BOX JNC – RELAYS MODULE

for EFESTO and KEEPER ESPE

Instruction use and maintenance

REL 021 X

REL 022 X

IMPORTANT REMARKS ON SAFETY

The user is obliged to observe the new European international standards in order 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.

Contents

GENERAL INFORMATIONS

The interface module contains all the main functions required for the remotely management of the EFESTO / KEEPER light curtain. It constitutes a point of support as interface between light curtain and the machine.
The use of key switches, designed to increase the safety level of the light curtain in order to ensure that the restart could be done only by authorized and qualified person (in case of maintenance the keys can be removed). The relay module does not contain an internal control circuits. The relays status must be monitored by the light curtain that implement the function of controlling external devices (EDM).
In all other applications, an external circuit must check the status of the relays in order to reach the desired safety level. The internal connections are mediated by PLUG IN connector to facilitate the operations of wiring, replacement and maintenance. The outputs (channel zero and one) are two safety contacts potential free independent between them and a NC contact potential free.

TECHNICAL CHARACTERISTICS

GENERAL	
Working temperature	-5 ÷ 60 °C
Relative humidity	5 - 95%
IP protection degree	56
Weight	700 grams
Max respose time	5ms

OUTPUT SAFETY RELAY	
Contact material	$AgSnO_2$
Working voltage	AC 230V; DC 300V
Max switching current	6A
Max constant current	2A
Max switching capability	1500VA
Mechanical service life	10^7
Electrical service life	10^5

MODELS

REL 021 B	relays module with spring-key for manual reset, OSSD status lamp, for EF b.
REL 021 D	relays module with spring-key for manual reset, OSSD status lamp, for EF d.
REL 022 E	relays module with spring-key for manual reset, guard override, OSSD, MUTING lamp, for EF e, KP e.
REL 022 F	relays module with spring-key for manual reset, guard override, OSSD and MUTING lamp for EF f1, KP f1, KP h.

CONNECTIONS AND FUNCTIONS

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

REL 021X - REL022X				
PIN N	Function	Description	Type	Level
X1 CONNECTOR				
1	Relay output N.C.	No Safety contact NC	OUT	AC15 230V 4A / DC13 24V 2A
2	Relay output N.C.	No Safety contact NC	OUT	AC15 230V 4A / DC13 24V 2A
3	Not connected	-	-	-
4	Relay output N.O.	Safety contact NO channel 0	OUT	AC15 230V 4A / DC13 24V 2A
5	Relay output N.O.	Safety contact NO channel 0	OUT	AC15 230V 4A / DC13 24V 2A
6	Not connected	-	-	-
7	Relay output N.O.	Safety contact NO channel 1	OUT	AC15 230V 4A / DC13 24V 2A
8	Relay output N.O.	Safety contact NO channel 1	OUT	AC15 230V 4A / DC13 24V 2A
X3 CONNECTOR				
9	BLNK-0	BLANKING input 0	IN	0 - 24 Vdc 10mA
10	BLNK-1	BLANKING input 1	IN	0 - 24 Vdc 10mA
11	BLNK-2	BLANKING input 2	IN	0 - 24 Vdc 10mA
12	GOVR-0	guard override input 0	IN	0 - 24 Vdc 10mA
13	GOVR-1	guard override input 1	IN	0 - 24 Vdc 10mA
14	MUTE-1	MUTING input sensor 1	IN	0 - 24 Vdc 10mA
15	MUTE-0	MUTING input sensor 0	IN	0 - 24 Vdc 10mA
16	MUTE-E	Muting enable input	IN	0 - 24 Vdc 10mA
X2 CONNECTOR				
17	TEST	TEST input	IN	0 - 24 Vdc 10mA
18	MUTE-S	Muting lamp output	OUT	0 - 24 Vdc 0,5A max
19	OSSD-S	OSSD lamp status outputs	OUT	0 - 24 Vdc 0,2A max
20	EDM	External device monitor input	IN	24 Vdc 10mA
21	START	Input of external RESET	IN	0 - 24 Vdc 10mA
22	START ENABLE	Selection of manual or automatic reset	IN	0 - 24 Vdc 10mA
23	GND	0V power supply	IN	0V
24	+24V	Positive power supply	IN	+24 Vdc +/- 10% 1A
X4 CONNECTOR				
25	PE	Ground	-	-
26	+24V	Positive power supply	IN	+24 Vdc +/- 10% 1A
27	GND	0V power supply	IN	0V
28	+24V	Positive power supply	IN	+24 Vdc +/- 10% 1A

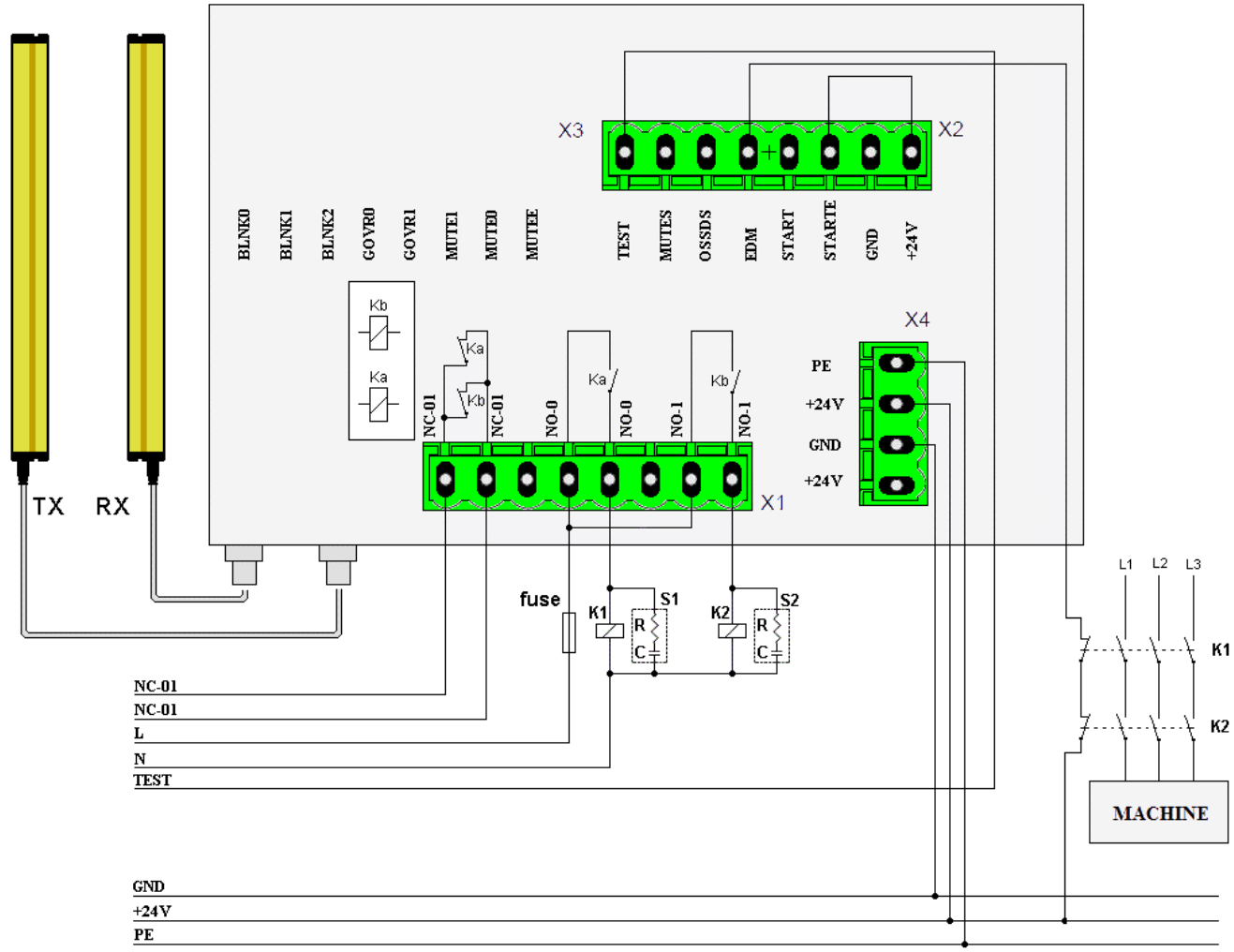
The contact status is referred to the control unit without power or with OSSDs ESPE deactivated.

WIRING CONNECTIONS

1 - BOX JNC cables shall be separated from power.
2 - BOX JNC 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 - REL021B

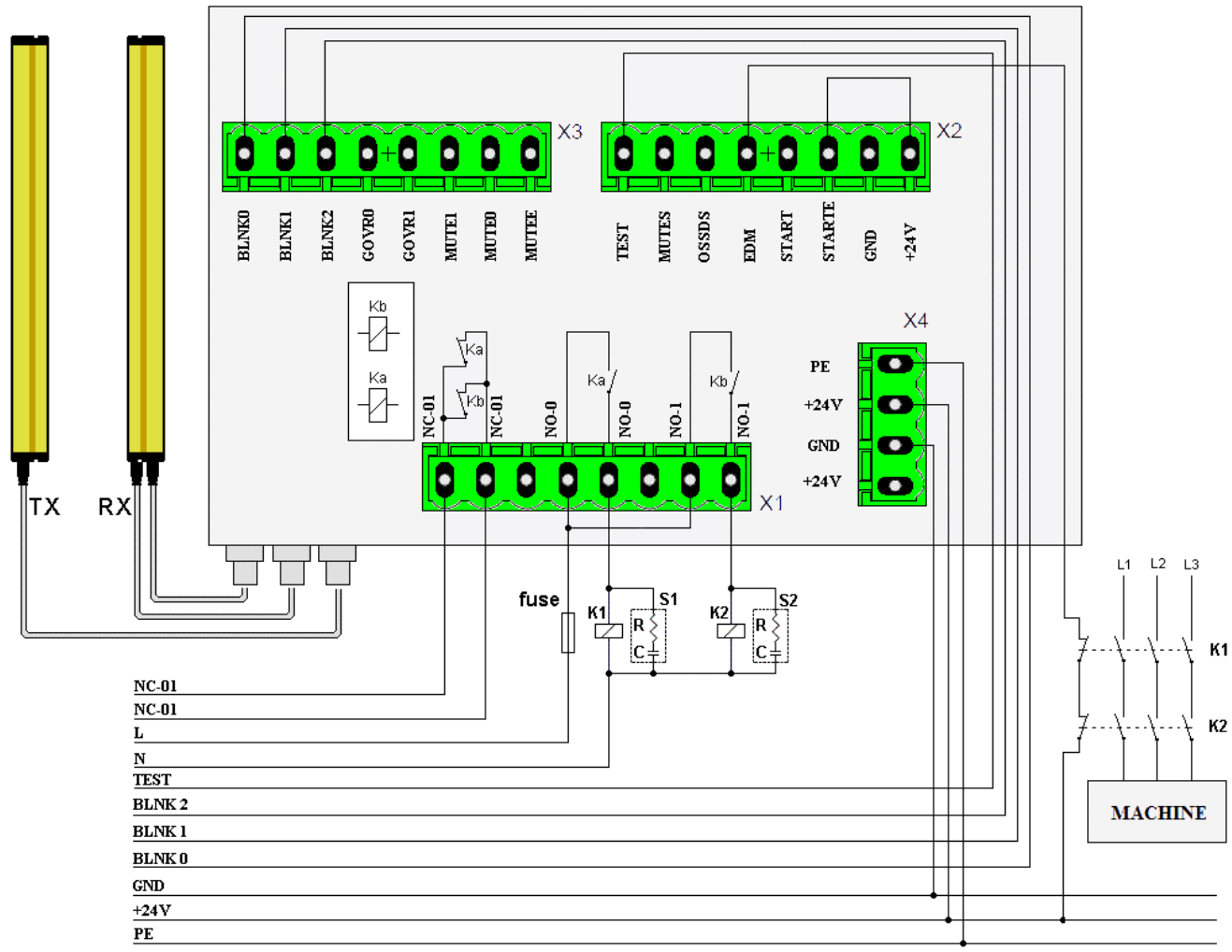
Connection scheme that provides the manual reset via key switch, OSSD state indicator, connection and control of external contactors.
The TEST signal can be lead outside to test the safety chain.
The signal START-E is connected to +24V, so the manual reset is selected.



If not used the external contactors control, connect the EDM input to +24V of X2 connector.

EXAMPLE OF CONNECTION - REL021D

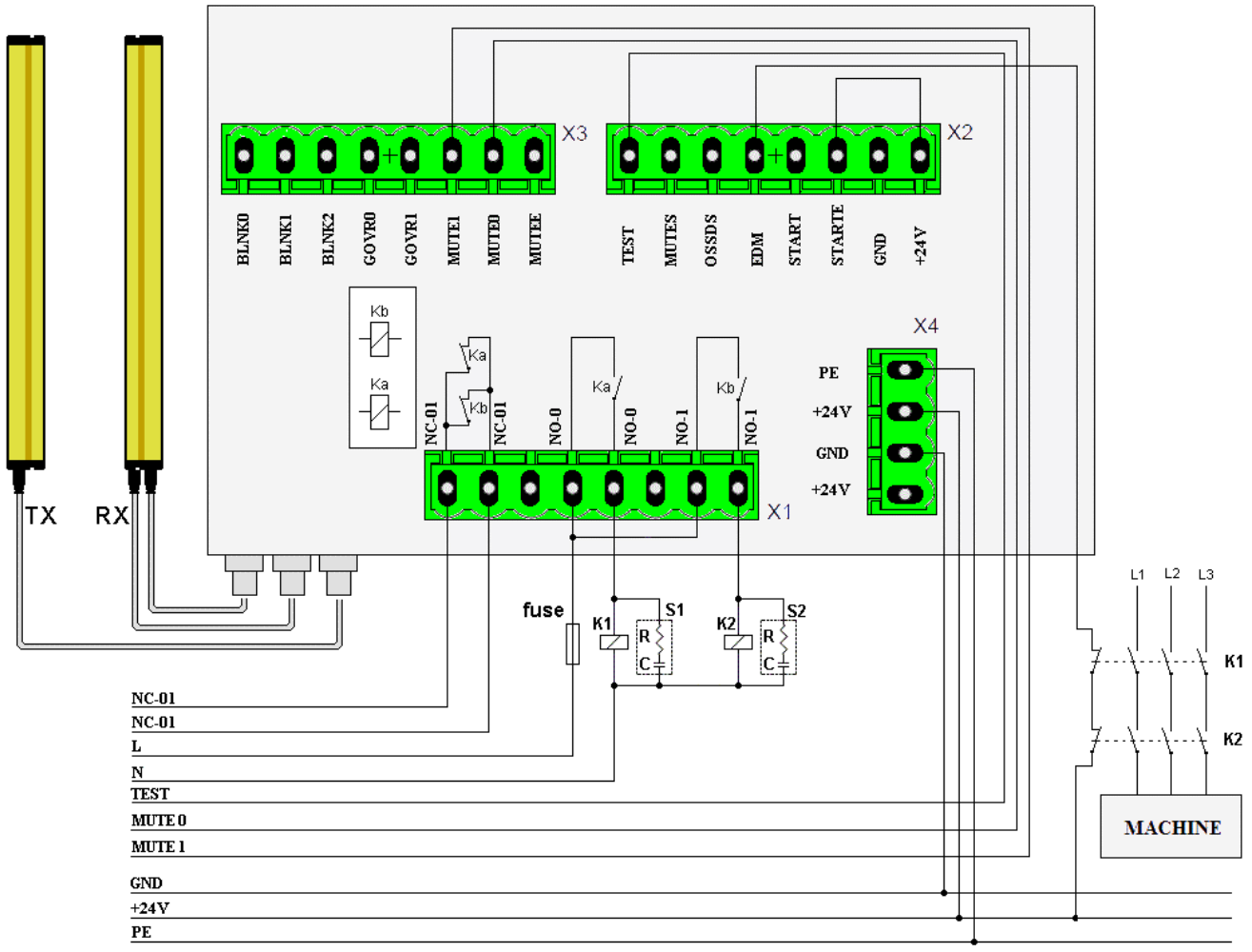
Connection scheme that provides the manual reset via key switch, OSSD state indicator, connection and control of external contactors.
The TEST signal can be lead outside to test the safety chain.
This module in conjunction with light curtain EFESTO connection D, allows to lead outside the BLANKING signals for setting the BLANKING function.



If not used the external contactors control, connect the EDM input to +24V of X2 connector.

EXAMPLE OF CONNECTION - REL022E

Connection scheme that provides manual reset via key switch, indicators of OSSD and MUTING state, connection and control of external contactors.
The TEST signal can be lead outside to test the safety chain.
This unit in conjunction with light curtain EFESTO / KEEPER connection E allows to lead outside the MUTING sensors 0 and 1.
A yellow indicator it's provided to indicate the activation of the MUTING function.
A key switch it's provided to activate the GUARD OVERRIDE function.



If not used the external contactors control, connect the EDM input to +24V of X2 connector.

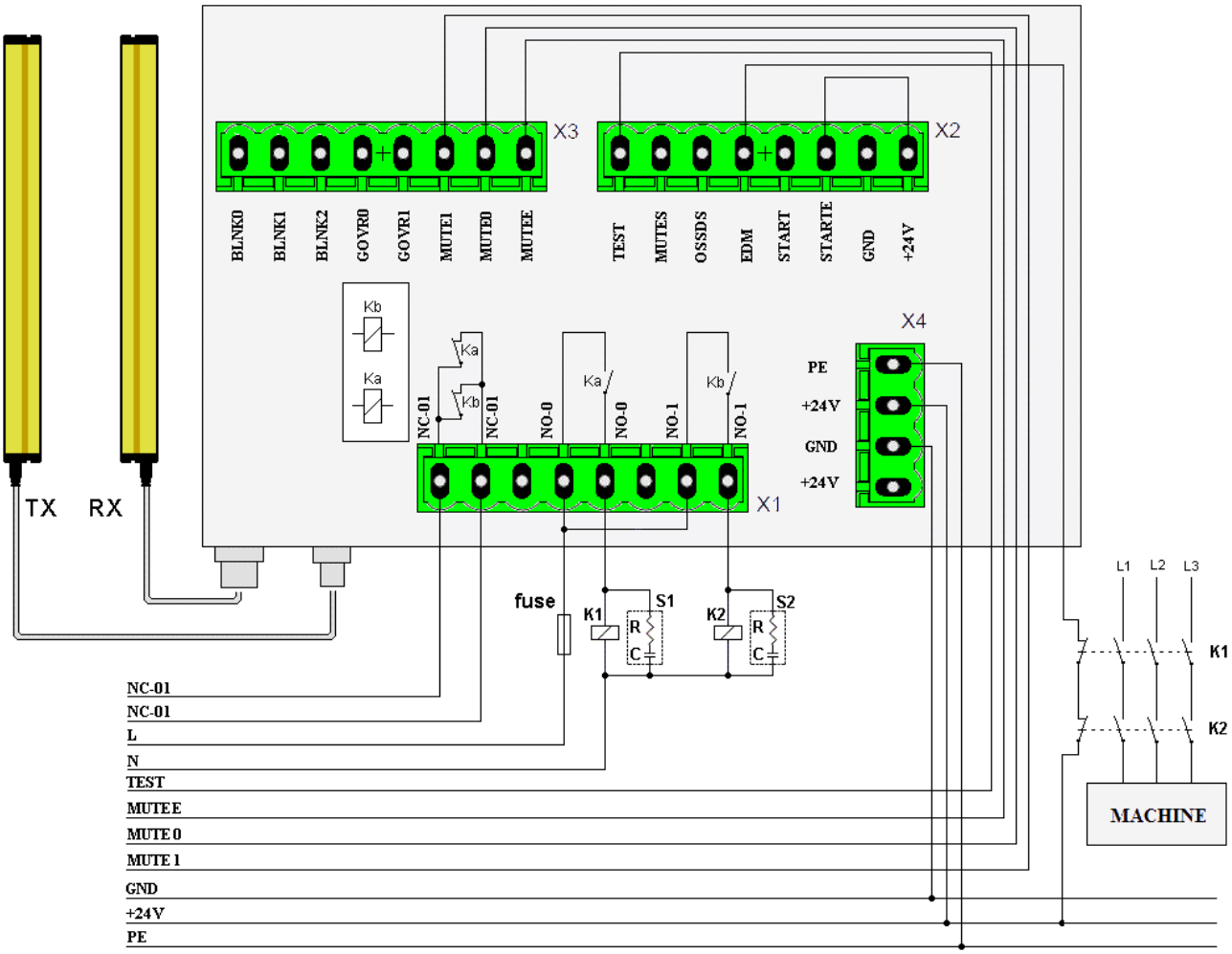
REL022F

This control unit provides the manual reset via key switch, indicators of OSSD and MUTING state, and the control of external contactors.
A yellow indicator is provided to indicate the activation of the MUTING function.
A key switch is provided to activate the GUARD OVERRIDE function.

In conjunction with light curtain EFESTO and KEEPER version F1 allows to lead outside the MUTING sensors 0, sensor 1 and muting enable signal.
In conjunction with light curtain KEEPER version H allows to setup the maximum muting time.

EXAMPLE OF CONNECTION REL022F – EFESTO / KEEPER F1

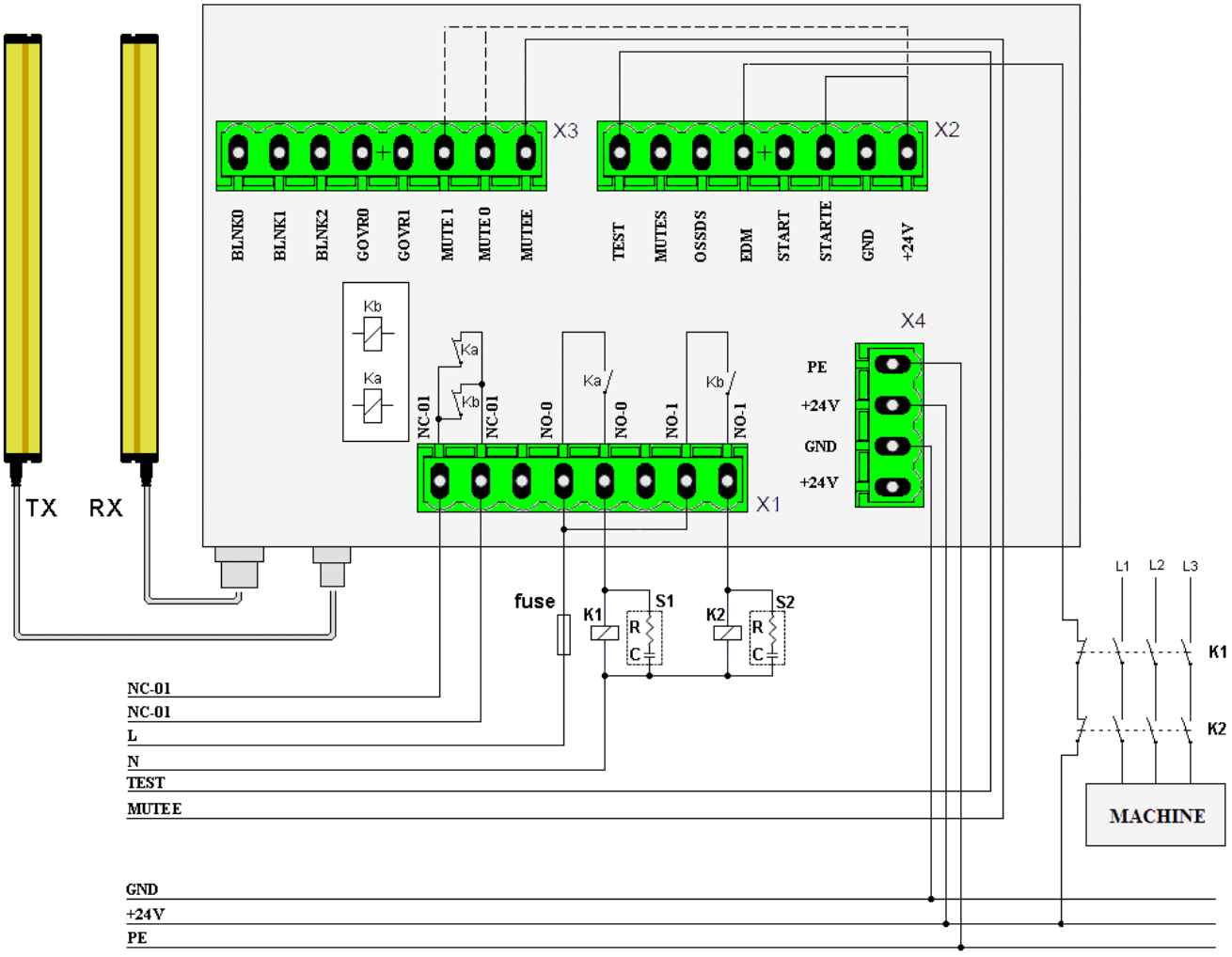
The MUTE 0 and MUTE 1 signals can be used to mute the barrier, the MUTE E to enable / disable the muting function. The TEST signal can be lead outside to test the safety chain.



If not used the external contactors control, connect the EDM input to +24Vdc of X2 connector.

EXAMPLE OF CONNECTION REL022F – KEEPER H

The MUTE-0 and MUTE-1 pins are used to setup the maximum muting time, the MUTE E to enable / disable the muting function. The TEST signal can be lead outside to test the safety chain.



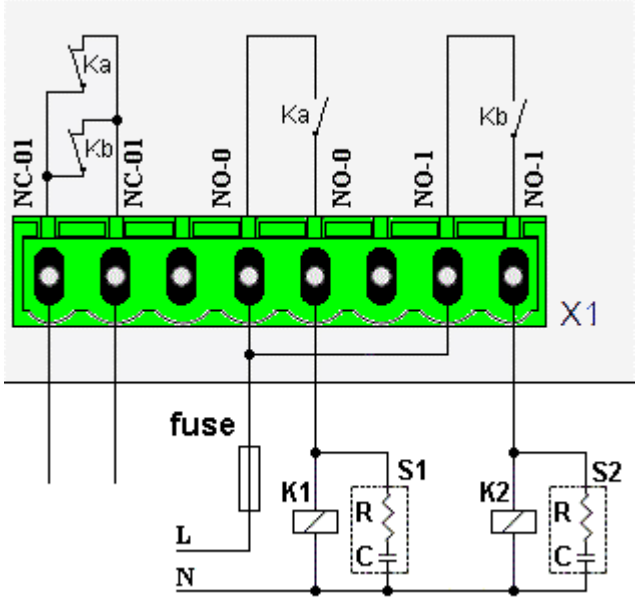
Pin MUTE-0 => TIME-0
Pin MUTE-1 => TIME-1

SETTINGS OF MAX MUTING TIME		
TIME - 0	TIME - 1	Maximum duration of the Muting
0V	0V	1 minute
0V	+24V	24 hours
+24V	0V	90 minutes
+24V	+24V	1 minute

ARC SUPPRESSOR FOR PROTECTION OF RELAY CONTACTS

Two noise filter (S1 and S2) must be connected across the K1 and K2 coil of the machinery control device, to avoid spikes on the relay contacts and increase their life.

S1 and S2 must be connected always and only in parallel to the load, must never be connected 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 = 1 µF

- for power supply 115 - 230 Vac
  R = 220 ohm
  C = 0.2 µF

MECHANICAL FITTING

The BOX JNC - Safety Relays Module, should be fixed properly following these guidelines:.

1) Do not mount the JNC box unit near sources of intense heat.
2) The BOX JNC control unit can be mounted in any position

INDICATIONS

MUTING LAMP	YELLOW - MUTING state

If yellow light is ON, the MUTING function is active.

OSSD LAMP	GREEN - OSSD state

If green light is ON, OSSD0 is active and vice-versa.

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 BOX JNC and of the ESPE. The test shall cover the correct interaction BOX JNC/ESPE 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 BOX JNC, the ESPE 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 BOX JNC, the ESPE connected to it and the components / units that affect the safety function must always be checked. For proper interaction with the BOX JNC, the ESPE connected to it must be checked that all the external components to it are tested

Periodical tests

Periodical tests 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 tests, 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 JNC verify that:

- The ESPE and the BOX JNC are supplied at 24Vdc
- Check the connections between ESPE and BOX JNC
- 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 BOX JNC are active (the N.O. contacts change from open to close) and the STATUS LAMP is ON.
Otherwise when the ESPE OSSDs are not active, the relays in the BOX DIN and the STATUS LAMP are OFF.
In the BOX JNC REL 022, activate the muting function and check the MUTING LAMP is ON.
To verify the GUARD OVERRIDE function, activate only one muting sensor, interrupt the main beams of the barrier, the OSSDs goes in OFF state. Activate the GUARD OVERRIDE with the key, check the STATUS LAMP pass from OFF to ON.

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 BOX JNC 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.

RESPONSE TIME CALCULATION

The total response time is given by the sum of the response time of the ESPE and the response time of BOX JNC

TOTAL RESPONSE TIME = ESPE RESPONSE TIME + BOX DIN RESPONSE TIME

EXAMPLE:

ESPE:	EF-B-0750B	=	11 ms
BOX DIN:		=	5 ms

TOTAL RESPONSE TIME = 11ms + 5ms = 16 ms

$MTTF_d/DC_{avg}$

MTTFd (years) AC15-230V-0,6A	MTTFd (years) DC13-24V-0,5A	NOTE
137,31	89,96	1 commutation each minute
686,15	449,81	1 commutation each 5 minutes
8238,64	5397,73	1 commutation each hour
197727,27	129545,45	1 commutation each day

Dcavg AC15-230V-0,6A	DCavg DC13-24V-0,5A	NOTE
99,00%	99,00%	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

The DCavg value becomes equal to zero if the EDM control is not used.

DIMENSIONS

The dimensions are the same for all the BOX JNC models.

Warranty

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"

These repairs of replacements shall be performed AT OUR WORKSHOP in MILANO.
Transport and workman-ship will be completely charged to purchaser.

Nothing will be owed to the purchaser 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.r.l. Milan

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

“CE” DECLARATION OF CONFORMITY

Il fabbricante **The manufacturer**

GREIN S.r.l.

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

Dichiara che **Declares that**

Il relè di sicurezza BOX JNC è fabbricato in conformità al campione esaminato da:

The safety relay BOX JNC is manufactured in accordance to the sample examined by

Prima Ricerca & Sviluppo S.r.l.
Via Campagna, 92
22020 Faloppio Italia

Direttive applicate **Applied directives**

2006/42/ EC	Direttiva Macchine	Machine Directive
2006 /95/EC	Direttiva Bassa Tensione	Low Voltage Directive
2004/108/EC	Compatibilità Elettromagnetica	ElectroMagnetic Compatibility Directive

Norme applicate **Applied standards**

EN ISO 13849-1/2 (2008)

NAME : Perissinotto Antonio
POSITION : C E O GREIN S.r.l.

Milan, gen 2016

GREIN s.r.l.
Amministratore Unico
A. Perissinotto