


SensoMAG BM60 SensoMAG BM120

Conventional linear detector using an optical light beam with reflector

ATTENTION: Read carefully this installation Instructions before installing the device! This manual is subject to change without notice!



 1293

 DoP No: 276



 Tested by EVPU

Teletek Electronics JSC

 Address: 2 Iliyansko shose str,




 1220 Sofia, Bulgaria


EN 54-12:2015




Attention: Integrated laser!

Do not stare or look directly into the beam lights!

 Laser alignment (visible): 650nm




 Indoor use
 
 IP65
 
 UV PROTECTION


 -10°C ÷ +60°C

 (93±3)%@+40°C
 
 Cover frame ABS, white (RAL 9016)

 Front cover PC, Violet fume

 Rear cover ABS, black (RAL 9005)


 0.5-2.5mm²

 SensoMAG BM . . ~530g

 Reflector ~6g

 Reflector set . . . ~530g

Models

The conventional beam detector is available in two models:

- SensoMAG BM60 for distances from 5m up to 60m, using one reflector plate (included).
- SensoMAG BM120 for distances from 50m up to 120m, using four reflector plates mounted to a metal frame (included).

ATTENTION: For simplicity of explanation hereafter in this document, we will use name SensoMAG BM, for reference to both SensoMAG BM60 and SensoMAG BM120 beam detectors. The specific options or operations concerning only one of the detectors are marked in an appropriate way pointing the concrete model.

General Description

SensoMAG BM is a conventional, reflector type, linear beam detector. The detector is compatible for operation with conventional fire alarm panels, including MAG series, produced by Teletek Electronics JSC. The detector is powered on from an external power supply unit with back-up battery.

SensoMAG BM consists of two parts: main module including a transmitter and a receiver of the emitted beam light, and a reflector plate. The main unit and the reflector are mounted facing each other on opposite walls of the protected premises, as there must be a clear direct (horizontal) viewing space between them without presence of any obstacles (as ducts, HVAC pipes, pending objects, etc).

The principal of operation of SensoMAG BM is based on detection of attenuation of the signal returned to the receiver. The reducing of the signal is due to obscuration of the light beam caused by visible smoke presence in the space between the main unit and the reflector. There are four sensitivity levels (alarm thresholds), available for adjustment. Every one of them refers to a specific percentage of obscuration of the light beam - from 25% to 60%. The highest percentage refers to the lowest sensitivity. The sensitivity levels are selectable via DIP-switches on the detector's PCB, and must be considered according the environmental conditions on the site.

Self-compensation algorithms

SensoMAG BM is equipped with a micro-controller for continuously monitoring the quality and the strength of the returned signal.

During the time of operation is possible a thin layer of dust or dirt to accumulate on the lens thus reducing the signal strength. To avoid false alarms and faults, the micro-controller performs periodic automation check and applies algorithm for positive or negative compensation of alarm threshold if needed. When the applied algorithm for dust/dirt compensation reaches the threshold limits, the beam detector will generate a fault message for service maintenance and cleaning, and will enter in fault mode.

The micro-controller also contiguously checks for variations (increasing or decreasing) of the temperature in the protected premises. After completing the initial starting up procedures, the detector saves in its memory the current environment temperature as a reference value for assessment. A slight increasing of the signal may occur with the temperature rising and vise versa. In this case the detector applies algorithm for temperature compensation, as lowers or increases the signal amplification and thus avoids false alarms and fault conditions.

Main Advantages

- Combined transmitter and receiver in one unit, lower installation cost for cabling
- Temperature and dust/dirt compensation algorithms for minimizing of false alarms
- Detection of fires at very early stage, when the materials are still smoldering, and a smoke is only visible in the protected area
- Precise lens with fine adjustment of the optics
- Pluggable terminal blocks for easy wiring

Functional Features

Range:

- SensoMAG BM60 from 5m to 60m
- SensoMAG BM120 from 50m to 120m

Alarm threshold (sensitivity), selectable via DIP-switches:

- Level 1 - Low Alarm Threshold 25% obscuration
- Level 2 - Normal Alarm Threshold 35% obscuration
- Level 3 - Medium Alarm Threshold 50% obscuration
- Level 4 - High Alarm Threshold 60% obscuration

Type of the reflector Prismatic

Optical wave length - smoke detection - NIR* 950nm

Max. angular misalignment:

- Detector ±0.5°
- Reflector 1°

Min. height mounting (people moving in the area) 2.7m

Distance between two beam detectors 15m

* Near infrared, invisible

Technical Specifications

External power supply voltage 24V DC ±10%

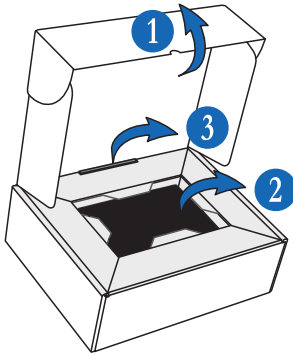
Nom. consumption <5.5mA

Consumption in alarm state, with RI activated <14mA



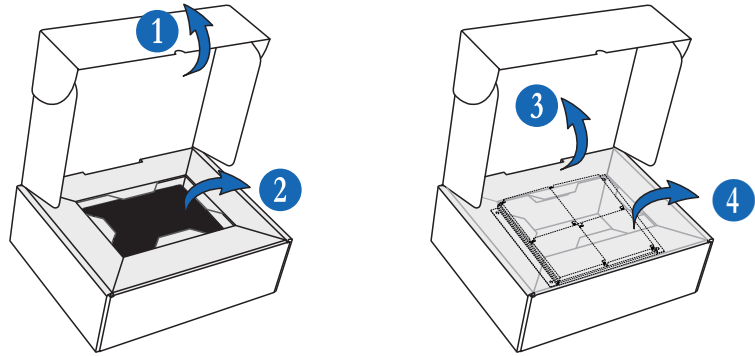
Unpacking

SensoMAG BM60



1. Open the packing box
2. Take out the Beam Detector
3. Take out the single reflector plate

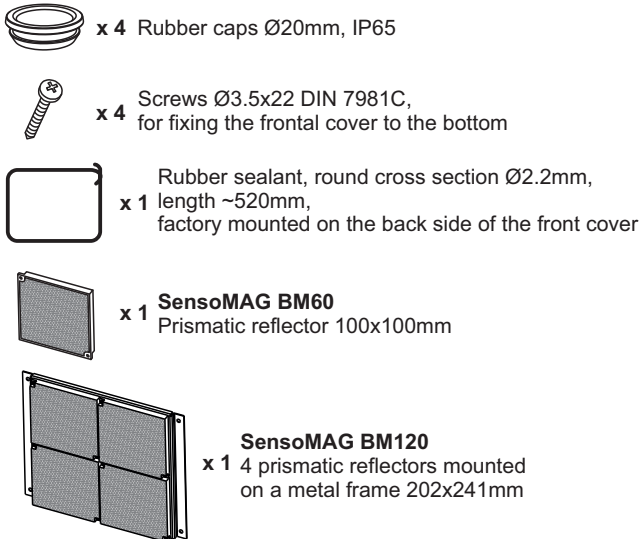
SensoMAG BM120



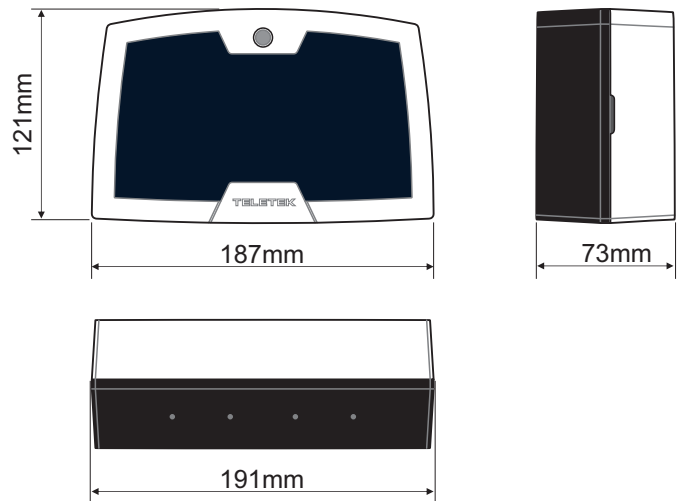
1. Open the packing box
2. Take out the Beam Detector
3. Pick up and open the internal paper holder, as tear its front side out and unfold it towards the cover of the packing box
4. Take out the metal frame with 4 reflectors from the bottom of the internal paper holder



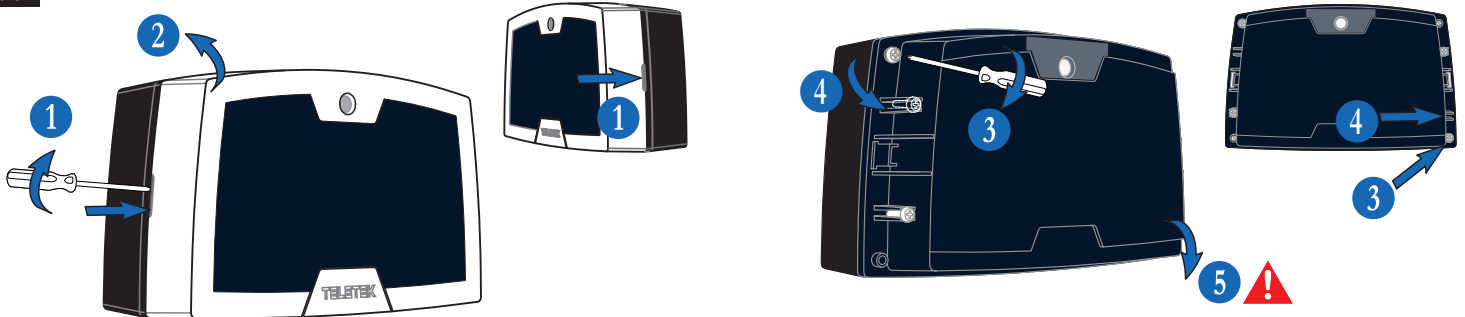
Included parts and accessories



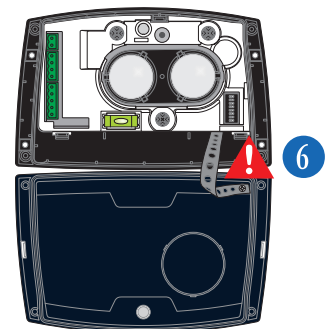
Dimensions



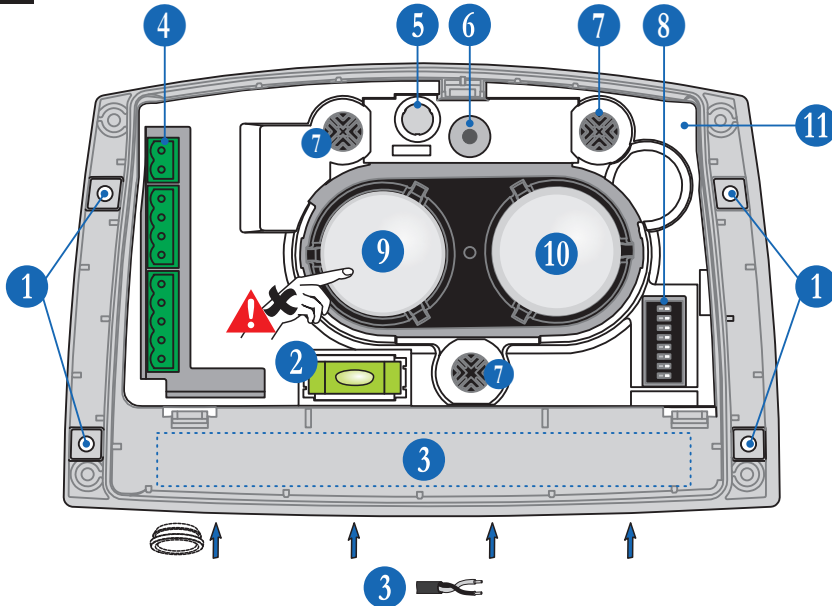
Opening of the housing box



1. Use a flat screwdriver to unlock the front frame from the cover.
2. Remove the front frame and keep it in a safe place.
3. For a security reasons during transportation, the front cover is fixed to the bottom. Undo the screws using a crossed-slot screwdriver.
4. Place the screws in the free holders to keep them safe during mounting and wiring of the beam detector. (At this step, you can also mount back the front frame over the cover so to keep the both parts at the same place.)
5. Carefully tear rotating down the front cover. **Attention: Do not pull out!**
6. The front cover and the bottom are connected with a security rubber strip for protection during mounting or opening for maintenance.



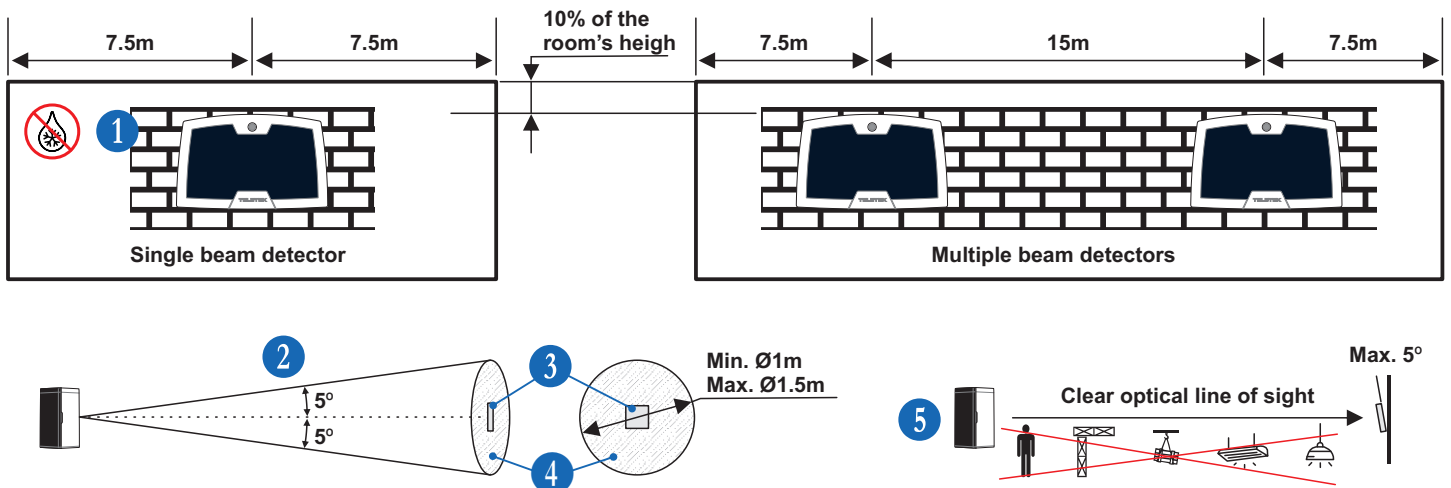
1 Elements of SensoMAG BM Beam Detector



1. Mounting holes $\varnothing 3.2\text{mm}$. Use the drilling template given in item 12 to drill the mounting holes. Use appropriate fixing elements according to the mounting surface. For other details and specifics concerning mounting, see item 2.
2. Bubble lever.
3. Places for cable entry and space for running cables. Use a drill bit $\varnothing 2.2\text{mm}$ with hole saw $\varnothing 20\text{mm}$ to drill the holes for cable entry at the enclosure bottom. Place the rubber caps on the drilled holes. Run a cable through the center of the rubber cap, as if necessary widen the hole using a thin sharp tool. Do not cut the rubber cap - that will compromise the announced IP65 protection.
4. Pluggable terminals for connection of the electrical circuits. For details see item 3.
5. LED indication. For details see item 4.
6. Laser.
7. Handles for fine adjustment of the laser pointer and signal strength.
8. DIP switches for operation and functional settings. For details see item 5.
9. Lens, transmitter section. Do not touch with bare hands!
10. Lens, receiver section. Do not touch with bare hands!
11. Protective cover for the PCB.

2 Considerations for position and location of mounting

Attention: SensoMAG BM is designed according to the requirements of EN 54-12. The detector and the reflector must be mounted also according to the local standards /regulations, laws, guidelines/, which can vary according to the different countries.



1. Mounting surface and surrounding environment. The mounting surface must be stable for proper operation of the device. It is not allowed the surface to move, vibrate, shift or bend under the influence of the surrounding environment or conditions, as thus will cause fault signals and alarms. **DO NOT** mount the detector on corrugated metal walls, sheets, siding coatings, suspended ceilings, rods, non-structural columns, plasterboard, clad walls, wood, or similar materials, as these surfaces are susceptible to movements. Mount the base of the detector on a solid stable surface as brick, concrete, or other load-bearing wall, support and structural columns, or surface that is not expected to experience vibrations or movements over time. The beam detector is mounted directly to the wall, with ensuring a downside cable entry. It is not recommended to mount the beam detector and/or the reflector at sites, where there is a high possibility of condensation and icing to occur. To avoid these undesired environment conditions and their influence on the proper operation of the beam detector, take respective preventing measures.

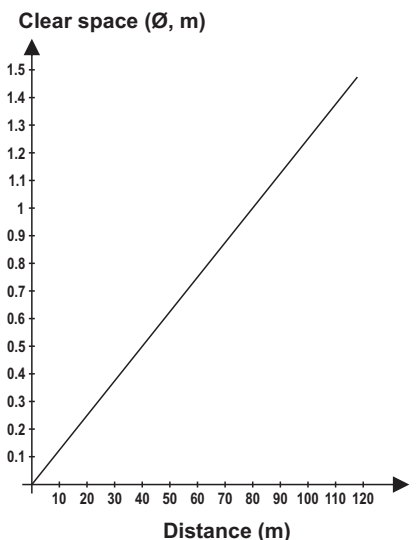
2. SensoMAG BM Beam Detector and the reflector must be mounted on the opposite walls at the one and the same height. It is allowed an angular error in positioning up to 5° in all directions.

3. Reflector. The reflector is mounted opposite to the detector. **DO NOT** mount the reflector on reflective or glass surfaces, places exposed on direct sun light, or with higher possibility of dust in the air caused from the surrounding environment conditions.

4. Diameter of clear space around the reflector. Ensure an area around the reflector free from other objects. The diameter can vary according to the distance of mounting and the model of the beam detector. To guarantee a proper operation it is recommended, when using SensoMAG BM60 (for distances from 5m to 60m) the clear space to be $\varnothing 1\text{m}$, and when using SensoMAG BM120 (for distances from 50m to 120m) the clear space to be $\varnothing 1.5\text{m}$.

5. SensoMAG BM must be mounted on a solid structure and with a clear line of sight to the reflector. **DO NOT** install the detector or the reflector behind glass or other transparent panels, that could compromise the operation. Avoid installation in areas with working processes and moving devices, pending fixtures, including lamps, in the operation space of the beam detector to guarantee its proper operation. The reflector has much more tolerance for movement than the detector, but it is allowed an angular error in positioning up to 5° against the mounting surface.

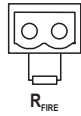
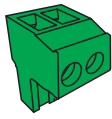
Diagram for reference between the required diameter of clear space around the reflector according to the distance to the Beam detector.



3 Wiring of SensoMAG BM Beam Detector

Attention: Power off the Zone line circuit before installing the SensoMAG BM conventional beam detector!

SensoMAG BM beam detector is delivered with a set (1x2-pin, 1x4-pin, 1x5-pin) of plug connectors for quick wire installation, mounted to the terminals on the PCB. To unplug a connector, just pull it up from the terminal. To plug it back, press down until a click is heard. Use a flat screwdriver to undo/do the screws of the plugs.



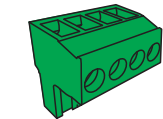
Resistor connection

The zone alarm resistor R_{FIRE} must be always installed at "Res" terminals. The value of the resistor is calculated according to the operation voltage of the conventional zone and the fire alarm threshold current of the used fire alarm devices - detectors and call points. Calculate the zone alarm resistor value using the formula:

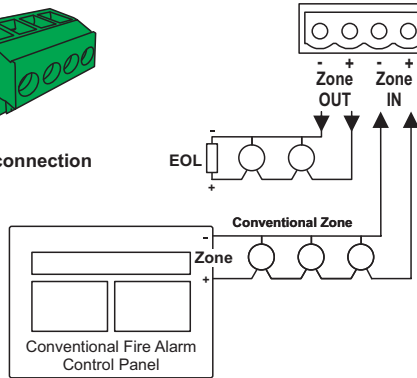
$$R_{FIRE} = U_{ZONE} / I_{DEVICE}$$

Refer to documentation of the used conventional fire alarm control panel and used conventional devices for supported features, technical data and electrical values.

When SensoMAG BM detector is connected to MAG series conventional fire alarm panel, the value of R_{FIRE} is 1-1.2kOhms.

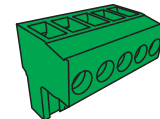


Zone connection

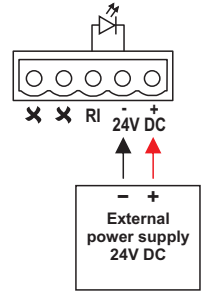


Connect the conventional zone line to zone input terminals of the module with strictly observing the polarity. In case the SensoMAG BM is the last device connected to the conventional zone line, fit the EOL resistor to zone output terminals of the detector.

When SensoMAG BM detector is connected to MAG series conventional fire alarm panel, the value of EOL resistor is 10kOhms.

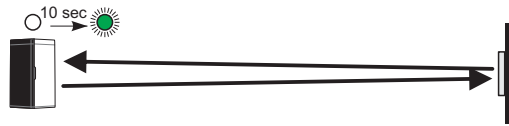


External power supply and remote indicator connection



4 Operation Modes and LED Indication

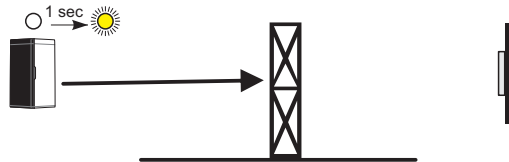
4.1 Normal operation mode



The emitted beam light is totally reflected and the strength of the received signal is 99-100% without loss.

LED Indication: The green led is flashing slowly (with 10sec interval).

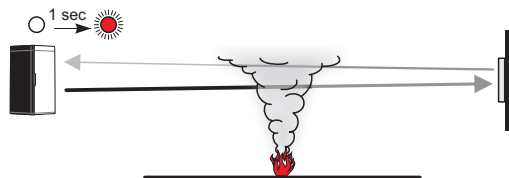
4.2 Fault mode



In case the emitted beam light is totally blocked and the reflected signal suddenly disappears at all, the detector will recognize this state as fault and will send a fault type message to the control panel. The detector will return to normal operation mode automatically after restoring the full reflection of the beam light (the strength of the received signal is 99-100% without loss).

LED Indication: The yellow led is flashing quickly (1sec).

4.3 Fire Alarm mode



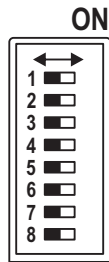
The emitted beam light is partially obscured by raising smoke. The reflected signal is attenuating with the gradually darkening in the space between the detector and the reflector. When the obscuration of the beam reaches the set alarm threshold level (see also item 6) the detector will send fire alarm message to the control panel.

LED Indication: The red led is flashing quickly (1sec).

5 DIP-Switches

SensoMAG BM is equipped with DIP-switches used for calibration and operation processes. By default, all DIPs are set in OFF position.

To move a DIP-switch to ON position, use a small sharp tool or a small plain screwdriver.



*** ATTENTION:** Settings must be done with power supply off of the detector.

Some DIP-switches have different functions in OFF and ON position:

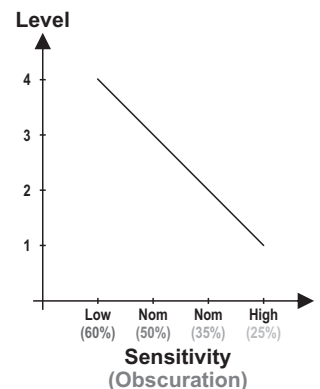
- Switches ON/OFF the built-in laser pointer.
- Switches ON the calibration process. In OFF position is enabled normal operation mode.
- *. Setting the sensitivity level - see item 6.
- *. Setting the sensitivity level - see item 6.
- *. Set the type of the resetting (after fire alarm restore):
OFF - Automatic self reset (unlatch state);
ON - Manual reset from the control panel (latch state).
- *. Fire Alarm and Fault announcement time delay settings:
OFF - 10sec time delay for Fire Alarm and Fault announcement;
ON - 30sec time delay for Fire Alarm announcement, and 60sec time delay for Fault announcement.
- Switch ON to enable Low power mode, when the laser point is activated (DIP 1 is ON).
- Type of the detector - conventional device. DO NOT change! It must be always in OFF position!**

6 Setting the Alarm Thresholds

The alarm threshold is a specific value to which the SensoMAG BM will react, when the smoke in the open space between the detector (receiver and the transmitter) and the reflector reaches a given level, called also obscuration, or darkening.

All values must be set to correspond to the environmental conditions, and according the local country laws for fire alarm alerting.

The operation of SensoMAG BM can be set to react to different alarm threshold values, which define Levels (1-4) of sensitivity:



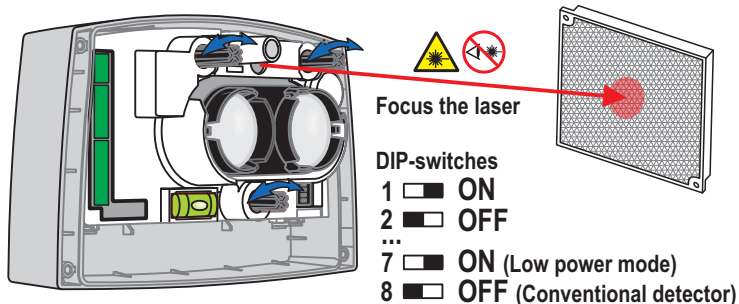
DIP3	DIP4	Level	Alarm Threshold	Obscuration	Sensitivity
OFF	OFF	1	Low	25%	High
OFF	ON	2	Normal	35%	Nominal
ON	OFF	3	Medium	50%	Nominal
ON	ON	4	High	60%	Low

The set Alarm Threshold Level is inversely proportional of the sensitivity of the beam detector.

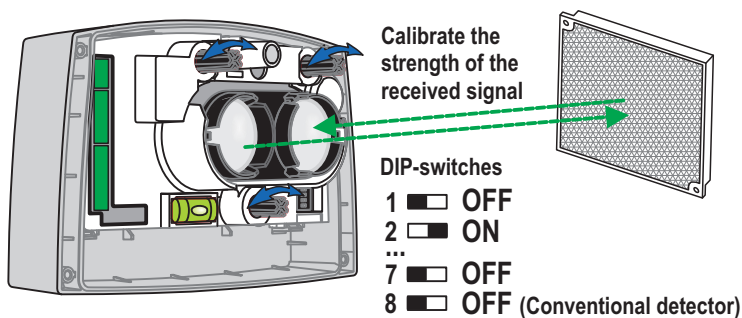
7 Installation Steps

Attention: In case of initial power up of a brand new SensoMAG BM beam detector the LED indication is alternative slowly flashing of the yellow and green LEDs. It is important to know that the beam lights (one emitted from the transmitter and the second received from the receiver) are factory optically phased to ease the alignment procedure. After the initial power up, the beam detector automatically start self-setting, so that the received signal is to be with value of 50% sensitivity.

1. Following the considerations in item 2, choose the place of installation and mount the detector and the reflector at the same height, on opposite walls, facing each other.
2. Run the cables as described in item 1. Follow the connection diagrams in item 3 for details. Note that, all the wiring must be done with zone line circuits power off.
3. Check the position of DIP-switch 8. **It must be in OFF position.**
4. Set the alarm threshold level using DIP-switches 3 and 4 - see item 6.
5. Set the type of the resetting using DIP-switch 5, and time delays for Alarm and Fault announcement using DIP-switch 6 - see item 5.
6. Power on the zone line. Power on the external power supply unit. The yellow and green LEDs are flashing slowly (alternative).
7. Move DIP-switch 1 in ON position. That will activate the laser point. A red dot on the opposite wall will start blinking quickly. (To lower the power consumption of the detector at this step you can switch ON DIP-switch 7 - the red dot will start blinking slowly.)
8. Focus the beam light in the center of the reflector as using the handles (rotation on the left-side or on the right-side) for fine adjustment.



9. Switch OFF DIP-switch 1.
10. Switch ON DIP-switch 2. This enables the procedure for alignment and calibration of the detector for receiving the reflected signal with a maximum strength. The red and green LEDs will blink quickly at the beginning during the self-tuning phase.
11. For the adjustment of the reflected signal strength, use the handles again doing little rotations on the left-side or on the right-side, as look for the indication of the green LED. The calibration is done when the green LED start flashing steadily (1 blink in 1.5sec).



Calibration Tips. Make the calibration with little rotations only. Do not rotate all the handles at the same time. If the signal is lost rotate the handle in the opposite position. The steady blinking of the green LED is possible to start immediately after self-tuning phase. In this case is recommended to leave the position of the handles as they are.

Troubleshooting. If during the calibration the red LED start blinking or the yellow LED is permanently lighting on, this means that the reflected signal is lost (too low), or is out of range. If it is impossible to make the adjustment rotating back the handles and the process fails, it is recommended to power off the detector, move DIP-switches 1 and 2 in OFF position and to start the calibration procedure again (start from point 6). If the calibration continuously fails, ask for support your local distributor.

12. To end the calibration procedure, switch OFF DIP-switch 2.
13. The yellow LED start blinking in a scheme - 2 slow blinks followed by 2 quick blinks. The detector enters in a special stand-by mode for the next 5 minutes. During this period the installer must mount back the front cover and the frame. The front cover must be fixed to the bottom with the screws.

7 Installation Steps - Continue

14. When the stand-by mode is over, the detector enters into Normal operation mode as the strength of the received (reflected) beam light is taken set as 100% (the highest possible). The green LED is blinking over 10 seconds.

Important: The settings with the DIP-switches (3, 4, 5, 6) must be done only with power supply off! If after a time of operation the settings must be changed, you have to first disconnect the zone line, then power off the beam detector and after that make new settings. After powering on the beam detector and connecting the zone line, reset also the conventional control panel.

8 Test of the Sensitivity

It is recommended to test the sensitivity of the beam detector periodically according the local regulations and country guidelines. For the test is used a filter hard folio with gradually darkening grey scale from 10% to 100%.

1. From the control panel, enable a Zone Test for the zone number to which the beam detector is connected.
2. Check the position of DIP-switches 3 and 4 (refer to item 6) to read the set alarm threshold level - 25%, 35%, 50%, 60%, and define the corresponding darkening on the filter folio for reference.
3. To test the sensitivity, place the filter folio in front of the beam detector with corresponding to the set alarm threshold darkening, and hold it for a minute. The time for reaction depends also of the set times for delaying of alarm and fault announcement (check the position of DIP-switches 5 and 6).
4. To test the response for fault, place some blocking material, or the most dark section of the filter, in front of the beam detector. The sudden lost of the signal will bring the beam detector in Fault mode.
5. After completing the tests for sensitivity and faults, remove the filter and leave the beam detector to return to normal operation mode.
6. Reset the control panel from the main screen.
7. Exit Zone test mode.

9 Maintenance and Cleaning

The manufacturer recommends to provide regular maintenance of the beam detector, including visual observation of the detector enclosure box and the reflector, and cleaning of the outside surfaces.

According the type of the protected site and the working processes a fine dust layer is possible to accumulate on the detector and the reflector. The dust can block partially the signal or to reduce the strength of the reflected beam.

Clean the surfaces with a soft cloth. Do not use abrasive or aggressive cleaning detergents or solvents, as they can harm the prismatic surface of the reflector and to scratch or damage the frontal cover of the beam detector.

Provide the maintenance and cleaning regularly according the environmental conditions, and extraordinary after completing construction repairs or renovations provided at the protected site.

10 Factory Reset

The factory reset is allowed only in case of moving the detector to different site and different environment conditions, and/or connecting to new conventional control panel.

The factory reset is done with a special mini button (SW2) on the detector's PCB. To access the button, first you must to remove the frame and the front cover as described on page 2. Then remove the pluggable connectors. Then you must remove the protective cover above the PCB - it is fixed to the bottom via clips - two at the bottom side, and one on the upper side. Use a plane screwdriver to unlock the clips. Remove the protective cover. The SW2 button is situated under the receiver lens. Power on the detector and press for 5-10 seconds the reset button. The yellow and green LEDs will start blinking alternatively - this is the common indication for initial power up. Disconnect the power supply and mount the protection cover back in place. Pay special attention to the protective strip for holding the frontal cover - the last hole of its end must be fixed on to the pin under the opening for the DIP-switches terminal.

Proceed following the mounting and installation instructions given above.

11 Additional Information

SensoMAG BM linear beam detector is compatible for operation with MAG series conventional fire alarm panel. For more information, and to download the engineering and operation manuals of the MAG series control panels, scan the QR codes for access to Teletek Electronics JSC database library portal.



MAG2
MAG4



MAG8



MAG8Plus



12 Drilling Template

Use the drilling template of the bottom (scale 1:1) for precise drilling holes on the mounting surface. Use a drilling bit $\varnothing 3/3.5\text{mm}$ and suitable fixing elements according the mounting surface.

