SOMMARIO

1.0 A GENERAL

Please attentively read this manual before installation, start-up, use and maintenance of **CX2** light curtains. This manual contains detailed instructions that must be carefully followed.

THIS MANUAL IS NOT IN THE ORIGINAL LANGUAGE

1.1 Function of this manual

This manual provides the user with the necessary instructions for safe and proper installation, electrical connection, start-up, use and maintenance of **CX2** light curtains.

1.2 Explanation of symbols

Warning
A warning sign indicates actual of potential hazards.
It indicates procedures and behaviours which can be useful to prevent accidents.
Read and follow these instructions carefully.

Indication
It refers to indications that can help achieve better performances.

Emitter
It identifies devices that have the function of Emitter.

Receiver
It identifies devices that have the function of Receiver.

2.0 SAFETY AND PROPER USE

Warning
This it is NOT a protective device. Therefore, it should not be used to guarantee personnel safety.

Warning
This is a low-voltage, direct current device. Proper functioning is only guaranteed between **16,8V$_{DC}$** and **30V$_{DC}$**. Under **15V$_{DC}$** voltage all outputs are in an OFF state. Over **30V$_{DC}$ permanent voltage** the device may be damaged.
When the device is switched on, outputs are inactive for a certain amount of time known as **power on delay** (see table below).

Warning
The Emitter emits near-infrared light at non-dangerous levels. The device is classified as **RG0** (exempt) according to IEC 62471: 2006-07.

Warning
Please make sure that light curtains are used in proper environmental conditions.
Manual or automatic calibration must always be carried out aiming for the best possible alignment. More than one calibration and alignment adjustment may be necessary to guarantee the best alignment.
Check any reflective surface next to the light beams which may influence them.
Check any transparent panels or similar panels which may change the beam angle of the light curtains .
Prevent the light curtain's optical window from getting scratched or tarnished.
Do not expose the receiver to strong natural or artificial light sources, including stroboscopic light.
Do not expose the receiver directly to optical beams projected by other optical devices.
Ensure that the ambient temperature does not exceed the stated limits.
Bear in mind that smoke, vapour, liquids and powders may alter transparency of air or dirty the optical window.
Dispose of unusable or irreparable devices always in accordance with national regulations regarding waste disposal.

3.0 PRODUCT DESCRIPTION

3.1 Short description

CX2 light curtains are photoelectric devices built according to the **IEC 60497-5-2** norms and they must **not** be considered as safety devices. Therefore they must **not** be used to guarantee operators' safety nor to protect users on dangerous machines. They must rather be used to detect objects reducing or obscuring the intensity of light beams hitting the receiver.
The housing is in **RAL5002** aluminium, painted in blue, size **20x36mm**, (20 mm refers to the front side). A groove on the back allows connection with T-shaped components. The top and bottom side are in black **PBT**, the optical window is in **PC**, Protection degree is **IP67**.
Models of this series can be delivered either with **5mm**-pitch and controlled height of **160**, **320**, **480mm** or with **10mm**-pitch and controlled height of **160, 320, 480, 640, 800, 960mm**. Controlled height is indicated in the item code which goes from **016** to **096**.
In all models, the axis of the first and last optical elements are at 4,5 mm from the housing edge. Therefore, the housing is always 9mm higher than the optical elements.
Nominal sensing distance is **3m** maximum with a **5mm**-pitch and **6m** with a **10mm** – pitch.
All models of **CX2** series are equipped with 2 sets of 3 LEDs each: green (emitter) or blue (receiver), yellow and red, on the top and on the bottom of the front side. This allows at least one set of LED to be perfectly visible in all applications (see chapter 4, tables 5, 6 and 7 for the meaning of indications).
For models consisting of just one motherboard, the two sets of LED give the same information. For models consisting of one motherboard and one (or more) slave board(s), all red LEDs indicate the Dark state (LEDs on) or Light state (LEDs off) related to their single board. Intermediate slave boards have just one red LED, the motherboard and the last slave board mount only the relative bottom and top three LEDs.
For models belonging to this series, it is necessary to wire at least two cables between emitter and receiver: one for synchronism (Sync_1W) and one to the Common. These cables must not exceed **20m** length.
In **CX2** models, optics are crossed and their extension is automatically adjusted at **Teach-in** by selecting the biggest possible extension between **1** (none), **1+1+1**, **3+1+3**, **5+1+5**, **8+1+8** according to the distance between emitter and receiver. Sensitivity of all beams, both direct and crossed, can also be equalised with the Teach-in. Therefore, detecting capacity is always optimised and can be lower than 1/10 the pitch. Detecting capacity changes according to sensing range. It should be considered that the best performances are guaranteed already from 500 mm sensing range upwards.
Receivers have models either with two digital outputs, a **PNP** and an **NPN** output with highest output current of **100mA**, or models with two analogue outputs, one with output voltage of **0-10V** and the other one with output current of **4-20mA**. All outputs are totally protected. Digital outputs switch between two states according to the state of the optics (DARK or LIGHT). Analog outputs indicate a value which is proportional to the active optics (not in blanking) in either LIGHT or DARK state. Mode is defined by **NC/NO** input. Regarding digital outputs, the state of the optics changes according to state of parallel and crossed beams. For analogical outputs, only the state of parallel beams have to be considered.
Three inputs are available: **NC/NO**, **Teach G/F** and **Blank Y/N.**
NC/NO input determines the state of all outputs. NC or NO state can only be determined when switching on the device. This input can be left either open or permanently connected to the common, or connected to the positive. In the first case, digital outputs will be in a **NO state** (**DARK** pulse) and the analogue outputs will be proportional to active optics in a DARK state. In the second case, digital outputs will be in an **NC** state (**LIGHT** pulse) and the analogue outputs will be proportional to the active optics in a LIGHT state.
The **Teach G/F** input**,** if connected to the positive, starts a rough calibration. If it is connected to the common, it starts an accurate calibration and the extension of the crossed beams' area is also checked. Calibration determines the power of the single IR LEDs of the emitter and a sensitivity equalisation of the related receivers.
During the calibration phase, in the receiver and emitter only the yellow LED remains on which can be static or flashing. At the end of the procedure the green and blue LEDs light on.
If the **Teach G/F** input is permanently connected to the positive or to the common, calibration is carried out only at switch-on.
The duration of the calibration depends on the number of beams, the time required will be about 0.5s for each beam.
The calibration should be performed under conditions of good, or better, perfect alignment.
If during calibration the energy emitted does not reach a value sufficient to determine a state of **LIGHT** (corresponding to all receivers in **LIGHT**), the procedure stops once it reaches the maximum permissible current in the IR LED.
This behavior may occur in the case where the active optics are not in view as there is an obstacle that has not been removed, in the case where the test is activated, or in response to a fault.

Avoid using large signal margins, if this mode is necessary to detect objects within semi-transparent materials, carefully check the behaviour of the system.

If **Blank Y/N** input is in a positive state at switch-on, the state of the optics is checked. If some or all optics are in a DARK state, they are excluded (**Blanking** function is activated). If all optics are in a LIGHT state, they are re-activated (**Blanking** function is eliminated). During this procedure, output current values and non-equalised reception thresholds are used, therefore performances are not optimised. For this reason, after a **Blanking** has been completed, a **Teach-in** is always necessary. In addition to that, connection of **Blank Y/N** input to the positive must be eliminated to avoid another **Blanking** at the following switch-on. If some optics are broken / not working properly, as soon as the **Blanking function** is activated, broken optics are not considered any more for evaluating the Dark or Light state of the device. In some of these cases, the light curtain can continue to be used anyway. To safely eliminate the **Blanking** function, the system must be supplied with the **Blank Y/N** input connected to the common. Also in this case, a **Teach-in** is always necessary afterwards because it shows if there are broken optics or not.
Emitters just have one **Test** input available. If it is connected to the positive it interrupts the emission and it can be used for checking, also automatically, if the device is working properly or not. In all devices, **green or blue LEDs** are off if supply voltage is below 5V, they blink if supply voltage is between 5 and 15V, they are permanently on if supply voltage is higher and the system can anyway work properly.
In all receivers, **yellow LEDs** are on if outputs are in an ON state. If they are weakly on, they indicate a short or an overload. In all receivers, **red LEDs** are on with an intensity or a blinking frequency that is proportional to the amount of DARK optics. Red LEDs are off when optics are in a LIGHT state.
These sensors have a standard output with M12 flying connector (220 mm pigtail). The emitter has a 4-pin cable, the receiver has an 8-pin cable.

3.2 Available models

In the tables, descriptions and model codes , height of light curtains is defined with a number indicating the distance "h" between the first and the last optic, expressed in cm. The housing height "H" of light curtains normally is H=(h+9mm).

MODEL	MODELS	Synchronisation	Optical Pitch	Optical height	Light curtain height	Beams	Sensing distance	Response time 2x integration	Frequenza massima di commutazione	Inputs/Outputs The digital outputs state depend on the parallel and crossed beams state. The analogue outputs depend on the parallel beams state only. All models have the automatic floating crossed beam array function at Teach-in.	NOTES
CODE ARTICLE	EMITTER RECEIVER		P mm	h mm	H mm	No	Sn m	Tr ms	f Hz		
CX2E0RB/05-016V	CX2E0/05-016V CX2RB/05-016V	Cable Synchronisation	5	160	169	33	0,1 ...3	14,8	33,7	Test NC/NO; Teach; Blank; PNP; NPN	**Two** ST151 kits are delivered
CX2E0RB/05-032V	CX2E0/05-032V CX2RB/05-032V		5	320	329	65	0,1 ...3	27,6	18,1	Test NC/NO; Teach; Blank; PNP; NPN	**Four** ST151 kits are delivered
CX2E0RB/05-048V	CX2E0/05-048V CX2RB/05-048V		5	480	489	97	0,1 ...3	40,4	12,3	Test NC/NO; Teach; Blank; PNP; NPN	**Four** ST151 kits are delivered
CX2E0RB/10-016V	CX2E0/10-016V CX2RB/10-016V		10	160	169	17	0,3 ...6	8,4	59,5	Test NC/NO; Teach; Blank; PNP; NPN	**Two** ST151 kits are delivered
CX2E0RB/10-032V	CX2E0/10-032V CX2RB/10-032V		10	320	329	33	0,3 ...6	14,8	33,7	Test NC/NO; Teach; Blank; PNP; NPN	**Four** ST151 kits are delivered
CX2E0RB/10-048V	CX2E0/10-048V CX2RB/10-048V		10	480	489	49	0,3 ...6	21,2	23,5	Test NC/NO; Teach; Blank; PNP; NPN	**Four** ST151 kits are delivered
CX2E0RB/10-064V	CX2E0/10-064V CX2RB/10-064V		10	640	649	65	0,3 ...6	27,6	18,1	Test NC/NO; Teach; Blank; PNP; NPN	**Six** ST151 kits are delivered
CX2E0RB/10-080V	CX2E0/10-080V CX2RB/10-080V		10	800	809	81	0,3 ...6	34	14,7	Test NC/NO; Teach; Blank; PNP; NPN	**Six** ST151 kits are delivered
CX2E0RB/10-096V	CX2E0/10-096V CX2RB/10-096V		10	960	969	97	0,3 ...6	40,4	12,3	Test NC/NO; Teach; Blank; PNP; NPN	**Six** ST151 kits are delivered
CX2E0RB/20-016V	CX2E0/20-016V CX2RB/20-016V		20	160	169	9	0,3 ...6	5,2	96,1	Test NC/NO; Teach; Blank; PNP; NPN	**Two** ST151 kits are delivered
CX2E0RB/20-032V	CX2E0/20-032V CX2RB/20-032V		20	320	329	17	0,3 ...6	8,4	59,5	Test NC/NO; Teach; Blank; PNP; NPN	**Four** ST151 kits are delivered
CX2E0RB/20-048V	CX2E0/20-048V CX2RB/20-048V		20	480	489	25	0,3 ...6	11,6	43,1	Test NC/NO; Teach; Blank; PNP; NPN	**Four** ST151 kits are delivered
CX2E0RB/20-064V	CX2E0/20-064V CX2RB/20-064V		20	640	649	33	0,3 ...6	14,8	33,7	Test NC/NO; Teach; Blank; PNP; NPN	**Six** ST151 kits are delivered
CX2E0RB/20-080V	CX2E0/20-080V CX2RB/20-080V		20	800	809	41	0,3 ...6	18	27,7	Test NC/NO; Teach; Blank; PNP; NPN	**Six** ST151 kits are delivered
CX2E0RB/20-096V	CX2E0/20-096V CX2RB/20-096V		20	960	969	49	0,3 6	21,2	23,5	Test NC/NO; Teach; Blank; PNP; NPN	**Six** ST151 kits are delivered
CX2E0RA/05-016V	CX2E0/05-016V CX2RA/05-016V		5	160	169	33	0,1 ...3	14,8	33,7	Test NC/NO; Teach; Blank; AnaV; AnaI	**Two** ST151 kits are delivered
CX2E0RA/05-032V	CX2E0/05-032V CX2RA/05-032V		5	320	329	65	0,1 ...3	27,6	18,1	Test NC/NO; Teach; Blank; AnaV; AnaI	**Four** ST151 kits are delivered
CX2E0RA/05-048V	CX2E0/05-048V CX2RA/05-048V		5	480	489	97	0,1 ...3	40,4	12,3	Test NC/NO; Teach; Blank; AnaV; AnaI	**Four** ST151 kits are delivered
CX2E0RA/10-016V	CX2E0/10-016V CX2RA/10-016V		10	160	169	17	0,3 ...6	8,4	59,5	Test NC/NO; Teach; Blank; AnaV; AnaI	**Two** ST151 kits are delivered
CX2E0RA/10-032V	CX2E0/10-032V CX2RA/10-032V		10	320	329	33	0,3 ...6	14,8	33,7	Test NC/NO; Teach; Blank; AnaV; AnaI	**Four** ST151 kits are delivered
CX2E0RA/10-048V	CX2E0/10-048V CX2RA/10-048V		10	480	489	49	0,3 ...6	21,2	23,5	Test NC/NO; Teach; Blank; AnaV; AnaI	**Four** ST151 kits are delivered
CX2E0RA/10-064V	CX2E0/10-064V CX2RA/10-064V		10	640	649	65	0,3 ...6	27,6	18,1	Test NC/NO; Teach; Blank; AnaV; AnaI	**Six** ST151 kits are delivered
CX2E0RA/10-080V	CX2E0/10-080V CX2RA/10-080V		10	800	809	81	0,3 ...6	34	14,7	Test NC/NO; Teach; Blank; AnaV; AnaI	**Six** ST151 kits are delivered
CX2E0RA/10-096V	CX2E0/10-096V CX2RA/10-096V		10	960	969	97	0,3 ...6	40,4	12,3	Test NC/NO; Teach; Blank; AnaV; AnaI	**Six** ST151 kits are delivered
CX2E0RA/20-016V	CX2E0/20-016V CX2RA/20-016V		20	160	169	9	0,3 ...6	5,2	96,1	Test NC/NO; Teach; Blank; AnaV; AnaI	**Two** ST151 kits are delivered
CX2E0RA/20-032V	CX2E0/20-032V CX2RA/20-032V		20	320	329	17	0,3 ...6	8,4	59,5	Test NC/NO; Teach; Blank; AnaV; AnaI	**Four** ST151 kits are delivered
CX2E0RA/20-048V	CX2E0/20-048V CX2RA/20-048V		20	480	489	25	0,3 ...6	11,6	43,1	Test NC/NO; Teach; Blank; AnaV; AnaI	**Four** ST151 kits are delivered
CX2E0RA/20-064V	CX2E0/20-064V CX2RA/20-064V		20	640	649	33	0,3 ...6	14,8	33,7	Test NC/NO; Teach; Blank; AnaV; AnaI	**Six** ST151 kits are delivered
CX2E0RA/20-080V	CX2E0/20-080V CX2RA/20-080V		20	800	809	41	0,3 ...6	18	27,7	Test NC/NO; Teach; Blank; AnaV; AnaI	**Six** ST151 kits are delivered
CX2E0RA/20-096V	CX2E0/20-096V CX2RA/20-096V		20	960	969	49	0,3 ...6	21,2	23,5	Test NC/NO; Teach; Blank; AnaV; AnaI	**Six** ST151 kits are delivered

Chapter 3; Tab.1

4.0 START-UP INSTRUCTIONS

4.1 Mechanical mounting of CX2 models

It is extremely important to secure the light curtains to a rigid structure, not subject to deformation or strong vibrations.
Decide where to place the Receiver so that it is not subject to strong natural or artificial light sources nor to luminous interference of other sensors.
Keep in mind that the devices are not suitable for outdoor installation, IP67 despite being declared, it is not guaranteed that the long exposure to the weather does not cause water penetration and performance degradation.
Place the Emitter and Receiver facing one another, at the same height above the reference plane, following the same orientation, the output wires of the transmitter and receiver must be on the same side.
The distance between the two elements must not exceed the limits set by the specifications. To secure the light curtains to a supporting structure, use the inserts which must be applied to the rear groove and the brackets which are usually provided (mounting accessory **ST151**).
If the application is subject to vibrations, which anyway do not prevent the optical alignment, use damping supports.
The optical beams can be partially deflected by nearby reflective surfaces. Because of that, the path beam interruption may not be detected. Therefore, all reflective surfaces and objects should be placed at a minimum safe distance from the optical beam path.
If the deviating effect of a reflective surface cannot be reduced or eliminated, it is necessary that this effect remains stable or, at least, that all system functions work in an acceptable and predictable way.
If the **Blanking** function needs to be activated due to a mechanical constraint, try first to place light curtains in a way that optics are either completely free or completely covered, also temporarily (just during the activation of blanking). Make sure that optics which could be only partially covered are completely covered during this time.
Temporarily block the emitter and the receiver so that they are aligned and parallel to each other.

4.2 Electrical installation

Use PELV power supplies, in compliance with Chap.6.4. of EN 60204-1.
If using a non-stabilized power supply, the transformer must have double insulation and adequate power, the secondary winding must not exceed 18Vac. Use a bridge rectifier, a filtering capacitor with a minimum value of 2200µF for absorptions up to 1A, for higher absorptions add 2200µF for each extra Ampere.
Connect the supply cables directly to the source and not downstream of other power or highly inductive devices.
Run the cables of the light curtains in dedicated raceways or where only signals run; do not use raceways already carrying power cables. If you use two separate power supplies for Transmitter and Receiver, they must have in common 0V.
Comply with the specification of the maximum length of the connection cables. Make sure that the part or parts of the metal structure on which the sensors are installed are effectively connected to the same earth ground.
Before inserting the connector, check that the mains voltage and the supply voltage are within the required limits, apply the connector and check again that the supply voltage has a correct nominal value and remains within the limits defined in all working conditions. Check the limits in the two extreme conditions of minimum and maximum absorption of all devices connected to the same power supply, especially if this is **not** a stabilized power supply.

Danger!
In order to carry out the following operations, a voltage supply to the emitter and to the receiver is necessary. Before starting this phase, make sure that the outputs' switch cannot lead to any danger.

Considering the wiring diagrams indicated in **Chapter 4, Fig. 1,** provide for the basic electrical connections necessary for a proper functioning of the device. Make sure that connection for synchronism is available and that **Test** input of the emitter is not set on positive. If possible, apply the stated loads to the outputs of the receiver , then properly connect the **NC/NO** input, the receiver can be in this state only at switch-on. **Do not** connect the **Teach** input and the **Blank** input to the positive yet, even if the application later needs this kind of connection.

4.3 Alignment of CX2E0RB models

Apply supply voltage and make sure that the LEDs do not indicate any error state. The green or blue LEDs of emitter and receiver must be on, if they blink it means that supply voltage is not enough. On the emitter, also the yellow LED should be permanently on. If not, make sure once again that the Test input is not set on positive. The red LED must be off. If it is on, it means either that an out-of-scale piloting current value of the IR LEDs resulting from a previous adjustment has been registered, or that a breakdown occurred.
If the yellow LED flashes on the transmitter and / or on receiver it means that the synchronization is missed, check the connections. If on the emitter and receiver only the yellow LEDs are ON, it means that a Blanking or a Teach is ongoing, wait for it to finish and check the connections. If on the emitter or receiver, the red LED flashes continuously, it means there was a writing error for the memory due to a power failure, perform a Blanking N to restore.
The yellow LED on the receiver can be on or off, If the red LED is on, it means that at least one optical element is covered.
Make sure that the optics, except for those which must be excluded by the blanking function, are free and remain free.
If it is necessary, start a Blanking by connecting the **Blank** input to the positive, interrupt and then re-start voltage supply, the blanking process begins. During this phase the yellow LEDs of the emitter and receiver blink. When they stop blinking at the end of the process, the receiver could be unstable.
Disconnect the input **Blank G / F** from the positive or common terminal and run a mandatory **Teach-in** momentarily connecting the input **Teach G/F** to the positive or to the common terminal.

4.4 Verify alignment for CX2 models

Make sure that the signal level achieved with the adjustment is sufficient to guarantee the stability of work. Check this by slightly changing the alignment or by urging the mechanical structure and making sure that the system remains in a light state. In case of instability rerun several times a "Fine" calibration procedure followed by an accurate mechanical alignment, then finally run the Teach required by the application.

Indication
A correct optical alignment with a good signal margin prevents unstable functioning of the light curtains, reduces optical interferences and reflection by shiny surfaces and guarantees better stability in general. Please do not forget to reconnect the cables and to control the correct functioning of the application.

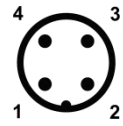
4.5 Electrical drawing

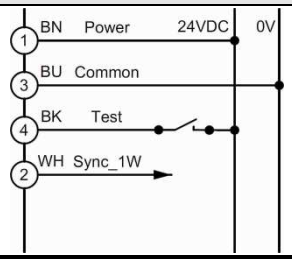
In the following tables the colours of the cables and LEDs are indicated with the abbreviations defined in IEC 60707 in English

BK	BN	RD	YE	OG	GN	BU	GY	WH	PK	VT
Black	Brown	Red	Yellow	Orange	Green	Blue	Gray	White	Pink	Violet

Chapter 4, Tab.1

CX2 SERIES	**EMITTER**	**CX2E0 MODEL** **Emitter with input test**
M12, 4 pole Male connector	**Wiring**	**Connectors**



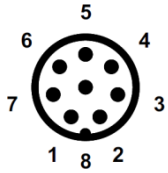


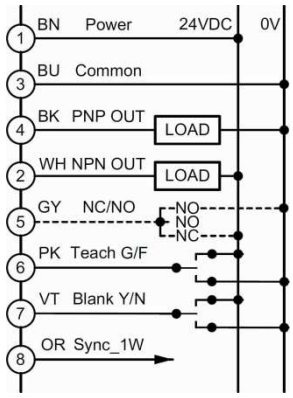
Pin	Color	Signal	Description
1	BN	24V$_{DC}$	Power supply input from 16,8 to 30V
2	WH	Sync_1W	Connection to same signal of the receiver
3	BU	0V	Supply voltage reference
4	BK	Test	Test input: if it is connected to the positive it interrupts the emission

NOTE: the pin 2 (Sync_1W) must be connect
if the pin 4 (Test) it is connected to the positive it interrupts the emission

Chapter 4; Tab. 2

CX2 SERIES	**RECEIVER**	**CX2RB MODEL** **Receiver with PNP e NPN outputs**
M12, 8 pole Male connector	**Wiring**	**Connectors and cables. Colors of CD12M as for IEC 60947-5-2, see Tab.:1; Cap.:8**



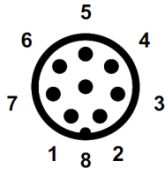


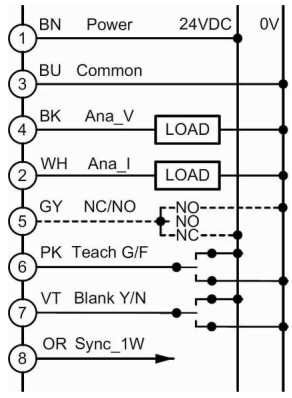
Pin	Color	Signal	Description
1	BN	24VDC	Power supply input from 16,8 to 30V
2	WH	NPN Out	Apply a load connected at the positive, maximum current 100mA
3	BU	0V	Supply voltage reference
4	BK	PNP Out	Apply a load connected to the common, maximum current 100mA
5	GY	NC/NO	Input select the logic outputs, at the positive Light ON; at the common or negative Dark ON
6	PK	Teach G/F	Teach-in input: Gross at positive; Fine at common
7	VT	Blank Y/N	Blanking Activation (at positive) / Deactivation (at common)
8	OR	Sync_1W	Connect to the same signal of the emitter. Maximum cable length = 20 m

NOTA: **NC/NO** and **Blank Y/N** inputs are read only at sensor's switch-on. If NO/NC input is left open or permanently wired to the common, it selects digital outputs as Dark ON. If it is connected to the positive it selects outputs as Light ON.
If **Blank Y/N** is connected to the positive, it excludes optics in Dark. If it is connected to the common it activates all optics.

Chapter 4; Tab.3

CX2 SERIES	**RECEIVER**	**CX2RA MODEL** **Receiver with analogue outputs**
M12, 8 pole Male connector	**Wiring**	**Connectors and cables. Colors of CD12M as for IEC 60947-5-2, see Tab.:1; Cap.:8**





Pin	Color	Signal	Description
1	BN	24V$_{DC}$	Power supply input from 16,8 to 30V
2	WH	Ana_I	Analogue Current Output 4-20mA, maximum Voltage output 10V, minimum resistance 500Ω.
3	BU	0V	Supply voltage reference
4	BK	Ana_V	Analogue Voltage Output 0-10V, c.c. Current 60mA, maximum Voltage output 10V, minimum resistance 1KΩ.
5	GY	NC/NO	Open or common outputs proportional at optics Darkness, if at positive outputs proportional at optics Lightness
6	PK	Teach G/F	Teach-in input: Gross at positive; Fine at common
7	VT	Blank Y/N	Blanking Activation (at positive) / Deactivation (at common)
8	OR	Sync_1W	Connect to the same signal of the emitter. Maximum cable length = 20 m

Note: **NC/NO** inputs and **Blank Y/N** are read only at sensor's power-on. If **NO/NC** input is left open or permanently wired to the common, it selects analogue outputs proportionally to the number of optics in Dark. If connected to the positive, it selects analogue outputs proportionally to the number of optics in Light.
If **Blank Y/N** is connected to the positive, at power on it excludes optics in a Dark. If it is connected to the common it activates all optics.

Chapter 4; Tab.4

4.5 Panel indications and diagnostics.

Two sets of three LEDs each (green, yellow and red) are on the front panel. The two sets provide the same indications. They are located respectively on the upper and lower part of the front panel. For light curtains with just one master board, the two sets are controlled in parallel. In case the curtain has one master board and one slave board, the two sets are controlled separately by the two different boards. The green LEDs or the blue and yellow ones give the same information, whereas the red LEDs show the DARK/LIGHT state (of the receiver) or a breakdown (of the emitter) for each board.
For curtains with one master board and more than one slave board, the central slave boards will be provided just with the red LEDs showing the DARK/LIGHT state for each board. LEDs have different signalling modes which are explained in the table here below.

MEANINGS OF LED SIGNALLING MODES	
☼	LED is permanently ON
✥	LED ON at low intensity or intermittent with periodic blinking
◐	LED blinks continuously
●	LED is OFF

Chapter 4, Tab.:5

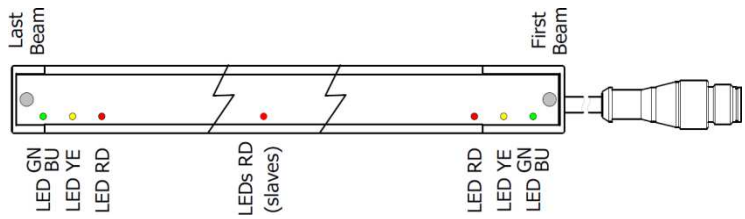
		CX2 EMITTERS
GN	●	No power supply.
	◐	Supply voltage below 15V, insufficient.
	☼	Supply voltage above 16V, sufficient.
YE	●	Emission stopped (on Test).
	◐	There is currently a Teach or a Blanking. Ceaselessly: missing sync.
	☼	Emission enabled (if the red LED is not on).
RD	●	Under normal operating conditions
	✥	Breakdown of some IR LEDs.
	◐	Only the red LED flashing. Memory error Make a Blanking N to recover.

Chapter 4, Tab. 6

		CX2 RECEIVERS
BU	●	No power supply.
	◐	Supply voltage below 15V, insufficient.
	☼	Supply voltage above 16V, sufficient.
YE	●	Digital output OUT_1 OFF.
	☼	Digital output OUT_1 ON.
	✥	Outputs shorted or overloaded.
	◐	There is currently a Teach or a Blanking. Ceaselessly: missing sync.
RD	●	LIGHT state (all beams are free).
	✥	Some beams are in DARK.
	☼	Many or all the beams are interrupted.
	◐	Only the red LED flashing. Memory error. Make a Blanking N to recover.

Chapter 4, Tab.7

COMBINED INDICATIONS



		RECEIVER												
EMITTER									NO	NC	NO	NC	C.C.	
GN	BU	●	☼	☼	☼	●	●	● ◐	☼	☼	☼	☼	☼	
YE		◐	●	☼	☼	☼ ... ◐	●	●	☼	●	●	☼	✥	
RD		●	●	●	✥	●	◐	●	✥ ... ☼		●		● ✥ ☼	
STATE		NO SYNC.	ON TEST	EMIS-SION	LED FAILURE	TEACH / BLANK.	MEMORY ERROR	OFF/LOW	DARK		LIGHT		SHORT CIRCUIT	
							Make a Blanking	Power					Out	

Chapter 4, Tab. 8

5.0 TECHNICAL SPECIFICATIONS

CX2E*R*/**-***V MODELS		TECHNICAL SPECIFICATION			
PARAMETERS		**Min.**	**Nom.**	**Max.**	**NOTES**
Power supply					
Supply voltage	V_{DC}	16,8	24	30	From PELV power supply according to EN 60204-1 Chap.6.4
Residual ripple	V			1,2	Supply voltage must stay within the stated limits
Absorbed power, Receiver	W	1		2,5	Excluding loads
Absorbed power, Emitter	W	1		3,0	
Digital Outputs					
Output type	N°	1xPNP, 1xNPN			Completely protected outputs
Current	mA		100		Higher values are interpreted as overload or short circuit
Voltage drop @100mA	V			1,5	Reduction in output voltage compared to the supply voltage
Minimum resistive load	Ω	280			Lower values are interpreted as short circuit
Leakage current	µA			10	Value at which the OFF state of the load must be guaranteed
Tolerated capacitive load	µF			0,7	Higher values can be interpreted as short circuit.
Switching time ON	µs		0,05		With load of 220/1000Ω
Switching time OFF	µs	2		10	With load of 220/1000Ω
Analogue outputs					
Voltage Output	V	0		10	Variation range of the analogue signal
Minimum resistive value	KΩ	1			Minimum resistance value applicable to the voltage output
Current Output	mA	4		20	Variation range of the analogue signal
Maximum resistive value	KΩ			0,5	Maximum resistance value applicable to the current output
Ripple overlapped	%			1	
Conformity	%	0		+10	
Repeatability	%			5	
Restore time	ms			0,1	
Short circuit current	mA			60	
Response time					**See also Tab.:1; Cap.:3**
Time delay before availability	s			3	All outputs are in the OFF state during this time
Time delay before availability with Blanking	s	1 * No. of beams			Blank Y/N connected to Positive or Common at Power on
Teach-in	s	0,5 * No. of beams			Teach G/F momentarily connected to the positive or common
Outputs response time (formula)	ms	Tr=((0.2*(N°-1))+1)*2			Maximum switching frequency f= 1/(2*Tr)
Input at two levels (Test and NC/NO)					
Low or open level	V	0	open	5,8	Rec: Selects function NO (Dark ON). Em: not on Test
High level	V	5,8		30	Rec: Selects function t NC (Light ON). Em: on Test
Integration time inputs	ms		20		The state must persist at least for the required time
Input at three levels (Teach G/F and Blank Y/N)					
Low input	V	0		0,8	Select function Teach F or Blank N
Open input	V	1,3		2,35	No action
High input	V	6		30	Select function Teach G or Blank Y
Input currents					
Input current for low level	µA	-250		520	Outgoing or incoming current
Input current for high level	mA	0,52		1,2	Incoming current
Ambient					
Models with standard protection according to		IP67			Dust and water protection (immersion for 60 min. at a depth of 1m)
Working temperature	°C	-10		55	Without condensation
Storage temperature	°C	-25		60	To be respected also during transportation
Humidity	%			95%	Without condensation
Vibrations according to		Acc. to IEC 60947-5-2			It complies with limits and conditions stated in the norm
Impact according to		Acc. to IEC 60947-5-2			It complies with limits and conditions stated in the norm
Range correction factors					
Use of diverter mirrors		0,85			For each diversion with a mirror
Environmental factors		0,50 / 0,25			For the presence of dust, vapours / mist, fumes (indicative values)
Connections					
Cables' section	mm^2		0,34		To guarantee the stated maximum length
Total length of cables for supply / output	m			100	With indicated cables' section
Length of Interconnection cables (extensions)	m			20	Length of connections **Sync_1W** (a wire and common ground)
Dimensions					
Housing section	mm	20 (front) x 36			Painted aluminium, colour: opaque blue RAL5002
Groove for fixing	mm	2/10/6,5			Rear groove, depth / width / width of entry
Front window width	mm	15mm			Central width: 13mm; material PC
Outer closings	N°	2			Material: Black PBT + 30% GF
Closing screws	N°	2+2			2M, FE37, burnished
Connectors/Cable					
CX2E Models		1xM12, 4p, Male			Pig-tail External cable length 240mm, PUR, Ø 4,7mm, 0,34mm^2
CX2R Models		1xM12, 8p, Male			Pig-tail External cable length 240mm, PUR, Ø 6mm, 0,34mm^2

Chapter 5 ; Tab.: 1; (see also Chapter 3; Tab.:1).

MODELS: CX2E*R*/05-***V (PICH: 5mm)					
OPTICAL PARAMETERS		**Min.**	**Nom.**	**Max.**	**NOTE**
Operating range (ro)	**m**	**0,1**	**3**		Displacement between sender and receiver
Wavelength of IR LEDs	**nm**		**850**		
Aperture angle	**deg**		**±30°**		
Threshold level for Teach G			**0,33**		Ratio between threshold value and signal relative to the LIGHT state
Detection capability for Teach G	**mm**		**1,5**		With a rod of specified diameter, also see the normalized graphics
Threshold level for Teach F			**0,8**		Ratio between threshold value and signal relative to the LIGHT state
Detection capability for Teach F	**mm**		**1**		With a rod of specified diameter, also see the normalized graphics
Immunity for artificial light, direct / indirect	**lux**		**20000/60000**		Incandescent lamp, standard calibration (Teach G)
Immunity for artificial light, direct / indirect	**lux**		**1000/2000**		Incandescent lamp, fine calibration (Teach F)
Immunity for artificial light, direct / indirect	**lux**		**3000/10000**		Fluorescent lamp, standard calibration (Teach G)
Immunity for artificial light, direct / indirect	**lux**		**350/500**		Fluorescent lamp, fine calibration (Teach F)

Chapter 5 ; Tab.: 2; (see also Chapter 3; Tab.:1).

MODELS: CX2E*R*/10-***V (PICH: 10mm)					
OPTICAL PARAMETERS		**Min.**	**Nom.**	**Max.**	**NOTE**
Operating range (ro)	**m**	**0,3**	**6**		Displacement between sender and receiver
Wavelength of IR LEDs	**nm**		**880**		
Aperture angle	**deg**		**±15°**		
Threshold level for Teach G			**0,33**		Ratio between threshold value and signal relative to the LIGHT state
Detection capability for Teach G	**mm**		**2**		With a rod of specified diameter, also see the normalized graphics
Threshold level for Teach F			**0,8**		Ratio between threshold value and signal relative to the LIGHT state
Detection capability for Teach F	**mm**		**1**		With a rod of specified diameter, also see the normalized graphics
Immunity for artificial light, direct / indirect	**lux**		**10000/30000**		Incandescent lamp, standard calibration (Teach G)
Immunity for artificial light, direct / indirect	**lux**		**1000/10000**		Incandescent lamp, fine calibration (Teach F)
Immunity for artificial light, direct / indirect	**lux**		**3000/10000**		Fluorescent lamp, standard calibration (Teach G)
Immunity for artificial light, direct / indirect	**lux**		**350/1000**		Fluorescent lamp, fine calibration (Teach F)

Chapter 5 ; Tab.: 3; (see also Chapter 3; Tab.:1).

6.0 MECHANICAL DIMENSIONS OF LIGHT CURTAINS AND STANDARD ACCESSORIES

6.1 Mechanical dimensions of CX2 light curtains

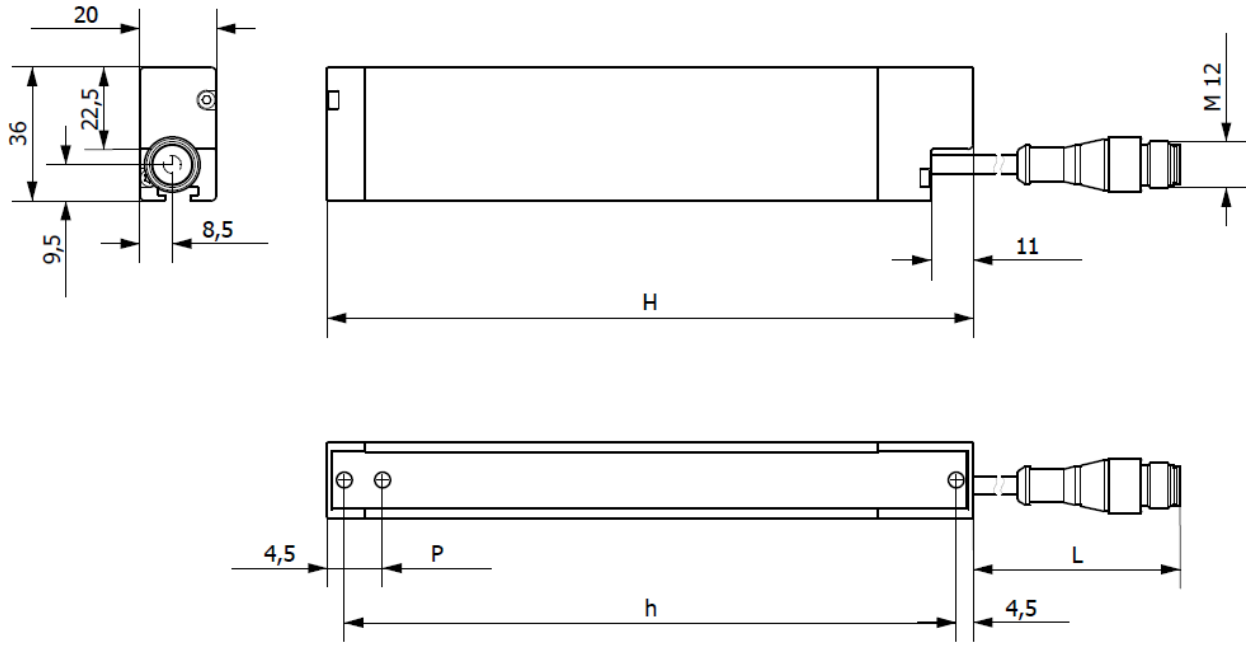


Fig.:1; Chapter 6.
For Dimensions **P**, **h** and **H** see **Chapter 3; Tab.:1**
Length pig-tail **L= 240mm**

6.1 Standard Mounting accessories

For the quantity see Chapter:3 Tab.:1;

Kit mounting accessories ST151

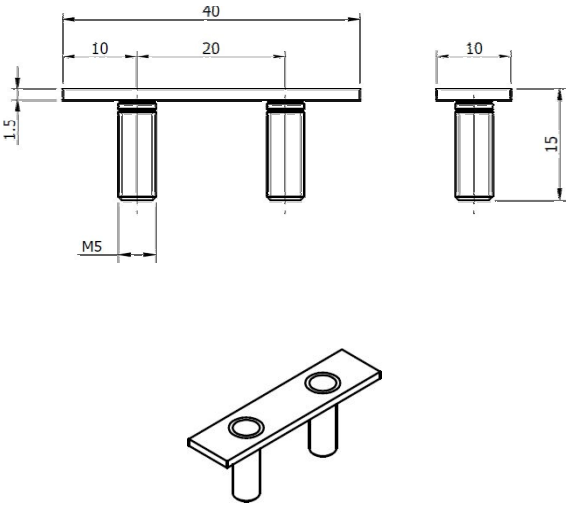


Fig.:2; Chapter 6.
T-shaped insert, with two M5 nuts and two split washers

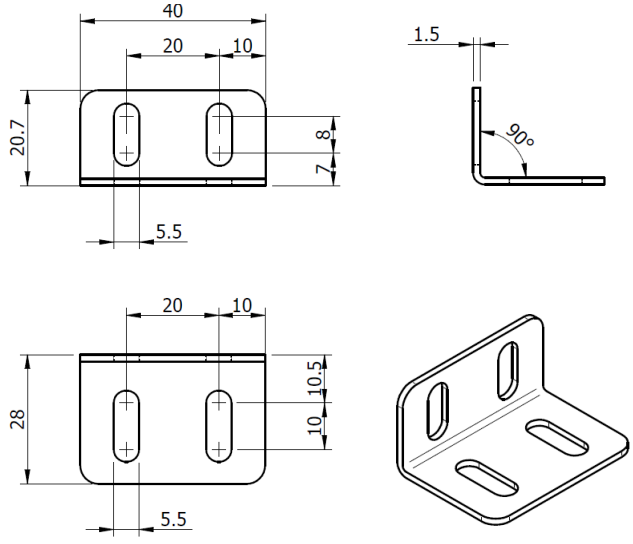
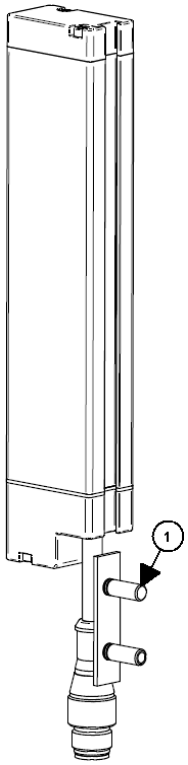


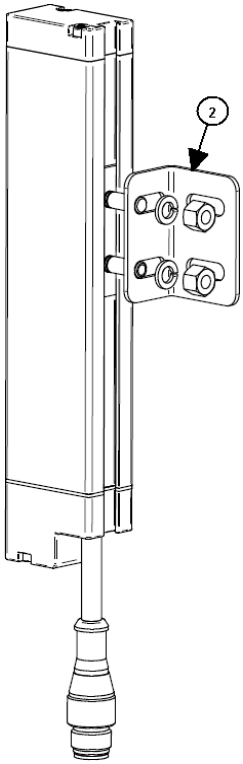
Fig.:3; Chapter 6.
L-shaped mounting bracket

7.0 MOUNTING OF CX2 LIGHT CURTAINS

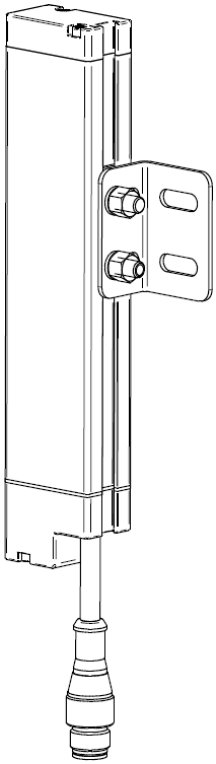
Securing CX2 light curtains with accessories' kit ST151.
For ST151 quantities see **Tab.:1; Chapter 3**.



Place the T-shaped insert (1)



Mount the L-shaped bracket (2) using the T-shaped insert



Secure light curtains to the wall

Fig.:1; Chapter 7

8.0 LIST OF AVAILABLE ACCESSORIES

M12 CONNECTORS, 4 POLES, WITH CABLE	
CD12M/0B-050A5	M12 connector, straight, 4 poles, female, 5m PUR cable
CD12M/0B-100A5	M12 connector, straight, 4 poles, female, 10m PUR cable
CD12M/0B-150A5	M12 connector, straight, 4 poles, female, 15m PUR cable
M12 CONNECTORS, 8 POLES, WITH CABLE	
CD12M/0X-050A5	M12 connector, straight, 8 poles, female, 5m PUR cable
CD12M/0X-100A5	M12 connector, straight, 8 poles, female, 10m PUR cable
CD12M/0X-150A5	M12 connector, straight, 8 poles, female, 15m PUR cable
STANDARD MOUNTING KIT FOR LIGHT CURTAINS	
ST151	Kit with T-shaped insert with two M5 screws complete with nuts and washers and a L-shaped bracket supplied in adequate quantities at the height of the curtain, see **Tab.: 1; Cap.: 3 and Fig.: 2 and 3 Cap.: 6.**
VIBRATION DAMPING SUPPORTS	
ST 4V S	Kit of 4 vibration-damping supports for models with optical height of 150
ST 8V S	Kit of 8 vibration-damping supports for models with optical height from 300 to 1050
ST 12V S	Kit of 12 vibration-damping supports for models with optical height from 1200 to 1500

Chapter 8; Tab. 1

9.0 PACKAGE CONTENT

Each package with a kit for a light curtains' pair has the following content:

- A pair of light curtains composed of emitter and receiver.
- A number of accessories' kits ST151 (T-shaped insert and L-shaped bracket) according to the H height (see **Tab.:1; Chapter 3**).
- Multilingual installation short manual.

10.0 CONTROL OF THE INSTALLED LIGHT CURTAINS

10.1 Purpose of controls.

The controls described here below are meant to ensure the functional and reliable performances required.

10.2 Preliminary controls before start-up

- All devices must be correctly installed and well secured.
- The maximum response time must be adequate to the application. Make sure that the sensor's response time is compatible with the specific application, detecting objects of minimum and maximum size, in different positions and, if possible, with even faster movements compared to what the application allows.
- Make sure that no optically interfering devices are in the visual field of the sensor. Make sure that other devices do not undergo interferences by the emitter.
- Make sure that sensors are not exposed to any substance which might dirty or damage the optics.
- Make sure that technical documentation is available for operators in charge of maintenance.

10.3 Controls device efficiency

- State and efficiency of the device can be checked using a test stick, which must be detected in a way that is repetitive in time.
- Make sure that there are no damages nor dirt on optical windows' surface. Scratches and tarnished surfaces can negatively affect the light curtain's resolution.
- If necessary, clean the optical surface with a humid antistatic cloth. Do not use any alcohol, nor solvents, nor abrasive substances.

11.0 CE-CONFORMITY DECLARATION

CX2 curtains comply with the following directives and norms:
- EMC 2004/108/CE Directive
- 2011/65/EU RoHS Directive
- IEC 60947-5-2 (3.1 edition, 2012-09)
- IEC 60947-5-7 harmonised norm (2003-06)
- EN 50581 harmonised norm (2012-09

Find the full version of the Conformity Declaration on Internet at:
http:// **www.microdetectors.com**

12.0 WARRANTY

For every new CX light curtain, in normal using conditions, M.D. Micro Detectors guarantees the absence of defects in materials and in manufacturing for a period of 24 (twenty-four) months.
For this period of time, M.D. Micro Detectors commits itself in eliminating any possible breakdown of the products, by repairing or by replacing the defective parts. Materials and labour are completely free of charge in this case.
M.D. Micro Detectors reserves the right to replace the whole defective device with another which is exactly the same or has equal characteristics, instead of repairing it.

Warranty is valid under the following conditions:
- M.D. Micro Detectors must be informed of the breakdown by the user within twenty-four months from product delivery.
- The device and its components are in the same conditions in which they were delivered by M.D. Micro Detectors.
- Breakdown or malfunctioning is not directly or indirectly due to:

- use for improper purposes;
- no respect of instructions;
- negligence, inexperience, incorrect maintenance;
- repairs, modifications, adaptations not executed by M.D. Micro Detectors personnel, tampering, etc.;
- accidents or impacts (also due to transport or force majeure);
- other events not depending on M.D. Micro Detectors.

Devices or parts will be repaired at M.D. Micro Detectors' laboratories, to which the material must be delivered or sent. Shipping costs and the risk of damaging or losing the material during transport will be at the Customer's charge.
All replaced products and parts are owned by M.D. Micro Detectors.
M.D. Micro Detectors does not acknowledge other warranties nor rights except for those explicitly described. Therefore, costs, activity interruptions or other elements or circumstances related to non-functioning products or parts of them will not be refunded.

The respect of all norms, indications and prohibitions contained in this document is essential to the correct functioning of light curtains.
Therefore, if these indications are not respected, even partially, M.D. Micro Detectors will not be held responsible under any circumstances for any possible consequence.