



VG-6688 Reflective Beam Smoke Detector User Guide



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1. Overview

VG-6688 Reflective Beam Smoke Detector User Guide is equipped with Laser beam pointing for real user-friendly alignment method. The Laser beam pointing accurately point the exact location where to mount reflector and with additional LEDs allows to monitor and guide on the actual light intensity between the reflector and detector which cannot be seen by our naked eye making it more easy and convenient in alignment commissioning.

The detector must be used together with a reflector. The number of reflector(s) to be used (one or four) depends on the distance from the detector.

With excellent built-in microprocessor, the detector has strong ability of analysis and judgment. The detector can carry out system adjustment, compensation of variation of ambient data, and judgment of fire and fault through fixed algorithm.

The sensitivity of the detector can be set through DIP switch on the interface board, no need for electronic encoder.

The detector is applicable to historical buildings, warehouses, large storages, shopping malls, leisure centers, exhibition halls, hotel lobbies, printing houses, clothing factories, museums and prisons, as well as places where slight smoke particles.

2. Features

1. Wide operating voltage range, big monitoring areas.
2. Hassle-free alignment, built with LEDs and laser beam pointing.
3. Built-in microprocessor enables intelligent judgment about fire alarm and fault.
4. The detector can calibrate automatically, which ensures a single person complete adjustment in short time. It's also convenient to operate.
5. Self-diagnosis function can monitor the inner fault.
6. Automatic compensation for factors weakening received signals, such as a certain of dust contamination, positional excursion and ageing transmitter.
7. Three sensitivity levels can be set in field.
8. The detector's optical pathway is designed with strong anti-interference ability.
9. Attractive and decent appearance.
10. Standard: EN 54-12:2015.

3. Technical Specifications

1. Operating Voltage: 24VDC (18V~30V)
2. Operating Current:
 - Commissioning current $\leq 32\text{mA}$
 - Standby current $\leq 15\text{mA}$
 - Alarm current $\leq 20\text{mA}$
3. Fire, fault contact output
 - Fire output contact: contact capacity is 30VDC/1A. Normally open in normal state, closed in fire condition.
 - Fault output contact: contact capacity is 30VDC/1A. Closed in normal state, and open in fault condition.
4. Angle of Adjusting: $-6^{\circ} \sim +6^{\circ}$
5. Maximum angular misalignment: $\pm 0.5^{\circ}$
6. Sensitivity Level:
 - Level 1: 2.3dB
 - Level 2: 1.8dB
 - Level 3: 1.3dB(default)
7. Indication of Detector State:
 - Commission:** Green LED and yellow LED are lit or flashed in a certain way. Refer to details in Section *VI Commission*.
 - Normal monitoring state:** Red LED flashes periodically.
 - Fire:** Red LED illuminates when the detector reports fire alarm. Fire output contact is closed. Power on the detector again to clear the fire signal.
 - Fault:** Yellow LED illuminates. Fault output contact is open. The detector clears the fault signal automatically if the condition causing the fault disappears.
8. Operating Environment:
 - Temperature: $-10^{\circ}\text{C} \sim +50^{\circ}\text{C}$
 - Relative Humidity $\leq 95\%$, non condensing
9. Monitoring Area: Maximum monitoring area: $14 \times 100 = 1400\text{m}^2$
Maximum width: 14m
10. Separation Distance: 8m~100m
11. Ingress Protection Rating: IP54
12. Dimensions:
 - Length: 222mm Width: 107mm Depth: 91mm
13. Material and Color of Enclosure: ABS, gray
14. Weight: 435g
15. Useful lifecycle: 10 year

4. Structure and Operation Principle

1. Internal devices of the detector and positions to be glued are shown in Fig. 1.

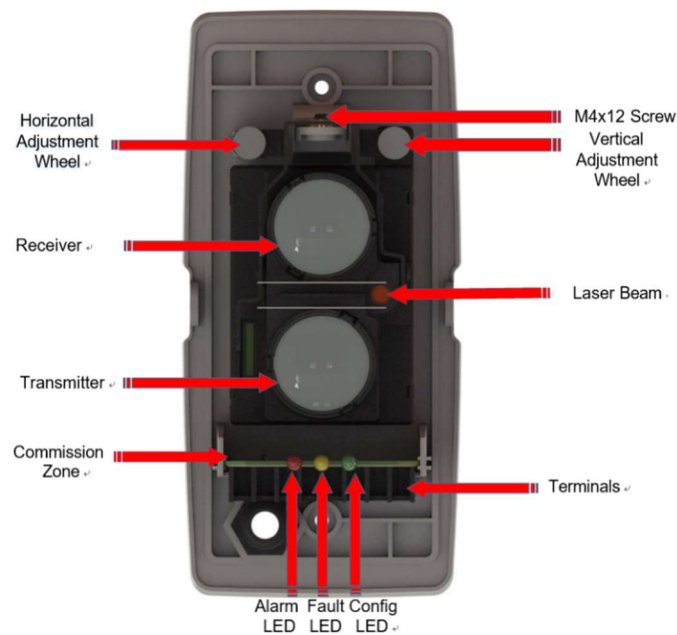


Fig. 1

2. Operation Principle

The detector and reflector are placed oppositely. The detector includes emitting part and receiving part. Infrared beam of certain intensity sent out from the emitting part is reflected by the right-angle prisms of the reflector, and then received by the receiving part of the detector. The receiving part simultaneously collects and amplifies the returned infrared beam, analyze and judge the collected signals through its microprocessor. When the detector is in normal monitoring state, the intensity of infrared beam received by the receiving part is steady at a certain level. When smoke particles enter the detecting area, the intensity of infrared light received by the receiving part falls owing to light scattering. When the smoke particles reach a certain density, and the intensity of infrared light received by the receiving part is reduced below the preset threshold value, the detector alarms fire, illuminates red LED. And fire output contact is closed. If connected with GST control panel, the fire signal will be passed to the panel through loop. Operation principle is shown in Fig. 3.

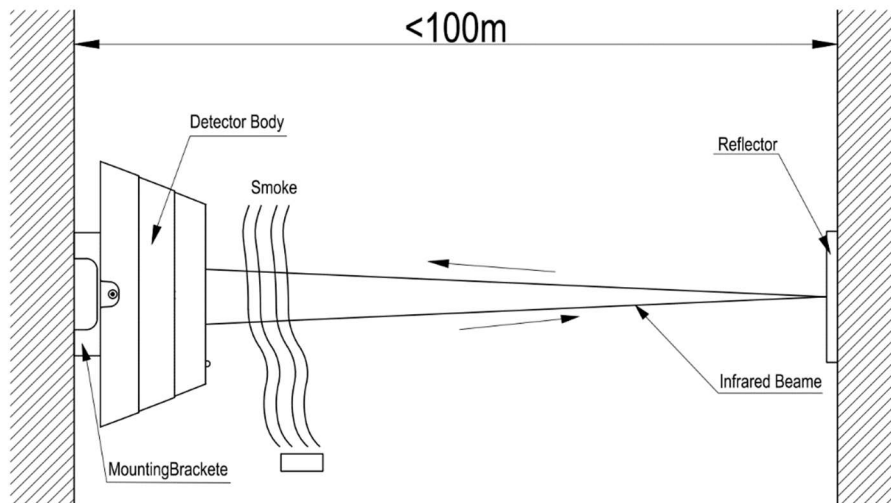


Fig. 3

5. Mounting and Wiring

1. Ambient Conditions for Installation

The detector works on light obscuration principle. Avoid any fixed or moving obscuration in its optical pathway when installing.

The wall for mounting either the detector or the reflector should be firm and smooth. The detector is mounted vertical to the wall. The wall may seem to be smooth, but corrugated or uneven, or may be changed by the environment (in rainy season or in winter) and the installer should ensure the detector not affected by these factors. If the detector is installed on sustaining rack similar to metal tube, make sure the sustaining rack fixed firmly.

Unsuitable for Locations where:

- Space height is over 40m.
- It is not roofed.
- Space height is less than 1.5m.
- There are a lot of dust, powder or vapor.
- It is clean normally, but can be dusty in some special cases.
- Temperature is high. **Note: Temperature at top part of a workshop with transparent roof may be over 50°C when there is sunshine.**
- There is no access for maintenance.
- The Mounting wall or fitting is greatly affected by mechanical vibration.
- There are fixed or moving objects within 1m from the detector's optical pathway.
- There is strong magnetic field.

2. Mounting Height and Position

The mounting height of the detector and reflector should be most accessible by smoke into beam zone. The following recommendations are for reference:

- a) When space height is not over 5m, the detector and reflector should be mounted on the two facing walls 0.5m from the ceiling, as shown in Fig. 4.

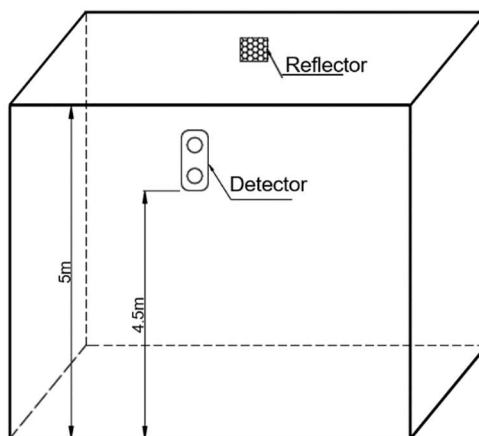


Fig. 4

- b) When space height is between 5m and 8m, the detector and reflector should be mounted on the two facing walls 0.5m to 1m from the ceiling, as shown in Fig. 5.

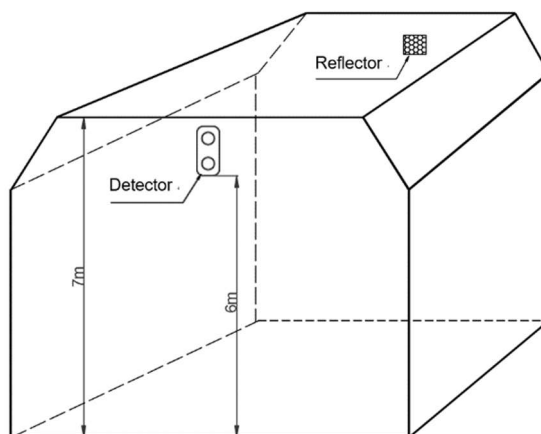


Fig. 5

- c) When space height is more than 8m, the roof is normally gabled without ceiling, the detector and reflector should be mounted on the two facing walls about 8m from the floor, ensuring that the vertical distance between the detector/reflector and top of the building is not less than 0.5m, as shown in Fig. 6. The distance should be 7m from the detector to the floor.

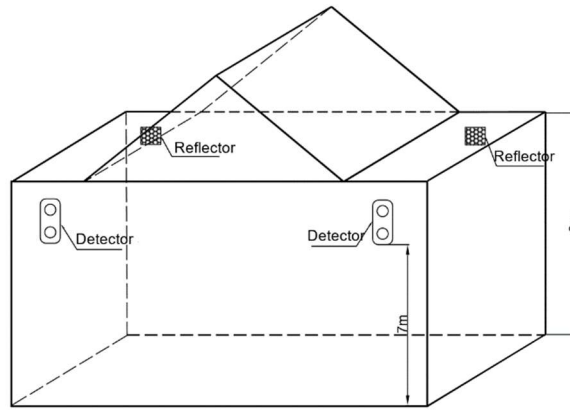


Fig. 6

d) For gable structure with space height about 8m, the detector and reflector should be mounted on the two facing walls 1.5m from the gabled girder, as shown in Fig. 7.

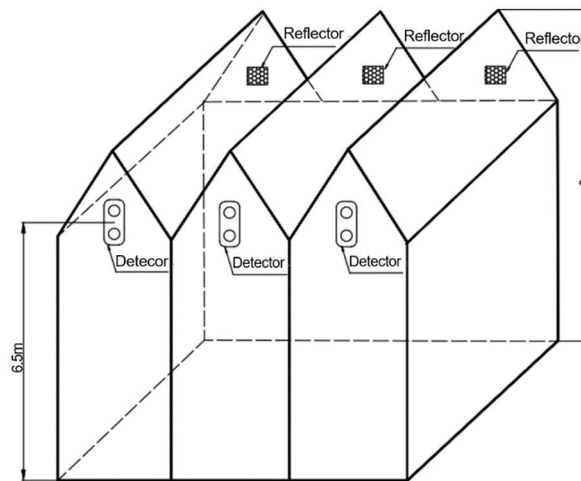


Fig. 7

e) If the surroundings are glass or transparent plastic, please place the detector on the south wall in a building. If the detector cannot be mounted northward, then place the detector on the west wall. For applications where sunlight can reach the detector after reflected, please consider mounting a sunshade over the detector's optical pathway or contact our field application engineer for a solution.

3. Mounting

1) Mounting the detector

Align the detector and the reflector horizontally on the two facing walls in monitoring area, as shown in Fig. 8

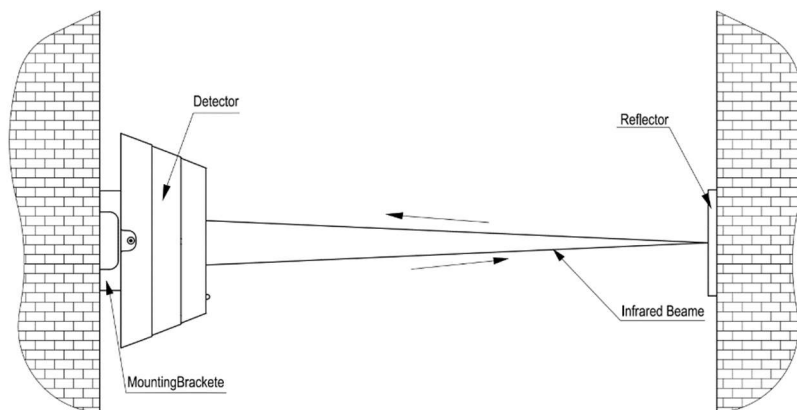


Fig. 8

The detector can be surface-mounted in two ways: with conduit embedded surface-mounted.

(1) Embedding conduit

- a. Remove the detector's top cover.
- b. Align the base of the detector over the back box and mark the positions of mounting holes on the wall.
- c. Drill two holes at the marked positions, and push two Ø6 plastic expansion bolts in.
- d. Thread the wires through the cable entry, ensuring the length of wires inside convenient for connection.
- e. Fix the detector base on the wall with two plastic expansion bolts and flat washers.

Mounting method is shown in Fig. 9.

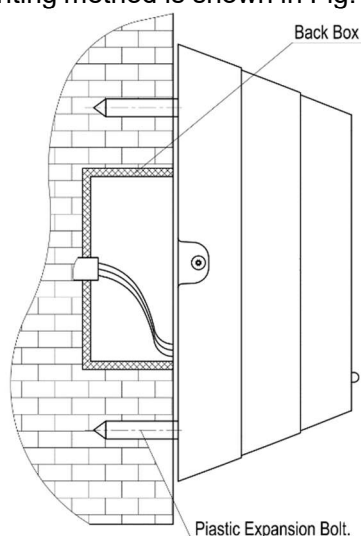


Fig. 9

(2) Conduit surface mounting

- a. Put the mounting bracket at position intended to install the detector; mark the locations of the four holes of mounting bracket on the wall.
- b. Drill the holes on marked positions, and push Ø6 plastic expansion bolts in.
- c. Fix the mounting bracket on the wall with four Ø6 plastic expansion bolts and flat washers.
- d. Remove the detector's top cover; thread the wires through the cable entry, ensuring the length of wires inside convenient for connection.
- e. Fix the detector base onto the bracket with two M4×10 bolts and flat washers.
- f. The mounting bracket should be earthed through the mounting hole.

Mounting method is shown in Fig. 10.

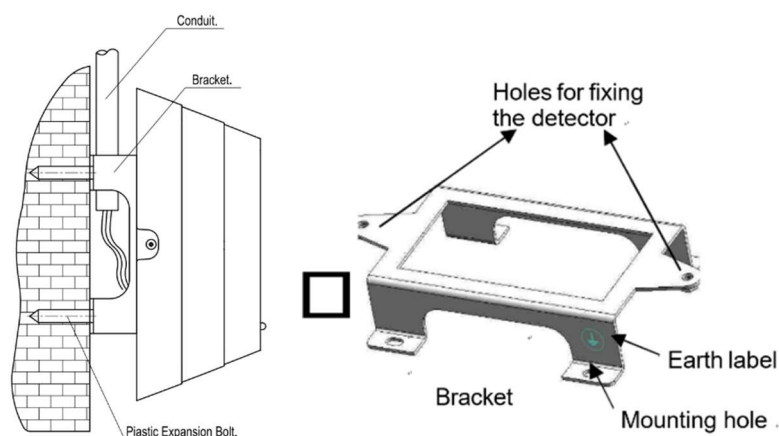


Fig. 10

- 2) Mounting the Reflector:** The reflector is mounted opposite the detector but in line with it. When the distance between the detector and the reflector is more than 8m (less than or equal to 40m), one reflector is enough. When the distance is more than 40m, four reflectors are needed. Two Ø6 plastic expansion bolts are needed to fix a single reflector. Mounting size is shown in Fig.11a. If four reflectors are needed, place them seamlessly as shown in Fig. 11b.

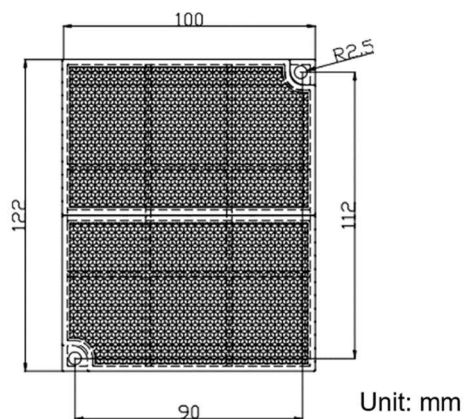


Fig. 11a

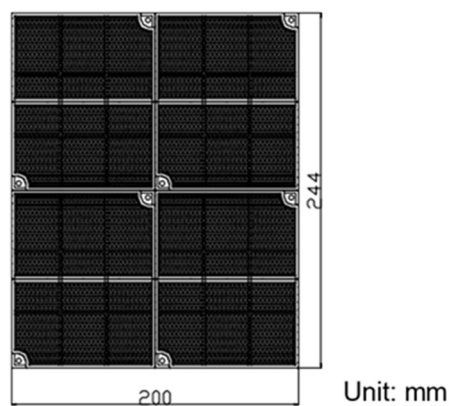


Fig.11b

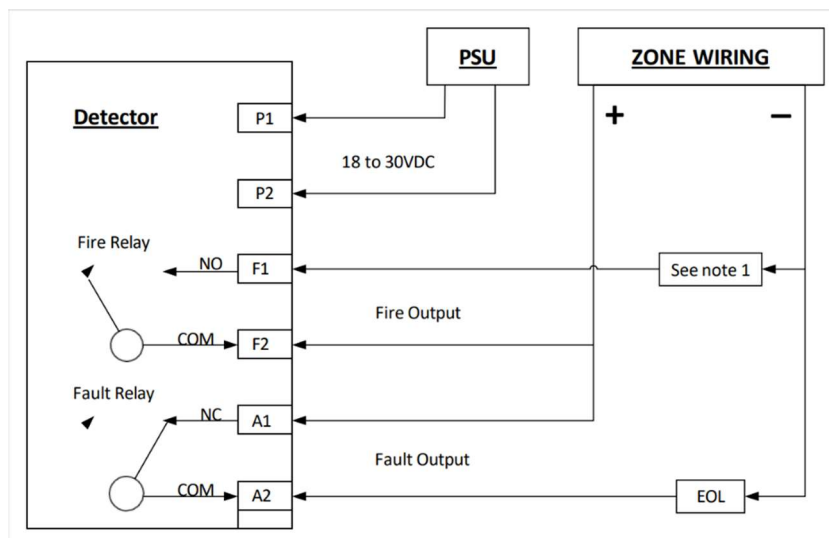
4. Wiring

Connect 24 VDC power wire (without polarity) to terminal P1 and P2 of the detector in field. Terminal S1 and S2 are reserved, no connection required. The reflectors need not to connect with wires. F1, F2 are fire output contacts. A1 and A2 are fault output contacts. Terminals are shown in Fig. 12.



Fig. 12

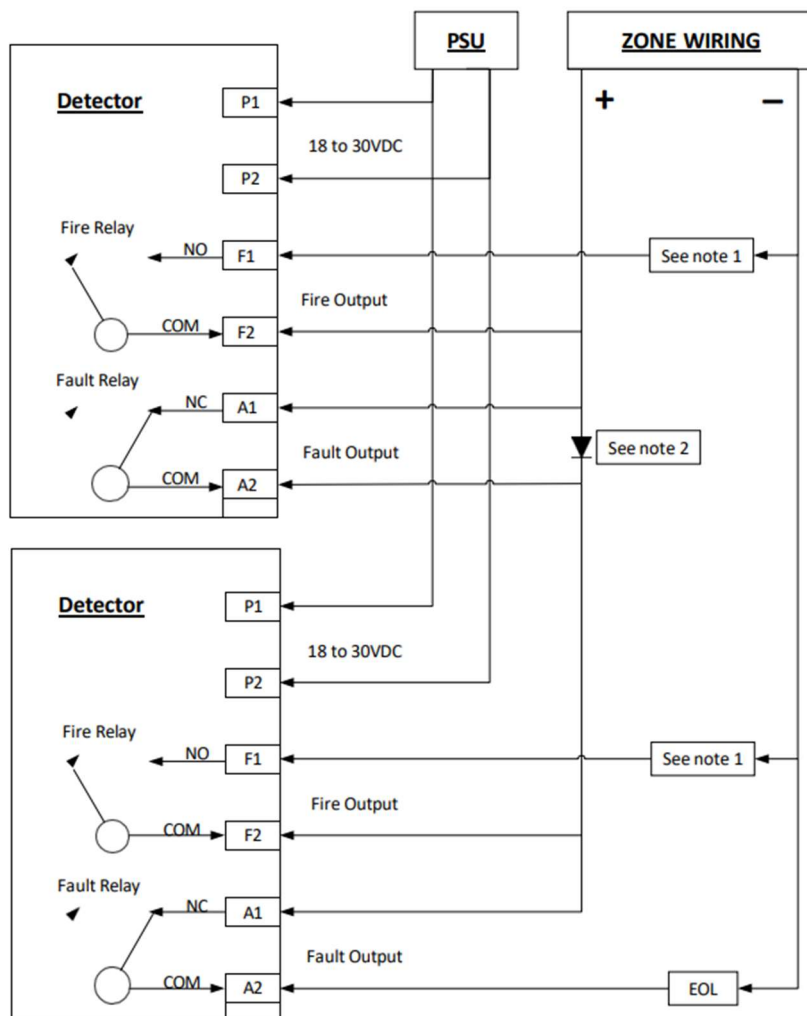
1) For connection of a single conventional Detector to a zone



Note 1 – This component is the Fire Resistor, and its value is specified by the Fire Control Panel Manufacture.

EOL – End of Line component – supplied by the Fire Control Panel Manufacture.

2) For connection of multiple conventional Detectors to a zone



Note 1 - This component is the Fire Resistor, and its value is specified by the Fire Control Panel Manufacture.

Note 2 – Schottky Diode (60V, 1A typical).

EOL – End of Line component – supplied by the Fire Control Panel Manufacture.

6. Commissioning

1. Commissioning preparation

- (1) Make sure both beam detector and reflector are properly and securely mounted.
- (2) Make sure that the line of sight is clear and both beam detector and reflector are in placed with accurate axis angle.
- (3) Make sure that the suitable numbers of reflector are installed depending on the distance between detector and reflector.
- (4) Wiring should be done correctly.

2. Steps

- a) Take off the protective membrane carefully on the surface of the reflector and the detector. Do not scratch or contaminate their surfaces.
- b) Remove the detector's top cover, and connect to 24VDC power, all LEDs flash together. Put the magnet of commissioning tool close to the reed switch (around the red LED) of detector's interface board. After a while the Laser Beam Pointer should turn on automatically.
- c) Look through on the reflector if the laser beam mark at the centre. Once you located the mark, loosen the M4x12 screw and adjust the horizontal or vertical adjustment wheel until the Laser beam mark at the centre of the reflector. Then there may be two cases with the Yellow LED:
 - (1) Yellow LED turns off.
 - (2) Yellow LED illuminates continuously.
- d) If Yellow LED turns off, it means the received light is quite weak. Tune the adjustment wheel and rotary rack on the detector to align the light beam until Yellow LED is lit continuously, showing that the light received by the detector is strong. Meanwhile the Green LED should be blinking (the faster the flashing frequency, the stronger the received light signal is). Tighten M4x12 Screw, and then stop regulating and enter step e).

If green LED illuminates continuously, it means the received light is too strong.

If Yellow LED illuminates continuously, you can go straight to step e).

Note: Observe the detector's optical pathway carefully to ensure that the received light signal is reflected by the reflector rather than by obscurations like wall, ceiling, or pillar. If uncertain, verify by covering the reflector with opaque objects.

- e) Put on the top cover gently, and screw the two bolts on the cover. The Yellow LED illuminates continuously and the Green LED is blinking. Put the magnet of commissioning tool close to the zone where marked ○A until Yellow LED and Green LED are flash synchronous. Then remove the commissioning tool quickly and make sure there is no obscuration on the optical pathway. About 5 seconds later, the detector begins to adjust automatically. If yellow LED and green LED illuminate no more, and red LED flashes periodically, this means the detector is at the best position and has entered normal monitoring state. The commission is finished.

3. Fire alarm test

Having been monitoring state for 20 seconds, the detector shall give fire alarm and illuminate red LED within 30 seconds as IR Light Filter (please use the part for fire alarm test) is close to the detector while receiving transmitting windows are blocked.

4. Fault test

Closing to transmitting or receiving window, an IR Light Filter is used to block the optical path. After that, fault LED of the detector illuminates yellow. Then the LED turns off if the IR Lighter Filter is removed.

5. Failed Detector

During testing, repair failing detectors according to directions in Section *IX Troubleshooting* and *X Maintenance*, and test again, if they fail again, return them to factory for repair.

7. Cautions

1. Power up only after all devices are well connected.
2. Adjust the detector after installation and maintenance.
3. The detector base should be fixed directly on solid wall or frame that will not be deformed by vibration. Any deformable material such as paperboard, plastic board, foam board or thin wood board should not be placed between the base and the wall or the bracket.

8. Operation

1. User configuration settings

Sensitivity level of the detector can be set by the DIP switch on the interface board. Which makes the detector easier to configure. Each setting of the detector can refer to table 1 for DIP switch position.

Factory default configuration settings are marked ←.

Table 1

Function	DIP switch			
	1	2	3	default
Level 1 Sensitivity	X	OFF	OFF	
Level 2 Sensitivity	X	OFF	ON	
Level 3 Sensitivity	X	ON	X	←

2. Other Functions

1) Automatic Compensation of Light

When dust exists in the working environment of the detector, the emitting window, receiving window and reflector will be covered with dust, which will affect normal operation. In order to solve the problem, we designed the function of automatic compensation of light. When there is dust on windows, the detector can judge the amount of dust, and compensate the received signal through internal program and circuit to ensure the detector can continue to work normally. The detector gives fault signal when dust on the lens and reflector surface reaches a certain level and light compensation reaches the limit for the detector to work normally.

2) Self-diagnosis on Optical Signal

The detector has functions of checking emitting, receiving and amplifying circuit. When there is fault with these three parts of circuit during operation, the detector will generate fault information.

9. Troubleshooting

Common problems and repair methods are as shown in Table 2.

Table 2

Problems	Reasons	Repair Methods
Reports fault after the control panel powers on and registers	The detector is not in normal working state.	Commission once more.
Green LED constantly flashes after power on	a) Emitting diode or circuit damaged. b) Receiving diode or amplifying circuit damaged.	Replace the faulty component..
Gives fault signal after a period of normal operation	The detector can't work normally.	Commission once more
Alarms fire after operation for some time, and gives fault signal after restart	The detector has deviated due to external vibration.	Commission once more
Fire signal cannot be cleared	a) There are obscuration on the optical pathway between the detector and the reflector. b) The angle of optical pathway has changed and need to be aligned again. c) The emitting diode or circuit damaged. d) The photodiode or amplifying circuit damaged.	If the problems are mentioned in a), b), commission once again. If in c), d), replace the component with problem.
The control panel can't receive fire or fault signals.	No registration.	Register again.

10. Maintenance

1. If the detector gives fault signal after working for a long time, first check whether the detector is damaged or not, and make sure that it is fixed to the wall or other fittings. Then check whether it is the accumulating dust and positional excursion, causing compensation fault, then consider other types of fault.
2. If emitting window, receiving window and reflector surface are found contaminated, clean them with soft cloth and alcohol (avoid scraping). Never use water or other chemicals. Commission the detector again after cleaning and make it in monitoring state.
3. The detector is fire protection product, whose operation must be well recorded by the personnel on duty and shift.
4. Personnel on duty should be familiar with the functions and operation process of the device to avoid mis-operation.
5. Test alarm function once half a year.
6. The special tool (Star-shaped hexagon wrench) is intended solely for authorised installers or service personnel, and must not be provided to or used by untrained end-users.

11. Accessories

Accessories provided with the detector are as follows:

Part No	Device Name	Product No	Number
TSB-6688	Commissioning controller	20200006	1
FSB-6688	Reflector	30100030	4
JSGDZJ-6688	Metal Fixed Bracket	30100031	1
PZLSTJ-6688	Expansion screw kit	30100032	1
HWLGP-6688	Infrared filter	30100033	1
MHXXLJBS-6688	Star-shaped hexagon wrench	30100034	1

12. WEEE Information



2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points.

Appendix 1 Warnings

Limitations of Smoke Detector

The smoke detector is designed for triggering and initiating emergency fire equipments, but it only functions when matching with other equipments. Installation of this smoke detector must conform to electrical codes and standards in your country.

The smoke detector cannot work without power. It cannot work if power is cut off for any reason.

The smoke detector may not sense fire that where smoke cannot reach it, such as in chimneys, in walls, on roofs, or on the other side of closed doors.

The detector also may not sense a fire on another level of a building. Therefore, detectors should be placed on every level of a building.

All types of smoke detector have limitations. Because fires develop in different ways and are often unpredictable in their growth, it is impossible to predict which type of detector will provide the earliest warning. No types of smoke detector can sense every kind of fire every time. Generally speaking, detectors may not warn you about fires caused by insufficient safety measures, violent explosions, leaking gas, improper storage of flammable materials like diluents and other safety hazards, arson or children playing with fire. The alarm of a smoke detector used in high velocity environment will be delayed due to dilution of smoke by frequent and fast airflow. What's more, the smoke detector has to be maintained frequently because there will be more dust contamination.

The smoke detector cannot last forever. In order to keep the detector working in good condition, please maintain the equipment continuously according to recommendations from manufacturers and relative nation codes and laws. Take specific maintenance measures on the basis of different environments.

The smoke detector contains electronic parts. Even though it's made to last for a long period of time, any of these parts could fail at any time. Therefore, test your smoke detector at least every half-year according to national codes or laws. Any smoke detectors, fire alarm devices or any other components of the system must be repaired or replaced as long as they fail.



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