

Doc. No: 32-0008-01



OPTICAL BEAM SMOKE DETECTORS

This training material provides information to assist the Fire System Designer and Installer in achieving a successful Optical Beam Smoke Detector installation.

The appropriate local installation standards and legislation in effect at the time of installation must be adhered to and take precedence over any statements made or implied by this training material.

Fire Fighting Enterprises cannot take responsibility for the installation (beam positioning and mounting), commissioning or maintenance of products.



AGENDA

- WHAT IS **FIRERAY50/100R**?
- INSTALLING **FIRERAY50/100R**
- COMMISSIONING **FIRERAY50/100R**
- USING **FIRERAY50/100R**
- MAINTAINING **FIRERAY50/100R**
- TECHNICAL SPECIFICATIONS OF **FIRERAY50/100R**



OVERVIEW



Optical Beam Smoke Detector (Reflective)

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Fireray 50/100R is a reflective type beam detector comprising a transmitter and receiver contained within one enclosure. It transmits an Infrared beam that is reflected from a retro reflector on the opposite wall, back to the internal receiver for analysis. Fireray50/100R reports its status back to the alarm/fire panel or monitoring device.



VERSIONS OF FIRERAY50/100R

There are three different types Fireray50/100R:

- Conventional
- Analogue Addressable
- Zone Powered

All of these types are available in either:

- (5 to 50m) or (50 to 100m) versions

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The FIRERAY50/100 comes in two ranges - 5m to 50m and 50m to 100m.

There are a number of variants available in these two ranges.

Conventional:

50RV / 100RV – Standard conventional beam with EN54-12 and CPD approval.

Typically used in Europe.

50RU / 100RU – Standard conventional beam with UL and ULC approval. Typically used in United States and other countries requiring UL approval.

We also do Analogue Addressable and Zone Powered versions for various customers.



WHY USE THE FIRERAY50/100R?

- 3 year warranty
- Designed, fully assembled and tested at FFE factory
- International Approvals including EN54:12 and UL
- Minimal reflective prisms versus range

Note: If more flexibility is required consider the FIRERAY5000

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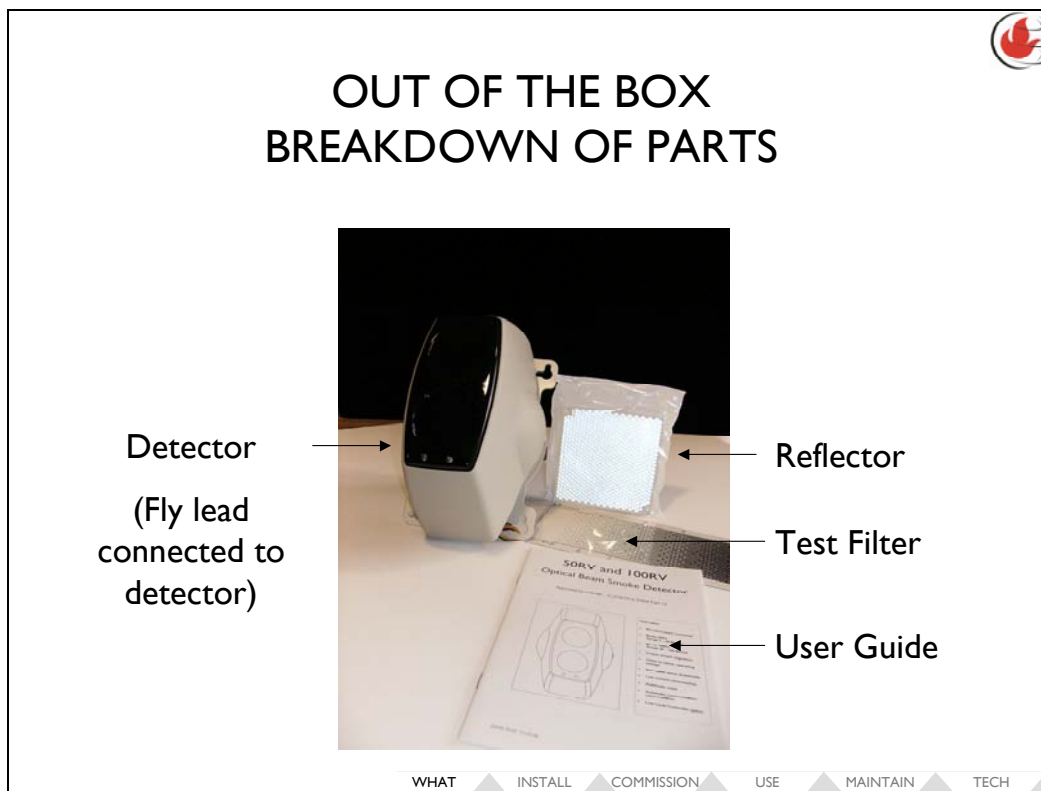
Any FIRERAY50/100 returned under warranty is replaced with new product without question, provided the fault is due to a manufacturing fault. We conduct full tests to establish and resolve causes of failures, improving product quality.

FFE have full control over product quality and minimising customer lead times.

Fully approved by all the internationally recognised authorities including LPCB, UL, VdS, VNIPO (Russia)

Needs only 1 reflective prism for 5 to 50m and only 4 prisms for 50 to 100m.

Adjustable brackets, brackets to hold reflective prisms (surface mount or adjustable).



The FIRERAY50/100 can be broken down into 2 key elements.

The Detector

Transmits and receives the infrared and then communicates the status to the alarm/fire panel or device monitor.

The Reflector

Reflects the infrared from the transmitter lens along the same path back onto the receiver lens.

The number of Reflectors required depends on the operating distance.

5 to 50m = 1 Reflector

50 to 100m = 4 Reflectors.

Note the additional 3 reflectors required for 50 to 100m operation must be purchased separately as the Long Range Kit.

Additional components

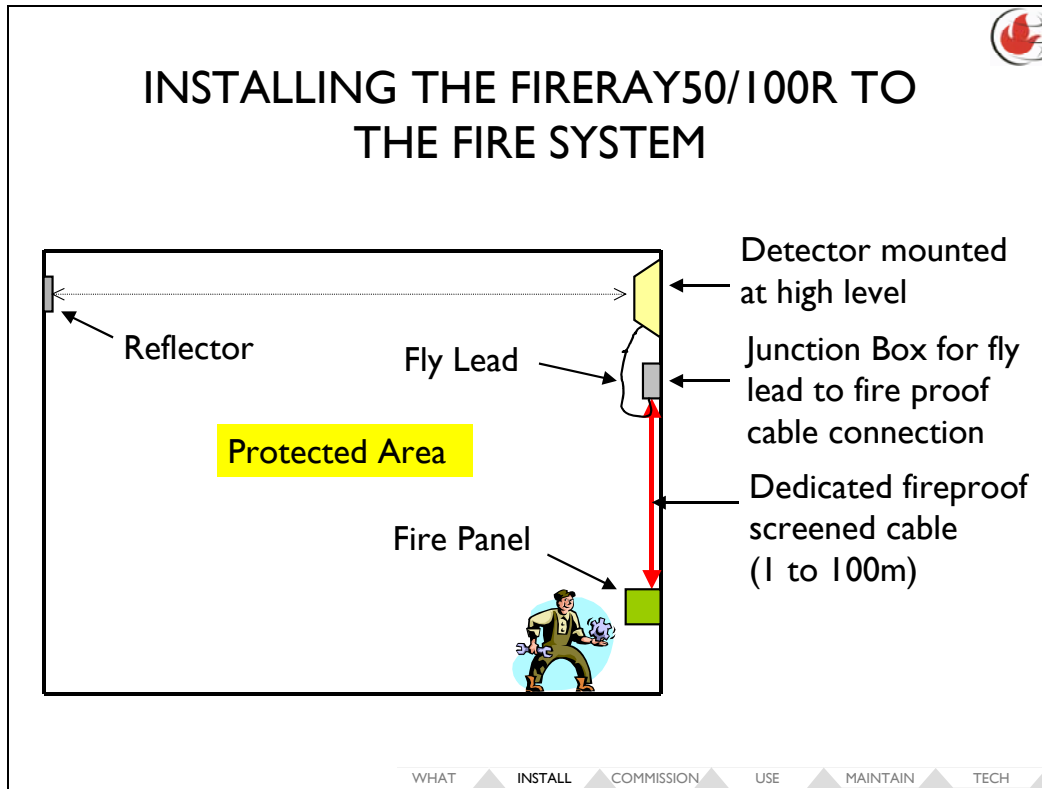
In the box one will also find the User Guide, test filter and the fly lead for the detector. No End-Of-Line components or Fire resistors are provided as these components are fire panel specific and as such are normally provided by the fire panel manufacture.



INSTALLATION & WIRING FOR 50/100RV & RU

- **FIRE**RAY50/100R to the Fire System
- Cables
- Typical Single Zone Wiring
- Multiple Detectors On Single Zone Wiring
- Mounting of the Detector

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The Detector and Reflector must to be mounted to a secure structure.
 The fly lead that is supplied with the detector should not be extended, but rather wired into a termination box where it is interfaced to the fire proof cable that goes back to the fire panel.



CABLES

- It is always advisable to have a dedicated, screened (shielded), fireproof cable for both power and signal lines
- Don't leave the shield of the cable unconnected, always connect it to the earth of the system
- Always mount power and signal cables away from any switching machinery or HV (High Voltage) lines
- Ensure that any connections are made properly. Intermittent connections are very difficult to trace and cause problems that are not easy to diagnose.

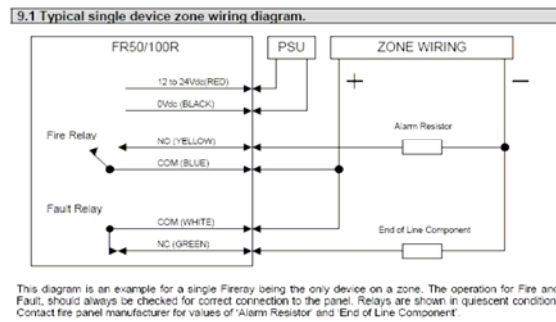
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Wiring up other equipment with the same cable that is used to monitor or power the detector can lead to unexpected behavior. It is always best to have a dedicated, screened cable for the power and the zone wiring. Also avoid the temptation to place the wiring in the same conduit that may be carrying cables that are used for large switching machinery or high voltage cables. These can sometimes cause problems due to mutual induction.

Although it is possible to have a long power cable or zone cable, it is always worth remembering that the shorter the cable the less the risk of there being any interference on the cable.



TYPICAL SINGLE ZONE WIRING



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The diagram can be found in the installation guide for the FIRERAY50/100.

Zone wiring – sometimes called a 'Conventional' system.

Note: External PSU, end-of-line device (EOL device), and fire resistor are not supplied by Fire Fighting Enterprises. The EOL and fire resistor are specified by the fire panel manufacturer.

The power supply should be able to supply a minimal current of 20mA (between 10.2 to 30v DC to power 1 FIRERAY50/100).

Power should not be applied until all wiring has been completed.

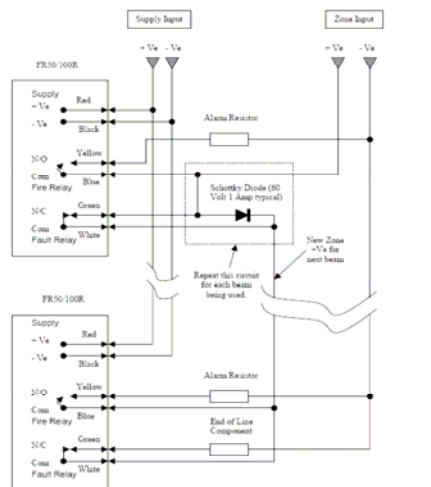
EOL Device and fire resistor are either supplied or specified by the switch monitor manufacturer.

A complete fire and fault test of the FIRERAY50/100 should be conducted to ensure correct wiring to the fire panel.



MULTIPLE DETECTORS ON SINGLE ZONE WIRING

9.2 Typical multiple-beam zone wiring diagram.



This diagram is an example for multiple Firecay beams on a zone. The operation for Fire and Fault should always be checked for correct connection to the panel. Relays are shown in quiescent condition. Contact fire panel manufacturer for values of Alarm Resistor and End of Line Component.

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In the event that more than one detector is connected to a “Zone” it is important to ensure that the fire panel or device monitor is capable of checking for “Detector out faults”. It is also crucial that the schottky diode is inserted, failing to do so will not allow a detector further down the zone wiring to report a fire condition if a detector preceding it goes into a fault condition, as it will break the line to remove the EOL component from the zone.



MOUNTING OF THE DETECTOR

Do

- **Do...** Mount onto a secure structure.
- **Do...** Fasten all mounting points before aligning.
- **Do...** Mount where both thumb screws and mode switch are accessible.
- **Do...** Use the correct number of reflectors for the required distance.

Do Not

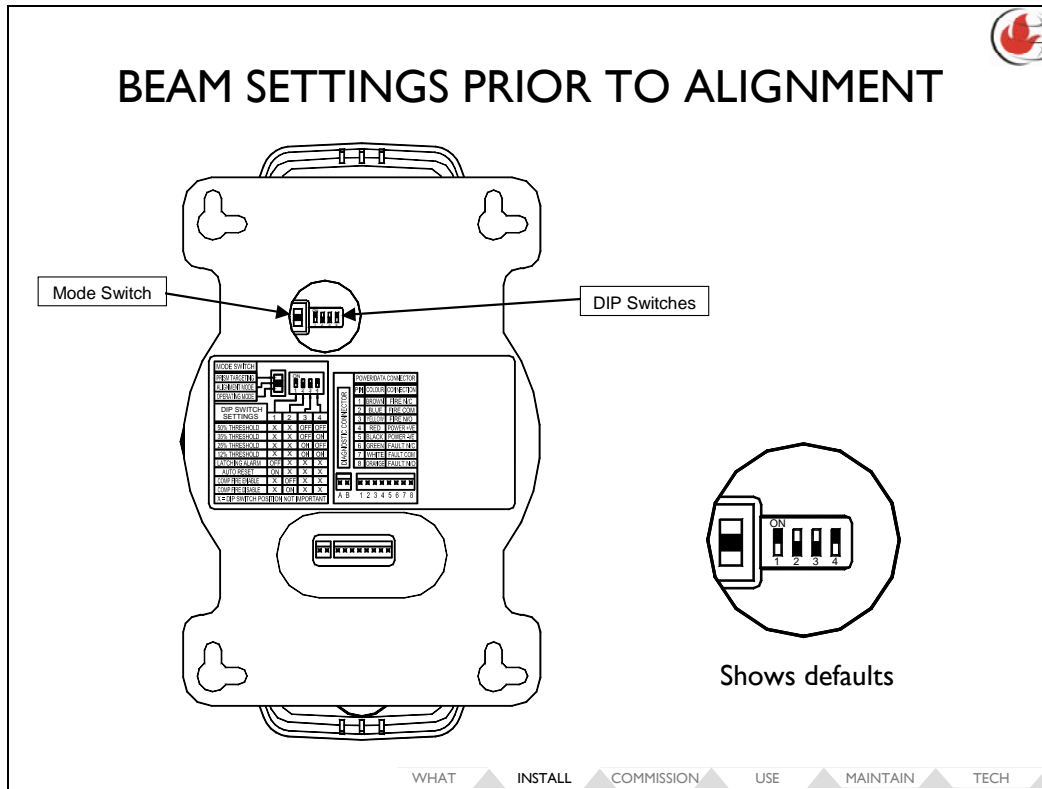
- **Don't...** Mount onto the skin of a building.
- **Don't...** Remove the detector from the mounting to switch the mode switch.
- **Don't...** Use a single piece of uni-strut to mount the detector from the main structure.
- **Don't...** Mount anywhere near open louvres that could allow condensation to build up.
- **Don't...** Mount where there will be direct sunlight on the detector, consider the path of the sun all year round.

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It is not always obvious to installers but one of the crucial elements of a beam type detector is its mounting!

The detector is designed to compensate for a certain amount of building movement, it is not designed for poor installation. One of the most useful pieces of kit a installer can have on his possession is a laser pointer. By mounting this onto the mounting where the beam is going to go will give you a great deal of information about the sturdiness of the mounting setup.

If one considers that the beam has a angle of misalignment of 0.8 Degrees then there is not much required to move the beam off alignment. This is why it is crucial that the beam is not mounted on plaster board, single pieces of hanging uni-strut... etc...



Prior to alignment, the user should select the alarm threshold to suit the environment using the switches shown. See next slide.
 Alarm thresholds of 12, 25, 35 and 50% can be selected. The Default setting is 35%.

The alarm relay can be set in one of two modes – Auto reset or alarm latching using switch 1. Auto reset is the factory default setting.
 Auto reset mode will reset the alarm relay and alarm LED 5 seconds after received signal has recovered to a level above the alarm threshold.

Latching mode holds the alarm relay and alarm LED active indefinitely, until cleared by either:
 placing the beam into prism targeting or alignment mode and then going back to run mode, or
 Removing the power to the beam for 10 seconds before powering back up



BEAM SETTINGS PRIOR TO ALIGNMENT

Function	Dip switch				
	1	2	3	4	
Auto Reset Fire Relay (5 seconds)	ON				←
Latching Fire Relay	OFF				
Fire Relay Enable, On Compensation Limit		OFF			
Fire Relay Disable, On Compensation Limit		ON			←
50% Threshold			OFF	OFF	
35% Threshold			OFF	ON	←
25% Threshold			ON	OFF	
12% Threshold (Use for extreme sensitivity requirements)			ON	ON	

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Refer to table for DIP switch position for each setting.

Access to the configuration settings is through the back plate of the Detector Head.
Factory default configuration settings are marked .



ALIGNMENT OF BEAM

- Basic Check
- Three Stages Of Alignment
 - Prism Targeting
 - Alignment Mode
 - Normal Operation
- Status Of LEDs
- Fault & Fire Test

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BASIC CHECK

- Isolate the beam from the fire panel
- Make sure the reflector(s) are mounted
- Ensure that the beam path is clear
- Confirm that the beam type and number of reflectors are correct

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While aligning the detector it is advisable to isolate the detector at the fire panel. This will prevent the alarm from sounding while an installation and/or commissioning are being done. A reflector is required before alignment can begin. The following should be taken into account regarding the mounting of the reflector:

Mounted on a secure structure, although it doesn't need to be as secure as the detectors' mounting.

Must be within 5 Degrees of perpendicular to the beam path, any greater, then the reflector will need to be placed on a universal bracket.

Must not be mounted on a reflective surface such as glass, stainless steel or such like. If this is not avoidable then it is suggested that the reflector is mounted off the perpendicular axis of the beam. By how much depends on how far the beam is traveling.

Don't use more reflectors to compensate for poor signal. If the reflectors are used as they should be with the correct beam (1 for 50m unit, 4 for 100m unit) then there will never be any need for extra reflectors.

As this type of beam is a reflective type, it does not discriminate where the reflection is coming from. It is advisable to ensure that there are no objects at least 0.5m from the center of the beam. Anything within this distance has the possibility to reflect the Infrared back and causing the installer to align the beam on the reflective surface and not the prism. The larger the path for the beam the easier and quicker it is to align a detector.

When power is applied to a detector the Red LED will flash. One flash indicates that it is a 50m unit, two flashes indicate that it is a 100m unit. Make sure that you have the correct unit for the required distance and that you have the correct number of reflectors as well.



THREE STAGES OF ALIGNMENT

- Prism Targeting Mode
 - Used to find the general direction of the prism
- Alignment Mode
 - Used to align the beam onto the reflector
- Normal Operation Mode
 - Used to save the settings achieved in alignment mode and put the beam into operation



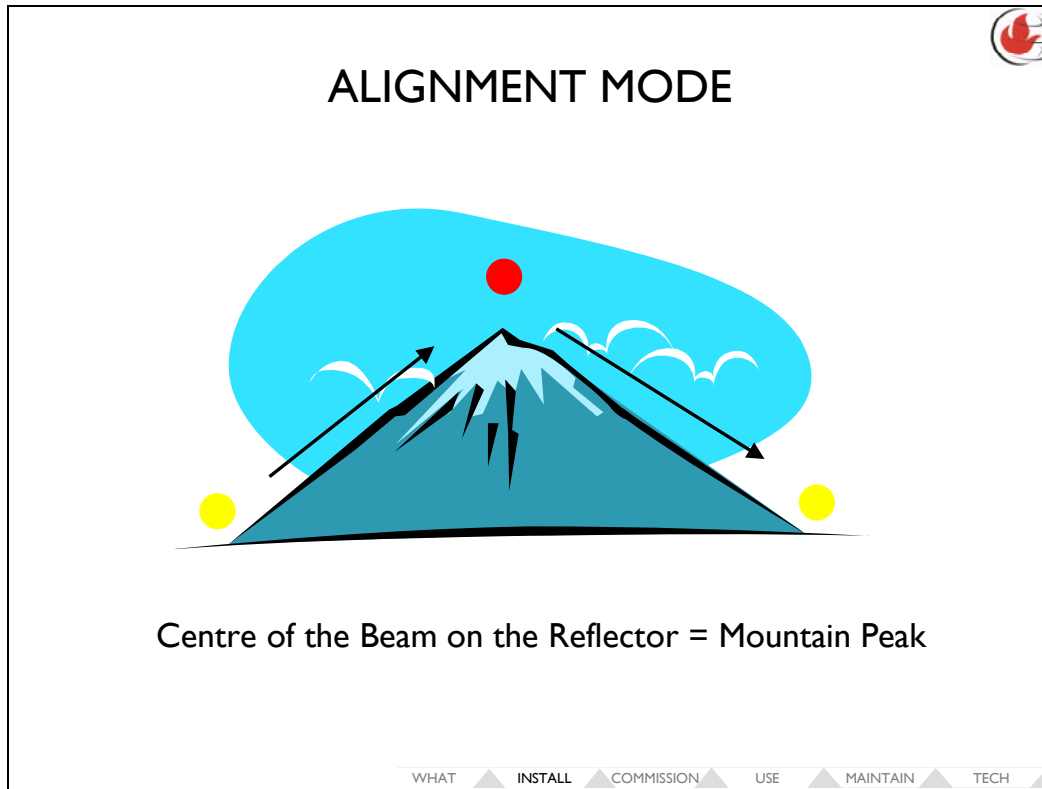
PRISM TARGETING

- Select this mode by putting the mode switch all the way in the top position
- The detector then transmits the Infrared beam at its maximum power setting
- The amber LED flash rate is directly proportional to the signal strength received
- Using the thumb wheels obtain the fastest flash rate possible, 'on constantly' being desirable
- Confirm that the beam is aligned fully onto the reflector

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Prism Targeting Mode

In this mode the detector transmits the Infrared beam at its highest transmit power level. The amount of signal it receives is directly proportional to the rate at which the amber LED flashes. You need to get the amber LED to flash at a rate that seems to make the LED appear as if it is constantly on. To steer the beam you need to turn the thumb wheels. Move these thumb wheels until you get the constant amber LED or the fastest flash rate that is possible. Once this has been achieved, go to the reflector and cover it over with a non reflective material and check that the amber LED is no longer on or is flashing at a very slow rate (around once a second). If the reflector and detector are fairly close or the reflector is mounted on a surface that is slightly reflective then you may get the amber LED flashing at a slow rate. If you are unable to change the flash rate by covering the reflector then there is a good chance that you are not on the reflector, uncover the reflector and try again.



If you were to take the analogy that the journey up a mountain was the same as that to aligning the beam it will make understanding the LEDs much easier.

On the product there are two LEDs. In alignment mode these LEDs indicate the direction of the transmit power to achieve a 100% received signal strength for the relative beam position. If the RED LED is flashing it is receiving too much signal as such the detector is busy reducing its power, if the AMBER LED is flashing then it is receiving too little signal and as such is busy increasing its power.

If you are never sure which way you should be turning the thumb wheels always remember that the RED LED is at the top of the mountain and that is where you need to be. It would be the same as if you were to walk up the side of a mountain if you are climbing up you would see the RED LED if you overshoot the peak or are heading in the wrong direction you would see the AMBER LED.

There is the chance that when the installer moves the thumb wheel that they don't see any LEDs flashing, this is the case when the amount the beam has moved has not been enough to change the signal strength, this would be similar to being on the mountain peak and you are moving straight across, neither up nor down therefore you would not see any LEDs flashing.



ALIGNMENT MODE (cont.)

- Select this mode by placing the mode switch into the middle position.
- Choose a thumb wheel and move it half a revolution
- If the RED LED flashes this means that you are moving the beam towards the reflector
 - Wait till the RED LED stops flashing then continue in the same direction
 - Repeat this till the AMBER LED starts to flash
 - To compensate for overshoot, turn the thumb wheel in the opposite direction for a quarter of a turn
 - Move on to the second thumb wheel and repeat the process from the beginning
- If the AMBER LED flashes this means that you are moving the beam away from the reflector
 - No need to wait till the AMBER LED stops flashing. Turn the thumb wheel in the opposite direction and the RED LED will flash.
 - Continue as above when the RED LED flashes

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As can be seen from the slide as we move closer to the reflector the RED LED flashes, this is similar to climbing up a mountain side. At some point we will get to the top and overshoot the peak this is when the RED LED no longer flashes and the AMBER LED flashes. Initially we assume that we overshoot the peak by half our “half revolution” so to move back onto the peak we move the thumb wheel a quarter of a revolution back. Sometimes when we do this no LEDs will flash, this is not uncommon as we may be on the peak and change in signal was not enough to be reported to the LEDs. Most of the time though the quarter turn back will cause the RED LED to flash because we are moving back up to the peak.

The process is to first move the one thumb wheel, then move the second. Avoid the temptation to move both thumb wheels at the same.

During any of the alignment stages don't get in the beam path! Especially the final stage when switching into normal run mode.



NORMAL OPERATION

- Select this mode by putting the mode switch all the way in the bottom position
- The detector makes a final adjustment before saving the settings
- Once the settings are saved and all is well, the unit will come out of “fault” and resume “normal” operation

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Once the alignment mode is completed then the last stage is to save the settings and place the beam in to normal run mode. This is achieved by placing the mode switch in the bottom position. The detector will now make a final adjustment with the gain potentiometer to get the signal to 100% before switching the fault relay from “fault” to “normal”.

It is essential to keep clear when switching the mode switch (for a period of 30 seconds), some installers will sometimes stand in front of the beam when switching into normal mode. In this case the beam will make final adjustments taking the reflections from the installer into account.



FAULT & FIRE TEST

- Check the following:
 - Wiring to and from detector is correct
 - The detector is optically aligned
 - Detector LEDs and Relays are functioning
- Ensure that the sounders and/or sprinklers are isolated!
- Conduct a simultaneous fault and fire test on multiple detectors on a single zone

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A fault and fire test can be conducted at either the detector end, with the test filter provided or at the reflector with a non reflective material. The receiver lens is furthest away from the LEDs.

The most effective test that can be performed to check the protected area is protected correctly would be a fault test at the reflector end. This would guarantee that the beam is not picking up stray reflections. If the beam were to be picking up some of its signal from a stray reflection then performing the fault at the reflector end would not place the beam into a fault condition but would rather place the detector into a fire condition.

To perform this test, place a piece of non reflective material in front of the whole reflector within a 1 second period. Keep this there for at least 8 seconds or until the beam signals a fault (constant AMBER LED). This fault should be indicated on the fire panel or monitoring device as well.

To perform a fire test place the same obstruction over half the reflector and keep there for a period of at least 4 seconds then over a further 4 second period cover the remaining half. The detector will indicate a fire condition (constant RED LED) as should the fire panel or monitoring device.

During both tests ensure that the Fire and Fault LEDs come on, and the monitoring device and/or fire panel indicate the correct status too.

Once all test are complete ensure that the system returns to normal operation in the OK state.

Alternatively the supplied filter can be used in accordance with the user instructions.



STATUS OF LEDS

50/100RV

- All OK
Amber flashes once every 10s.
- Fault
Amber LED on continuously.
- Fire
Red LED on continuously.
- AGC limit
Amber LED flashes every 2s.

50/100RU

- All OK
No LEDs on or flashing.
- Fault
Amber LED on continuously.
- Fire
Red LED on continuously.
- AGC limit
Amber LED flashes every 2s.

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Analogue addressable variants may have slightly different LED indications. Refer to appropriate user guide for details.

In normal operation, the UL version does not flash its amber LED, whereas the EN version flashes its amber LED every ten seconds.



DELAY TIME TO FIRE / FAULT

- 10 seconds

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Non user-selectable



MAINTAINING AN OPTICAL BEAM SMOKE DETECTOR

To ensure the system continues to operate correctly:

- Routinely check for visual damage
- Check installation remains mechanically and electrically sound
- Check there have been no major changes to the environment such as line of sight, obstructions, reflections, strong light sources etc.
- Clean the system
- Confirm system operation with Trouble (Fault) and Fire tests

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Optical Beams are relatively maintenance-free after successful commissioning, however routine checks and cleaning are recommended to ensure satisfactory functioning of the system.

Before maintenance, notify the relevant authorities that Optical Beams will be temporarily out of service and disable the zone or system to ensure fire services are not inadvertently dispatched.

The system should be cleaned during regular maintenance. Refer to the particular product's installation guide for more detailed information. In general, use a lint-free cloth or lint-free feather duster to gently wipe lenses (and reflectors) taking care not to disturb alignment. Confirm alignment remains satisfactory after cleaning with Trouble (Fault) and Fire tests.

Special servicing will be required:

After a fire

If an unacceptable rate of false alarms is experienced

When a new maintenance organisation is contracted

Following long periods of disconnection



CLEANING

- Clean during regular maintenance
- Clean carefully with lint free cloth/feather duster
- After cleaning follow simple re-alignment procedure

- Amber LED may indicate an AGC fault therefore clean & align



TECHNICAL SPECIFICATION TABLE

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 Huddersfield, SG4 0TJ England
 T: +44 (0)1422 444242
 F: +44 (0)1422 444789
 E: sales@fire.com
 W: www.fire.com

FIRE RAY 50/100RV (EN model)
FIRE RAY 50/100RU (UL model)
 Infrared Optical Beam Smoke Detector



Installation Recommendations

The installation of the FIRE RAY infrared optical beam smoke detector should be undertaken in accordance with recognized national or international standards and codes of practice. Please refer to our installation guide. We also recommend that simulated fire tests are conducted to ensure the desired response time is met for a given installation.

Dimensions

Technical Specification

Operating Range F18RV / RU:	5 to 30 Meters
Operating Range F100RV / RU:	30 to 100 Meters
Operating Voltage Range:	10 V DC to 30Vdc
Quiescent Current:	<4mA @ 24Vdc
Alarm Current:	<15mA
Power Down Reset Time:	5 seconds
Fire Relay Contacts:	Normally Open, VFCO 2A @ 30 Volts DC, recessive
Fault Relay Contacts:	Normally Closed, VFCO 2A @ 30 Volts DC, recessive
Operating Temperature:	-20°C to +55°C (non-condensing)
Tolerance to Beam Misalignment:	±30°, Detector ±0.8°, Prism ±0.5°
Fire Alarm Threshold:	1.25dB (25%), 1.87dB (50%), 3.00dB (90%)
Optical Wavelength:	880nm
Detector Dimensions:	Width 130mm, Height 110mm, Depth 130mm
Prism Dimensions:	Width 100mm, Height 100mm, Depth 35mm
Weight:	0.67 kg
LED Indicators:	Red LED: Indicates FIRE Composite Amber LED: Indicates FAULT Flashing Amber LED: Once every 10 seconds indicates normal operating mode (RV Models only) Flashing Amber LED: Once every 2 seconds indicates fire compensation function has reached its limit Alarm Conditions: Indicated by fire relay closing Fault Conditions: Indicated by fault relay opening Alarm may be latching or non-latching (default)
Conditions:	
IP Rating:	IP50
Relative Humidity:	5% to 95% (non-condensing)
Approvals/Certifications:	Designed, manufactured and certified to EN54-12:2002, Use 25% and 25% (default) thresholds. The 20% threshold is recommended for hostile and extreme environments.
CPD Reference:	0786-CFD-20045
UL File:	124117
Parts List:	1 x Detector Head Assembly, 1 x prism (SR) or 4 x prisms (100R), 1 x Bull Prism, 1 x Cable Strainer Assembly
Housing Construction:	Flame Retardant ABS, Finish: Grey / Black



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In the event of a dispute, please refer to the Fire Fighting Enterprises Ltd. terms and conditions of sale, which apply to all products unless otherwise stated.

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OPERATING VOLTAGE

- Between 10.2V to 30Volts DC
- Operating outside of this will cause reduced functionality or damage to the System

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The specified operating voltage to the System Controller is between 10.2 to 30Vdc. This allows for the connection of a standard 24V power supply.



OPERATING CURRENT

- Quiescent Current
 - < 4mA @ 24Volts DC
- Alarm Current
 - < 15mA @ 24Volts DC



OPERATING RANGE

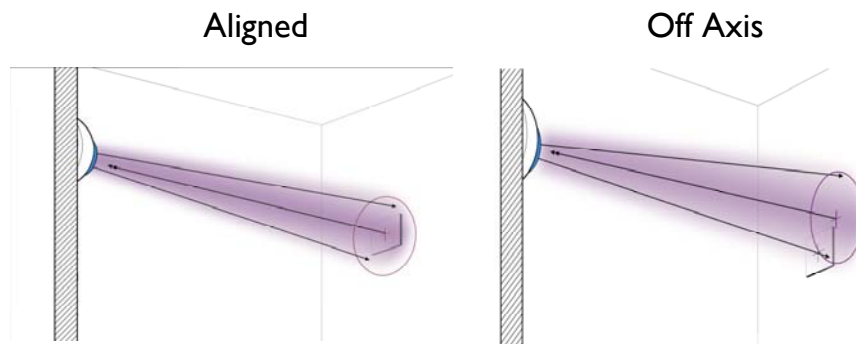
The Minimum & Maximum Separation between the Detector & Receiver is 5m to 100m

- 5m to 50m = 1 Reflector
- 50 to 100m = 4 Reflectors



MAXIMUM DETECTOR MISALIGNMENT

The amount by which the Detector can be moved off axis and still be operational (and still be able to detect a fire and fault correctly) = ± 0.5 degrees



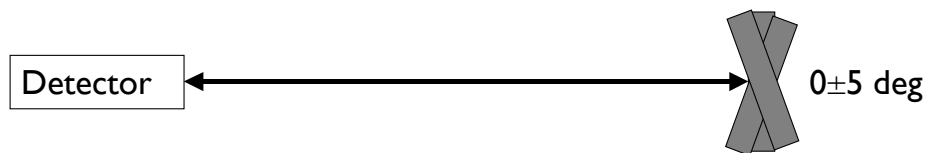
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The FIRERAY50/100 has been designed so that the beam can move slightly off axis from the Reflector and still operate. This is achieved by the conical form of the projected infrared light. The diameter of the cone will generally be larger than the surface area of the Reflector. Therefore, so long as the reflector remains inside the cone the signal should be ok. This angle is ± 0.5 degrees. Anything greater than this and the signal returned to the Detector will start to drop as the cone is no longer fully illuminating the reflector.



MAXIMUM REFLECTOR MISALIGNMENT

The amount by which the Reflector can be moved off axis and for the IR system still to be operational (and still be able to detect a fire and fault correctly) = ± 5 degrees



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Similar to the Detector, the Reflector can be off axis from the Detector and still return enough signal not to create a fire or fault condition. This angle is +/-5 degrees.

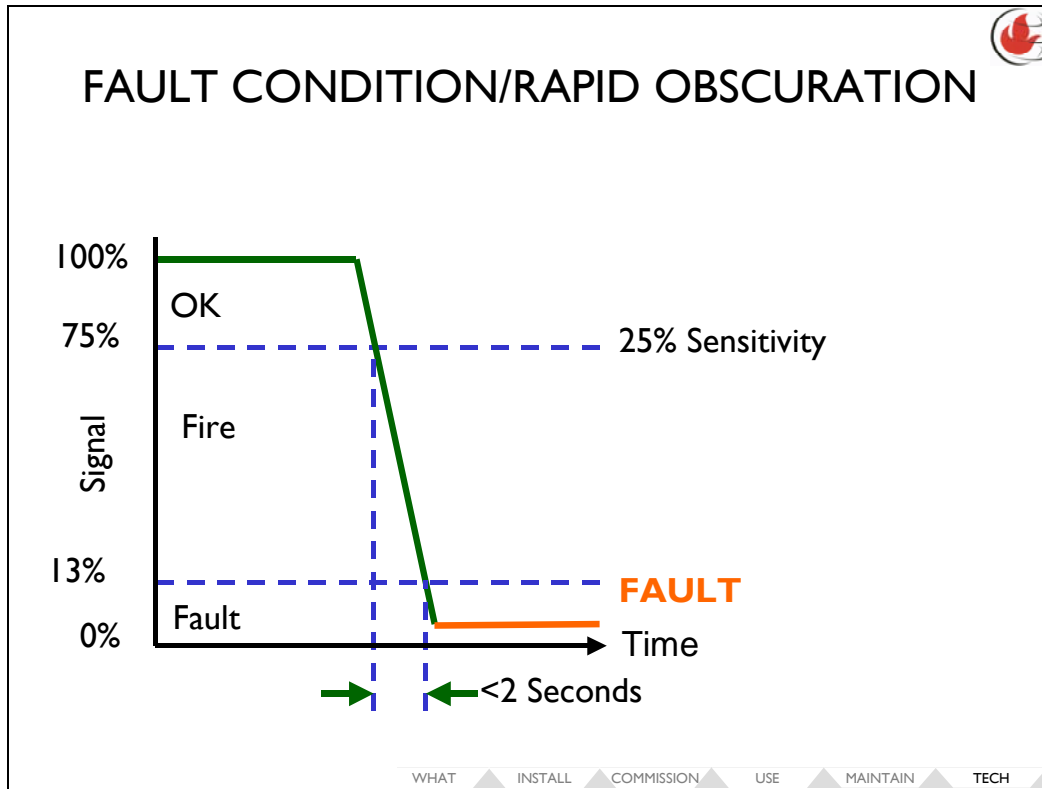


OPTICAL WAVELENGTH

- Wavelength of **FIRERAY50/100R** Infrared = 880nm (nanometres)
 - Near Infrared
 - Invisible to human eyes
- Visible Wavelength 380 to 750nm

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The typical human eye can see wavelengths between 380 to 750nm, (blue to red). Below 380nm is a region called Ultraviolet. Above 750nm is a region called Infrared. The FIRERAY50/100 uses an infrared LED, (IRED), transmitting at 880nm, therefore, making it invisible to human eyes.



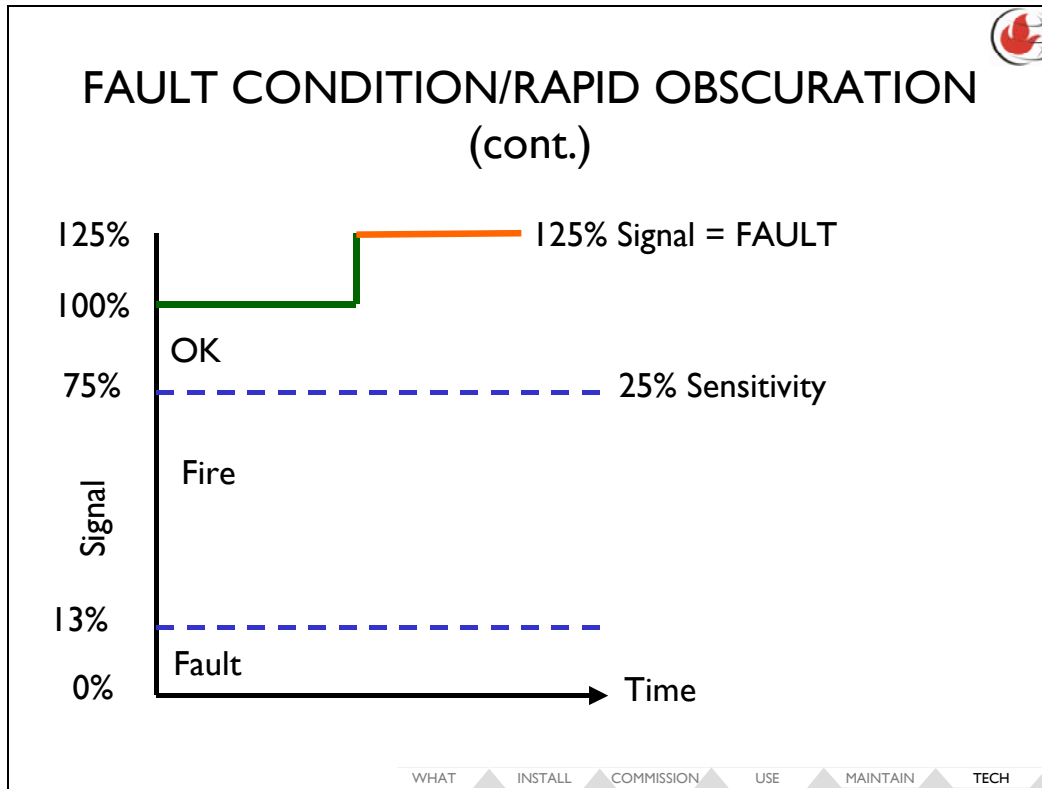
The FIRERAY50/100 signals a fault condition when the signal drops from above the fire threshold to below the fault threshold within 2 seconds. The Fault Threshold on the FIRERAY50/100 is 13%, i.e. the signal must drop potentially by 87% in 2 seconds or less.

A Fault Condition exists because of the potential for non-reflective objects to be moved quickly into the path of the beam, for example boxes or pallets. This results in the beam being 'blocked' as the Detector can no longer see the Reflector, thus preventing a false fire being signalled but warning that the area cannot be fully protected.

A threshold of 13% is used as a level as potentially the signal may not drop to 0% as the object blocking the beam may be partially reflective.

This is a factory set level and cannot be changed by the user.

The reason for the signal having to drop below this level in 2 seconds or less is because it must not signal a fault for a fast burning fire and also because if an object is moved into the beam-path it usually happens in less than 2 seconds.



A Fault will also be raised if the signal level increases to 125%. This could be due to a highly reflective object being moved between the Detector and Reflector causing the system not to protect the full area.



ENVIRONMENTAL CONDITIONS

- Operating Temperature (EN) = -10 to +55°C
- Operating Temperature (UL) = 0 to +37.8°C

- Storage Temperature = -40 to +85°C

- Relative Humidity (Non-Condensing) = 90%
- IP Rating = 50

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It must be remembered that Detectors are usually mounted in the apex of buildings; an area which is usually hotter than the floor level.

The 'Non-Condensing' statement within the Relative Humidity specification is an important one because if water vapor condenses onto the lenses of the FIRERAY50/100RV the signal will be attenuated and false fires or faults may occur. The IP rating means that it has limited ingress against dust – no harmful deposits. Note: if operational at the time the beam will signal a fault or fire as the path has been obscured. The system will recover when a clear line of sight returns (lenses are clean and dry).



HOUSING FLAMMABILITY RATING

- Housing Flammability Rating = UL94 V0
 - Extinguishes when flame removed
 - Will not drip flaming residue

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The FIREREAY50/100R outer plastics are made from UL94 V0 material. This means that if a flame is applied and then removed the product will extinguish itself, (not maintain the fire). It will also not drip any flaming, melted plastic residue (which if it did could cause further fires).

AUTOMATIC GAIN CONTROL (AGC)



- Compensation for slow changes in the signal level
 - Dirt/dust on Lenses or Reflector
 - Building movement
- Will not compensate out a slow burning fire

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The FR50/100R uses Automatic Gain Control, (AGC), to compensate for slow changes in the signal level of the system to maintain the signal level at 100%. These changes usually come from external influences such as dirt/dust on the lenses/reflector or building movement. This usually happens over days, months or years rather than minutes or seconds. AGC is automatic and does not require user involvement.

If the system did not use AGC a progressive build-up of dust, for example, could cause the system to report a false alarm when the signal drops below the fire threshold. At the same time, AGC must not compensate quicker than a slow burning fire. If it did, a slow burning fire would be compensated out and the signal would remain above the fire threshold and never signal an alarm.

It should be noted that AGC will not compensate for quick, progressive changes in the signal level.

AGC can only compensate for a finite amount of signal degradation. When the limit is reached a fault is signalled, and the beams will need to be cleaned.

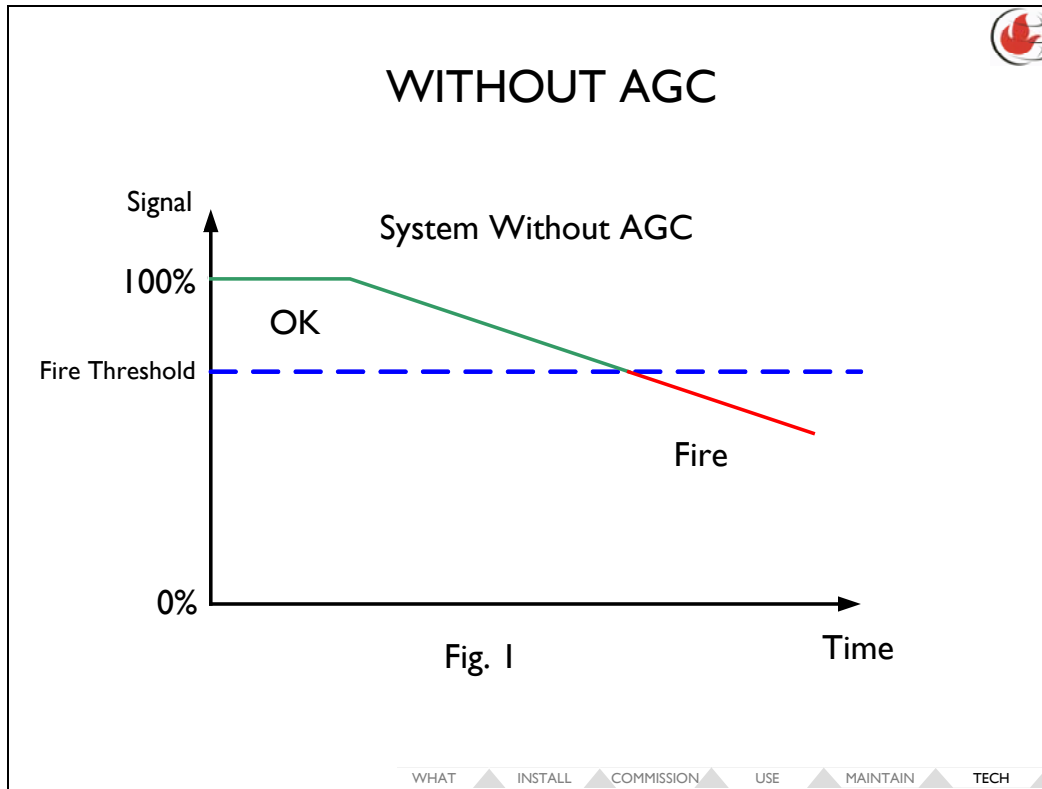


Fig. 1 shows what would happen to the signal level without AGC. Initially when the beam is setup and commissioned the signal level should be sitting at 100%. Over time, external influences such as dirt, dust &/or building movement will start to degrade the signal level. Without AGC, as there is no means of combating this, the signal level will start to drop as the received signal is reducing. If the external influences persist, the signal level will eventually drop below the fire threshold (sensitivity), thus initiating an alarm. A system without AGC would therefore require a high level of maintenance as the detector and reflector would need to be accessed regularly to keep the surfaces clean and the system perfectly aligned.

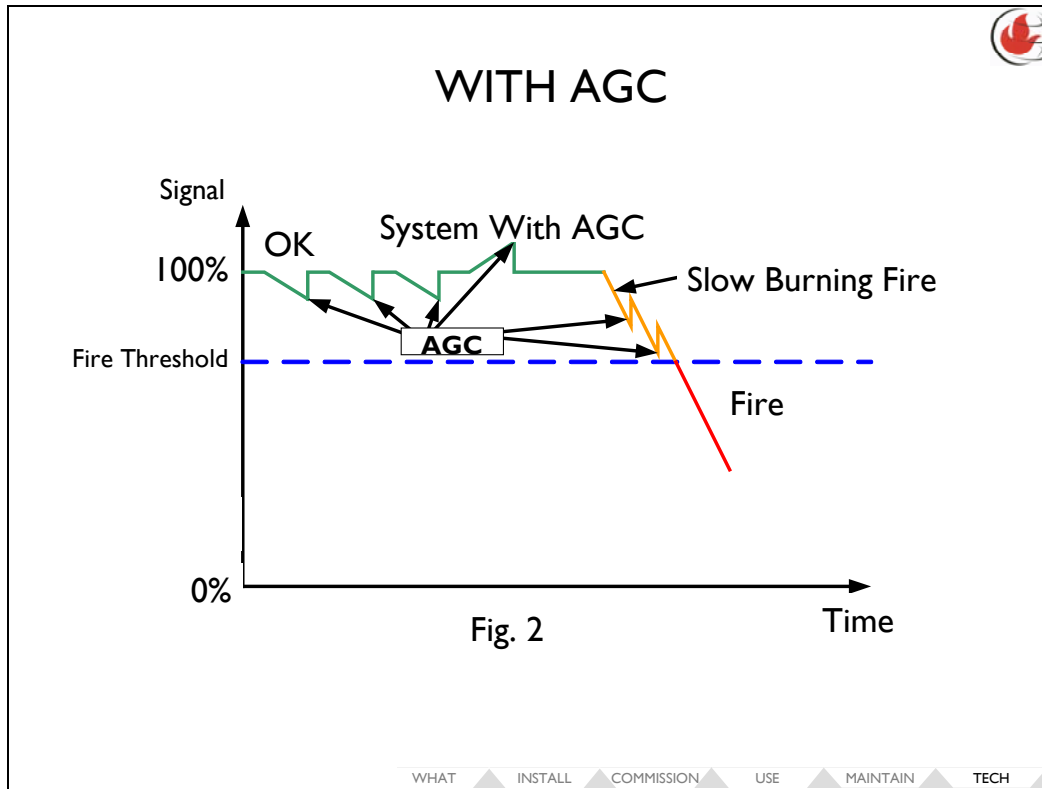


Fig. 2

Fig. 2 shows a system with AGC.

As the external influences build-up, the system will compensate for them by increasing the AGC potentiometer.

As mentioned earlier the AGC does not compensate out of a slow burning fire.

It should also be noted that the AGC would stop when the system is in either a fire or fault condition, so as not to compensate out of that condition.

If the AGC limit is reached the beam will need to be cleaned and realigned.



RELAY SPECIFICATIONS

- Fire Relay Contacts:
 - Normally Open, VFCO 2A @ 30V DC, resistive.
- Fault Relay Contacts:
 - Normally Closed, VFCO 2A @ 30V DC, resistive.

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VFCO = Volt Free Change Over - closing two metal contact are volt free, that is the contacts allow you to place any voltage/current within specification through the contacts and they do not add their own voltage/current levels (i.e. are inert)



RESET LATCHED FIRE

If the detector is set to “Latch Fire” mode, then in the event of a fire the Latched condition is cleared by either:

- placing the beam into prism targeting or alignment mode and then going back to run mode, or
- Removing the power to the beam for 10 seconds before powering back up

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The alarm relay can be set in one of two modes – Auto reset or alarm latching. Auto reset mode will reset the alarm relay and alarm LED 5 seconds after received signal has recovered to a level above the alarm threshold.



OUR SUPPORT

Website

- www.ffeuk.com

Technical Support (outside US)

- Email: technical@ffeuk.com
- Telephone: 01462 444783

Sales Administration Support

- Email: sales@ffeuk.com
- Telephone: 01462 444740

Technical Support (inside US)

- Email: technical@ffeuk.com
- Telephone: 866-FIRERAY
(= 1-866-347-3729)

FFE Technical Support covers:

helping you select the right type of Optical Beam and advising you of good installation practice

providing telephone support throughout your installation

troubleshooting if any issues arise after installation

We first work with you by phone and email, discussing your data, photos etc. then we can arrange a site visit if necessary

Call or email us to speak with one of our eight Engineers or with our Sales Managers (UK, USA and India)

We offer flexible, modular training courses on Beams in general and our wide range of beam products in particular

Courses can be arranged with the appropriate Sales Managers with an Agenda to suit your requirements

In the UK, courses are usually delivered in our Hitchin office utilising the training room and 27m demonstration area



CONCLUSION

FIRERAY50/100R could be the detector of choice for protecting lives, equipment and properties where:

- ✓ Areas are wide
- ✓ Ceilings are high
- ✓ Cost of installation and servicing need to be low
- ✓ Architecture cosmetics / aesthetics are important
- ✓ Ceilings are ornate
- ✓ There is potential for building movement

Note that although Fireray50/100R is a non-motorised Optical Beam Smoke Detector, using AGC, compensation for building movement is achieved.



FIRERAY



FIRE
FIGHTING
ENTERPRISES

THANK YOU