

SERIE BX4-10 ATEX



COMPLYING WITH THE 94/9/CE NORMS
INSTRUCTION AND SAFETY MANUAL



Micro Detectors

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Modello BX*
Emettitore/Ricevitore

 0722  II 2GD

EEx m IIC T6 IP67 T 85°C
CESI 04 ATEX 155
-5 ≤ Ta ≤ +55°C
Vmax 26 Vdc
Imax 50 mA

*: All 4-10 models

PROTECTION MODE

| | |
|-----------------------------------|---------------------|
| Group | II |
| Category | 2 |
| Type of materials | GD |
| Protection mode | EEx m oppure EEx md |
| Gas group | IIC |
| Temperature class | T6 T 85°C |
| Protection degree | IP65 |
| Production surveillance institute | 0722 (CESI) |
| Certificate number | CESI 04ATEX155 |

- Emitter with power adjustment and check input on request.
- Controlled area height up to 90mm
- Sensing range up to 2m
- Complete protection against electrical damages.

SUPPLIED MATERIAL

- Installation manual
- Sensor / Sensors depending by code
- N. 1 bracket ST18-C for each element
- N. 1 M18 metal fastening ring nut for each element
- Trimmer adjustment accessori ST82

GENERAL DESCRIPTION

New generation of multiple beam photoelectric area sensors for detecting the presence or passage of objects; no wiring synchronism between emitter and receiver is required. The new housing, rectangular and extremely compact, is manufactured through the injection moulding technique. The use of fibreglass-strengthened plastic together with walls of substantial thickness, make the housing extremely strong and suitable for use in industrial environments. The protection degree is IP67. These sensors operation is based on the total beam crossing principle: the emitter photodiodes are switched on one at a time in sequence and the light given out by each emitter must be seen simultaneously by all of the receiver photodiodes. The height of the area checked is 90mm, irrespective of the number of beams (whether 4 or 10). The light from the emitter is modulated to minimize sensitivity of the system to ambient light. The product features a nominal sensing range of 2000mm and a minimum range of 300mm (blind zone); all models have a 90mm high optical lens, the 10-beam version has a 10mm optical element spacing, which is 30mm for the 4-beam version. The light-dark response time is maximum 1ms, the minimum duration of the dark pulse is 5ms, extendable to 80ms in the special models, with

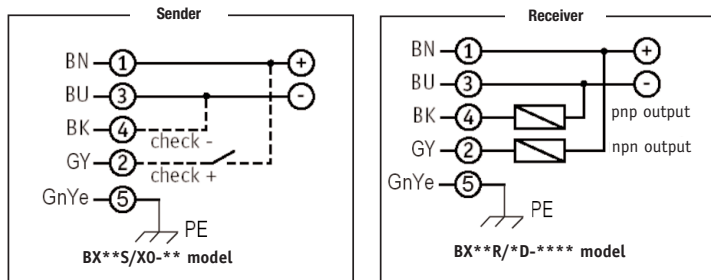
delay off. The emitter has only one green LED indicating emission which, in the version with the check function, switches off when the check mode is active. The receiver has two LEDs, one yellow and one red. The brightness of the red LED is inversely proportional to the level of the signal; the LED switches off when the signal is sufficient and it does not indicate excess gain. The yellow LED lit indicates that the output is ON. The receiver features two available outputs, PNP and NPN. The dark-pulse/light-pulse selection function is available. Emitter with or without check function are available. The emitter power can be adjusted by means of the trimmer.

The main applications are implemented placing emitter and receiver at opposite sides of a conveyor belt and orientating them perpendicularly to the motion direction. Depending on the different requirements and on the objects to be detected, the controlled area can lie entirely above the belt conveying surface, or it can be half above and half below the said surface. In this last case, the BX pair is positioned at an interruption in the belt, at the end or at the separation point between two adjacent belts. The sensor thickness of only 20mm is particularly suitable for applications of the latter type.

Warranty - MD Micro Detectors S.p.A
warrants for a period of three (3) years from the date of manufacturing that all products will be free from defects and commits oneself to repairing and replacing the goods that MD considers defective. Such warranty satisfaction is available only if any alleged defect has not been caused by misuse or improper installation.

Declaration of conformity - MD Micro Detectors S.p.A.
Declare under our sole responsibility that this products are in conformity with the following EEC directive: 89/336 and 73/23 and amendment.
MD Microdetectors S.p.A., strada S. Caterina 235, 41100 Modena (MO) declares under its own responsibility that the middle and high resolution area sensors series BX80, NO.CESI 04ATEX155 certified, built according to the protection mode "Group II 2 GD EEx md IIC T6 T85°C IP67" (models with external regulation power trimmer) or "group II Category 2 GD EEx m II C T6 T85°C IP67" (models without external regulation power trimmer), comply with the basic safety requirements foreseen by the "group II Categoria 2 GD EEx m II C T6 T85°C IP67" norms. The compliance of the electric building to the norm is determined by the correspondence to the technical requirements of the CENELEC EN 50014: 1997+A1.A2, EN50018:2000+A1 and EN 50028: 1995-5 standards.

WIRING DIAGRAM



WIRING COLORS

- 1/Bn: Brown
- 2/Gy: Grey
- 3/Bu: Blue
- 4/Bk: Black
- 5/GnYe: Yellow-Green


CODE DESCRIPTION

| | | | | | | | |
|---|----|----|----|---|---|---|---|
| Series | BX | 04 | S | O | A | B | AT |
| Area sensor in rectangular plastic housing 20x45x120 | BX | | | | | | AT Complying with ATEX 94/9/CE |
| Type | | 04 | | | | | B Load 0,3 - 2m |
| Four optical elements, 30mm element spacing, area height 90mm | | | | | | | A Cable 5m, M18 cable exit available for staff fixing ST18-A or C |
| Ten optical elements, 10mm element spacing, area height 90mm | | | | | | | O Emitter |
| | | | | | | | D Two independent outputs PNP and NPN, both in the same state |
| Element | | | | | | | |
| Emitter with sensitivity adjustment | | | S | O | | | Emitter |
| Emitter without adjustment | | | E | O | | | Receiver with NO/NC selection (not standard) |
| Receiver | | | R | X | | | Emitter with check function option |
| Emitter/receiver pair | | | SR | A | | | Dark-pulse receiver (NO, normally open) |
| | | | | | | | C Light-pulse receiver (NC, normally closed not standard) |

INSTALLATION AND STARTING

- Before starting the device, please check the following:
- Check the accordance with the electric parameters stated on the label
 - Check the perfect contact of the electric and mechanical connections
 - Check the integrity of all parts and conductors
 - Check that no modification that can change the electrical and mechanical structure and functions of the device has been effected without MD approval.
 - Check the absence of possible damages different to the ones for which the device has been studied.

UTILIZATION

 **IMPORTANT:** The use of a safety electrical construction object of intervention and not explicitly authorized, exclude any responsibility of MD and will cause the investigation of the relevant conformity certificate and of the contractual warranty.

Following the restrictions foreseen by the special use conditions, the devices can be used also in presence of potentially explosive atmospheres, with inflammable gas, steam or dust, where it is necessary the use of an electrical constructions Group II, Cat 2 (Zone 1, Zone 2, Zone 21, Zone 22) in environment temperature ranges, temperature class and surface maximum temperature stated on label.

INSTALLATION AND ADJUSTMENT PROCEDURES

Connections

- 1 Make sure that the operating voltage is correctly stabilized with a maximum ripple lower than that given in the catalogue.
- 2 In the event that the noise induced by the power lines is greater than that foreseen by the EMC regulation (interference immunity), detach the sensor cables from the power and high voltage lines and insert the cable in an earthed metal cable trough. Furthermore, it is advisable to connect the sensor directly to the supply source and not downstream other devices.
- 3 The sensor state will be active only 100ms after voltage has been supplied. During this time, the outputs will be OFF.

Mounting

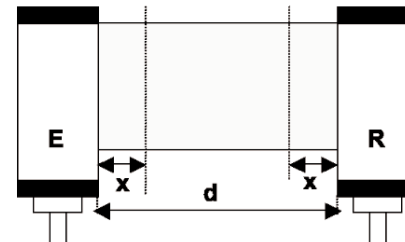
- 1 The use of the brackets ST18-C is advised for a perfect mounting and alignment.
- 2 Do not allow dust, water and condensation to deposit on the element optics.
- 3 Avoid exposing the optics to chemical reactive products.
- 4 Do not allow strong light or sunlight to fall directly onto the receiver optical element.
- 5 For cleaning, use a wet cloth and then dry all parts.

Alignment/Adjustment

- 1 Check that the distance between the emitter and the receiver falls within the specification range of the model used. Arrange the brackets so that the displacement between the axes of the two parts (emitter and receiver) lies within +1,5°.
- 2 Position the optical lenses facing one other, aligning them as much as possible with the axis joining the two parts.
- 3 Check the wiring and supply power to the system. The green LED on the emitter switches on (check also that, in the emitters, the sensitivity adjustment trimmer is rotated in a clockwise direction to the final position).
- 4 Rotate the emitter checking the receiver's red LED and searching the minimum brightness position or switching-off; secure it provisionally in this position.

- 5 Rotate the receiver checking its red LED and searching the minimum brightness position or switching-off; secure it provisionally in this position.
- 6 Repeat points 4 and 5 until the red LED on the receiver switches off.
- 7 If it is not possible to switch off the receiver's red LED, check the relative height, parallelism and distance between the two elements, and try to improve the conditions referring to the minimum brightness of the LED. Points 8 to 10 are used to obtain the highest possible signal margin, which is useful in the case of demanding working conditions.
- 8 Rotate the trimmer on the emitter in an anticlockwise direction, until the receiver's red LED switches on with a medium-low brightness.
- 9 Orientate the emitter and the receiver as described in points 4 and 5, so as to find the minimum brightness area or switching-off.
- 10 Repeat points 8 and 9 so as to improve the beam aiming, then bring the trimmer back to its (threshold) position.
- 11 To detect small object, rotate the trimmer in a clockwise direction a few degrees beyond the point at which the red LED switches off.
- 12 Check the detection of the required diameters and secure system.

N.B. The trimmer adjustment is indispensable for obtaining a maximum resolution, above all in the event that emitter and receiver are positioned at a distance lower than the nominal one, or in the detection of semitransparent objects. Very small diameters cannot be detected regularly in proximity of the optical elements, but are detected in the central zone, this being the maximum resolution area. The dark zone within which such diameters cannot be detected, can be obtained from the figure below and from the previously described formulas.



The dimension of the blind zone is found using the following formula:
 $X = 0,06 * d$ 10-optics sensor
 $X = 0,17 * d$ 4-optics sensor

DIAGNOSTIC

| LED | STATUS | CONDITION |
|------------------------|------------------------------------|---|
| GREEN emitter SUPPLY | ON | Supply |
| YELLOW receiver OUTPUT | ON OFF | ON state output OFF state output |
| RED receiver ALIGNMENT | BRIGHT ON LESS BRIGHT ON OFF | NO alignment Partial alignment or low receiver Good alignment and enough receiver |

MAINTENANCE



IMPORTANT

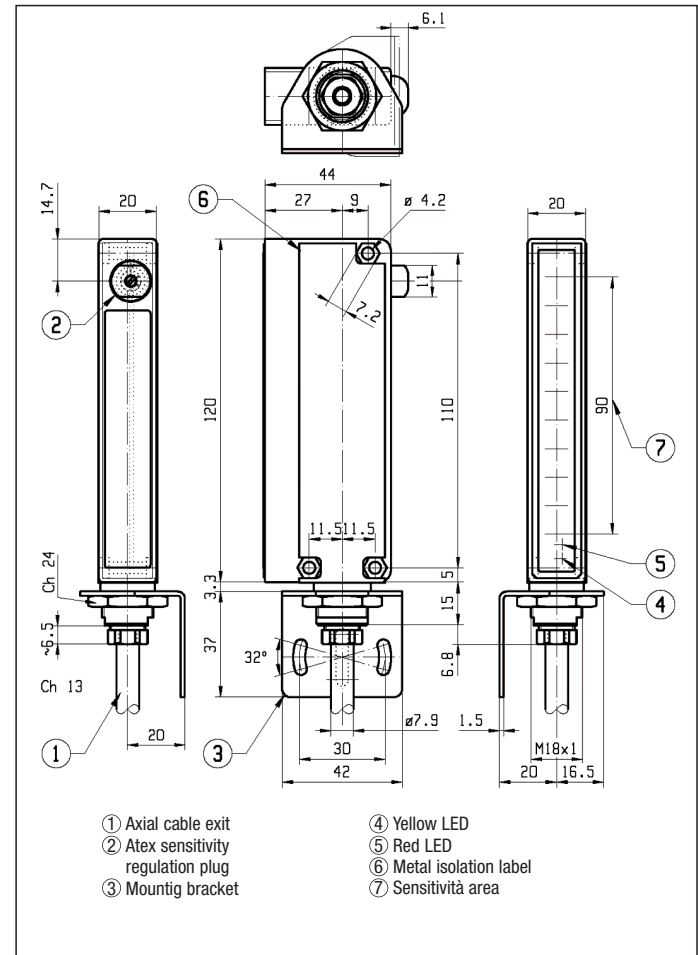
- Only qualified staff must carry out maintenance.
- Any eventual repair relevant to the protection mode must be effected only under specific agreements with MD concerning the procedures to be followed both during the implementation and for the subsequent norms verification.

• The maintenance is a combination of operations carried out with the target of maintaining or restoring a safety electrical construction in order to make it able to fit the specification and effect the required functions.
Such maintenance operations must be carried out according to the CENELEC EN 60079-17 norms now in force.

• A precise maintenance program, studied and managed by qualified technicians must guarantee the maintenance of the original features of the safety electrical constructions.

• The maintenance must guarantee the safety electrical constructions functions integrity and, since safety is a legal obligation, such is also the preservation of the conditions to which it depends.

MECHANICAL DRAWINGS



SPECIFICATIONS

| Model | BX04/**-** | BX10/**-** |
|--------------------------------|--|---------------------|
| Type | Medium resolution area sensor | |
| Nom. Sensing distance (Sn) | 2m | |
| Emission | Infrared (880nm) modulated | |
| Controlled area height | 90mm | |
| Operating distance | 2m | |
| Minimum detectable object | Ø 35° Ø 25° Ø 15°mm | Ø 15° Ø 7.5° Ø 5°mm |
| Differential travel | >10% | |
| Operating voltage | 10 - 26 Vdc | |
| Ripple | ≤ 10% | |
| No-load supply current | 50 mA (emitter) - 25 mA (receiver) | |
| Load current | 100 mA | |
| Leakage current | <10 µA (at VDC max.) | |
| Voltage drop | 2 V at 100 mA | |
| Output type | NPN o PNP - NO Standard* | |
| Response time (light/dark) | 500 µs | |
| Response time (dark/light) | 5 ms | |
| Time delay before availability | 100ms | |
| Supply electrical protections | Polarity reversal, transient | |
| Output electrical protections | Short circuit (autoreset) | |
| Interference to external light | 1000 lux (incandescent lamp) - 1500 lux (sunlight) | |
| LED indicator (emitter) | Green (power and emission) | |
| LED indicator (receiver) | Red (alarm) - Yellow (output state) | |
| Housing material | Valox | |
| Lenses material | Lexan | |
| Tightening torque | 25 Nm | |
| Weight (approx.) | 800g (cable) | |

*1) Guaranteed resolution everywhere in the detection area
*2) Guaranteed resolution in the central part of the detection area with exclusion of the dark zone

*3) As note 2), but with sensitivity adjustment
*4) NC output models available on request
Dark zones are parts of the detection area close to the emitter and the receiver, their amplitude X is proportional to the distance D between the emitter and the receiver.



WARNING These products are NOT safety sensors and are NOT suitable for use in personal safety application

■ BX04: X=0.17D
■ BX10: X=0.06D