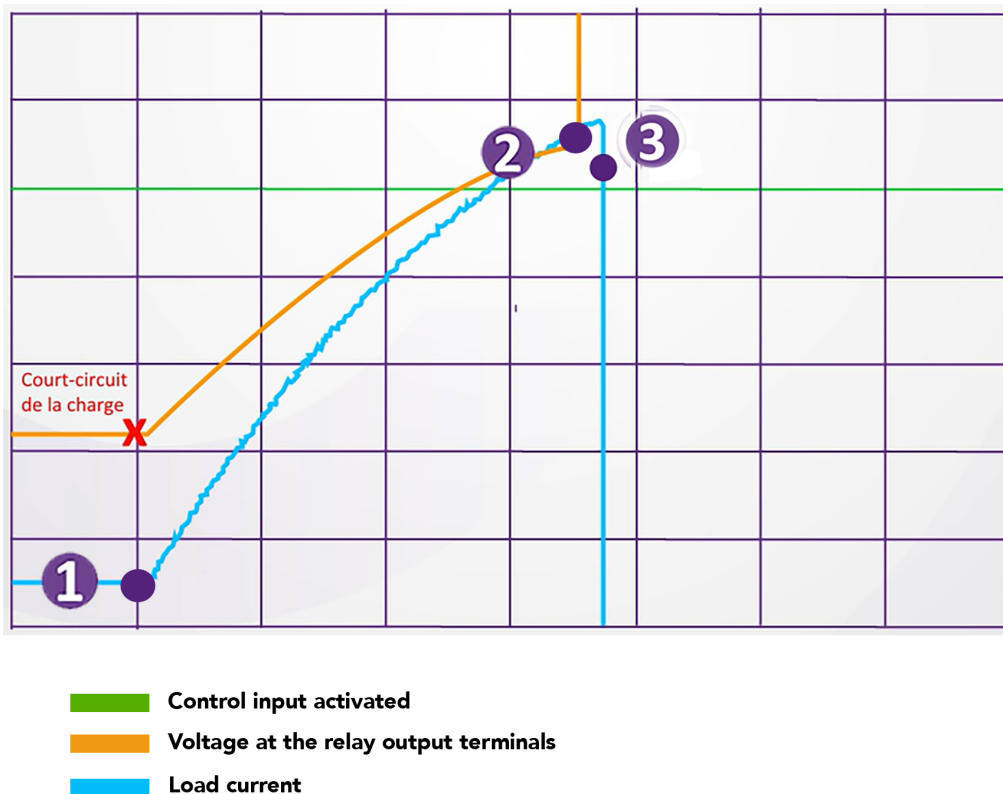
When this fault is detected, the Diagnostic output is activated (contact is closed).

3-Overload



3-3- Load short-circuit protection

Our SDI range has a built-in Load short-circuit protection.



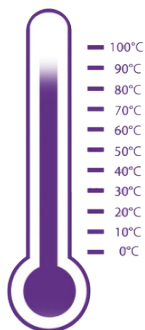
1- The current is stabilized at nominal value in normal operation

2- A short circuit on the load causes an increase of the current up to the detection threshold.

3- We then open the IGBT in a few microseconds to ensure the power is cut and the current is extinguished. The short-circuit detection shouldn't be repeated.

After 4 detections by the relay, the IGBT state is locked, which will be kept open regardless of the state of the control input. In this case, we recommend that you check your installation and the product is unlocked by resetting the auxiliary power supply.

3-4- Thermal protection



A temperature sensor directly implemented in the IGBT makes it possible to limit the maximum temperature which could destroy the product or lower its lifespan.

4- Lifetime expectancy

According to calculations made in accordance to ISO13849-1 standard, we get :

MTTF = 118 years

MTTFd = 236 years

MTTFd (in case of extreme use) = 24 years



5- Standards

All products are designed, tested and manufactured in compliance with the strictest international standards and always with reliability and safety in mind.

All of our relays okpac® SO (as well as SC relays), celpac® 2G SU/ SA (including the current sense module ESUC) but also the 2-phase SOB and 3-phase SGT comply with the European standard EN 61373 for railways : **shocks and vibrations tests** on relay.

Regarding the standards about **Fire behavior and fumes** NF F16-101, NF F16-102 and EN 45545 calling for the EN 60695-2-10/11/12 (Glow Wire tests (GWFI –GWIT), blue and black plastic covers and encapsulating resin of SO and SU/SA relays are classified.

Our products are also compliant with the EN 50155 standard which applies to all electronic equipment for control, regulation, protection and power supply used on rolling stock.

EN 50155 : Operation, design, documentation and testing requirements for Electronic equipment used on rolling stock

EN 50124-1 : Insulation coordination for all electrical and electronic equipment used on rolling stock

EN 50121-3-2 : Electromagnetic compatibility for all electrical and electronic equipment used on rolling stock

EN 45545-2 : Requirements for fire behavior of materials and components used on rolling stock

6- Available products

[SDI0501700](#) – 50A / 12-940VDC / 1700V / CTRL 24-48VDC

[SDI0501710](#) – 50A / 12-940VDC / 1700V / CTRL 72-96-110VDC

[SDI1001700](#) – 100A / 12-940VDC / 1700V / CTRL 24-48VDC



Thanks for reading



www.celduc-relais.com