



TGR-T4 series

Single beam safety control unit,
safety level 4,
from 1 to 4 pairs of photocells

USER'S MANUAL



The device conforms with the EC requirements in compliance with the following standards:

- Low Voltage Directive 73/23/EEC
- EMC Directive 89/336/EEC
- Machinery Directive 89/392/EEC
- IEC 61496-1: 1997
- IEC 61496-2: Ed.2 IEC :2001 (CDV draft8)
- DIN V VDE 0801: 1990 and
-amendment A1: 1994
- EN 61000-2,-3,-4,-5,-6
- EN 55022: 1994
- DIN EN 60204-1: 1993
- EN 50178: 1997
- IEC 664-1: 1997

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1 BEFORE USING THE DEVICE.**1.1 GENERAL INSTRUCTIONS.**

To guarantee a correct installation, carefully follow the instructions of this manual.

Do not touch non-insulated cables, unless they have been disconnected from the power supply.

Make sure that the cables connected to the control unit are not too taut and that they do not hinder the movement of persons or objects.

The control unit does not contain parts subject to maintenance; before carrying out any outer operation, turn off the power.

Do not open the control unit for any reason (apart from the selection of the configuration dip-switch **which must be only carried out by skilled workers**) and in case of failure, send it to our laboratories indicating the detected failure and the operation period.

Avoid touching the protective cover of the safety sensors with the hands in order to prevent dust and/or grease build upon the device, thus reducing the system performances.

The possible wear of the protective covers does not compromise the system safety in any way but can cause a system tripping.

1.2 PRECAUTION OF SAFETY

The following symbols are used for highlighted items in order to ensure safe and proper use of the TGR-T4. Highlighted items are critical for safe operation and must be heeded at all time.

**WARNING****NOTICE****1.3 ROUTINE MAINTENANCE.**

Be sure to conduct inspection regularly.

Please refer to sec.10 and the safety PES instruction manual.

Techno-GR refuses to accept any responsibility for damage to persons or object due to the incorrect use / installation of the control unit and safety PES.

2 GENERAL INFORMATION AND MAIN APPLICATIONS.

The single beam safety control unit TGR-T4 has been designed and produced to meet the need to protect persons in areas where it is necessary to guarantee the safety of the operator using machinery, robots or in general automation systems which are considered dangerous or subject to casual or undesired access to unsafe parts.

The system conforms with the requirements for safety devices of type 4 in compliance with international standards, e.g. IEC 61496 1-2.



WARNING

The safety system category depends on the safety PES's used as follows.

- | | |
|-------------------|----------------------------|
| Type 4 safety PES | : Safety system category 4 |
| Type 2 safety PES | : Safety system category 2 |

- A qualified person, as determined by local regulations, must confirm that installation, inspection, and maintenance are implemented correctly.
- Do not disassemble, repair, and modify the control unit and safety PES. The control unit does not contain parts subject to maintenance.
- The presence of a limb or an object interrupting one of the safety PESs will open the safety outputs and consequently stop the connected machine. It is necessary to install the safety PESs in such a way that bypassing and defeating of any person is not possible.
- Do not use the control unit and safety PES on machines that cannot be stopped by electrical control in case of an emergency.
- Do not use the control unit and safety PES in environments exposed to flammable or explosive gases.
- Do not use the control unit and safety PES in a retro-reflective configuration. Otherwise detection may fail.



NOTICE

- Do not install the control unit and safety PES in the following environments;
 - Areas exposed to intense interference light such as direct sunlight.
 - Areas with high-humidity where condensation is likely to occur.
 - Areas exposed to corrosive gases.
 - Areas exposed to vibration or shock levels higher than specification provisions.

- Do not use the cellular phones or transceivers near the control unit and safety PES.
- The control unit and safety PES must not be used in water.

The TGR-T4 safety controller is protected by a plastic housing so that it can be installed on a DIN/OMEGA rail; it has 32 removable screw terminals to which it is possible to connect from 1 to 4 pairs of photocells.

This version of the single beam safety control unit has the '*muting*' function integrated, by means of this function it is possible to connect or disconnect one or more pairs of photocells in order to allow - for instance - the material passage without stopping the machine.

The additional '*override*' function enables system, to keep the output relays closed even with intruded rays to enable material transport after a system shutdown.

Both *muting* and *override* functions represent a system, that require additional precautions to limit the reduction of the safety level. This precautions have to be considered carefully.

The *muting and override* function is available by simply connecting the LMS muting lamp supplied separately.

The presence of a limb or an object interrupting a beam causes the opening of the safety outputs and the consequent stopping of the connected machine. It is necessary for the safety sensors to be connected in the right position in such a way that there isn't any possibility to climb over or defeat the system.

Here is a list of the commonly used applications:

- ◇ Machines for the processing of wood, glass and ceramic products.
- ◇ Automatic warehouses.
- ◇ Conveying lines.
- ◇ Palletizers

The unit has been designed in accordance to the following standards:

- | | |
|-------------------------|---|
| IEC 61496-1: 1997. | Safety of machinery: electro-sensitive protective devices
- General requirements and test. |
| FDIS IEC 61496-2: 1997. | Safety of machinery: electro-sensitive protective devices
- Particular requirements for system using active opto-electronic devices. |

3 OPERATION.

The electronic control system of the device is made up of a microprocessor. By means of the suitable hardware, it continuously control and check the connected photocells. No interference among the photocells is possible as they are controlled sequentially; it will be thus possible to install one or two adjacent photocells. When one or more beams are interrupted, the electronic system opens the outputs. The photocells have been triggered are displayed by LEDs on the housing. The control-unit can work in two different modes (please refer to par. 7) which he can carry out the following operations:

The two external buttons that have to be connected are for:

- **TEST** : This is used to check if the whole system works effectively. By pressing the TEST button (opening of the contact), this simulates the interruption of one or more safety PESs. This operation makes the machine stop, so the system checks can be made according to the established time and modes. If pressed after a failure detection of the unit (see the table error code), reset of the system is required.
- **RESET** button: It is used to start the system, also for manual reset condition after relay triggering or after an error which can be reset (see table related to the error codes).

Two different operating modes are available:

1. **Automatic reset:** The system will start automatically after the beam intrusion have been removed.
2. **Manual reset:** The system will remain in safe off condition until the RESET button have been pressed. This manual reset allows to start the system only on a wanted action of the user.

During the unit working, no operation set by the user interface involves functions which can influence the system safety.

4 PRECAUTIONS AND INSTALLATION CRITERIA.

The safety products used must be suitable for the required application, and other influences must be also taken into account such as a room temperature, electromagnetic interference, intense light sources etc. Please refer to the manual for specification or contact the manufacturer for details.

4.1 CALCULATION OF THE MINIMUM INSTALLATION DISTANCE.

The safety distance 'S' must be sufficient to guarantee that the dangerous area cannot be reached by the operator up to the moment in which the machine with moving part stops. The safety distance must be calculated according EN999 (European Standards. Safety of Machinery – The positioning of protective equipment in respect of approach speeds of part of the human body).

Using EN 999 formula:

$$S = (K * T) + C$$

- S = safety distance.
 T = T1 + T2
 whereas T1 = machine response time in seconds.
 T2 = unit response time in seconds including Safety sensor response time.
 K = 1600 mm/s (speed of the body approaching the dangerous area).
 C = additional distance depend on resolution of SLC and applicable standard.

1) Multiple separate beams (EN999, clause 6.1.4)

K = 1600 mm/s
 C = 850 mm

Heights recommended in EN999	4 Beams	3 Beams	2 Beams
Heights of 1 st ray	300 mm	300 mm	400 mm
Heights of 2 nd ray	600 mm	700 mm	900 mm
Heights of 3 rd ray	900 mm	1100 mm	
Heights of 4 th ray	1200 mm		

2) Single height beam (EN999, clause 6.1.5)

Where the risk assessment allows the use of a single beam, the following values can be used

K = 1600 mm/s
 C = 1200 mm

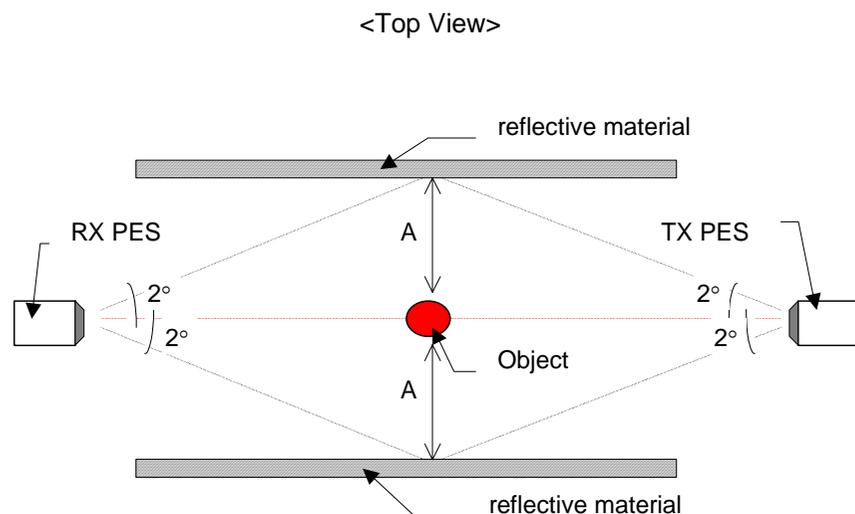
The height of beam from the ground or reference plan: 750mm (EN 999)

**WARNING.**

Always maintain the safety distance between the safety PES and a hazardous part of a machine.

4.2 REFLECTIVE SURFACES.

In case that reflective surface exist, the distance must be sufficient to avoid the possibility of passive reflections.



Distance between emitter and receiver (detection distance L)	Minimum installation distance D
0.3 to 3m	0.27 m
3m or more	$L \times \tan 2^\circ = L \times 0.034$ (m)

**WARNING.**

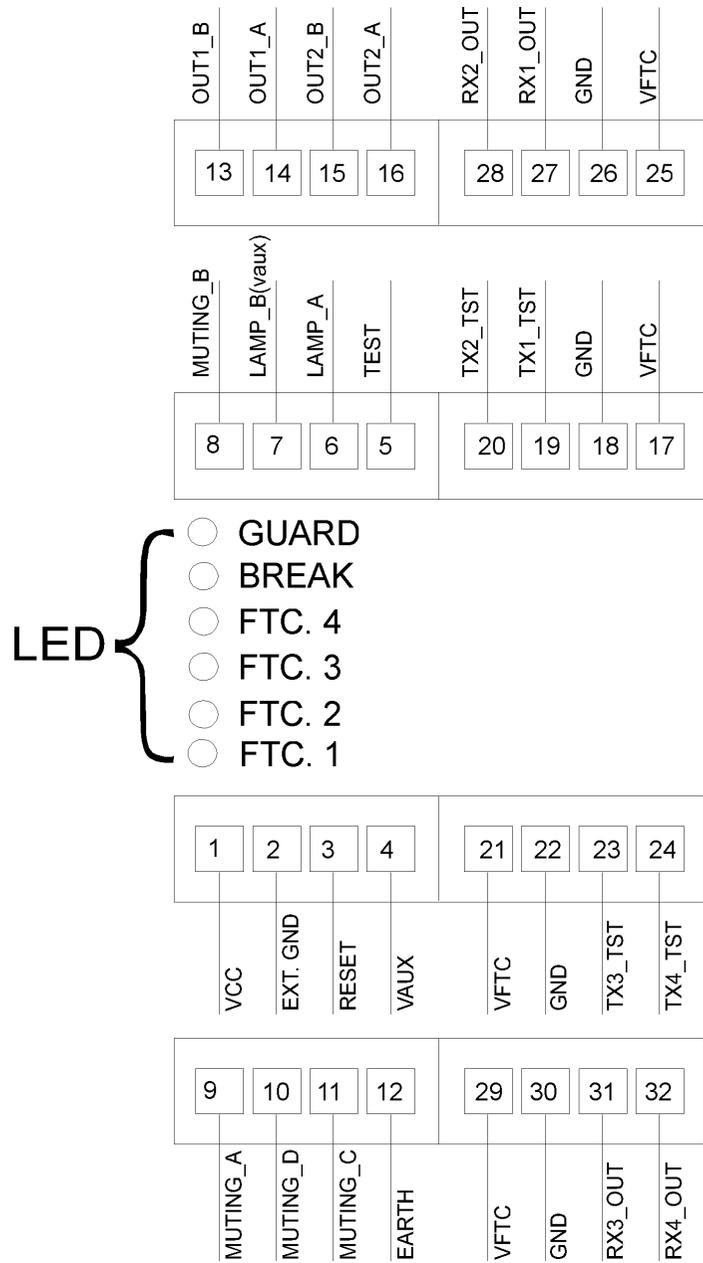
Do not install the safety PES in a location affected by shiny surface reflections.

5 CONNECTIONS.**5.1 REFERENCES ON THE TERMINAL BOARD.**

TERMINAL BLOCK ASSIGNMENT

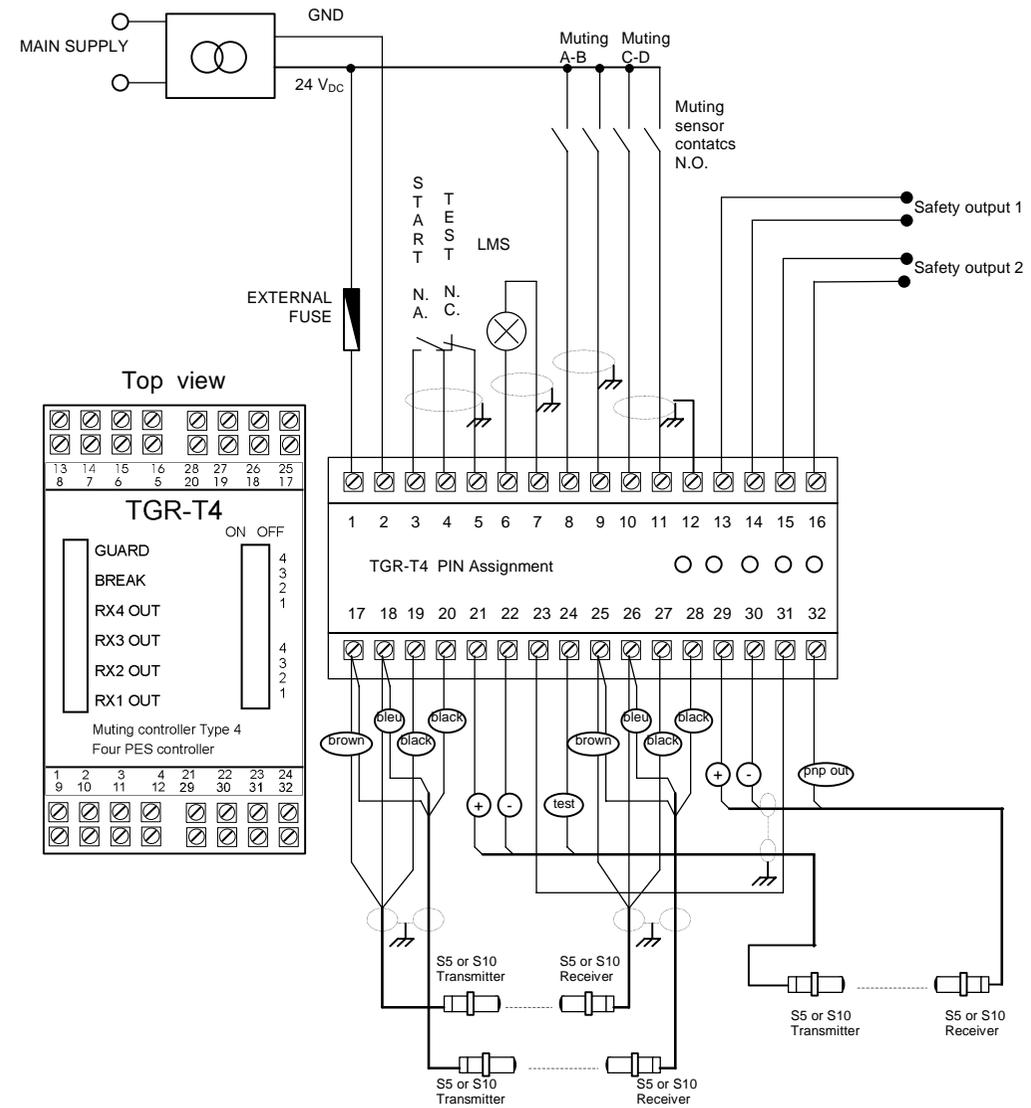
TERMINAL	OUTER CONNECTION
1 - 2	Connect to the 24 Vdc power supply, terminal 1 → 24Vdc / terminal 2 → 0Vdc.
3 - 4	RESET button; connect a normally opened button (N.O.).
4 - 5	TEST button; connect a normally closed button (N.C.).
6 - 7	Connect the muting signaller.
8	Input of the muting B sensor. Connect to the N.O. contact of the muting sensor (photocell, proximity switch, other).
9	Input of the muting A sensor. Connect to the N.O. contact of the muting sensor (photocell, proximity switch, other).
10	Input of the muting D sensor. Connect to the N.O. contact of the muting sensor (photocell, proximity switch, other).
11	Input of the muting C sensor. Connect to the N.O. contact of the muting sensor (photocell, proximity switch, other).
12	Earth. Connect to the plant's earth.
13 - 14	(OUT1) safety output 1 with N.O. contact.
15 - 16	(OUT2) safety output 2 with N.O. contact.
17 - 18	Power supply to emitters (TX) of PES 1 and 2. Connect Vs wires (pin 1 of connector) to terminal 17, and 0V wires (pin 3 of connector) to terminal 18.
19 - 20	Sending test signal to emitters (TX) of the safety PES 1 and 2; Connect test wire (pin 4 of connector) of PES 1 to terminal 19, and that of PES 2 to terminal 20.
21 - 22	Power supply to emitters (TX) of PES 3 and 4. Connect Vs wires (pin 1 of connector) to terminal 21, and 0V wires (pin 3 of connector) to terminal 22.
23 - 24	Sending test signal to emitters (TX) of the safety PES 3 and 4; Connect test wire (pin 4 of connector) of PES 3 to terminal 23, and that of PES 4 to terminal 24.
25 - 26	Power supply to receivers (RX) of PES 1 and 2. Connect Vs wires (pin 1 of connector) to terminal 25, and 0V wires (pin 3 of connector) to terminal 26.
27 - 28	Receiving PNP output from the receivers (RX) of safety PES 1 and 2: Connect PNP out wire (pin 4 of connector) of PES 1 to terminal 27, and that of PES 2 to terminal 28.
29 - 30	Power supply to receivers (RX) of PES 3 and 4. Connect Vs wires (pin 1 of connector) to terminal 29, and 0V wires (pin 3 of connector) to terminal 30.
31 - 32	Receiving PNP output from the receivers (RX) of safety PES 3 and 4: Connect PNP out wire (pin 4 of connector) of PES 3 to terminal 31, and that of PES 4 to terminal 32.

5.2 PINOUT TOP VIEW



5.3 WIRING EXAMPLE.

Connection of 3 safety PES to the control unit.



Please, note:

- To configure the control unit in such a way that it works only with three photocells, it is necessary to connect the unused transmitter output to the corresponding receiver input, in this case to terminal TEST-TX3 with PNP_OUT-RX3.
- All models can be connected in all the possible combinations for a maximum of four pairs of sensors with at least one pair connected.
-  The power supply which is necessary to power the system must conform to standard EN 60742 (double insulation) or with equal insulation, for instance VDE 0551.
-  It is necessary to protect the control unit with an outer fuse having a nominal interruption current equal to 1 A.
-  The TEST and RESET pushbuttons must be positioned in such a way that the operator can see the protected area when he restarts, or carries out a *test* or *override* operation.
-  The Muting lamp (LMS) be positioned in a place where it can be seen from any operative point.
-  Read the paragraph relating to the *muting* function and its use for the positioning of the activation sensors of this function.
-  Both safety contacts OUT1 and OUT2 must be connected. If the machine has a single locking circuit, the two normally opened contacts must be connected in series.
- The connection cables of the photocells, of *muting* request, *start* and *test* must be masked with minimum section 22AWG. The screen braids must be all earthed towards the control unit side.

6 ALIGNMENT PROCEDURE.

After having carried out the correct mechanical assembly and the correct connections as described in the previous paragraphs, it is necessary to align the pairs of photocells. Follow the operative modes as follows:

- Turn off the power supplying the control unit.
- Open the test contact.
- Power the control unit.
- Align the photocells by observing the LEDs on the control unit: If the alignment of the relevant pair of photocell is correct, the LED corresponding LED will turn on.
- After the alignment, turn off the power supplying the control unit, close the test contact and power the control unit again.
- Wait for the control unit to carry out the initial tests.
- At the end of this operation, the unit indicates the right alignment with the guard led green on.
- Carry out all the checks described in the final checks and in the routine maintenance operations.

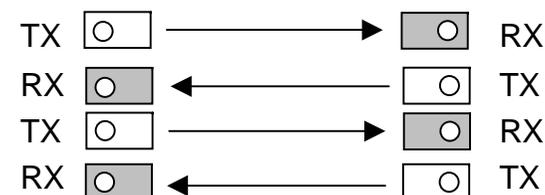
During aligning operations or normal working, check that the photocells connected to the same or other units do not interfere with each other.

NOTICE

The control unit can detect the mutual interference between safety PESs. The control unit forces the output contact to open, when it detects external disturbance light including mutual interference light.

The safety PESs should be installed the following way to avoid mutual interference.

- The safety PESs are installed with sufficient distance.
- Emitters and receivers of safety PES are installed alternately as follows:



7 OPERATING PROCEDURES.

7.1 DIP-SWITCHES CONFIGURATION.

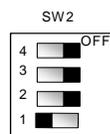
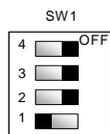
The configuration indicated in the table must be selected on both the *dip-switches* available in the front cover.

4	Function
X	not used

3	Function
Off	muting A-B act on the sensor couples 1 and 2. muting C-D act on the sensor couples 3 and 4.
On	muting A-B act on the sensor couple 1. muting C-D act on the sensor couple 2. The sensor couples 3-4 continue to function normally.

2	function
Off	muting 60 s
On	muting ∞ s *

1	function
Off	manual restoring
On	automatic restoring



The control-unit is manufactured from the factory with the following configuration:

- Automatic reset, all four sensors in *muting*, the maximum duration of the *muting* is of sixty seconds.

* infinite muting duration: this feature must be used carefully because it's against the norm. Using this, the user must know that it works under its sole responsibility.

7.2 CONFIGURATION OF THE NUMBER OF PHOTOCELLS.

In case you use a number of photocells which is lower than 4, operate as follows: to disconnect the photocells do not use and therefore do not connect to the control unit; carry out a connection among the following terminals:

unused photocell	connection
1	19 to 27
2	20 to 28
3	23 to 31
4	24 to 32

At least one pair of photocells must be connected, otherwise (condition of all the disconnected photocells) the control unit is locked.

7.3 MUTING FUNCTION.

7.3.1 DESCRIPTION.

As mentioned in the introduction, the *muting* function can be enabled with any unit by simply connecting the LMS muting lamp when the unit is switched off.

This presence of this indicator is recognised every time the unit is powered on. If its presence is detected, the unit will enable the *muting* function and if its presence is not detected the unit will ignore any request for *muting*. It is important to note that if the *muting* indicator is connected during the TGR-T4 is powered on, it will not be recognised and the *muting* function will not be enabled. Once enabled, if the indicator develops a fault or is removed without first disconnecting the unit's power supply, it will signal an error as described in section 8.

To disable the *muting* function, the unit's power supply must be turned on without the LMS muting lamp connected.

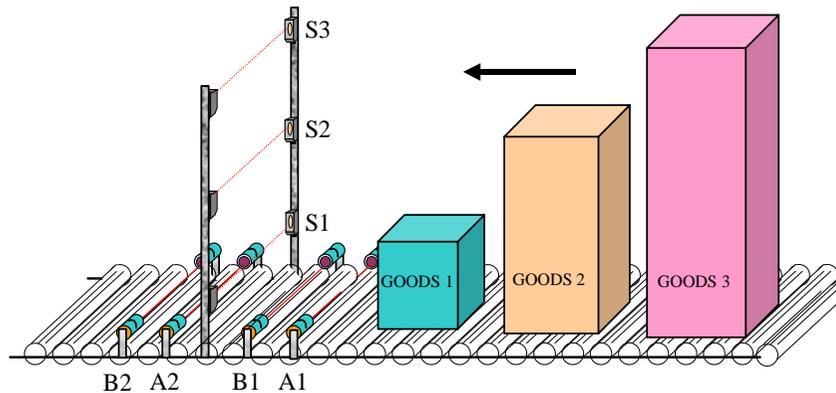
In brief: this function, present on all units, is enabled and disabled by means of the following simple procedure:

- Disconnect the unit's power supply.
 - Connect the appropriate LMS muting lamp and the muting sensors.
 - Restore the unit's power supply.
- Bypass the muting function as follows.
- Disconnect the unit's power supply.
 - Disconnect the LMS muting lamp and the muting sensors.
 - Restore the unit's power supply.

7.3.2 INSTALLATION CRITERIA



1. The *muting* sensors must recognise the material (pallets, vehicles, etc.) in all its length.
2. The sensors must be arranged in such a way that the material is recognised even when it must be lifted for the relevant processing.
3. In case of different transport speeds in the *muting* area, always bear in mind their influence on the *muting* total duration.
4. All the safety photocells and the *muting* sensors must be arranged in such a way that the previous material has already passed the last *muting* sensor before the new material has reached the first sensors.

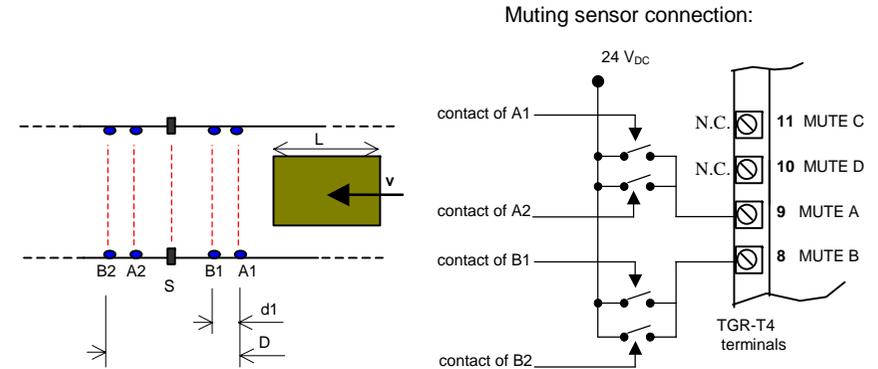


In the previous page, an installation example of a protection arranged on a conveyor is drawn; it must allow the passage of package 1, preventing other packages from passing or it must allow the passage of packages 1 and 2, preventing package 3 from passing. The protection photocells **S** are connected to the TGR-T4 control unit and are temporarily interrupted at the package passage by means of the *muting* **A1**, **A2**, **B1** and **B2** activated sensors.

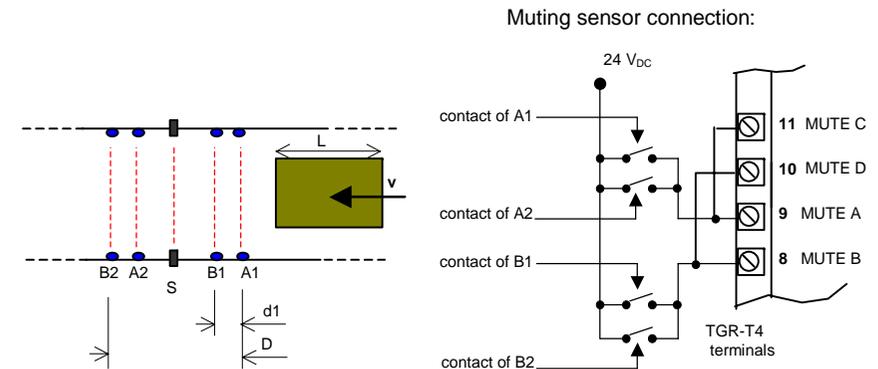
Sensors **A** and **B** are optical, mechanical, proximity, etc. sensors with closed contact in the presence of the object to be detected.

In both cases, the configuration *dip-switch* 2 must be set in the on position.

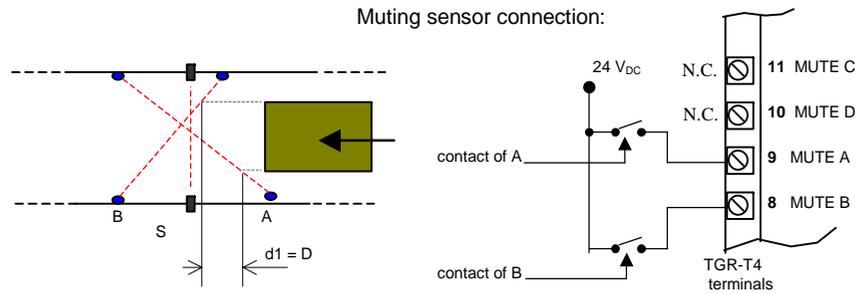
Application with four *muting* sensors, passage permitted only for package 1:



Application with four muting sensors, passage permitted only for packages 1 and 2:



Application with two muting sensors, passage permitted only for package 1:



where:

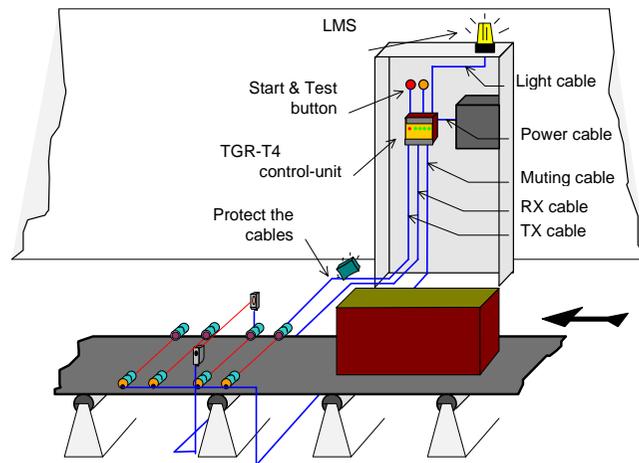
D: minimum distance that the *muting* sensors keep active the request; it depends on the parcel length: $D < L$.

d_1 : necessary maximum distance so that the muting request is accepted; it depends on the parcel speed:

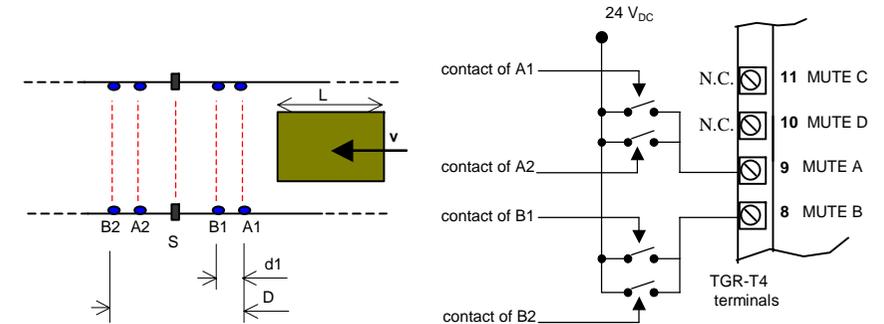
$$d_{max} [cm] = v[m/s] * 3[s] * 100$$

This distance must not allow to activate both sensors and the *muting* with the accidental passage of a person.

Application with four muting sensors and only photocell S1:



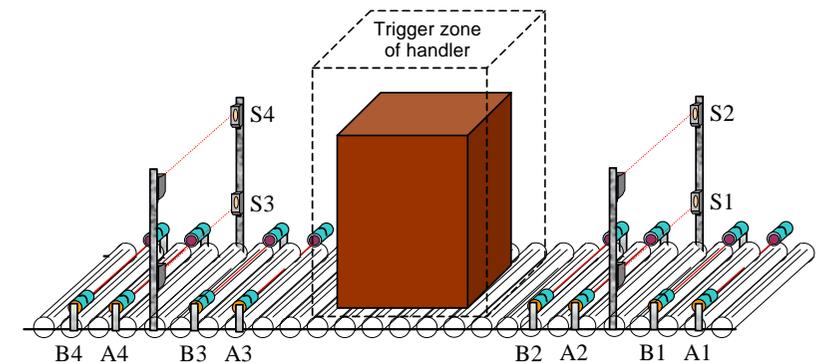
Muting sensor connection:

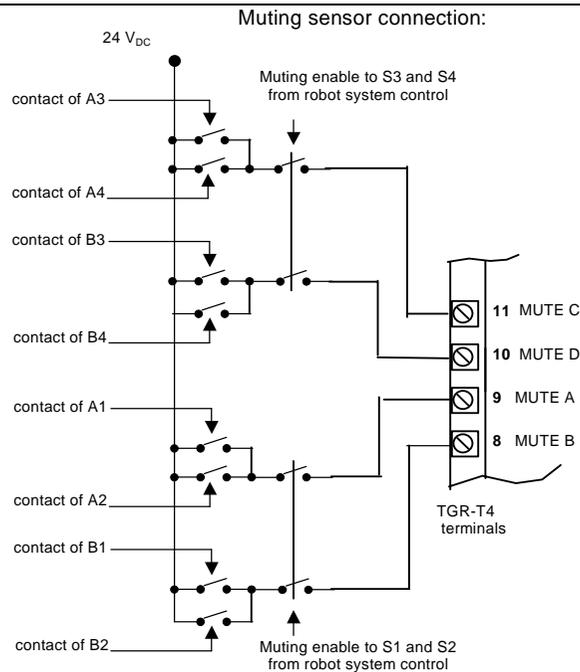


The examples above are thought for the use of the muting functions only relating to sensors S1 and S2, with the configuration *DIP-SWITCH 2* in the off positions; sensors S1 and S2 are controlled by the *muting* A and B inputs, while sensors S3 and S4 are controlled by the *muting* C and D inputs. His configuration makes other applications be possible.

Application with eight *muting* sensors and output and input control

We imagine an area in which a manipulator acts; the barriers in input and output must allow the passage of the packages only when the manipulator has terminated its work, thus avoiding intrusions in unwished moments.





- The TEST and START pushbuttons must be positioned in such a way that the operator can see the protected area when he carries out restart, *test* or *override* operations.
- The LMS *muting* lamp must be positioned in a place where it can be seen from any operative point.
- If the *muting* sensors are installed very near the protection photocells, it is necessary to install the sensor receivers on the photocell sender side to avoid interference.
- The system is anyway protected from possible failures due to the cable damage; it is necessary to prepare the wiring of all connections so as to avoid damage to the connection cables.
- The control unit must be located in a cabinet with protection degree of at least IP54.

7.4 OVERRIDE.

This function makes it possible to force a muting condition, if it is necessary to start the machine despite one or more rays have been interrupted by the material. The aim is that of removing from the protected area the material which has possibly gathered before the photocells for instance because of a failure of the machine cycle.

Let's suppose that a pallet has stopped before one or more used optical devices; the conveyor belt cannot be started again because the control unit - after having detected one or more interrupted rays - will not close the safety outputs, thus making it impossible to free the controlled area.

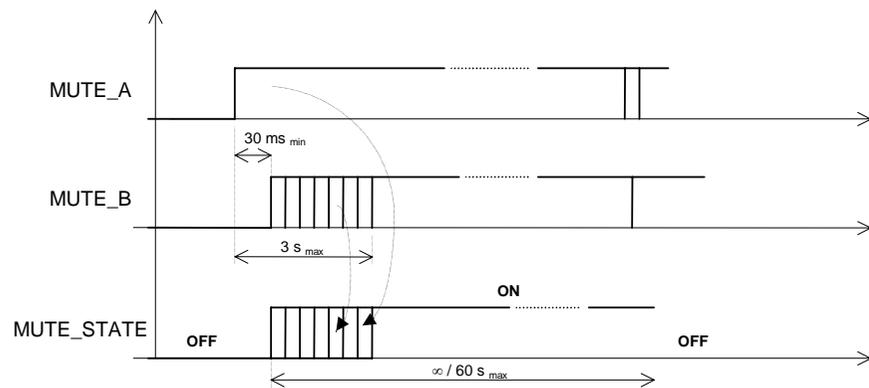
By starting the override function, it will be possible to carry out this operation.

7.5 STARTING THE OVERRIDE FUNCTION.

- Switch off the control unit.
- Make sure that the TEST and RESET buttons are connected. (N.C. for the TEST button, N.O. for the RESET button).
- Switch on the control unit.
- Within 10 seconds, press together the test and reset buttons and keep pressing. (At each switching on operation, a test is carried out to check that the buttons are not locked).
- The override function has been activated. The display visualises three overlapping segments. The muting lamp blinks to signal the light curtain disconnection.
- The maximum duration of the override function amounts to 60 seconds after that the light curtain is connected again even if the buttons are pressed. If the buttons are released before this time has elapsed, the override function will be immediately stopped.

7.6 MUTING RESTRICTIONS (muting function).

- The muting operation must occur according to the correct timing sequence. For the two muting channels, it is necessary to activate input MUTE_A or MUTE_C at first and then input MUTE_B or MUTE_D within 3 seconds. If not, the muting sequence will not be activated.
- When the muting state is active, an object can remain for a period of no longer than 60 s., otherwise the muting function is switched off. This mechanism is optional and can be deactivated when the control unit is set up. (see page 13)
- For the cases in which the muting function is automatically disabled because of time-out, the request must be cut-out (override function, or removing object (and restart)) to generate the following correct muting state.



It is not possible to carry out a muting request, if the light curtain is interrupted and the output contacts are in the opened.

8 LED DIAGNOSTIC

Information of the units operative state by means of four LEDs.

The LED state has the following meaning:

- GREEN LEDs: if switched on, the photocells work regularly and no object is detected; the relays are closed.
- RED LED / GREEN LED: if switched on in RED, the unit has detected an object or an error has occurred - which can be possibly recovered by pressing the reset button -; in this condition, the safety outputs are opened.
- RED LED / GREEN LED: if switched on in GREEN, the barrier is working regularly and there are no detected obstacles; in this condition, the safety outputs are closed.

The Unit include a simple diagnostic indications on the most significant errors.

- One LED flashing.
Error in an photocell pair.
- Two LED flashing.
Error in connection of bypassed PES.
- Three LED flashing.
Error in muting lamp or invalid sequence of muting.
- Four LED flashing.
Internal fail of system.

All these errors are resettable by the TEST pushbutton if the error condition can be removed.

THE LED INDICATIONS CAN BE POSSIBLE ONLY IF THE SLC ASSOCIATED TO THE LED FLASHING ARE FREE. IF THE SLC ARE INTERRUPTED THE LEDS CAN ONLY BE OFF.

9 FINAL CHECKS.

 Check that the area protected by the barrier is free from any obstacle; check the correct triggering of the safety relay opening by interrupting the protection rays (red LED switched on, controlled machine stopped). CAUTION! If the red LED switches on and off, check the correct mechanical assembly.

 **NOTE.** *This check must be repeated each time you move or mechanically re-align the photocells.*

10 ROUTINE MAINTENANCE OPERATIONS.

Here is a list of checks recommended to the user to be carried out periodically by skilled workers:

- Check that the barrier locks by inserting an object detecting the single elements of each photocell.
- By opening the *test* contact, check that the safety relays are opened (red LED switched on and machine under test stopped).
- Make sure that the access to the machine dangerous areas is not possible from any non-protected area and that the minimum distance from the barrier dangerous parts is not lower than the one calculated with reference to the formula reported at paragraph 4.1.
- Check that it is not possible for a person to stop between the barrier and the dangerous parts of the machine.
- Make sure that there is no outer damage to the barrier and/or the outer electrical connections.
- Make sure that the response time - including the barrier and the machine ones - does not exceed the established limits.

The frequency of these operations depends on the special applications and operative conditions according to which the barrier is working.

11 GENERAL INFORMATION AND USEFUL DATA.

 Safety **MUST** be part of our consciousness. The safety devices are useful only if installed correctly by respecting the indications reported on the standards. If you believe not to have the sufficient competence to correctly install the safety devices apply to our advisory service or request the installation. We recommend to leave free space on the cover side to allow a possible easy access to the inner parts.

Trouble that cause voltage interruption on power supply may cause temporary openings of the outputs that are not damaging in any case the safety work of the barrier.

The guarantee is complete for a period of 12 months starting from the delivery date of the device.

Defects which are clearly due to damage caused by an incorrect use, accidental causes or catastrophic events are not covered by the guarantee.

In case of failure, send the unit to:

 TECHNO-GR via Torino, 13/15
10046 Poirino (TO) - ITALY
Tel. +39 011 9452041
FAX. +39 011 9452090

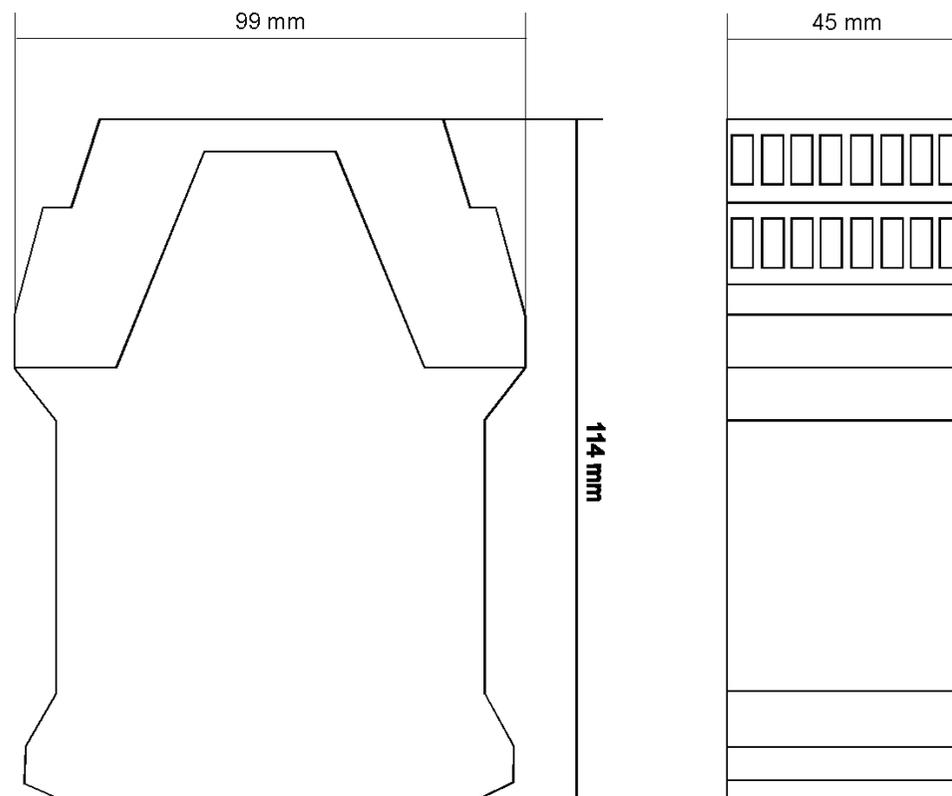
always indicating the detected failure and the operational period.

12 TECHNICAL DATA.

- Voltage: 24 Vdc \pm 10%
- Electrical input: 420 mA max (for any model)
- Combinable photocells: Techno GR S5 – S10 – S30 series
- Number of photocells: four pairs max
- Wire range: size AWG 14 – 24 Solid/Stranded
- Wire type: 60/75 °C copper (Cu) conductor only
- Torque on terminals: 2.0 N*m
- Indicators: 4 green LEDs, 1 green/red LED
- Response time: \leq 30 ms
- Working temperature: -10 a + 55 °C
- Humidity: from 15% to 95% (not condensing)
- Output contacts: 2 NO, 250 Vac 2.5 A max
- Switch capability: 1,500 VA, 180W
- Electrical life expectancy: 100.000 op. minimum at 1,800 oprs/hr.
- Operative distance: according to the type of photocell

S5-5	8m
S5-10	8m
S30-5	50m
- Outer controls: *start/restart* control, *test*, *muting*
- Housing: plastic case for installation on a din/omega rail
- Protection class of control unit: IP 20
- Protection class of photocells: IP 67
- Protection class of the cabinet containing the control-unit: IP54 at least
- Weight: control unit 600 g
- Features of fuses *muting* signalling lamp: internal resettable fuse 315mA T 60V
- *Muting* signalling: LMS

13 OVERALL DIMENSIONS.



Control unit
TGR-T4