

## RS4 406 SIL4 VITAL RELAY

TECHNICAL DATA CLEARSY

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### RS4 406 SIL4 Vital Relay

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*RS4 System  
SIL4 Vital relay  
Safety contacts guaranteed to open  
4 NO 6 NC*



# RS4 406



## TECHNICAL FEATURES

- It integrates two PCB relays which meet DIN EN 61810-3 standard (forcibly guided relay).
- The two PCB relays are coming from different series to protect against the shared modes introduced by manufacturing errors involving a single series.
- Two "working" contacts from each PCB relay are twisted in series to work out the security output.
- The distances between the internal tracks and the pins of the safety control must respect the NF F 74003 standard to guarantee the absence of a short circuit
- The distances between the control of the PCB relays and the security output strips must resist to insulation tensions of 2000Vac.
- The circuit safety is processed with a SIL4 safety level
- RS4 relay is "fail safe", including design based on component failure according to EN50129 standard



■ **RS4 Dimensions : 121 x 90 x 44 mm**

## DESCRIPTION DU RS4 406

[Safety systems control is often done via safety relays. There is often confusion in the terms used for the notion of safety relay:](#)

### RELAY FORCIBLY GUIDED ACCORDING TO EN 61810-3 STANDARD

In reality a lot of safety relays are simply forcibly guided relays according to EN 61810-3 standard, guaranteeing that it is impossible that a NO (Normally Opened) contact and a NC (normally closed) contact are established at the same time.

### RELAYS GUARANTEED TO BE FAIL-SAFE AND FORCIBLY GUIDED

Relays like the NS1 relays which meet NF F 70 030 standard, are also guaranteed to be fail-safe (it is also the same analysis for Q-relay). The fail-safe guarantee is obtained by the fact that the moving part of the relay is orientated in relation to earth's attraction. This way, via the effect of gravity", the "working" contacts open if the relays coil is not powered. This implies that these relays may not be used in-board. These relays are mainly used in rail signaling facilities and are considered to be intrinsic safety relays with a SIL4 safety level.

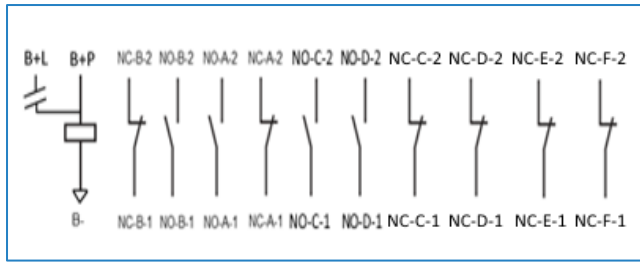
The standard emphasize on the fact that these safety characteristics are only valid if the terms of use for these relays are respected (maximum supply tension at 28.8V, maximum current in the limited contacts, etc.).

### [Why has CLEARSY developed the RS4 RELAYS?](#)

We have developed and set up systems like COPPILOT, COPP, DOF1 and DIL which are intended to control the platform screen doors of various underground rail systems. The vital function on these systems is SIL3. The opening control is achieved through existing relay contact in working position. The security of the safety function on CLEARSY's systems is based on the fact that we safely detect that the relay has remained "stuck" in the condition in which working contact is established. This principle was used to produce the RS2 relay: this relay is made up of 2 forcibly guided relays and allows, thanks to an external check of the contacts (by a security automaton for example) to guarantee a SIL3 safety level.

For security applications which have no checking system, we have designed an automatically checked relay named RS4. The RS4 is functionally comparable to the traditional vital relays because the RS4 relay is an intrinsic safety relay with a SIL4 safety level. The RS4 is "forcibly guided " AND " fail-safe ", including design based on component failure according to EN50129 standard. Like the NS1 relay, certain conditions of use must be respected to guarantee the SIL4 safety integrity

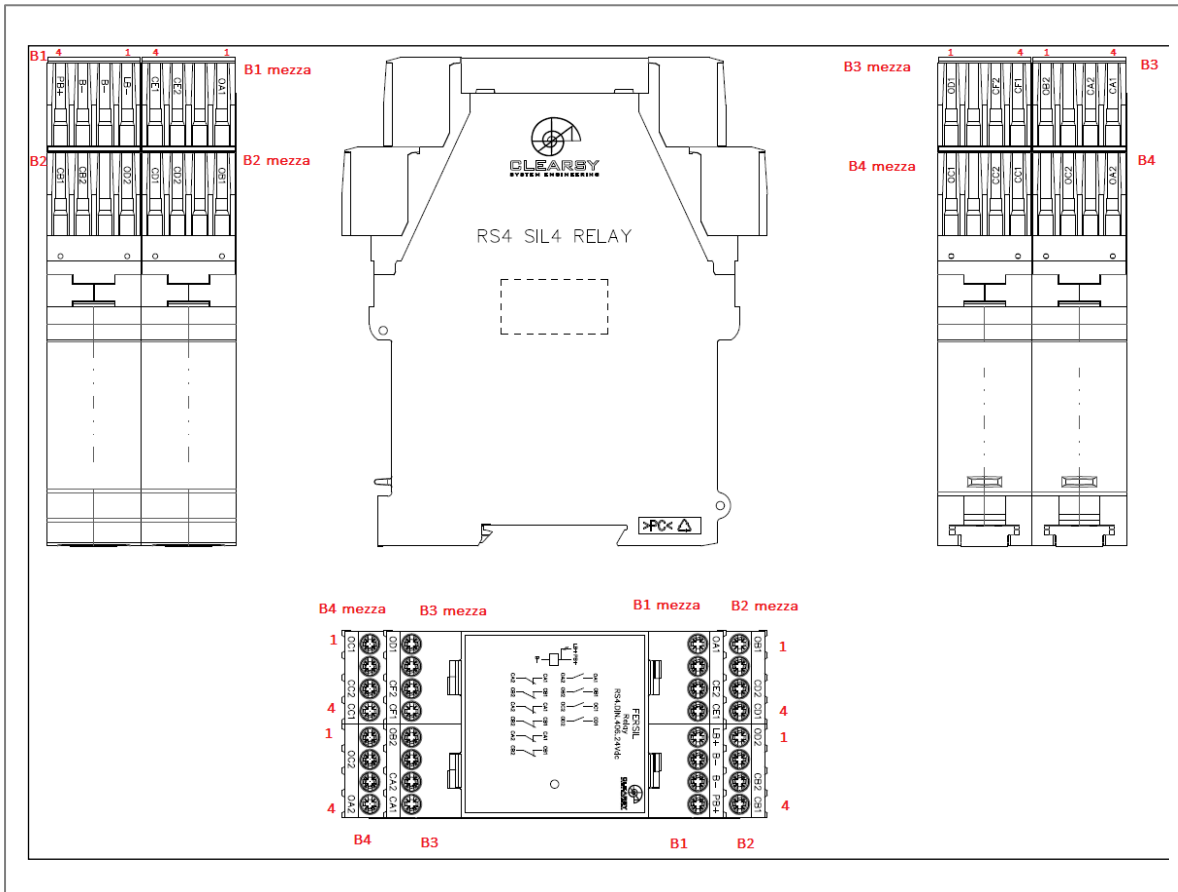
# RS4 406



## Mechanical and connectors:

- Post Supply : B1-4
- Line Supply : B2-2
- Ground : B1-3 and B1-1
- One CONTACT NO OA1 OA2 : B1mezza-1/B4-4
- One CONTACT NO OB1 OB2 : B2mezza-1/B3-1
- One CONTACT NO OC1 OC2 : B4mezza-1/B4-2
- One CONTACT NO OD1 OD2 : B3mezza-1/B2-1
- One CONTACT NC CA1 CA2 : B3-4 and B3-3
- One CONTACT NC CB1 CB2 : B2-4 and B2-3
- One CONTACT NC CC1 CC2 : B4mezza-4/B4mezza-3
- One CONTACT NC CD1 CD2 : B2mezza-3/B2mezza-4
- One CONTACT NC CE1 CE2 : B1mezza-3/B1mezza-4
- One CONTACT NC CF1 CF2 : B3mezza-3/B3mezza-4

Contact NO mean normally opened (or working contact).  
Contact NC mean Normally Closed (or release contact).



# RS4 406

RELAY		RS4-406
<b>1 Command coils data</b>		
1.1 Nominal voltage	DC V	24
1.2 Nominal power	W	2,6
1.3 Operating voltage range	Un	22,56 ... 28,8 Vdc
1.4 Drop out specified (in % of Un)	Un	More than 0,1*Un mean: >2 VDC
1.5 Command signal maximum rise time	ms	The command signal must rise from 0 to the nominal voltage in less than 30ms.
1.6 Relay maximum inrush current	A	At least 5A
1.7 Maximum number of switching per second should not be exceeded	switching / secondes	1
1.8 Power input maximum equivalent series resistance. (this value should be used to calculate the maximum conductor length in function of the wire type $\Omega$ /meter value)	$\Omega$	$\leq 19 \Omega$ on « Poste » input (PB+) $5\Omega < R \leq 24\Omega$ on « Line » input (LB+)
<b>2 Contacts</b>		
2.1 Contacts configuration		4NO / 6NC Forcibly guided contacts in accordance with EN61810-3 standard.
2.2 Contacts materials		AgNi 0,15 + 5 $\mu$ m Au
2.3 Dielectric strength between coils and contacts and between contacts	VAC	2000 (1 minute)
Minimum contact making voltage	V	1 VAC and 230 VDC
Maximum contact breaking voltage	V	230 VAC and 230 VDC Breaking a load with an operating voltage greater than 60VDC will volatize the 5 $\mu$ m contact gold plating. In this case the minimum voltage to apply increases from 1V to 10 VDC.
2.4 Minimum making current	mA	4mA
2.5 Maximum nominal load current	A	3A DC/AC Breaking a load carrying a current greater than 0.3A DC or AC will volatize the 5 $\mu$ m contact gold plating. In this case the minimum current to apply must be at least 20 mA DC or AC
2.6 Minimum making power	mW	4mW
2.7 Maximum nominal load power	W/WA	460 Breaking a load carrying a power greater than 7W will volatize the 5 $\mu$ m contact gold plating. In this case the minimal power to apply increases from 4mW to 200mW
2.8 Electrical life expectancy 230Vac 3A cos $\phi = 1$ 24Vdc 3A 230Vac 0.3A cos $\phi = 1$ 24Vdc 0.3A	Number of cycles	Greater than $2.2 \cdot 10^5$ Greater than $1.5 \cdot 10^5$ Greater than $3 \cdot 10^6$ Greater than $1 \cdot 10^6$
2.9 Pick-up closure time contact Ta for NO contacts	ms	<b>5&lt;Ta&lt;120 ms</b> Typical at 24Vdc : 35ms
2.10 Drop-out opening contact time T'c for NO contacts	ms	<b>5&lt;T'c&lt;50ms</b> Typical at 24Vdc : 28ms
2.11 Pick-up closure time contact Ta for NC contacts	ms	<b>1&lt;ta&lt;60 ms</b> Typical at 24Vdc NF1:20 ms Typical at 24Vdc NF2: 4 ms
2.12 Drop-out opening contact time tc for NC contacts	ms	<b>1&lt;tc&lt;40 ms</b> Typical at 24Vdc NF1: 7 ms Typical at 24Vdc NF2: 7ms
2.13 Contact bouncing	ms	20

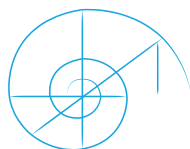
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## 3 Other

3.1 Mechanical life	Number of operations	Supérieur à $20 \cdot 10^6$
3.2 MTTR	hour	0,08
3.3 Operating temperature range	°C	-40 ... +70°C (EN 50155 Class T1)
3.4 Choc and Vibration		Compliant with EN 61373 Category 1 Class B
3.5 Supply interruption		EN 50155 Class S2 (without interruption)
3.6 Supply change over		Class C1 at 0.6 Un during 100ms (without interruptions)

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