SB Series AIR Beam Detectors Installation Manual

EN SB Series AIR Beam Detectors Installation Manual

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Content

Introduction

The SB250-N / SB2100-N two-beam detectors and the SB450-N / SB4100-N / SB4200-N four-beam detectors generate an alarm when 1 or 2 beams are interrupted, ignoring birds, small animals, dead leaves etc.

They consist of two identical detector modules equipped with detector cells integrating both transmission and reception functions. These modules are installed facing each other over the distance to be protected providing a non-physical invisible detection zone.

Detectors are based on a system of pulsed infrared beams, and operate on four user-selectable frequencies (channels), which allow avoiding any risk of interference between detectors.

The SB450-N and SB4100-N barriers have 2 operating modes suitable for different types of installation (see “Operating modes” on page 11):

- “AND” mode: Simultaneous obstruction of two adjacent cells
- “OR” mode: Obstruction of one of the cells

Refer to “Installing modules in columns” on page 14 for detailed information on infrared barriers functionality in columns.

General features

- Maximum outdoor range:

  - SB250-N : 50 m

  - SB2100-N : 100 m

  - SB450-N : 50 m

  - SB4100-N : 100 m

  - SB4200-N : 200 m

  The range of an infrared detector depends directly on visual range.

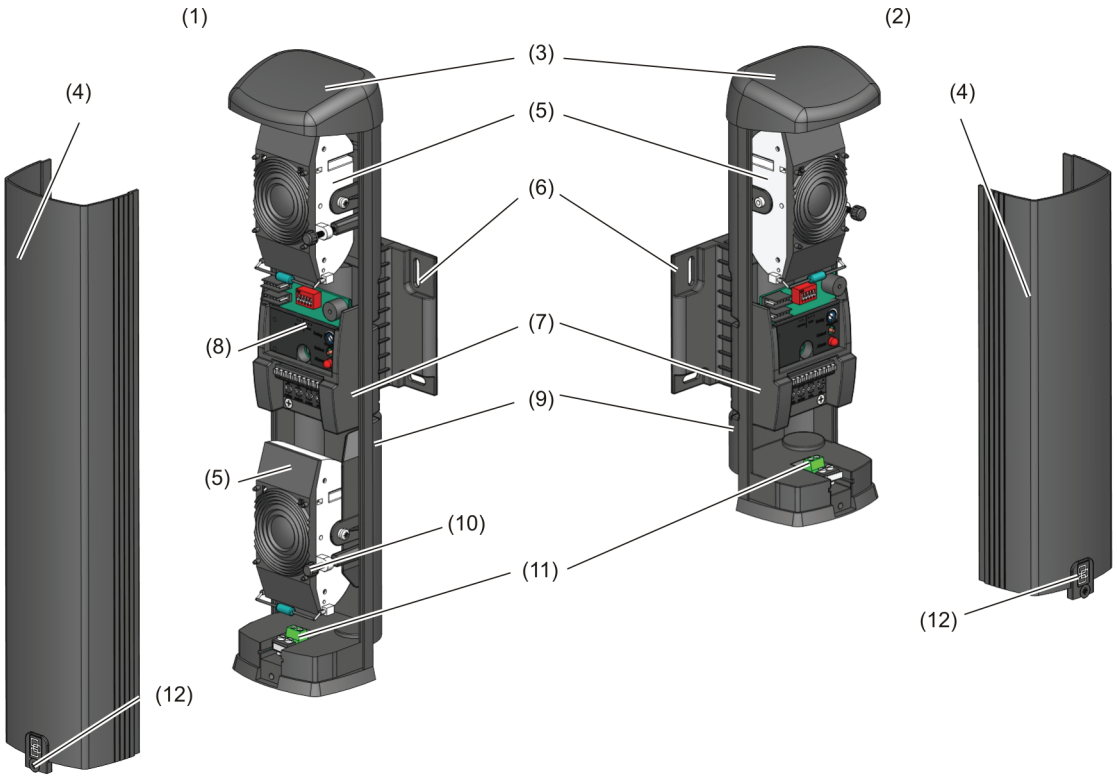
  Maximum range of an infrared cell according to visibility:

  - When visibility is 200 m, the range is 200 m.

  - When visibility is 60 m (dense fog), the range is 100 m.
- Four user-selectable frequencies (channels) for distinguishing between different detectors.
- SB250-N and SB2100-N detectors are equipped with one cell.
- SB450-N, SB4100-N and SB4200-N type detectors are equipped with two cells dual-beam.
- 2 operating modes for SB450-N and SB4100-N: “AND” and “OR”.
- SB250-N, SB2100-N and SB4200-N have only 1 operating mode: “AND”.

Detector layout

Figure 1: Detector layout



(1) 2 cells module, type SB450-N / SB4100-N / SB4200-N

(2) 1 cell module, type SB250-N / SB2100-N

(3) Top plate

(4) Infrared cover

(5) Dual-beam cell

(6) Adjustable support

(7) Terminal block

(8) Horizontal direction locking screw

(9) Chassis

(10) Vertical cell alignment

(11) Cover removal tampers

(12) Fixing staple for infrared cover

Accessories supplied

- 8X Ø3.9x13 screws for fixing to column
- 1X Installation manual

Installation

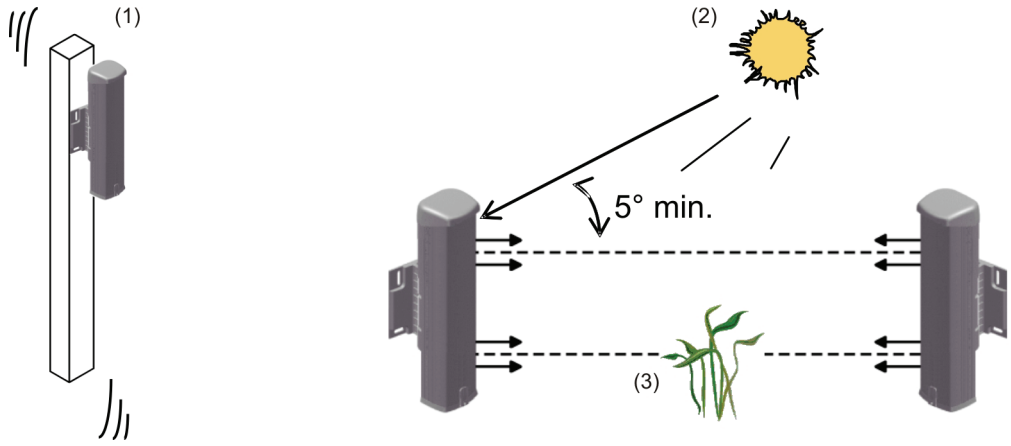
General guidelines

See Figure 2 below.

To install the detectors correctly, certain rules must be followed.

- Do not place the detector on an unstable support (such as a mesh or a poorly fixed post). See item 1.
- Do not position the module facing direct sunlight (item 2).
- Make sure that no vegetation interrupt the cells (item 3).

Figure 2: Potential causes of instability



Detector mounting

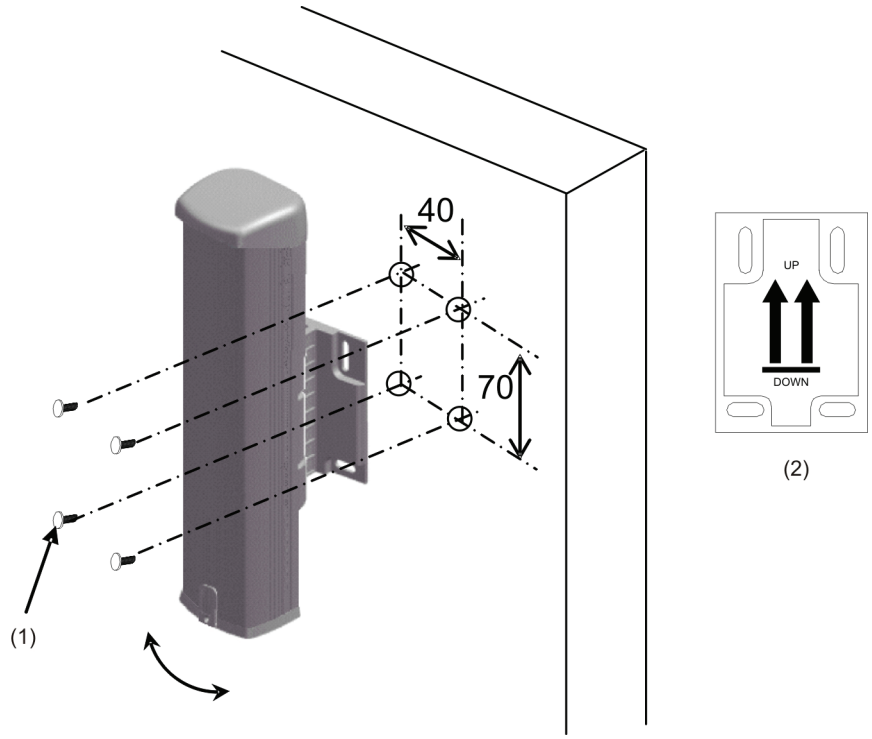
To attach the detectors to a metallic support, drill 4 holes measuring 3 mm and use the sheet metal screws provided.

To fix the detectors to a wall, use appropriate screws and wall plugs for the type of wall (we recommend at least Ø5 x 30 screws).

- Drill 4 holes and insert wall plugs.
- Position the holes in the adjustable support over the wall plugs.

Note: Rotate the module to be able to reach the screw holes in the adjustable support (see Figure 3 on page 5).

Figure 3: Wall mounting



(1) 4 screws

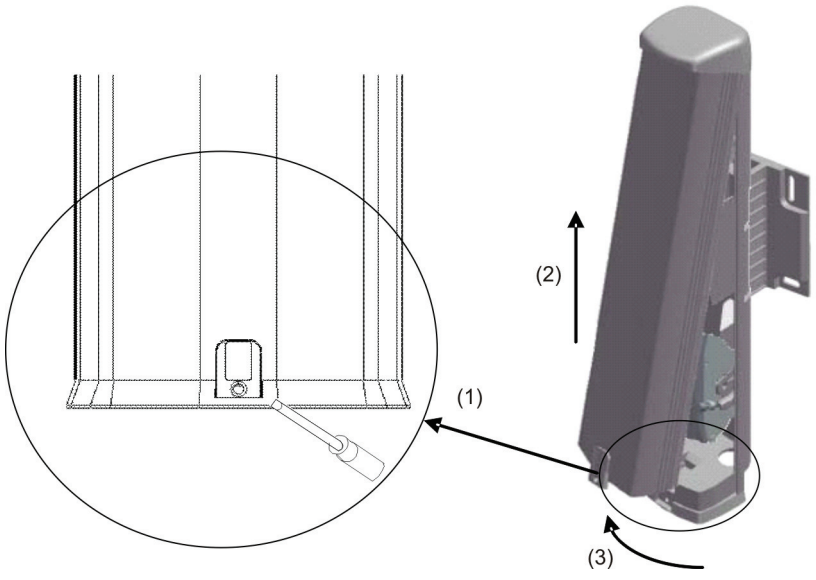
(2) Rear view of the adjustable bracket

Removing the infrared cover

See Figure 4 below.

1. Remove the screw attaching the infrared cover, taking care not to lose the staple (item 1).
2. Slide the cover upwards until it is stopped by the top plate (item 2).
3. Pull the cover outwards from the grooves in the chassis to remove it (item 3).

Figure 4: Removing the infrared cover

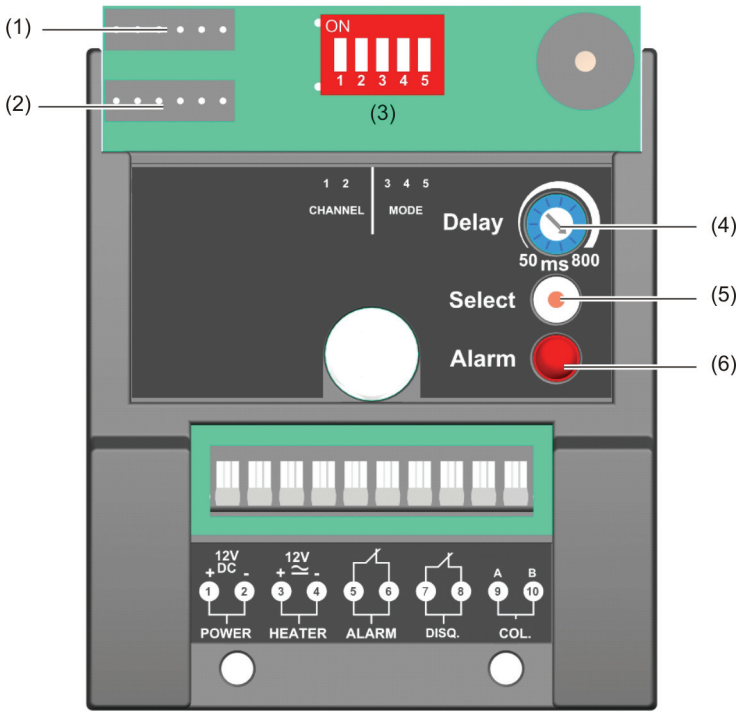


Wiring

We recommend that different power supplies are used for the module and heating.

Note: When using guillotine connectors, put the wire in the connector, and then pull it out slightly so that it tightens.

Figure 5: Terminals and controls



Item	Description	Note
(1)	Top cell	
(2)	Bottom cell	
(3)	DIP switches	Channel selection (1 and 2) Operating mode selection (3 to 5)
(4)	Delay adjustment	An adjustment of the response time of the intrusion alarm (50 to 800 ms)
(5)	Selection button	Select alignment mode Select cells in alignment mode
(6)	Alarm LED	Intrusion alarm / disqualification (blinking) Level of the signal in alignment

Table 1: Terminals

Terminal	Description
1	“+” Power
2	“−” Power
3	“+” Heating

Terminal	Description
4	“–” Heating
5	NO intrusion relay
6	COM intrusion relay
7	NO disqualification relay
8	COM disqualification relay
9	A column synchronization [1]
10	B column synchronization [1]

[1] See “Installing modules in columns” on page 14.

DIP switch settings

Table 2: DIP switch 1 to 2 - channel selection

Switch 1	Switch 2	Function
OFF	OFF	Channel 1
ON	OFF	Channel 2
OFF	ON	Channel 3
ON	ON	Channel 4

See “Channel selection” on page 10 for more details.

Table 3: DIP switch 3 to 5 - operating modes

Switch 3	Switch 4	Switch 5	Function
OFF	OFF	ON	Single module in “AND” mode
OFF	OFF	OFF	Single module in “OR” mode
OFF	*ON*	*OFF*	*“Slave” mode with low beam enabled*
OFF	*ON*	*ON*	*“Slave” mode with low beam disabled*
ON	*OFF*	*OFF*	*“Master” mode with the mono detection column*
ON	*OFF*	*ON*	*“Master” mode with double detection column*
ON	ON	OFF	Not used
ON	ON	ON	Not used

See “Operating modes” on page 11 for more details.

Cable diameter and length

Table 4: Length of 12V DC power cable (m) (screened SYT1-type)

Ø of wire (mm)	Cross-section area wire (mm²)	SB250-N	SB2100-N	SB450-N	SB4100-N	SB4200-N
0,6	0,3	159	159	136	136	136
0,9	0,6	359	359	307	307	307
1,4	1,5	800	800	684	684	684

Table 5: Length of 12V AC/DC heating cable (m) (screened SYT1-type)

Ø of wire (mm)	Cross-section area wire (mm²)	SB250-N	SB2100-N	SB450-N	SB4100-N	SB4200-N
0,6	0,3	94	94	47	47	47
0,9	0,6	211	211	105	105	105
1,4	1,5	470	470	235	235	235

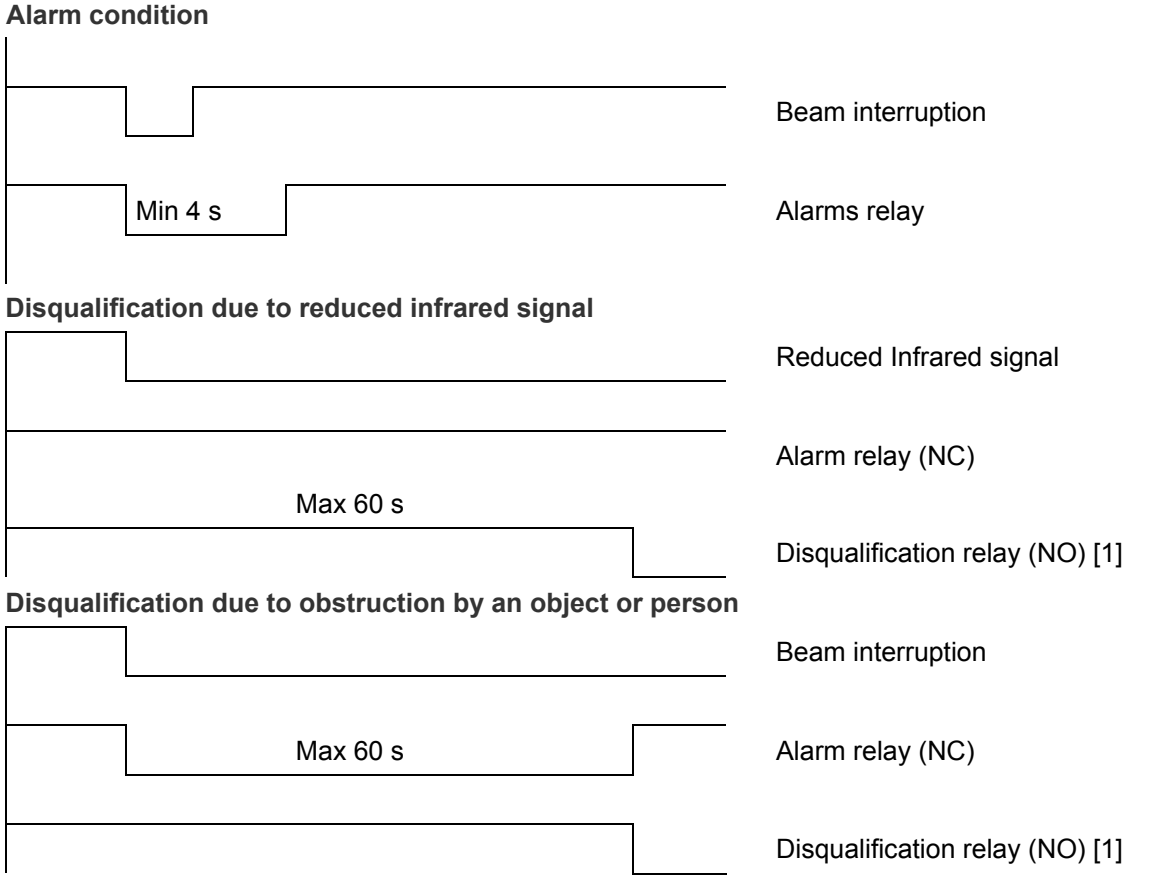
Note: If a single cable is used to supply power to several elements, the distance given should be divided by the number of elements connected to the cable. If several wires of the same cross-sectional area and polarity are placed in parallel, the distances given should be multiplied by the number of wires.

Alarm and disqualification relay

When infrared signal is significantly reduced (for example, fog, heavy rain, etc.) then the disqualification relay will be triggered after 60 s and the Alarm LED will blink.

In case of obstruction of the beams (for example, by an object or a person) for more than 60 s, first alarm relay will be triggered, then disqualification relay will be triggered and alarm relay will be reset (see Figure 6 on page 9 for details).

Figure 6: Relay response



[1] This releases the alarm relay when there are several alarm relays connected in series (for example, different modules in one pillar). If this option is not required, connect the alarm and disqualification relays in series.

Connecting the tamper detection contact

Remove the PCB at the bottom of the module, connect the two wires and then replace the PCB sliding it in the two grooves until it can go no further, and taking care not to twist the contact strip.

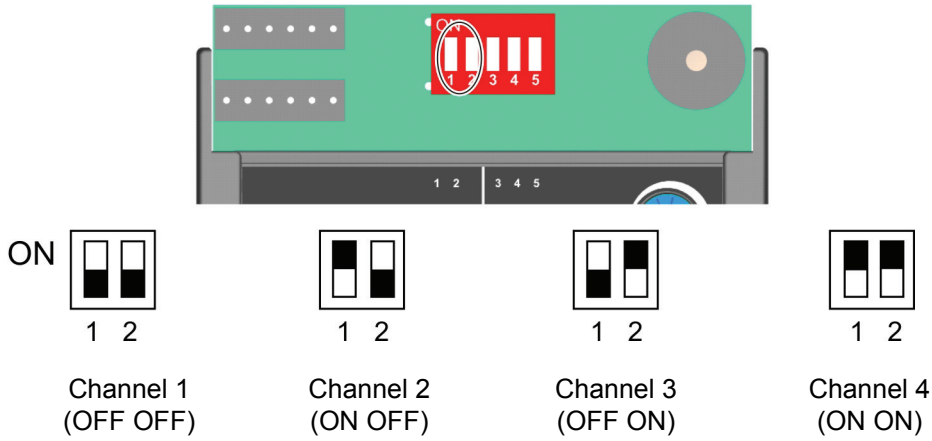
Configuration

Channel selection

To avoid different detectors on the same site interfering with each other, they are equipped with 4 user-selectable frequencies (channels).

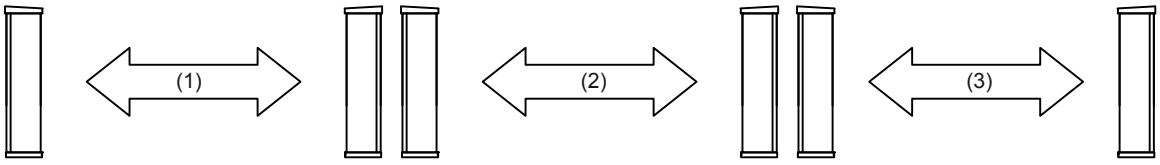
Each of 2 modules composing the detection area must be set with the same number of channel. This configuration is done using DIP switches 1 and 2 on the top of the terminal block. The channel is validated once the detector is powered on. (Switching channels once the detector is powered up has no effect on the channel selection).

Figure 7: Channel selection switches



When the detectors are placed in the same alignment (see Figure 8 below), allocate different channels to each detector, channel 1 (item 1) to channel 3 (item 3).

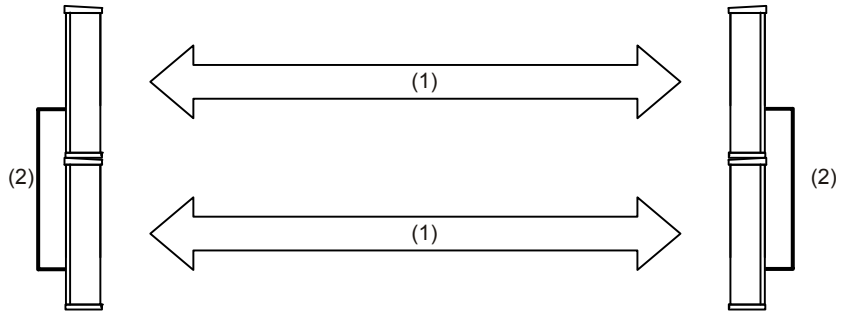
Figure 8: Multiple channels example



(1) Channel 1 (1) Channel 2 (1) Channel 3

When the detectors are placed one on the top of the other (see Figure 9 below), allocate the same channel to each detector and relay them to each other by the synchronization link in Column mode.

Figure 9: Single channel example



(1) Channel 1 (2) Inter-module connection

Operating modes

The SB450-N and SB4100-N barriers can operate in 2 modes:

- “AND” mode: simultaneous obscuration of 2 dual-beam cells to trigger the intrusion alarm.
- “OR” mode: obscuration of one of the dual-beam cells to trigger the intrusion alarm.

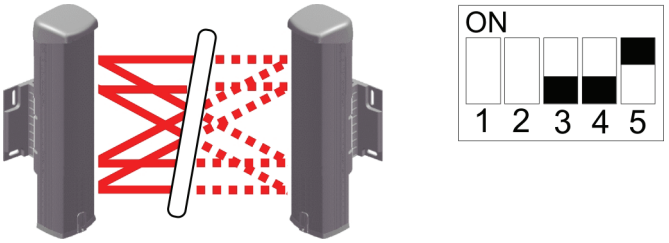
The mode is selected with DIP switches 3 to 5. The DIP switch location is shown in Figure 5 on page 6.

See Figure 10 on page 12 for modes illustration and DIP switch settings.

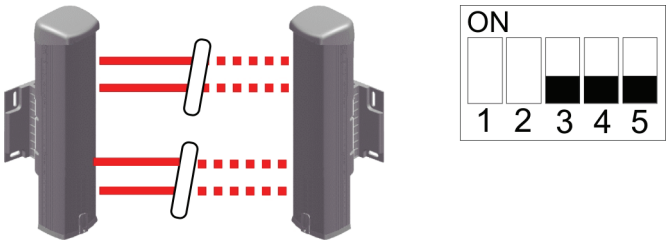
Caution: The DIP switches settings must be identical on both of 2 associated modules. In OR mode, the response time must be also equal.

Figure 10: Operation modes

“AND” mode:



“OR” mode:



Caution: Adjust the intrusion alarm response time by using the potentiometer as described in “Response time” on page 23. It will adapt the detection sensitivity of the barrier to the environment. A long response time decreases the sensitivity.

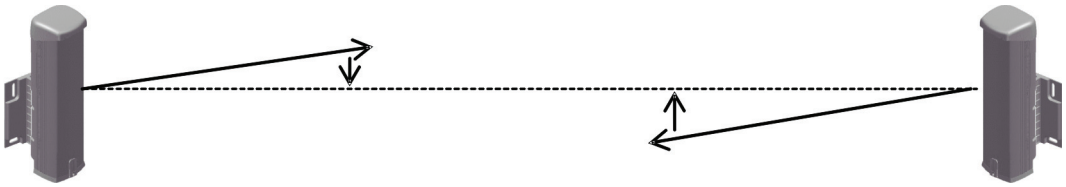
Note: Mode selection is only available in all 2 cell modules beams (SB450-N and SB4100-N), except for the SB4200-N, which only supports the “AND” mode

Caution: The selected operating mode is activated during barrier power-up. Any change of appropriate the DIP switch setting has no effect until the detector power supply is reconnected.

Single module alignment and settings

Optical alignment

Figure 11: Optical alignment

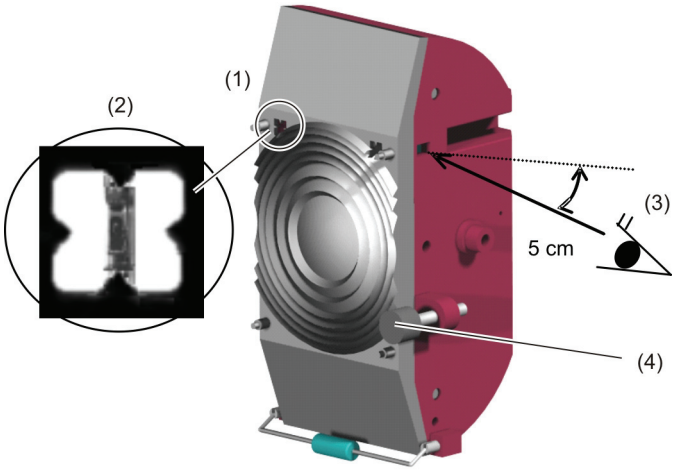


This alignment consists in lining up the optical axes of the modules installed facing each other.

This basic alignment adjustment is performed for each module using the integrated sighting system.

Aligning the cells visually

Figure 12: Visual alignment



(1) Viewfinder

(2) Viewfinder image

(3) Oblique angle

(4) Vertical adjustment thumbscrew

To align the detector:

1. Slightly unscrew the module's adjustable support.
2. Position your eye at an oblique angle about 5 cm from the module as shown in Figure 12, item 3.
3. Look in the mirror inside the module to see the image (item 2) of the module opposite through the viewfinder (item 1) in the side of the cell.

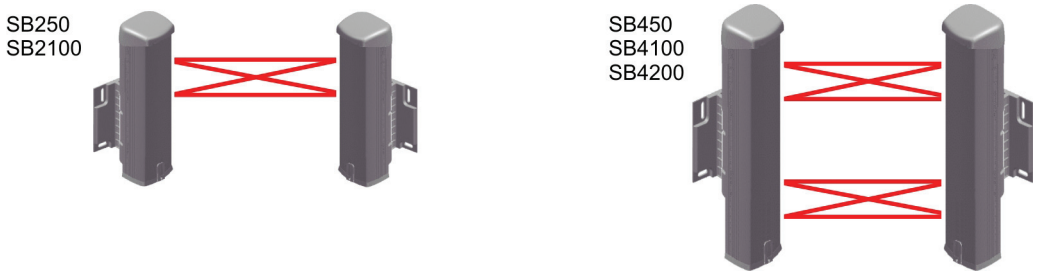
   - Horizontal alignment: Rotate the adjustable support by up to 90°.

   - Vertical alignment: Turn the thumbscrew (item 4) by up to 10°.

Once the optimal alignment has been achieved, tighten the screw of the adjustable support to lock horizontal rotation.

Optimization of the detector alignment (without module synchronization)

Figure 13: Optimization of the detector alignment



1. Power cycle the unit (module)

   - The buzzer beeps 1 time for SB250-N and SB450-N.

   - The buzzer beeps 2 times for the SB2100-N and SB4100-N.

   - The buzzer beeps 3 times for the SB4200-N.

2. Hold down “Select” button (for at least 2 seconds) until the buzzer beeps 2 times.

   The red LED blinks once and the buzzer sounds one long beep to indicate the alignment of the bottom cell.

3. Rotate the cell until the buzzer sound becomes continuous and the alarm LED lights up continuously.

   - SB250-N, SB2100-N, SB450-N and SB4100-N: the alignment must be done cell by cell.

   - SB4200-N: the alignment most be done on both cells simultaneously.

   See “Alignment status indication” below for status indication details.

4. For the SB450-N and SB4100-N modules, switch to the next cell by pressing “Select” button. Blinks of the alarm LED and buzzer beeps are indicating the number of the cell to be aligned.

   Rotate the cell until the buzzer signal becomes continuous and the alarm LED lights up continuously.

To exit from the alignment mode, hold down “Select” button for more than 2 seconds until the buzzer beeps 2 times.

Alignment status indication

Table 6: Alignment status indication

Red LED status	Buzzer status	Alignment status
Slow blink	Slow beep	Bad
Quick blink	Quick beep	Good [1]
Fixed light	Continuous sound	Excellent

Note: In absence of a signal, the buzzer beeps one time per second.

[1] The modules SB4200-N, if the continuous beep cannot be reached, try to obtain the quickest beep that is possible.

Installing modules in columns

It is possible to combine up to 4 modules in one column. Table 7 below shows the compatibility of detector models in one column.

Table 7: Detector models compatibility

	SB250-N	SB450-N	SB2100-N	SB4100-N	SB4200-N
SB250-N	Yes	Yes	No	No	No
SB450-N	Yes	Yes	No	No	No
SB2100-N	No	No	Yes	Yes	No
SB4100-N	No	No	Yes	Yes	No
SB4200-N	No	No	No	No	Yes

We do not recommend mixing detectors of different generations (for example, SB250 and SB250-N) or brands in a same column.

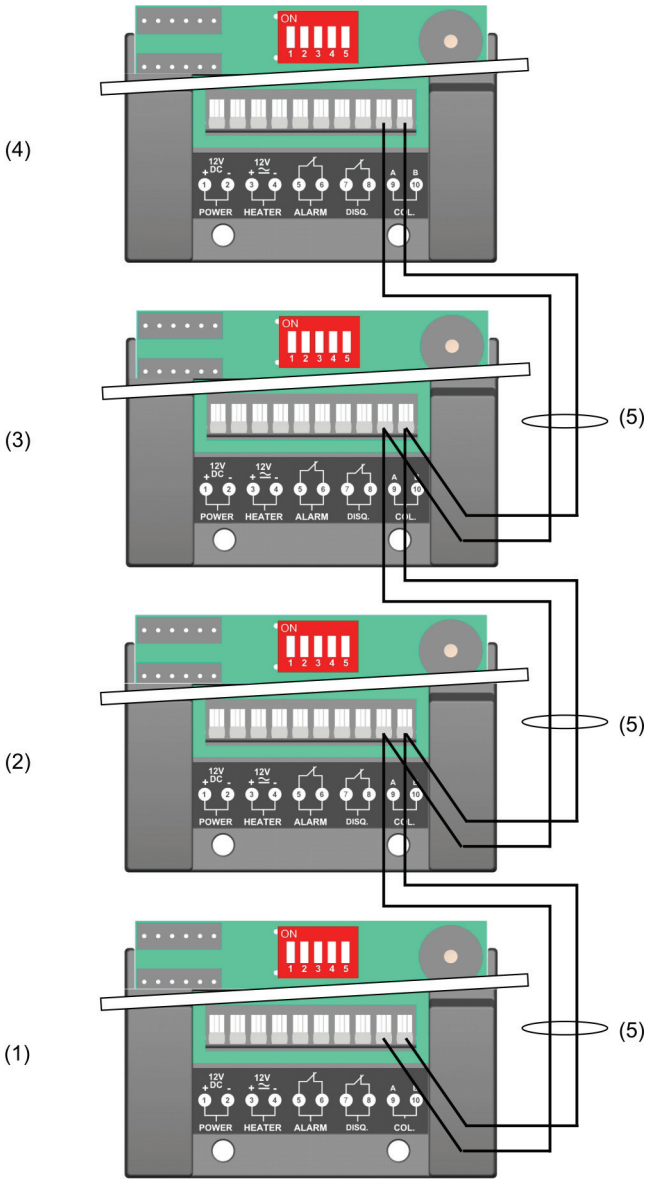
Connections

Mount the modules as described in “Installation” on page 4.

Connect the modules between themselves via the inter-module connections A and B (connect the A’s to the A’s and the B’s to the B’s).

Recommendation: wire the alarm relays on the module 2 (the second module from the bottom of the column) because this module is recommended to be selected as “Master”.

Figure 14: Multiple module wiring



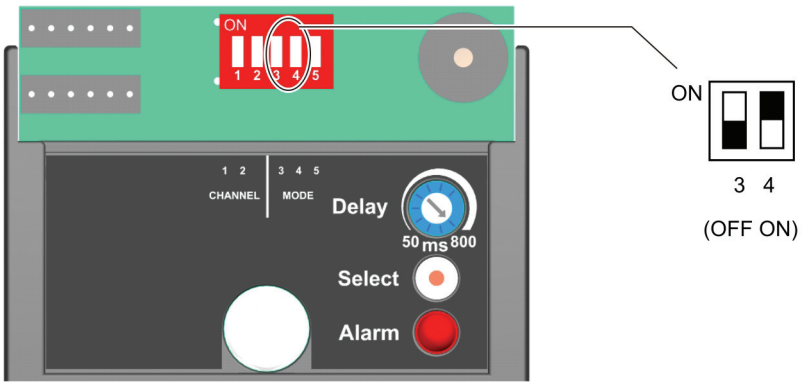
(1) to (4) Modules 1 to 4

(5) Inter-module connection

Setting “Slave” mode

Put all the modules in “Slave” mode: switch 3 on OFF and switch 4 on ON.

Figure 15: Slave mode



Caution: All the switch configurations of the modules of one column must be the same as the modules opposite on the other column that constitutes the barrier.

Module numbering

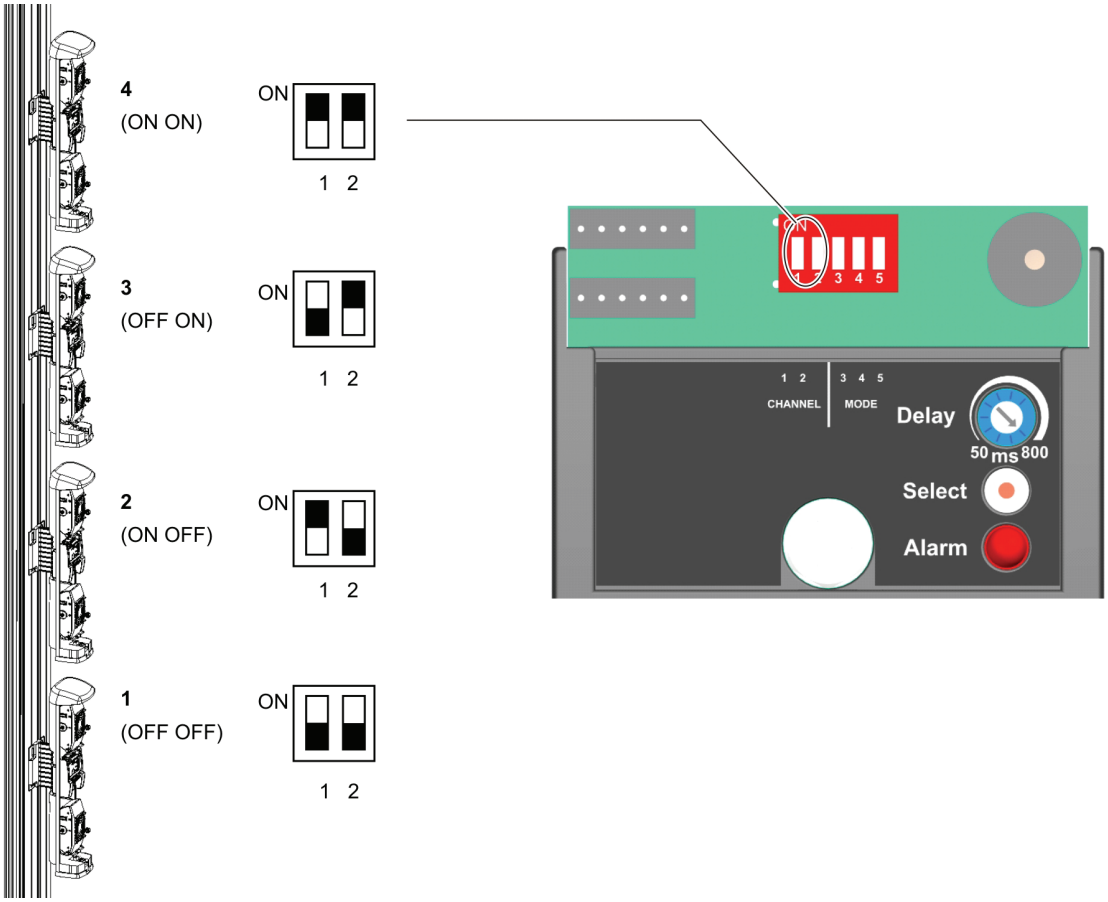
Determine positions of the modules inside a column.

Note: The numbers designating the positions must follow from bottom to top. If there are less than 4 modules inside a column, there should not be gaps or overlaps in the numbering (see Table 8 below).

Table 8: Allowed module numbering

	Position 1	Position 2	Position 3	Position 4
2 modules	X	X		
3 modules	X	X	X	
4 modules	X	X	X	X

Figure 16: Module configuration

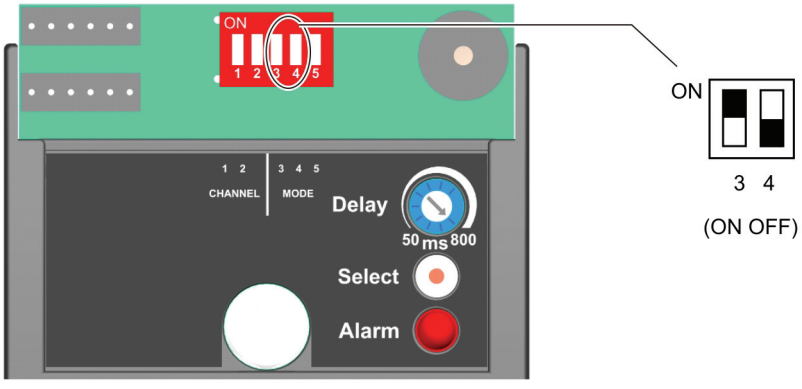


“Master” module selection

Set the module on which the relay alarms are wired in “Master” mode: switch 3 ON and switch 4 OFF.

Caution: A column is composed of 1 “Master” module and 1 to 3 “Slave” modules. “Master” module can be positioned anywhere within the column: position 1, 2, 3 or 4. If “Master” is installed in position 1, it is not possible to use the mono-detection of the bottom beam (see “Mono-detection of the bottom beam (optional)” on page 20) for more details.

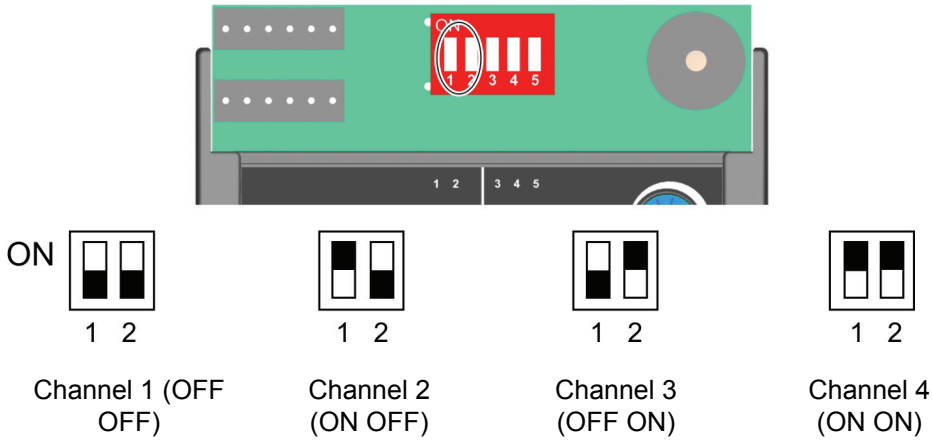
Figure 17: “Master” mode selection



“Master” module channel selection

Select the channel of the barrier on “Master” module (see also “Channel selection” on page 10).

Figure 18: Master module channel selection



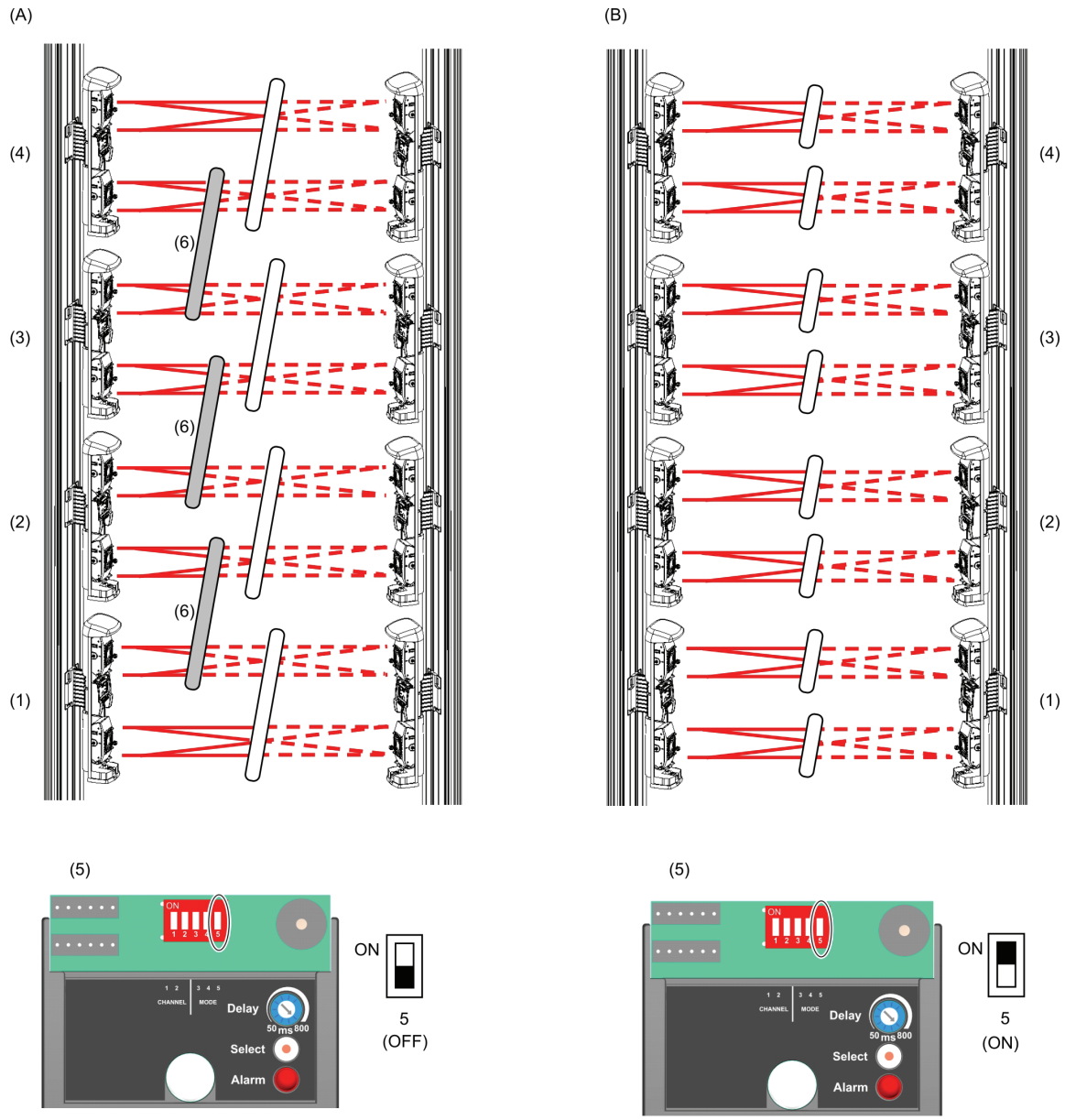
Detection mode selection

Select the detection mode: simple detection or interdetection (not available on the modules SB4200-N).

The detection mode is set on the “Master” module:

- Switch 5 of the “Master” module ON to select dual-detection.
- Switch 5 of the “Master” module OFF to select simple detection.

Figure 19: Detection mode selection



(A) Interdetection mode

(B) Simple detection mode

(1) to (4) Modules 1 to 4

(5) “Master” module settings

(6) Dual detection between modules

Important Note: Interdetection can be selected for all kind of modules except for SB4200-N (item 6).

Mono-detection of the bottom beam (optional)

Important Note: Functionality is not available in SB4200-N, SB250-N and SB2100-N modules.

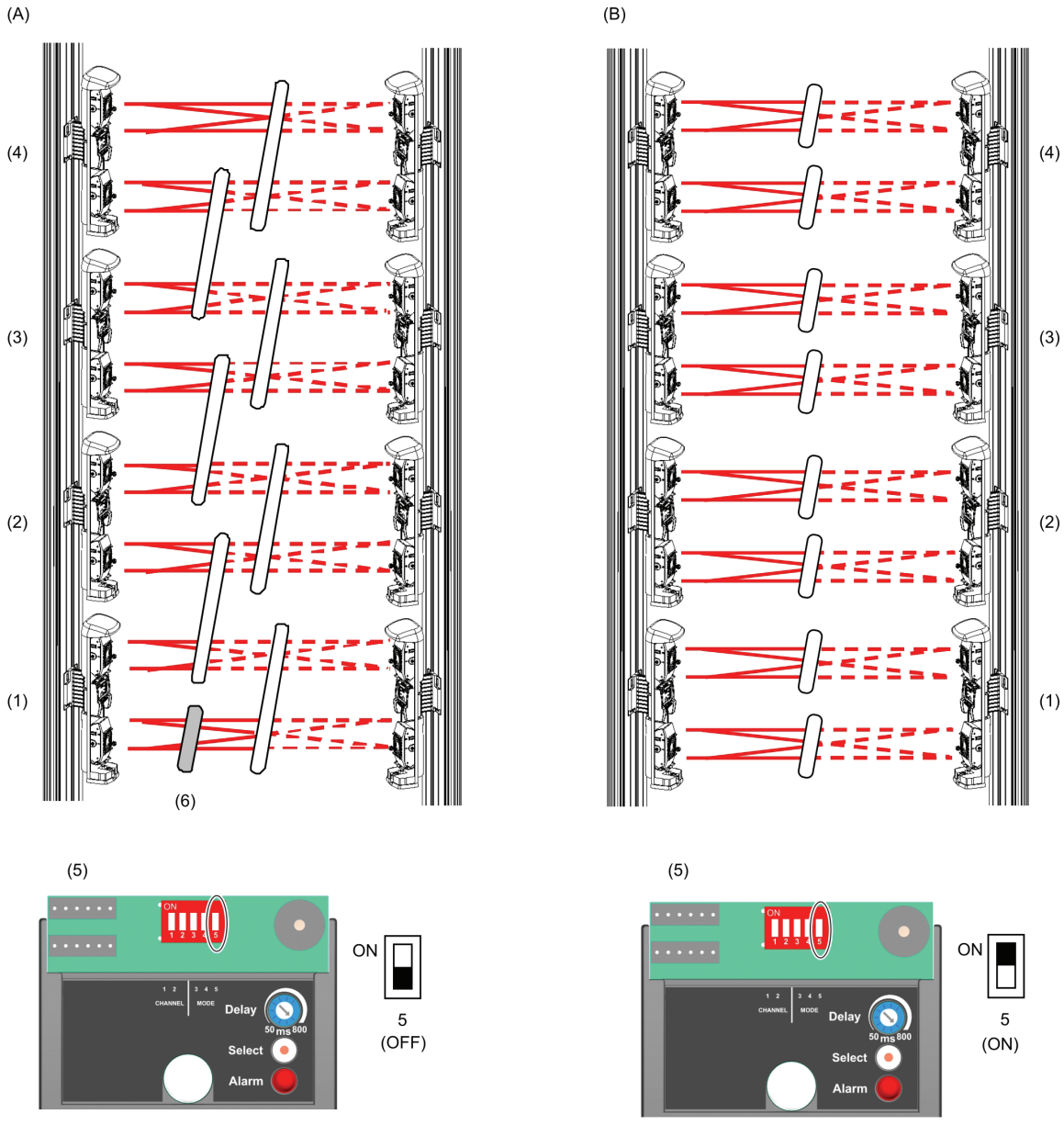
The column must be configured in interdetection mode in order to activate the mono-detection of the bottom beam.

The mono-detection of the bottom beam triggers an intrusion alarm when the bottom beam is cut for a period of 1.5s.

The mono-detection of the bottom beam is activated on the “Slave” module in position 1 only.

- Switch 5 of “Slave” module OFF to activate the mono-detection of the bottom beam.
- Switch 5 of “Slave” module ON to deactivate the mono-detection of the bottom beam.

Figure 20: Bottom beam mono-detection



(A) Interdetection mode with mono detection

(B) Interdetection mode without mono detection

(1) to (4) Modules 1 to 4

(5) “Master” module settings

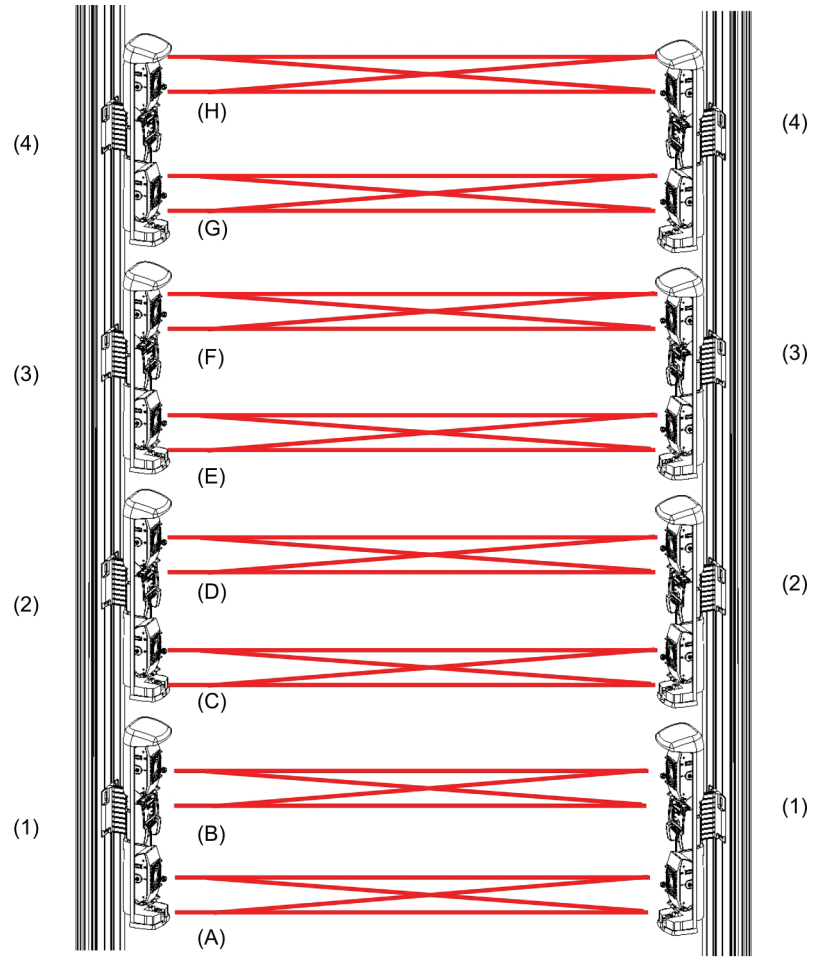
(6) Dual detection between modules

Column alignment

Alignment of the columns: start by aligning the cells with the integrated optical sight on each cell for each module (see “Single module alignment and settings” on page 12).

Optimization of synchronized barriers alignment

Figure 21: Optimization of synchronized barriers alignment



(1) to (4) Modules 1 to 4 (A) to (H) Cells 1 to 8

1. Power cycle the modules in the barrier.

   - The buzzer beeps 1 time for SB250-N and SB450-N.

   - The buzzer beeps 2 times for the SB2100-N and SB4100-N.

   - The buzzer beeps 3 times for the SB4200-N.

   The red LED blinks for 5 to 10 s during the initialization of the column.

2. Press “Select” button of “Master” module (for at least 2 seconds) until the buzzer of “Master” module beeps twice.

   The red LED blinks once and the buzzer sounds one long beep on “Master” module to indicate the alignment of the bottom cell.

3. Rotate and readjust the cell until the buzzer sounds a continuous beep and the red LED stays lit.

   Note: SB250-N, SB2100-N, SB450-N and SB4100-N are aligned cell by cell. SB4200-N is aligned module by module (two cells of the same module at the same time).

   See “Alignment status indication” on page 14 for status indication details.

4. Move on to the next cell by pressing “Select” button of “Master” module, the blinks of the red LED and the beeps of the buzzer indicate the number of the cell to be aligned.

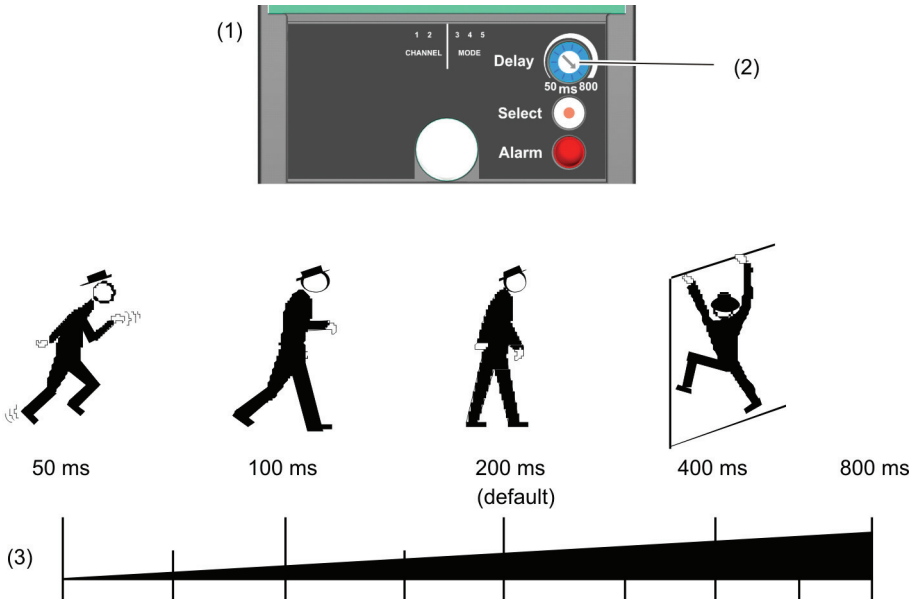
   Rotate and readjust the cell until the buzzer sounds a continuous beep and the red LED stays lit.

To leave the alignment mode, push “Select” button of “Master” module for more than 2 seconds until the buzzer beeps two times.

Response time

Set the response time of the intrusion alarm by using the potential-meter of “Master” module.

This allows the sensitivity of the barrier to be adapted to its environment. A long response time reduces the sensibility of the barrier.



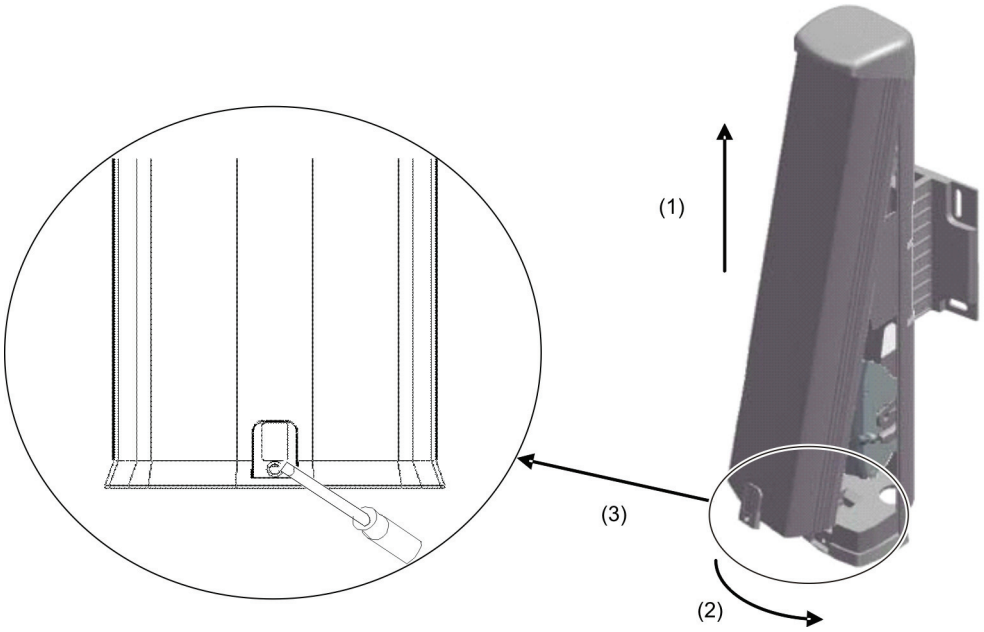
(1) “Master” module

(2) Potentiometer to set the response time of the intrusion alarm

(3) Response time

Replacing the infrared cover

Figure 22: Replacing the infrared cover



1. Engage the infrared cover in the grooves of the chassis taking care not to loose the staple (step 1).
2. Slide the cover upwards until it is stopped by the top plate (step 2).
3. Place it flat along the chassis, then slide it downwards and screw in the cover fixing screw (step 3).

Final tests

After installation, make sure everything is working with an overall system test.

SB250-N and SB2100-N barriers

- Movement control in the cell: intrusion alarm.
- Extended interruption of the cell for more than 1 minute: disqualification alarm.

For SB4200-N barriers

- Movement control in only one of the two cells: alarm not triggered.
- Movement control in both of two cells: intrusion alarm.
- Extended interruption of both cells for more than 1 minute: disqualification alarm.

For SB450-N and SB4100-N barriers

“AND” mode:

- Movement control in only one of the two cells: alarm not triggered.
- Movement control in both of two cells: intrusion alarm.
- Extended interruption of both cells for more than 1 minute: disqualification alarm.

“OR” mode:

- Movement control on the top cell: intrusion alarm.
- Movement control in the lower cell: intrusion alarm.
- Extended interruption of one of the two cells for more than 1 min: disqualification alarm.

Modules installed in columns

Simple detection:

- Movement control in only one of the two cells: intrusion alarm.
- Extended interruption of one cell for more than 1 min: disqualification alarm.

Interdetection:

- Movement control in only one of the two cells: alarm not triggered.
- Movement control in both of two adjacent cells: intrusion alarm.
- Movement test on two adjacent cells on two different modules (except SB4200-N): intrusion alarm.
- Extended interruption of one of two cells for more than 1 min: disqualification alarm.
- If the bottom cell is enabled: Movement control in the bottom cell for more than 1.5 sec: intrusion alarm.

Maintenance

To keep good ongoing performance levels, minimal maintenance is required:

- Clean the infrared cover of each module at least once a year (or more often, depending on exposure to dirt).
- Repeat the final tests (once a year). See “Final tests” on page 25.

Troubleshooting

How to find the “Master” module

Push the button “Select” for at least 2 seconds:

- The buzzer beeps two times: the module is “Master”.
- The buzzer does not sound: the module is “Slave”.

All configurations

Fault	Possible cause	Solution
Red led blinks	The 2nd module creating the detection zone is not powered	Check the power supply of the 2nd module
	The modules creating the detection zone are using different channels	Set both of associated modules on the same channel
	Poor cell alignment	Repeat the alignment procedure
	Cells are covered or in disqualification	Clear cells field of view
The red alarm LED does not light up when the beams are interrupted	Incorrect power supply of the module	Check power supply
	Both cell beams are not interrupted simultaneously (for SB450-N, SB4100-N and SB4200-N barriers only)	Break all cell beams at the same time
The red alarm LED does not light up when only one beam is interrupted	Modules in “AND” mode	Put module in “OR” mode. See “Operating modes” on page 11 for more details.
Red LED remains lit for more than 1 minute	Factory-set configuration mode	Set DIP switches 3 and 4.

Single modules only

Fault	Possible cause	Solution
Red LED: 1 flash light	Module is in “Master” or “Slave” mode	Turn off the selected mode. See “Operating modes” on page 11 for more details.

Modules installed in columns only

Observed fault	Possible cause	Solution
Red LED: 1 flash light	Error in modules settings:	
	Several “Master” modules are set up	Verify DIP switches 3 to 5 settings. See “Installing modules in columns” on page 14 for more details.
	No “Master” module is set up	Set up one of the “Master” modules with the switches 1 and 2. See “Installing modules in columns” on page 14 for more details.
	The position of “Slave” is not correct	Check the position of “Slave” modules with switches 1 and 2. See “Installing modules in columns” on page 14 for more details.
	Inter-module connection fault	Wire the inter-module connections. See “Installing modules in columns” on page 14 for more details.
	Mixing of installed ranges.	Verify the compatibility of modules. Put the modules of the same range only. See Table 7 on page 15 for more details.

Specifications

Detector model	SB250-N	SB2100-N	SB450-N	SB4100-N	SB4200-N
Maximum protected distance for interior use	125 m	250 m	125 m	250 m	350 m
Maximum protected distance for outdoor use with thermostat controlled heating	50 m	100 m	50 m	100 m	200 m [1]
Type of detection	Pulsed infrared beam of wavelength 950 nm at a choice of 4 channels				
Number of cells	1 cell		2 cells		
Detection mode	Cell is interrupted		1 or 2 cells are interrupted. See “Single module alignment and settings” on page 12 for more details.		Both cells are interrupted
Intrusion alarm response time	Adjustable from 50 to 800 ms				
Disqualification alarm response time	60 s, non-adjustable				
Typical duration of intrusion alarm	Duration of cell interruption, with a minimum of 4 seconds				
Power supply	10 to 15 VDC				
Current consumption at 12 VDC (1 module)	47 mA	47 mA	55 mA	55 mA	55 mA
Heater power supply	10 to 15 V AC/DC				
Heater current consumption at 12 VDC (1 module)	80 mA	80 mA	160 mA	160 mA	160 mA
Intrusion output for each switch NC alarm off	Yes				
Tamper output for each switch NC alarm off	Yes				
Disqualification output for each switch NO alarm off	Yes (cutting the intrusion alarm)				
Intrusion alarm output rating	30 VDC, 500 mA				
Tamper output rating	30 VDC, 500 mA				
Disqualification alarm output rating	30 VDC, 500 mA				
Operating temperature with thermostat controlled heating	−25 to +55°C				
Protection rating	IP44				
Weight	0,8 kg	0,9 kg	1,1 kg	1,2 kg	1,2 kg
Cell direction adjustability	Vertically ±10°				

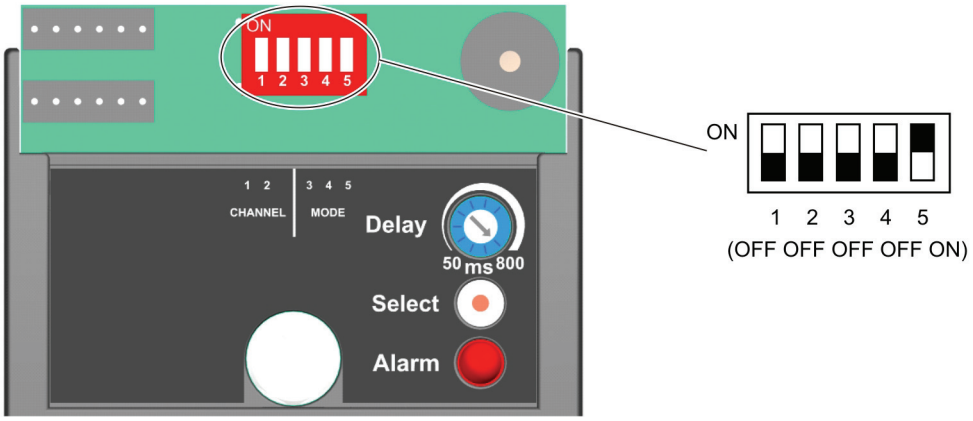
Detector model	SB250-N	SB2100-N	SB450-N	SB4100-N	SB4200-N
Module direction adjustability	Horizontally ±90°				
Integrated alignment tools	Optical viewfinder system, LED, and buzzer indicating the quality of the received signal				

[1] Depends on visibility. See “General features” on page 2 for more details.

Default configuration

For modules default settings see figure 23. Modules are in “AND” mode by default.

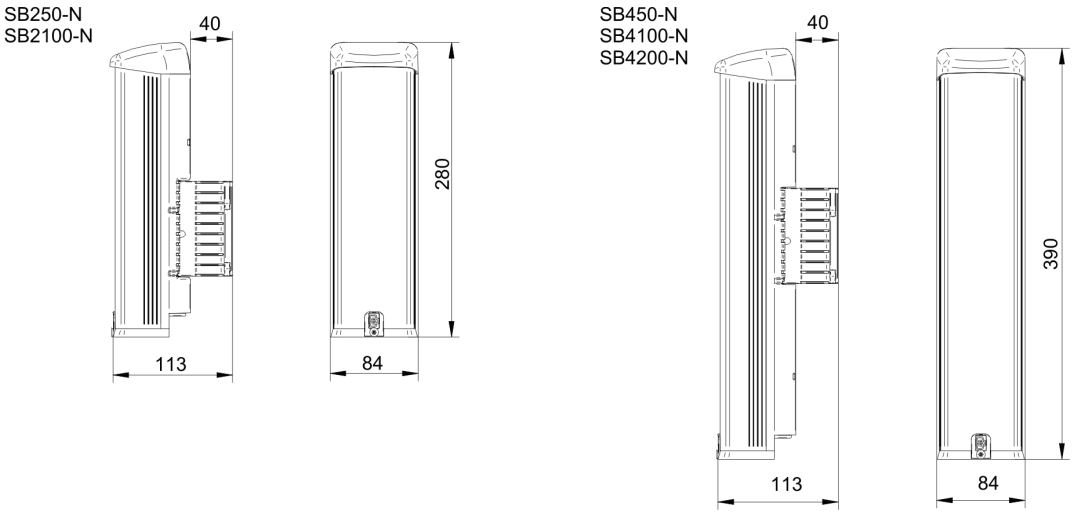
Figure 23: DIP switch default setting



Dimensions

All dimensions are given in mm.

Figure 24: Detector dimensions



Accessories and spare parts

Accessories

- SB53: Floor socket
- SB51: Alignment Controller
- SB52: Power Supply
- SB18: Anti-climbing Cap

Spare parts

- SB12: Cover for column 1m
- SB17: Cover for column 1m50
- SB22: Cover for column 2m
- SB27: Cover for column 2m50
- SB32: Cover for column 3m
- SB13: Cover for module SB2XX
- SB14: Cover for module SB4XX
- SB19: Flask bottom and top + tamper card + cable glands