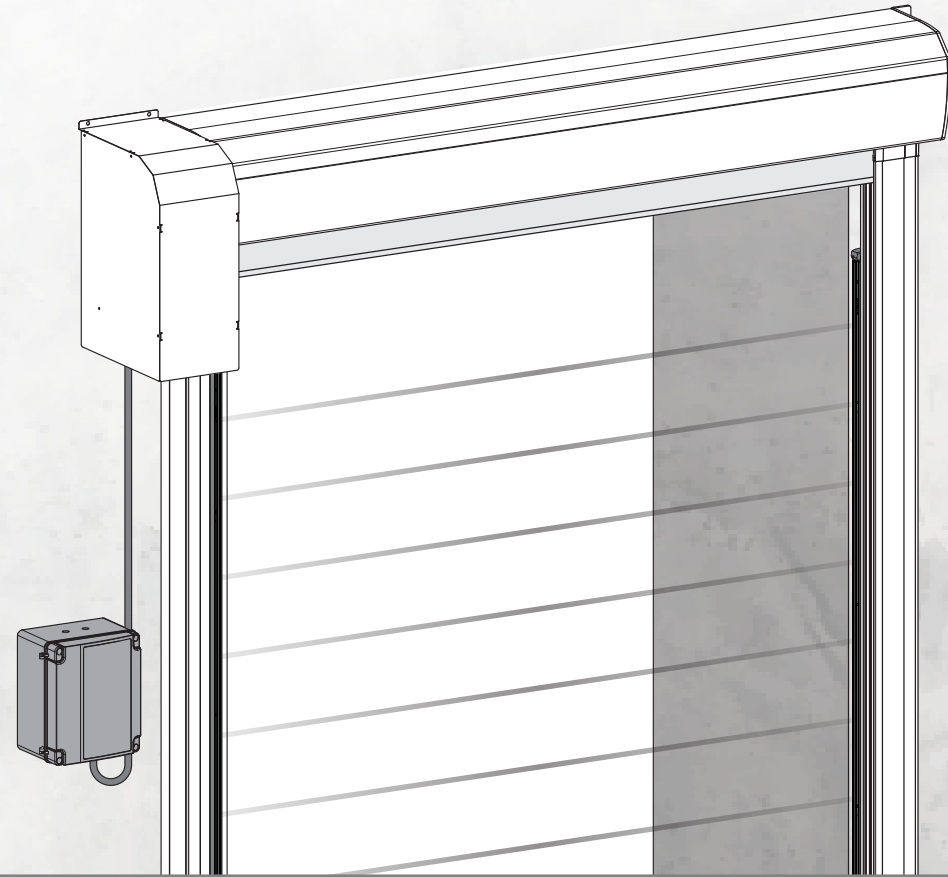
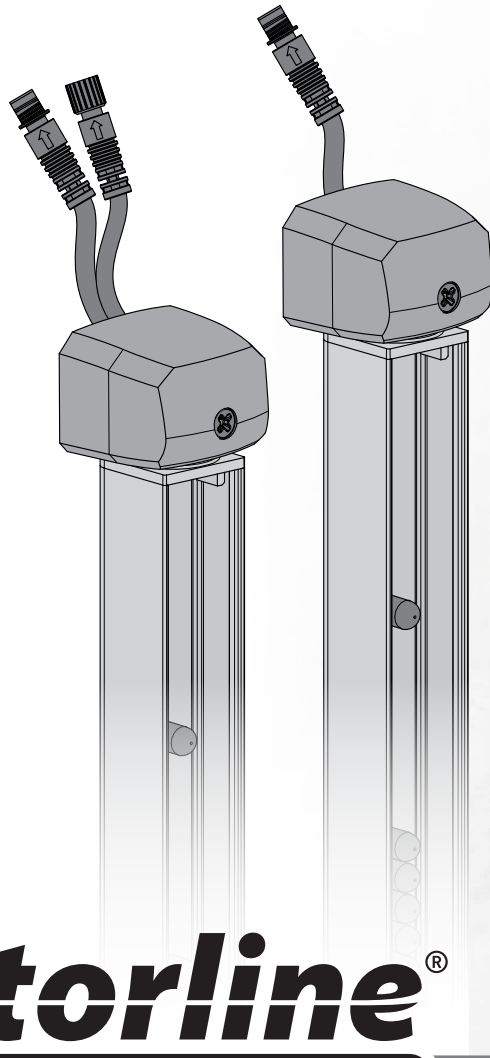




MF2020

USER'S AND INSTALER'S MANUAL



motorline[®]
PROFESSIONAL



V2.9 REV. 09/2024

Compatible hardware and firmware versions:







TX: MF2020 TX V1.REV101 25Q10 / MF2020 TX V1.REV100 F15
RX: MF2020 RX V1.REV102 25Q10 / MF2020 RX V1.REV104 F15

00. CONTENT

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01. SAFETY INSTRUCTIONS

	This product is certified in accordance with European Community (EC) safety standards.
	This product complies with Directive 2011/65/EU of the European Parliament and of the Council, of 8 June 2011, on the restriction of the use of certain hazardous substances in electrical and electronic equipment and with Delegated Directive (EU) 2015/863 from Commission.
	(Applicable in countries with recycling systems). This marking on the product or literature indicates that the product and electronic accessories (eg. Charger, USB cable, electronic material, controls, etc.) should not be disposed of as other household waste at the end of its useful life. To avoid possible harm to the environment or human health resulting from the uncontrolled disposal of waste, separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources. Home users should contact the dealer where they purchased this product or the National Environment Agency for details on where and how they can take these items for environmentally safe recycling. Business users should contact their vendor and check the terms and conditions of the purchase agreement. This product and its electronic accessories should not be mixed with other commercial waste.
	This marking indicates that batteries should not be discarded like other household waste at the end of their useful life. Batteries must be delivered to selective collection points for recycling.
	The different types of packaging (cardboard, plastic, etc.) must be subject to selective collection for recycling. Separate packaging and recycle it responsibly.
	This marking indicates that the product and electronic accessories (eg. charger, USB cable, electronic material, controls, etc.) are susceptible to electric shock by direct or indirect contact with electricity. Be cautious when handling the product and observe all safety procedures in this manual.

01. SAFETY INSTRUCTIONS

GENERAL WARNINGS

- This manual contains very important safety and usage information. Read all instructions carefully before beginning the installation/usage procedures and keep this manual in a safe place that it can be consulted whenever necessary.
- This product is intended for use only as described in this manual. Any other enforcement or operation that is not mentioned is expressly prohibited, as it may damage the product and put people at risk causing serious injuries.
- This manual is intended firstly for specialized technicians, and does not invalidate the user's responsibility to read the "User Norms" section in order to ensure the correct functioning of the product.
- The installation and repair of this product may be done by qualified and specialized technicians, to assure every procedure are carried out in accordance with applicable rules and norms. Nonprofessional and inexperienced users are expressly prohibited of taking any action, unless explicitly requested by specialized technicians to do so.
- Installations must be frequently inspected for unbalance and the wear signals of the cables, springs, hinges, wheels, supports and other mechanical assembly parts.
- Do not use the product if it is necessary repair or adjustment is required.
- When performing maintenance, cleaning and replacement of parts, the product must be disconnected from power supply. Also including any operation that requires opening the product cover.
- The use, cleaning and maintenance of this product may be carried out by any persons aged eight years old and over and persons whose physical, sensorial or mental capacities are lower, or by persons without any knowledge of the product, provided that these are supervision and instructions given by persons with experienced in terms of usage of the product in a safe manner and who understands the risks and dangers involved.

- Children shouldn't play with the product or opening devices to avoid the motorized door or gate from being triggered involuntarily.
- If the power cable is damaged, it must be replaced by the manufacturer, after-sales service or similarly qualified personnel to avoid danger.
- The device must be disconnected from the electrical network when removing the battery.
- Ensure that blocking is avoided between the actuated part and its fixed parts due to the opening movement of the actuated part.

WARNINGS FOR TECHNICIANS

- Before beginning the installation procedures, make sure that you have all the devices and materials necessary to complete the installation of the product.
- You should note your Protection Index (IP) and operating temperature to ensure that is suitable for the installation site.
- Provide the manual of the product to the user and let them know how to handle it in an emergency.
- If the automatism is installed on a gate with a pedestrian door, a door locking mechanism must be installed while the gate is in motion.
- Do not install the product "upside down" or supported by elements do not support its weight. If necessary, add brackets at strategic points to ensure the safety of the automatism.
- Do not install the product in explosive site.
- Safety devices must protect the possible crushing, cutting, transport and danger areas of the motorized door or gate.
- Verify that the elements to be automated (gates, door, windows, blinds, etc.) are in perfect function, aligned and level. Also verify if the necessary mechanical stops are in the appropriate places.
- The control board must be installed on a safe place of any fluid (rain, moisture, etc.), dust and pests.
- You must route the various electrical cables through protective tubes, to protect them against mechanical exertions, essentially on

01. SAFETY INSTRUCTIONS

the power supply cable. Please note that all the cables must enter the control board from the bottom.

- If the automatism is to be installed at a height of more than 2,5m from the ground or other level of access, the minimum safety and health requirements for the use of work equipment workers at the work of Directive 2009/104/CE of European Parliament and of the Council of 16 September 2009.
- Attach the permanent label for the manual release as close as possible to the release mechanism.
- Disconnect means, such as a switch or circuit breaker on the electrical panel, must be provided on the product's fixed power supply leads in accordance with the installation rules.
- If the product to be installed requires power supply of 230Vac or 110Vac, ensure that connection is to an electrical panel with ground connection.
- The product is only powered by low voltage safety with control board (only at 24V motors).
- Parts/products weighing more than 20 kg must be handled with special care due to the risk of injury. It is recommended to use suitable auxiliary systems for moving or lifting heavy objects.
- Pay special attention to the danger of falling objects or uncontrolled movement of doors/gates during the installation or operation of this product.

WARNINGS FOR USERS

- Keep this manual in a safe place to be consulted whenever necessary.
- If the product has contact with fluids without being prepared, it must immediately disconnect from the power supply to avoid short circuits, and consult a specialized technician.
- Ensure that technician has provided you the product manual and informed you how to handle the product in an emergency.
- If the system requires any repair or modification, unlock the automatism, turn off the power and do not use it until all safety

conditions have been met.

- In the event of tripping of circuits breakers or fuse failure, locate the malfunction and solve it before resetting the circuit breaker or replacing the fuse. If the malfunction is not repairable by consult this manual, contact a technician.
- Keep the operation area of the motorized gate free while the gate in in motion, and do not create strength to the gate movement.
- Do not perform any operation on mechanical elements or hinges if the product is in motion.

RESPONSABILITY

- Supplier disclaims any liability if:
 - Product failure or deformation result from improper installation use or maintenance!
 - Safety norms are not followed in the installation, use and maintenance of the product.
 - Instructions in this manual are not followed.
 - Damaged is caused by unauthorized modifications
 - In these cases, the warranty is voided.

MOTORLINE ELECTROCELOS SA.

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Barcelos, Portugal

SYMBOLS LEGEND:



• Important safety notices



• Useful information



• Programming information



• Potentiometer information



• Connectors information



• Buttons information

02. THE PRODUCT

MF2020

The **MF2020** is a column photocell developed to safeguard all types of industrial doors (sectional and high-speed doors) up to a maximum width of 10 meters.

This photocell is divided into two different versions, one optimized for distances of 1 to 5 meters wide, and the other optimized for distances of 5 to 10 meters.

The emitter and receiver create an infrared beam grid offering protection up to 2.5 meters high.

When the infrared beams are interrupted, a signal is sent to the control board. Once the detention area is clear, a new signal is sent to the control board to indicate that the area is clear.

The photocell has three operating modes:

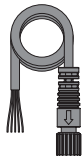
Static, Sequential and **Sequential for transparent tarpaulins**.



EN 13849-1

TECHNICAL CHARACTERISTICS

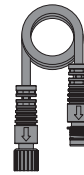
GENERAL	
• Power supply	12-24 Vdc
• Consumption (29 elements at 24Vdc)	100 mA
• Protection degree	IP67
• Working temperature	-20°C to 60°C
• Operating mode	Sequential Static Sequential for transparent tarpaulins
• Output	Relay (NC)
• Output load	1A (30 Vdc) 0,3A (125 Vac)
• Maximum response time	70 ms
• Supervision timer	265 ms
• Operating distance	1 to 5 meters OR 5 to 10 meters
• Number of elements	17 21 25 29
• Maximum protection height	2505 mm
• Material	Lacquered aluminum
• Speed in sequential mode	1.4 m/s



CONNECTION CABLE TO THE CONTROL BOARD	
• Length	3 m
• Connection	Screw-on (M8) 5 pins
• Diameter	Ø4,2 mm
• Wires	AWG28
• Material	Polyurethane (PUR)
• Protection degree	IP67

02. THE PRODUCT

TECHNICAL CHARACTERISTICS



SYNC CABLE	
• Length	1 to 5 meters OR 5 to 10 meters
• Connection	Screw-on (M8) 4 pins
• Diameter	Ø3,5 mm
• Material	Polyurethane (PUR) with shielding
• Protection degree	IP67

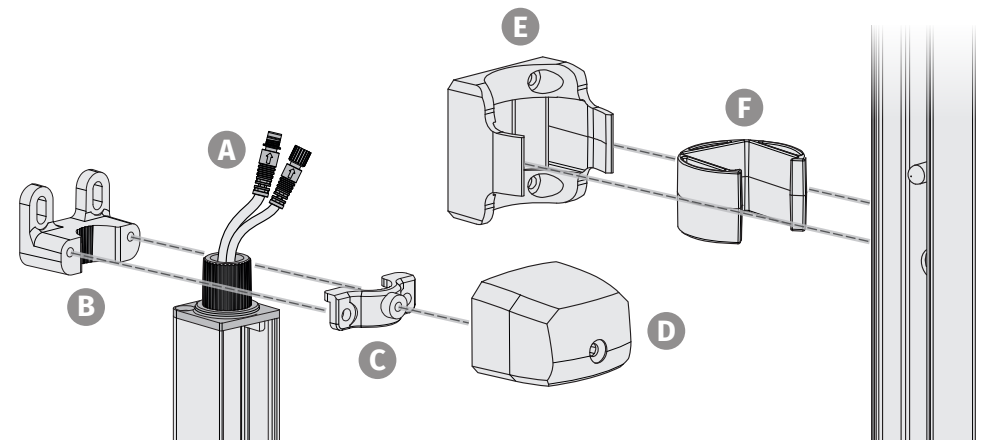
NUMBER OF SENSORS ON DIFFERENT MODELS

Depending on the maximum length chosen for the MF2020, the protection distance and number of sensors in each column of photocells vary:

Length/Model	Protection height	Number of sensors
MF2020-1425 mm	1305 mm	17
MF2020-1825 mm	1705 mm	21
MF2020-2225 mm	2105 mm	25
MF2020-2625 mm	2505 mm	29

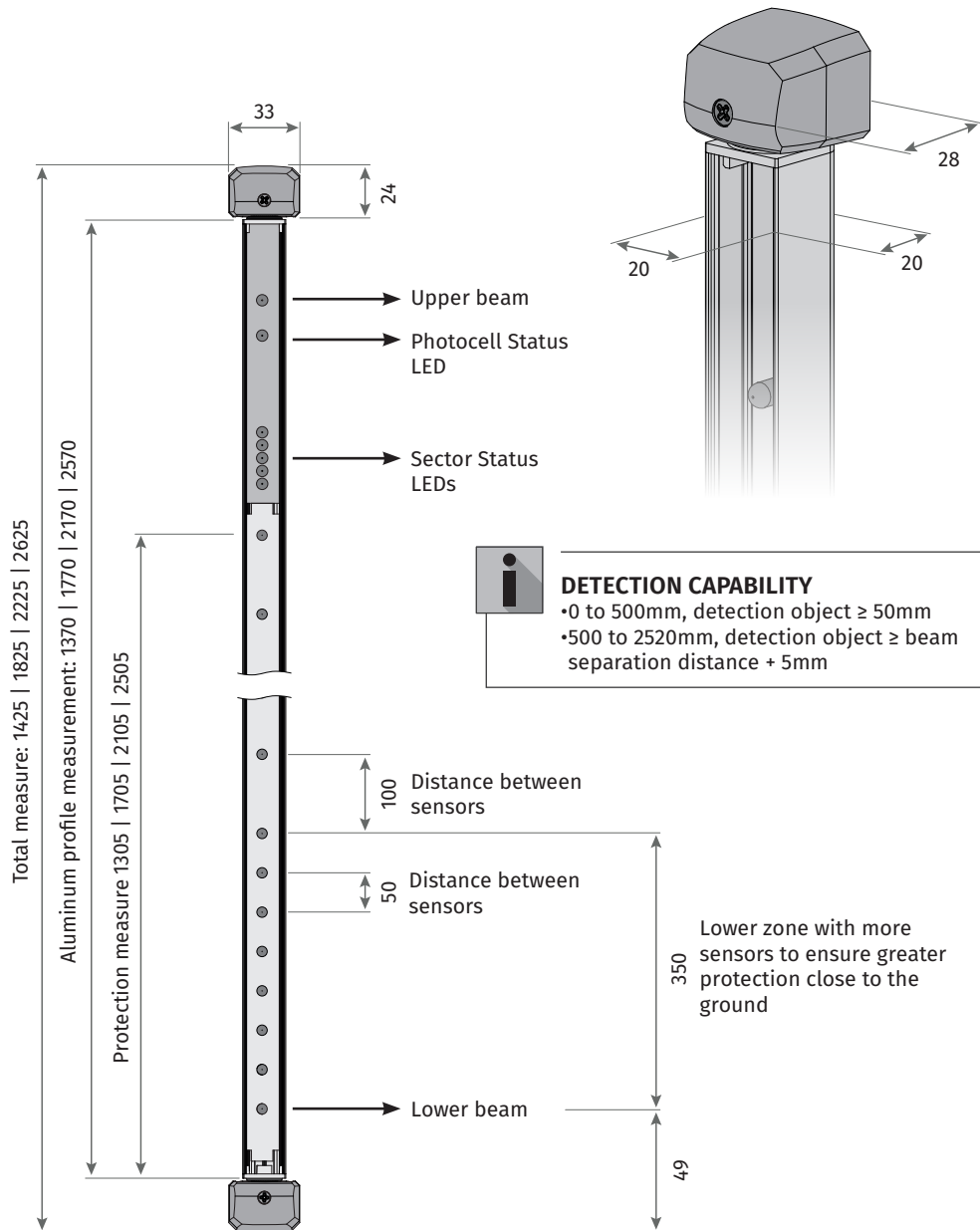
IDENTIFICATION OF PARTS

To facilitate the identification of the parts in the installation diagram, each part of the photocell columns is identified with a letter:



02. THE PRODUCT

DIMENSIONS AND DESCRIPTION



Dimensions in mm

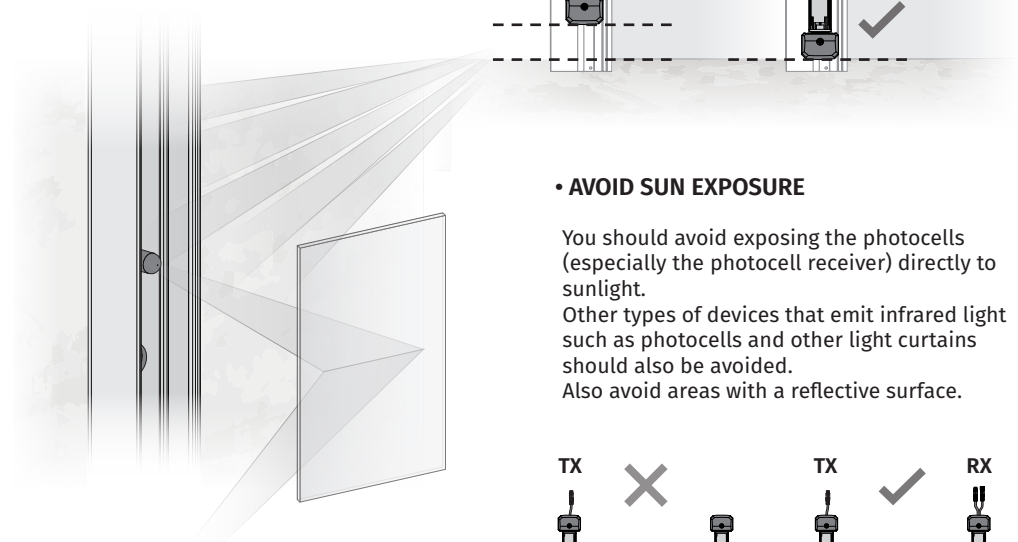
03. INSTALLATION

CARE DURING INSTALLATION

For the correct functioning of the photocells, it is necessary to pay attention to some aspects during the installation process.

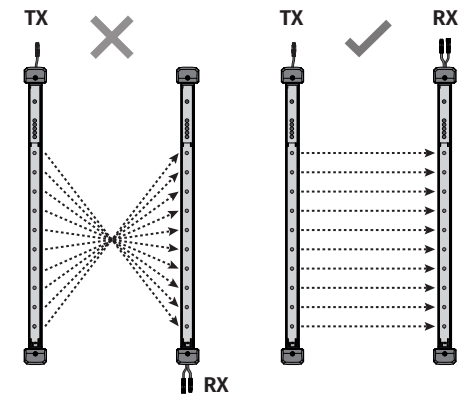
• COLUMN ALIGNMENT

Make sure that the lower edge of the photocell columns is aligned with the level of the door in the closed position.



• PHOTOCELLS ORIENTATION

Make sure the columns are installed with the cable ends facing up.



Attention: The Photocell version must be chosen in advance taking into account the distance between the photocell columns and the installation distance, so that the operation is stable and without interference.

03. INSTALLATION

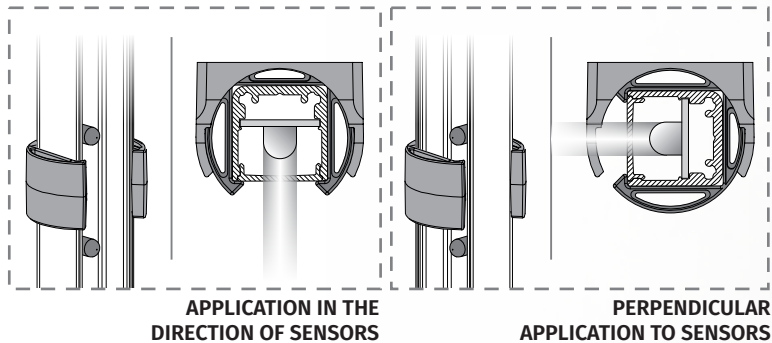
INSTALLATION



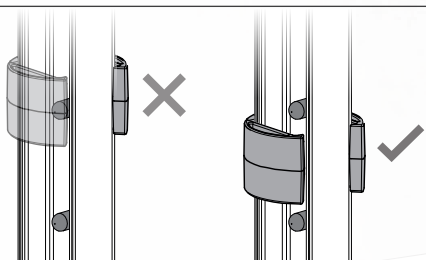
Before starting the installation, turn off the main power supply to the door control board and make sure that this system is completely deactivated.

• ASSEMBLY OF PHOTOCELL COLUMNS

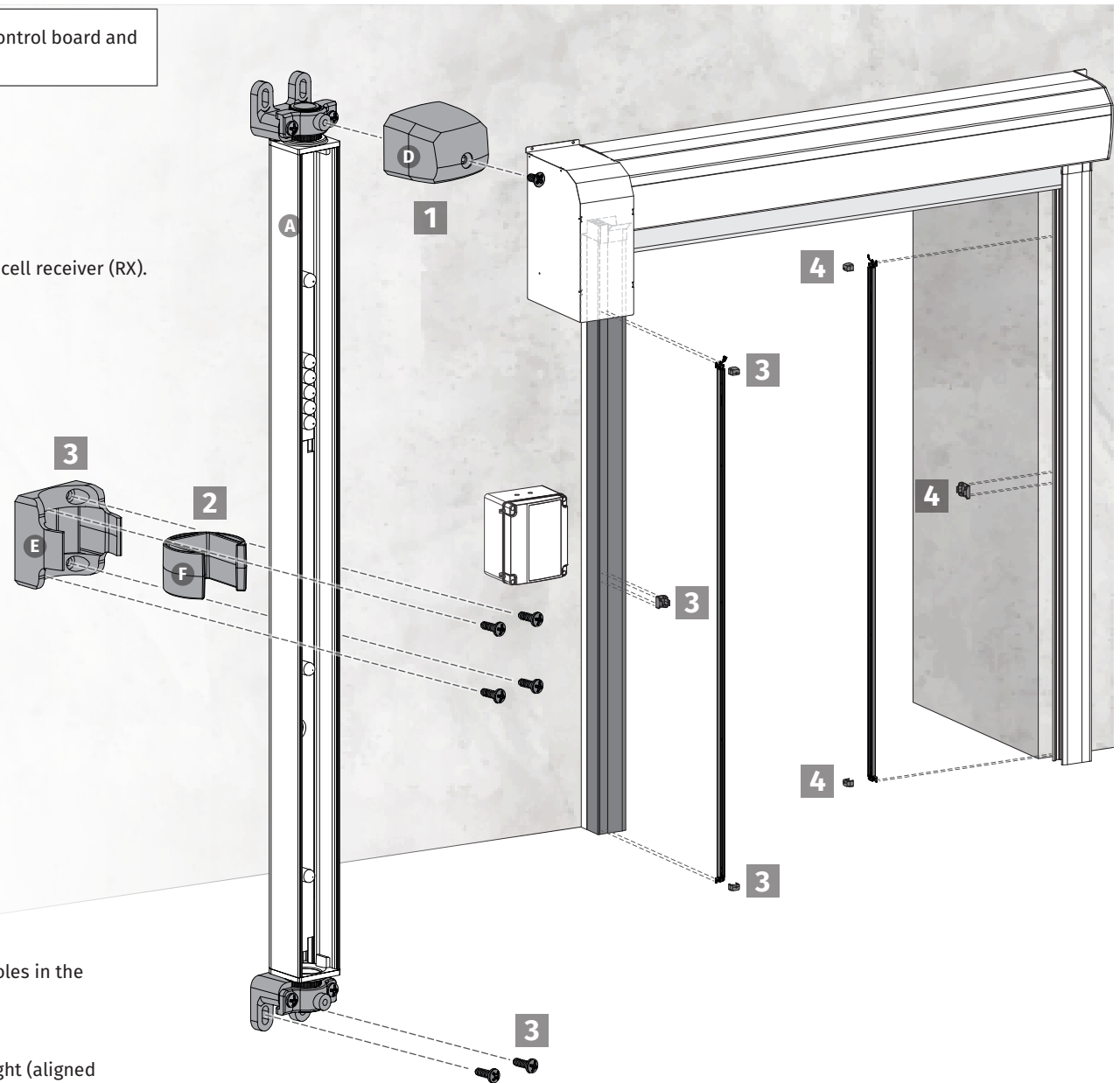
- 1 Remove covers (D) from columns (A) by loosening the screws on each cover.
- 2 Fit the rotating support (F) of the central base (E) in the central area of the photocell receiver (RX).
There are 2 types of column application on the support:



The rotating supports (F) of the bases (E) must be placed in the center of the photocell, in an area where the sensors are not obstructed.



- 2 Place the photocell receiver (RX) in the place to be fixed, mark the 8 necessary holes in the supports of each photocell, drill and tighten.
The output of the cables must always face upwards.
- 3 Repeat with the other photocell (TX), ensuring both columns are at the same height (aligned horizontally).

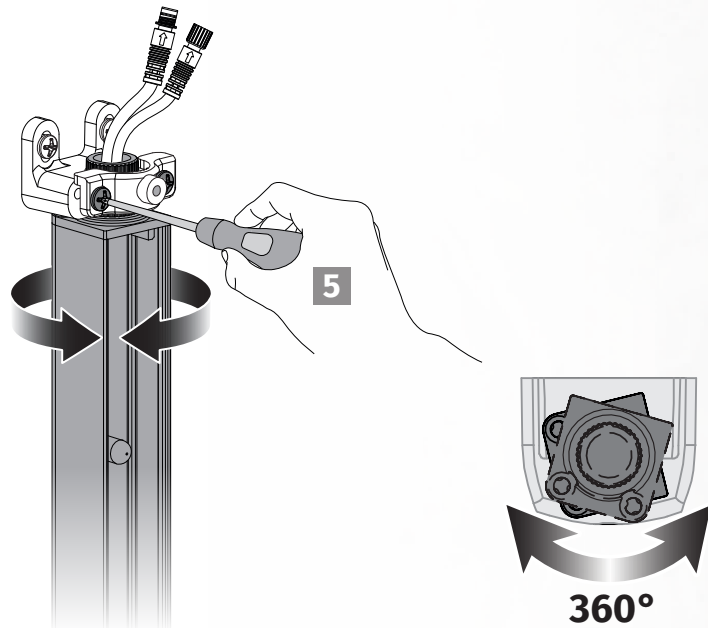


03. INSTALLATION

INSTALLATION

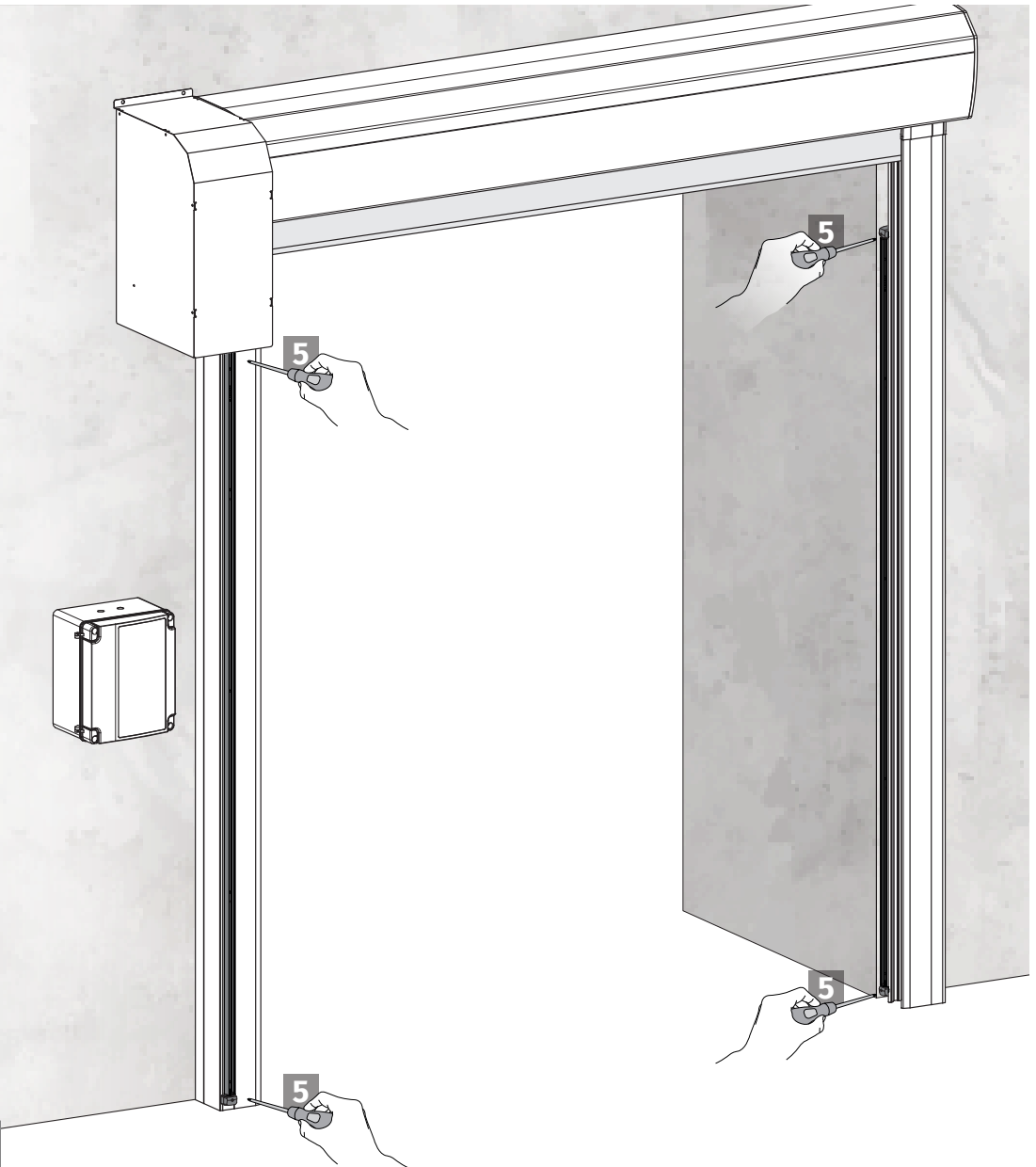
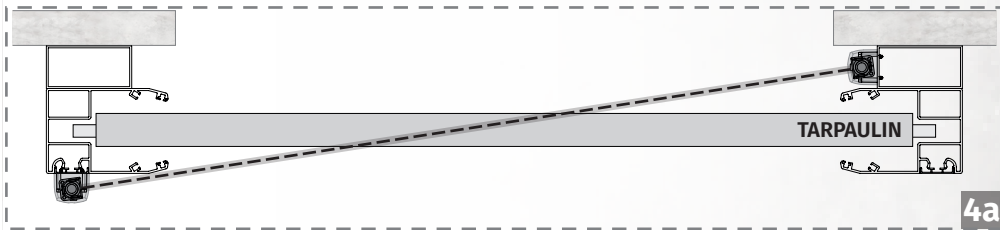
• ALIGN THE PHOTOCELL BEAMS

- 4 Adjust the orientation of each column so that they are aligned between them:
- Slightly loosen the clamp screws (C);
 - Rotate the columns until they are perfectly aligned (Detail 4a);
 - Retighten the clamp screws (C) to lock this position.



MODO SEQUENTIAL

- Fix a photocell on each side (inside and outside) of the tarpaulin



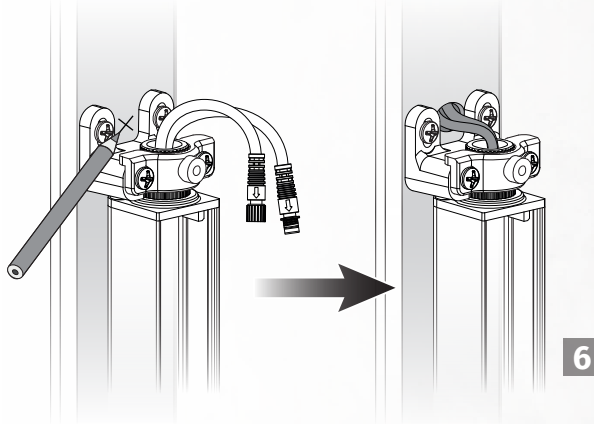
Check the alignment of the photocells. The receiver and emitter must be perfectly aligned.

03. INSTALLATION

INSTALLATION

• MAKE THE CONNECTIONS

- 5 Pass the photocell cables through holes centered with the supports (B) of each column, in order to make the connections between them and with the control board.
This way, they will be hidden by the covers (D).



6

- 6 Make the cable connections in the following order:
Connection a: TX Photocell (emitter) with Synchronization Cable;
Connection b: Synchronization Cable with RX Photocell (receiver);
Connection c: RX Photocell (receiver) with Connection Cable;
Connection d: Connection Cable with Control Board (see page 8A);

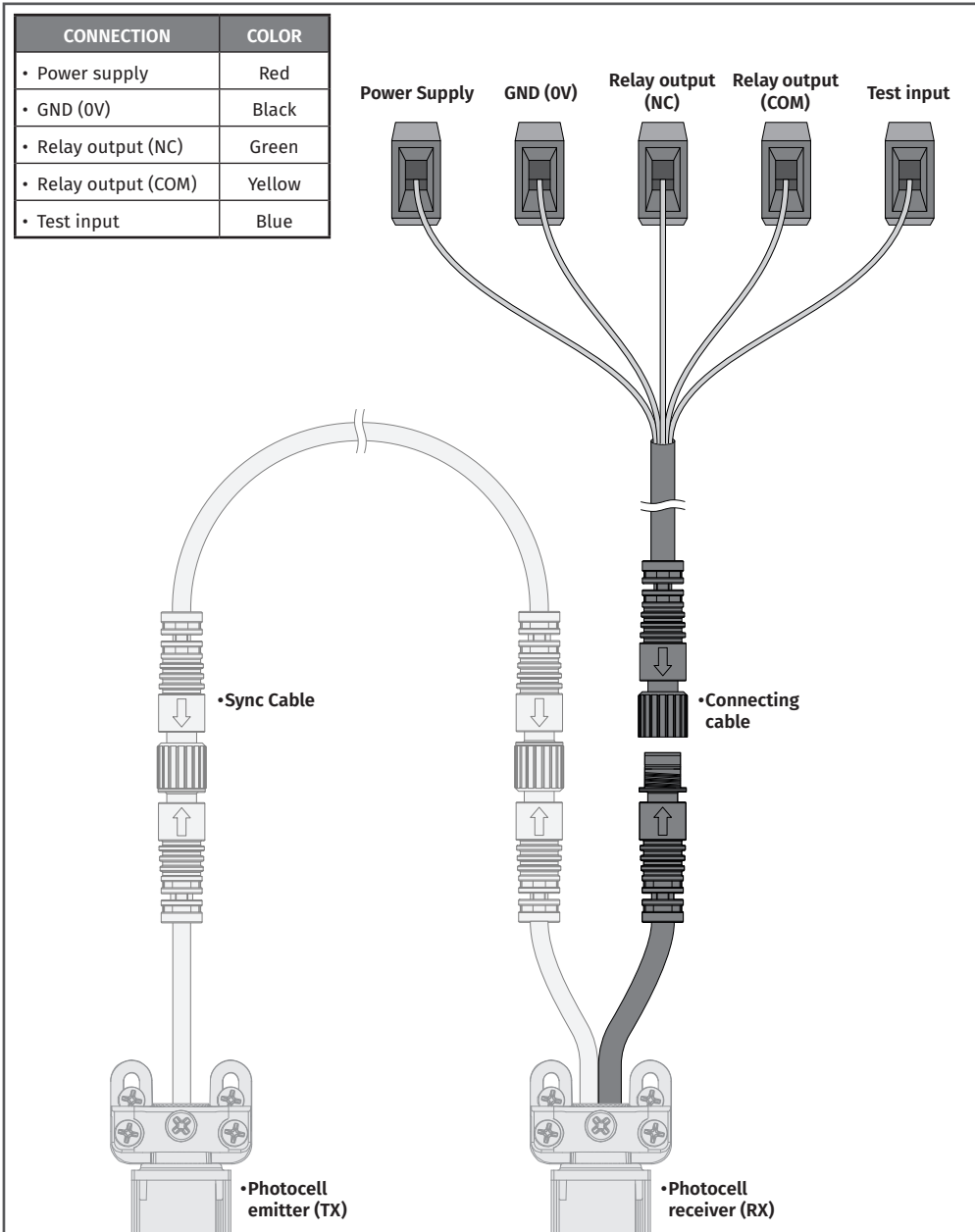
• TEST SYSTEM OPERATION

- 7 Power the door control board and check the photocell Signaling Leds (see page 11A).
- 8 Test the functioning of the system by carrying out an opening/closing maneuver, verifying that the photocells do not interfere with the normal movement of the door.
Then repeat the maneuver and place yourself in the area protected by the photocells and check if it reverses the direction of maneuver.
- 9 Replace the covers (D) on the supports (B) and fasten with the screws.



04. CONNECTIONS

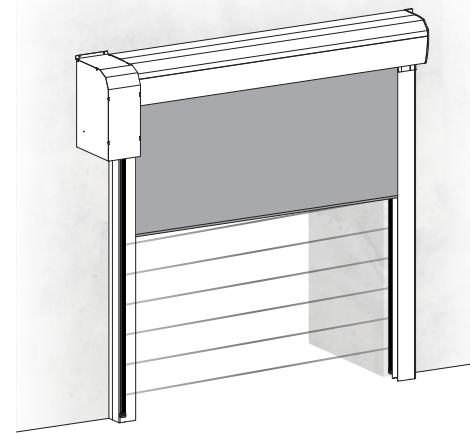
CONNECTION SCHEME



05. OPERATION

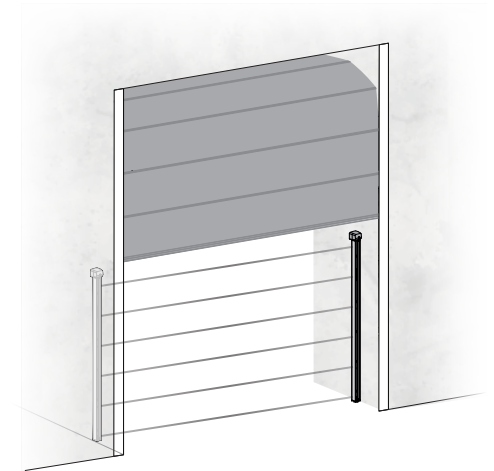
OPERATING MODE

Photocells can operate in three different modes:



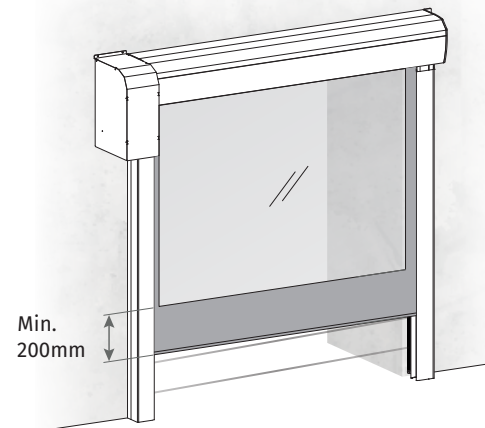
• SEQUENTIAL MODE

The photocell is able to differentiate between an interruption caused by an object and the movement of the door. For this mode to work correctly, the door must be opaque.



• STATIC MODE

In this mode, the photocell will reverse the maneuver when one of the sensors is interrupted.



• SEQUENTIAL MODE FOR TRANSPARENT TARPULINS

The photocell is able to differentiate between an interruption caused by an object and the movement of the door. For this mode to work properly, the bottom of the tarpaulin must be opaque by at least 200mm.

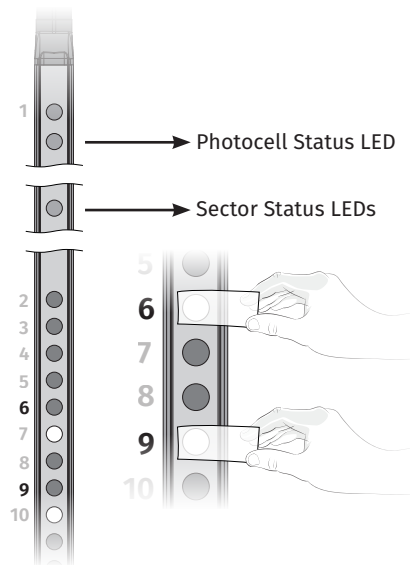
05. OPERATION

CHANGE OPERATING MODE

To detect the current Operating Mode of the photocell, you must observe the behavior of the RX Photocell Status LED:

Mode	Status LED (RX Photocell)
SEQUENTIAL	Blinks 1 time every 2 seconds
STATIC	Always on
SEQUENTIAL FOR TRANSPARENT TARPAULINS	Blinks 2 times every 2 seconds

i By default the photocells are in **SEQUENTIAL FOR TRANSPARENT TARPAULINS** Mode (max speed of 1.4 m/s).



To select the next Operating Mode, follow these steps:

- 01 • Turn off the power supply photocells;
- 02 • On the photocell receiver (RX) cover sensors 6 and 9 from the top and keep the others clear;
- 03 • Reconnect the photocells to the power supply. **The photocell will operate in the next Operating Mode.**
- 04 • Uncover sensors 6 and 9 again.

i Whenever you carry out the steps to change the Operating Mode, the photocell assumes the mode immediately following the mode that is active by the following order:
 • **SEQUENTIAL FOR TRANSPARENT TARPAULINS** → **STATIC** → **SEQUENTIAL** → **SEQUENTIAL FOR TRANSPARENT TARPAULINS**

05. OPERATION

RELAY OUTPUT

When an object enters the area protected by the light curtain the output switches to open contact (NO) after the response time.

When the object leaves the area, the output returns to closed contact (NC).

TEST INPUT

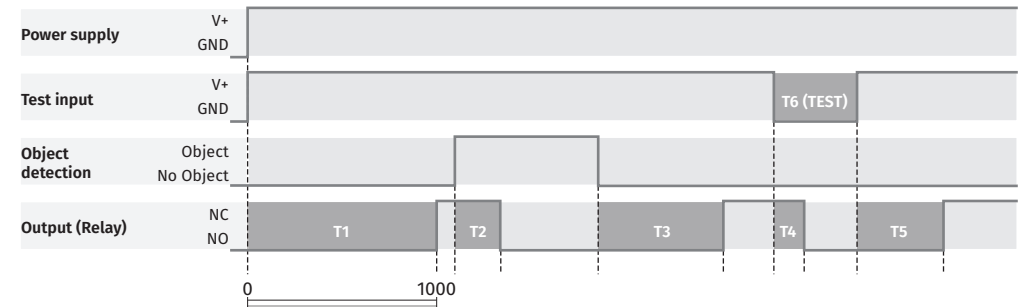
To check if the photocell is working correctly, this function allows the photocell to be self-tested through a pulse of at least 100ms to GND (0V) executed by the door control board.

If the photocell is working correctly, it will switch the relay output.

i If you do not want to use this feature, you must connect the test cable to the power cable.

TIME DIAGRAM

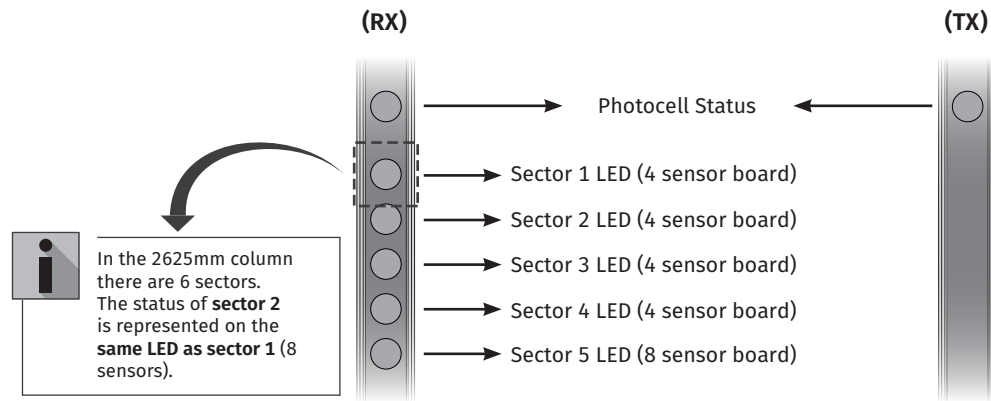
This diagram allows, during a test, to verify the behavior of the photocell and its interaction on a time scale, showing the conditions that change during that period.



Value	Description	Time
T1	Startup time	1000 ms
T2	Response time	70 ms
T3	Recovery time	350 ms
T4	Test response time	30 ms
T5	Reboot time	100 ms
T6	Test time	100 ms (minimum)

05. OPERATION

LED SIGNALING



• Photocell RECEIVER (RX)

Green LED	Yellow LED	Photocell Status
●	○	The light curtain is functional
○	●	No communication between photocells
○	☀	Test input off
○	○	Without power
Green LED	Red LED	Sector State
●	○	Cleared and aligned sector
○	●	Clogged or misaligned sector

• Photocell EMITTER (TX)

Green LED	Photocell Status
●	With power
○	Without power

● LED On ○ LED Off ☀ Blinking LED

06. TROUBLESHOOTING

INSTRUCTIONS FOR CONSUMERS AND SPECIALIZED TECHNICIANS

LED Status			Solution
Green TX LED	Green RX LED	Yellow RX LED	
○	○	○	<ul style="list-style-type: none"> Check electrical connections; Check if the power supplied to the control board is correct.
○	○	●	<ul style="list-style-type: none"> Check the Sync Cable connection.
●	○	☀	<ul style="list-style-type: none"> Make sure the test input cable is connected correctly; If you are not using the test feature, connect this to the photocell supply (V+).
●	○	●	<ul style="list-style-type: none"> Check the Sync Cable connection.

● LED On ○ LED Off ☀ Fast flashing LED

07. CERTIFICATIONS

DIRECTIVES AND CERTIFICATES

Directives	Security standard	Other standards
2014/35/EU 2014/30/EU 2011/65/EU 2006/25/EC	EN 12978:2003, +A:2009 EN 12453:2017 E device IEC 62471:2006 UNE-EN 12978:2003 + A1:2010	EN60335-1:2012+A11:2014+A13:2017+A1:2019+A2:2019 +A14:2019 EN 62233:2008 EN IEC 55014-1:2021 EN IEC 61000-3-2:2019 EN 61000-3-3:2013+A1:2019 EN IEC 55014-2:2021 IEC 60529:1989+A1:1999+A2:2013 ESPE type 2 as per IEC 61496-2