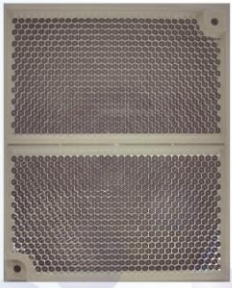
DI-9105E
Intelligent Reflective Beam Detector





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Installation and Operation Manual

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1. Overview

DI-9105E Intelligent Reflective Beam Detector (hereinafter referred to as the detector) is an addressable smoke detector with infrared optical beam. The reflective detector can connect with GST control panels, transmitting states through the loop. The detector's address can be programmed within 1~242 through a GST handheld programmer in filed.

Combining a transmitter and a receiver, the detector connects reflector on the opposite wirelessly. In this way, it is simple for on-site wiring. One reflector or four reflectors are used based on different mounting distance from a detector to a reflector.

The detector has an integral visible indicator and 2 bits digital tube. It is easy to install and align the reflector as the visible indicator directs the emitting infrared light. Alongside, it is convenient for commissioning with 2 bits digital tube displaying received light intensity.

The detector is suitable for various applications including large storage zones, shopping malls, fitness centers, gyms, exhibition halls, hotel lobbies and areas with complex ceilings.

2. Features

1) Providing wide operating voltage and protection area.
2) Combining a transmitter and a receiver, one end connects wires simply.
3) Judging fire alarms and faults intelligent with a built-in MCU.
4) Commissioning in field becomes easier than before with the help of the visible indicator and 2 bits digital tube.
5) Monitoring faults inside the detector due to self-diagnosis ability.
6) Providing compensation for such sensor signal changes caused by the build-up of dirt, position offset or a component aging.

7) The address can be programmed electronically in field through a handheld programmer.
8) Four sensitivities are available in field.
9) Standard: EN 54-12: 2015

3. Technical Specifications

1) Operating Voltage: Loop 24V (16V～28V）
2) Operating Current:
   Standby Current ≤2mA
   Alarm Current ≤5mA
   Commission Current ≤20mA
3) Angle of Adjusting: -6°～+6°
4) Maximum Angular Misalignment: ±0.5°
5) Sensitivity Level (Any of the following sensitivities can be set at allowed distance):
   Level 1: 1.3dB
   Level 2: 1.8dB (factory default)
   Level 3: 2.3dB
   Level 4: 2.8dB (not EN 54-12: 2015 approved)
6) State Indication:
   Commission: Green LED and yellow LED illuminate or flash in a way. Refer to Section VI Commission.
   Normal Standby State: LED flashes red regularly.
   Fire: Fire LED illuminates steadily as the detector in alarm.
   Fault: Fault LED illuminates steadily as the detector in fault.
   Completely Obscure the Optical Beam Path: The detector gives fault signal and illuminates fault LED if the optical beam path suddenly been obscured by object. If the optical beam path been slowly obscured, the detector gives fault signal first and then change to fire signal.

Note: It doesn't mean a fire occurs in this case. As the obscuration is removed, fault signals are cleared by the detector and fire signals are cleared by the control panel or by switching off the power.

7) Operating Environment:
   Temperature: -10°C～+55°C
   Relative Humidity ≤95%，non condensing.
8) Protection Area: The detector can protect the area of 1400m^2 (14×100＝1400m$^{2)}$) with the widest 14m.
9) Length of Optical Beam Path: 5m～100m
10) Ingress Protection Rating:
   IP 20 for ordinary environment;
   IP 66 with glue treatment for special environment.
11) Dimensions:
   Long: 206mm x 95mm x 95mm
12) Material and Color of Enclosure: ABS, grey
13) Weight: About 450g
14) Mounting Hole Spacing:
   Dimensions for Embedded Mounting: 158mm
   Mounting Hole Spacing for Surface Mounting: 79mm×96mm

4. Structure and Operation Principle

1) Appearance of the detector is shown in Fig.1.

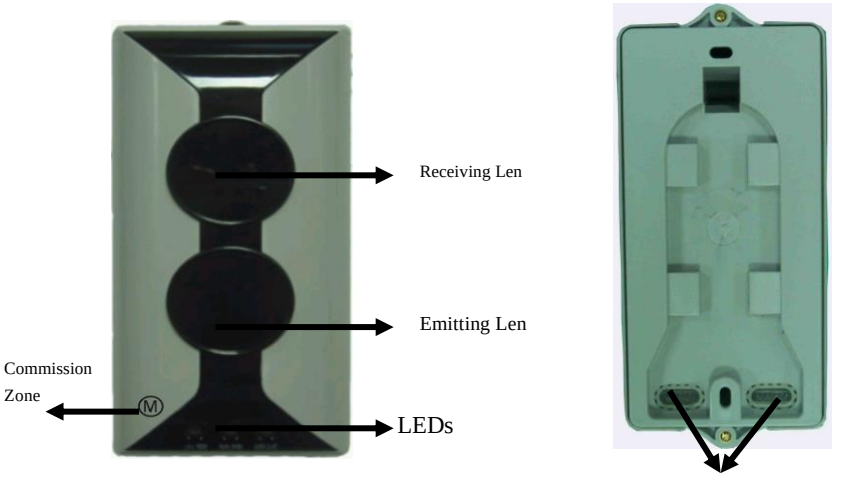


Fig.1

2) Components inside the detector and positions with glue are shown in Fig. 2.

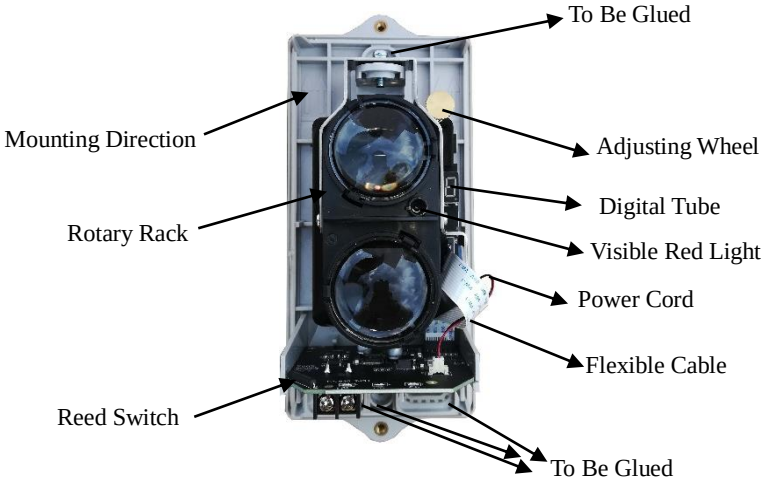


Fig. 2.

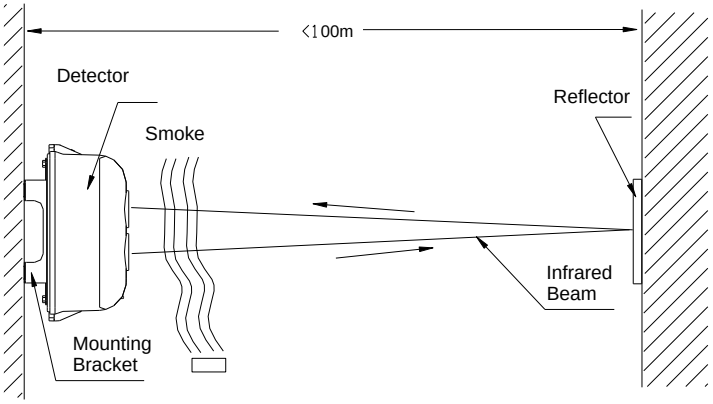


Fig. 3

5. Installation and Cabling

1) Ambient Conditions

The detector monitors and gives alarms by attenuation changes. So, constant or causal obscuration should not appear in the optical beam path.

The wall should be solid and flat to mount a detector or a reflector. The detector is mounted vertically to the wall. Even if the wall looks like flat, it may be uneven or become corrugated due to weather changes. Therefore, the installer should ensure that those factors can't have an impact on the wall for detectors. In addition, the metal rack is used for mounting detectors should be fixed without any vibration.

Not Fit for Locations Where，

- The ceiling is higher than 40m.

- It is not roofed.
- The ceiling is lower than 1.5m.
- There is much dust, powder or vapor.
- It generates a lot of dust in some certain conditions even though it is clean in normal state.
- The places are very hot. **Note: The air temperature in the transparent ceiling will exceed 55℃ while the sun is shining.**
- Places are not maintained.
- The wall or bracket for mounting the detector is not stable due to nearby mechanical vibration.
- There are fixed or moving objects obscured within 1m of the optical beam path.
- The strong magnetic field exists.

2) Mounting Height and Position

The height for mounting a detector and reflector/s should be depended on whether smoke enters the optical beam path directly and quickly. Here are some references below.

a) As the space height is not over 5m, the detector and reflector/s should be mounted on the walls which are opposite, having about 0.5m from the ceiling. Refer to Fig. 4.

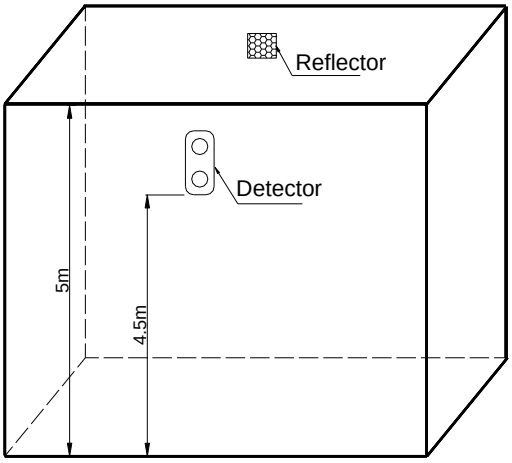


Fig.4

b) As the space height is between 5m and 8m, the detector and reflector/s should be mounted on the walls which are opposite, having about from 0.5m to 1m from the ceiling. Refer to Fig. 5.

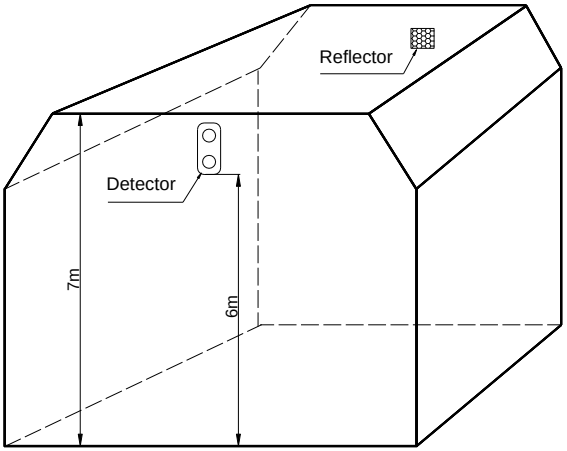


Fig.5

c) As the space height is over 8m, the roof is normally gabled

without ceiling. In this case, the detector and reflector/s should be mounted on the walls which are opposite, having about 7m from the floor and over 0.5m from the top. Refer to Fig. 6.

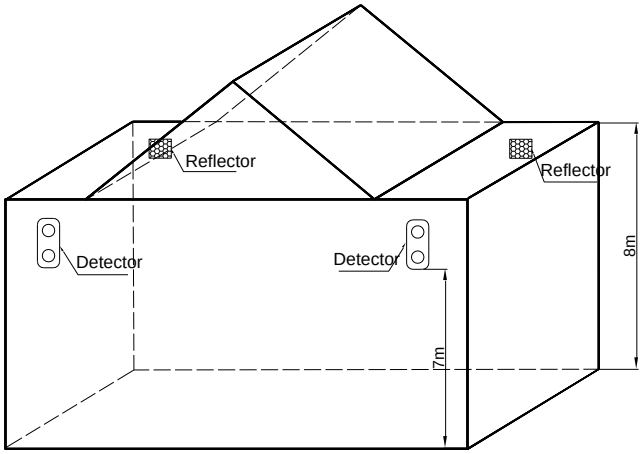


Fig.6

d) As the space height with gable structure is about 8m, the detector and reflector/s should be mounted on the walls which are opposite, having about 1.5m from the gabled girder. Refer to Fig. 7.

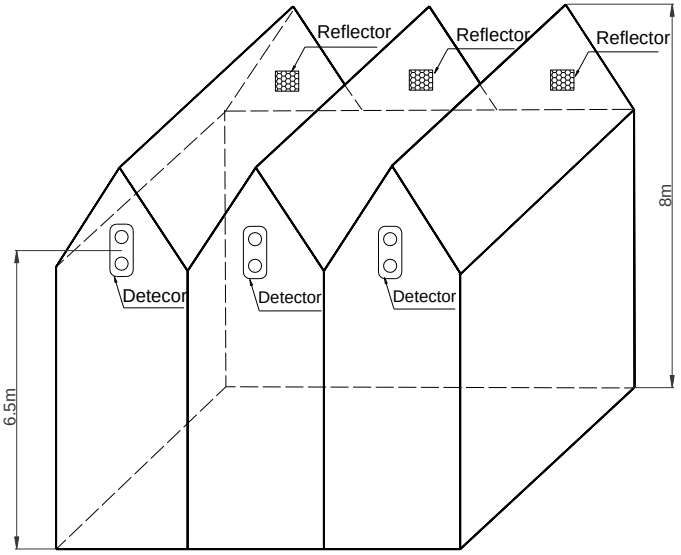


Fig.7

e) The detector should be installed on the south wall of the building surrounded with glass and plastics. However, the detector should be placed on the west wall when north-south installation doesn't work. A sunshade should be equipped with the optical beam path for those applications where reflected sunlight can shine on the detector. Besides, technical engineers in our company can provide better solutions.

3) Installation

a) Optical Path Length

The optical path length of this detector should be set according to applications before installation. It can be set through length types.

Mounting Distance	Length Type
5～20m	20
20～40m	40
40～70m	70
70～100m	100 (factory default)

The detector can be set according to mounting distance with four different optical path lengths. Refer to Section VIII Operation for details.

b) Detector Mounting

The detector and reflector/s should be installed on two walls oppositely and horizontally. Refer to Fig.8.

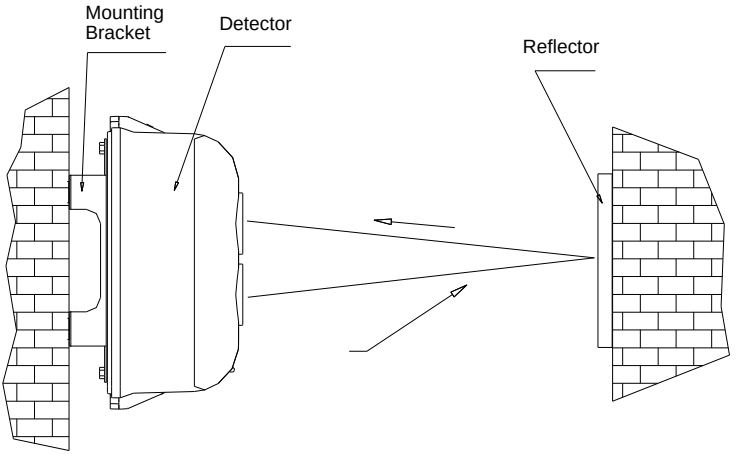


Fig.8

The detector is surface-mounted with conduit embedded or conduit surface-mounted.

(1) Conduit Embedded

a. Remove the detector's top cover.

b. Aligning the detector base with the back box, put it close

to the wall and make marks on the wall for mounting holes.

c. Drill holes on the marks and place ∅6 plastic expansion bolts in the holes.

d. The wire putting through the cable entry should be convenient for wiring.

e. The detector base should be fixed to the wall using two plastic expansion bolts and two plain washers.

The mounting of the detector is shown in Fig.9.

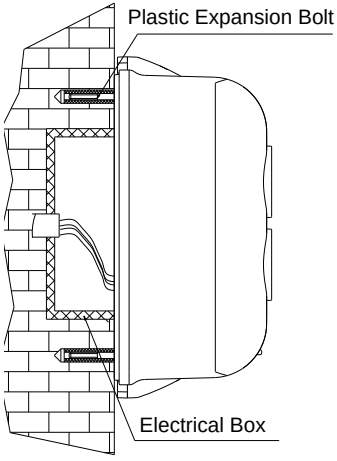


Fig.9

(2) Conduit Surface-mounted

a. Put the mounting bracket close to the wall for the detector, make marks for mounting holes.

b. Drill holes on the marks and place ∅6 plastic expansion bolts in the holes.

c. The bracket should be fixed to the wall using four plastic expansion bolts and four plain washers.

d. The wire putting through the cable entry after removing the detector top cover should be convenient for wiring.

e. The detector base should be fixed to the mounting bracket using two M4×10 screws and two plain washers.

F. The mounting bracket should be earthed through a mounting hole.

The mounting of the detector is shown in Fig.10.

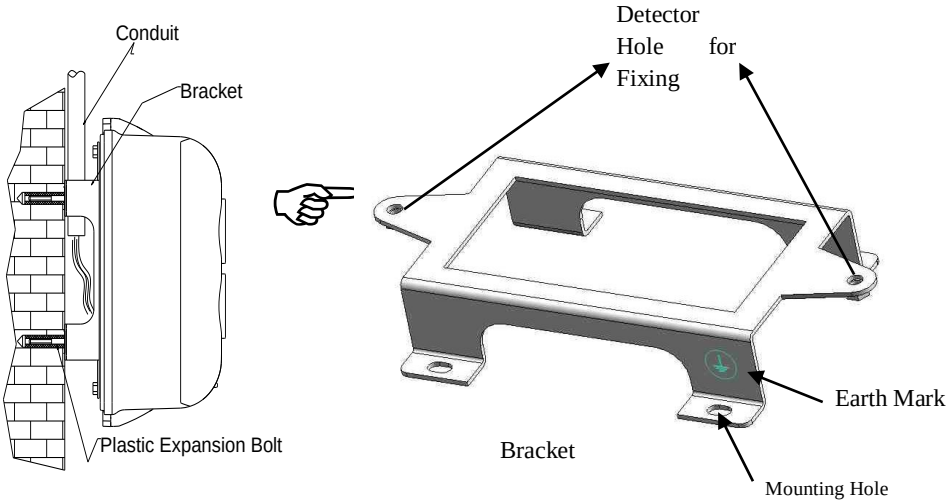


Fig.10

c) Mounting Reflector:

Reflector should be mounted on the position keeping the same level with the detector but opposite to it. One reflector is required as the distance from the detector to the reflector is between 5m and 40m, when the actual distance installation between the detector and the reflector is less than 10 meters, it is needed to paste the non-reflective mask on the reflector because the infrared light reflected by the reflector is too strong; four reflectors are needed as the distance from the detector to the reflector is between 40m and 100m. Two ∅6 plastic expansion bolts are used to fix one reflector. Refer to Fig. 11a for details. Four reflectors should be placed seamlessly when mounted. Refer to Fig.11b for

details. The non-reflective mask refers to Fig.11c.

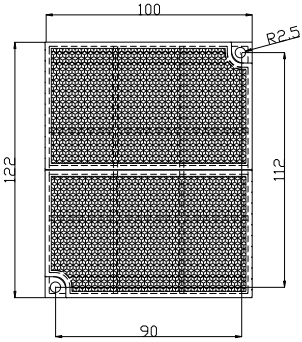


Fig.11a (unit: mm)

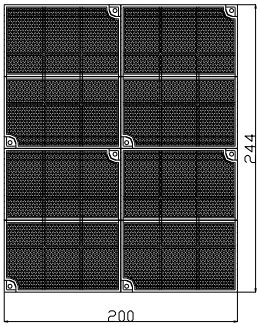


Fig.11b (unit: mm)

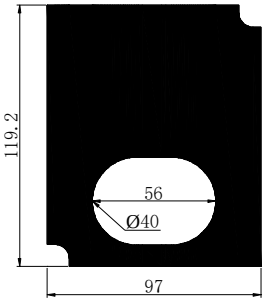


Fig.11c (unit: mm)

d) Recommended Wiring

In field, Z1，Z2 (polarity insensitive) of a detector should be connected to signal loop of a control panel. The reflector doesn't need any wires. The terminals of the detector are shown in Fig.12.

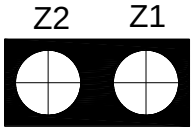


Fig.12

Wiring: 1.5mm^2 or above twisted pair for Z1, Z2. 1.0mm^2 or above for the grounding wire.

Note: As the detector is mounted in the special environment such as dust, damp, three positions as shown in Fig. 2 should be sealed with glass glue or 703 silica gel after fixing and wiring, ensuring the detector works stably.

6. Commissioning

1) **Commissioning Steps**

a） Protective film of the detector and the reflector should be removed without scratching their surfaces.

Take off the top cover of the detector, and then switch on the power of the detector. After two minutes, make the Magnet Ⓜ of a commission tool approach the reed switch (near the Fire LED) located on the interface board of the detector. At the moment, the visible red light will be emitted by the detector, then remove the commissioning tool

Adjust wheel and rotary rack to make sure the visible red light point at center of the reflector. Then observe the two bits digital tube, if it

shows “PP”: means the detector is commissioning automatically, please keep the detector stay still. If shows “P..”: It means Step a) works, please go to step b). If shows “0-99”: It means the received light is too weak, the detector needs to be further alignment with the reflectors. The number “0-99” can be used as a reference during move the direction of the detector, the numbers will change from small to large to indicate the received signal from weaker to stronger, until shows “P..”, then go to step b). if shows “H0-H9”: It means the received light is too strong, the detector needs to be further alignment with the reflectors as well. “H0-H9” can be used as a reference to move the direction of the detector because it means the light intensity is from weak to strong. Until finally shows “P..” then go to step b).

Note: The received light should be ensured that it is reflected from the reflector rather than from obstructions such as walls, ceilings or pillars. As you can’t confirm it by observation, you can use an opaque object to block the optical path to verify it.

b） Put on the detector cover gently, As the green LED illuminate continuously, then fasten those two screws. If the green LED flash, please go back to step a) and repeat the commissioning procedures.

c） The Commission LED illuminates green steadily. The Magnet Ⓜ of the commission tool should be put approach to the Ⓜ of the detector. As the yellow LED illuminates constantly, then remove the commission tool quickly and make sure there is no obscuration on the optical pathway. After about 20 seconds, if yellow LED and green LED turn off, and red LED flashes periodically, this means the detector is at the best position and has entered normal monitoring state. The commissioning is finished. As the Yellow Led and the green LED illuminate continuously, that means the detector is failed to calibrate

automatically and can't enter normal monitoring state. Power on the detector again, go back to step a) to repeat the commissioning procedures.

2) **Fire Alarm Testing**

As the detector has been in standby state for over 20 seconds, use Alarm Zone of IR light filter close to the detector to block the receiver and transmitter parts windows. In this case, the detector should give fire alarm and the red Fire LED turn on in 30 seconds.

Note: As the detector is set to sensitivity 1 or 2, fire alarm testing uses IR Light Filter-1. As the detector is set to sensitivity 3 or 4, fire alarm testing uses IR Light Filter-2. The protective film covering two sides of IR Light Filter should be removed carefully when the filter is used for the first time.

3) **Fault Testing**

Use Fault Zone of IR light filter close to the detector to block the receiver or transmitter parts windows. The yellow fault LED should turn on, detector will report fault, and the yellow fault LED turns off with removing the filter immediately.

The Alarm Zone and Fault Zone of IR Light Filter are shown in Fig 13.

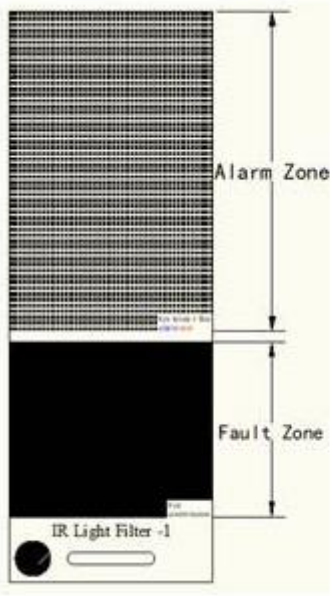




Fig 13.

4) **Unqualified Products**

Unqualified detectors should be dealt with according to Section IX Troubleshooter and X Maintenance. After treatment, the unqualified detector should be tested again. Return it to the factory for repair if the testing fails again.

7. Cautions

1) Warning: Power up only after all devices are well connected.

2) The detector should be calibrated after installation and every maintenance.

3) In commissioning, the detector could give fault signals either sent from the detection loop or from fault output contact.

4) The detector base should be installed directly on a solid wall or a

mounting bracket without deformation, those materials such as paperboard, plastic board, foam board or thin wood board should be avoided between the detector base and the solid wall or the bracket.

8. Operation

The address, length type and sensitivity of a detector can be programmed electronically by GST handheld programmer. Connect the "Z1, Z2" terminals of the detector to the P-9910B programmer

1) Read Information

The information can be fast read through the programmer. Refer to details below.

- As the programmer is connected and switched on, it will display the address when pressing "Test".
- Pressing "Up" the programmer will display the sensitivity level, device type and length type in sequence.
- Pressing "Down", the programmer will display above-mentioned information in reverse.

2) The address of a detector can be programmed in field. Refer to details below.

- Enter the address you need as the programmer is connected and switched on.
- The address will be programmed with the "Program" key pressed. "P" will appear on the display as it is programmed successfully. Otherwise, "E" will appear.
- As the programming is successful, the programmer displays "0" with "Clear" pressed, the further operations can continue.
- As the programming is fail, the programmer displays "0" with "Clear" pressed and the programming is repeated.

3) Set Sensitivity Level

Four sensitivity levels (from 1 to 4) can be set through the programmer.

- Enter unlock password and press “Clear” to unlock the programmer.
- The programmer displays “—”with “Function” and “3”pressed.
- Input corresponding sensitivity and press “Program”, “P” will appear on the display as the sensitivity level is programmed successfully. Otherwise, “E” will appear.
- As the programmer displays “0” with “Clear” pressed, the further operations can continue.

4) Set Length Type

The length type can be set for the detector through the programmer. Refer to details below.

- Enter unlock password and press “Clear” to unlock the programmer.
- The programmer displays “—”with “Function” and “4”pressed.
- Input corresponding length type and press “Program”. “P” will appear on the display as the length type is programmed successfully. Otherwise, “E” will appear.
- As the programmer displays “0” with “Clear” pressed, the further operations can continue.

Note: The handheld programmer has lock password to prevent non-special personnel from modifying some important data. “456” is unlocking password; “789” is locking password.

5) Other Functions

1) Automatic Compensation for Light

As the detector operates in the dust environment, its emitter part and receiver part covered with dust will have an impact on its

operation. We add automatic compensation light for its better performance. As there is dust on the emitter part or receiver part of the detector, it will judge the dust amount and compensate for received signals through the inner program and the hardware circuit, ensuring the detector operates normally in dust environment. The detector gives fault signals as build-up dust reaches a certain level and the light compensation reaches the limit.

2) Self-diagnosis on Optical Signals

The detector can diagnose the emitter, the receiver and the amplification circuit. The detector can give fault signals as those parts have something wrong.

9. Maintenance

1) The detector should be checked if it is damaged first when it gives fault signals after long term operation. Then ensure it is installed on a wall or a mounting bracket securely. After that, the build-up dust and position should be inspected to confirm if automatic compensation is not correctly. Finally consider other faults.

2) As surfaces of the detector and the reflector are contaminated, soft cloth and alcohol can be used to clear them gently. Don't scratch the surfaces or don't use water or other chemicals. The detector should be commissioned once more to make it enter the normal standby state.

3) The detector belongs to fire products so that its operation, duty, and shift should be recorded carefully.

4) People on duty should be familiar with functions and operations to avoid incorrect operation.

5) The detector should undertake fire alarm test half a year.

10. Accessories

Name	Quantity
Plastic Expansion Bolt	4 pcs
Mounting Bracket	1 pcs
M4×10 cross recessed pan head screws	2 pcs
IR Light Filter	2 pcs
∅4 Plain Washer	6 pcs
T-MT Commission Tool	1 pcs
NRM-9105 non-reflective mask	Order separately

11. 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.

For Article33 information, please refer to the following website：

https://www.gst.com.cn/en/reacharticle33.asp

12. Limited Warranty

GST will repair or replace the product to the original purchaser free of charge, if defective in materials or workmanship during the warranty period, subject to the terms below. GST and CRSS are not responsible for defects or problems as a result of conditions or applications including normal wear and tear; catastrophe; fault or negligence of any user or any party other than GST and CRSS; improper installation, application, storage, maintenance, or use of products; other causes external to products; or failure to conform to any applicable recommendations of GST and CRSS. In no event shall GST and CRSS be liable for incidental, indirect, special or any other consequential damages. To the fullest extent permissible by law, the foregoing limited warranty is exclusive and in lieu of all other warranties, whether written, oral, implied or statutory. Subject to applicable law, in no event shall the

liability of GST and CRSS exceed the purchase price of the products. NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. Anybody, including the agents, distributors or employees, is not in the position to amend the contents of this warranty.

13. Product warnings and disclaimers

THESE PRODUCTS ARE INTENDED FOR SALE TO AND INSTALLATION BY QUALIFIED PROFESSIONALS. CARRIER FIRE & SECURITY BV, CARRIER FIRE & SECURITY AMERICAS CORPORATION AND THEIR AFFILIATE COMPANIES (TOGETHER AND EACH INDIVIDUALLY "CARRIER") CANNOT PROVIDE ANY ASSURANCE THAT ANY PERSON OR ENTITY BUYING ITS PRODUCTS, INCLUDING ANY “AUTHORIZED DEALER” OR “AUTHORIZED RESELLER”, IS PROPERLY TRAINED OR EXPERIENCED TO CORRECTLY INSTALL FIRE AND SECURITY RELATED PRODUCTS.

For more information on warranty disclaimers and product safety information, please check https://firesecurityproducts.com/policy/product-warning/ or scan the following code:

Appendix 1 Warning

Limitations of Smoke Detectors

The smoke detector is designed for triggering and initiating emergency fire equipment, but it only functions when matching with other

equipment. 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 starts 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 manufacturer 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.

Appendix 2 Warranty

GST warrants that the product will be free from defects in design, materials and workmanship during the warranty period. This warranty shall not apply to any product that is found to have been improperly installed or used in any way not in accordance with the instructions supplied with the product. Anybody, including the agents, distributors or employees, is not in the position to amend the contents of this warranty. Please contact your local distributor for products not covered by this warranty.



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