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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 upstream.

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 things.

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

Do not open the container for any reason (apart from the fuse replacement and 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 by possibly indicating the detected failure and the operation period.

Avoid touching the protective cover of the lenses with the hands in order to prevent dust and/or grease from infiltrating 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 locking.

1.2. ROUTINE MAINTENANCE

No special operations are necessary apart from the **cleaning of the optical units**.

Do not use woollen clothes.

Do not use solvents.

According to the room conditions, estimate the frequency of this operation.

DATASENSOR S.p.A. refuses any responsibility for damage to persons or things due to the incorrect use of the device.

1.3. AGRO-FOOD INDUSTRIES

This device does not require washing and rinsing but simply the lens cleaning by means of a soft cloth dampened with water; anyway, apply to the producer to make sure that possible chemical agents used during the production processes cannot damage the photocells.

2. GENERAL INFORMATION AND MAIN APPLICATIONS

The multiray safety barrier of the BWS-T4 series has been produced to meet the need to protect persons in areas where it is necessary to guarantee the safety of the operator using machines, robots or in general automatic 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 level 4 in compliance with what described in the latest international standards, that is to say IEC 61496 1-2.

This safety device is made up of a control unit protected by a plastic container so that it can be installed on a DIN/OMEGA guide; it has 32 screw terminals to which it is possible to connect from 1 to 4 pairs of photocells.

A version with the '*Muting*' function is also available; by means of this function it is possible to connect or disconnect one or more pair of photocells in order to allow - for instance - the material passage without stopping the machine. If the device has this function, an other function must be also possible: The '*override*' function. It represents the possibility to force the system, that is to say to close the output relays even with occupied rays in order to make it possible for the material which has gathered before the optical devices to proceed.

Both the *Muting* and the *override* functions represent a system forcing; for this reason, to activate these functions some precautions limiting the reduction of the safety level have been added.

The presence of a limb or an object interrupting a beam causes the opening of the emergency exits and the consequent locking of the duly connected machine. It is necessary for the barrier to be connected in the right position in comparison with the passage to be protected in such a way that there isn't any possibility to climb over.

Here is a list of the commonly used applications:

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

CEI EN 61496-1: 2004 Safety of machinery: electro-sensitive equipment. General requirements and tests.

CEI IEC 61496-2: 1997 Safety of machinery: electro-sensitive protective equipment. Particular requirements for equipment using active optoelectronic protective devices.

3. OPERATION

The control electronic system is fitted inside the control unit. The 'core' of the device is made up of two microprocessors forming - as required by the standards - a system having "two independent channels".

By means of the suitable hardware, they 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 two or more adjacent photocells. When one or more rays are interrupted, the electronic system opens the output relays signalling which photocells have triggered by means of LEDs which can be seen on the container.

A display supplies information on the state and on possible failures.

The control-unit can work in two different modes (please refer to par. 7) which he can carry out the following operations:

- TEST/RESET button: It is used to check if the whole system - made up of the output relays of the control unit and the machine actuator - works effectively. By pressing this button (opening the contact) you practically simulate the interruption of one or more safety rays and check that the machine stops according to the established times and modes.
- START/RESTART button: It is used to start the system which has been just powered - in case you are in a condition of manual reset - and to start it again when it has locked after a relay triggering (if you are in a condition of manual reset) or after an error which can be reset (see table relating to the error codes).

Two types of different operating modes are also available:

1. Automatic restoring, that is to say after the triggering caused by the detection of an object: The barrier starts to work again normally when the object is removed.
2. Manual reset by means of the reset button so that the return to the normal operating mode takes place only after the object has been removed and the button has been pressed.

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

These barriers have also a model with *Muting* function on each optical device.

During the operation, this feature makes it possible to connect or disconnect any available optical device from the protection function by respecting special times.

The optical devices which must be set on *Muting* during the operation can be pre-set by the user by means of a dip-switch inside the control unit.

Even the models showing this feature can be both with manual and automatic restoring.

4. PRECAUTIONS AND INSTALLATION CRITERIA

The area on which the barrier must be installed must be compatible with the technical features of the device; room temperature, troubles of electromagnetic, luminous or other character must be previously evaluated possibly applying to the producer for data which are not reported on this manual.

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 formula used to calculate the safety distance for multiray barriers is the following one:



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

S = safety distance.

T = T1 + T2

where T1 = machine response time in seconds.

T2 = barrier response time in seconds.

K = 1600 mm/s (speed of the body approaching the dangerous area).

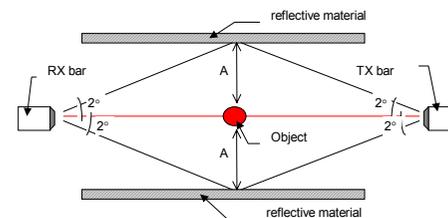
C = 850 mm (1200 mm for systems with single optical unit).

The height of ray from earth, in case of multirays barrier, are defined in following table:

	4 rays	3 rays	2 rays
height of 1° ray	300 mm	300 mm	400 mm
height of 2° ray	600 mm	700 mm	900 mm
height of 3° ray	900 mm	1100 mm	--
height of 4° ray	1200 mm	--	--

4.2. REFLECTIVE SURFACES

In case reflecting surfaces are present, the distance must be sufficient to avoid the possibility of passive reflections.



5. CONNECTIONS

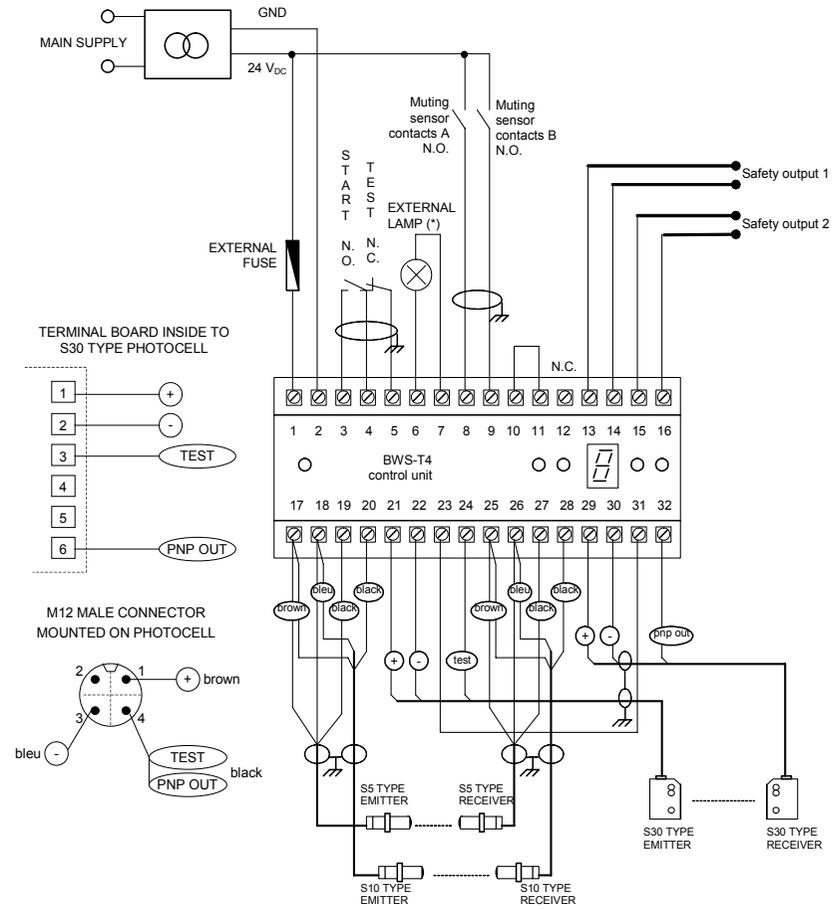
5.1. REFERENCES ON THE TERMINAL BOARD

Here is a table reporting the function and the connection to be carried out for each number which is present on the label near the terminal board:

TERMINAL	OUTER CONNECTION
1 - 2	Connect to the 24 Vdc power supply, respecting the polarity indicated on the label.
3 - 4	Start/restart button; connect a normally opened button (N.O.).
4 - 5	Test/reset 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 - 11	Input test contacts, outer contactors (in case it is not used, connect the two terminals one another).
12	Terminal not used.
13 - 14	Safety output 1 with N.O. contact.
15 - 16	Safety output 2 with N.O. contact.
17 - 18	Power supply emitters (TX), photocells 1 and 2. Brown wires (pin 1 of connector) to terminal 17, blue wires (pin 3 of connector) to terminal 18. (in case of photocell S30 with terminal board, connect 17 and 18 respectively with 1 and 2 of the photocell)
19 - 20	Connect the photocells 1 and 2 to the test input of emitters (TX). Black wire (pin 4 of connector) TX 1 on terminal 19, black wire TX 2 on terminal 20. (in case of photocell S30 with terminal board, connect these terminals with 3 of the photocell)
21 - 22	Power supply emitters (TX), photocells 3 and 4. Brown wires (pin 1 of connector) to 21 terminal, blue wires (pin 3 of connector) to terminal 22. (in case of photocell S30 with terminal board, connect 21 and 22 respectively with 1 and 2 of the photocell)
23 - 24	Connect photocells 3 and 4 to the test input of emitters (TX). Black wire (pin 4 of connector) TX 3 on terminal 23, black wire TX4 on terminal 24 (in case of photocell S30 with terminal board, connect these terminals with 3 of the photocell)
25 - 26	Power supply receivers (RX), photocells 1 and 2. Brown wires (pin 1 of connector) to terminal 25, blue wires (pin 3 of connector) to terminal 26. (in case of photocell S30 with terminal board, connect 25 and 26 respectively with 1 and 2 of the photocell)
27 - 28	Connect to the PNP output of the receivers (RX) photocells 1 and 2. Black wire (pin 4 of connector) RX1 on terminal 27, black wire RX2 on terminal 28 (in case of photocell S30 with terminal board, connect these terminals with 6 of the photocell)
29 - 30	Power supply receivers (RX), photocells 3 and 4. Brown wires (pin 1 of connector) to terminal 29, blue wires (pin 3 of connector) to terminal 30. (in case of photocell S30 with terminal board, connect 29 and 30 respectively with 1 and 2 of the photocell)
31 - 32	Connect to the PNP output of the receivers (RX) photocells 3 and 4. Black wire (pin 4 of connector) RX3 on terminal 31, black wire RX4 on terminal 32 (in case of photocell S30 with terminal board, connect these terminals with 6 of the photocell).

5.2. WIRING EXAMPLE

Here is a connection example of the control unit BWS-T4 relating to a mixed configuration in which all the available models of photocells have been used.



English

(*) for application **without Muting** connect between PIN 6 and 7 a 150÷180 Ω ½ W resistor to avoid control unit lock.

Please, note especially what follows:

- Three out of four photocells have been connected choosing among the ones which can be used; model S5-5 has been connected to the terminals relating to TX1-RX1, model S10-5 to the ones of TX2-RX2, the terminals of TX3-RX3 have not been used and TX4-RX4 has been connected to model S30-5.
- To configure the control unit in such a way that it works only with three present photocells, it has been necessary to connect the unused emitter output to the input of the corresponding receiver, 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 transformer 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 START 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 outer light device for active *Muting* signalling must 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 to terminals K1+K2 is needed for the static check of a possible auxiliary remote control switch among the safety outputs and the machine locking circuit. The connection of these terminals must have an outer contact having an opening time lower than 80 ms. in case it is not used, connect them each other as shown in the picture.
- Photocells of the type S5-5 and S10-5 are delivered with wired cable or standard M12 connector and the wiring on the control unit is indicated according to the cable colour, or to the male connector pin number.
-

Photocells of the type S30-5 are available also in the version with terminal board; in this case, it is necessary to carry out the

- connections by respecting the same symbols present both on the terminal board of the control until and on the photocell one.
- 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.
-

In the following paragraph you can find the codes of the available models which can be used in the wished configuration.

5.3. CODES AND DESCRIPTION OF THE AVAILABLE PHOTOCELLS

MODEL S5-5

CODE	TYPE	CONTAINER
S5-5-G8-60-ST4	sender	plastic, with 5m of cable
S5-5-G8-62-ST4	sender	plastic, with connector M12
S5-5-F8-90-ST4	receiver	plastic, with 5m of cable
S5-5-F8-92-ST4	receiver	plastic, with connector M12

MODEL S10-5

CODE	TYPE	CONTAINER
S10-5-G8-60-ST4	sender	metal, with 5m of cable
S10-5-G8-62-ST4	sender	metal, with connector M12
S10-5-F8-90-ST4	receiver	metal, with 5m of cable
S10-5-F8-92-ST4	receiver	metal, with connector M12

MODEL S30-5

CODE	TYPE	CONTAINER
S30-5-G50-1ST4	sender	plastic, connection to terminal board
S30-5-G50-2ST4	sender	plastic, with connector M12
S30-5-F50-1ST4	receiver	plastic, connection to terminal board
S30-5-F50-2PST4	receiver	plastic, with connector M12

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 is turned 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, visualizing on the display a count-down which indicates the control unit activity.
- At the end of this operation, the display will visualize letter 'A' indicating the active state of the control unit.
- 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, modifying their mutual position, for instance by positioning some pairs of emitters on the other receiver side.

7. OPERATING PROCEDURES

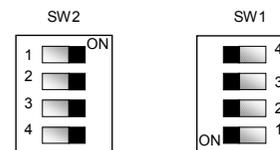
7.1. DIP-SWITCHES CONFIGURATION

The configuration indicated in the table must be selected on both the *dip-switches* available in the inner card. The description corresponding to the pre-chosen selection is reported.

1	2	function
Off	Off	Muting sensor 1
Off	On	Muting sensor 1-2
On	Off	Muting sensor 1-2-3
On	On	Muting sensor 1-2-3-4

3	function
Off	Muting 60 s
On	Muting ∞ s

4	function
Off	manual restoring
On	automatic restoring



NOTES: the configuration of the two dip-switches must be done in the same way, if not the control-unit will jam-up, and the code '8' will be displayed.

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

- Model without *Muting*: automatic restoring.
- Modello with *Muting*: automatic restoring, all four optics in *Muting*, the maximum duration of the *Muting* is of sixteen seconds.

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.

English

7.3. MUTING FUNCTION

7.3.1. DESCRIPTION

The *Muting* function makes it possible to connect or disconnect one or more optical devices during the operation according to the operative needs. As required by the standard, the control unit has two inputs for the activation of this function. Two separate *Muting* functions are present.

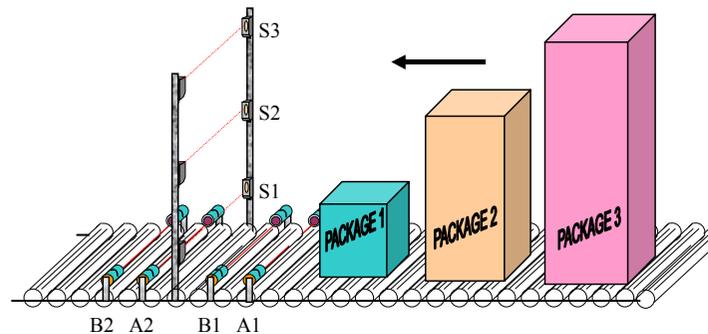
It is necessary to duly connect the *Muting* sensors in order to avoid that a wrong positioning can cause undesired *Muting* requests. It is nevertheless necessary to remember that the *Muting* function represents a system forcing and for this reason it must be used with care.

By means of the inner *DIP-SWITCHES*, it is possible to decide which optical units must be set on *Muting* (that is to say, which optical units must be disconnected) after a request (see *DIP-SWITCHES* setting).

To use the *Muting* function, it is necessary also to connect the *Muting* signaller without which the control unit locks. For application **without Muting** connect between PIN 6 and 7 a 150÷180 Ω ½ W resistor to avoid control unit lock.

7.3.2. INSTALLATION CRITERIA

1. The *Muting* sensors must recognise the material (namely 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.

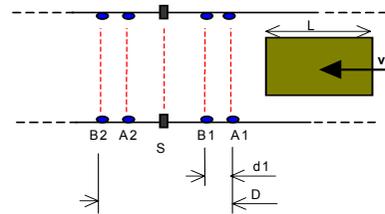


The contacts of these sensors are checked by unit BWS-T4.

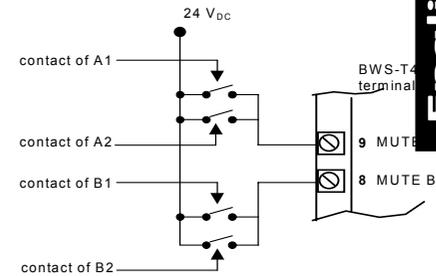
S is any combinable photocell among the ones listed in paragraph 5.3. Sensors **A** and **B** are optical, mechanical, proximity, etc. sensors with closed contact in the presence of the object to be detected.

Here are some examples of configurations with the use of the function of *Muting*:

- **Application with four sensors:**

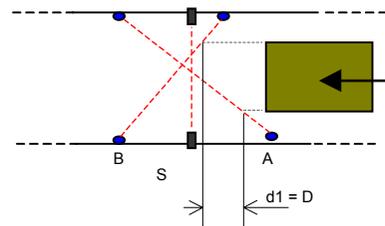


Muting sensor connections:

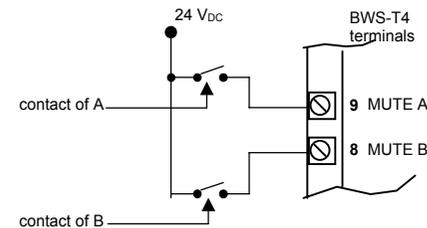


English

- **Application with two sensors:**



Muting sensor connections:

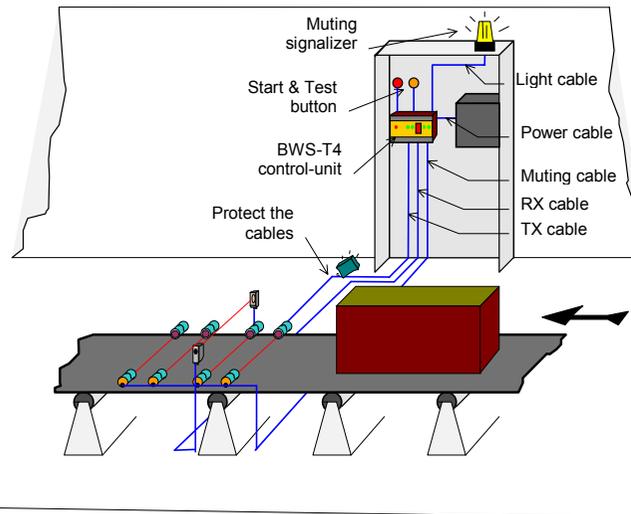


D: minimum distance sdo that the *Muting* sensors keep active the request; it depends on the parcel length: $D < L$.

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

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

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



- ☞ • 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 outer light device for active *Muting* signalling 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 output relays, thus making it impossible to free the controlled area.

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

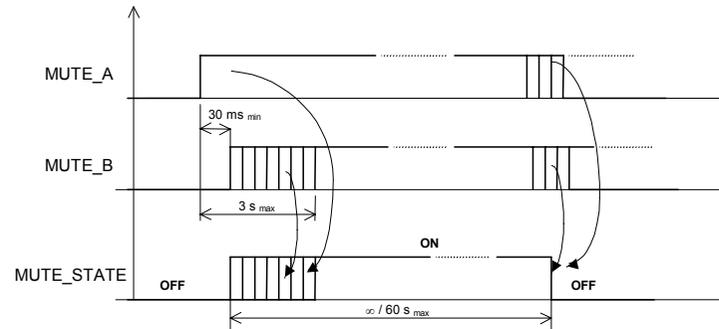
7.5. STARTING THE OVERRIDE FUNCTION

- Switch off the device.
- Make sure that the test e start buttons are connected. (N.C. for the test button, N.O. for the start button).
- Switch on the device.
- 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 visualizes three overlapping segments. The *Muting* lamp blinks to signal the barrier disconnection.
- The maximum duration of the override function amounts to 60 seconds after that the barrier is connected again even if the buttons are pressed. Obviously, if the buttons are released before this time has elapsed, the override function will be immediately stopped.

7.6. TIMING RESTRICTIONS (*Muting function*)

- a) The request of *Muting* must occur according to the correct time sequence: first activate the entrance MUTE_A then the entrance MUTE_B. The request of this last one must arrive within a maximum time of 3 seconds. If not the *Muting* request will not be activated. A wrong sequence on the entrances of *Muting* shows a mistake on the *display* and the relays are open, waiting for the pressure of the *restart* buttons.

- b) Since when the *Muting* state is active, an object can remain for a period of time not longer than 60 s., otherwise the *Muting* function is switched off. This mechanism is optional and can be deactivated when the barrier is set up.
- c) For all the cases in which the *Muting* function is automatically disabled because of *time-out*, the request must be cut-out and re-activated to generate the following *Muting* state.



It is not possible to carry out a *Muting* request, if the barrier is in the opened relay state ('E' or 'F' code on *display*, beams are interrupted).

7.7. LED DIAGNOSTIC

The user can be informed of the barrier operative state by means of a segment *display* and of the indication of four LEDs.

The LED state has the following meaning:

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

At paragraph 12, the description of the coding visualized on the *display* is reported.

8. 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.*

English

9. ROUTINE MAINTENANCE OPERATION

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.

10. 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.

The guarantee is complete for a period of 36 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 barrier to:

 **DATASENSOR S.p.A.**

always indicating the detected failure and the operational period.

11. TECHNICAL DATA

- Voltage: 24 Vdc \pm 10%.
- Electrical input: 420 mA max. (for any model).
- Combinable photocells: S5 – S10 – S30 series (see paragraph 5.3 for available models).
- Number of photocells: four pairs max.
- Indicators: 4 green LEDs, 1 green/red LED.
- Resolution with static test rod: S5-5, S10-5: 15mm – S30-5: 20mm
- Resolution with dynamic test rod: S5-5, S10-5, S30-5: 53mm (measured with velocity of 1.6 m/s).
- 1-digit display (diagnostic).
- Response time: \leq 30 ms.
- Working temperature: -10 a + 55 °C.
- Moisture: from 15% to 95% (not condensing).
- Output contacts: 2 NA, 3.15 A max, 250 Vac, $\cos \varphi$ 0.6 \div 1 (protected by a fuse).
- Operative distance: according to the type of photocell.

S5-5	8m.
S5-10	8m.
S30-5	50m.
- Outer controls: reset control, *test Muting* and *Override*.
- Container: plastic container for installation on a din/omega guide.
- Protection class of control unit: IP 20.
- Protection class of photocells: IP 67.
- Minimum protection class of the cabinet containig the control-unit: IP54 at least.
- Weight: control unit 600 g.
- Features, fuses relay board: F1-F2, fuses made in glass 5x20 3.15A Voltage 250V.
- Features, fuses *Muting* signalling lamp: F1, fuse made in glass 5x20 315mA Voltage 250V.
- *Muting* signalling: incandescent lamp 24 V, 3 W min, 300 mA max., screw fastened E10.

12. DISPLAY OPERATIVE CODES

12.1. OPERATIVE STATE SIGNALINGS

Code	Description
H	Initial test activated
8 -> 1	Count-down during the initial test
U	Opened test contact
≡	Override in function
A	Normal cycle: closed relays
E	Interrupted rays in automatic reset conditions: opened relays
F	Interrupted rays in manual reset conditions: opened relays

12.2. FAILURE SIGNALINGS

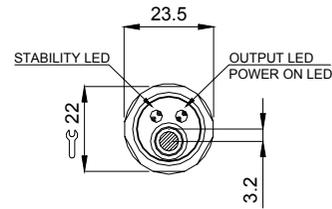
Code	Description	Action
1 - 4	Error on the relevant sensor	1
5	Error relay sensors	2
6	Error wrong configuration active sensors	3
7	Error Muting signalling lamp	4
8	System irreversible error or error on the output relays	2
9	Wrong sequence Muting request	5

Procedures to activate in the case failure codes are visualised on the *display*:

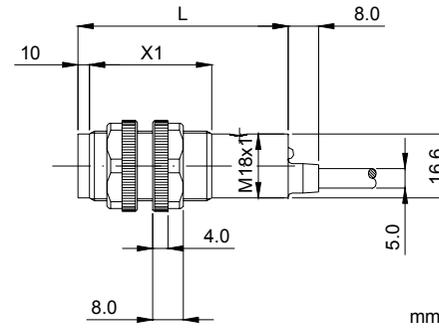
1. with this type of failure, check that the sensor have no interference with other sensors connected to the same unit or with other photocells present in the nearby area; check whether the unit recovers normal operation by pressing RESTART; in case the failure is not eliminated, the unit cannot be used and it is necessary to call the producer.
2. this type of failure means that the unit cannot be used and it is necessary to call the producer.
3. check the correct wiring among the output terminals of emitters TEST_TXn and the relevant input of receiver PNP_OUT_RXn; these terminals must be connected each in case they are not used with a pair of photocells; check whether the unit recovers normal operation by pressing RESTART; in case the failure is not eliminated, the unit cannot be used..
4. check that the outer lamp is not blown out or that its fuse is not damaged, otherwise call the producer (to replace the fuse, follow the instruction on paragraph 10).
5. check the correct wiring and sensor positioning for *Muting* activation.

Indirect discharge with 6kV or direct discharge with 8kV may cause influence to the 7-segment *display* and the output relays may open; this situation does not compromises the safety functioning of the barrier.

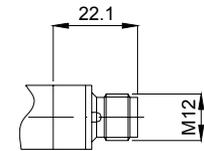
PHOTOCELL S5-5



MODELS		
	F8-ST4	G8-ST4
L	72	62
X1	42	32



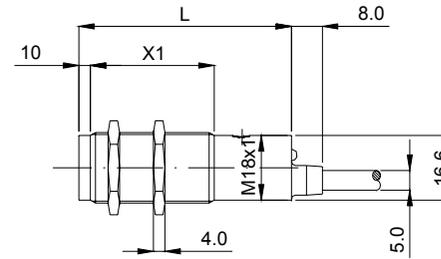
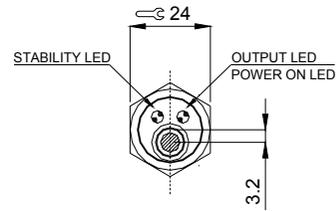
M12 CONNECTOR



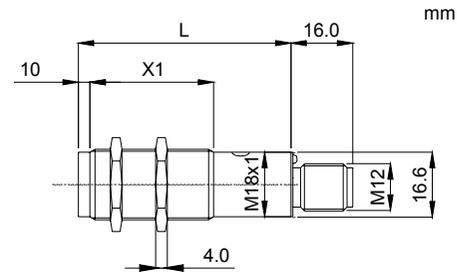
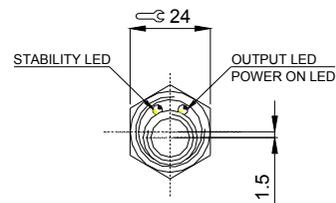
English

PHOTOCELL S10-5

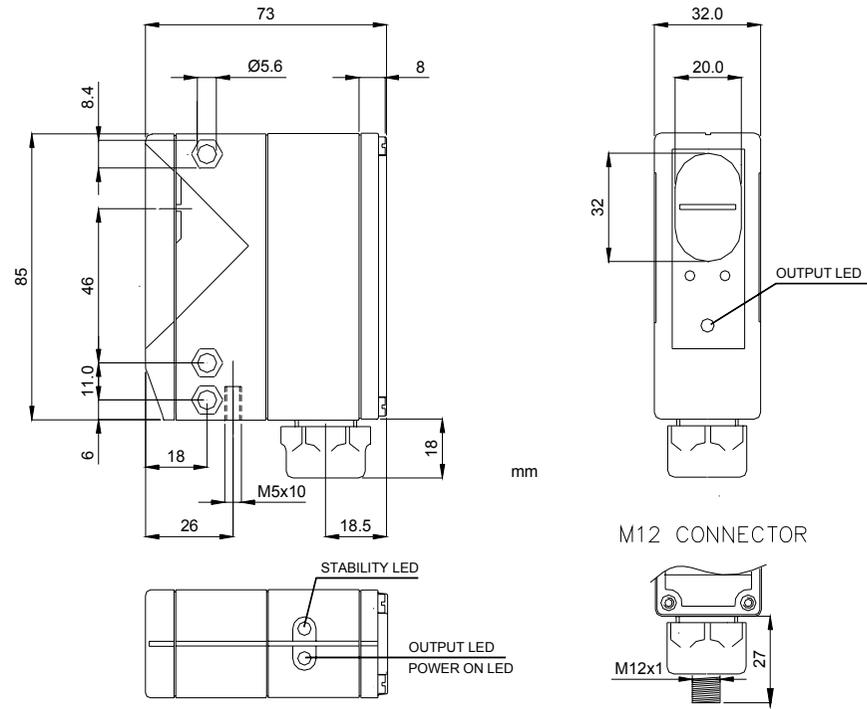
CABLE VERSION



M12 CONNECTOR VERSION



PHOTOCELL S30-5



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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 upstream.

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 things.

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

Do not open the container for any reason and in case of failure, send it to our laboratories by possibly indicating the detected failure and the operation period.

Avoid touching the protective cover of the lenses with the hands in order to prevent dust and/or grease from infiltrating 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 locking.

1.2. ROUTINE MAINTENANCE

No special operations are necessary apart from the **cleaning of the optical units**.

Do not use woollen clothes.

Do not use solvents.

According to the room conditions, estimate the frequency of this operation.

DATASENSOR S.p.A. refuses any responsibility for damage to persons or things due to the incorrect use of the device.

1.3. AGRO-FOOD INDUSTRIES

This device does not require washing and rinsing but simply the lens cleaning by means of a soft cloth dampened with water; anyway, apply to the producer to make sure that possible chemical agents used during the production processes cannot damage the photocells.

2. GENERAL INFORMATION AND MAIN APPLICATIONS

The multiray safety barrier of the BWS-T4N series has been produced to meet the need to protect persons in areas where it is necessary to guarantee the safety of the operator using machines, robots or in general automatic 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 level 4 in compliance with what described in the latest international standards, that is to say IEC 61496 1-2.

This safety device is made up of a control unit protected by a plastic container so that it can be installed on a DIN/OMEGA guide; it has 32 screw terminals to which it is possible to connect from 1 to 4 pairs of photocells. This version of the multi-ray safety barrier has the double 'Muting' function, by means of this function it is possible to connect or disconnect one or more pair of photocells in order to allow - for instance - the material passage without stopping the machine. If the device has this function, an other function must be also possible: The 'Override' function.

It represents the possibility to force the system, that is to say to close the output relays even with occupied rays in order to make it possible for the material which has gathered before the optical devices to proceed.

Both the *Muting* and the *Override* functions represent a system forcing; for this reason, to activate these functions some precautions limiting the reduction of the safety level have been added.

The presence of a limb or an object interrupting a beam causes the opening of the emergency exits and the consequent locking of the duly connected machine. It is necessary for the barrier to be connected in the right position in comparison with the passage to be protected in such a way that there isn't any possibility to climb over.

Here is a list of the commonly used applications:

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

CEI EN 61496-1: 2004 Safety of machinery: electro-sensitive equipment. General requirements and tests.

CEI IEC 61496-2: 1997 Safety of machinery: electro-sensitive protective equipment. Particular requirements for equipment using active optoelectronic protective devices.

3. OPERATION

The control electronic system is fitted inside the control unit. The 'core' of the device is made up of two microprocessors forming - as required by the standards - a system having "two independent channels". By means of the suitable hardware, they 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 two or more adjacent photocells. When one or more rays are interrupted, the electronic system opens the output relays signalling which photocells have triggered by means of LEDs which can be seen on the container. A display supplies information on the state and on possible failures.

The control-unit can work in two different modes (please refer to par.7) which he can carry out the following operations:

- TEST/RESET button: It is used to check if the whole system - made up of the output relays of the control unit and the machine actuator - works effectively. By pressing this button (opening the contact) you practically simulate the interruption of one or more safety rays and check that the machine stops according to the established times and modes.
- START/RESTART button: It is used to start the system which has been just powered - in case you are in a condition of manual reset - and to start it again when it has locked after a relay triggering (if you are in a condition of manual reset) or after an error which can be reset (see table relating to the error codes).

Two types of different operating modes are also available:

1. Automatic restoring, that is to say after the triggering caused by the detection of an object: The barrier starts to work again normally when the object is removed.
2. Manual reset by means of the reset button so that the return to the normal operating mode takes place only after the object has been removed and the button has been pressed.

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

These barriers have also a model with *Muting* function on each optical device. During the operation, this feature makes it possible to connect or disconnect any available optical device from the protection function by respecting special times. The optical devices which must be set on *Muting* during the operation can be pre-set by the user by means of a *dip-switch* (please refer to par. 7.1).

Even the models showing this feature can be both with manual and automatic restoring.

4. PRECAUTIONS AND INSTALLATION CRITERIA

The area on which the barrier must be installed must be compatible with the technical features of the device; room temperature, troubles of electromagnetic, luminous or other character must be previously evaluated possibly applying to the producer for data which are not reported on this manual.

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 formula used to calculate the safety distance for multiray barriers is the following one:



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

S = safety distance.

T = T1 + T2

where T1 = machine response time in seconds.

T2 = barrier response time in seconds.

K = 1600 mm/s (speed of the body approaching the dangerous area).

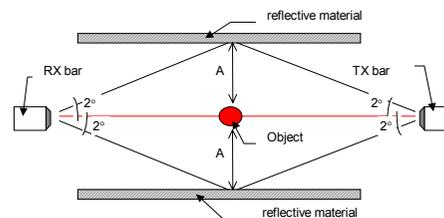
C = 850 mm (1200 mm for systems with single optical unit).

The height of ray from earth, in case of multirays barrier, are defined in following table:

	4 rays	3 rays	2 rays
height of 1° ray	300 mm	300 mm	400 mm
height of 2° ray	600 mm	700 mm	900 mm
height of 3° ray	900 mm	1100 mm	--
height of 4° ray	1200 mm	--	--

4.2. REFLECTIVE SURFACES

In case reflecting surfaces are present, the distance must be sufficient to avoid the possibility of passive reflections.



5. CONNECTIONS

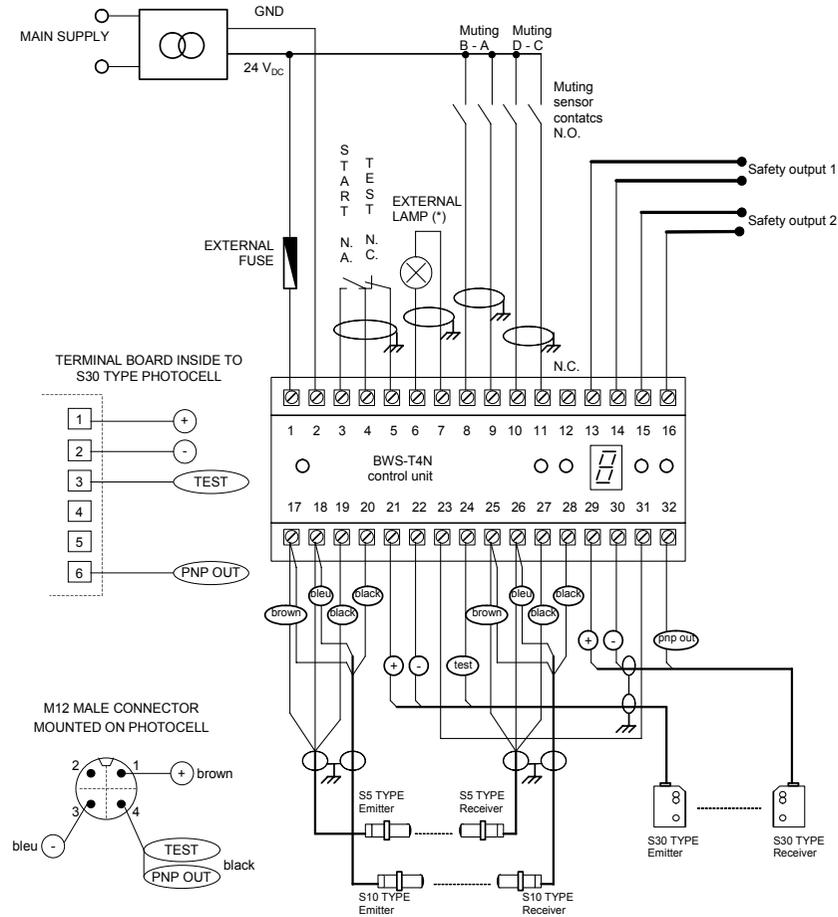
5.1. REFERENCES ON THE TERMINAL BOARD

Here is a table reporting the function and the connection to be carried out for each number which is present on the label near the terminal board:

TERMINAL	OUTER CONNECTION
1 - 2	Connect to the 24 Vdc power supply, respecting the polarity indicated on the label.
3 - 4	Start/restart button; connect a normally opened button (N.O.).
4 - 5	Test/reset 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, others)
11	Input of the Muting C sensor. Connect to the N.O. contact of the Muting sensor (photocell, proximity switch, others)
12	Terminal not used.
13 - 14	Safety output 1 with N.O. contact.
15 - 16	Safety output 2 with N.O. contact.
17 - 18	Power supply emitters (TX), photocells 1 and 2. Brown wires (pin 1 of connector) to terminal 17, blue wires (pin 3 of connector) to terminal 18. (in case of photocell S30 with terminal board, connect 17 and 18 respectively with 1 and 2 of the photocell)
19 - 20	Connect the photocells 1 and 2 to the test input of emitters (TX). Black wire (pin 4 of connector) TX 1 on terminal 19, black wire TX 2 on terminal 20. (in case of photocell S30 with terminal board, connect these terminals with 3 of the photocell)
21 - 22	Power supply emitters (TX), photocells 3 and 4. Brown wires (pin 1 of connector) to 21 terminal, blue wires (pin 3 of connector) to terminal 22. (in case of photocell S30 with terminal board, connect 21 and 22 respectively with 1 and 2 of the photocell)
23 - 24	Connect photocells 3 and 4 to the test input of emitters (TX). Black wire (pin 4 of connector) TX 3 on terminal 23, black wire TX 4 on terminal 24. (in case of photocell S30 with terminal board, connect these terminals with 3 of the photocell)
25 - 26	Power supply receivers (RX), photocells 1 and 2. Brown wires (pin 1 of connector) to terminal 25, blue wires (pin 3 of connector) to terminal 26. (in case of photocell S30 with terminal board, connect 25 and 26 respectively with 1 and 2 of the photocell)
27 - 28	Connect to the PNP output of the receivers (RX) photocells 1 and 2. Black wire (pin 4 of connector) RX1 on terminal 27, black wire RX2 on terminal 28 (in case of photocell S30 with terminal board, connect these terminals with 6 of the photocell)
29 - 30	Power supply receivers (RX), photocells 3 and 4. Brown wires (pin 1 of connector) to terminal 29, blue wires (pin 3 of connector) to terminal 30. (in case of photocell S30 with terminal board, connect 29 and 30 respectively with 1 and 2 of the photocell)
31 - 32	Connect to the PNP output of the receivers (RX) photocells 3 and 4. Black wire (pin 4 of connector) RX3 on terminal 31, black wire RX4 on terminal 32 (in case of photocell S30 with terminal board, connect these terminals with 6 of the photocell).

5.2. WIRING EXAMPLE

Here is a connection example of the control unit BWS-T4N relating to a mixed configuration in which all the available models of photocells have been used.



English

(*) for application **without Muting** connect between PIN 6 and 7 a **150÷180 Ω ½ W** resistor to avoid control unit lock.

Please, note especially what follows:

- Three out of four photocells have been connected choosing among the ones which can be used; model S5-5 has been connected to the terminals relating to TX1-RX1, model S10-5 to the ones of TX2-RX2, the terminals of TX3-RX3 have not been used and TX4-RX4 has been connected to model S30-5.
- To configure the control unit in such a way that it works only with three present photocells, it has been necessary to connect the unused emitter output to the input of the corresponding receiver, 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 transformer 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 START 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 outer light device for active Muting signalling must 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.
- Photocells of the type S5-5 and S10-5 are delivered with wired cable or standard M12 connector and the wiring on the control unit is indicated according to the cable colour, or to the male connector pin number.
- Photocells of the type S30-5 are available also in the version with terminal board; in this case, it is necessary to carry out the connections by respecting the same symbols present both on the terminal board of the control until and on the photocell one.



- 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.

In the following paragraph you can find the codes of the available models which can be used in the wished configuration.

5.3. CODES AND DESCRIPTION OF THE AVAILABLE PHOTOCELLS

MODEL S5-5

CODE	TYPE	CONTAINER
S5-5-G8-60-ST4	emitter	plastic, with 5m of cable
S5-5-G8-62-ST4	emitter	plastic, with connector M12
S5-5-F8-90-ST4	receiver	plastic, with 5m of cable
S5-5-F8-92-ST4	receiver	plastic, with connector M12

MODEL S10-5

CODE	TYPE	CONTAINER
S10-5-G8-60-ST4	emitter	metal, with 5m of cable
S10-5-G8-62-ST4	emitter	metal, with connector M12
S10-5-F8-90-ST4	receiver	metal, with 5m of cable
S10-5-F8-92-ST4	receiver	metal, with connector M12

MODEL S30-5

CODE	TYPE	CONTAINER
S30-5-G50-1ST4	emitter	plastic, connection to terminal board
S30-5-G50-2ST4	emitter	plastic, with connector M12
S30-5-F50-1ST4	receiver	plastic, connection to terminal board
S30-5-F50-2PST4	receiver	plastic, with connector M12

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 is turned 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, visualizing on the display a count-down which indicates the control unit activity.
- At the end of this operation, the display will visualize letter 'A' indicating the active state of the control unit.
- 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, modifying their mutual position, for instance by positioning some pairs of emitters on the other receiver side.

7. OPERATING PROCEDURES

7.1. DIP-SWITCHES CONFIGURATION

The configuration indicated in table must be selected on both the dip-switch present on the side of the control unit, after to have removed the cap of protection. The description corresponding to the pre-chosen selection is reported.

1	function
X	not used

2	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.

3	function
Off	Muting 60 s
On	Muting ∞ s



NOTE: configure the two dip-switch in the same way, otherwise the central control unit is locked and code '8' is *displayed*.

4	function
Off	manual restoring
On	automatic restoring

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

- Automatic restoring, all four optics in *Muting*, the maximum duration of the *Muting* is of sixteen seconds.

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 con 27
2	20 con 28
3	23 con 31
4	24 con 32

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

English

7.3. MUTING FUNCTION

7.3.1. DESCRIPTION

The *Muting* function makes it possible to connect or disconnect one or more optical devices during the operation according to the operative needs. As required by the standard, the control unit has two inputs for the activation of this function. Two separate *Muting* functions are present.

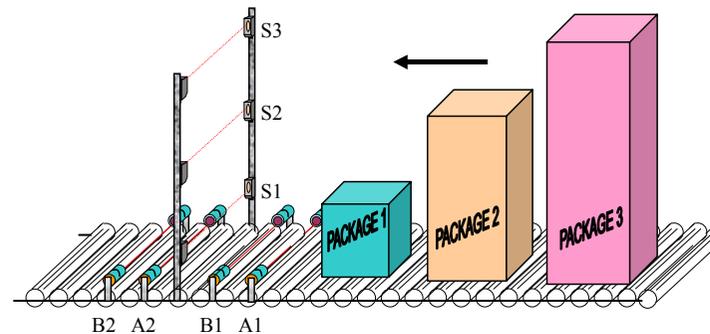
It is necessary to duly connect the *Muting* sensors in order to avoid that a wrong positioning can cause undesired *Muting* requests. It is nevertheless necessary to remember that the *Muting* function represents a system forcing and for this reason it must be used with care.

By means of the inner *DIP-SWITCHES*, it is possible to decide which optical units must be set on *Muting* (that is to say, which optical units must be disconnected) after a request (see *DIP-SWITCHES* setting).

To use the *Muting* function, it is necessary also to connect the *Muting* signaller without which the control unit locks. For application **without Muting** connect between PIN 6 and 7 a 150÷180 Ω ½ W resistor to avoid control unit lock.

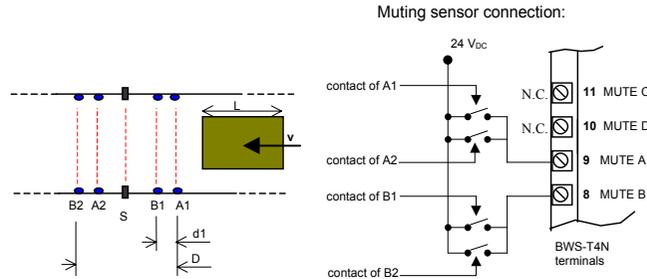
7.3.2. INSTALLATION CRITERIA

1. The *Muting* sensors must recognise the material (namely 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.

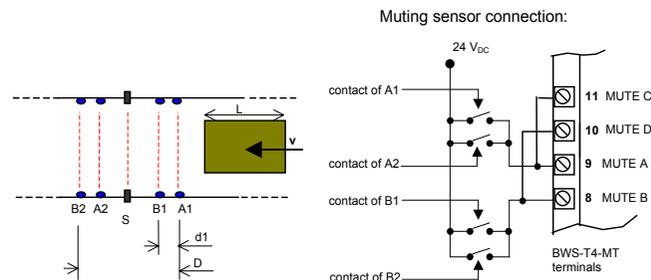


In the previous page, an installation example of a protection arranged on a conveyor is drawn; it must allow the passage of package 1, preventing other packages from passing or it must allow the passage of packages 1 and 2, preventing package 3 from passing. The protection photocells **S** are connected to the BWS-T4N control unit and are temporarily cut-out at the package passage by means of the *Muting A1, A2, B1 and B2* activation 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.

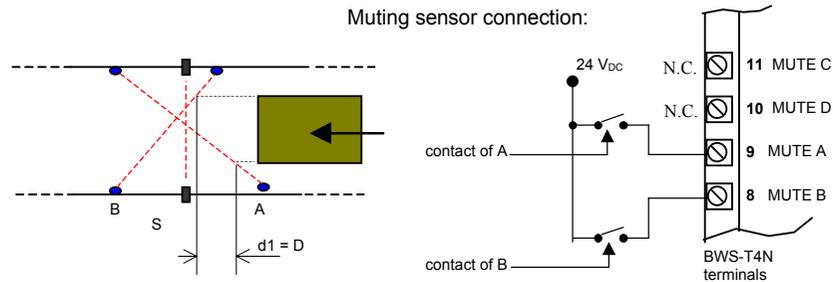
- **Application with four Muting sensors, passage permitted only for package 1:**



- **Application with four Muting sensors, passage permitted only for packages 1 and 2:**



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



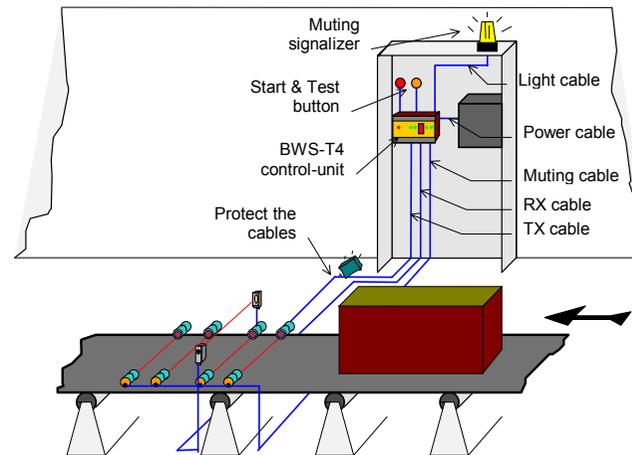
D: minimum distance sdo that the *Muting* sensors keep active the request; it depends on the parcel length: $D < L$.

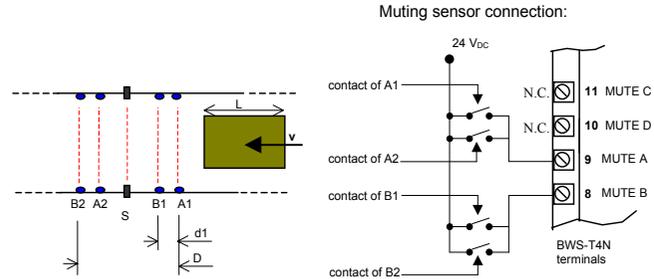
d_1 : necessary maximum distance so that the Muting request is accepted; it depends on the parcel speed:

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

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:



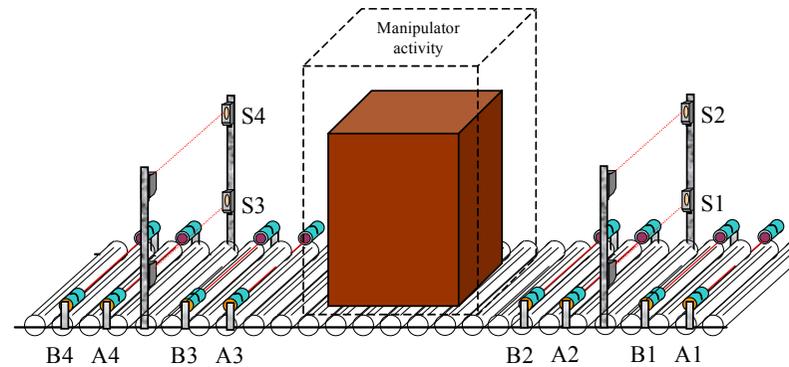


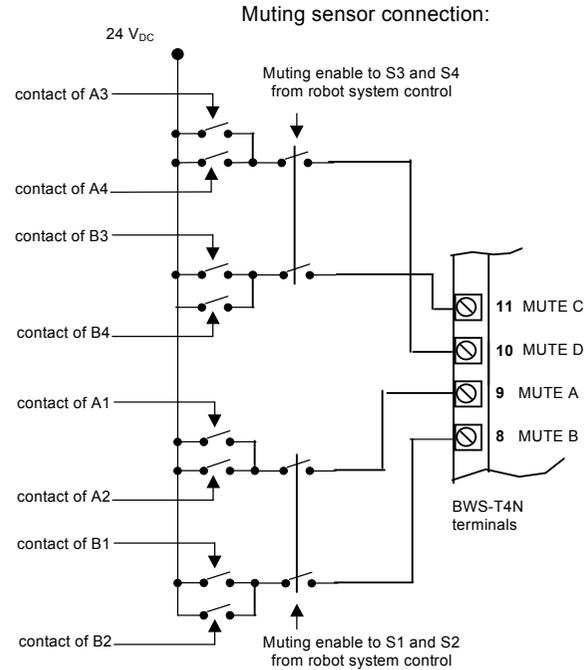
The examples above are thought for the use of the *Muting* functions only relating to sensors S1 and S2, with the configuration *DIP-SWITCH 2* in the off positions; sensors S1 and S2 are controlled by the *Muting A* and *B* inputs, while sensors S3 and S4 are controlled by the *Muting C* and *D* inputs.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

English

- **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 poassage 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 outer light evic for active *Muting* signalling 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 output relays, thus making it impossible to free the controlled area.

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

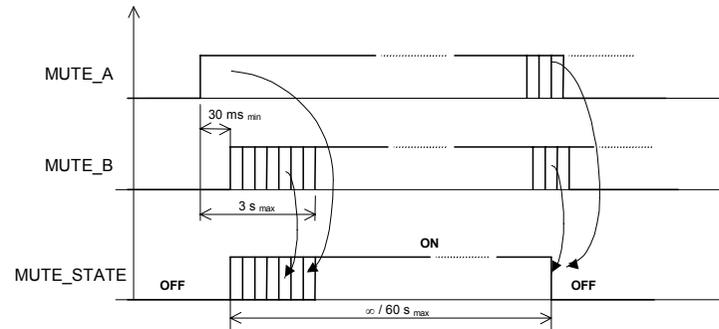
7.5. STARTING THE OVERRIDE FUNCTION

- Switch off the device.
- Make sure that the test e start buttons are connected. (N.C. for the test button, N.O. for the start button).
- Switch on the device.
- 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 visualizes three overlapping segments. The *Muting* lamp blinks to signal the barrier disconnection.
- The maximum duration of the Override function amounts to 60 seconds after that the barrier is connected again even if the buttons are pressed. Obviously, if the buttons are released before this time has elapsed, the Override function will be immediately stopped.

7.6. TIMING RESTRICTIONS (Muting function)

- a) The request of *Muting* must occur according to the correct time sequence: respectively 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. The request of this last one must arrive within a maximum time of 3 seconds. If not the *Muting* request will not be activated. A wrong sequence on the entrances of *Muting* shows a mistake on the *display* and the relays are open, waiting for the pressure of the *restart* buttons.

- b) Since when the *Muting* state is active, an object can remain for a period of time not longer than 60 s., otherwise the *Muting* function is switched off. This mechanism is optional and can be deactivated when the barrier is set up.
- c) For all the cases in which the *Muting* function is automatically disabled because of *time-out*, the request must be cut-out and re-activated to generate the following *Muting* state.



It is not possible to carry out a *Muting* request, if the barrier is in the opened relay state ('E' or 'F' code on *display*, beams are interrupted).

7.7. LED DIAGNOSTIC

The user can be informed of the barrier operative state by means of a segment *display* and of the indication of four LEDs.

The LED state has the following meaning:

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

At paragraph 12, the description of the coding visualized on the *display* is reported.

8. 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.*

English

9. 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.

10. 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 output that are not damaging in any case the safety work of the barrier.

The guarantee is complete for a period of 36 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 barrier to:



DATASENSOR S.p.A.

always indicating the detected failure and the operational period.

11. TECHNICAL DATA

- Voltage: 24 Vdc \pm 10%.
- Electrical input: 420 mA max. (for any model).
- Combinable photocells: S5 – S10 – S30 series (see paragraph 5.3 for available models).
- Number of photocells: four pairs max.
- Indicators: 4 green LEDs, 1 green/red LED.
- Resolution with static test rod: S5-5, S10-5: 15mm – S30-5: 20mm
- Resolution with dynamic test rod: S5-5, S10-5, S30-5: 53mm (measured with velocity of 1.6 m/s).
- 1-digit *display* (diagnostic).
- Response time: \leq 30 ms.
- Working temperature: -10 ... + 55 °C.
- Moisture: from 15% to 95% (not condensing).
- Output contacts: 2 NA, 3.15 A max, 250 Vac, $\cos \varphi$ 0.6...1 (protected by a resettable fuse).
- Operative distance: according to the type of photocell.
 - S5-5 8m
 - S5-10 8m
 - S30-5 50m
- Outer controls: *start/restart* control, *test*, *Muting* and *Override*.
- Container: plastic container for installation on a din/omega guide.
- Protection class of control unit: IP 20.
- Protection class of photocells: IP 67.
- Minimum protection class of the cabinet containing the control-unit: IP54 at least.
- Weight: control unit 600 g.
- Features of fuses relay board: F1-F2, internal resettable fuses 3.15A T 250V.
- Features of fuses *Muting* signalling lamp: internal resettable fuse 315mA T 250V.
- *Muting* signalling: incandescent lamp 24 V, 3 W min, 300 mA max., screw fastened E10.

12. DISPLAY OPERATIVE CODES

12.1. OPERATIVE STATE SIGNALINGS

Code	Description
H	Initial test activated
8 -> 1	Count-down during the initial test
U	Opened test contact
≡	Override in function
A	Normal cycle: closed relays
E	Interrupted rays in automatic reset conditions: opened relays
F	Interrupted rays in manual reset conditions: opened relays

12.2. FAILURE SIGNALINGS

Code	Description	Action
1 - 4	Error on the relevant sensor	1
5	Error relay sensors	2
6	Error wrong configuration active sensors	3
7	Error Muting signalling lamp	4
8	System irreversible error or error on the output relays	2
9	Wrong sequence Muting request	5

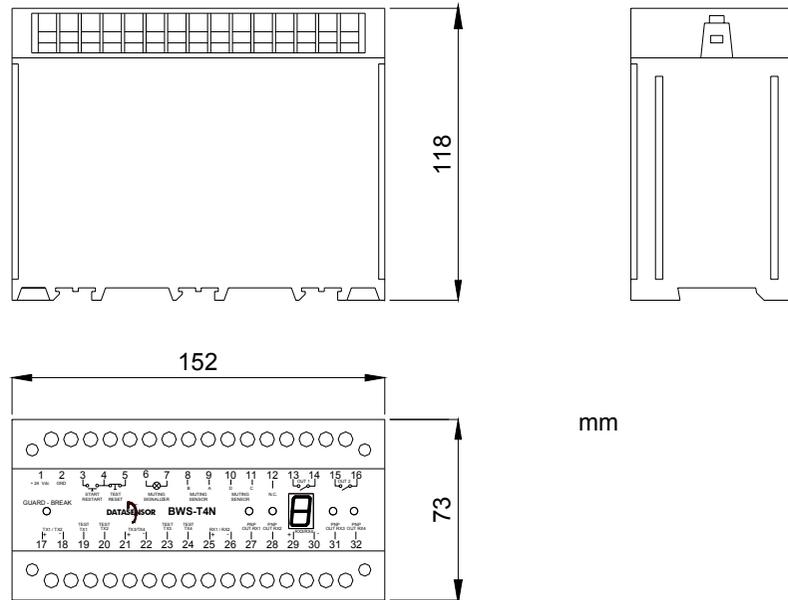
Procedures to activate in the case failure codes are visualised on the *display*:

1. with this type of failure, check that the sensor have no interference with other sensors connected to the same unit or with other photocells present in the nearby area; check whether the unit recovers normal operation by pressing RESTART; in case the failure is not eliminated, the unit cannot be used and it is necessary to call the producer.
2. this type of failure means that the unit cannot be used and it is necessary to call the producer.
3. check the correct wiring among the output terminals of emitters TEST_TXn and the relevant input of receiver PNP_OUT_RXn; these terminals must be connected each in case they are not used with a pair of photocells; check whether the unit recovers normal operation by pressing RESTART; in case the failure is not eliminated, the unit cannot be used.
4. check that the outer lamp is not blown, otherwise call the producer (to replace the fuse, follow the instruction on paragraph 10).
5. check the correct wiring and sensor positioning for *Muting* activation.

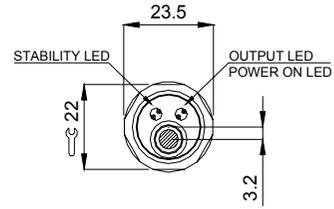
Indirect discharge with 6kV or direct discharge with 8kV may cause influence to the 7-segment *display* and the output relays may open; this situation does not compromises the safety functioning of the barrier.

13. OVERALL DIMENSIONS

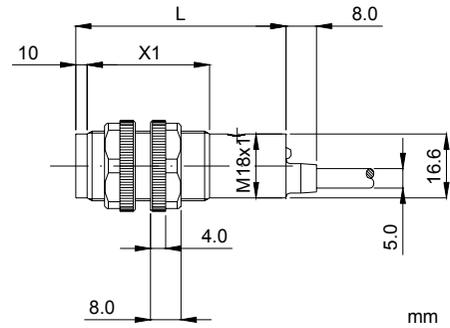
Control unit **BWS-T4N**



PHOTOCELL S5-5



M O D E L S		
	F8-ST4	G8-ST4
L	72	62
X1	42	32

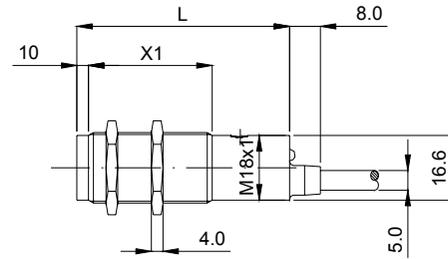
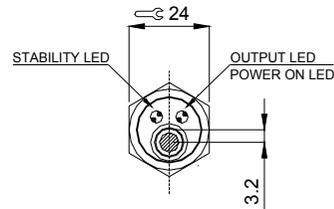


M12 CONNECTOR

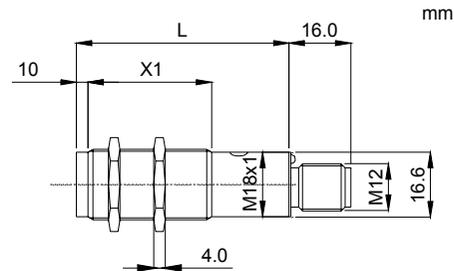
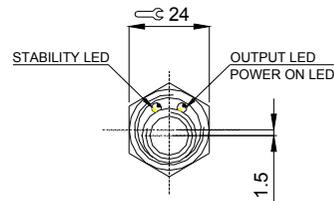
English

PHOTOCELL S10-5

CABLE VERSION



M12 CONNECTOR VERSION



PHOTOCELL S30-5

