Cat. No. E507-E2-01

F3SP-U1P-TGR

Safety control unit,
for use with 1 to 4 safety photoelectric switches

USER'S MANUAL

CE

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

-Low Voltage Directive 73/23/EEC
-EMC Directive 89/336/EEC
-Machinery Directive 98/37/EC
-IEC 61496-1: 1997
-DIN V VDE 0801: 1990 and
-amendment A1: 1994
-EN 50081-2: 1993
-EN 55022: 1994
-DIN EN 60204-1: 1993
-EN 50178: 1997

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USER'S MANUAL: Version 1.0 issued on 01/05/2001

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1 BEFORE USING THE DEVICE.

1-1 GENERAL INSTRUCTIONS.

Read this manual and the manual of safety PES (safety photoelectric switch) completely. Be sure the information provided is understood before attempting to operate the safety PES .

Keep the manual in a secure and convenient location and refer to it as necessary.

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

- Do not touch non-insulated cables, if they have been energised.
- Make sure that the cables connected to the control unit are not taut and that they do not hinder the movement of persons or objects.
- Before carrying out any outer operation, turn off the power.

Failure to do so may result in loss of life or serious injury.

1-2 ROUTINE MAINTENANCE.

Be sure to conduct inspection regularly.

Please refer to sec. 9 and the safety PES instruction manual.

OMRON Europe and Techno GR refuse to accept any responsibility for damage to persons or objects due to the incorrect use / installation of the control unit and safety PES.

1-3 PRECAUTION OF SAFETY.

The following symbols are used for highlighting items in order to ensure safe and proper use of the F3SP-U1P-TGR. Items highlighted are critical for safe operation and must be heeded at all times.

WARNING

NOTICE

2 GENERAL INFORMATION.

WARNING

- **The safety control unit of the F3SP-U1P-TGR has been designed to be used with the dedicated safety PES (Please refer to sec.11). It must not be connected to other safety PESs.**
  The control unit complies with the requirements for type 4 safety equipment in accordance with the latest international standards, IEC 61496-1.
  However, the safety system category depends on the safety PES's type as follows.
  Type 4 safety PES : Safety system category 4
  Type 2 safety PES : Safety system category 2
  Only type 2 safety PES is available as of 01.04.2001.
- 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 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 DIN/OMEGA mounted control unit is protected to IP20 by a plastic housing. It has 32 screw terminals to which it is possible to connect from 1 to 4 pairs of safety PESs.

This control unit has the double 'muting' function. This function makes it possible to inactivate one or more safety PESs in order to allow, for instance, the objects passage without stopping the machine.
The 'override' function represents the possibility to force the system. The 'override' function allows closing the output contacts manually so that stuck material can be cleared from the muting area after the cause of an error is removed.
Both the muting and the override functions force the system to work. Therefore, activating these functions needs some precautions to avoid the reduction in safety (see sec. 7.2).

The control unit has been designed to the following standards:

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

3 OPERATION.

The control unit has two independent microprocessors forming a system with “two independent channels” as required in the standards.
When one or more safety PESs are interrupted, the control unit opens both safety output contacts and indicates which safety PES has been interrupted by four green LEDs locating on the front panel.
A 7-segment display supplies information on normal states and on probable failures.

The control-unit can work in two different modes (see sec. 7) as follows:

1. Automatic mode:
   The control unit automatically starts after power-ON and automatically restarts after the object in the detection zone is removed.
2. Interlock mode:
   Returns to the normal operating mode only after the object has been removed and the RESET button has been pressed.

The control unit needs following two buttons.

- 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.
- RESET : It is used to reset the interlock (see above “2. Interlock mode). It is also used to restart after the cause of an error is removed (see sec. 12).

In addition, the control unit can be set for the muting function. This function can be selected by setting of dip-switches inside the control unit.

NOTICE

While the control unit is connected to power, do not change any dip switch to avoid influence on 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 room temperature, electromagnetic interference, intense light sources etc.

4-1 CALCULATION OF THE MINIMUM SAFETY DISTANCE.

The safety distance 'S' must be sufficient to guarantee that an operator cannot reach the hazardous area by the moment when the dangerous movement stops. Regarding the calculation of safety distance, please read the related standards, e.g. EN 999 (European Standard. Safety of machinery – The positioning of protective equipment in respect of approach speeds of parts of the human body)

Using EN 999 Formula

Safety distance is calculated based on the following equation;

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

S = safety distance.
T = T1 + T2 + T3
whereas T1 = machine response time in seconds.
T2 = safety PES response time in seconds.
T3 = control unit response time in seconds.
K = speed of the body approaching the dangerous area
C = additional distance based on intrusion towards the hazardous area prior to actuation of the protective equipment.

1) Multiple separate beams

K = 1600 mm/s
C = 850 mm

The following heights are recommended in EN999;

	4 Beams	3 Beams	2 Beams
Height of 1st ray	300 mm	300 mm	400 mm
Height of 2nd ray	600 mm	700 mm	900 mm
Height of 3rd ray	900 mm	1100 mm	--
Height of 4th ray	1200 mm	--	--

2) Single height beam

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 the beam from the ground or reference plane: 750mm
(Recommended in EN 999)

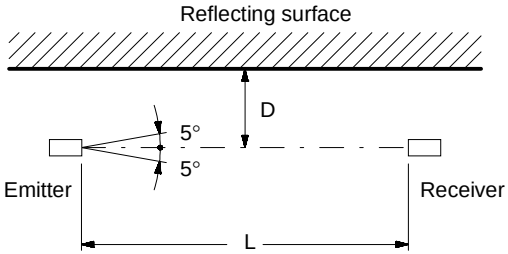
WARNING

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 exists, the distance must be sufficient to avoid the possibility of passive reflections.

<Top View>



Distance between emitter and receiver (detection distance L)	Minimum installation distance D
0.3 to 3 m	0.27 m
3 m or more	L x tan 5° = L x 0.087 (m)

WARNING

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

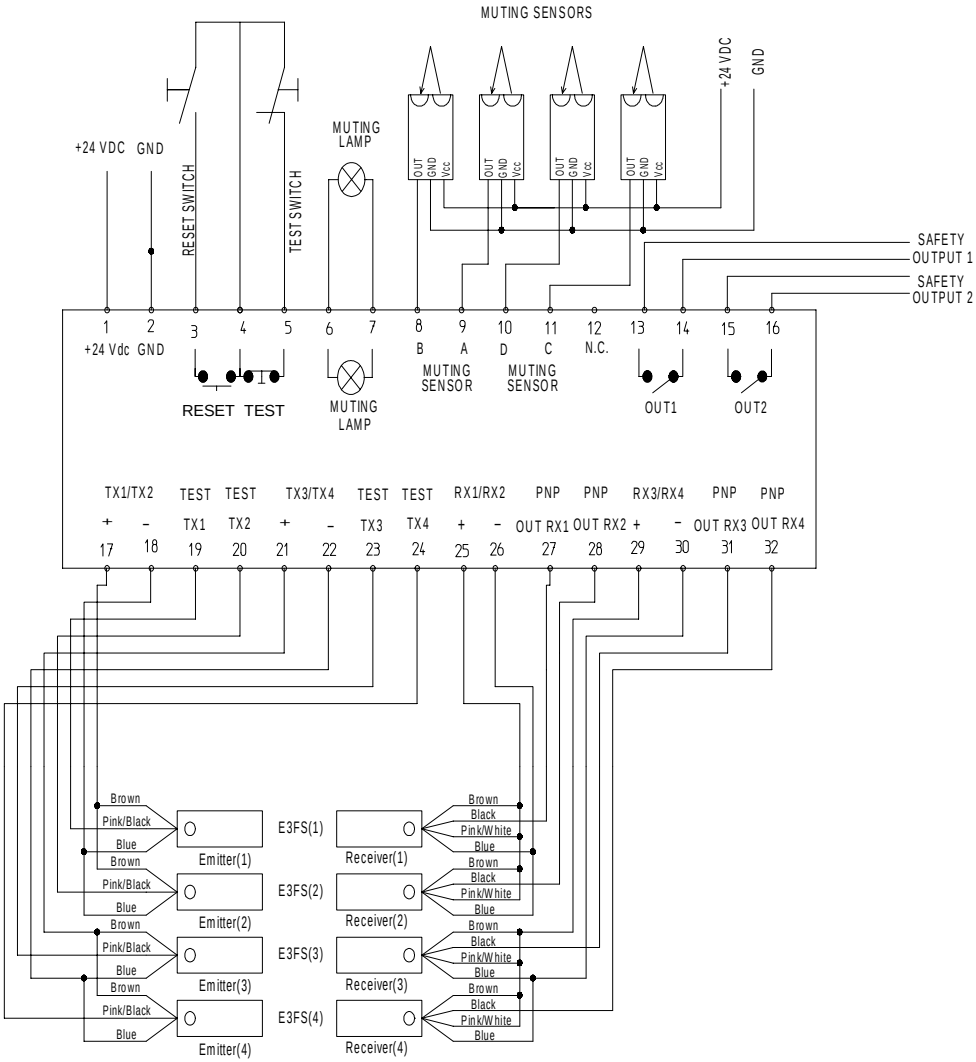
5 CONNECTIONS.

5.1 TERMINAL BLOCK ASSIGNMENT.

TERMINAL	OUTER CONNECTION
1 - 2	Connect to the 24 Vdc power supply, note the polarity indicated on the label.
3 - 4	RESET button; Connect to a normally opened contact. (N.O.).
4 - 5	TEST button; Connect to a normally closed contact. (N.C.).
6 - 7	Connect to the muting lamp.
8	Input of the muting B sensor; Connect to the N.O. contact of the muting sensor (PES, proximity switch, etc.).
9	Input of the muting A sensor; Connect to the N.O. contact of the muting sensor (PES, proximity switch, etc.).
10	Input of the muting D sensor; Connect to the N.O. contact of the muting sensor (PES, proximity switch, etc.).
11	Input of the muting C sensor; Connect to the N.O. contact of the muting sensor (PES, proximity switch, etc.).
12	This terminal not used.
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 safety 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 safety 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 safety 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 safety 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 WIRING EXAMPLE.

Connection of four E3FS-10, safety PESs, to the control unit F3SP-U1P-TGR.



WARNING

- It is necessary to protect the control unit with an outer fuse having a nominal interruption current equal to 1 A.
- DC power supply units must satisfy all the conditions below so that the control unit can comply with the applicable standards.
  - The power supply voltage must be within rating (24 VDC ± 10 %).
  - The power supply uses double or reinforced insulation between the primary and secondary circuits to fulfil EN60742 or equivalent standard requirements.
  - The power supply has automatic reset characteristics (voltage drop) to protect against over current.
  - The power supply maintains an output holding time of at least 20ms.
  - FG (frame ground terminal) must be connected to PE when using a commercially available switching regulator.
  - The power supply must have output characteristics required for the power source for Class 2 Circuit of limited Voltage/Current Circuit as defined in UL508.
  - The power supply must conform to regulatory requirement and standards, regarding EMC and electrical equipment safety, of the country where the control unit is installed and where machinery will be operated, for example: The EMC Directive(industrial environment) and the Low Voltage Directive in EU.
- Do not short the output lines to the Vs line. Doing so will cause the output to be always ON, creating a dangerous situation.
- Do not connect the control unit to an AC or DC power supply with higher voltage than nominal 24 VDC.
- The TEST and RESET buttons must be positioned in such a way
  - that the operator can see the protected area when he carries out reset, test, or override operations.
  - that it can not be activated from inside the hazardous area.

NOTICE

- The control unit can be combined with up to four pairs of safety PES, but at least one pair of Safety PES must be connected.
  If less than four pairs of safety PES are used, the unused “TEST TXn” terminal for an emitter must be connected to the “PNP OUT RXn” terminal of the corresponding receiver (see sec. 12.2).
- Make sure to connect the muting lamp, otherwise the control unit is locked.
- 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 safety PESs must be at least AWG24. The connection cables of *muting* request, test button and reset button must be at least AWG22. When shielding cable is used, all shield braids must be earthed on the control unit side.
- Be sure to isolate the power prior to wiring.
- Be sure to route the control unit and safety PESs cable separately from high-potential power lines or through an exclusive conduit.
- Make sure the conductor path in the connector is rated IP54 or higher.
- A load must be basic insulated to prevent the load from being applied to hazardous voltage (e.g. 230 VAC) when the load is a relay.

6 ALIGNMENT PROCEDURE.

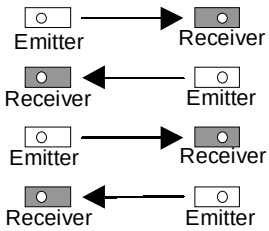
After having carried out the correct mechanical assembly and the correct connections as described in the previous paragraphs, it is necessary to align the safety PESs. Follow the operating guide as follows:

- Turn off the power supplying the control unit.
- Open the test button contact.
- Power the control unit.
- Align the safety PESs by observing the LEDs on the control unit: If the alignment of the relevant pair of safety PES 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, showing on the display a count-down which indicates the control unit activity.
- At the end of this operation, the display will show 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.

NOTICE

The control unit can detect the mutual interference between safety PESs. The control unit forces the output contacts 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 interval.
- Emitters and receivers of safety PESs are installed alternately (see below drawing).



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

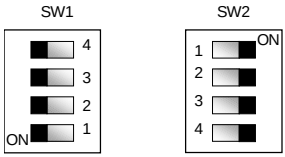
7 OPERATING PROCEDURES.

7.1 DIP-SWITCHES CONFIGURATION.

The configuration shown in the below table must be selected from the both dip-switches on the internal board. To configure dip-switch, remove the round plastic cover on the lateral surface of F3SP-U1P–TGR with a screwdriver.

Pole 1	function
X	not used

Pole 2	function
Off	muting A-B act on the safety PES 1 and 2. muting C-D act on the safety PES 3 and 4.
On	muting A-B act on the safety PES 1. muting C-D act on the safety PES 2. The safety PES couples 3 and 4 continue to function normally.



NOTE: Configure the two dip-switch in the same way,otherwise code '8' is displayed, which means a failure.

Pole 3	function
Off	muting 60 s
On	muting ∞ s

Pole 4	function
Off	interlock mode
On	automatic mode

Factory default set

Pole 2 : Off (All of four PESs in *muting*)

Pole 3 : Off (the maximum duration of the *muting* is of 60 seconds)

Pole 4 : On (Automatic mode)

7.2 CONFIGURATION FOR UNUSED PES.

If you use safety PESs less than four sets, terminals which are not connected to safety PESs must be connected directly as follows;

unused safety PES	connection
1	19 and 27
2	20 and 28
3	23 and 31
4	24 and 32

At least one pair of safety PES must be used, otherwise the control unit is locked.

7.3 MUTING FUNCTION.

7.3.1 DESCRIPTION.

The muting function makes it possible to inactivate one or more safety PESs in order to allow, for instance, the objects passage without stopping the machine. 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 position and connect the muting sensors in order to avoid undesired muting inputs. It is important to remember that the muting function forces the system to work and for this reason, it must be used with much care.

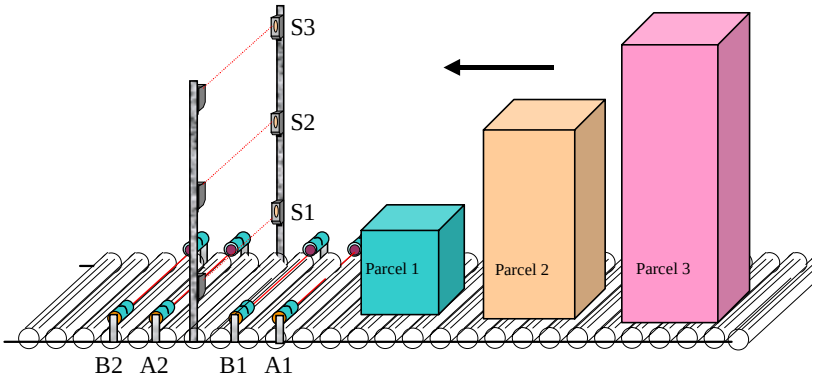
7.3.2 INSTALLATION CRITERIA.

1 The muting sensors must recognise the material (namely pallets, vehicles, etc.) over its full length.

2 The muting sensors must be arranged in such a way that the material is recognised even when it is not on a pallet but on other transporting medium like a lift.

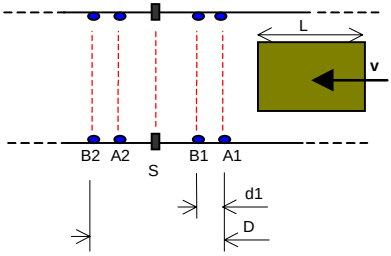
3 In case of different transport speeds through the muting area, consideration must be given on the muting duration.

4 All the safety PESs 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 muting sensors.

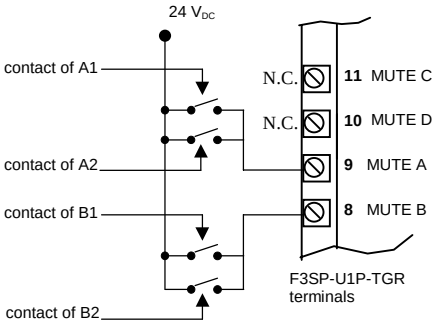


On the previous page, an installation example of a protection arranged on a conveyor is shown. It must allow the passage of package 1, preventing other packages from passing (refer to Wiring example 1) or it must allow the passage of packages 1 and 2, preventing package 3 from passing (refer to wiring example 2). Safety PESs **S#** are connected to the control unit and are temporarily muted, as the object passes, by means of the *muting* sensors **A1**, **A2**, **B1** and **B2**.
Sensors **A#** and **B#** may be optical, mechanical, proximity, etc. sensors with closed contact in the presence of the object to be detected.
In the case of Wiring example 1, the pole 2 of *dip-switches* must be set in the On position. And in the case of wiring example 2, the pole 2 of *dip-switches* must be set in the Off position.

Wiring example 1)
Application with four *muting* sensors, passage permitted only for package 1:
Pole 2 of dip-switches : On

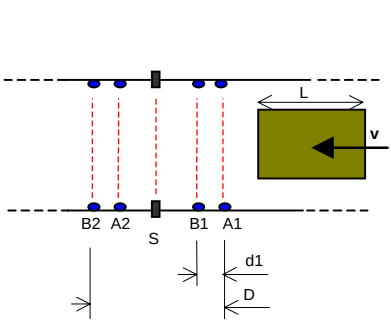


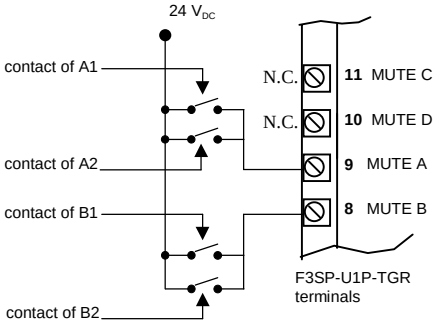
Muting sensor connection:



Wiring example 2)
Application with four muting sensors, passage permitted only for packages 1 and 2:
Pole 2 of dip-switches: Off

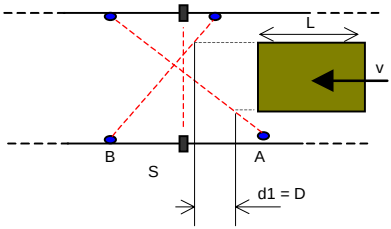
Muting sensor connection:

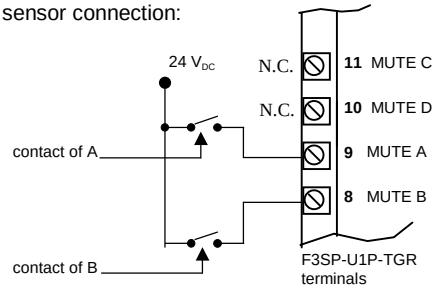




Wiring example 3)
Application with two muting sensors, passage permitted only for package 1:
Pole 2 of dip-switched: On

Muting sensor connection:



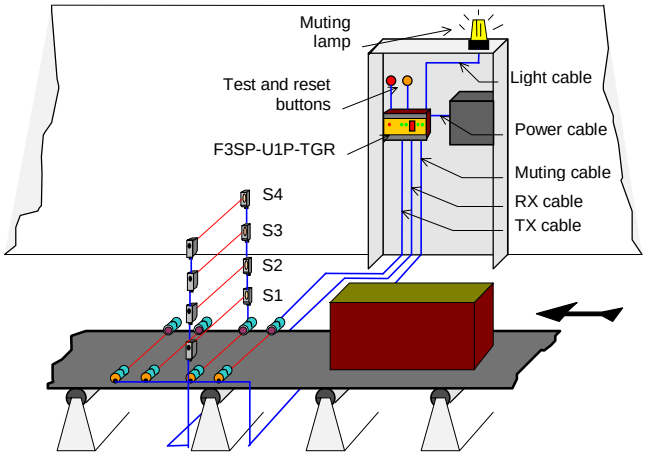


D: minimum distance so that the *muting* sensors keep active the request; it depends on the parcel length: D < L.

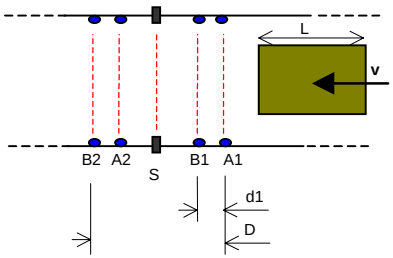
d_1: necessary maximum distance so that the muting request is accepted; it depends on object speed:

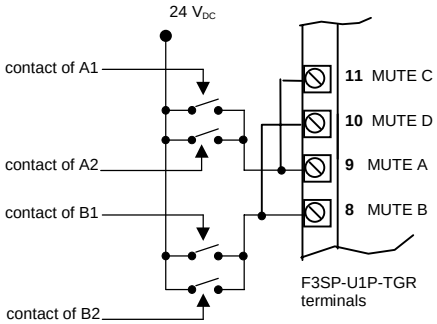
d_1 [cm]= v[m/s] * 3[s] * 100

Wiring example 4)
Application with four muting sensors and safety PES S1 to S4:
Pole 2 of dip-switches: Off



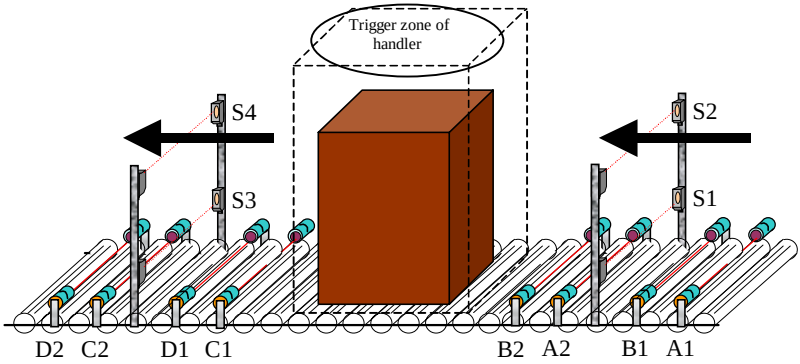
Muting sensor connection:



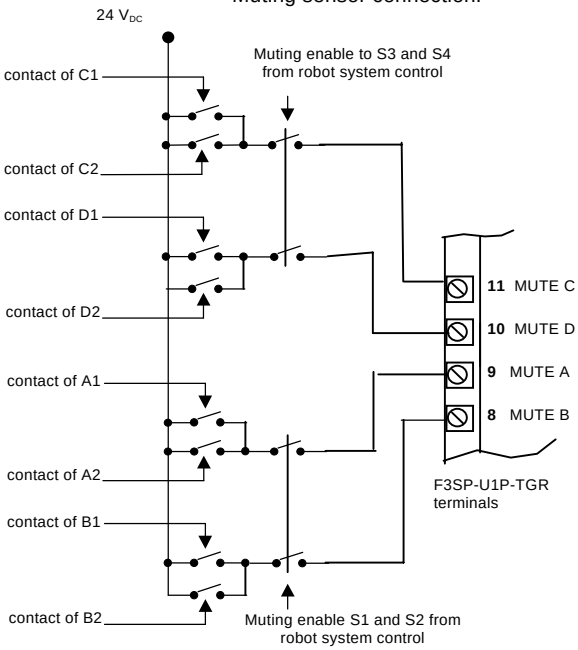


With the pole 2 of dip-switches in the Off position; sensors S1 and S2 are controlled by the *muting* A and B inputs, while sensors S3 and S4 are controlled by the *muting* C and D inputs. In the case of Wiring example 4, you can control four sets of safety PESs simultaneously.

Wiring example 5)
Application with eight *muting* sensors and output and input control
Pole 2 of dip-switches: Off



Muting sensor connection:



WARNING

- The muting lamp for indication “active muting” must be positioned in a place where it can be seen from any operative point.
- If the muting sensors must be installed close to the safety PESs, it is necessary to install the muting sensor receivers near the safety PES emitter side to avoid interference.
- The system must be protected from possible failures due to the cable damage; it is necessary to prepare the wiring to avoid damage to the connection cables.
- Muting sensors must be positioned so that they cannot be activated inadvertently by personnel.

NOTICE

- The control unit must be located in a cabinet with protection degree of at least IP54.
- The control unit does not have power supply terminals for muting sensors.

7.4 OVERRIDE.

This function makes it possible to force a muting condition, if necessary by starting the machine despite one or more safety PESs having been interrupted by the object. Thus enabling removal of the material from the protected area, when it has been stuck in the beam of the safety PESs due to a failure.
Suppose that a pallet has stopped in front of a safety PES; the conveyor belt cannot be started again because the control unit - after the ray of the safety PES is interrupted - will not close the output contacts, thus making it impossible to free the detection area.
By activating the override function, it gets possible to carry out this operation.

7.5 STARTING THE OVERRIDE FUNCTION.

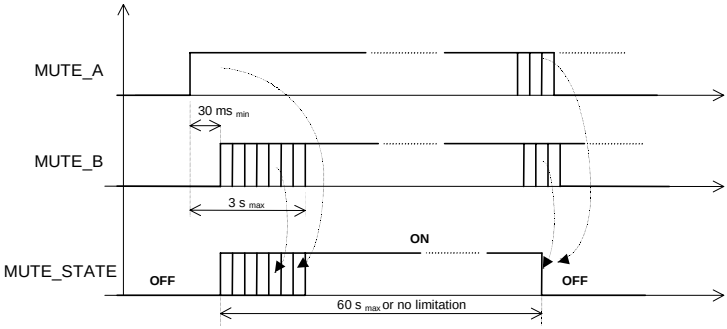
- Switch off the control unit.
- Make sure that the TEST and RESET buttons are connected. (N.C. for the TEST button, N.O. for the RESET button).
- Switch on the control unit.
- During the countdown displayed, press together the TEST and RESET buttons and keep pressing. (Do not press the buttons before the countdown. Otherwise a failure occurs, because a self-test is carried out to check that the buttons are not locked.)
- The override function has been activated. The display shows three overlapping segments. The muting lamp blinks to signal that a safety PES is not available.
- The maximum duration of the override function is 60 seconds, until the safety PES gets available again, even if the buttons are pressed. If the buttons are released before 60 seconds passes, the override function will be immediately stopped.

7.6 MUTING RESTRICTIONS (muting function).

a) 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. A wrong sequence on muting shows a failure on the display and the output contacts are open, until the RESET button is activated.
b) When the muting state is active, an object like a parcel can remain for less than 60 seconds, i.e. the muting function is inactivated in 60

seconds. This time limitation is optional and can be inactivated by dip-switches (see sec. 7.1).

c) When the muting function is automatically inactivated because of the time-out, the request must be cut out and reactivated to generate the following muting state.



It is not possible to carry out a muting request, if the safety PES is interrupted and the output contacts are in the opened state ('E' or 'F' code on display, beams are interrupted).

7.7 LED INDICATOR.

The operator can see the control unit status by a bicolour LED, four green LEDs, and a 7-segment display.
The LEDs have following meanings:

- RED / GREEN LED (bicolour LED)
  - RED: The output contacts are opened.
    Because the safety PES/s detect an object, or
    the control unit detects an error, which can be possibly recovered by pressing the RESET button.
  - GREEN: The output contacts are closed because the safety PES/s are working correctly and there are no detected objects.
- Four GREEN LEDs
  - When a green LED lights, the corresponding safety PES works normally and no object is detected.
- 7-segment display
  See sec. 12, the description of each code is given.

8 FINAL CHECKS.

Check that the area protected by the safety PES is free from any objects; check the correct triggering of the output contacts opening by interrupting the protection rays (red LED is lighting, controlled machine stops).

⚠ WARNING

- If the red LED switches on and off, check the correct mechanical installation.
- This check must be made every time you move or mechanically re-align the safety PESs and muting sensors.

9 ROUTINE MAINTENANCE OPERATIONS.

⚠ WARNING

Be sure to conduct inspection checks as below regularly.

- Check that there is no person in the hazardous area before operator turns ON the power.
- Check that the F3SP-U1P-TGR locks by inserting a moving object through the detection zone.
- Use an opaque test piece specified in the instruction manual of the safety PES to check the detection capability.
- By opening the *test* contact, check that the safety relays are opened (red LED lights and machine under test stops).
- Make sure that the access to the hazardous areas is not possible from any non-protected area, and that the minimum distance from the safety PES to the hazardous part is not less than the result calculated with reference to the formula stated in sec 4.1.
- Make sure the installation satisfies one of following conditions;
  1) The machine connected to the control unit has an interlock function.
  2) The control unit uses interlock mode.
  3) It is not possible for a person to stop between the safety PES and the dangerous parts of the machine.
- Make sure that there is no outer damage to the safety PES and/or the outer electrical connections.
- Make sure that the response time - including the safety PES and the machines, does not exceed the established limits.
- If the failure occurs, all functions of the control unit shall be tested.
- Do not use the control unit until the inspections are completed.

The frequency of these operations depends on each application and operative conditions.

10 GENERAL INFORMATION AND USEFUL DATA.

Safety MUST be part of our consciousness.
The safety devices are only effective if installed correctly by respecting the guidelines laid down in the relevant standards.
These devices should be installed by a competent and skilled person.

Problems due to voltage interruption on the power supply may cause temporary openings of the outputs. This is not damaging to the safety PES and control unit.

The guarantee is complete for a period of 12 months starting from the delivery date of the equipment.
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 PES to your distributor (see the back cover).
Please indicate the detected failure and the operational period.

11 TECHNICAL DATA.

- The safety PES which can be combined;
  - E3FS-10B series (Type 2 safety PES)
- Number of safety PESs:
  4 pairs max. (total current consumption of PESs: 350 mA max.)
- Supplied voltage: 24 Vdc ± 10%.
- Power consumption: 8 W max. (including muting lamp and excluding PES).
- Indicators: 4 green LEDs, 1 green/red LED.
- 1-digit 7-segment display (diagnostic).
- Response time: 30 ms max.
- Ambient temperature: Operating -10 °C to + 55 °C.
- Ambient humidity: Operating 15% to 95% (not condensing).
- Output contacts: 2 NO, 3.15 A max., 250 Vac, cos φ 0.6 to 1 (protected by a resettable fuse).
- Outer controls: *test, reset, muting* and *override*.
- Enclosure: plastic enclosure for installation on a din/omega guide.
- Protection class of control unit: IP 20.
- Protection class of the cabinet containing the control-unit: IP54 at least.
- Weight: control unit 600 g.
- Features of fuses for relay board: internal resettable fuses 3.15A T, 250V.
- Features of fuses for *muting* lamp: internal resettable fuse 315mA T, 250V.
- *Muting* lamp: incandescent lamp 24 V, 3 W min., 300 mA max.

12 DISPLAY of STATE CODES.

12.1 STATE IN NORMAL OPERATION.

CODE	DESCRIPTION
H	Initial test activated.
8 → 1	Count-down during the initial test.
U	Test button is pressed. Output contacts are opened.
≡	Override function is activated.
A	Normal cycle: Output contacts are closed.(Note)
E	The safety PES is interrupted in automatic mode: Output contacts are opened.
F	Interlocked condition: Output contacts are opened.

Note: When you turn on the supplied power with the test button contact opened, output contacts are NOT closed (see sec. 6).

12.2 STATE IN FAILURE (for trouble shooting)

CODE	DESCRIPTION	Action
1 - 4	Error of the relevant safety PES.	1
5	Damage of internal relay.	2
6	Error of safety PESs installation.	3
7	Error of muting lamp	4
8	Error of dip-switches.	5
	Error of supplied power.	6
	Damage of system or an output contact.	2
9	Error of muting request sequence.	7

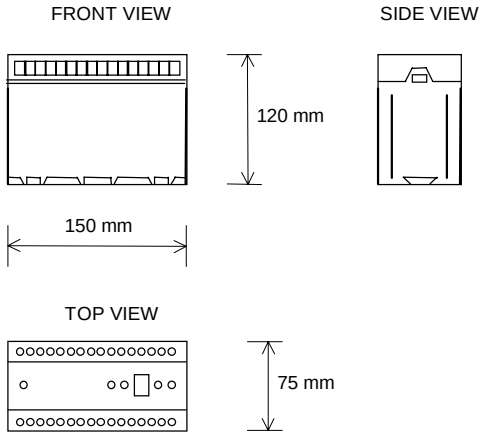
If a failure code is shown on the display, the user must only take the corresponding “Action” indicated in the table above. Detailed procedure of each “Action” is described as follows:

Action

1. Check that the safety PESs are not interfering with other safety PESs connected to the same unit or with other sensors present in a nearby area. Check whether the unit recovers normal operation by pressing RESET. If the failure is not eliminated, the F3SP-U1P-TGR cannot be used and it is necessary to contact your distributor.
2. This type of failure means that the F3SP-U1P-TGR cannot be used and it is necessary to contact your distributor.
3. Check the correct wiring between the output terminals of emitters, TEST_TXn, and the relevant input terminals of receivers, PNP_OUT_RXn. The input and output terminals which are not connected to safety PESs must be also connected as described in 7.2. Check whether the unit recovers normal operation by pressing RESET. If the failure is not eliminated, the F3SP-U1P-TGR cannot be used and it is necessary to contact your distributor.
4. Check that the muting lamp is not blown and is correctly wired. If no failure is found, contact your distributor.
5. Check that both dip-switches show the same state (see 7.1).
6. Check that the supplied power voltage is 24 Vdc.
7. Check that the wiring and sensor positioning for muting sequence are correct.

Note: Undefined code caused by electrostatic discharge.
Indirect discharge with 6kV or direct discharge with 8kV may have influence on the 7-segment display and the output relay contacts may open, however, the safety performance of a safety PES and the F3SP-U1P-TGR does not deteriorate.

13 OVERALL DIMENSIONS.



Control unit
F3SP-U1P-TGR