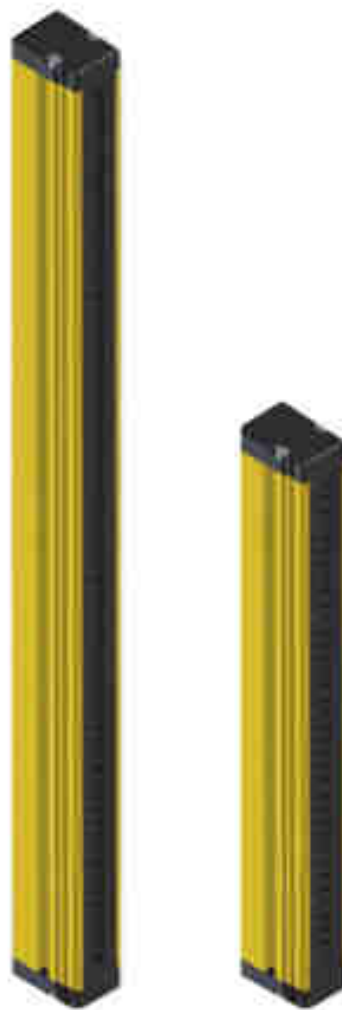


“EFESTO4” Safety Light Curtain with multi beams

Instruction use and maintenance



IMPORTANT REMARKS ON SAFETY

As this device, for the safety of operators working on dangerous machinery, it is necessary that an authorised person should carry out the installation carefully while making notes, and maintain such records for future instruction and maintenance.

The safety light curtain forms only one link of the safety system.

Therefore, complete system performance remains the responsibility of the machine builder or end user.

Please observe all technical details and recommendations reported in this installation/instruction manual without exception and with strict adherence to all applicable local, National and International Safety Standards and guidelines which may apply to the machines.

GREIN is not responsible for any dangerous occurs to a not good employ of the product.

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GENERAL INFORMATIONS

The EFESTO4 light curtain is a optoelectronic system with multi beams (**Electro-Sensitive Protective Equipment**) type 4 for the protection of body to prevent accident on the machine on dangerous plants in accordance with International safety standards.

EFESTO4 is formed of an emitter and a receiver unit synchronized through a optic link. The safety output are at solid state with possibility to transform on power with relays inserted on special module.

The wide range of model permit the employ on every field of industrial automation supplying the protection of the fingers, hand, arm, body, for the movement on dangerous area.

The principal application are: presses, robotized areas, highly automated equipment, and many others.

The series EFESTO4 is divided in different models on the basis of the functions implemented. This system allows the customer to choose the most adequate model of barrier in according to his requirements. To complete the range are available some interconnection modules to connect the barrier without to pass to the general panel of machine.

TERMS AND DEFINITIONS

OSSD0	Safety output channel zero.
OSSD1	Safety output channel one.
OSSD STATO ON	Condition on which the output permits the flow of current.
OSSD STATO OFF	Condition on which the output don't permit the flow of current.
EDM	External Device Monitor.
RESET	OSSD restart from OFF to ON.
MUTING	Temporary suspension of the safety function.
OVERRIDE	Manual muting function after a mistake in automatic muting.

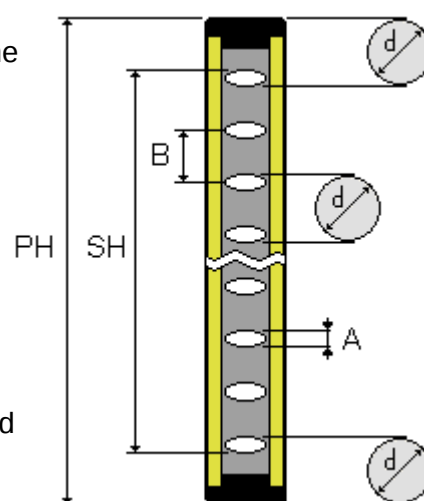
Protective height PH
It is the zone in which the test rod will stop the barrier.

Sensitive height SH
It is the zone covered by the beams.

A
Active part of the lens.

B
Beam spacing in mm.

Resolution d
It is the minimum object detected on protected area, Is the dimension necessary for the obscuration of two adjacent beams.
 $d = A + B$.



Technical characteristics

Synchronization Tx Rx	Optical
Total aperture angle	5°
Wave lenght	940 nm
Resolutions	14, 20, 30, 40, 55, 65, 175, 185, 320, 330 mm
Maximum range	6 - 15 - 30 - 60m depending from the resolution
Protected height	from 200 mm to 3000 mm
Maximum speed	3,3 m/s (of test rod 150mm length)
Output	2 PNP - 500 mA short circuit and overload protected
Connections	M12 5 / 8 poles or M23 17 in functions of the model and options
Power supply	24Vcc $\pm$ 10% PELV
Response time	From 5 to 30ms depending to number of beams
Max connections lenght	100 m
Body	Extruded aluminium, 36 x 50, RAL 1.021
IP protection degree	IP 65
Relative umidity	5 - 95%
Working temperature	0 ÷ 65 °C
Safety level	Ttpe 4 - SIL 3 - SILCL 3 - PL e – Cat. 4

Functions

Reset	Selection of the restart of the barrier
Type	Automatic or manual
Restart time	100 ms
Blanking	Beams exclusion
N of beams	1, 2 or 3 beams
Type	Blanking with or without the presence of the object
Selection	Through wiring, are not necessary programming modules
MUTING	Temporary exclusion of safety function of the barrier
Muting type	Two sensors, with contemporaneity control
Muting enable	Enable / disable muting function
Override	Manual override of muting function
Muting lamp output	Output for muting lamp, 24V 500mA max
EDM	External Device Monitor
OSSD-S	Output signaling of the safety outputs state
MUTE - F	Output for signaling of interrupted barrier when muting active
TEST	Simulation of interruption of light curtain beams barrier, to facilitate the monitoring of the safety of the machine
BARGRAPH	3 led for alignment and indications

INSTALLATION GUIDELINES

Correct Installation



frontal protection

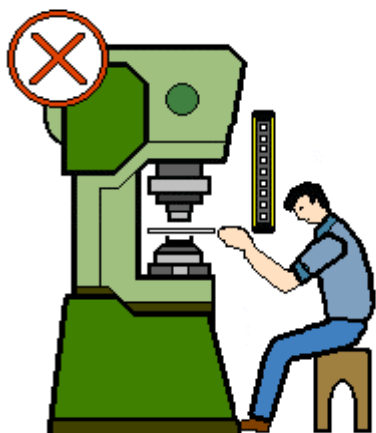


vertical and horizontal protection



oblique protection

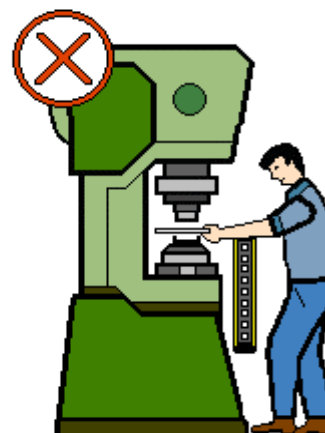
Incorrect installation



insertion into the danger zone under the barrier



insertion between the barrier and dangerous zone



insertion into the dangerous zone above the barrier

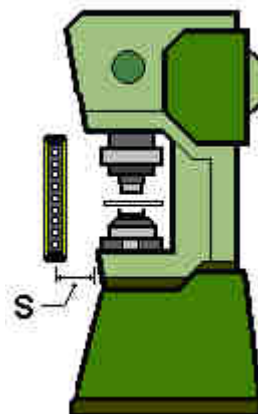
Refer to the standard EN ISO 13855 for a correct installation of the safety device

DETERMINATION OF SAFETY DISTANCE

Before of the installation it is necessary to calculate the safety distance in order to allow the stop of the machine before the operator or part of his body enter in the dangerous area (as described in EN 999 and ISO 13855).

Definitions:

- S** safety distance in mm
- T1** response time of machine in msec
- T2** response time of curtain in msec
(see TX / RX label)
- d** resolution of the system in mm



Vertical installation

Models with resolution up to 40mm

The following formula is valid for a distance S included between 100 and 500 mm :

$$S = 2 (T1 + T2) + 8 (d - 14)$$

If **S** results more of 500mm, use the following formula :

$$S = 1,6 (T1 + T2) + 8 (d-14)$$

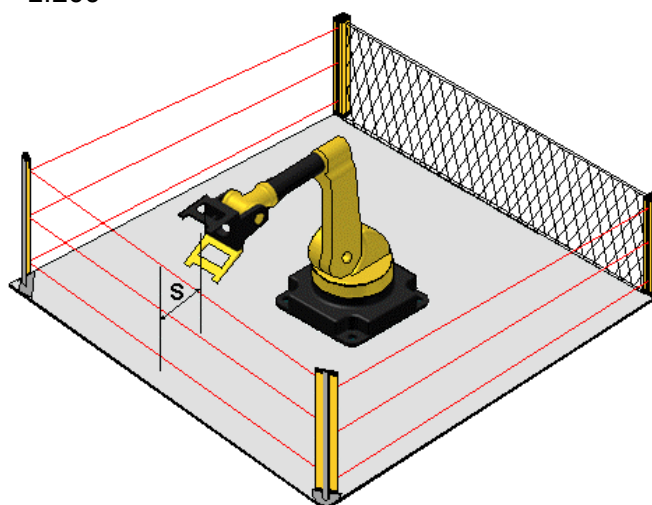
Models with resolution more than 40 and up to 90 mm

$$S = 1,6 (T1 + T2) + 850$$

The highest beam must be placed at a minimum height of 900 mm from the installation plane of the machine, while the inferior beam must be at a height less than 300 mm

Models with resolution more than 90 mm

$$S = 1,6 (T1 + T2) + 1.200$$



DETERMINATION OF SAFETY DISTANCE

Horizontal installation

For all types of light curtains with horizontal installation, to detect intrusion of legs and body, the distance **S** shall be calculated using formula :

$$S = 1,6 (T1 + T2) + K$$

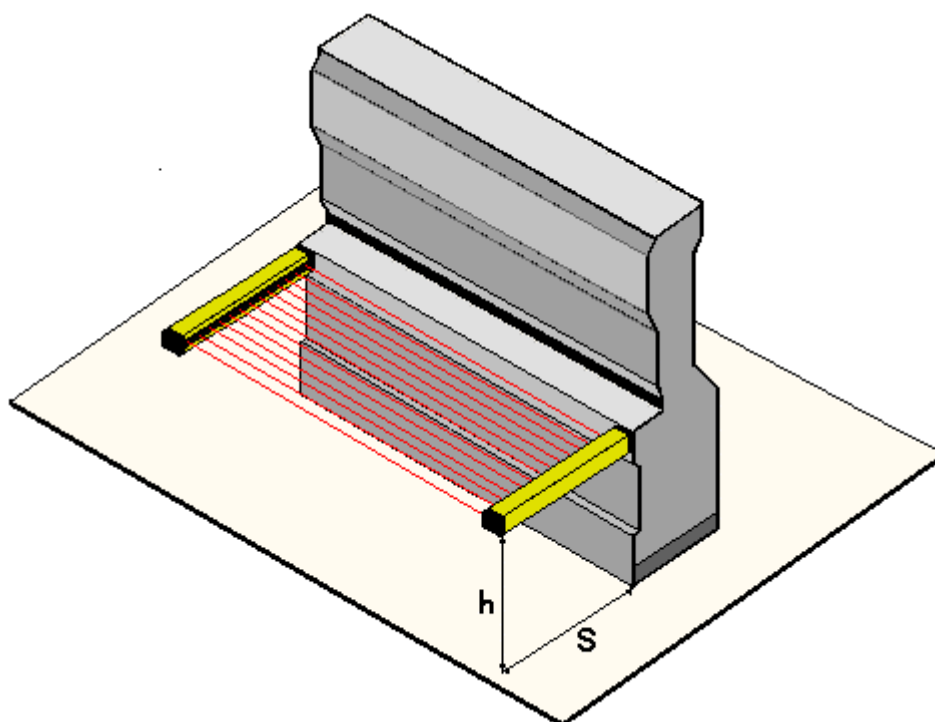
where:

K = (1200 - 0.4 H)) must be > 850 mm
H = height of curtain in mm from ground

H must be lower than the working plane, and in any case don't higher than 1.000 mm

Example using a light curtain with resolution 50 mm height of working plane 800 mm:

T1 = 100msec
T2 = 10 msec
H = 750 mm
K = 1200 - 0.4 x 750 = 900 mm
S = 1.6 (100 + 10) + K = 1076 mm



MINIMUM DISTANCE TO AVOID THE REFLECTIONS

The beam angle of optic and alignment tolerance for emitter and receiver is 5 degrees. Since reflective surfaces near the detection zone can cause reflections and therefore non-detection of an object, a minimum distance **A** to the optical axis, should be observed according to the following formula:

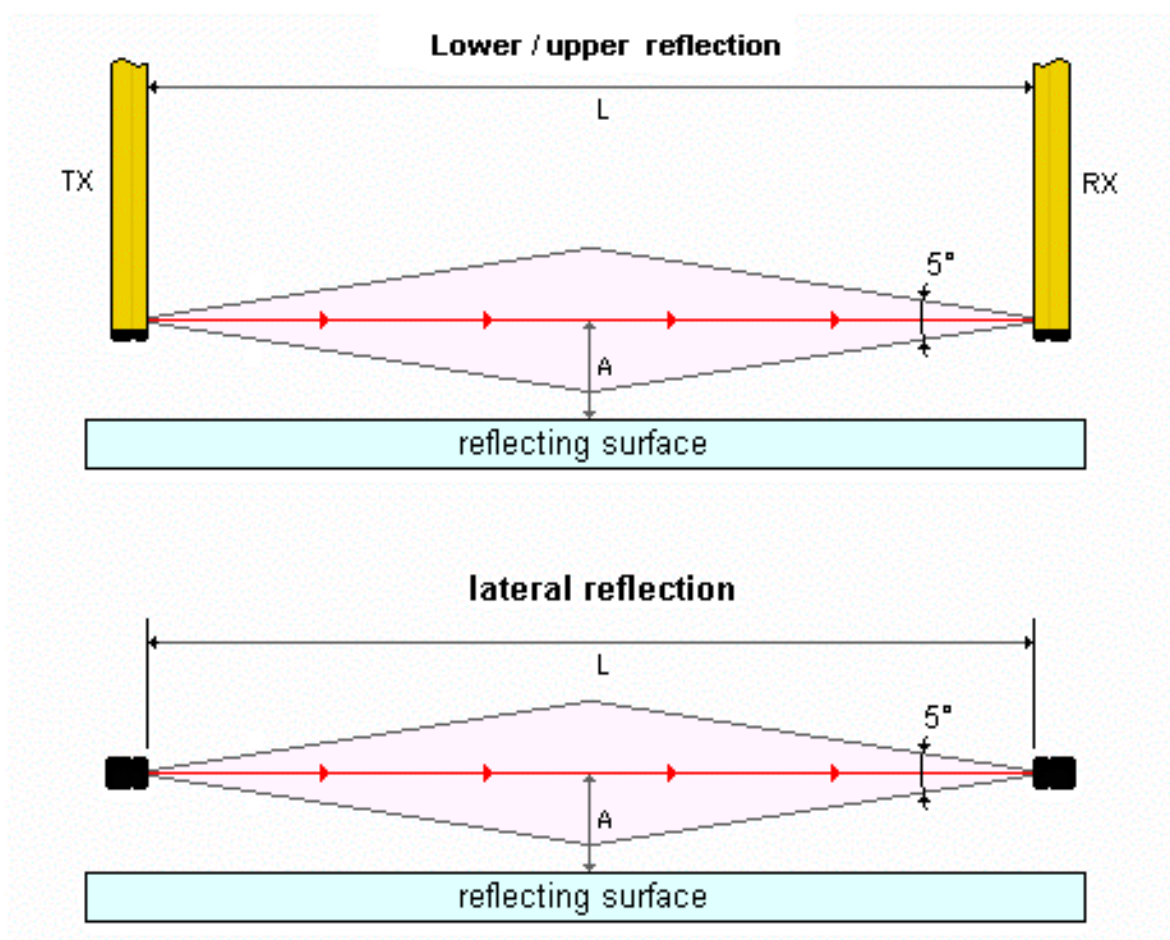
$$A = 44 L \quad \text{where } A \text{ is in mm, } L \text{ is in m}$$

A should never be less than 131 mm

To verify the above, after the installation of the light curtain, is necessary to pass the test rod through the detection zone, near the emitter, the receiver and in the middle of the detection zone, verifying that :

If selected the automatic restart the LED OS OFF should remain always ON;
If selected the manual restart the LED BMS should remain always OFF.

If the indication are not as described above, there is a hole in the detection zone due to reflection. Modify the position of the barrier in order to avoid the reflection.

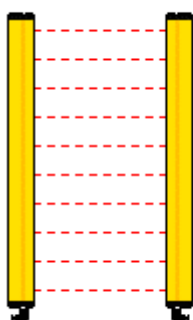


MECHANICAL ASSEMBLY

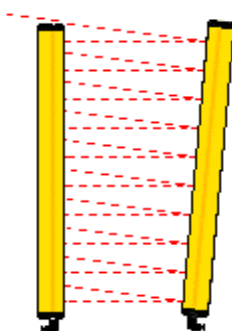
During the installation it is necessary to verify the right position of emitter and receiver in order to check that they are in the same plane and axis as shown on the following drawings.

SIDE VIEW :

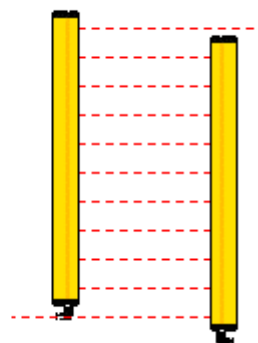
CORRECT



ANGULAR MISTAKE



AXIAL MISTAKE

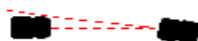


TOP VIEW :

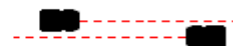
CORRECT



ANGULAR MISTAKE



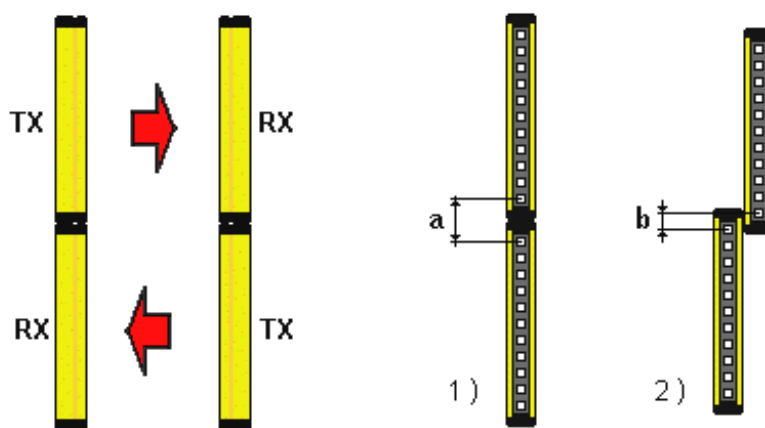
AXIAL MISTAKE



GROUPING OF LIGHT CURTAINS

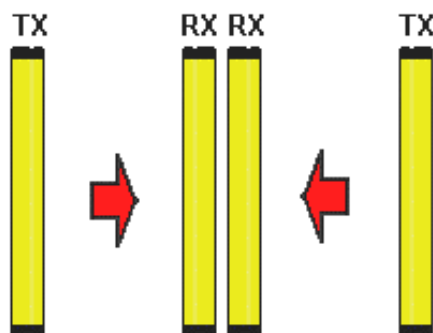
Linear assembly: to increase the protected height

To avoid the reciprocal interference between 2 light curtains it is necessary that the emitter and receiver are mounted on opposite sides.



- 1) Example of two light curtains on the same axis with a non constant resolution in the joint point
- 2) Example of two light curtains no aligned to maintain constant resolution in the joint point.

Suggestions to avoid interference between light curtains assembled in line in case of long distances or protected machines installed in series:

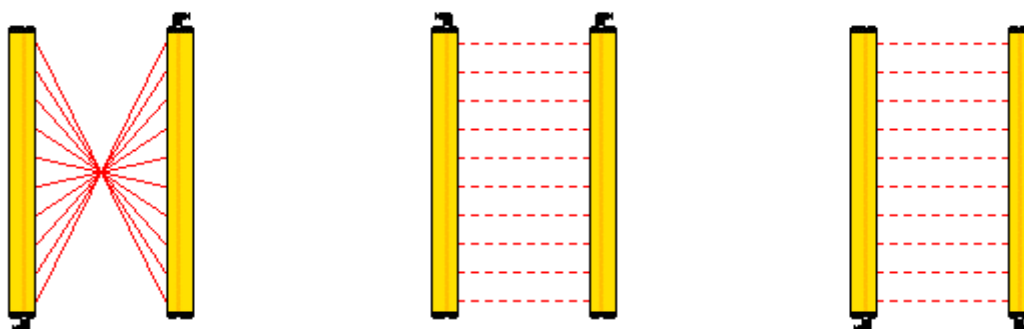


The light curtain can work on vertical position or upside-down.
Don't turn the transmitter in the opposite direction of the receiver, it changes the protected field.

Wrong

Right

Right



LIGHT CURTAINS FOR ANGLED APPLICATION "L" SHAPE (master and slave)

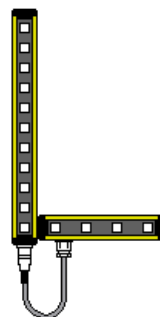
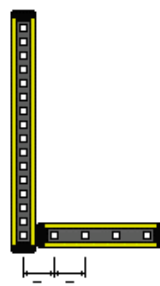
Where the safety distance is particularly long (for example using large presses) it is necessary that nobody can enter in the dangerous area at the restart of the machine. This problem can be solved by installing the angled version light curtain, which consists of a vertical unit (MASTER) and an horizontal unit (SLAVE) used to stop behind protection.

The vertical light curtain is provided with one fixed cable of length max. 0.5m and a male connector. The horizontal light curtain is provided with female connector only.

Particular attention must be taken during the installation, insuring that on the point where the light curtains meet, the resolution must be the same as the horizontal light curtain (see drawing below).

As the two units (vertical and horizontal) works electrically as one light curtain, particular attention must be taken during the installation, the system will operate only if all the vertical / horizontal - emitter / receiver are perfectly aligned. The bargraph can help in this operation.

On this solution, the function of floating blanking is active only on vertical light curtain (MASTER). On the horizontal unit (SLAVE) the blanking is not active and the interruption of a single beam leads OSSD in the OFF state.



Connection Master / slave

Model and function

All model have the following features :

- TX with M12 4 poles connector and test input ;
- RX with 2 solid state PNP output ;
- Automatic reset;
- Bargraph with 3 led for alignment and signaling.

Functions and connections available of different models

Model	Function available							RX Connectors		
	RM	EDM	BLNK	MUTE-E	MUTE	O-S	M-F	M12 5P	M12 8P	M23-17P
EF - a ...								•		
EF - b ...	•	•							•	
EF - c ...			•						•	
EF - d ...	•	•	•			•		•	•	
EF - e ...	•	•			•			•	•	
EF - f1 ...	•	•		•	•	•				•
EF - f2 ...	•	•		•	•		•			•

... optical code

Optic

optic	Resolution	Min. Range	Max range
__ A	14 mm	0	6 m
__ AL	20 mm	2 m	15 m
__ B	30 mm	0.5m	15 m
__ BL	40 mm	5 m	30 m
__ C	55 mm	0.5m	15 m
__ CL	65 mm	5 m	30 m
__ D	175 mm	0.5m	15 m
__ DL	185 mm	5 m	30 m
__ E	320 mm	0.5m	15 m
__ EL	330 mm	5 m	30 m

__ protection height

Note, are available special versions __DLL and __ELL with range from 6 up to 60m

LEGEND

RM	Manual reset
EDM	External Device Monitoring
BLNK	Blanking
MUTE-E	Input for muting enable
MUTE	Input of 2 external sensors + guard override + signaling lamp
O-S	Output signaling the status of the safety outputs
M-F	Output signaling the status of interrupted barrier during the muting state.

RECEIVER CONNECTIONS

M12-5P	Connector M12 - 5 Poles - male
M12-8P	Connector M12 - 8 Poles - male
M23-17P	Connector M23 - 17 Poles - male

Wiring connection

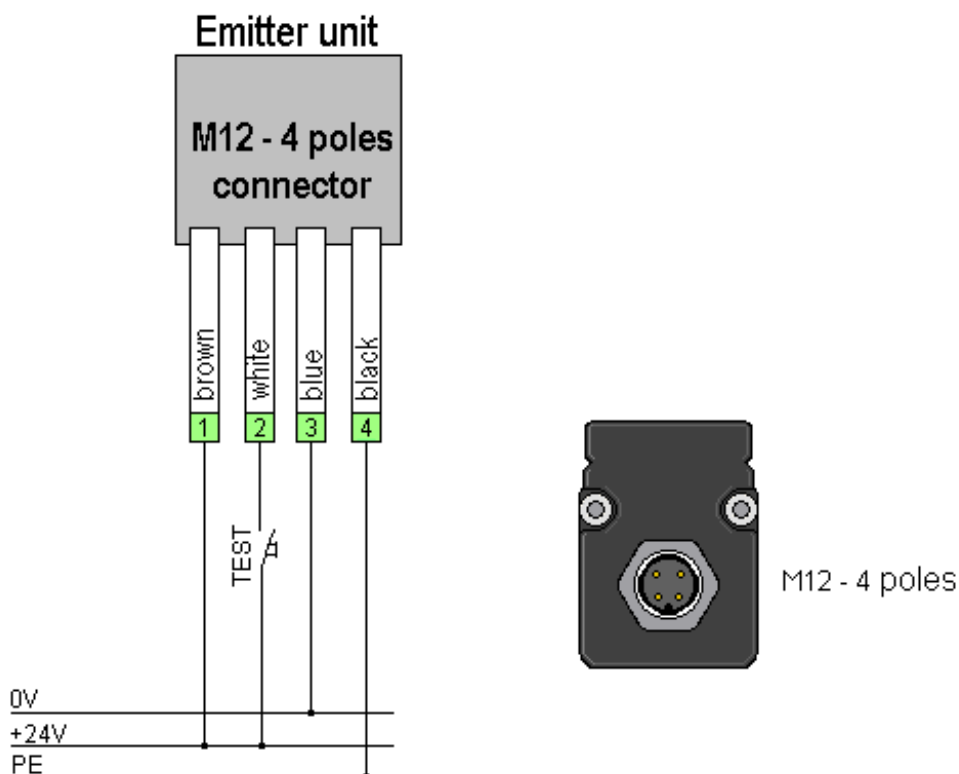
Warning on connection cables

- 1 – Use cables with section of 1 mm² for length connection more than 50m.
- 2 – The units TX / RX shall be connect to the ground (PE).
- 3 – All the cables shall follow different way from those of power.
- 4 – The power of the barrier should be separated from that of equipment dedicated to the control of power equipment, such as inverters.
- 5 – If there is the possibility to damage the cables, take care to protect them against crushing or cutting.
- 6 – The cables should be shielded type, the shield should be connected to the ground (PE).

Emitter connection

Emitter		EF - ... -			
Pin N	Wire color	Function	Description	Type	Level
M12 4 poles					
1	Brown	+24V	Positive power supply	IN	+24Vdc +/- 10% 0,5A
2	White	TEST	TEST signal	IN	0 - 24 Vdc 10mA
3	Blue	GND	0V power supply	IN	0V
4	Black	PE	Ground	-	-

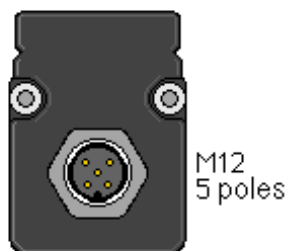
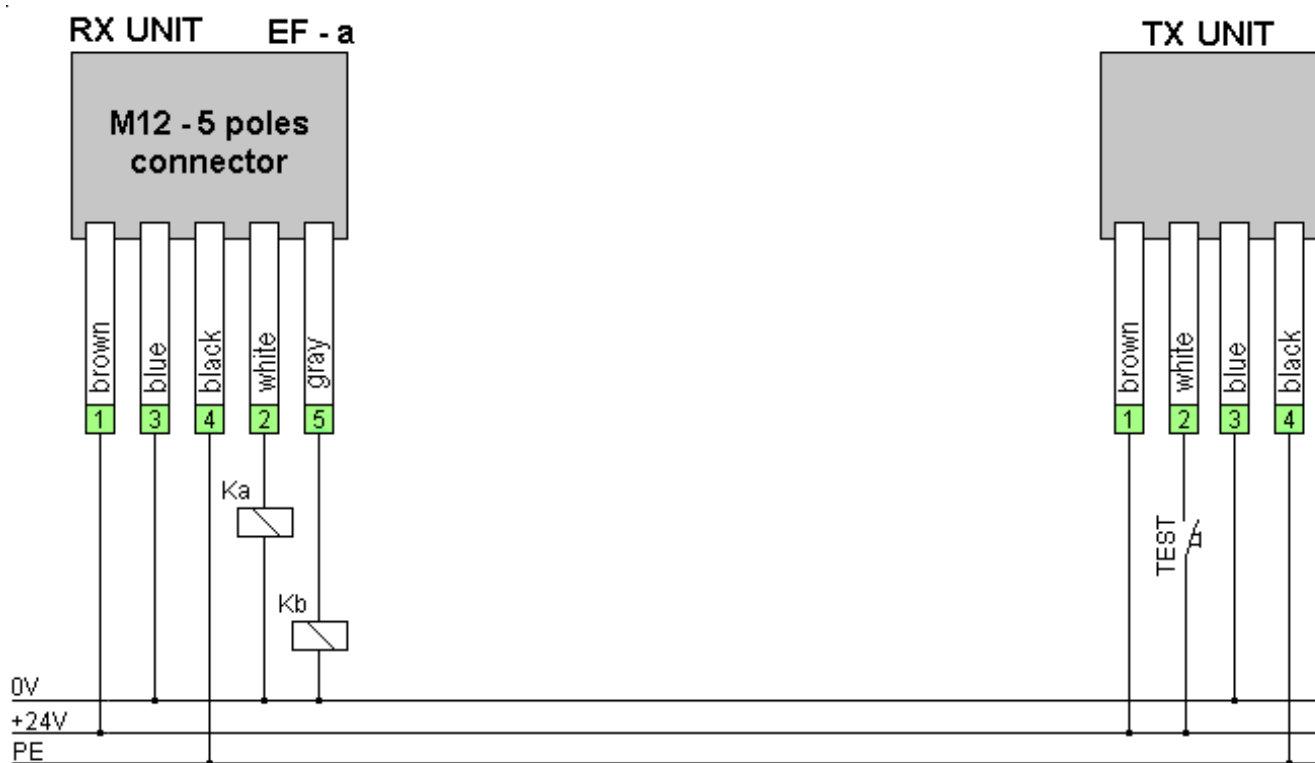
Example of connection



EF- a CONNECTION

Receiver		EF-a - ... - Base			
Pin N	Wire color	Function	Description	Type	Level
M12 5 poles					
1	Brown	+24V	Positive power supply	IN	+24Vdc +/- 10% 1A
2	White	OSSD-0	Static safety output 0	OUT	0 - 24 Vdc 0,5A max
3	Blue	GND	0V power supply	IN	0V
4	Black	PE	Ground	-	-
5	Grey	OSSD-1	Static safety output 1	OUT	0 - 24 Vdc 0,5A max

Example of connection

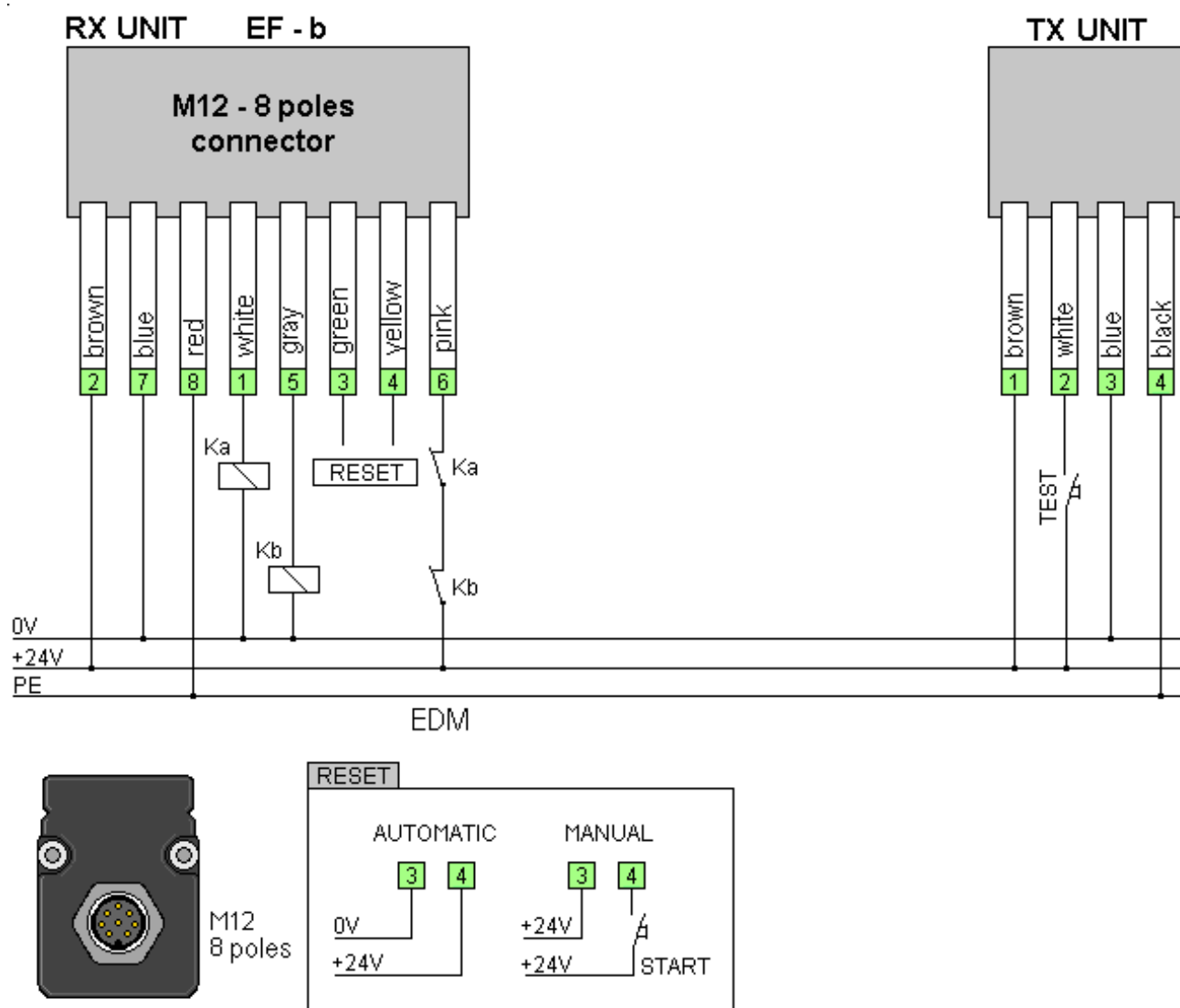


This version doesn't have the control of the external relays. The OSSD output must be connected to the machine through a safety module or a PLC.

EF- b CONNECTION

Receiver		EF-b - ...	Reset + Edm		
Pin N	Wire color	Function	Description	Type	Level
M12 8 poles					
1	White	OSSD-0	Static safety output 0	OUT	0 - 24 Vdc 0,5A max
2	Brown	+24V	Positive power supply	IN	+24Vdc +/- 10% 1A
3	Green	START ENABLE	Selection of manual or automatic reset	IN	0 - 24 Vdc 10mA
4	Yellow	START	Input of external RESET	IN	0 - 24 Vdc 10mA
5	Gray	OSSD-1	Static safety output 1	OUT	0 - 24 Vdc 0,5A max
6	Pink	EDM	External device monitor input	IN	0 - 24 Vdc 10mA
7	Blue	GND	0V power supply	IN	0V
8	Red	PE	Ground	-	-

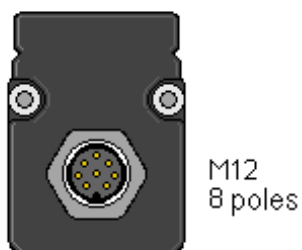
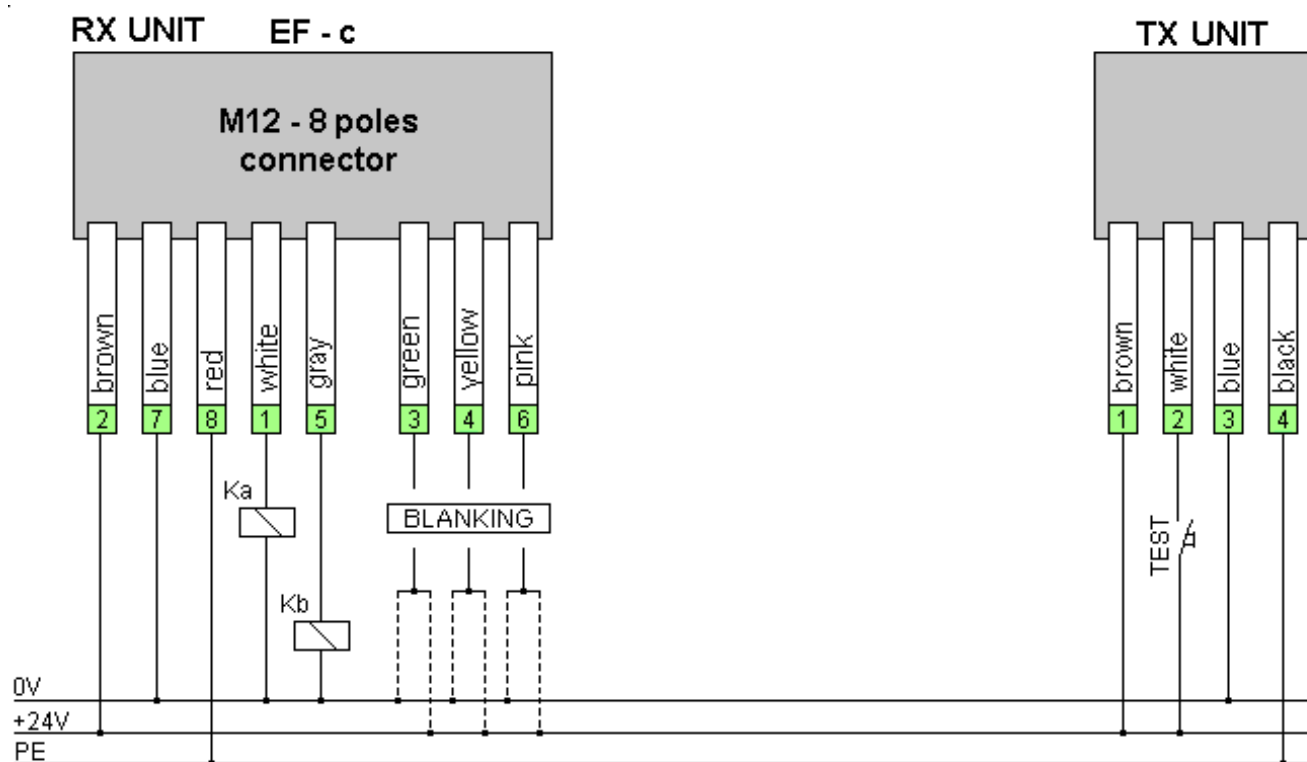
Example of connection



EF- c CONNECTION

Receiver		EF-c - ...	Blanking		
Pin N	Wire color	Function	Description	Type	Level
M12 8 poles					
1	White	OSSD-0	Static safety output 0	OUT	0 - 24 Vdc 0,5A max
2	Brown	+24V	Positive power supply	IN	+24Vdc +/- 10% 1A
3	Green	BLNK-0	BLANKING input 0	IN	0 - 24 Vdc 10mA
4	Yellow	BLNK-1	BLANKING input 1	IN	0 - 24 Vdc 10mA
5	Gray	OSSD-1	Static safety output 1	OUT	0 - 24 Vdc 0,5A max
6	Pink	BLNK-2	BLANKING input 2	IN	0 - 24 Vdc 10mA
7	Blue	GND	0V power supply	IN	0V
8	Red	PE	Ground	-	-

Example of connection

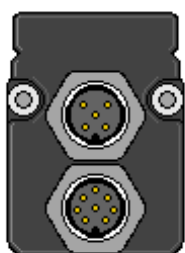
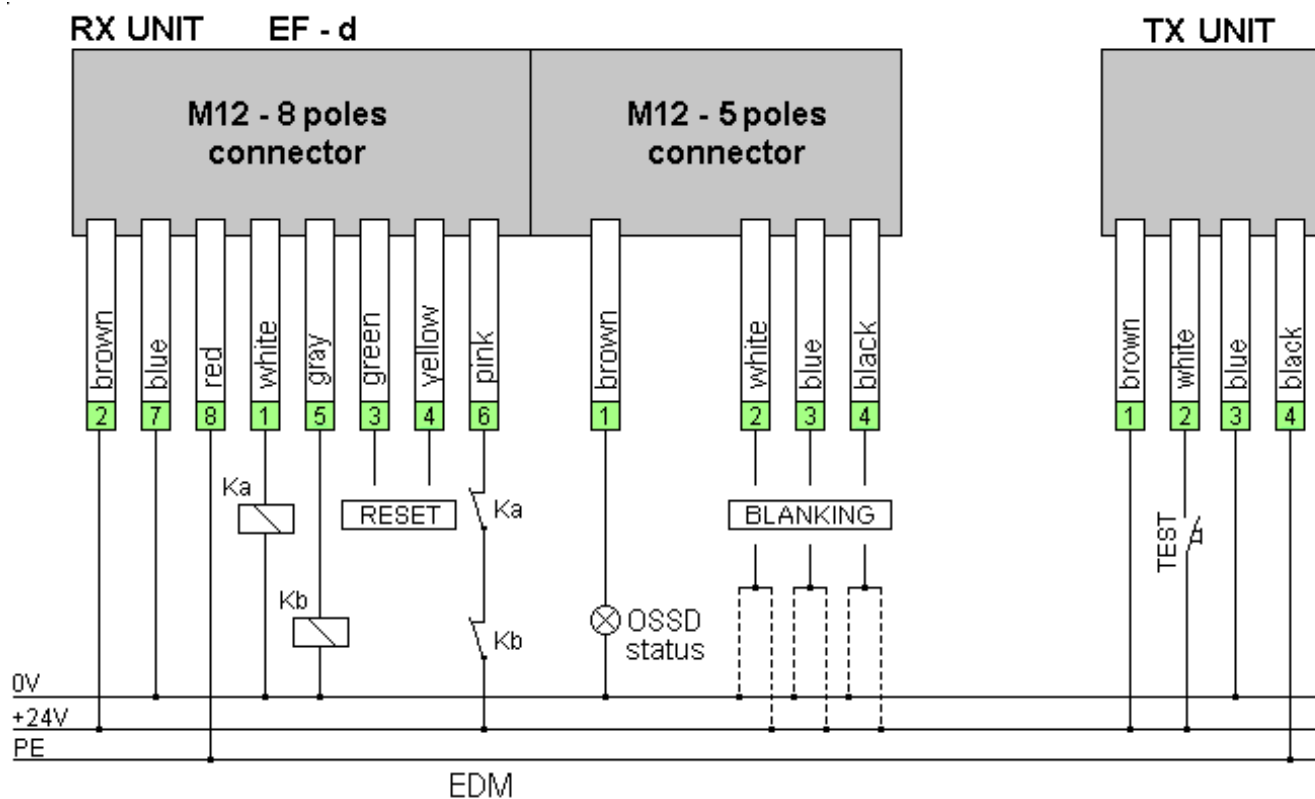


This version doesn't have the control of the external relays. The OSSD output must be connected to the machine through a safety module or a PLC.

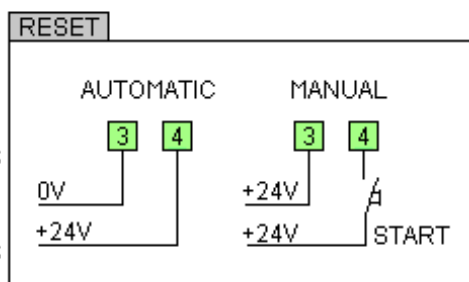
EF- d CONNECTION

Receiver		EF-d - ...	Reset + Edm + Blanking				
Pin N	Wire color	Function	Description	Type	Level		
M12 8 poles							
1	White	OSSD-0	Static safety output 0	OUT	0 - 24 Vdc	0,5A max	
2	Brown	+24V	Positive power supply	IN	+24Vdc +/- 10%	1A	
3	Green	START ENABLE	Selection of manual or automatic reset	IN	0 - 24 Vdc	10mA	
4	Yellow	START	Input of external RESET	IN	0 - 24 Vdc	10mA	
5	Gray	OSSD-1	Static safety output 1	OUT	0 - 24 Vdc	0,5A max	
6	Pink	EDM	External device monitor input	IN	0 - 24 Vdc	10mA	
7	Blue	GND	0V power supply	IN	0V		
8	Red	PE	Ground	-	-		
M12 5 poles							
1	Brown	OSSD-S	Output signaling of the safety outputs state	OUT	0 - 24 Vdc	0,2A max	
2	White	BLNK-0	BLANKING input 0	IN	0 - 24 Vdc	10mA	
3	Blue	BLNK-1	BLANKING input 1	IN	0 - 24 Vdc	10mA	
4	Black	BLNK-2	BLANKING input 2	IN	0 - 24 Vdc	10mA	
5	Grey	nc		-	-		

Example of connection



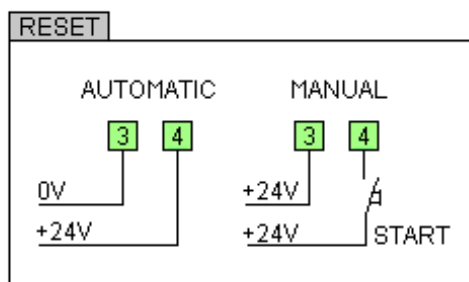
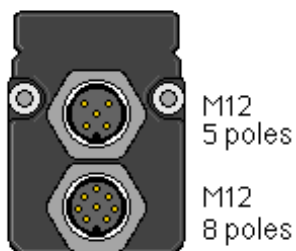
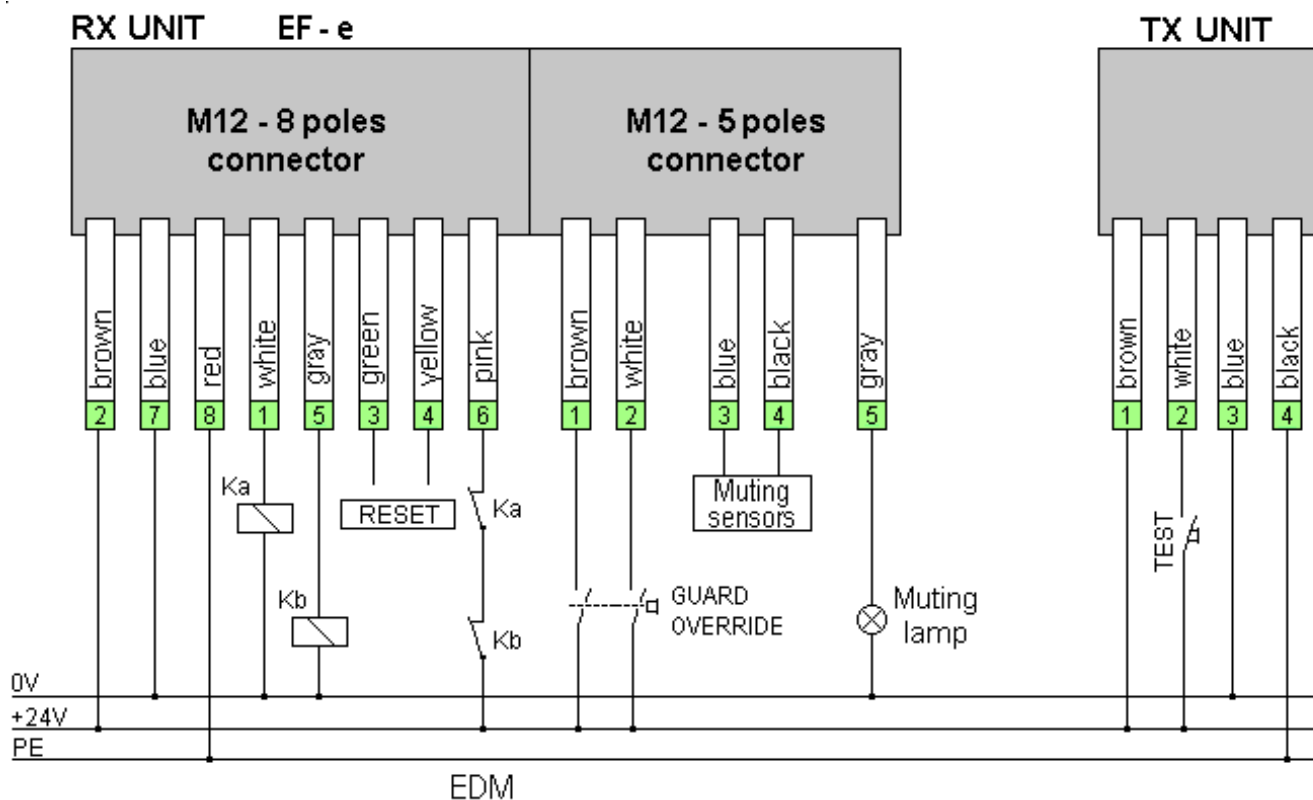
M12 5 poles
M12 8 poles



EF- e CONNECTION

Receiver		EF-e - ...	Reset + Edm + Muting	
Pin N	Wire color	Function	Description	Type Level
M12 8 poles				
1	White	OSSD-0	Static safety output 0	OUT 0 - 24 Vdc 0,5A max
2	Brown	+24V	Positive power supply	IN +24 Vdc +/- 10% 1A
3	Green	START ENABLE	Selection of manual or automatic reset	IN 0 - 24 Vdc 10mA
4	Yellow	START	Input of external RESET	IN 0 - 24 Vdc 10mA
5	Grey	OSSD-1	Static safety output 1	OUT 0 - 24 Vdc 0,5A max
6	Pink	EDM	External device monitor input	IN 0 - 24 Vdc 10mA
7	Blue	GND	0V power supply	IN 0V
8	Red	PE	Ground	- -
M12 5 poles				
1	Brown	GOVR-0	Guard override input 0, bypass of the muting function	IN 0 - 24 Vdc 10mA
2	White	GOVR-1	Guard override input1, bypass of the muting function	IN 0 - 24 Vdc 10mA
3	Blue	MUTE-0	Muting 0 input	IN 0 - 24 Vdc 10mA
4	Black	MUTE-1	Muting 1 input	IN 0 - 24 Vdc 10mA
5	Grey	MUTE-S	Muting lamp output	OUT 0 - 24 Vdc 0,5A max

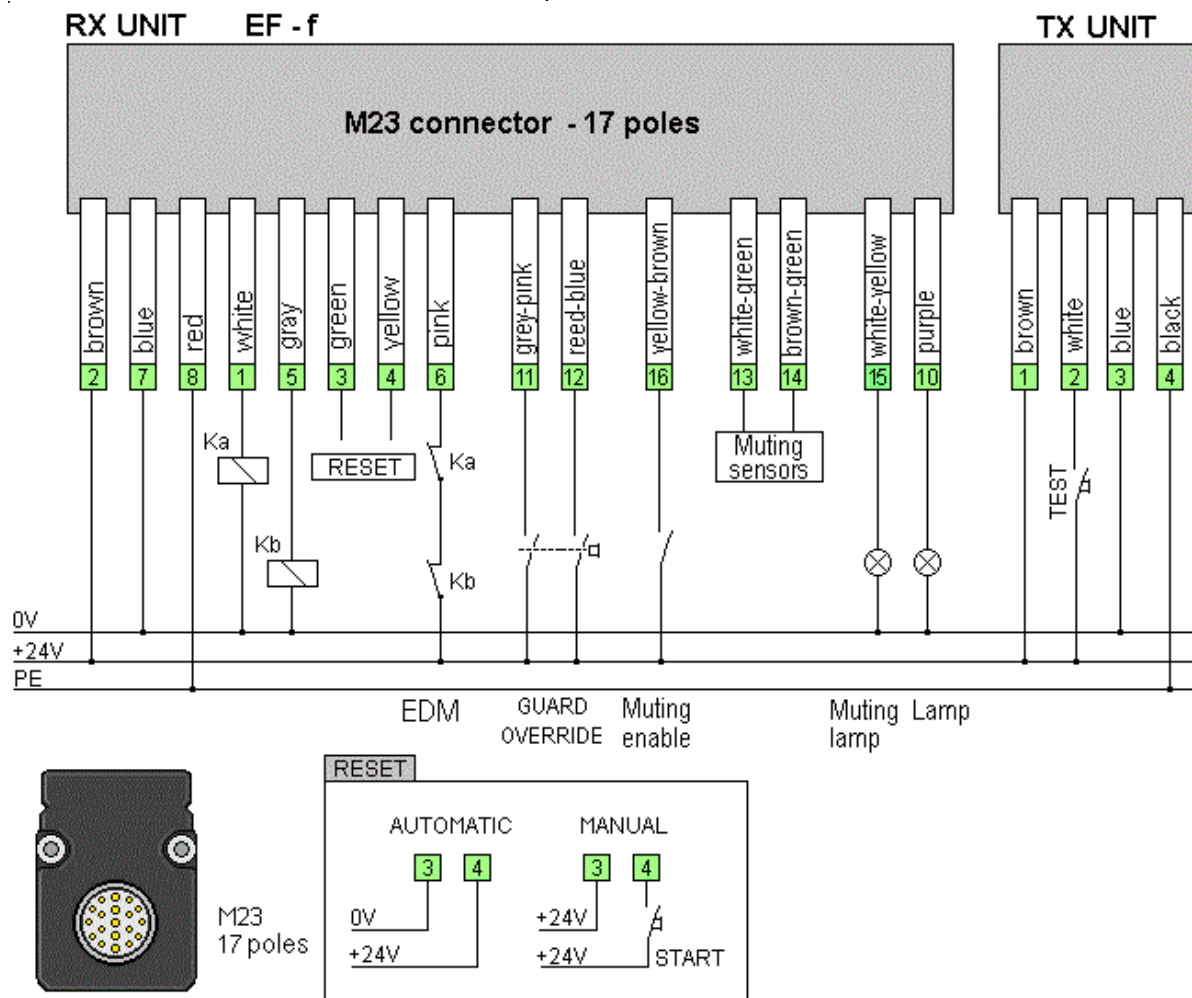
Example of connections



EF - f1 / EF - f2 CONNECTION

Receiver		EF-f - ...	Reset + Edm + Muting		
Pin N	Wire color	Function	Description	Type	Level
M23 17 poles					
1	White	OSSD-0	Static safety output 0	OUT	0 - 24 Vdc 0,5A max
2	Brown	+24V	Positive power supply	IN	+24 Vdc +/- 10% 1A
3	Green	START ENABLE	Selection of manual or automatic reset	IN	0 - 24 Vdc 10mA
4	Yellow	START	Input of external RESET	IN	0 - 24 Vdc 10mA
5	Grey	OSSD-1	Static safety output 1	OUT	0 - 24 Vdc 0,5A max
6	Pink	EDM	External device monitor input	IN	0 - 24 Vdc 10mA
7	Blue	GND	0V power supply	IN	0V
8	Red	PE	Ground	-	-
9	Black	nc		-	-
10	Purple	OSSD-S MUTE-F	EF f1 = OSSD-S Output signaling of the safety outputs state EF f2 = MUTE - F main beam interrupted when MUTING function is activated	OUT	0 - 24 Vdc 0,2A max
11	Grey - pink	GOVR-0	Guard override input 0, bypass of the muting function	IN	0 - 24 Vdc 10mA
12	Red - blue	GOVR-1	Guard override input 1, bypass of the muting function	IN	0 - 24 Vdc 10mA
13	White - green	MUTE-0	Muting 0 input	IN	0 - 24 Vdc 10mA
14	Brown - green	MUTE-1	Muting 1 input	IN	0 - 24 Vdc 10mA
15	White - yellow	MUTE-S	Muting lamp output	OUT	0 - 24 Vdc 0,5A max
16	Yellow - brown	MUTE-E	Muting function enable	IN	0 - 24 Vdc 10mA
17	White - grey	nc		-	-

Example of connections



CONNECTING EXTERNAL CONTACTORS

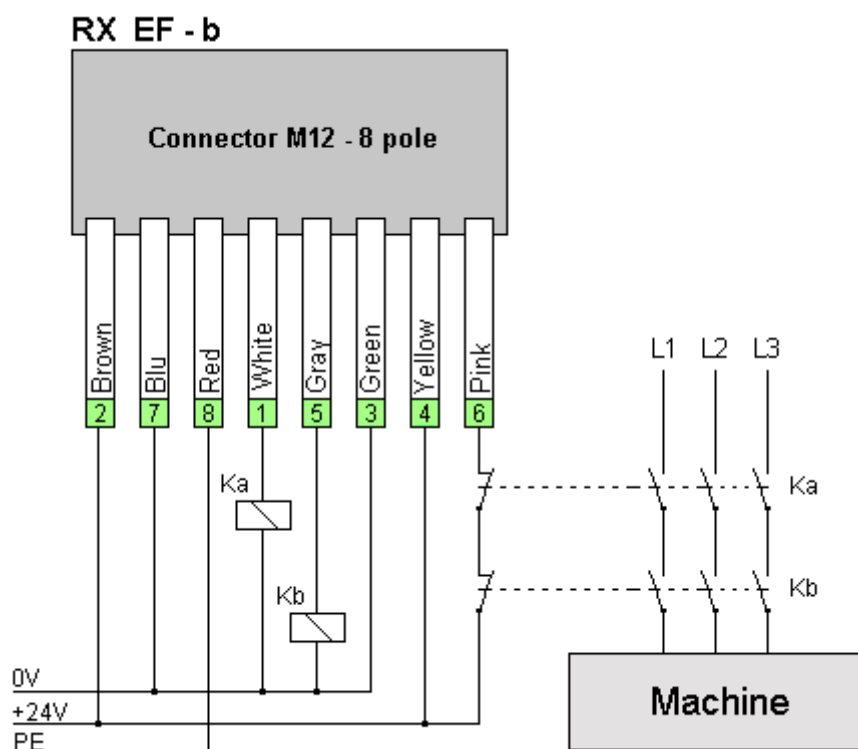
The diagram below shows the connection of the external contactors for increase the number of contacts or the necessary current to the load and the connection contacts of the feedback signal to the EDM (pink wire).

Only series barriers EFESTO with EDM (external device monitor) can be used to carry out properly the application.

The voltage supplied by the EFESTO light curtain is 24V with a maximum current of 0.5A. Select the external contactors on the basis of these values .

In the example below, a EFESTO model B light curtain with setting the automatic reset it connected to Ka and Kb contactors.

The normally closed contacts of external contactors are connected in series, with the voltage of + 24V and the EDM input (pink wire) of the light curtain.



EMITTER CONNECTIONS AND FUNCTIONS

+24 Vdc	+24 Vdc Power supply
----------------	----------------------

Connect to +24Vdc PELV $\pm 10\%$ 1A power supply.

The current of 1A is the supply current for all type of EFESTO4 light curtains

0 Vdc	0 Vdc Power supply
--------------	--------------------

Connect to 0 Vdc of 24 Vdc PELV $\pm 10\%$ 1A power supply.

PE	Protective Earth
-----------	------------------

Connect to the ground of machine.

TEST	Input for TEST
-------------	----------------

This signal simulates the interruption of the beams to check the safety chain.

During the test, OSSD0 and OSSD1 are in OFF state and the POWER / TEST indicator blinks.

The TEST is active when connected to +24 Vdc.

If connected to 0V or not connected the test is not active, the POWER / TEST indicator is OFF.

RECEIVER CONNECTIONS AND FUNCTIONS

Some of the following functions can be present or not, depending of the model ordered.

Power supply

+24 Vdc	+24 Vdc Power supply
----------------	----------------------

Connect to +24Vdc PELV $\pm 10\%$ 1A power supply.

The current of 1A is the supply current for the EFESTO4 light curtains.

To calculate the total current is necessary include:

- OSSD0 e OSSD1 absorbed current (max 0.5A each);
- STATUS lamp absorbed current (max 0.2A);
- MUTING lamp absorbed current (max. 0.5 A).

0 Vdc	0 Vdc Power supply
--------------	--------------------

Connect to 0 Vdc of 24 Vdc PELV $\pm 10\%$ 1A power supply.

PE	Protective Earth
-----------	------------------

Connect to the ground of machine.

Outputs

OSSD-0	Safety output 0
OSSD-1	Safety output 1

Static safety PNP outputs, OSSD0 channel 0 and OSSD1 channel 1.

Use the OSSD outputs to stop the dangerous movement of the machine through contactors with guided contacts controlled by the barrier, or by safety relay module or safety PLC.

The OSSDs outputs go in ON state (+24 V) if are satisfy the following conditions:

- barrier aligned and activated by reset command,
- protected area free,
- correct connections and no internal fault.

The barriers with MUTING can activate the OSSDs also using the guard override function.

The OSSD outputs go or remain in OFF state (0Vdc) if is not satisfied one ore more of the above conditions.

The outputs are dynamically monitored. To check the absence of fault, when the OSSDs are in ON state, will be switched in OFF state for 0,2 msec, with a period = response time – 1 msec

ELECTRICAL CHARACTERISTICS OF THE OUTPUTS

DESCRIPTION	
Nominal output current for resistive load	500 mA
Max. output current for resistive load	500 mA
Nominal output current for inductive load	500 mA
Max. output current for inductive load	500 mA
Max. capacitive load with no resistive load applied	10 nF
Max. capacitive load with resistive load of 48 OHM applied	2 uF
Max. output voltage in OFF-State	0.1 V
Max. output current in OFF-State	10 µA (leakage current)
Max. resistance between the OSSDs outputs and the load	22 Ω

OSSD-S	Output for OSSD state
---------------	-----------------------

PNP output to indicate the state of the OSSDs outputs.

This output is 24V when the OSSDs are active, vice versa 0V.

EDM	Input for External Device Monitor
------------	-----------------------------------

Monitoring of external contactors.

Allow to check the external contactors using their series of the NC contacts.

The contactors shall have the forced guided contacts.

With OSSD in OFF state on the EDM input shall be present 24V.

With OSSD in ON state on the EDM input shall be present 0V.

The barrier checks the EDM input after the power on, and at every change state of the OSSDs.

The barrier checks the time of ON / OFF commutation, it shall be max 500 ms.

If the EDM is not used shall be connected to OSSD 0 output.

Reset

START-E	Input for reset selection
START	Input for restart pushbutton

AUTOMATIC RESET

With the selection of the automatic reset, the OSSDs outputs follow the state of the barrier.

When the protected area is free, automatically the OSSDs go in ON state.

Take into consideration that in this case there is no the start interlock. If this function is necessary, verify that other means are present to stop the machine at the power on.

MANUAL RESET

One push button NO shall be activated to start or re-start the OSSD0 and OSSD1 after the interruption of the beams or when the ESPE is turned on at first time.

This pushbutton must be located outside the dangerous area, and shall not be possible to activate it from inside of the dangerous area. It shall be located where is possible to check the dangerous area. The manual reset has the function of start interlock.

This system shall be utilized when the barrier is employed for the protection of a dangerous passage.

The following table show the reset setup.

START- E	START	Function selected
0Vdc	24Vdc	AUTOMATIC RESET
24Vdc	NO / 24Vdc	MANUAL RESET

Blanking

BLNK-0	INPUT blanking 0
BLNK-1	INPUT blanking 1
BLNK-2	INPUT blanking 2

This function allow to inhibit 1, 2 or 3 beams. Their interruptions will not turn OFF the OSSDs.

The blanking function is useful in applications where the working materials cross the protected area, and the interruption of the beams shall not stop the machine.

The configuration is realized using 3 wires on the connector of the receiver, and will be memorized at power on.

Every modification during the normal operation will not be accepted until the next power on cycle.

Where the blanking selection signals are derived from device external to the barrier (eg. PLC), this device should meet the relevant requirements of other appropriate standards (for example ISO 13849-1, IEC 62061)

The first beam near the end cap with the connector is the synchronization beam and cannot be excluded from the blanking.

Some models of barriers can't use the blanking function (see pag 35-36)

The following table indicates the setup of the blanking:

BLNK-2	BLNK-1	BLNK-0	DESCRIPTION
0V	0V	24V	BSO1 blanking without requirement of object presence, 1 beam
0V	24V	0V	BSO2 blanking without requirement of object presence, 1-2 beams
0V	24V	24V	BSO3 blanking without requirement of object presence, 1-2-3 beams
24V	0V	24V	BCO1 blanking with requirement of object presence, 1 beam
24V	24V	0V	BCO2 blanking with requirement of object presence, 1-2 beams
24V	24V	24V	BCO3 blanking with requirement of object presence, 1-2-3 beams
NC	NC	NC	no blanking
0V	0V	0V	no blanking
24V	0V	0V	no blanking
NC	X	X	error on the blanking configuration, the curtain is in block state
X	NC	X	error on the blanking configuration, the curtain is in block state
X	X	NC	error on the blanking configuration, the curtain is in block state

X : +24Vdc or 0Vdc , **NC** : not connected.

In case of mistake of blanking programming, the curtain is in block state.

Muting

MUTING with two sensors.

The muting function generates a temporary suspension of the protective function of the barrier in order to ensure the normal passage of the material through the protected area.

If the MUTING function is active, the interruption of the beams doesn't disable the OSSDs outputs.

The muting function is activated through the activation of two sensors within 2 sec of each other.

Any others conditions applied to the sensors don't activate the MUTING function.

During the MUTING the two sensors shall be always active.

Disabling a muting sensor terminates the muting function.

A signalling MUTING lamp can be connected to MUTE-S output to indicate that the MUTING function is active.

If for any reason, the muting doesn't activate, the interruption of the beams will determine the block of the machine. In this case the cycle can be restarted using the **GUARD-OVERRIDE** command.

The GUARD-OVERRIDE function can be utilized only at the following conditions:

- the muting enable command is active, and
- mistake of sequence of muting sensors, and
- at least one beam of vertical barrier is interrupted, and
- the correct activation of the GUARD OVERRIDE commands.

The GUARD-OVERRIDE it is not performed if:

- the muting enable command is not active, or
- one command of GUARD OVERRIDE is OFF, or
- time out expired, or
- all mute inputs and the beams are free.

The command for the GUARD OVERRIDE is formed by a couple of contacts NO (i.e. key selector with spring return) that shall be activated simultaneously within 300 msec. If this don't happens the guard-override function will not be activated.

The opening of only one contact cause the stop of the OVERRIDE function.

The time out is 3 minutes. After this time, the guard-override function is terminate.

The OVER indicator is ON if the guard-override function is active and vice versa.

The OVER indicator blinks if are past the 3 minutes of TIME OUT, or if the MUTING conditions have been restored (vertical beams are free and MUTING sensors are free) and the GUARD OVERRIDE command is still active.

MUTE-E	MUTING Enable input
---------------	---------------------

Input for enable the MUTING function.

If connected to 24Vdc the MUTING function is enabled and the E-MUTE indicator is ON, otherwise if floating or connected to 0V, the MUTING function is not enabled and the E-MUTE indicator is OFF.

MUTE-0	MUTING 0 sensor input
MUTE-1	MUTING 1 sensor input

Inputs for external muting sensors.

If they are connected to 24Vdc are active, and SENSE 0 / 1 indicators are ON, otherwise if are floating or are connected to 0V, are not active and SENSE 0 / 1 indicators are OFF.

GOVR-0	Guard Override 0 input
GOVR-1	Guard Override 1 input

Inputs for external guard override commands.

If they are connected to 24Vdc the GOVR-0 / 1 are active, and OVER indicator is ON, otherwise if are floating or are connected to 0V, the GOVR-0 / 1 aren't active and OVER indicator is OFF.

MUTE-S	Output MUTING Lamp
---------------	--------------------

Output for MUTING lamp.

The muting lamp is active (+24V) when the MUTING function is active and vice-versa.

MUTE-F	Muting phase, main beams interrupted
---------------	--------------------------------------

This output is active (+24V) only when the muting function is active and the beams of the “ Sensitive Height “ are interrupted and vice-versa.

The output is deactivated when the barrier is in MUTING, and the main beams are not interrupted, or when the MUTING function is not active.

For other details of muting function see pag. 45.

INDICATIONS and DIAGNOSTIC

Below are the main functions related to each indicator and its status.

TRANSMITTER

POWER-TEST	YELLOW - Power On & Test
-------------------	--------------------------

If the indicator is ON, the power supply is connected correctly.
If the indicator blinks, the TEST function is active.

FAULT	RED - Fault
--------------	-------------

If the indicator is blinking, the light curtain is stopped due to an internal failure.
In this case contact the technical support.

RECEIVER

OS OFF	RED - State of OSSD0 e OSSD1
---------------	------------------------------

The OSSD0 and OSSD1 outputs are in OFF state.

OS ON	GREEN - State of static OSSD0 e OSSD1
--------------	---------------------------------------

The OSSD0 and OSSD1 outputs are in ON state.

BMS	YELLOW - Wait external reset
------------	------------------------------

If all beams of the sensitive zone are aligned and the manual RESTART is selected, the indicator is ON. After pressed and released the restart button, the indicator is OFF.

FAULT	RED - Fault
--------------	-------------

If the indicator is ON, the light curtain is stopped due to an internal failure.
In this case contact the technical support.

ALN1	YELLOW - BARGRAPH Led 1
ALN2	YELLOW - BARGRAPH Led 2
ALN3	YELLOW - BARGRAPH Led 3

The three LEDs provide indications on the beams alignment. This simplifies the alignment of the light curtain, particularly in case of difficult installations, for example with the use with mirrors or on long range.

To each indicator is associated a percentage of beams aligned.

The indications given are summarized in the following table.

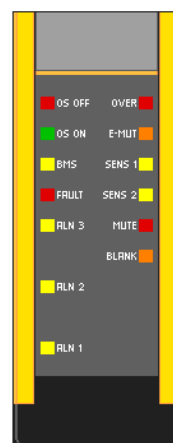
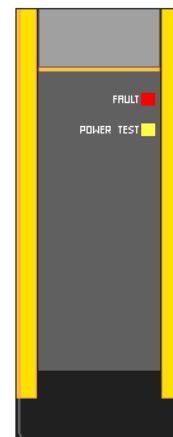
ALN1	ALN2	ALN3	DESCRIPTION
OFF	OFF	OFF	No beam is alignment or the first beam is interrupted
BLINK	OFF	OFF	The number of the aligned beams is less than 1/3 of total beams
ON	BLINK	OFF	The number of the aligned beams is between 1/3 and 2/3
ON	ON	BLINK	The number of aligned beams is between 1/3 and up to maximum
ON	ON	ON	All beams are aligned

The blink period is 1 second.

When the OSSDs go from OFF to ON state, the alignment indicators will turn OFF.

OVER	RED - GUARD OVERRIDE function
-------------	-------------------------------

If the GUARD OVERRIDE function is active the indicator is ON, and vice-versa.
If there is an error on the function activation, the indicator blinks (see pag 31).



E-MUTE	ORANGE - MUTING Function enabled
---------------	----------------------------------

If the MUTING function is enabled the indicator is ON, and vice-versa.

SENSE-1	YELLOW - External Muting Sensor 1
----------------	-----------------------------------

If the MUTING sensor 1 is active the indicator is ON, and vice-versa.

SENSE-2	YELLOW – External Muting Sensor 2
----------------	-----------------------------------

If the MUTING sensor 2 is active the indicator is ON, and vice-versa.

MUTE	Red – gives the function of MUTING
-------------	------------------------------------

If the MUTING function is active the indicator is ON, and vice-versa.

BLNK	Orange - Function of BLANKING
-------------	-------------------------------

At power up, for about 5 seconds, the barrier provides an indication of the type of blanking set.
The indications are:

2 blinks, blanking without object presence obligation,
3 blinks, blanking with object presence obligation.

Blanking without object presence obligation: if BLNK indicator is ON the area is free, or the number of interrupted beams is correct, vice-versa if BLNK indicator blinks, indicates that the number of interrupted beams is greater than beams selected or the beams are not adjacent.

Blanking with object presence obligation: if BLNK indicator blinks, the area is free or the number of interrupted beams is greater than the selected beams or the beams are not adjacent, vice-versa if the BLNK indicator is ON, indicates that the area is occupied by an object and the number of interrupted beams is correct.

The number of beams excluded is indicated with the indicators ALN:

ALN1 ON	BLANKING of 1 beam
ALN2 ON	BLANKING of 2 beams
ALN3 ON	BLANKING of 3 beams

In case of an error on the connections settings Blanking, the **FAULT** indicator is ON and the **BLNK** indicator blinks.

The light curtain is locked, turn OFF it, check the settings and then turn ON.

Sequence of led BLNK e ALN

Blanking without object presence obligation

Led ALN		Protected area is free
Led BLNK		

Led ALN		Protected area is busy
Led BLNK		

Blanking with object presence obligation

Led ALN		Protected area is free with object positioned correctly
Led BLNK		

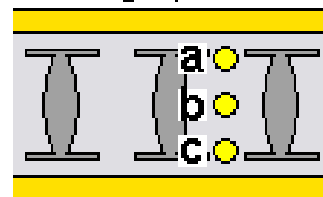
Led ALN		Protected area is busy object not positioned correctly
Led BLNK		

Led FAULT		error on the blanking configuration
Led BLNK		

MASTER-SLAVE

In the master / slave barrier models to facilitate the alignment of the slave part (horizontal) it is provided an additional bargraph alignment. The bargraph of the master performs as previously described.

bargraph slave



When the master (vertical) is fully aligned, the first indicator of the slave (horizontal) start flashing at a rate of a brief flash and a pause (FLASH).

When at least one beam of the slave is aligned, the bar graph provides the following information:

a	b	c	DESCRIPTION
FLASH	OFF	OFF	No aligned beams or first beam obscured
BLINK	OFF	OFF	The number of the aligned beams is less than 1/3 of total beams
ON	BLINK	OFF	The number of the aligned beams is between 1/3 and 2/3
ON	ON	BLINK	The number of aligned beams is between 1/3 and up to maximum
ON	ON	ON	All beams are aligned

When the barrier is fully aligned, the LEDs of the master and the slave are switched off.

Further indication to find the faults.

MANUAL and AUTOMATIC RESTART

If an error occurs in the reset setting, the **FAULT** indicator is ON and **ALN1** indicator blinks. The light curtain is locked.

Turn OFF the light curtain, check the reset settings and then turn ON the barrier.

The principal causes can be :

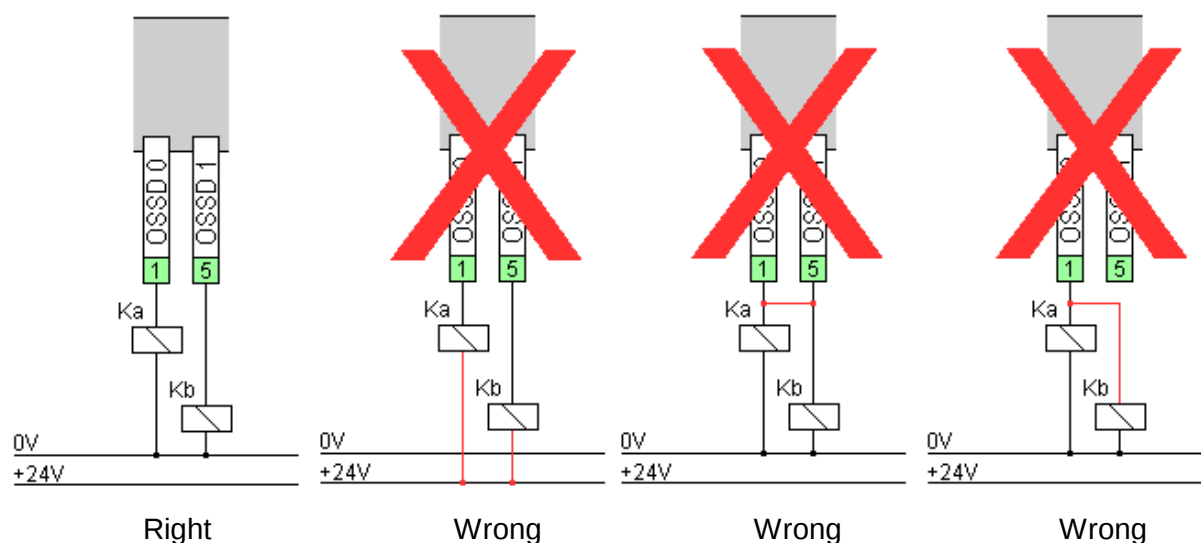
- Restart wires not connected properly;
- push button of manual reset is NC instead of NO;
- push button of manual reset pressed during the turn on of the barrier.

OSSD 0 / OSSD 1

If an error occurs on the OSSD output, the **FAULT** indicator is ON and **ALN2** indicator blinks.
The light curtain is locked.
Turn OFF the barrier, check the OSSD output connections and then turn ON the power supply.

The principal causes can be :

- short circuit between OSSD;
- OSSD connected to +24V or 0V;
- capacitive load beyond the limit, excessive cable length;
- wrong connection of the outputs;
- internal fault.



EDM

If an error occurs on the EDM function, the **FAULT** indicator is ON and **ALN3** indicator blinks.

The light curtain is locked.
Turn OFF the barrier, check the EDM connections and then turn ON the power supply.

The principal causes can be :

- wire not connected;
- wire connected to fixed voltage (+24V o 0V);
- contact of external device open when the OSSD are active;
- voltage to external device not present or not correct ;
- external contactor defective.

In Automatic reset every 15s the barrier test the EDM input, if the safety conditions are met the barrier will be activated.

In Manual reset if the safety conditions are met the BMS indicator is ON.
Press and release the RESTART push button to activate the barrier.

GUARD OVERRIDE

If an error occurs in the GUARD OVERRIDE function, the **FAULT** indicator is ON and the **OVER** indicator blinks.

The light curtain remain locked.

Turn OFF the barrier, check the GUARD OVERRIDE connections and then turn ON the power supply.

The principal causes can be :

- one or two contacts are normally closed instead of normally open;
- break of one contact;
- end of the GUARD OVERRIDE time out;
- non simultaneous closing of contacts in the maximum expected time of 300 ms.

ATTENTION

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

SERVICE AND TEST

Putting into service and tests at regular intervals

The installer that put the equipment into service shall have all necessary information about the machine or the plant, and the installed ESPE EFESTO4.

The testing shall cover the correct interaction of the 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 (e.g. a press manufacturer) shall always be observed when testing.

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 (approval tests)

An authorized, qualified person should test the ESPE prior to its being put into service for the first time, and after its - or its components / units involved in the safety function - having been modified.

All changes of the circuit/switching, the control system, the ESPE configuration and the involved components/units affecting the safety function are considered a modification.

Those tests are to determine that the power-operated working equipment (e.g. the press) fulfils the requirements when the ESPE is employed, and that the correct operation of the components/units involved in the safety function is ensured for the interaction with the ESPE. Furthermore, type of use and installation of the ESPE shall be 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**" of the ESPE's instructions for use, and shall be determined and specified for each individual working equipment (e.g. for a press). Furthermore, the prerequisites (e.g. qualified person, expert) to be fulfilled by the appointed person are to be specified.

The testing includes a safety check of the correct functioning of the ESPE, the condition of the components, the correct installation of the ESPE, and the interaction of the ESPE with the control system of the press. The test results shall be recorded and writing in a report which is to be signed by the inspector. The report shall be kept at the installation site of the machine or facility, respectively.

SETTING UP AND TEST

FINAL CHECK BEFORE STARTING

Before connecting the curtain to the power supply, ensure that:

- the value of power supply is 24Vdc ;
- connection cables of emitter and receiver to machine are correct ;
- if there is the BLANKING function deactivate it.

When the barrier is aligned, if AUTOMATIC RESTART is set, the OS ON indicator will turn ON and the 24Vdc is present on OSSDs outputs. Otherwise, if the MANUAL RESTART is set, the BMS indicator is ON and OS ON is OFF, then press and release the START button to activate the barrier (24Vdc is present on OSSDs outputs, BMS is OFF and OS ON is ON).

Performing the periodical test follow the verifications listed below:

Hint: to ensure major safety, perform these tests in manual reset.

Daily testing of the protective device by authorized personnel.

By the operator, daily or prior to each work session by means of complete coverage of every beam of light.

Move the test rod slowly through the length of the protective field at three different points:

- 1) Protective field limits / protective field markings close to sender (access opening);
- 2) Protective field limits / protective field markings close to receiver;
- 3) Protective field limits in middle between transmitter and receiver.

During the test, the BMS indicator must be turned OFF. If during this test the BMS indicator is lights up, it is necessary to verify the mechanical installation in accordance with the minimum distance to avoid the reflecting signal as reported in page 9.

If used the the function “ blanking without object presence obligation”, use a test rod with a diameter equal to the resolution indicated in pag 42

Check for damage to the protective device, in particular the mounting, electrical connection.

Check for wear or damage to the housing, front screen or electrical connection cable.

Check that people or body parts can only access the danger zone through the protective field.

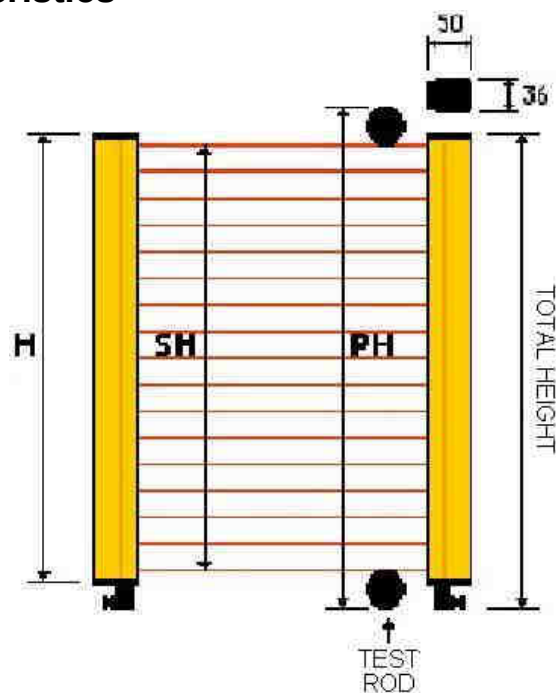
If one or more errors occur during the test, the machine must be shut down.

Now the light curtain is ready for working and you can select the automatic or manual reset as desired and activated the BLANKING function.

List of models and characteristics

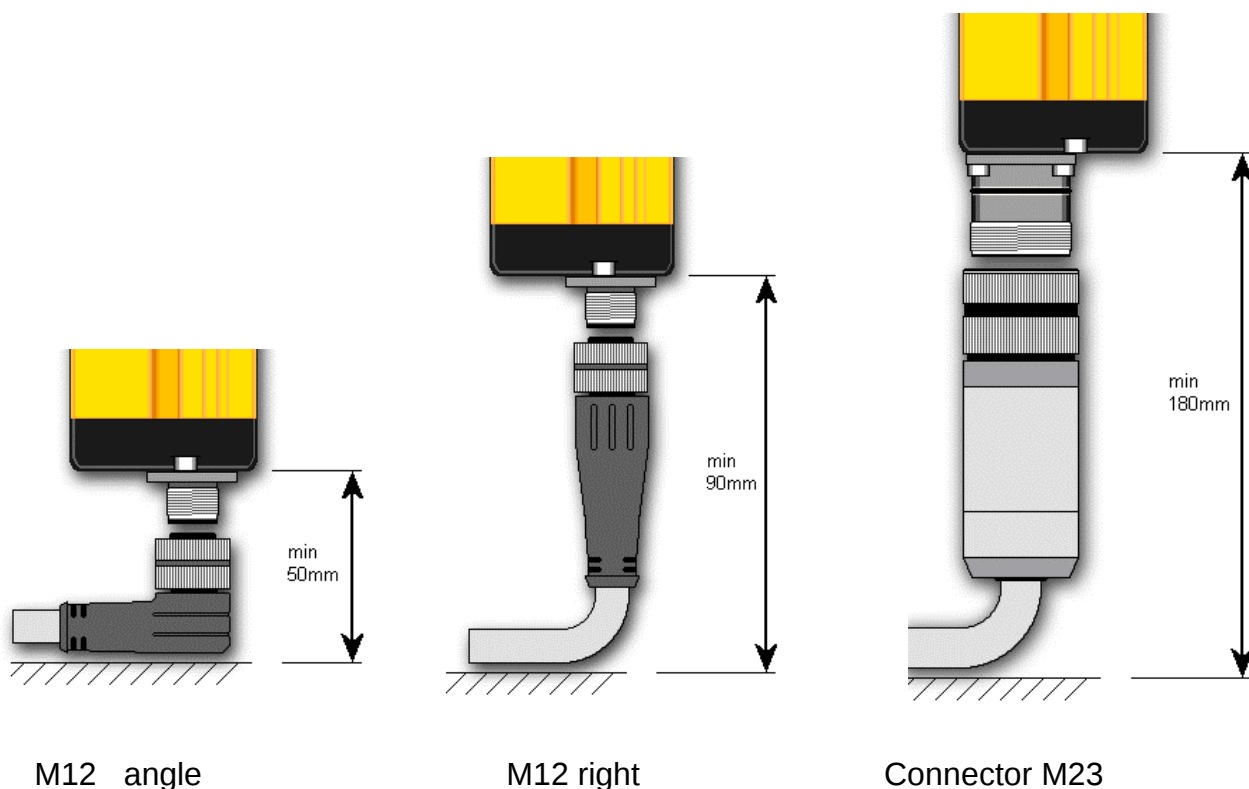
The images describes the main parameters considered in the selection of light curtain and in the following pages shows the complete list of barriers "EFESTO4" series.

Total height. Total height. To estimate the total height of the barrier check the column H (barrier height) in table below and add the connector height how show in the figure below.



Minimum dimensions for the connection

It is necessary to provide a minimum space for the connector, refer to figure below.



Special size. If the standard barriers don't satisfy the customer application, our technical office will evaluate the possibility to produce a custom model.

Resolution 14mm Range 0 - 6m Optical Code "A"									
Model	N° of beams	Protected Height PH (mm)	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtff (anni)	PL
EF -x - 0240 A	24	254	234	316	1,3	6	7.5	100	e
EF -x - 0360 A	36	374	354	436	1,7	11	15	100	e
EF -x - 0480 A	48	494	474	556	2,1	11	15	100	e
EF -x - 0600 A	60	614	594	676	2,5	11	15	100	e
EF -x - 0700 A	72	734	714	796	3,0	16	22.5	84,06	e
EF -x - 0850 A	84	854	834	916	3,4	16	22.5	76,09	e
EF -x - 0950 A	96	974	954	1036	3,8	16	22.5	69,51	e
EF -x - 1100 A	108	1094	1074	1156	4,2	16	22.5	63,97	e
EF -x - 1200 A	120	1214	1114	1276	4,7	21	30	59,25	e
EF -x - 1300 A	132	1334	1314	1396	5,1	21	30	55,18	e
EF -x - 1400 A	144	1454	1434	1516	5,5	21	30	51,63	e
EF -x - 1500 A	156	1574	1554	1636	5,9	26	37.5	48,51	e
EF -x - 1700 A	168	1694	1674	1756	6,4	26	37.5	45,75	e
EF -x - 1800 A	180	1814	1794	1876	6,8	26	37.5	43,28	e
EF -x - 1900 A	192	1934	1914	1996	7,2	31	45	41,07	e
EF -x - 2000 A	204	2054	2034	2116	7,6	31	45	39,07	e
EF -x - 2200 A	216	2174	2154	2236	8,1	31	45	38,53	e
EF -x - 2300 A	228	2294	2274	2356	8,5	31	45	35,61	e

Resolution 20mm Range 2 - 15m Optical code "AL"									
Model	N° of beams	Protected Height PH (mm)	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtff (anni)	PL
EF -x - 0240 AL	24	260	240	316	1,3	6	7.5	100	e
EF -x - 0360 AL	36	380	360	436	1,7	11	15	100	e
EF -x - 0480 AL	48	500	480	556	2,1	11	15	100	e
EF -x - 0600 AL	60	620	600	676	2,5	11	15	100	e
EF -x - 0700 AL	72	740	720	796	3,0	16	22.5	84,06	e
EF -x - 0850 AL	84	860	840	916	3,4	16	22.5	76,09	e
EF -x - 0950 AL	96	980	960	1036	3,8	16	22.5	69,51	e
EF -x - 1100 AL	108	1100	1080	1156	4,2	16	22.5	63,97	e
EF -x - 1200 AL	120	1220	1200	1276	4,7	21	30	59,25	e
EF -x - 1300 AL	132	1340	1320	1396	5,1	21	30	55,18	e
EF -x - 1400 AL	144	1460	1440	1516	5,5	21	30	51,63	e
EF -x - 1500 AL	156	1580	1560	1636	5,9	26	37.5	48,51	e
EF -x - 1700 AL	168	1700	1680	1756	6,4	26	37.5	45,75	e
EF -x - 1800 AL	180	1820	1800	1876	6,8	26	37.5	43,28	e
EF -x - 1900 AL	192	1940	1920	1996	7,2	31	45	41,07	e
EF -x - 2000 AL	204	2060	2040	2116	7,6	31	45	39,07	e
EF -x - 2200 AL	216	2180	2160	2236	8,1	31	45	38,53	e
EF -x - 2300 AL	228	2300	2280	2356	8,5	31	45	35,61	e

Resolution 30mm Range 0,5 - 15m Optical code "B"									
Model	N° of beams	Protected Height PH (mm)	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtbf (anni)	PL
EF -x - 0150 B	6	174	126	272	0,8	6	7,5	100	e
EF -x - 0210 B *	8	222	174	272	0,9	6	7,5	100	e
EF -x - 0240 B *	9	246	198	296	1,0	6	7,5	100	e
EF -x - 0300 B	12	318	270	368	1,2	6	7,5	100	e
EF -x - 0360 B *	14	366	318	416	1,3	6	7,5	100	e
EF -x - 0390 B *	15	390	342	440	1,4	6	7,5	100	e
EF -x - 0450 B	18	462	414	512	1,6	6	7,5	100	e
EF -x - 0540 B *	21	534	486	584	1,8	6	7,5	100	e
EF -x - 0600 B	24	606	558	656	2,0	6	7,5	100	e
EF -x - 0680 B *	27	678	630	728	2,4	11	15	100	e
EF -x - 0750 B	30	750	702	800	2,4	11	15	100	e
EF -x - 0820 B *	33	822	774	872	2,6	11	15	100	e
EF -x - 0900 B	36	894	846	944	2,8	11	15	100	e
EF -x - 0970 B *	39	966	918	1016	3,0	11	15	100	e
EF -x - 1050 B	42	1038	990	1088	3,2	11	15	100	e
EF -x - 1100 B *	45	1110	1062	1160	3,4	11	15	100	e
EF -x - 1200 B	48	1182	1134	1232	3,6	11	15	100	e
EF -x - 1250 B *	51	1254	1206	1304	3,8	11	15	100	e
EF -x - 1350 B	54	1326	1278	1376	4,0	11	15	100	e
EF -x - 1400 B *	57	1398	1350	1448	4,2	11	15	100	e
EF -x - 1500 B	60	1470	1422	1520	4,4	11	15	100	e
EF -x - 1650 B	66	1614	1566	1664	4,8	11	15	100	e
EF -x - 1800 B	72	1758	1710	1808	5,2	16	22,5	100	e
EF -x - 1950 B	78	1902	1854	1952	5,6	16	22,5	100	e
EF -x - 2100 B	84	2046	1998	2096	6,0	16	22,5	100	e
EF -x - 2200 B	90	2190	2142	2240	6,4	16	22,5	100	e
EF -x - 2300 B	96	2334	2286	2384	6,8	16	22,5	100	e
EF -x - 2450 B	102	2478	2430	2528	7,2	16	22,5	100	e
EF -x - 2650 B	108	2622	2574	2672	7,6	16	22,5	99,18	e
EF -x - 2750 B	114	2776	2718	2816	8,0	21	30	97,15	e
EF -x - 2900 B	120	2910	2862	2960	8,4	21	30	95,21	e
EF -x - 3000 B	126	3054	3006	3104	8,8	21	30	93,35	e

* Models shown may not implement the blanking function.

Resolution 40mm Range 6 - 30m Optical code "BL"									
Model	N° of beams	Protected Height PH (mm)	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtbf (anni)	PL
EF -x - 0150 BL	6	185	135	272	0,8	6	7.5	100	e
EF -x - 0210 BL *	8	233	183	272	0,9	6	7.5	100	e
EF -x - 0240 BL *	9	257	207	296	1,0	6	7.5	100	e
EF -x - 0300 BL	12	329	279	368	1,2	6	7.5	100	e
EF -x - 0360 BL *	14	377	327	416	1,3	6	7.5	100	e
EF -x - 0390 BL *	15	401	351	440	1,4	6	7.5	100	e
EF -x - 0450 BL	18	473	423	512	1,6	6	7.5	100	e
EF -x - 0540 BL *	21	545	495	584	1,8	6	7.5	100	e
EF -x - 0600 BL	24	617	567	656	2,0	6	7.5	100	e
EF -x - 0680 BL *	27	689	639	728	2,4	11	15	100	e
EF -x - 0750 BL	30	761	711	800	2,4	11	15	100	e
EF -x - 0820 BL *	33	833	783	872	2,6	11	15	100	e
EF -x - 0900 BL	36	905	855	944	2,8	11	15	100	e
EF -x - 0970 BL *	39	977	927	1016	3,0	11	15	100	e
EF -x - 1050 BL	42	1049	999	1088	3,2	11	15	100	e
EF -x - 1100 BL *	45	1121	1071	1160	3,4	11	15	100	e
EF -x - 1200 BL	48	1193	1143	1232	3,6	11	15	100	e
EF -x - 1250 BL *	51	1265	1215	1304	3,8	11	15	100	e
EF -x - 1350 BL	54	1337	1287	1376	4,0	11	15	100	e
EF -x - 1400 BL *	57	1409	1359	1448	4,2	11	15	100	e
EF -x - 1500 BL	60	1481	1431	1520	4,4	11	15	100	e
EF -x - 1650 BL	66	1625	1575	1664	4,8	11	15	100	e
EF -x - 1800 BL	72	1769	1719	1808	5,2	16	22.5	100	e
EF -x - 1950 BL	78	1913	1863	1952	5,6	16	22.5	100	e
EF -x - 2100 BL	84	2057	2007	2096	6,0	16	22.5	100	e
EF -x - 2200 BL	90	2201	2151	2240	6,4	16	22.5	100	e
EF -x - 2300 BL	96	2345	2295	2384	6,8	16	22.5	100	e
EF -x - 2450 BL	102	2489	2439	2528	7,2	16	22.5	100	e
EF -x - 2650 BL	108	2633	2583	2672	7,6	16	22.5	99,18	e
EF -x - 2750 BL	114	2777	2727	2816	8,0	21	30	97,15	e
EF -x - 2900 BL	120	2921	2871	2960	8,4	21	30	95,21	e
EF -x - 3000 BL	126	3065	3015	3104	8,8	21	30	93,35	e

* Models shown may not implement the blanking function.

Resolution 55mm Range 0,5 - 15m Optical code "C"									
Model	N° of beams	Protected Height PH (mm)	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtbf (anni)	PL
EF -x - 0150 C	3	200	102	272	0,8	6	7.5	100	e
EF -x - 0250 C	5	296	198	296	1,1	6	7.5	100	e
EF -x - 0300 C	6	344	246	368	1,2	6	7.5	100	e
EF -x - 0400 C	8	440	342	440	1,5	6	7.5	100	e
EF -x - 0450 C	9	488	390	512	1,6	6	7.5	100	e
EF -x - 0600 C	12	632	534	656	2,0	6	7.5	100	e
EF -x - 0750 C	15	776	678	800	2,4	6	7.5	100	e
EF -x - 0900 C	18	920	822	944	2,8	6	7.5	100	e
EF -x - 1050 C	21	1064	966	1088	3,2	6	7.5	100	e
EF -x - 1200 C	24	1208	1110	1232	3,6	6	7.5	100	e
EF -x - 1350 C	27	1352	1254	1376	4,0	11	15	100	e
EF -x - 1500 C	30	1496	1398	1520	4,4	11	15	100	e
EF -x - 1650 C	33	1640	1542	1664	4,8	11	15	100	e
EF -x - 1800 C	36	1784	1686	1808	5,2	11	15	100	e
EF -x - 1950 C	39	1928	1830	1952	5,6	11	15	100	e
EF -x - 2100 C	42	2072	1974	2096	6,0	11	15	100	e
EF -x - 2200 C	45	2216	2118	2240	6,4	11	15	100	e
EF -x - 2300 C	48	2360	2262	2384	6,8	11	15	100	e
EF -x - 2450 C	51	2504	2406	2528	7,2	11	15	100	e
EF -x - 2650 C	54	2648	2550	2672	7,6	11	15	100	e
EF -x - 2750 C	57	2792	2694	2816	8,0	11	15	100	e
EF -x - 2900 C	60	2936	2838	2960	8,4	11	15	100	e
EF -x - 3000 C	63	3080	2982	3104	8,8	11	15	100	e

Resolution 60mm Range 6 - 30m Optical code "CL"									
Model	N° of beams	Protected Height PH (mm)	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtbf (anni)	PL
EF -x - 0150 CL	3	211	111	272	0,8	6	7,5	100	e
EF -x - 0250 CL	5	307	207	296	1,1	6	7,5	100	e
EF -x - 0300 CL	6	355	255	368	1,2	6	7,5	100	e
EF -x - 0400 CL	8	451	351	440	1,5	6	7,5	100	e
EF -x - 0450 CL	9	499	399	512	1,6	6	7,5	100	e
EF -x - 0600 CL	12	643	543	656	2,0	6	7,5	100	e
EF -x - 0750 CL	15	787	687	800	2,4	6	7,5	100	e
EF -x - 0900 CL	18	931	831	944	2,8	6	7,5	100	e
EF -x - 1050 CL	21	1075	975	1088	3,2	6	7,5	100	e
EF -x - 1200 CL	24	1219	1119	1232	3,6	6	7,5	100	e
EF -x - 1350 CL	27	1363	1263	1376	4,0	11	15	100	e
EF -x - 1500 CL	30	1507	1407	1520	4,4	11	15	100	e
EF -x - 1650 CL	33	1651	1551	1664	4,8	11	15	100	e
EF -x - 1800 CL	36	1795	1695	1808	5,2	11	15	100	e
EF -x - 1950 CL	39	1939	1839	1952	5,6	11	15	100	e
EF -x - 2100 CL	42	2083	1983	2096	6,0	11	15	100	e
EF -x - 2200 CL	45	2227	2127	2240	6,4	11	15	100	e
EF -x - 2300 CL	48	2371	2271	2384	6,8	11	15	100	e
EF -x - 2450 CL	51	2515	2415	2528	7,2	11	15	100	e
EF -x - 2650 CL	54	2659	2559	2672	7,6	11	15	100	e
EF -x - 2750 CL	57	2803	2703	2816	8,0	11	15	100	e
EF -x - 2900 CL	60	2947	2847	2960	8,4	11	15	100	e
EF -x - 3000 CL	63	3091	2991	3104	8,8	11	15	100	e

Resolution 125mm Range 0,5 - 15m Optical code "D"								
Model	N° of beams	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtff (anni)	PL
EF - x - 400 D	4	366	465	1,6	6	7.5	100	e
EF - x - 600 D	6	606	705	2,8	6	7.5	100	e
EF - x - 850 D	8	846	945	3,2	6	7.5	100	e
EF - x - 1050 D	10	1086	1185	4,2	6	7.5	100	e
EF - x - 1350 D	12	1326	1425	4,8	6	7.5	100	e
EF - x - 1550 D	14	1566	1665	5,4	6	7.5	100	e
EF - x - 1800 D	16	1806	1905	6,0	6	7.5	100	e
EF - x - 2050 D	18	2046	2145	6,6	6	7.5	100	e
EF - x - 2250 D	20	2286	2385	7,2	6	7.5	100	e
EF - x - 2550 D	22	2526	2625	7,8	6	7.5	100	e
EF - x - 2750 D	24	2766	2865	8,4	6	7.5	100	e
EF - x - 3000 D	26	3006	3105	9,0	11	15	100	e

Resolution 135mm Range 6 - 30m Optical code "DL"								
Model	N° of beams	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtff (anni)	PL
EF - x - 400 DL	4	375	465	1,6	6	7.5	100	e
EF - x - 600 DL	6	615	705	2,8	6	7.5	100	e
EF - x - 850 DL	8	855	945	3,2	6	7.5	100	e
EF - x - 1050 DL	10	1095	1185	4,2	6	7.5	100	e
EF - x - 1350 DL	12	1335	1425	4,8	6	7.5	100	e
EF - x - 1550 DL	14	1575	1665	5,4	6	7.5	100	e
EF - x - 1800 DL	16	1815	1905	6,0	6	7.5	100	e
EF - x - 2050 DL	18	2055	2145	6,6	6	7.5	100	e
EF - x - 2250 DL	20	2295	2385	7,2	6	7.5	100	e
EF - x - 2550 DL	22	2535	2625	7,8	6	7.5	100	e
EF - x - 2750 DL	24	2775	2865	8,4	6	7.5	100	e
EF - x - 3000 DL	26	3015	3105	9,0	11	15	100	e

Resolution 306mm Range 0,5 - 15m Optical code "E"								
Model	N° of beams	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtbf (anni)	PL
EF -x - 300 E	2	306	405	1,5	6	7.5	100	e
EF -x - 600 E	3	606	705	1,9	6	7.5	100	e
EF -x - 900 E	4	906	1005	3,0	6	7.5	100	e
EF -x - 1200 E	5	1206	1305	4,1	6	7.5	100	e
EF -x - 1500 E	6	1506	1605	5,2	6	7.5	100	e
EF -x - 1800 E	7	1806	1905	6,3	6	7.5	100	e
EF -x - 2200 E	8	2106	2205	7,4	6	7.5	100	e
EF -x - 2400 E	9	2406	2505	8,5	6	7.5	100	e
EF -x - 2700 E	10	2706	2805	9,6	6	7.5	100	e
EF -x - 3000 E	11	3006	3105	10,7	6	7.5	100	e

Resolution 315mm Range 6 - 30m Optical code "EL"								
Model	N° of beams	Sensitive Height SH (mm)	Barrier Height H (mm)	Weight (Tx+RX) (Kg)	Response Time (ms)	Response Time blanking (ms)	Mtbf (anni)	PL
EF -x - 300 EL	2	315	405	1,5	6	7.5	100	e
EF -x - 600 EL	3	615	705	1,9	6	7.5	100	e
EF -x - 900 EL	4	915	1005	3,0	6	7.5	100	e
EF -x - 1200 EL	5	1215	1305	4,1	6	7.5	100	e
EF -x - 1500 EL	6	1515	1605	5,2	6	7.5	100	e
EF -x - 1800 EL	7	1815	1905	6,3	6	7.5	100	e
EF -x - 2200 EL	8	2115	2205	7,4	6	7.5	100	e
EF -x - 2400 EL	9	2415	2505	8,5	6	7.5	100	e
EF -x - 2700 EL	10	2715	2805	9,6	6	7.5	100	e
EF -x - 3000 EL	11	3015	3105	10,7	6	7.5	100	e

Response time in master / slave configuration

The response time is variable with the number of beams, and increases if the blanking function is active.

In the master / slave configuration, the total response time is calculate as follow :

Total beams number = number of the MASTER beams + number of the SLAVE beams

Total beams number	Response Time msec	Response time with blanking active msec
from 2 up to 24	6	7.5
from 25 up to 66	11	15
from 67 up to 108	16	22.5
from 109 up to 150	21	30
from 151 up to 186	26	37.5
from 187 up to 228	31	45

I.E. - The following configuration of the light curtains produce a response time equal to:

MASTER 90 beams + SLAVE 18 beams total 108 beams

Response time = 16 ms blanking not active

Response time = 22.5 ms blanking active

MTTFd

In the master / slave configuration, the total MTTFd value is obtained by adding the MASTER number beams with the SLAVE number beams. After derive from " List of the models and the characteristics " tables, the total value of MTTF based on the total number of beams obtained previously.

BARRIER CODE

		EF - a		400	B
Model	see tables pag 13				
Sensitive Height	see tables pag 32-39				
Optic Code	see tables pag 32-39				
Master / Slave *	optional M = master S = slave				

* suffix present only in the Master / Slave versions .

BLANKING FUNCTION DETAILS

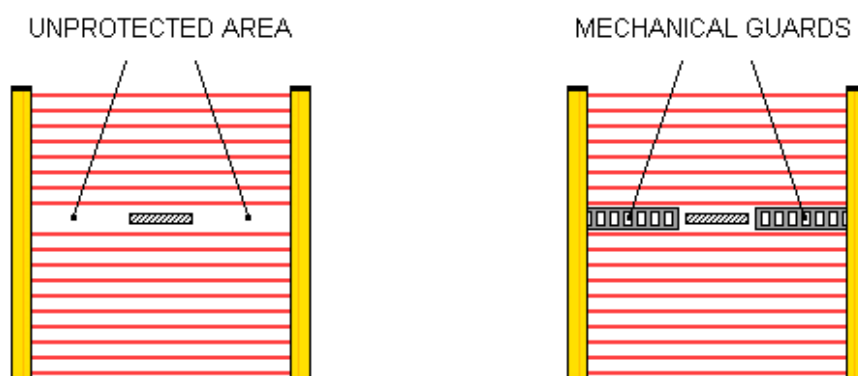
For the blanking connection refer to pag 18, 24

Some models of barriers can't use the blanking function (see pag 35-36)

- 1) Cannot be selected on the first beam near the cap with connectors because this is the synchronism beam. The interruption of this beam causes the OSSD OFF.
- 2) In the MASTER / SLAVE model, the blanking function is active only on the MASTER.
- 3) In the blanking version without the presence of the object (BSO) the resolution of the ESPE changes as shown in the table below

Barrier model	Blanking without object obligation	Resolution	Maximun size of non detected object
EF A	Resolution without blanking	14mm	0mm
	Resolution with blanking 1 beam BSO1	24mm	6mm
	Resolution with blanking 2 beams BSO2	34mm	16mm
	Resolution with blanking 3 beams BSO3	44mm	26mm
EF AL	Resolution without blanking	20mm	0mm
	Resolution with blanking 1 beam BSO1	30mm	2mm
	Resolution with blanking 2 beams BSO2	40mm	12mm
	Resolution with blanking 3 beams BSO3	50mm	22mm
EF B	Resolution without blanking	30mm	0mm
	Resolution with blanking 1 beam BSO1	54mm	18mm
	Resolution with blanking 2 beams BSO2	78mm	42mm
	Resolution with blanking 3 beams BSO3	102mm	66mm
EF BL	Resolution without blanking	40mm	0mm
	Resolution with blanking 1 beam BSO1	64mm	10mm
	Resolution with blanking 2 beams BSO2	88mm	34mm
	Resolution with blanking 3 beams BSO3	112mm	58mm
EF C	Resolution without blanking	55mm	0mm
	Resolution with blanking 1 beam BSO1	102mm	42mm
	Resolution with blanking 2 beams BSO2	150mm	90mm
	Resolution with blanking 3 beams BSO3	198mm	138mm
EF CL	Resolution without blanking	65mm	0mm
	Resolution with blanking 1 beam BSO1	112mm	34mm
	Resolution with blanking 2 beams BSO2	160mm	82mm
	Resolution with blanking 3 beams BSO3	208mm	178mm

- 4) Using the **BCO** blanking, if the width of the worked object is lower than protected field , in order to maintain the nominal resolution , is necessary to install special mechanical protection as drawing below. If is not possible insert the protection in this area, the resolution increases. Refer to the **BSO** table to obtain the new value of resolution.



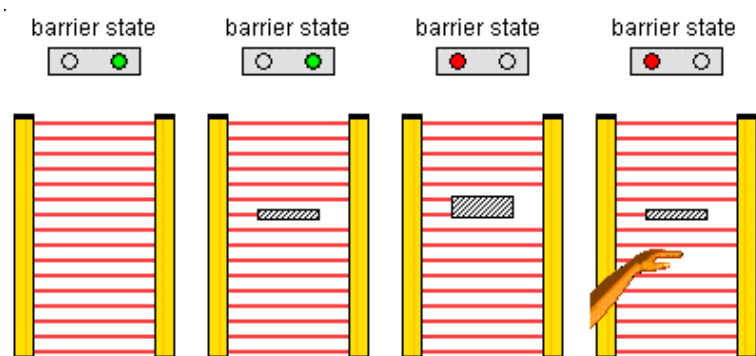
- 5) It is possible set the type of blanking as indicated below.

Blanking without object presence obligation

This function allows to enter an object in the sensitive area without deactivating the outputs of the light curtain. The resolution is modified for the entire height of the protected area as indicated in the table above. Can be implemented the following configurations:

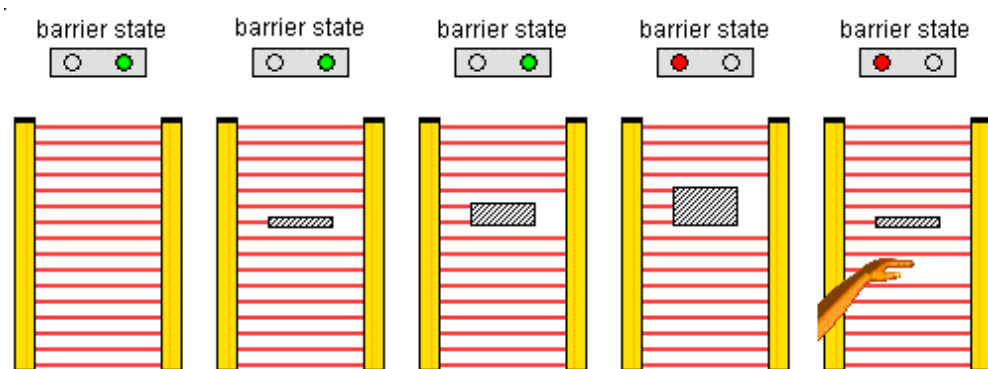
BSO1 1 BEAM

- With all the beams free, the protected area is free.
- With one beam interrupted, the protected area is considered free and the OSSDs are in ON state.
- With two or more beams interrupted, the protected area is considered occupied and the OSSD are in OFF state.



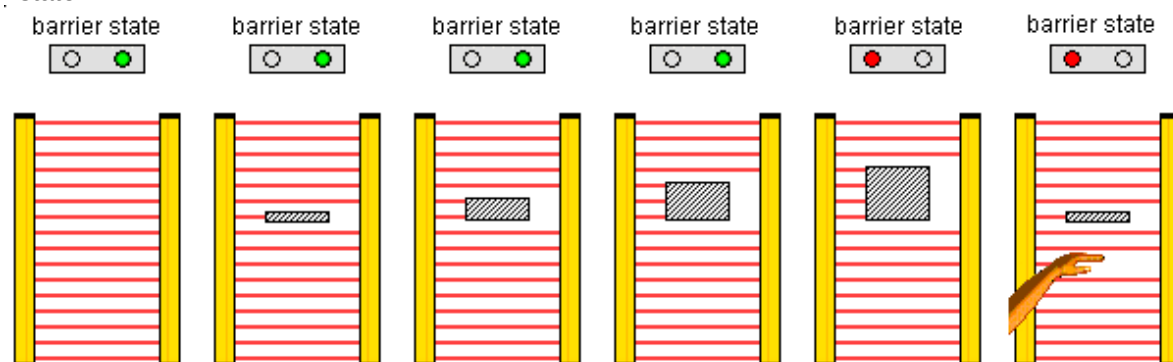
BSO2 1-2 BEAMS

- With all the beams free, the protected area is free.
- With one or two adjacent beams interrupted, the area is considered free and the OSSDs are in ON state.
- With two or more non-adjacent beams interrupted, the area is considered occupied and the OSSDs are in OFF state.



BSO3 1-2-3 BEAMS

- With all the beams free, the protected area is free.
- With one, two or three adjacent beams interrupted, the area is considered free and the OSSDs are in ON state.
- With two or more non-adjacent beams interrupted, the area is considered occupied and the OSSDs are in OFF state.

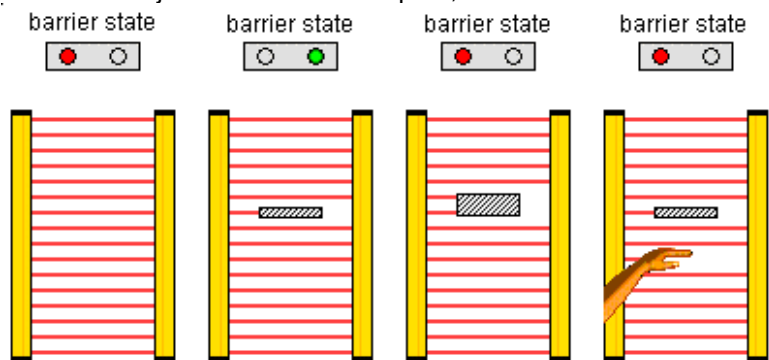


Blanking with object presence obligation

This function allows to keep an object in the sensitive area without deactivating the outputs of the light curtain. Can be implemented the following configurations:

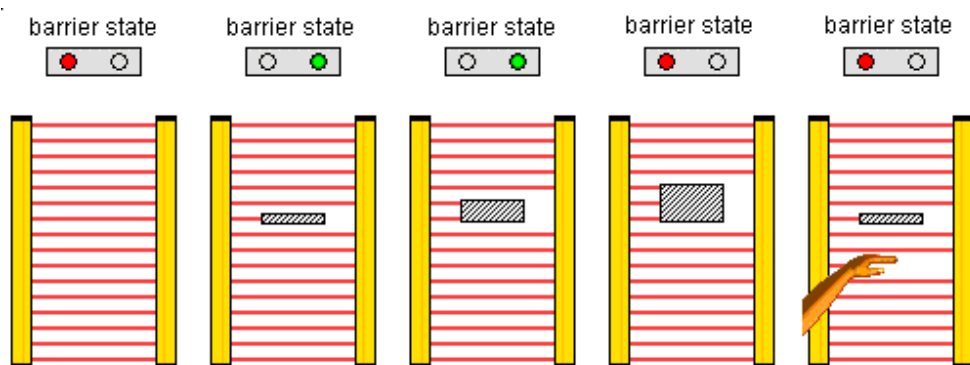
BC01 1 BEAM

- If the movable object is not present the OSSDs are in OFF state.
- With one beam interrupted, the area is considered free and the OSSDs are ON.
- With two adjacent beams interrupted, the area is considered occupied and the OSSDs are in OFF state.



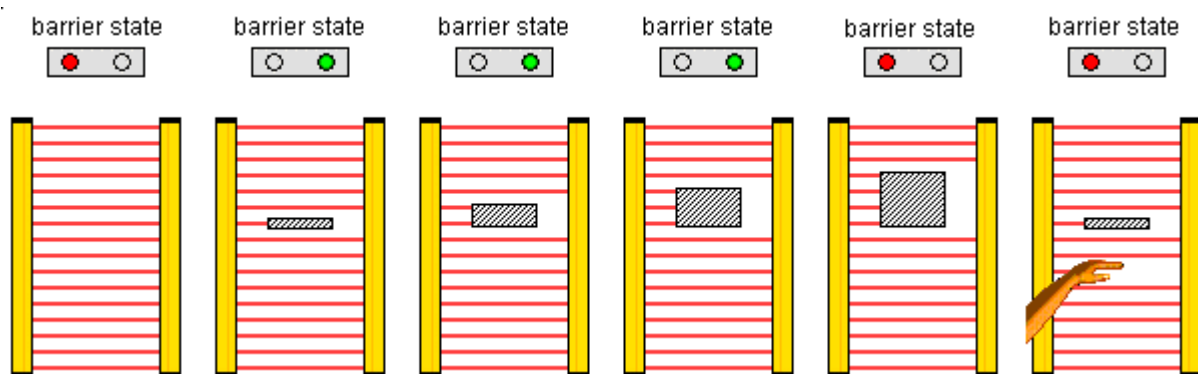
BC02 1-2 BEAMS

- If the movable object is not present, the OSSDs are in OFF state.
- With one or two adjacent beams interrupted, the area is considered free and the OSSDs are in ON state.
- With two or more non-adjacent beams interrupted, the area is considered occupied and the OSSDs are in OFF state.



BC03 1-2-3 BEAMS

- If the movable object is not present, the OSSDs are OFF.
- With one, two or three adjacent beams interrupted, the area is considered free and the OSSDs are ON.
- With two or more non-adjacent beams interrupted, the area is considered occupied and the OSSDs are in OFF state.



MUTING FUNCTION DETAILS

Before to use the muting function, should be evaluated :

- a. the application;
- b. the installation of the two sensors;
- c. the risk of the machinery or the plant.

In order to use the muting function, thus the knowledge and observance of the machinery / equipment-specific standards and the relevant standards or guidelines for machine safety / protective devices.

The following overview, which does not claim to be exhaustive, gives some of the major standards:

EN 61496-1	Safety of machinery - Electro-sensitive protective equipment
EN 60947-5-3	Low-voltage switchgear and controlgear
EN ISO 13855	Safety of machinery - Positioning of protective equipment
IEC/TS 62046:2008	Safety of machinery - Application of protective equipment to detect the presence of persons

!! Warning !

SAFETY INSTRUCTION

!! Warning !!

Failure to observe the following instructions may lead to most severe injuries and death.

- Observe the above-mentioned standards as regards configuration, installation and operation of muting systems.
- Take measures to exclude common mode failures.
- Take measures to exclude failures by cross circuits.
- Take measures to prevent the muting function from being tripped by persons.
- Please note that a muting function shall not be initiated until the preceding muting function has been terminated.
- Take measures to safeguard maintenance gates to the danger zones in compliance with the necessary safety level.

The muting function integrated in the EFESTO4 is appropriate for applications where the muting sensors used to initiate the muting function are the same as those used to terminate the muting function.

Muting sensors location and positioning:

The muting sensors shall be located such that the user is not able to manipulate / defeat the muting sensors in order to activate the muting function. The above-mentioned standards and safety instructions shall be observed.

This means e.g. for safeguarding the access with use infrared emitter-receiver type as sensors:

- the beams of the muting sensors shall always meet in the danger zone.
- the muting sensors shall be positioned / located such that the light grid is interrupted before it is possible to reach the beam intersection point.

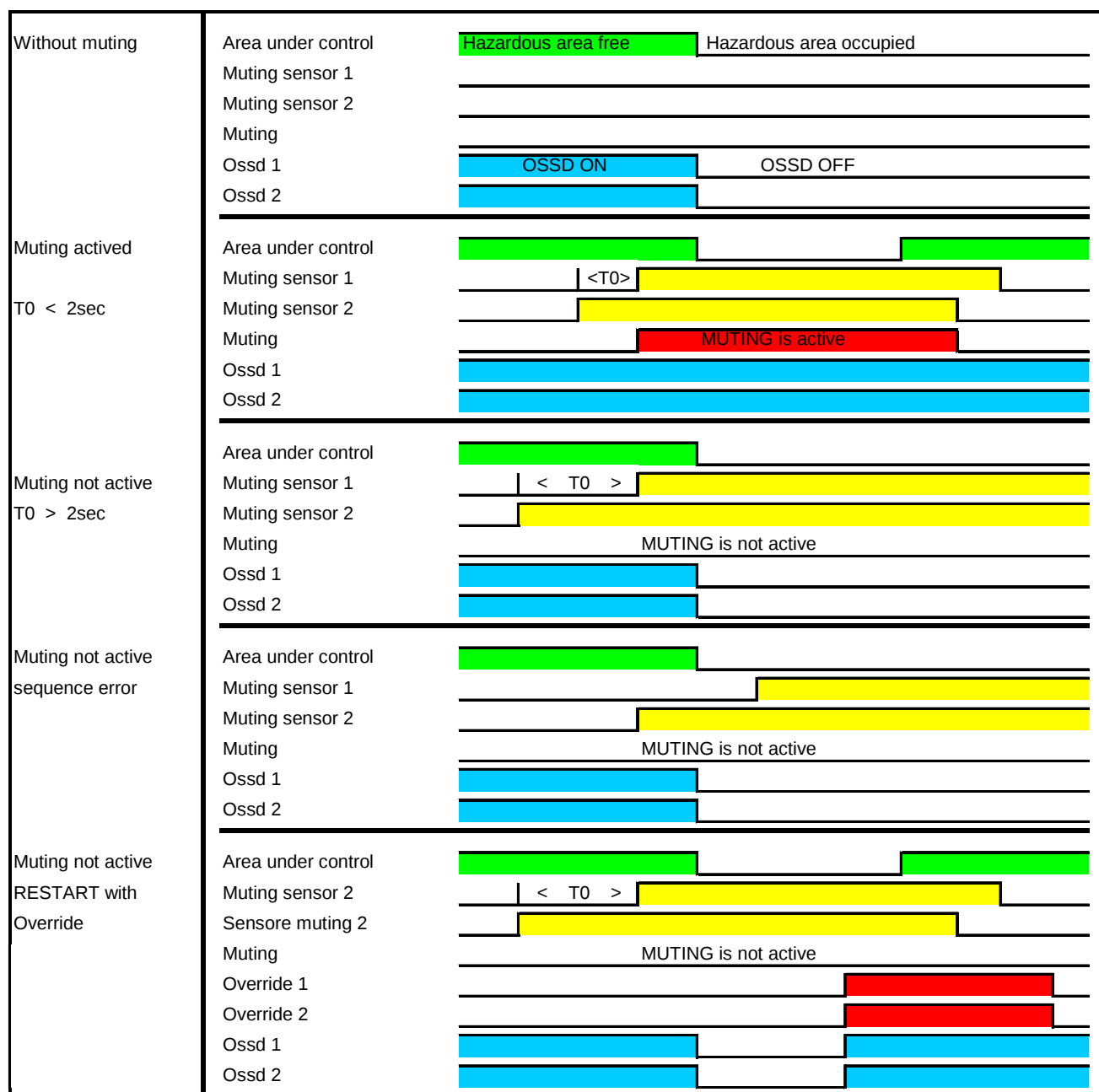
Type and connection of the sensors

The sensors can be of every type (also no safety sensor) because the internal circuit of the barrier provide the control of the same and to block on the case of damage .

These components can be choice between proximity, mechanical micro , light curtains, ect as specify on the standard machinery. When activate, the muting sensor must supply 24Vdc.

To avoid common mode failures the conductors must be of type armed against the mechanical crushing and screened electrically. Their installation must happen on two separate runs for avoid that a possible cause could damage both the connections with a short circuit or with the cut of the conductors.

Sequence function of muting



ACCESSORIES

MIRRORS

They are the ideal solution for the protection of area as they protect 2 or 3 sides of the machine reducing the cost of installation. It is possible to resolve the following situations:

- Protection to “ L “ shape when the unit must protect 2 sides with the employ of 1 mirror as fig. 1
- Protection to “ U “ shape when the barrier must protect 3 sides with employ of 2 mirrors as fig. 2
- Total protection when the light curtain protect 4 sides with the employ of 3 mirrors as fig. 3.
If the perimeter is quite long this solution is not suggested for difficulty of alignment, the best solution is to use 2 barriers and 2 mirrors as shown in fig. 4.

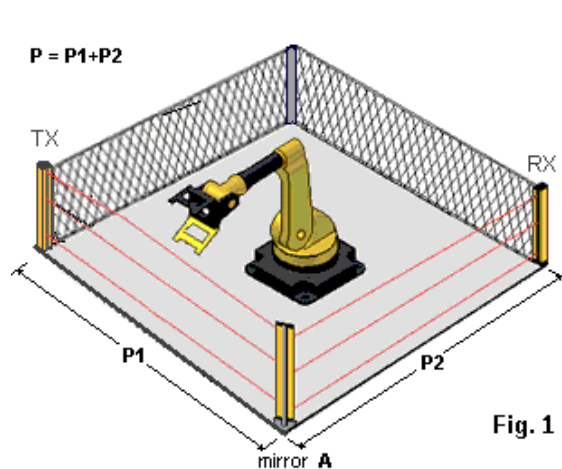


Fig. 1

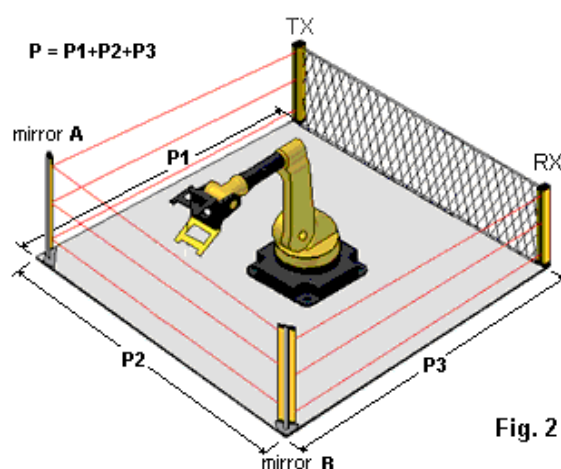


Fig. 2

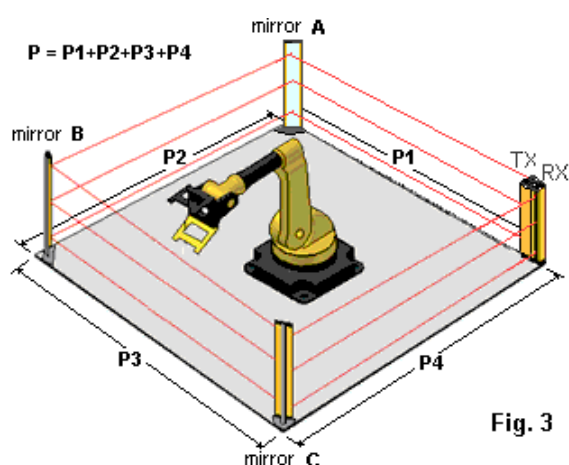


Fig. 3

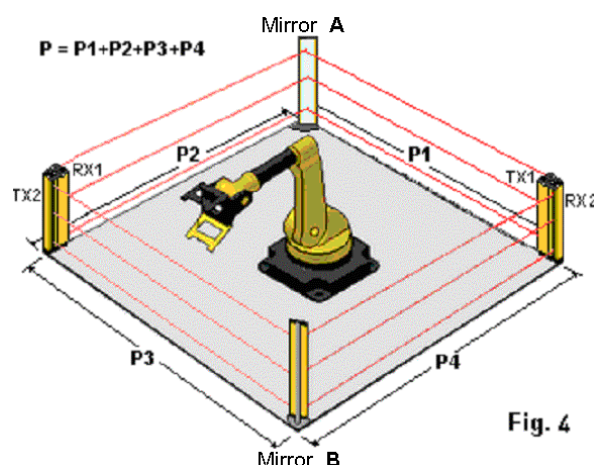


Fig. 4

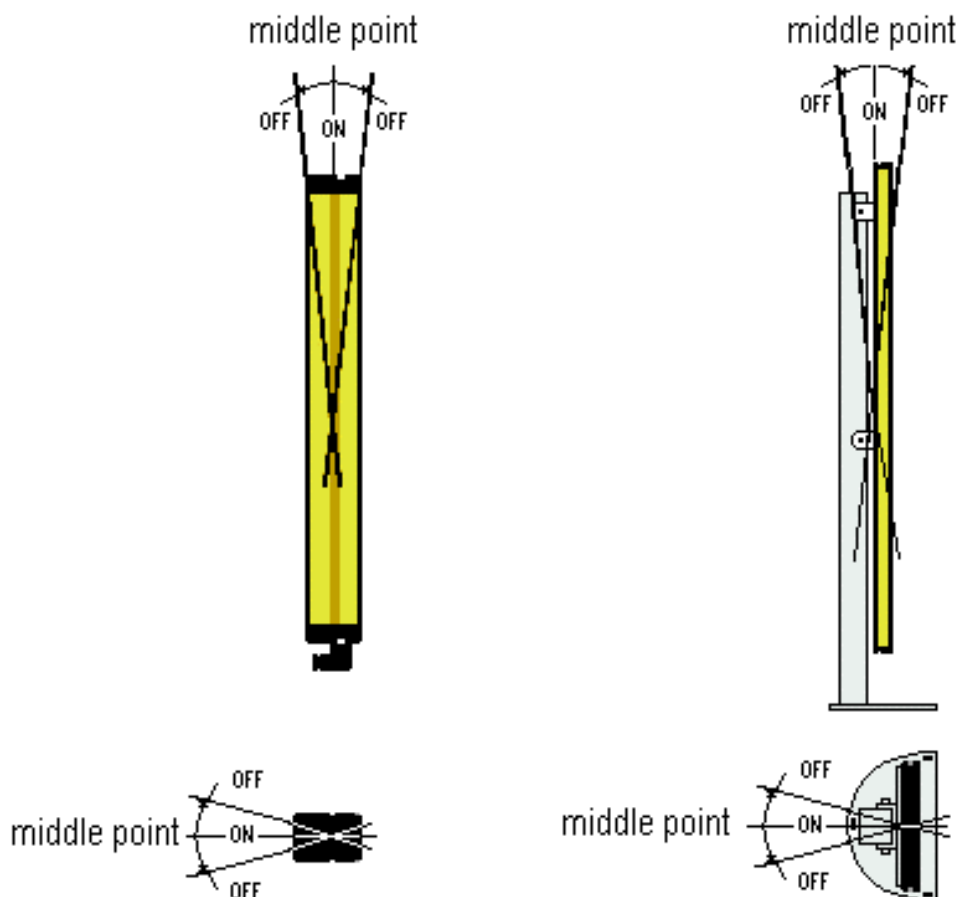
Range of curtain using mirrors

The nominal range of the light curtain using these devices will be reduced depending on the number of mirrors, taking into consideration that every mirror reduces the total range by about 25 %.
The values of the range are the following:

	Range up to 15 m	Range up to 30 m
Solution fig. 1	P = 12 m	P = 22,5 m
Solution fig. 2	P = 8,5 m	P = 16,5 m
Solution fig. 3	P = 6 m	P = 12 m

Alignment of barriers using mirrors

- Verify the distance of the sides to protect considering the above data.
- Install the light curtain and the mirrors on the stated points.
- By the adjustments permitted by the brackets set heights of light curtain and verify the verticality of all components.
- Proceed to accurate adjustment as indicated below.



Application of 1 mirrors with two protected sides

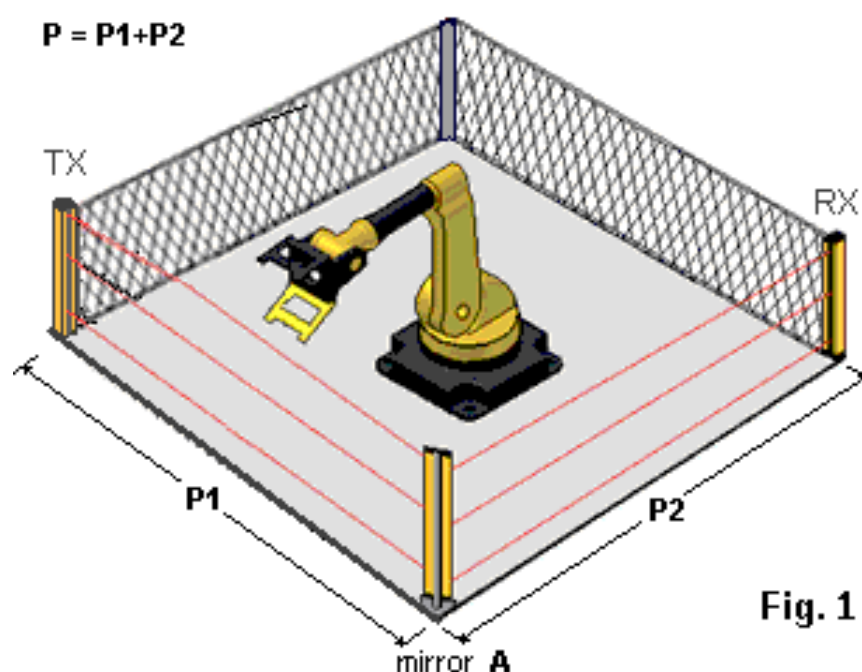
Application of 1 mirror for protection of 2 sides

- **first adjustment**

- o stand behind the emitter, rotate the mirror until the receiver is visible in the mirror.
- o check the verticality of all components.

- **second adjustment to the tuning**

- o stand behind the emitter, rotate the mirror until the receiver is visible in the middle of the mirror.
- o Turn on the light curtain, and use the "bargraph" for alignment. If the restart is automatic, when the beam is all alignment the OS ON is green, otherwise if the restart is manual the BMS is light on if the beam is all alignment.
- o At this point, check the system to render insensible at the vibrations. We must find the middle point as shown in page 48.



Application of 2 mirrors with three protected sides

Application of 2 mirrors for protection of 3 sides

• first adjustment

- o place the mirrors on the line of TX or RX unit in order to centre the axis of the beams . Check the distance between the TX and RX with those of the two mirrors and verify the angularity of 90° of each side .
- o Place behind the TX and move the mirror A to see the mirror B
- o Place behind the RX and move the mirror B to see the mirror A
- o check the verticality of all components.

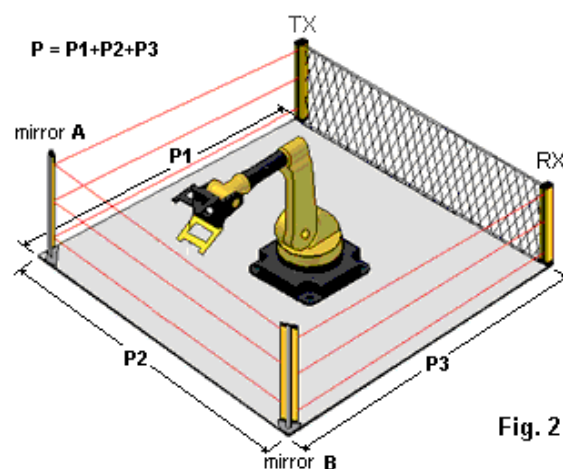


Fig. 2

• second adjustment to the tuning

- o stand behind the TX, rotate the mirrors until the RX is visible in the middle of the mirror B; stand behind the RX, rotate the mirrors until the TX is visible in the middle of the mirror A
- o Turn on the light curtains, and use the "bargraph" for alignment. If the restart is automatic, when the beam is all alignment the OS ON is green, otherwise if the restart is manual the BMS is light on if the beam is all alignment.
- o At this point, check the system to render insensible at the vibrations. We must find the middle point as shown in page 48.

Application of 3 mirrors with 4 protected sides

Follow the same procedure as the above point of fig. 2 considering that the centering will be made on 3 mirrors instead of 2. It is quite difficult to align a system using 3 mirrors. For this reason we suggest using 2 light curtains and 1 mirror or 2 barriers and 2 mirrors depending on the perimeter length needed.

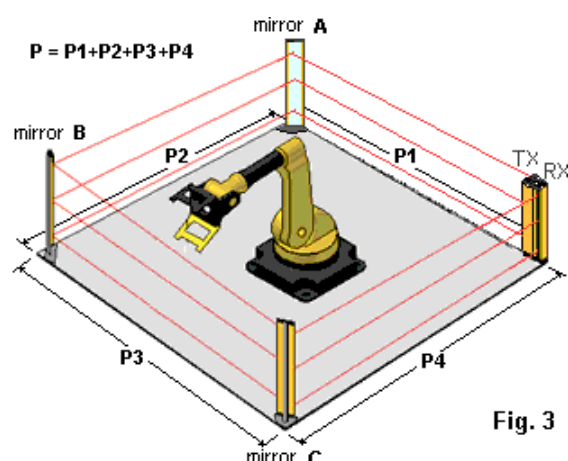


Fig. 3

Application of 2 mirrors with 2 units

This solution allows to protect the 4 sides as in the previous case, but with the use of two mirrors and two light curtains. The alignment should be done as shown in the first reference (fig.1) but acting independently on two combinations of mirrors / barriers.

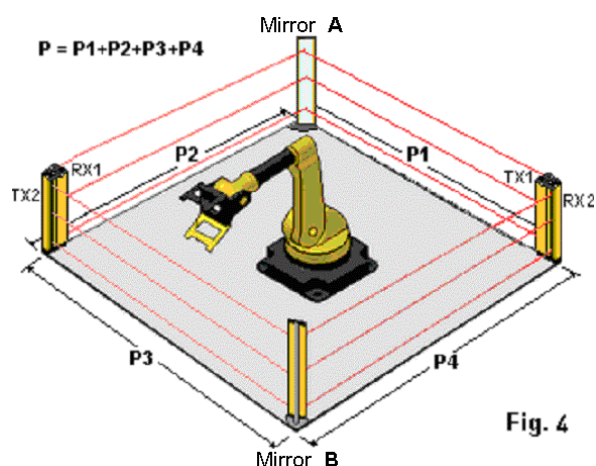
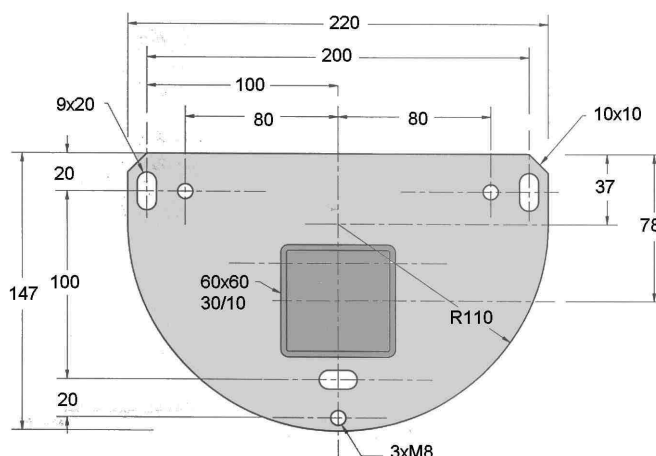


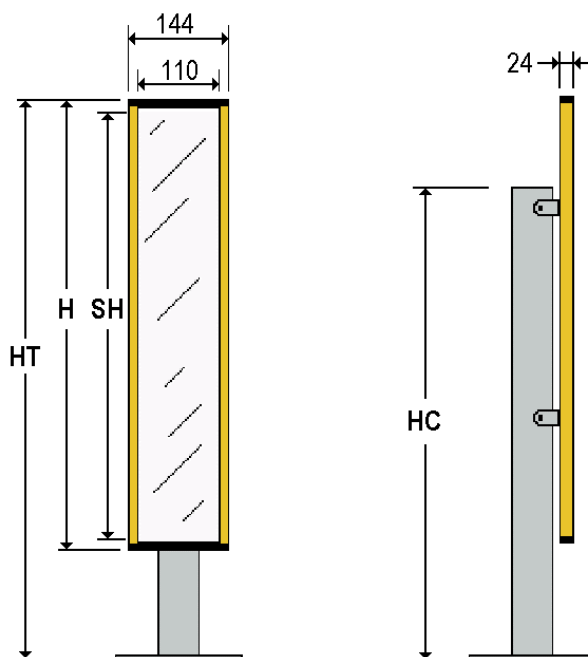
Fig. 4

DIMENSIONS



Mirrors models

Model	SH mm	H mm	HC mm	HT min : max
WAB 501	370	390	385	400 : 570
WAB 502	690	710	705	720 : 1050
WAB 503	1010	1030	1025	1040 : 1530
WAB 504	1330	1350	1345	1360 : 2010
WAB 505	1650	1670	1345	1680 : 2320
WAB 506	1810	1830	1345	1840 : 2480
WAB 507	1970	1990	1345	2000 : 2640



BRACKETS

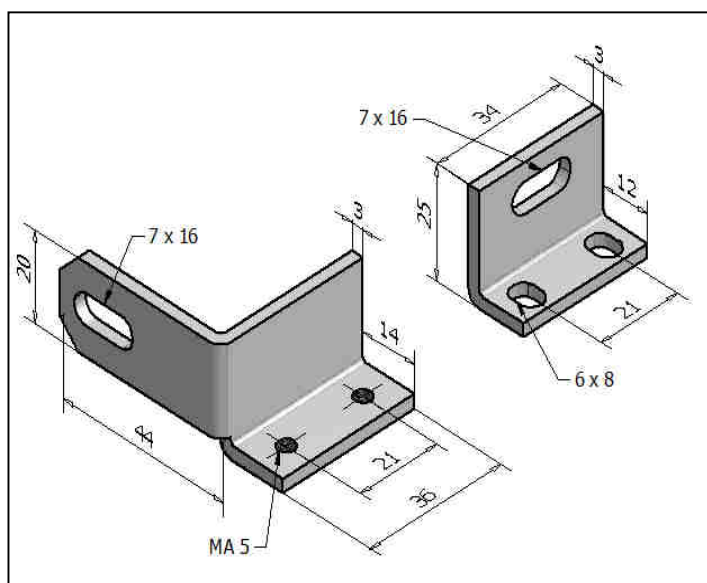
KIT brackets type “STVB”

Supplied as standard with the barrier.

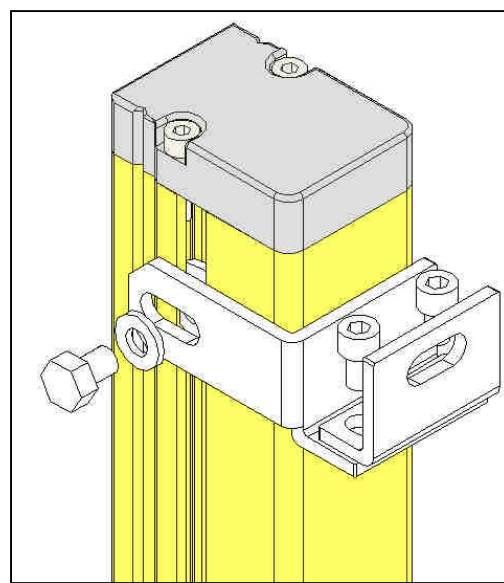
It is the more complete bracket: it is composed from two units (VB1 and VB2) that allow the rotation of the light curtain on the 3 axes in order to regulate the alignment of TX or RX unit.

They include :

- 4 brackets VB1
- 4 brackets VB2
- 4 washers Ø6
- 4 screws M 6X8
- 8 screws M 5X8



Brackets type VB1 / VB2



Brackets assembled on the barrier

NOTE :

To remove the flowing insert (in order to insert them in the opposite guide of the aluminium enclosure) you need to remove the end cap without the connector, unscrewing the two screws.

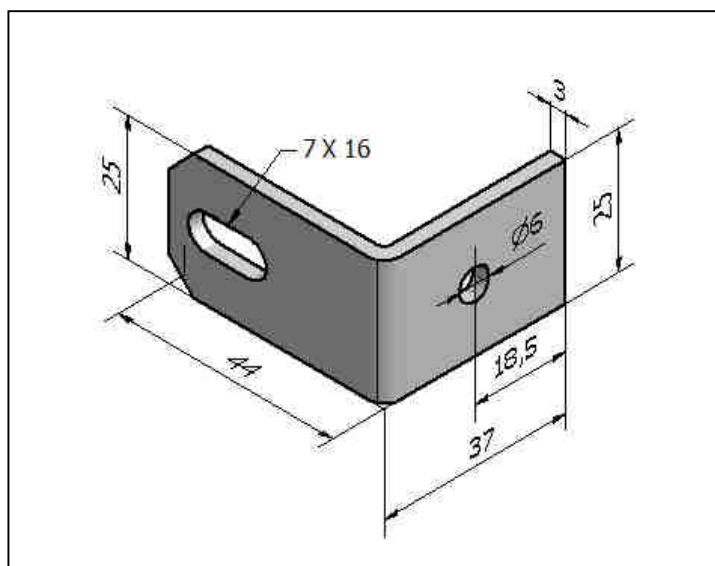
KIT OF BRACKETS “STDL”

supplied as optional to STVB kit

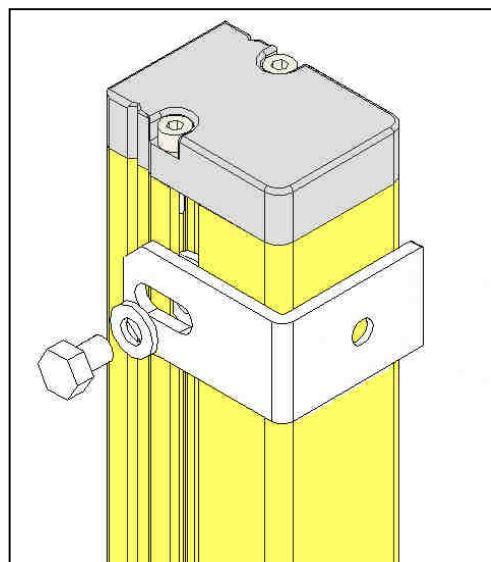
Is formed by a one bracket “L” shape that is used for the angular regulation of the barrier. The sliding insert inside the aluminium profile allows the sliding of the light curtain in the height to facilitate its correct positioning.

Content :

- 4 brackets GM
- 4 washers Ø6
- 4 screws M 6X8



Brackets type GM



Brackets mounted on the barriers

NOTE :

To remove the flowing insert (in order to insert them in the opposite guide of the aluminium enclosure) you need to remove the end cap without the connector, unscrewing the two screws.

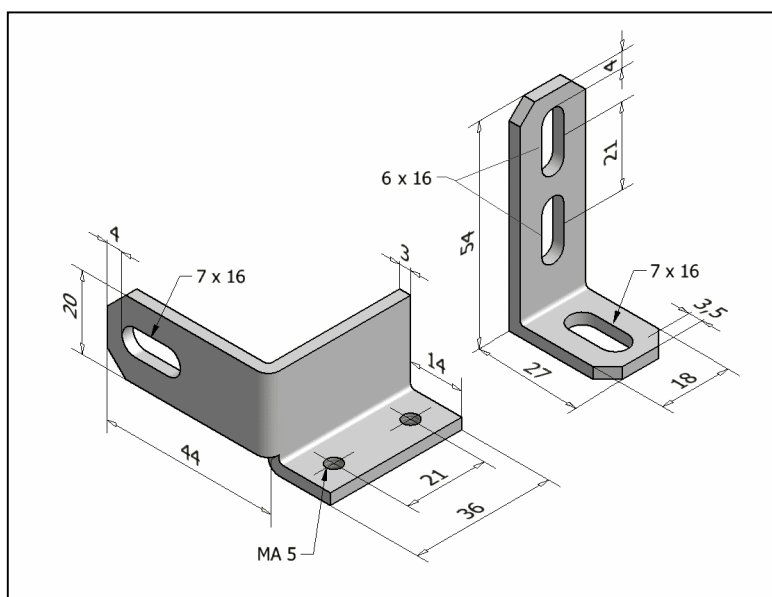
KIT OF BRACKETS “STGM”

Supplied on request as alternative to mod. STVB

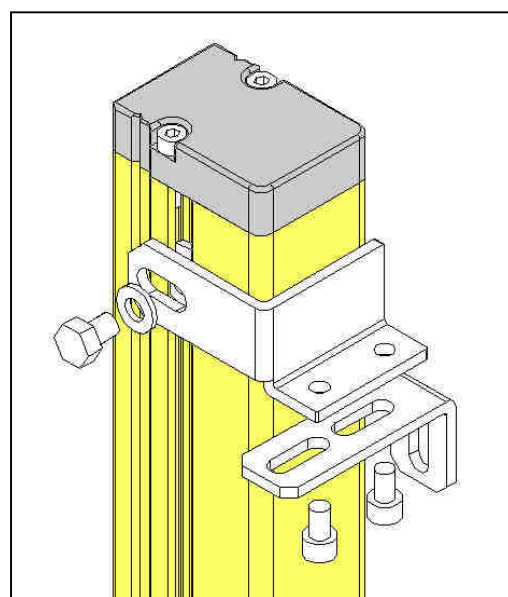
This brackets kit allows to stay the light curtain in its place established by fixing one of the brackets to the side of the light curtain, is recommended when there are needs or difficulties in the installation of light curtains.

Content:

- 4 brackets type VB1
- 4 brackets type VB3
- 4 washers Ø6
- 4 screws M 6X8
- 8 screws M 5X8



Brackets type VB1



Brackets type VB 3 mounted on the barrier

NOTE:

To remove the flowing insert (in order to insert them in the opposite guide of the aluminium enclosure) you need to remove the end cap without the connector, unscrewing the two screws.

CONNECTION CABLES

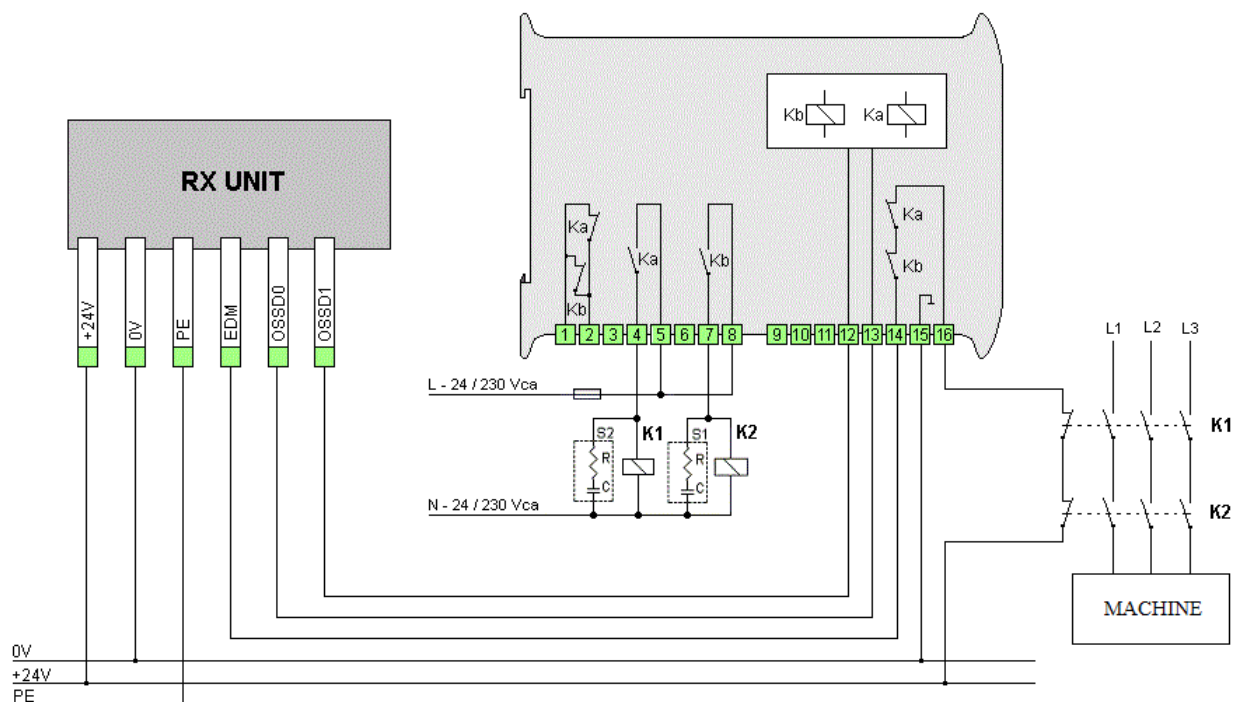
Description		Code	
Connection cable Barrier - cabinet / relay module din rail			
M12 / 4 pins shielded connecting cable, right connector for TX	5m	E-84-5	
	10m	E-84-10	
M12 / 5 pins shielded connecting cable, right connector for RX a/d/e	5m	E-85-5	
	10m	E-85-10	
M12 / 8 pins shielded connecting cable, right connector for RX b/c/d/e	5m	E-88-5	
	10m	E-88-10	
M23 / 17 pins shielded connecting cable, right connector for RX f	5m	E-817-5	
Connection cable - to external relay module			
M12 / 4 pins shielded cable, 2 female right connector for TX-Rel 021/ 022	10m	E-94-10	
M12 / 5 pins shielded cable, 2 female right connector for RXa/d/e -Rel021/022	10m	E-95-10	
M12 / 8 pins shielded cable, 2 female right connector for RXb/c/d/e-Rel 021/022	10m	E-98-10	
M23 / 17pin shielded cable, 2 female right connector for RX f -Rel 021/ 022	10m	E-917-10	

RELAYS MODULE DIN RAIL

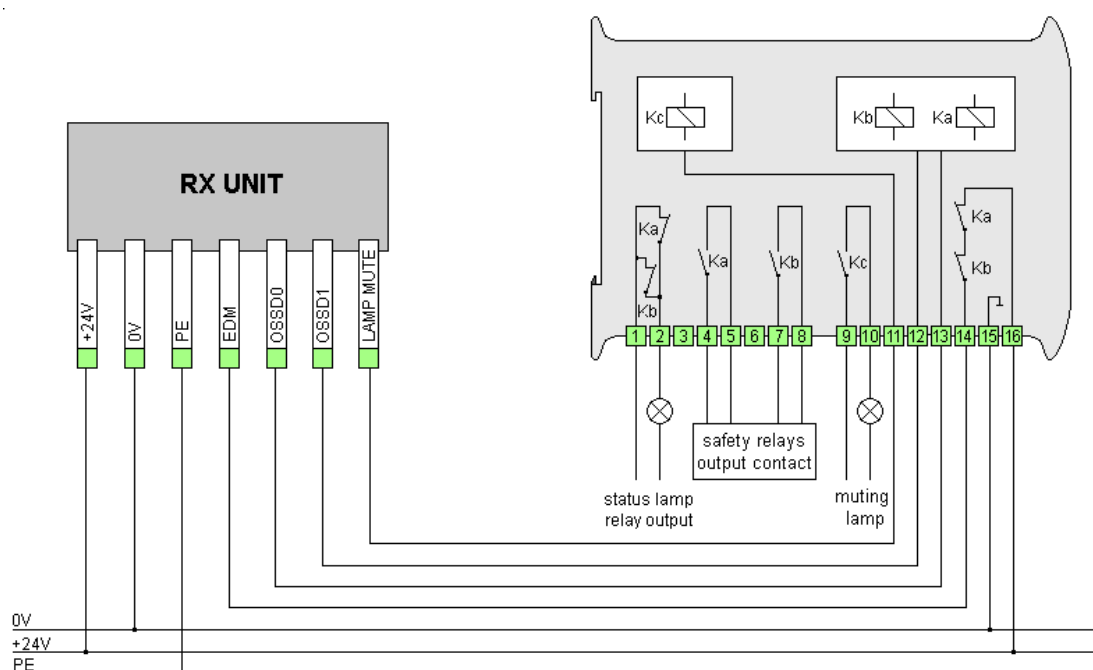


The following box, changes the static output of the light curtain, into relays output. This modules can be mounted on DIN rail and are matched with light curtains with EDM function: **EF b, EF d, EF e, EF f.**

REL 011 relay module standard - example of connections with external contactors. The same wiring diagram can be applied to REL012.



REL 012 relay module with blinking muting lamp - example of connections



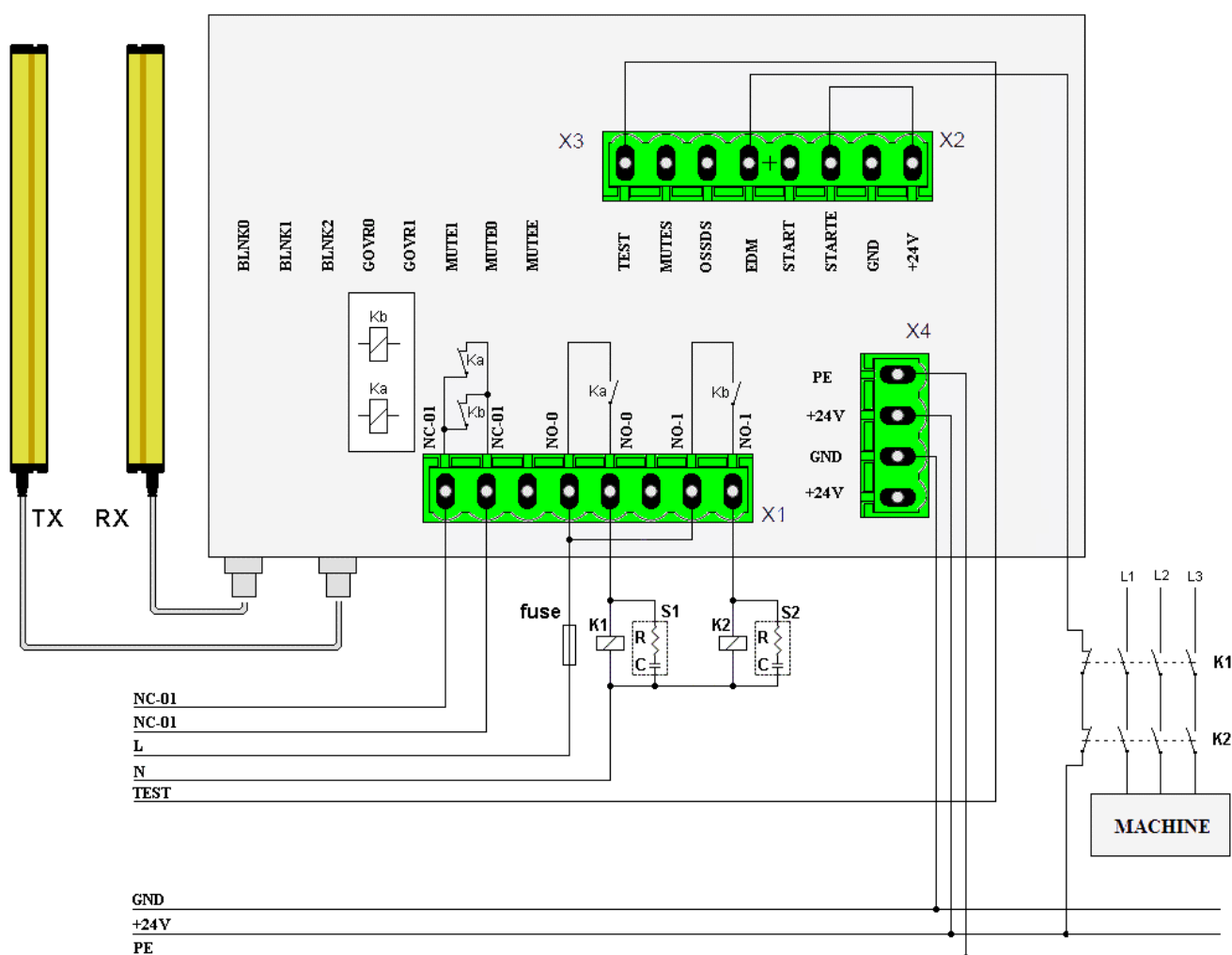
If not used the external contactors control, connect the pin 16 to +24Vdc.

EXTERNAL RELAY MODULES

REL 021 B relays module with spring-key for manual reset and OSSD status lamp for **EF b**.



Example of connection with external contactor control.



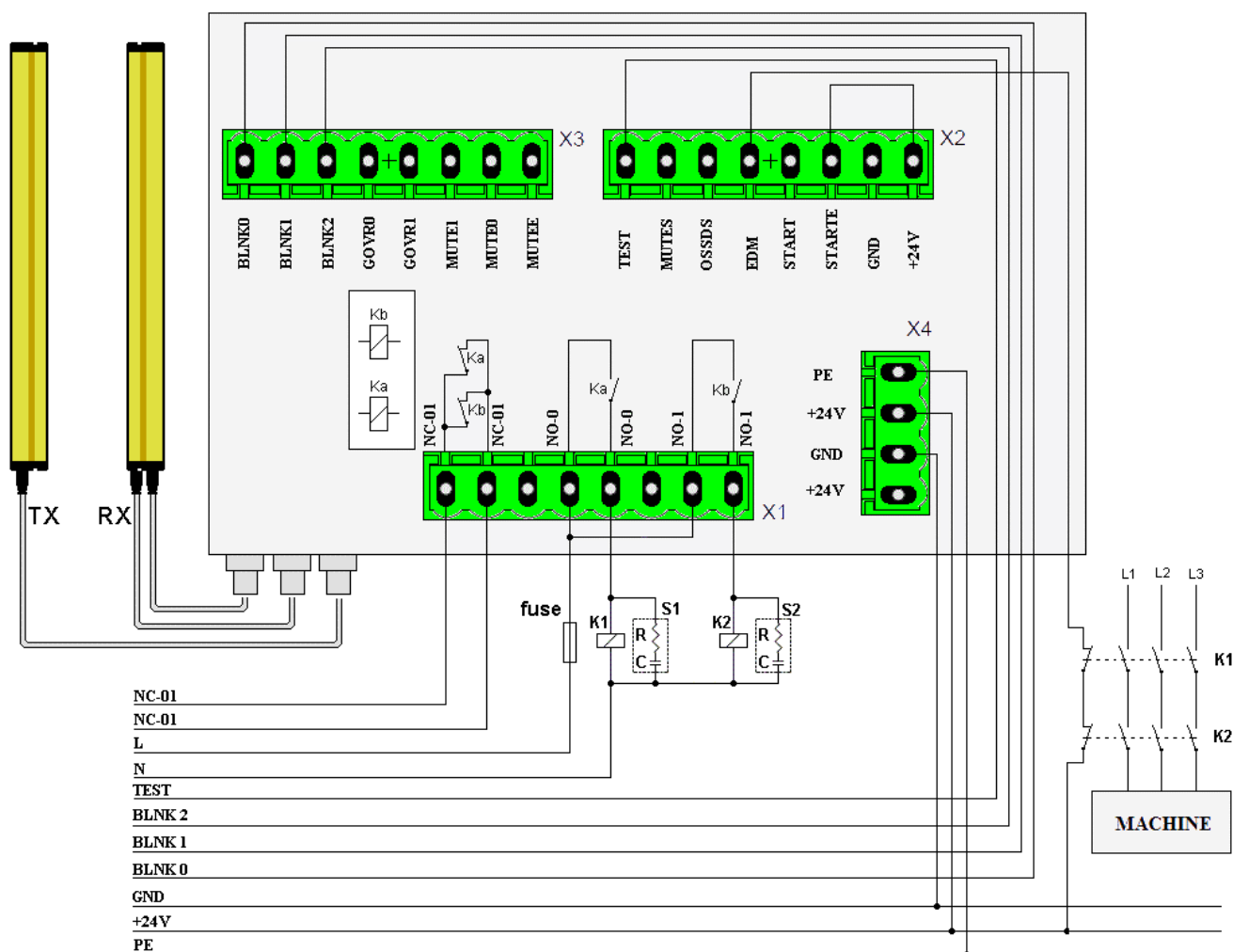
The TEST signal can be lead outside to test the safety chain.
The signal START-E is connected to +24V, so the manual reset is selected.

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

REL 021 D relays module with spring-key for manual reset and OSSD status lamp for **EF d**.



Example of connection with external contactor control.



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.

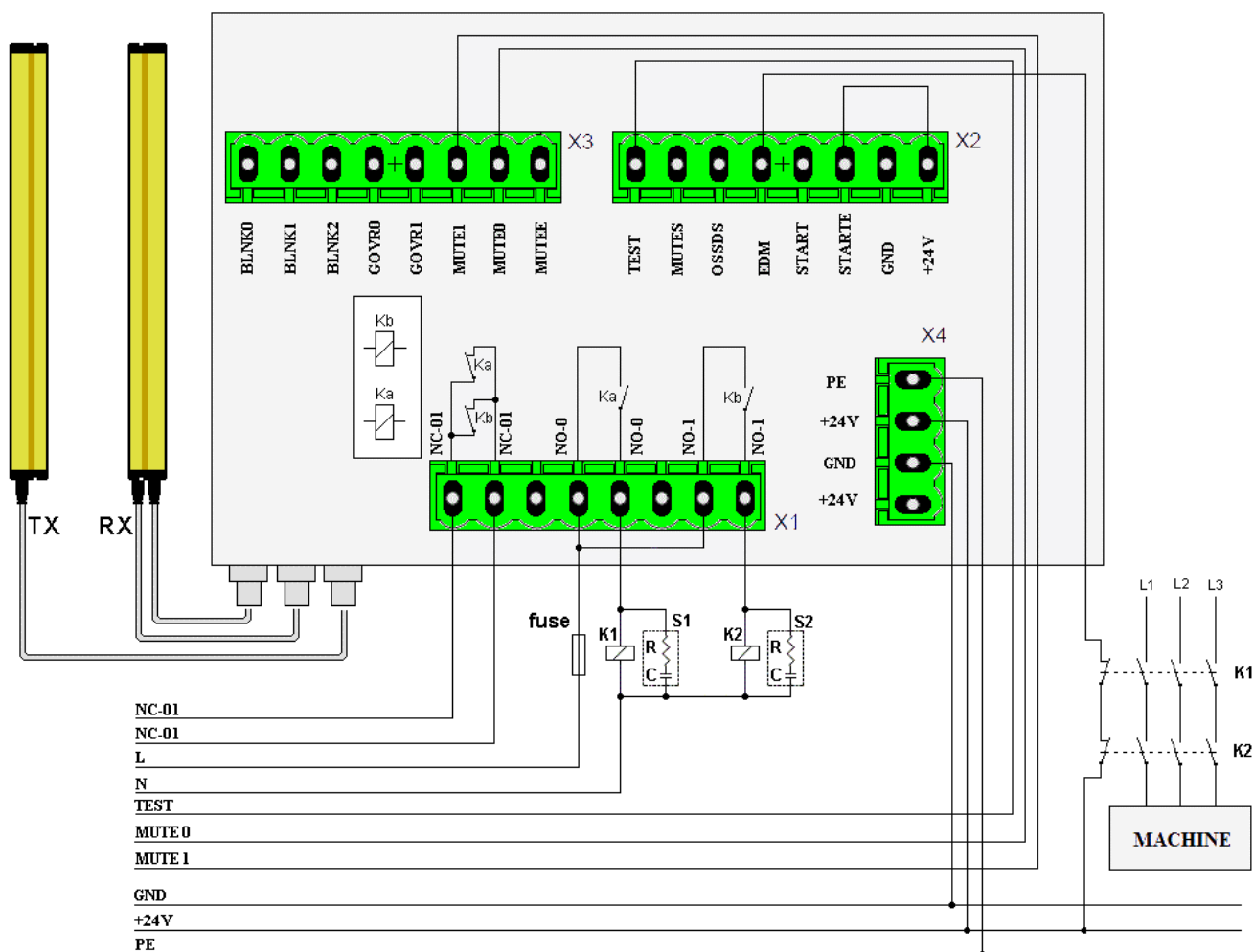
The signals BLNK0....BLNK2 can be connected inside the box, otherwise can be brought out and connected at other control system(i.e. PLC).

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

REL 022 E relays module with spring-key for manual reset and guard override; OSSD status and MUTING lamp for **EF e**.



Example of connection with external contactor control.



The TEST signal can be lead outside to test the safety chain.

The signal STARTE is connected to +24V, so the manual reset is selected.

The signals MUTE0 and MUTE1 are brought out of the box and connected to the MUTING sensors.

The MUTE, signal for enable the MUTE function, is connected to +24V inside the box.

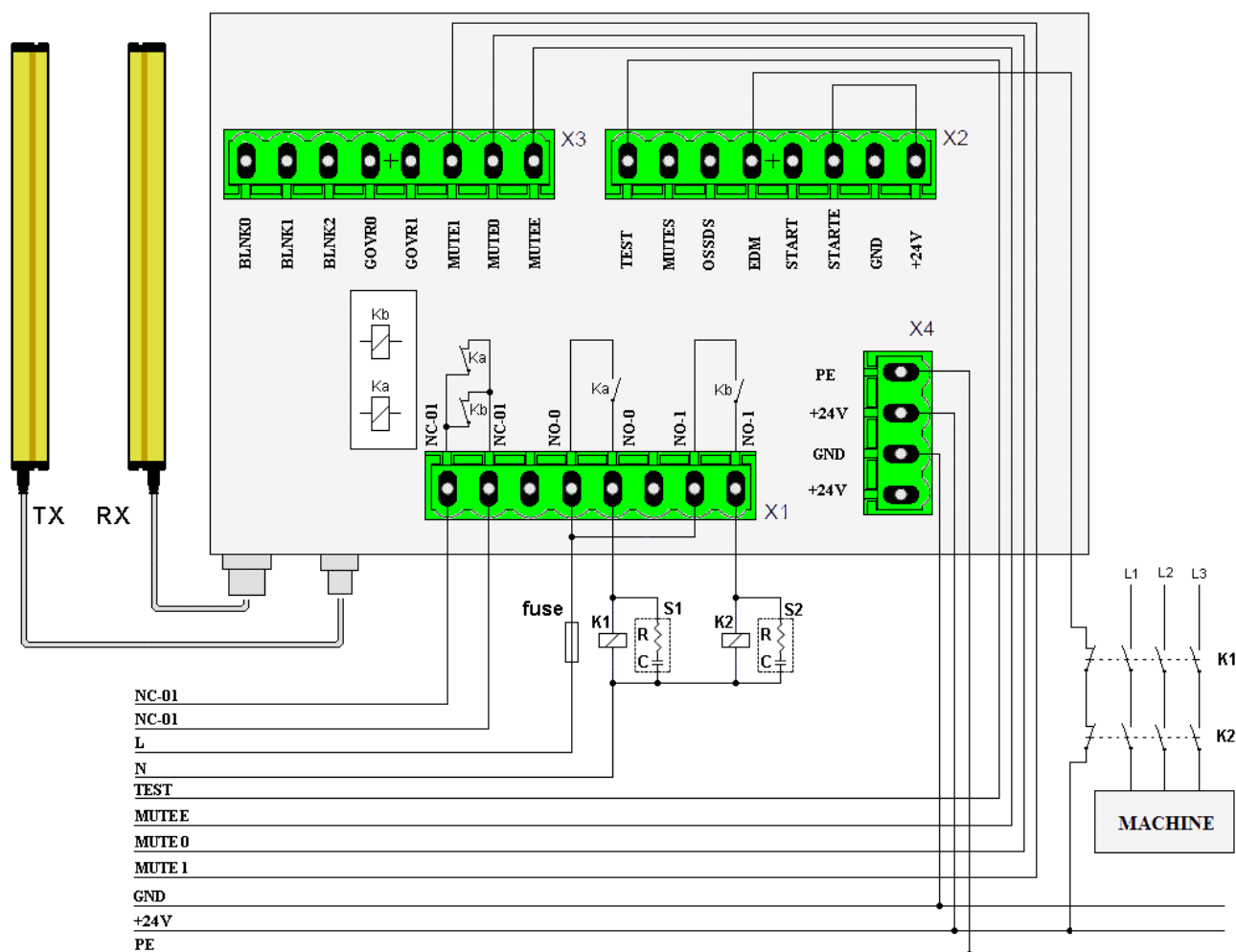
The MUTING function is always active, is no possible deactivate it.

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

REL 022 F relays module with spring-key for manual reset and guard override; OSSD status and MUTING lamp for **EF f1**.



Example of connection with contactors control.



The TEST signal can be lead outside to test the safety chain.
 The signal STARTE is connected to +24V, so the manual reset is selected.
 The signals MUTE0 and MUTE1 are brought out of the box and connected to the MUTING sensors.
 The MUTEE, signal for enable the MUTING function, is also brought out of the box, so the customer can activate or not the MUTING function.

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

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 or 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.

**DICHIARAZIONE "UE" DI CONFORMITA'
"UE" 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**

I prodotti identificati come "EFESTO4" sono
Dispositivi Elettrosensibili di Sicurezza (ESPE)
Versione 1609 di:

The products identified with the name EFESTO4"
are Device for protection of dangerous area (ESPE)
Version 1609 of:

Tipo 4, SIL 3, Cat 4 – PL e

Type 4, SIL 3, Cat 4 – PL e

Organismo Notificato**Notified Body**

TÜV Intercert S.r.l.
Via Cecati 1/1 – 42123 Reggio Emilia Italia
N attestato esame CE del tipo

N identificazione 2616**N 16-MD-B002-TIC**

Conformi alle seguenti direttive

Conforms to the following directives

2006 / 42 / EC Direttiva Macchine
come attuata dal DLGS N17 del 27 gen 2010
2014 / 30 / EC Compatibilità Elettromagnetica
come attuata dal DLGS N 80 del 18 mag 2016

Machine Directive
Electro Magnetic Compatibility Directive

Norme armonizzate utilizzate

EN 61496-1: 2013, EN 61000-6-2: 2005, EN 61000-6-4: 2007 + A1: 2011
EN 62061: 2005 + AC: 2010 + A1: 2013 + A2: 2015
EN ISO 13849-1: 2015, EN ISO 13849-2: 2012

Altre norme e specifiche tecniche utilizzate

EN 61496-2: 2013, EN 61508-3: 2010

La persona autorizzata a costituire il fascicolo tecnico è :
Grein S.r.l. Via S.G.B. De La Salle 4/A 20132 MILANO ITALY

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

Milano, 04 set 2016

Originale / Original

La presente dichiarazione di conformità è rilasciata sotto la responsabilità esclusiva del fabbricante

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



GREIN



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