

# BOX DIN - RELAY MODULE

## REL013

for 2 ESPE EFESTO4, EFSTOSZ, KEEPER

### Instruction use and maintenance



Original instruction

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## **IMPORTANT REMARKS ON SAFETY**

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The user is obliged to observe the new European international standards to make best use of the equipment for the safety of machines and plants to be protected.

For this purpose, it is necessary that a manager read this manual completely and follows the installation and setup of the system.

Please observe all the technical details and the suggestions reported in this manual without exception, and with strict compliance with local and national regulations to the safety of industrial machines.

This protecting system is only a part of the entire safety equipment of the machine, the control unit described here, should be incorporated within the general electric circuit.

The responsibility of the safety circuit is of the manufacturer of the machine and of the end user.

This documentation must accompany the product throughout its operating life.

The people responsible must ensure that the maintenance staff, assistance, and anyone is relevant to the use of the safety of the machine, have access to all the information provided by the manufacturer of these systems.

**The GREIN company is not responsible for injury or damage resulting from failure to observe these directions in the use of its products.**

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## GENERAL INFORMATION

The REL013 module changes the EFESTO4 / KEEPER static outputs into relays output.

The REL013 doesn't contain an internal circuit to check the relays state, so, only EFESTO4, EFESTO SZ and KEEPER barriers with EDM function (External Device Monitor) can be connected to this module. In all other applications, an external circuit must check the status of the relays to reach the desired safety level.

In this manual will be analysed the connections with EFESTO4, EFESTO SZ and KEEPER light curtains.

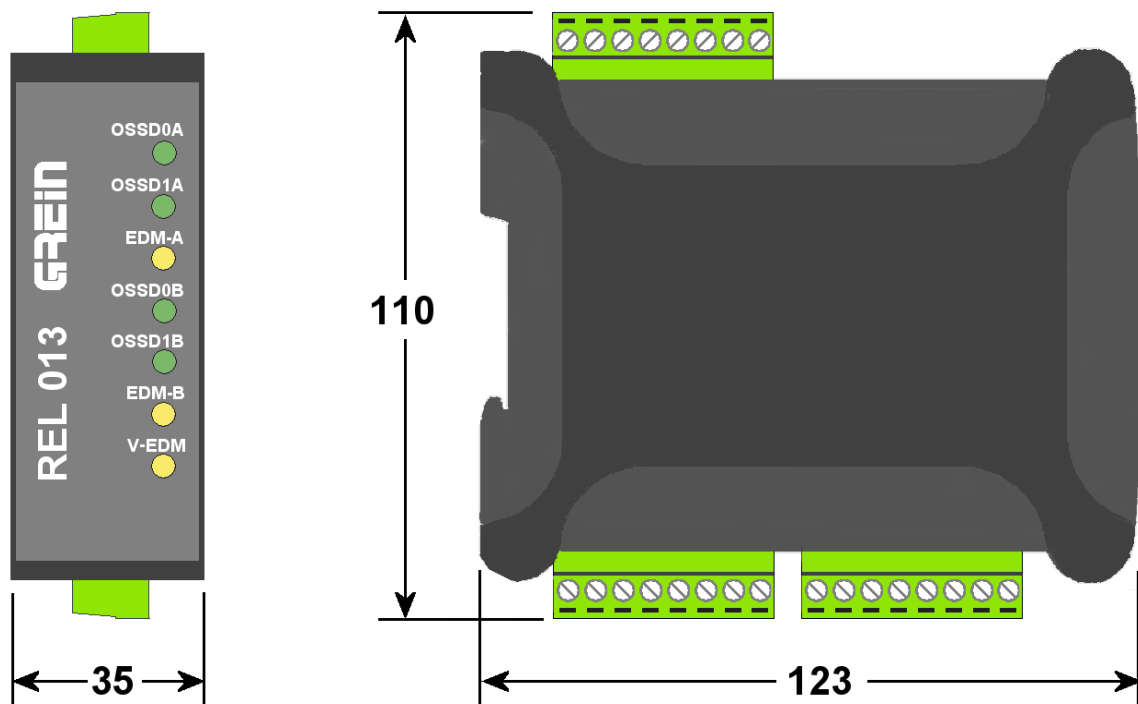
The OSSD0A input controls the output relay K1,  
 the OSSD1A input controls the output relay K2,  
 the OSSD0B input controls the output relay K3,  
 the OSSD1B input controls the output relay K4,

For each barrier, the outputs are two independent safety contacts and one potential-free, non-safety NC contact.

## TECHNICAL CHARATTERISTICS

GENERAL	
Working Temperatue	-5 ÷ 60 °C
Relative umidity	5 - 95%
IP	20
Weight	240 grams
Response Time	5 ms

## OVERALL DIMENSIONS



## CONNECTIONS AND FUNCTIONS

The tables below summarize the electrical characteristics (input and output) and function of each input.

REL013					
PIN N	Function	Description	Type	Level	
1	Relay K1+K2 contact N.C.	Non-Safety contact K1+K2 NC	OUT	AC15 230V 4A / DC13 24V 2A	
2	Relay K1+K2 contact N.C.	Non-Safety contact K1+K2 NC	OUT	AC15 230V 4A / DC13 24V 2A	
3	Not connected	-	-	-	
4	Relay K1 contact N.O.	Safety contact K1 NO	OUT	AC15 230V 4A / DC13 24V 2A	
5	Relay K1 contact N.O.	Safety contact K1 NO	OUT	AC15 230V 4A / DC13 24V 2A	
6	Not connected	-	-	-	
7	Relay K2 contact N.O.	Safety contact K2 NO	OUT	AC15 230V 4A / DC13 24V 2A	
8	Relay K2 contact N.O.	Safety contact K2 NO	OUT	AC15 230V 4A / DC13 24V 2A	
9	Relay K3+K4 contact N.C.	Non-Safety contact K3+K4 NC	OUT	AC15 230V 4A / DC13 24V 2A	
10	Relay K3+K4 contact N.C.	Non-Safety contact K3+K4 NC	OUT	AC15 230V 4A / DC13 24V 2A	
11	Not connected	-	-	-	
12	Relay K3 contact N.O.	Safety contact K3 NO	OUT	AC15 230V 4A / DC13 24V 2A	
13	Relay K3 contact N.O.	Safety contact K3 NO	OUT	AC15 230V 4A / DC13 24V 2A	
14	Not connected	-	-	-	
15	Relay K4 contact N.O.	Safety contact K4 NO	OUT	AC15 230V 4A / DC13 24V 2A	
16	Relay K4 contact N.O.	Safety contact K4 NO	OUT	AC15 230V 4A / DC13 24V 2A	
17	OSSD1-B	Input OSSD1 barrier B	IN	0 - 24 Vdc	50mA
18	OSSD0-B	Input OSSD0 barrier B	IN	0 - 24 Vdc	50mA
19	EDM-B	Output for EDM barrier B	OUT	DC13 24V 2A	
20	OSSD1-A	PNP input channel 1	IN	0 - 24 Vdc	50mA
21	OSSD0-A	PNP input channel 0	IN	0 - 24 Vdc	50mA
22	EDM-A	Output for EDM barrier A	OUT	DC13 24V 2A	
23	GND	0V Power supply	IN	0V	
24	V-EDM	Power supply for EDM contacts	IN	24 Vdc	50mA

The contact status is referred to the control unit without power or with OSSDs ESPE not active.

## WIRING CONNECTIONS

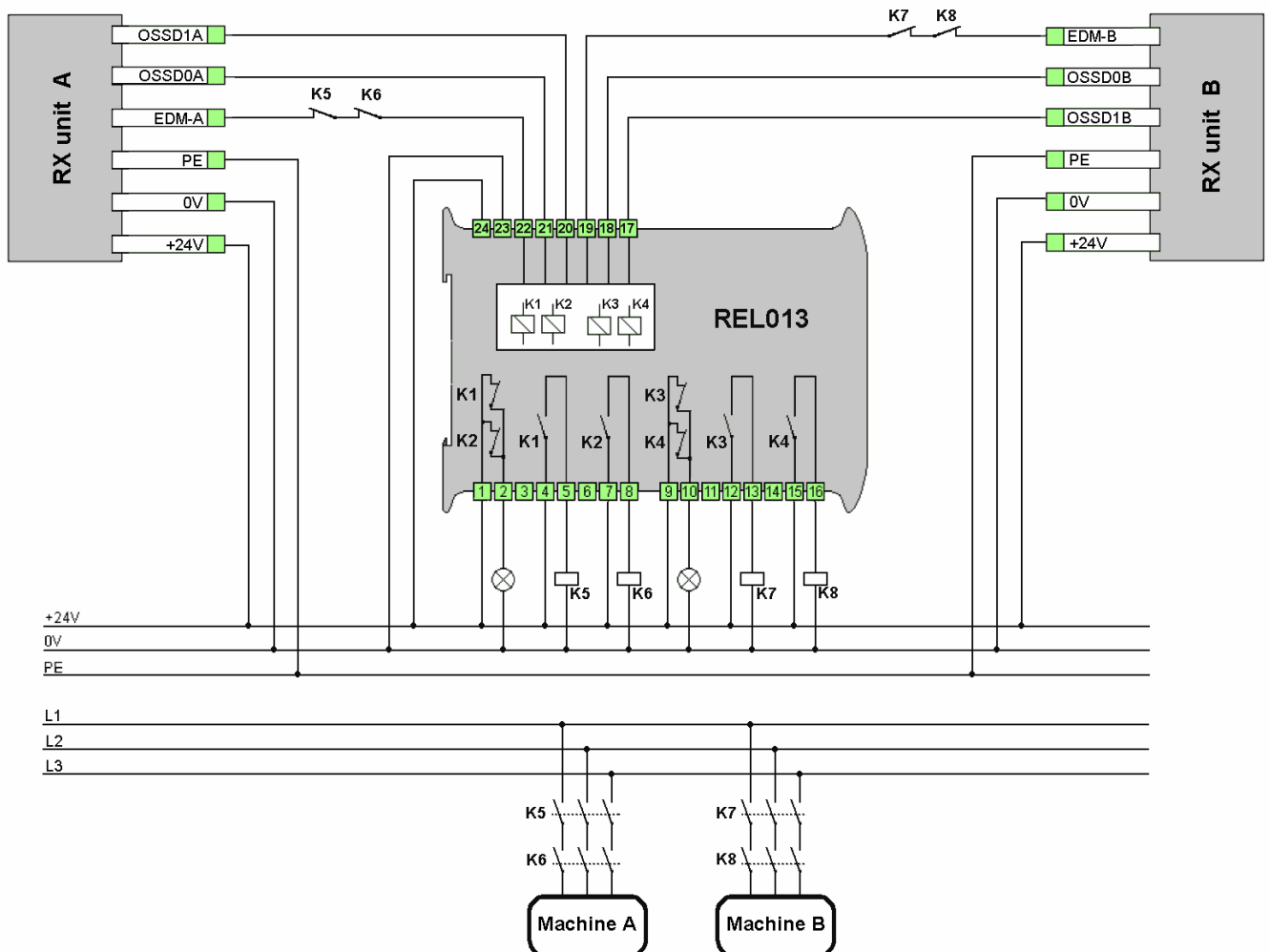
### CONNECTION CABLES WARNING

- 1 – REL013 cables shall be separated from power.
- 2 – REL013 power supply should be separated by power supply of the power equipment (i.e. inverters).
- 3 – If there is the possibility to damage the cables, take care to protect them against crushing or cutting.

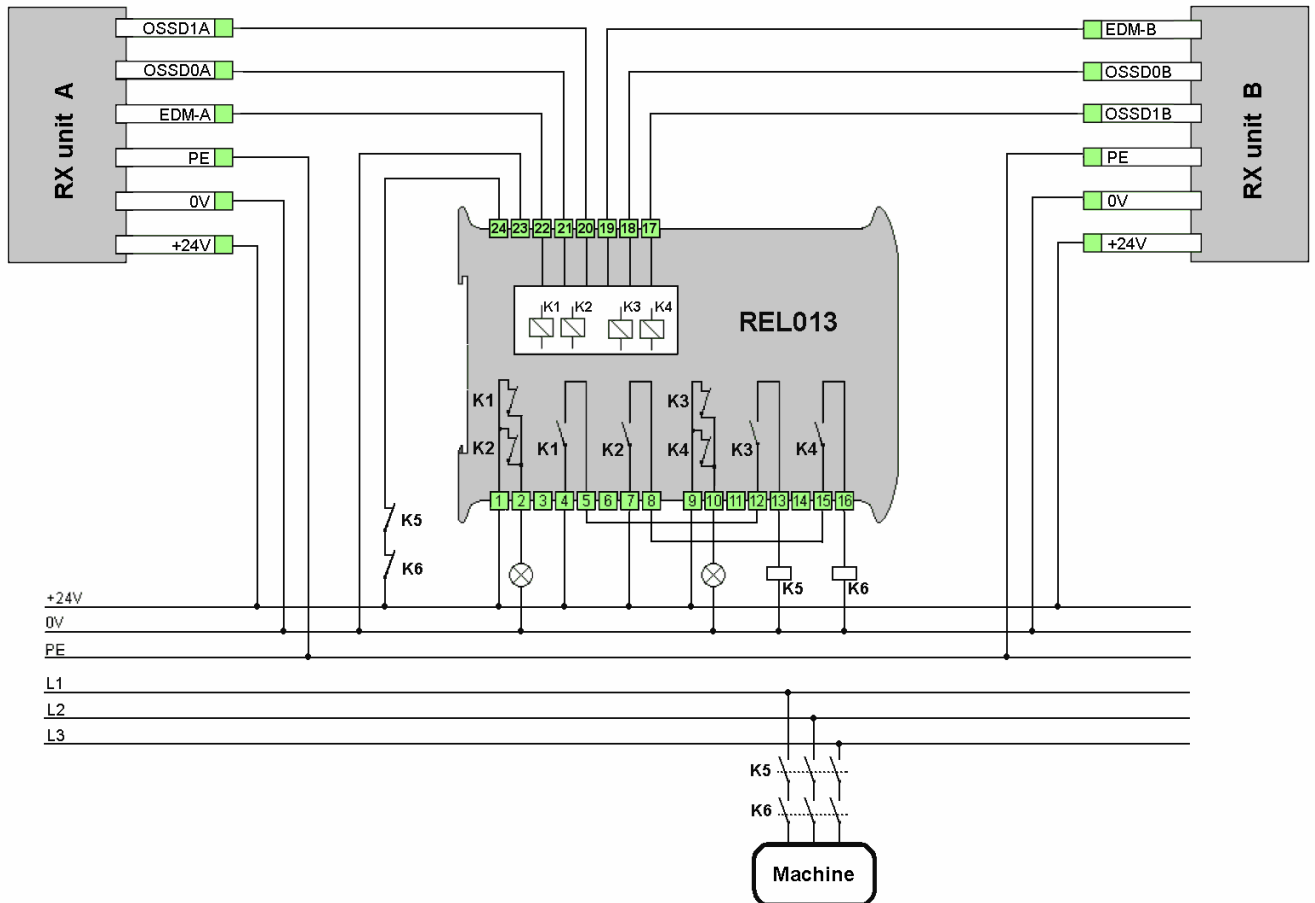
### EXAMPLE OF CONNECTION - REL013

Diagram of the connection of two barriers that control two separate areas of the system by means of contactors.

The correct operation of the module and contactors is controlled by the barriers via the EDM input.



Connection diagram of two barriers that control a single machine (e.g. front-back protection).  
The correct operation of the module and contactors is checked by the barriers via the EDM inputs.



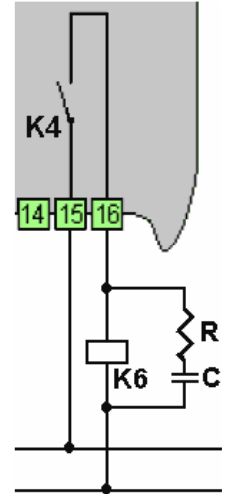
### ARC SUPPRESSOR

A filter shall be connected across the coil of the external contactors of the machine control device, to avoid spikes on the relay contacts increasing their life.

**The arc suppressor must be connected always and only in parallel to the load, never connect in parallel on the safety contacts of the relay outputs.**

If the relays K1 and K2 do not have arc suppressors, we suggest to install the filters of the following value:

- for power supply 24 - 48 Vac / dc : R = 100 ohm, C = 1µF
- for power supply 115 - 230 Vac / dc: R = 220 ohm, C = 0.2µF



### RESPONSE TIME CALCULATION

The total response time is given by the sum of the response time of the ESPE and the response time of the REL013.

TOTAL RESPONSE TIME = ESPE RESPONSE TIME + REL013 RESPONSE TIME

Example:  
 ESPE: EF-B-0750B = 11 ms  
 REL013: = 5 ms  
 TOTAL RESPONSE TIME = 11 ms + 5 ms = 16 ms

### MTTF<sub>d</sub> / DC<sub>avg</sub>

Condition	MTTF <sub>d</sub> (anni) AC15-230V-0,6A	MTTF <sub>d</sub> (anni) DC13-24V-0,5A
1 commutation each minute	137.31	89.96
1 commutation each 5 minutes	686.15	449.81
1 commutation each hour	8238.64	5397.73
1 commutation each day	197727.27	129545.45

Condition	DC <sub>avg</sub> AC15-230V-0,6A	DC <sub>avg</sub> DC13-24V-0,5A
1 commutation each minute	99.00%	99.00%
1 commutation each 5 minutes	99.00%	99.00%
1 commutation each hour	99.00%	99.00%
1 commutation each day	99.00%	99.00%



**The DC<sub>avg</sub> value becomes equal to zero if the EDM control is not used.**



## **MECHANICAL FITTING**

The REL013 - Safety Relays Module, should be fixed properly following these guidelines:

- 1) In a control cabinet protected from dust / moisture with a minimum IP54 protection degree.
- 2) Fix it in a DIN rail 35 mm according to EN 50 022
- 3) Do not mount the control unit near sources of intense heat.
- 4) The control unit can be mounted in any position

## **SERVICE AND TEST**

### **Attention**

Each repair operation should be performed only by GREIN authorized technicians.

### **Putting into service and tests at regular intervals**

The installer that puts the equipment into service shall have all necessary information about the machine or the plant of the installed REL013 and of the ESPEs. The test shall cover the correct interaction REL013 / ESPEs and the control system of the power operated working equipment, the safe state, and the construction in compliance with the equipment specific safety rules. The test relevant information provided by the machine or plant manufacturer shall always be observed when testing. The frequency of the periodic tests must be in accordance with the requirements of national law.

A distinction is made between the following types of test:

### **Testing prior to put a device into service for the first time and after modifications**

A person authorized and qualified, should test the REL013, the ESPEs connected to it, the first time it is put into service and all units involved in the safety function of the machinery. All changes on the configuration of the REL013, the ESPE connected to it, and the components / units that affect the safety function, must always be checked. For proper interaction with the REL013 and the ESPEs connected to it, must be checked that all the external components are tested.

### **Periodical test**

Periodical test serve the purpose of systematically detecting and removing safety-relevant deficiencies (e.g. in the event of modification or manipulation) of the protective equipment of the machine or facility which occur after the machine/facility having been put into service. Type, scope and time intervals to be followed are listed in clause "SETTING UP AND TEST" and shall be determined and specified for each individual machinery. For all test, must be complied with the requirements of national law.

The test results shall be recorded in a report which is to be signed by the inspector.

The report shall be kept at the installation site of the machine or plant.

## **SETTING UP AND TEST**

### **FINAL CHECK BEFORE STARTING**

Before powering the ESPE connected to BOX DIN verify that:

- check the connections between ESPEs and REL013
- If necessary to increase the safety, set the ESPE in manual reset.

If the above steps are correct power the ESPE.

When the ESPE OSSDs are active, check that also the relays in the REL013 are active (the N.O. contacts change from open to close) and the green indicators of OSSDs are ON.

Otherwise check when the ESPE OSSDs are not active, the relays in the REL013 and the green indicators are OFF.

### INDICATIONS and DIAGNOSTIC

<b>V-EDM</b>	YELLOW - Power supply for EDM contacts
<b>EDM-A/B</b>	YELLOW – EDM active ON indicates the presence of 24V on the EDM connection. If the system is operating normally, it turns ON when the OSSDs are OFF and turns OFF when the OSSD is ON. If turned OFF with OSSD OFF it indicates a problem in the control circuit of the relays or contactors.
<b>OSSD0-A/B OSSD0-A/B</b>	GREEN - OSSD0 output state ON indicates OSSD active. If turned OFF with the barrier in OSSD ON state (green), it indicates a connection problem between barriers and module.

### SPARE PARTS



Only parts approved by the manufacturer may be substituted; the use of unauthorized parts or if changes are made to the control unit edge or mat, the device performance may be affected.

### PACKING AND UNPACKING



Always observe the standards and regulations regarding the prevention of accidents when handling the product.

### PRODUCT PACKAGING

The shape, size and content of the package varies depending on the number of REL013 module in the package.

### UNPACKING GUIDELINES

When unpacking the product, follow these guidelines:

- 1 Inspect the package to check for damaged or missing items.
- 2 Proceed with unpacking paying particular attention to the opening of the package, if you use the cutter be careful not damage the products.

### STORAGE

If the product is not installed immediately after delivery, store it as follows:

- 1) store the product in a dry place at a temperature range between -10 and +60 °C.

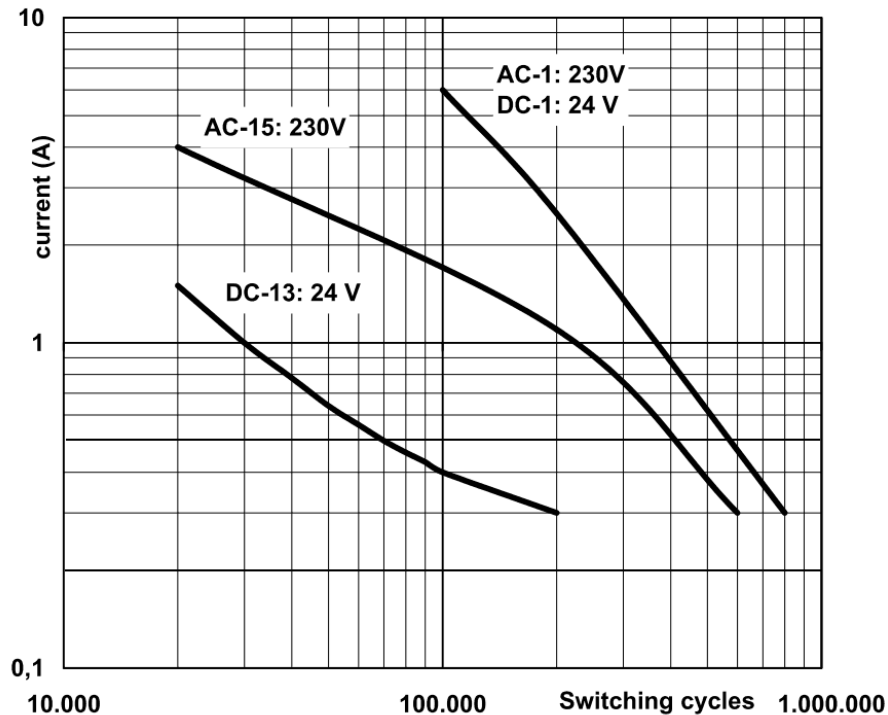
### DISPOSAL

Dispose of this product and its components in accordance with state and local codes.

### SAFETY RELAY FEATURES

SAFETY RELAY - OUTPUT CONTACT	
Contact material	AgSnO <sub>2</sub>
Working voltage	AC 230V; DC 24V
Max switching current	6 A
Max switching capability	AC 1500 VA

Proprietà di commutazione	
NO contact AC-15 230/240V	4A
NC contact AC-15 230/240V	1.2A
NO contact DC-13 24V	2A
NC contact DC-13 24V	1.2A
Mechanical service life	10 <sup>7</sup>
Electrical service life	see following diagram



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## Warranty

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A guarantee is provided for a period of 12 months from the delivery date and terminates at the expiration of this term, even if the materials have not been used for any reason.

Our company undertakes to repair or replace, during this period, free of charge, within the shortest possible time, those parts which owing to poor quality of material or defective workman-ship or inaccurate assembly should prove defective. This is providing that defects are not due to:

- wear and tear
- failure caused by inexperience or negligence
- unauthorized intervention or tampering
- overloads behind contract limits
- accidental causes or "force major"

The repairs or replacements shall be carried out in our workshop in Milan, Italy.  
Transport will be completely charged to the purchaser.

Nothing will be due to the customer for the time during which the plant may remain idle, nor shall he make claims or ask indemnity for charges, accidents or direct or indirect damages.

For anything else not specified or that becomes a subject of dispute, the ANIE (Italian Electrotechnical Industries Association) general sale conditions will be applied.

**GREIN S.p.A. Milan**

**NOTE: characteristics and dimensions reported in this manual are for reference only and can be subject to change without notice.**

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**“UE” DECLARATION OF CONFORMITY  
DICHIARAZIONE “UE” DI CONFORMITA’**

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**Il fabbricante****The manufacturer****GREIN S.p.A.**

Via S.G.B. de La Salle 4/A 20132 MILANO ITALY

**Dichiara che****Declares that**

Il modulo di sicurezza REL013 è conforme alle seguenti direttive e norme :

The REL013 safety relay complies with the following directives and standards:

**Direttive applicate****Applied directives**2006 /95/EC Direttiva Bassa Tensione  
2004/108/EC Compatibilità ElettromagneticaLow Voltage Directive  
ElectroMagnetic Compatibility Directive**Norme applicate****Applied standards**EN ISO 13849-1 2015  
EN ISO 13849-2 2012**NAME** : Begozzi Roberto  
**POSITION** : C E O GREIN S.p.A.

Milan, 19 June 2024

  
**GREIN S.P.A.**  
**Amministratore Unico**