Light Curtains
Light Curtains for Doors
Type BFD40E, BFD40S


BFD E


BFD S

- **Flexible and detachable connecting cables, M12 male connector**
- **IP65 versions BFD40x200I and BFD40x250I**
- **IP54 versions BFD40x200 and BFD40x250**

- **Protective screen for doors, generated by light curtains**
- **Two height versions: 200, 250 cm**
- **Diodes position on the edge and on the side of the profile**
- **Output type: static opto-mosfet (70 mA)**
- **Output working mode: NO or NC selectable**
- **PC-ABS plastic housing**
- **Operating range: 12 m**
- **Easy alignment**
- **Door speed: 0.1 to 3 m/s at opening, 0.04 to 1 m/s at closing**
- **Light immunity > 100 kLux**
- **Automatic signal level adjustment**
- **High speed scanning**
- **LED indication for power supply ON, system status and alignment**
- **Dynamic blanking function to recognize beams interruption due to vertical gate or shutter closing**
- **Test function**

Ordering Key

BFD 40 E 200 I

Function
Beams number
Diodes position
Height
Extended IP

Product Description

The BFD series provides the protection of industrial doors (industrial production, automatic stores for cargo monitoring and so on) by means of a light curtain of infrared beams between the emitting and receiving units. It is especially designed to avoid collisions between a vertical gate or shutter which is closing and an object present in the movement area: if at least one beam is interrupted, the system is triggered, making the door controller re-open the door. The transmitting unit (TX) and the receiving unit (RX) are synchronized by a wire connection. The system is able to adjust the power of the signal depending on the distance between the two units, in order to minimize power consumption and ensure maximum lifespan of the components without any maintenance. The test function ensures the internal correct operating of the BFD.

The Output is Normally Closed by default; however, the wires configuration can be changed so as to obtain a Normally Open or a Voltage Free Contact output.
No external control box is required.
The BFD has a special Gate Blanking function that allows the light curtain to distinguish the alarm condition from the proper gate opening/closing function. This feature, always activated, allows the light curtain to be positioned inside the guide rail of the industrial door. The door can move from top to bottom and vice-versa, interrupting the beam pattern with the proper sequence, without causing any alarm.
Alignment status, TEST funcion and syncronization between TX and RX are indicated by LEDs.

Type Selection: light curtain

Height	Diodes/beams number	Protection degree	Diode Position	Output	Supply 10 ÷ 30 VDC
200 cm	40	IP54	Edge	opto-mosfet	**BFD 40 E 200***
200 cm	40	IP65	Edge	opto-mosfet	**BFD 40 E 200 I***
250 cm	40	IP54	Edge	opto-mosfet	**BFD 40 E 250***
250 cm	40	IP65	Edge	opto-mosfet	**BFD 40 E 250 I***
200 cm	40	IP54	Side	opto-mosfet	**BFD 40 S 200***
200 cm	40	IP65	Side	opto-mosfet	**BFD 40 S 200 I***
250 cm	40	IP54	Side	opto-mosfet	**BFD 40 S 250***
250 cm	40	IP65	Side	opto-mosfet	**BFD 40 S 250 I***

*** The part number only refers to the light curtain with an M12 male connector, WITHOUT CABLE**

Type Selection: cable

Length	Diameter	Cable colour	Connection	Reference KIT
4 m	5.2 mm	Black	M12 female connector (TX)	BFDCBL
15 m	5.2 mm	Grey	M12 female connector (RX)	

Output Specifications

Output (TX)	
Type	NC static: opto-mosfet NO configuration selectable by connecting the NONC black wire on RX to ground. Voltage free contact
Load	V_{ON} 2.5 VAC/DC max 70 mA V_{max} 30 VDC (27 VAC rectified)

Supply Specifications

Power supply	Overvoltage cat. 1
Rated operational voltage through brown and blue wires	(IEC 60664) 10 to 30 VDC 18 to 27 VAC rectified
Rated operational current	
TX	max. 50 mA
RX	max. 15 mA

General Specifications

Operating range	0 ÷ 12 m
Protected height	
BFD40x200x	20.5 to 1846 mm
BFD40x250x	20.5 to 2528 mm
Distance between the diodes	
BFD40x200x	46.8 mm
BFD40x250x	64.3 mm
Light immunity	> 100 kLux
Start-up time	1800 ms @ 12 m 1300 ms @ 4 m
Reaction time	
BFD40xxxxx	50 ms @ uniform illum. (L) + 5 ms if | L-Lmax | > 30 kLux
Alarm OFF delay	500 ms
Angular mounting tolerance	
Vertical	± 2.0° (@ 3 m)
Horizontal	± 2.0° (@ 3 m) (see details in the Mounting Tolerance Diagrams)
Linear mounting tolerance	
Vertical	± 2.0 mm (@ 0 m)
Horizontal	± 2.0 mm (@ 0 m) (see details in the Mounting Tolerance Diagrams)
RX-TX synchronization	By wire
Transmitting signal power level	Self-adaptative, depending on the distance between TX and RX
BFDCBL KIT cable (To be ordered separately)	
Connecting	Detachable, 5 x 24AWG PVC, not shielded
Length	
TX	4 m (Black jacket)
RX	15 m (Grey jacket)
Diameter	5.2 mm

Test function	Selectable by connecting white wire on RX to GND (see Mode of Operation)
Dynamic Blanking function	Automatic
Distance between bottom beam and bottom of housing	13.7 mm
Distance between top beam and bottom of housing	
BFD40x200x	1838.7 mm
BFD40x250x	2521.0 mm
LEDs indication	
TX	2 red
RX	2 red (see details in the LEDs Indication tables)
Indication LEDs position	Approx. 10 cm from the top of the housing
Environment	(EN 60529)
Degree of protection	
BFD40x2x0	IP54
BFD40x2x0I	IP65
Pollution degree	3
Operating temperature	-20 to +55°C, R.H. < 95%
Storage temperature	-20 to +65°C, R.H. < 95%
Housing (TX, RX)	
Dimensions (W,H,L)	
BFD40E200x	29.9 x 2001 x 9.7 mm
BFD40E250x	29.9 x 2677 x 9.7 mm
BFD40S200x	16.4 x 2009 x 26 mm
BFD40S250x	16.4 x 2706 x 26 mm
Material	Plastic (PC-ABS)
Weight (TX, RX)	Approx. 1 Kg
Mounting	Static
Approvals	UL, CSA
CE Marking	Yes
EMC	Electromagnetic Compatibillity
Immunity	According to EN 61000-6-1
Emission	According to EN 61000-6-3

CARLO GAVAZZI

Function Setting

Output selection.
If the NONC (black) wire is not connected, the BFD is in NC output configuration.

Select the NO output function by connecting the NONC wire on RX to ground.

Test function.
If the TEST(white) wire on RX is not connected, the Test function is not enabled.

Select the Test function by connecting the TEST wire to GND.

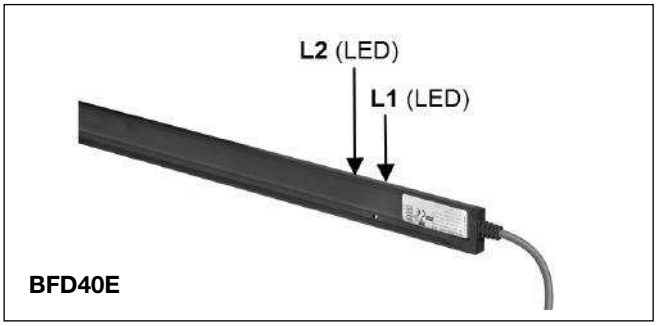
LEDs Indication

TX LED	Status	Description
L1 (red)	OFF ON	• Test OFF • Running test
L2 (red)	ON OFF Flashing	• Power supply ON/ Transmitter operating • Unit not supplied • Wrong TX-RX transmission

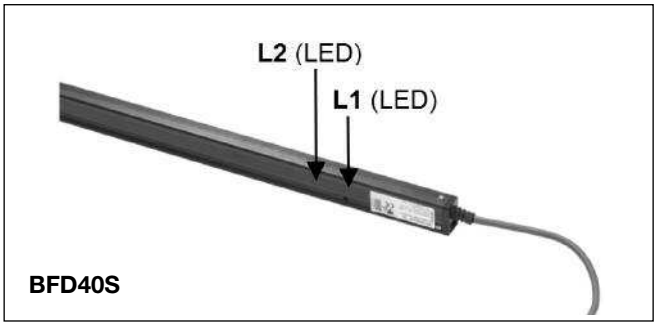
RX LED (BFD40E)	Status	Description
L1 (red)	ON OFF Flashing	• Power supply ON/ Receiver operating • Unit not supplied • Alarm condition
L2 (red)	OFF ON	• Good alignment • Wrong alignment

RX LED (BFD40S)	Status	Description
L1 (red)	OFF ON	• Good alignment • Wrong alignment
L2 (red)	ON OFF Flashing	• Power supply ON/ Receiver operating • Unit not supplied • Alarm condition

LEDs Position



BFD40E



BFD40S

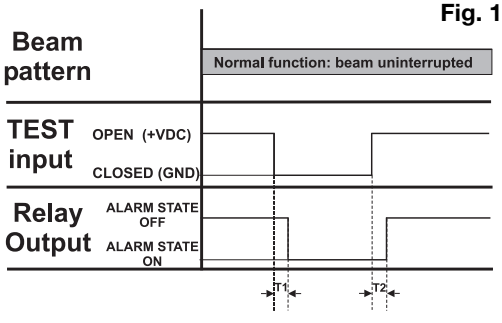
Mode of Operation

Provided with heigths of 200 or 250 cm, the BFD series ensures a beams pattern produced by infrared diodes. The BFD can be connected directly to the door-controller if it can provide 10 ÷ 30 DC voltage.
If one or more beams get obstructed, the NC(NO) output on the TX operates.

Test function
Since BFD is used for safety operations in the door movements, appropriate measures have to be implemented by the user in order to maintain the required safety level. Its safe functioning can be guaranteed using a test signal and a supervision of the output response of the test input signal (Figure 1C). When the door is open and every time the system is switched on, the door controller has to provide an appropriate test signal and it must prevent the closing of the door if the test is not carried out or is not successful. This test signal puts BFD into a test mode whereby the device checks all relevant safety circuits including the static output. If this internal test is successful and the test signal is floating, the BFD output will follow the state of the light curtain. If this test fails, the BFD output remains in the 'OFF' state and prevents the door from operating. Only if this test is successful, the door is allowed to operate.
This test sequence must be implemented otherwise a safe operation cannot be guaranteed!

Test function mode of operation
1) Once the door is in the upper end position, the test input must be connected to GND, so that the test can be carried out. The light curtain will start testing its internal safety functions. Within 90 ms after the test signal is connected to GND, the BFD output is switched off. The external safety circuit performing the Test has to check this change in the BFD output. If no changes are detected, the test has to be considered failed and the

Fig. 1C



T1 <= 90 ms
T2 <= 90 ms

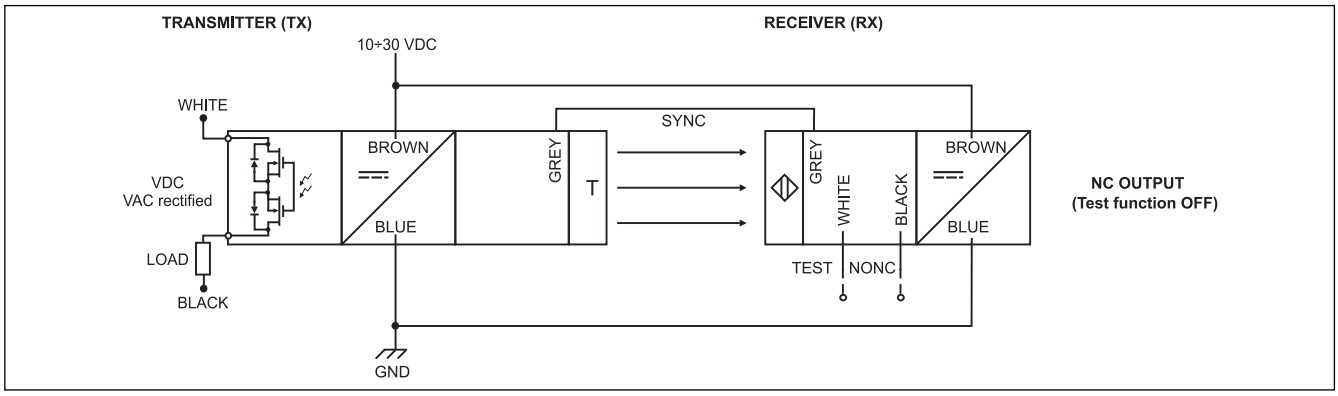
Mode of Operation (cont.)

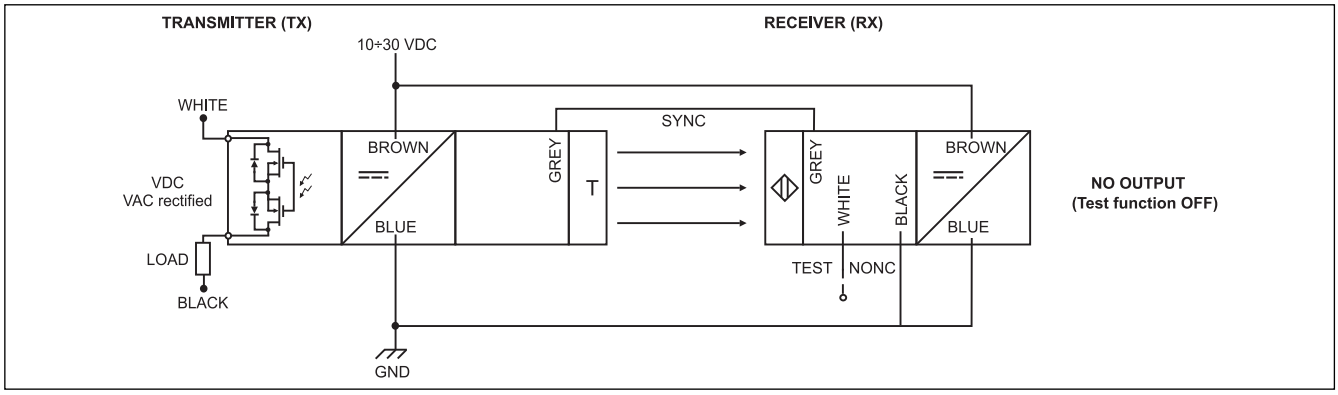
external circuit must prevent the door from closing until the test will be successful.
2) If this test has been completed successfully (no error), and all light beams are uninterrupted, the BFD output changes its state to 'ON' following the timing in figure 1C and allows the door to move.
3) If the internal safety check detects a failure of BFD, it means that the device has lost its safety functionality; the status of the BFD output remains in the 'OFF' state and will not allow the door to move.
Once the test is finished, pay attention when disconnecting the TEST wire.

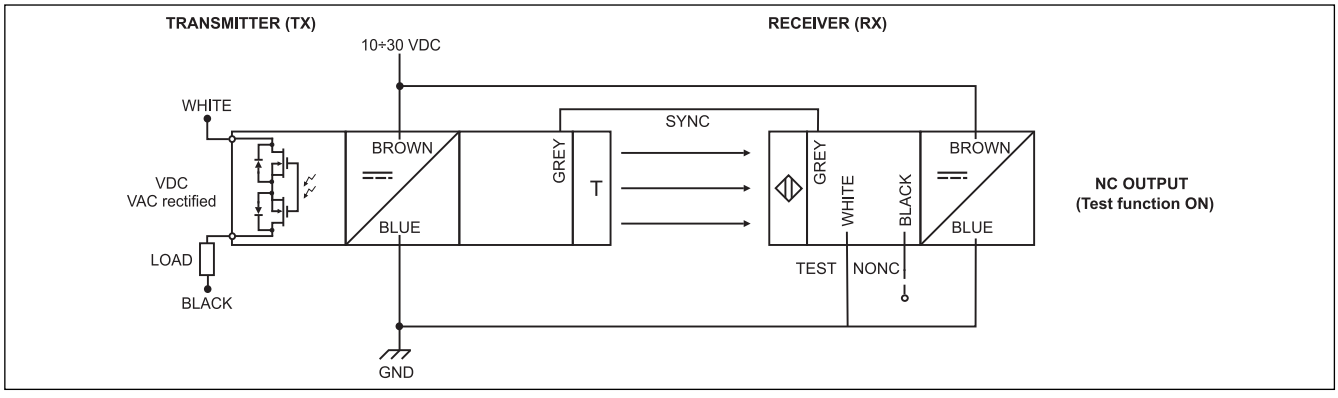
To ensure the required safety level, the BFD light curtain must be used with a NC closed output, so the black wire on the receiver must be not connected.

Dynamic blanking function
This function allows the detectors to be mounted into the industrial door rail. Provided that the relevant function is always activated, the light curtains allows the door to open/close without any intervention.
The system is always able to detect an object, but can ignore the door movement if it travels from top to bottom (or vice-versa).
The gate must not stop during ascent and discent phase, till the end, otherwise the output operates.

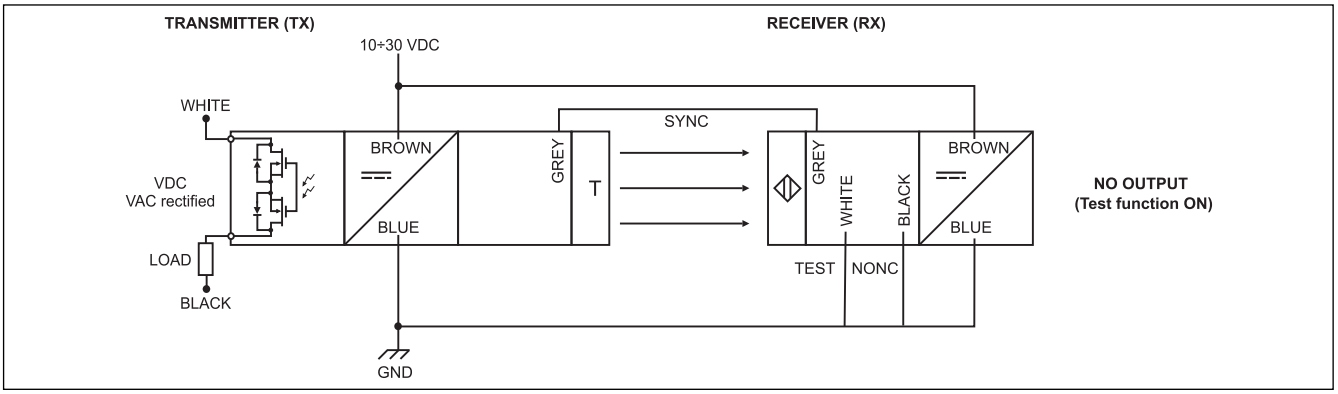
Wiring Diagrams



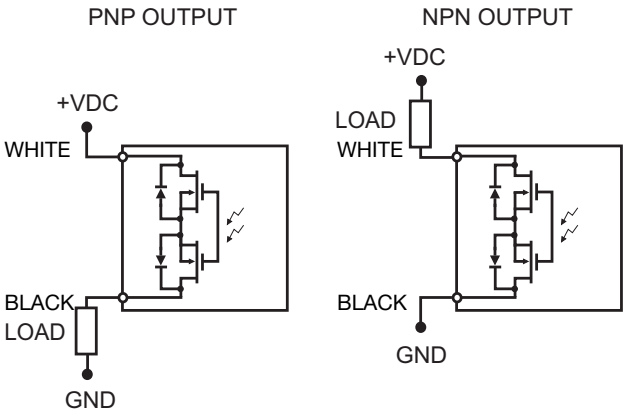




Wiring Diagrams (cont.)

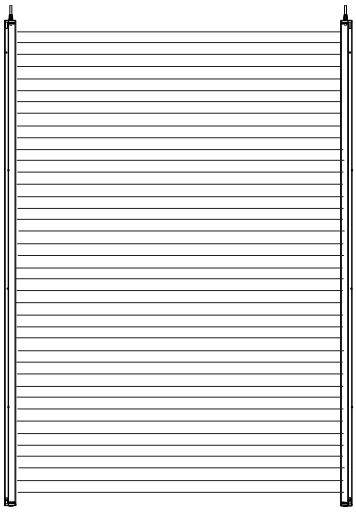


The connection to VDC and GND does not depend on the cable color sequence (black or white).

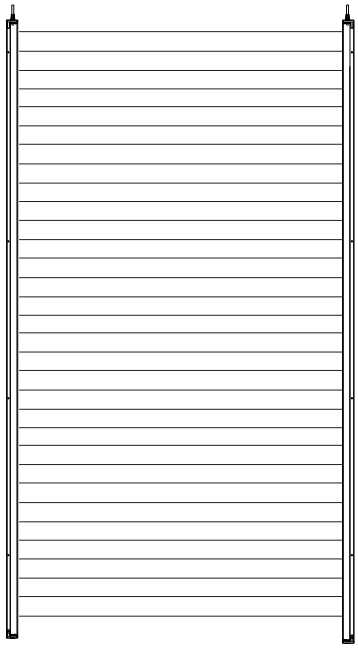


Beam Pattern

BFD40x200x

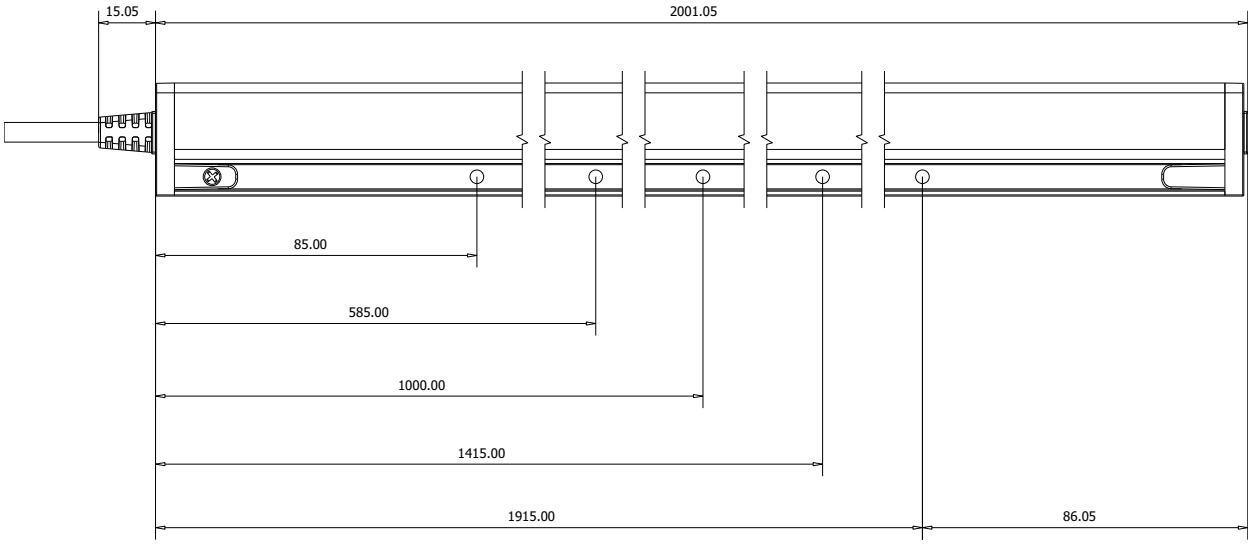


BFD40x250x

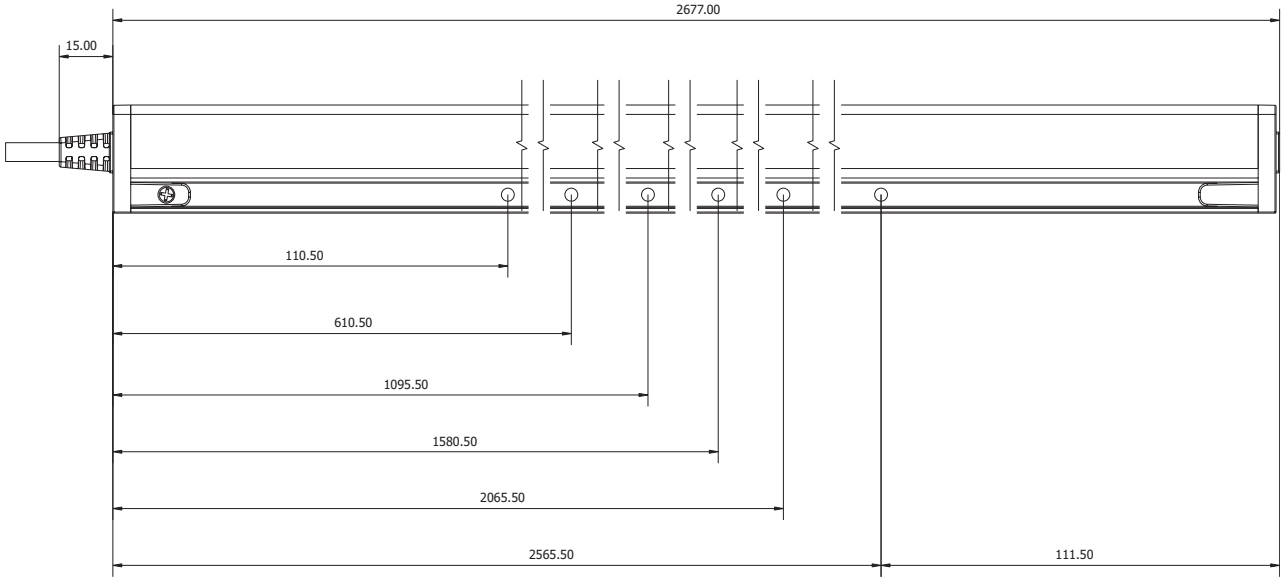


Dimensions BFD40Exxxx

BFD40E200x

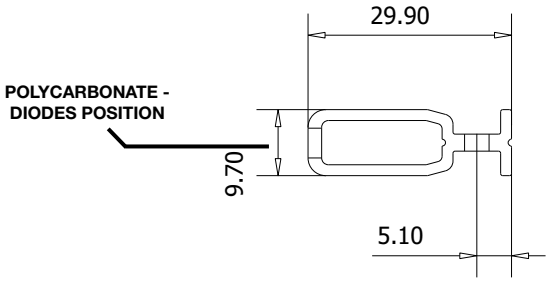


BFD40E250x

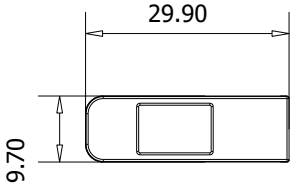


BFD40Exxxx

Section

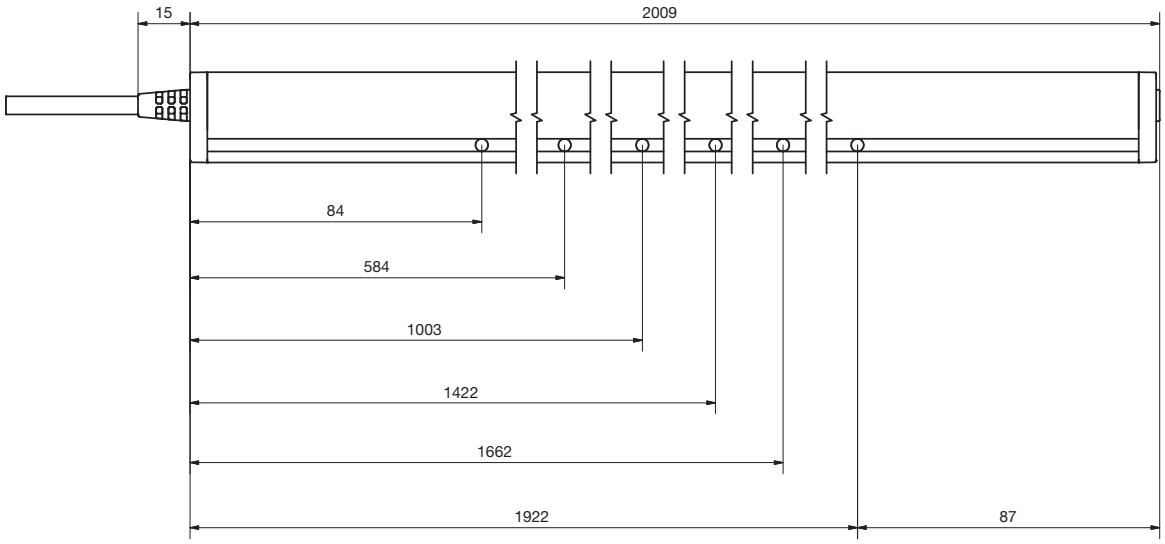


End-cup view

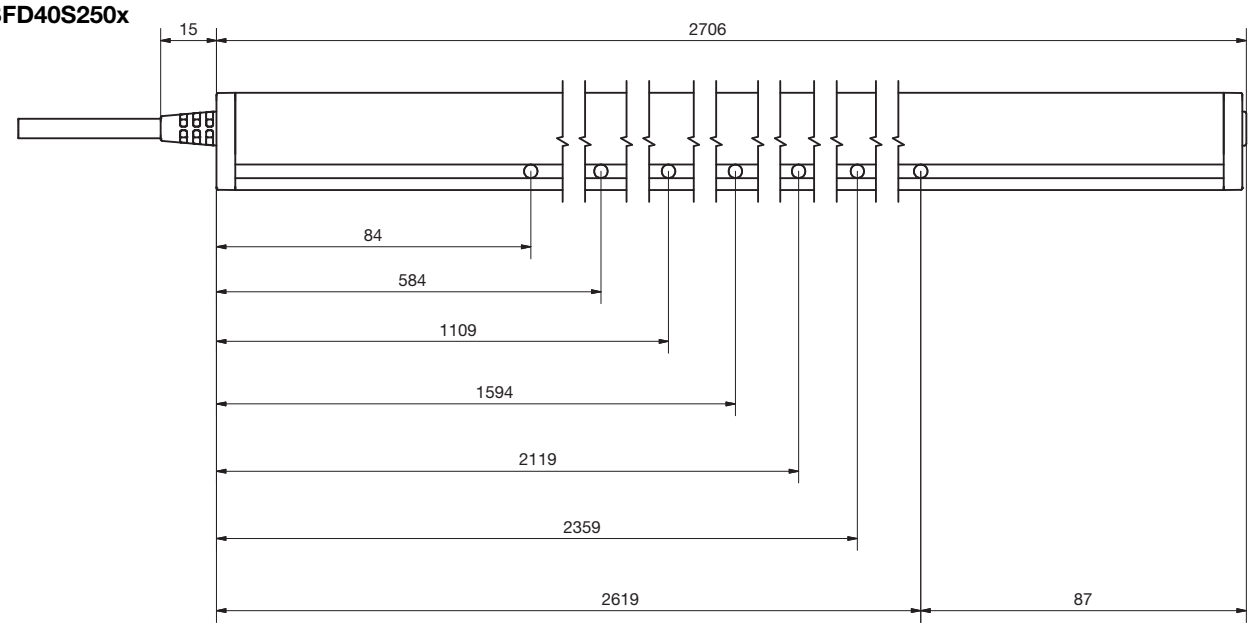


Dimensions BFD40Sxxxx

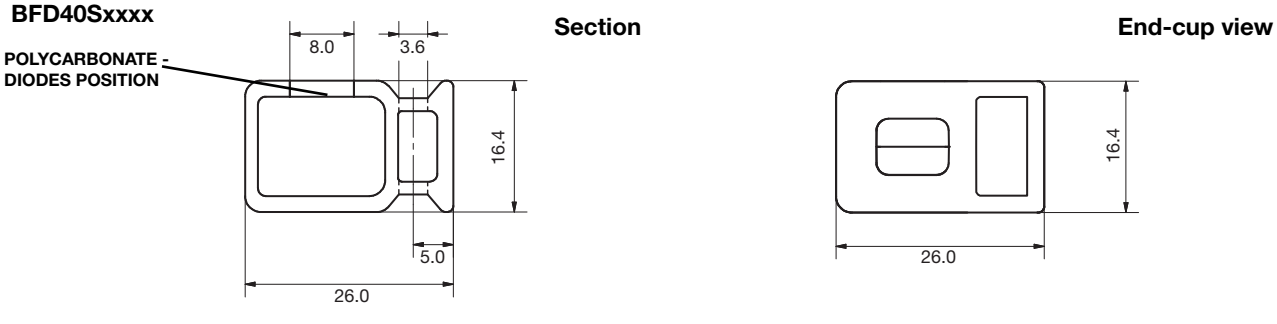
BFD40S200x



BFD40S250x



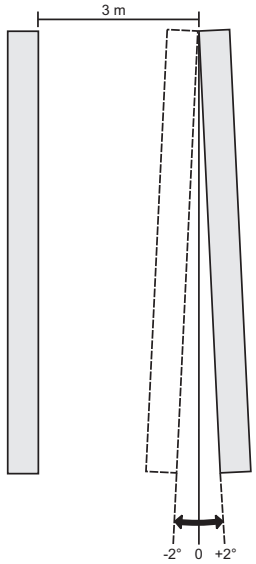
BFD40Sxxxx



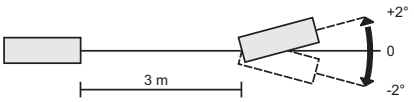
Mounting Tolerance Diagrams

Angular mounting tolerance

Vertical



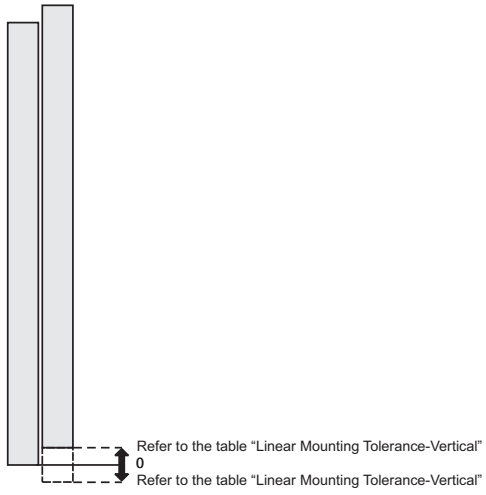
Horizontal



Angular mounting tolerance	
Vertical	Horizontal
± 2.0° (@ 3 m)	± 2.0° (@ 3 m)

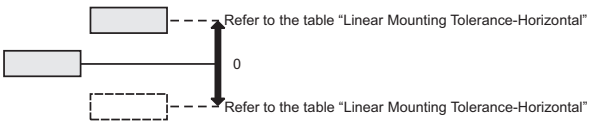
Linear mounting tolerance

Vertical



Linear Mounting Tolerance-Vertical	
Distance RX-TX (m)	Alignment tolerance (cm)
0	0.2
3	8
6	16
12	32

Horizontal



Linear Mounting Tolerance-Horizontal	
Distance RX-TX (m)	Alignment tolerance (cm)
0	0.2
3	9
6	18
12	36