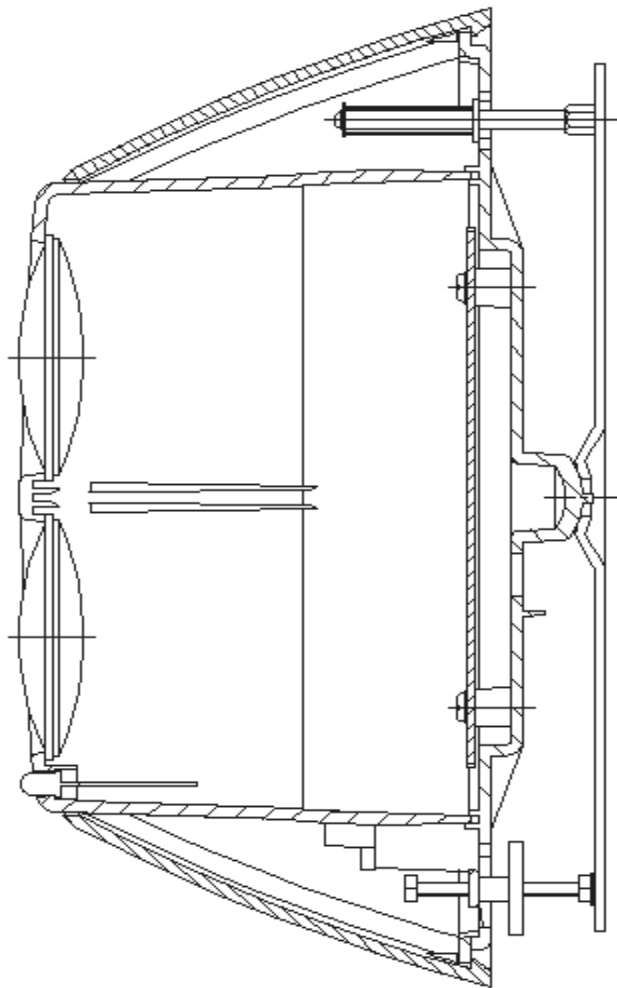


FIRERAY

FD2705R/FD2710R



FEATURES

- **Microprocessor controlled**
- **Range 5 – 50 Metres**
- **Range 50 – 100 Metres**
- **Unique simple alignment**
- **Loop powered**
- **Selectable alarm thresholds**
- **Low current consumption**
- **Automatic contamination compensation**

Loop Powered
Analogue Addressable

1. System Description.

Fireray FD2705R/FD2710R Detector comprises a Transmitter and Receiver contained within one enclosure.

The Detector installs to the building fabric between 0.3 and 0.6 metres from the ceiling.

The Transmitter emits an invisible infrared light beam that is reflected via a prism(s) mounted directly opposite and with a clear line of sight. The reflected infrared light is detected by the Receiver and analysed.

The Detector has maximum lateral detection of 7.5 metres either side of the beam.

2. System Operation.

Smoke in the beam path will reduce the received infrared light proportionally to the density of the smoke. The Detector analyses this attenuation or obscuration of light and acts accordingly.

Alarm thresholds of 25%, 35%, and 50% can be selected to suit the environment, where 25% is the most sensitive. If the received infrared signal reduces to below the selected threshold, and is present for approximately 10 seconds, a Fire condition is activated.

If the infrared beam is obscured rapidly to a level of 90% or greater for approximately 10 seconds a Fault condition is activated.

This condition can be entered in a number of ways, for example, an object being placed in the beam path, transmitter failure, loss of the prism(s), or sudden misalignment of the Detector. The fault condition will reset within 5 seconds of the condition being rectified.

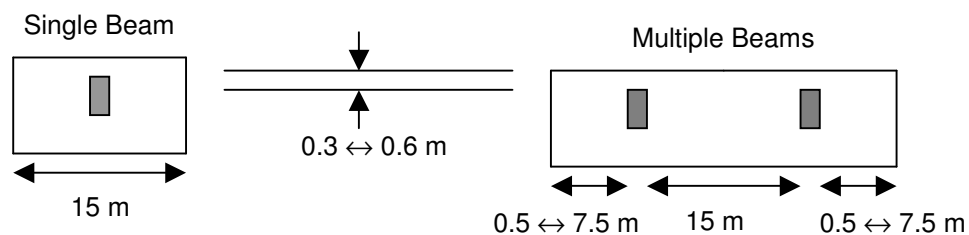
The Detector monitors long term degradation of signal strength caused by component ageing or build up of dirt on optical surfaces. This operates by comparing the received infrared signal against a standard every 15 minutes; differences of less than 0.7dB/Hour are corrected automatically. When the detector is showing AGC fault, the detector will still operate correctly indicating Alarm and Fault as normal.

3. Detector Positioning.

It is important that the Fireray FD2705R/FD2710R Detector is positioned correctly to minimise the detection time.

Experiments have shown that smoke from a fire does not rise directly upwards, but fans out or mushrooms due to air currents and heat layering effects. The time to signal a fire condition depends on the location of the Detector within the premises, the volume of smoke produced, construction of the roof, and ventilation arrangements.

The maximum distance either side of the beam axis is found to be typically 7.5 metres for satisfactory detection under flat ceilings.

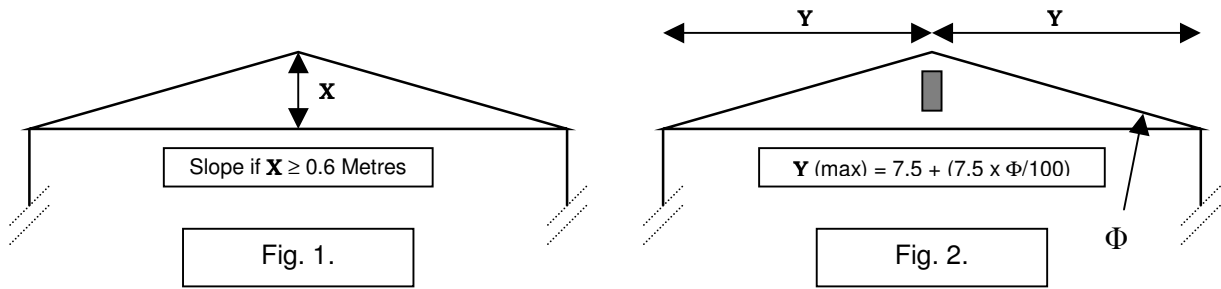


Smoke layering, where smoke does not reach the ceiling level due to layers of static hot air is overcome by mounting the Detector at the recommended height below the ceiling of between 0.3 and 0.6 metres, bringing the infrared beam below the heat layer and into the smoke layer.

However, in all installations the latest national fire standards **must** be consulted. If there is any doubt on the correct mounting height, positioning may be determined by smoke tests.

3.1. Detector Positioning In Apex Of Sloping Ceiling.

A ceiling is defined as sloping if the distance from the top of the apex to the intersection of the ceiling and adjacent wall is greater than 0.6 metres. See Fig. 1.



When a Detector is positioned in the apex of a ceiling (See Fig. 2), the lateral beam distance covered (Y) can be increased in relation to the angle of pitch (Φ).

For Example:

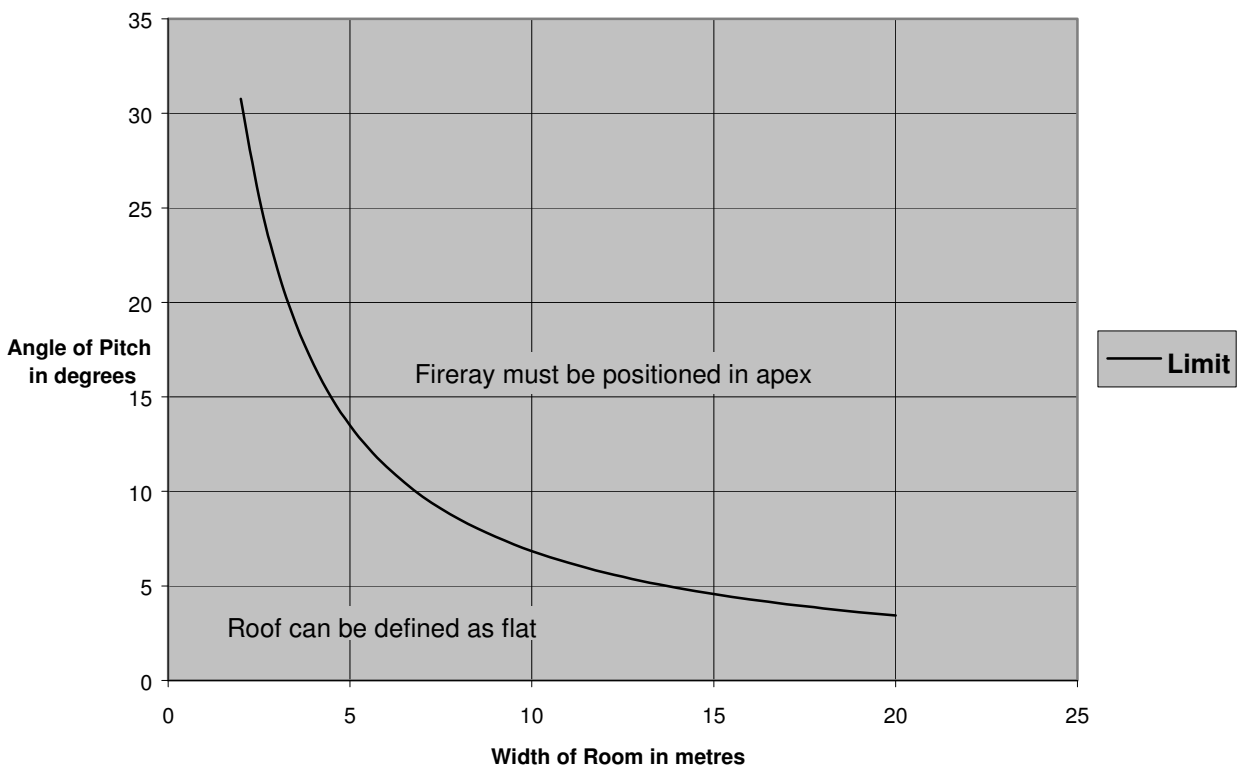
If the pitch angle is 20 degrees, the lateral coverage can be increased from 7.5 metres either side of the beam (Y) to:

$$Y = 7.5 + (7.5 \times 20/100) \text{ metres}$$

$$Y = 9 \text{ metres}$$

Therefore, with a roof pitch of 20 degrees the lateral coverage can be increased from 7.5 metres either side of the beam to 9 metres either side of the beam, but only for the beam positioned in the apex. All other calculations remain the same.

Limit to when a Fireray must be positioned in roof apex



4. Installation.

Pre-installation at Ground Level.

Confirm that all parts have been supplied as listed in the parts list. See page 10.

Select the required alarm threshold using configuration switches 3 and 4 (See page 8, fig. 4. for switch configuration settings). The factory default setting is 35% this should be adequate for most environments, if the Detector is to be installed into an exceptionally dirty environment change the threshold to 50%.

Select the required address using address switches 1 to 8 (See page 9, Table 1. for address switch settings) where 1 is 'ON' and 0 is 'OFF'. The lower nibble (bit 1 to 4) is a BCD value and the upper nibble (bit 5 to 8) is a HEX value. The factory default setting is address1.

Shown below is an example of address 55 (1+4+10+40 = 55).

	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Switch Value	1	2	4	8	10	20	40	80
Switch Position	ON	OFF	ON	OFF	ON	OFF	ON	OFF
Logic	1	0	1	0	1	0	1	0

The Detector Head Assembly is now ready for installation. If configuration switches 3 and 4 require resetting after installation, a power down reset is required (entering into Alignment Mode can also be used as a reset).

4.1. Detector Head Assembly Installation.

Remove the outer cover before installation; this is only to prevent the cover becoming dislodged during handling.

▶ **Do not mount on plasterboard or cladded walls as these surfaces do, and will move.** ◀

Determine the position of the Head Assembly, which must be mounted on a **solid structure** between 0.3 and 0.6 metres below the ceiling, and no closer than 0.5 metres to an adjacent wall or structure. Ensure that there is a **clear line of sight** to the proposed position of the prism(s), which is to be mounted on a solid structure between 5 and 100 metres directly opposite the Detector (range dependent on model).

Using the template provided mark and install all 4 fixing points to the structure. The rear mounting plate of the Detector Head Assembly is provided with 4 keyhole slotted apertures to allow for easy installation onto the 4 fixing points. Install the detector on the four mounting points.

Replace the outer cover.

Terminate the field wiring. See section 8.

4.2. Prism(s) Installation.

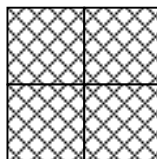
Due to the principle of the detector i.e. reflective, the prism(s) must NOT be mounted on glass or a polished reflective surface.

Mount the Prism(s) on a **solid structure**, 90° to the beam path, between 5 to 50 metres (Fireray FD2705R), and 50 to 100 metres (Fireray FD2710R) directly opposite the Detector.

FD2705R =
1 Prism



FD2710R =
4 Prisms



Ensure that there is a clear line of sight to the Detector, taking care that no moving objects i.e. doors, mechanical lifting equipment etc, will interfere with the beam path between the Detector and Prism(s).

*Note: On ranges of ≥ 5 metres and ≤ 50 metres use a FD2705R.
On ranges of ≥ 50 metres and ≤ 100 metres use a FD2710R.*

5. Prism Targeting Mode.

Apply power to the Detector. There is a 5 seconds pre-charge delay after power is applied to allow the internal circuits to stabilise correctly.

Do not remove the detector from the wall during this action.

Using the mode switch (See fig. 4) select 'Prism Targeting Mode' (Switch will be in the up position). At this time there will be a fault condition showing on the panel.

Find the prism(s) by adjusting the horizontal and vertical thumbwheels until the Amber LED is flashing. Both the Red and Amber LED will be OFF when no signal is being received. The Red LED will start to flash when a weak signal is received (the stronger the signal, the faster the flash rate). When the received signal is high enough the Red LED will extinguish and the Amber LED will start to flash.

- **At this point it is essential to test that the prism(s) and not another surface is reflecting the beam.**

This can easily be confirmed by covering the prism(s) with a non-reflecting surface and confirm that the AMBER and RED indicators are OFF.

6. Alignment Mode.

Mechanical alignment is provided by two adjustment thumb wheels on two sides of the Detector, positioned just behind the Detector Head cover. Adjustment is achievable in both axes.

6.1. Enabling Alignment Mode.

Do not remove the detector from the wall during this action.

Using the mode switch (See fig. 4) select 'Alignment Mode' (Move switch to the middle position). At this time there will be a fault condition showing on the panel.

6.2. Adjustment in Alignment Mode.

The Detector will automatically adjust its infrared beam power and receiver sensitivity to give an optimum receiver signal strength.

The alignment progress is indicated by the colour and state of the indicator lamp on the front of the Detector.

- **FLASHING RED**

The Detector is receiving too much signal and is attempting to reduce the infrared power output to compensate. **Wait** at this point until the indicator lamp is **OFF**, this may take up to 20 seconds depending on the distance between Detector and Prism(s), the shorter the distance the longer the time.

- **FLASHING AMBER**

The Detector is receiving a weak signal and is attempting to increase the infrared power output.

- **OFF**

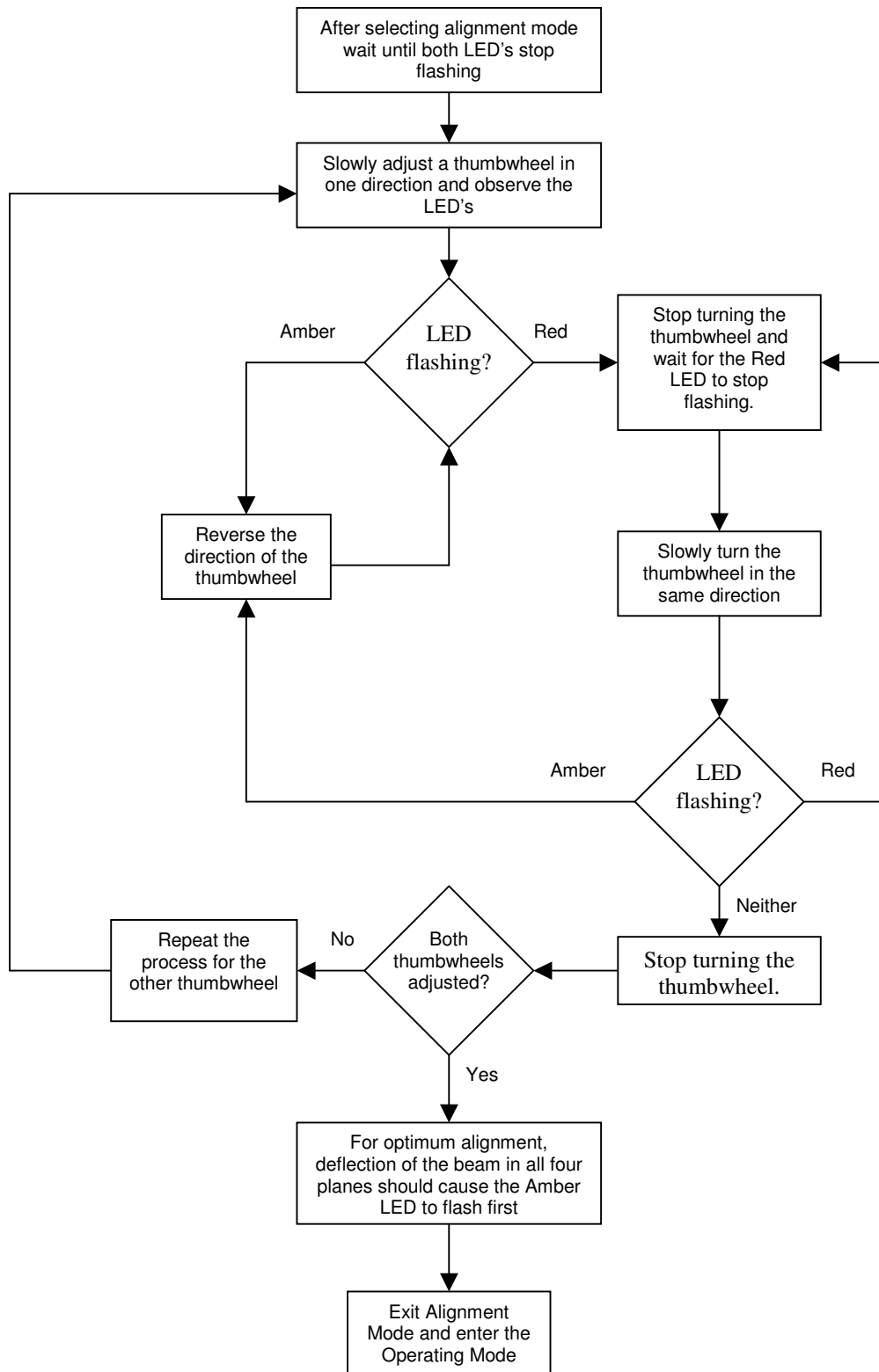
The Detector has optimised the infrared power and receiver gain for the current orientation of the Detector and Prism(s). **This does not mean that the Detector to Prism(s) alignment is at its optimum**, i.e. if the power is too high, a misaligned Detector may be receiving a fringe reflection from another object.

- **FLICKERING RED/AMBER**

This state can occur sometimes. It means that the infrared power is stepping through the optimum setting.

Continue to flow diagram for procedure.

6.3. Alignment Process Flow Diagram.



6.4. Exiting Alignment Mode.

Do not remove the detector from the wall during this action.

Using the mode switch (See fig. 4) select 'Operating Mode' (Switch will be in the down position).

On exiting 'Alignment mode' the Detector will perform an internal calibration check. If this fails, which would be due to bad alignment or either electrical or optical noise, the power level will try to compensate. If, after 60 seconds, the power level is still not correct, the Fault LED will illuminate and the panel will show a Fault. In this case the alignment procedure must be repeated.

If the internal calibration check completes satisfactory, the AMBER LED will flash once every 10 seconds. The panel will need to be reset. The Detector will be in normal operating mode.

7. System Testing.

After successful installation and alignment the System will require testing for both alarm and fault conditions.

7.1. Alarm (smoke) Test.

Taking note of the threshold selected during installation (default 35%).

Select obscuration mark on filter to correspond with the Detector alarm threshold (see fig. 3).

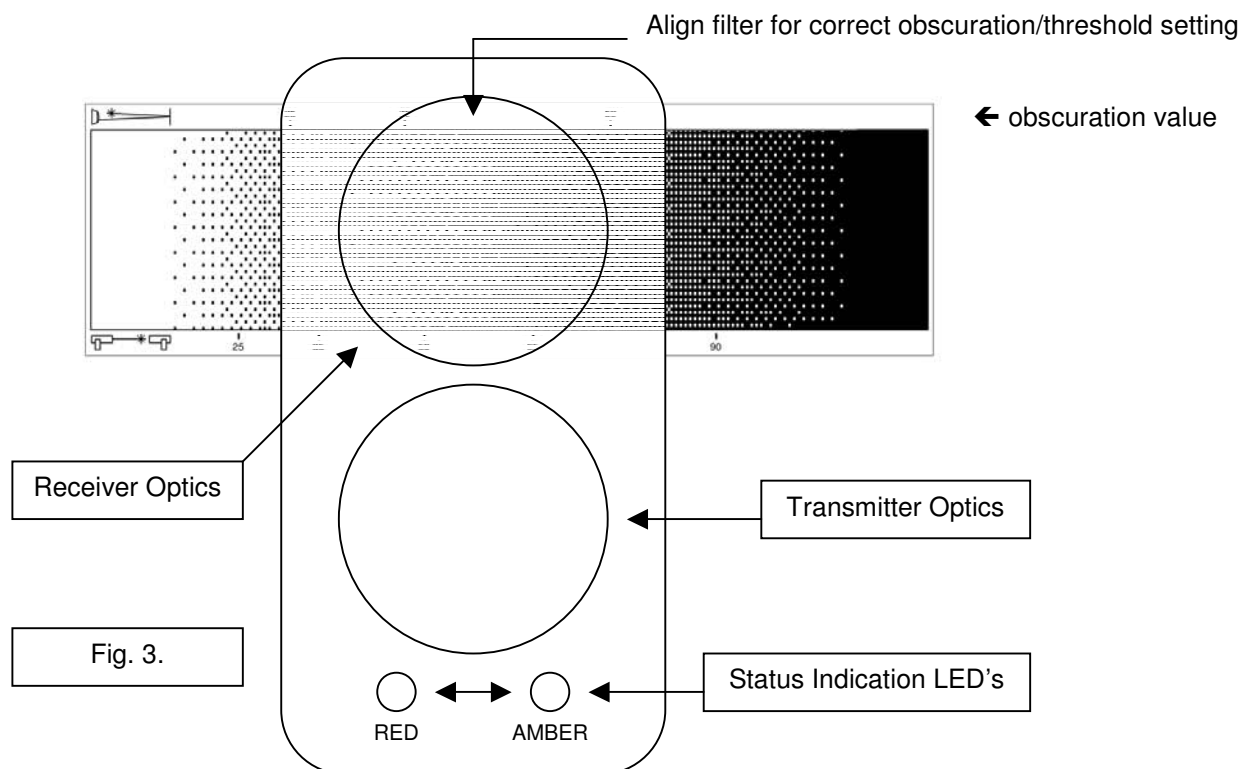
Place the filter over the receiver optics (Top of Detector Head – opposite end to the status indication LED's) at the correct obscuration value determined by the threshold selected, i.e. if a threshold of 35% has been selected position the filter just past the 35% obscuration value on the filter (see fig 3.).

Take care not to cover the transmitter optics.

The Detector will indicate a fire within 10 seconds.

7.2. Fault Test.

Cover the Prism(s) totally with a non-reflective material and confirm that the Detector indicates a fault condition after approximately 10 seconds. The Amber LED on the Detector will flash, and the panel will show a Fault condition. The fault condition will automatically reset after a period not greater than 2 seconds when the obstruction is removed.



8. Connection and Configuration Settings.

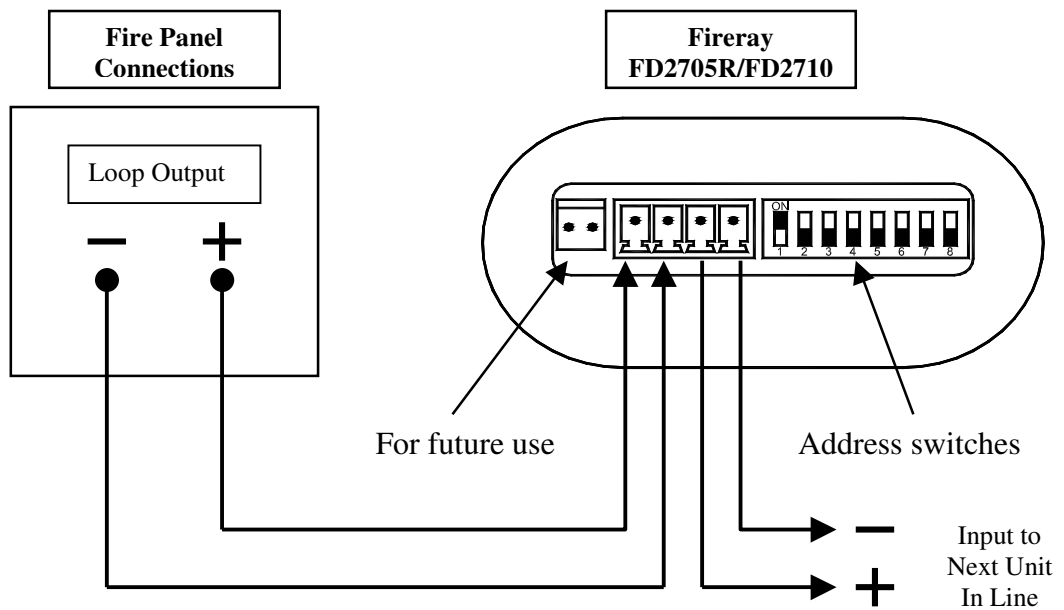
8.1. Field Wiring.

The loop wiring is accessed through the back plate of the Detector Head (See Fig 4). The small 2-pin connector on the left is for future use.

8.2. DIP Switch Settings.

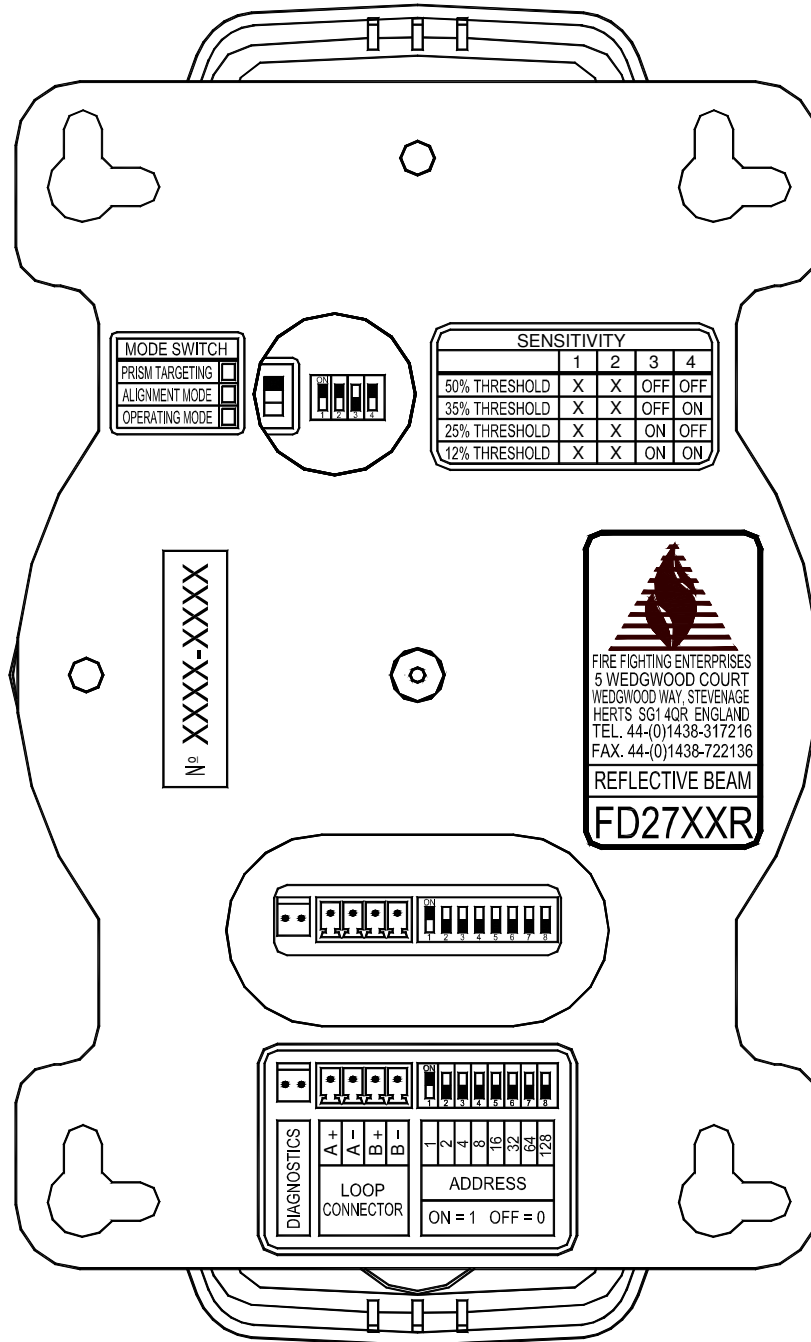
Access to the configuration and address settings is through the back plate of the Detector Head (See Fig 4).

8.3. Typical Loop Wiring.



9. Detector Interface Assembly Configuration Settings.

Fig. 4.



10. Address Settings.

Table 1 - Address settings:

Address #	Switch Configuration		Address #	Switch Configuration		Address #	Switch Configuration	
	SW1	SW8		SW1	SW8		SW1	SW8
1	10000000		44	00100010		87	11100001	
2	01000000		45	10100010		88	00010001	
3	11000000		46	01100010		89	10010001	
4	00100000		47	11100010		90	00001001	
5	10100000		48	00010010		91	10001001	
6	01100000		49	10010010		92	01001001	
7	11100000		50	00001010		93	11001001	
8	00010000		51	10001010		94	00101001	
9	10010000		52	01001010		95	10101001	
10	00001000		53	11001010		96	01101001	
11	10001000		54	00101010		97	11101001	
12	01001000		55	10101010		98	00011001	
13	11001000		56	01101010		99	10011001	
14	00101000		57	11101010		100	00000101	
15	10101000		58	00011010		101	10000101	
16	01101000		59	10011010		102	01000101	
17	11101000		60	00000110		103	11000101	
18	00011000		61	10000110		104	00100101	
19	10011000		62	01000110		105	10100101	
20	00000100		63	11000110		106	01100101	
21	10000100		64	00100110		107	11100101	
22	01000100		65	10100110		108	00010101	
23	11000100		66	01100110		109	10010101	
24	00100100		67	11100110		110	00001101	
25	10100100		68	00010110		111	10001101	
26	01100100		69	10010110		112	01001101	
27	11100100		70	00001110		113	11001101	
28	00010100		71	10001110		114	00101101	
29	10010100		72	01001110		115	10101101	
30	00001100		73	11001110		116	01101101	
31	10001100		74	00101110		117	11101101	
32	01001100		75	10101110		118	00011101	
33	11001100		76	01101110		119	10011101	
34	00101100		77	11101110		120	00000011	
35	10101100		78	00011110		121	10000011	
36	01101100		79	10011110		122	01000011	
37	11101100		80	00000001		123	11000011	
38	00011100		81	10000001		124	00100011	
39	10011100		82	01000001		125	10100011	
40	00000010		83	11000001		126	01100011	
41	10000010		84	00100001		127	11100011	
42	01000010		85	10100001		128	00010011	
43	11000010		86	01100001		129	10010011	

11. Technical Data.

- Operating Range Fireray FD2705R 5 to 50 metres
- Operating Range Fireray FD2710R 50 to 100 metres
- Supply Voltage 10.2Vdc to 30Vdc
- Quiescent Current (no lamp illuminated) <4mA
- Alarm Current <25mA
- Fault Current <13mA
- Power Down Reset Time >5 seconds
- Operating Temperature -30°C to 55°C
- Tolerance to Beam Misalignment at 35% Detector $\pm 0.8^\circ$, Prism $\pm 5.0^\circ$
- Fire Alarm Thresholds 2.50dB (25%), 3.74dB (35%), 6.02dB (50%)
- Optical Wavelength 880nm
- Head Maximum Size Width 130mm, Height 210mm, Depth 120mm
- Weight 740 gm

12. Service / Application Notes.

- For full compliance with BS5839 part 5, use 25% and 35%(default) thresholds. The threshold of 50% is recommended for hostile and extreme environments.
- Red LED indicates FIRE (set and cleared by panel).
- Amber LED flashing once every 2 seconds indicates FAULT.
- Amber LED flashing once every 10 seconds indicates normal operating mode.

13. Parts List.

- 1 off: Detector Head Assembly
- 1 off: Prism for the FD2705R
- 4 off: Prisms for the FD2710R
- 1 off: Dual Test Filter
- Installation guide



GE Interlogix

GE Interlogix
Excelsiorlaan 28
B-1930 Zaventem
Belgium
Tel. +32 (0) 2 725 1120
Fax. +32 (0) 2 721 4047