FIRERAY2000®

EExd

OPTICAL BEAM SMOKE DETECTOR

Doc. No: 32-0009-01

OPTICAL BEAM SMOKE DETECTORS

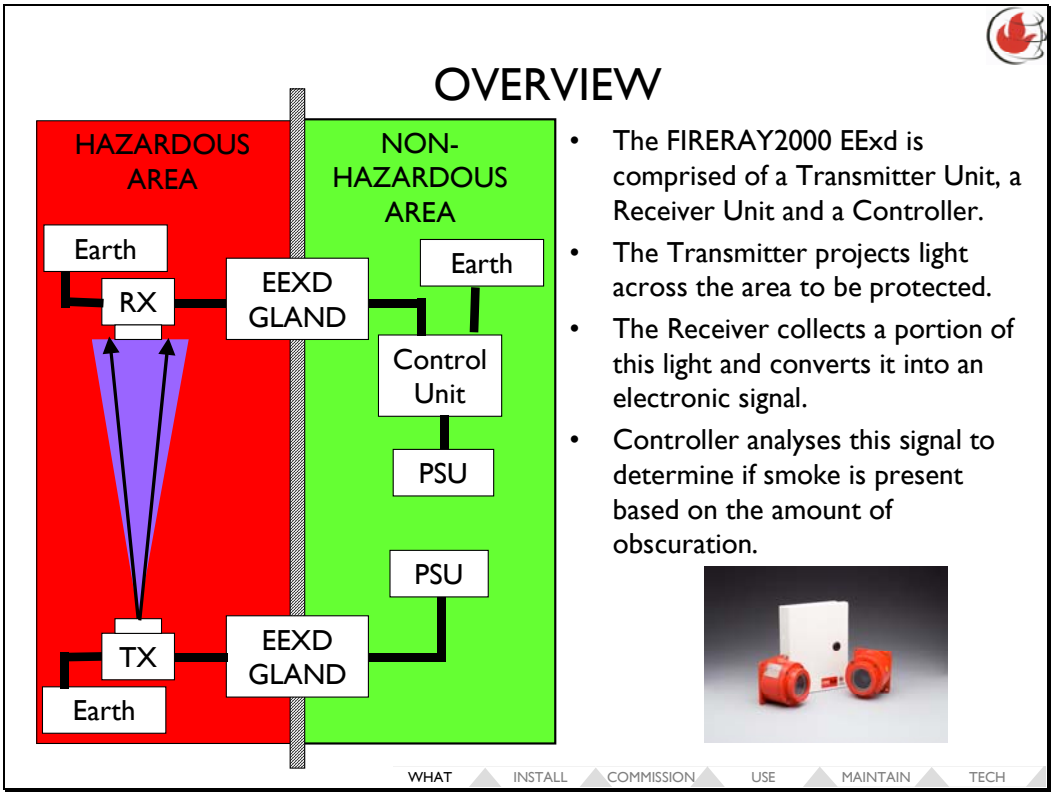
This training material provides information to assist the Fire System Designer and Installer in achieving a successful Optical Beam Smoke Detector installation.

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.

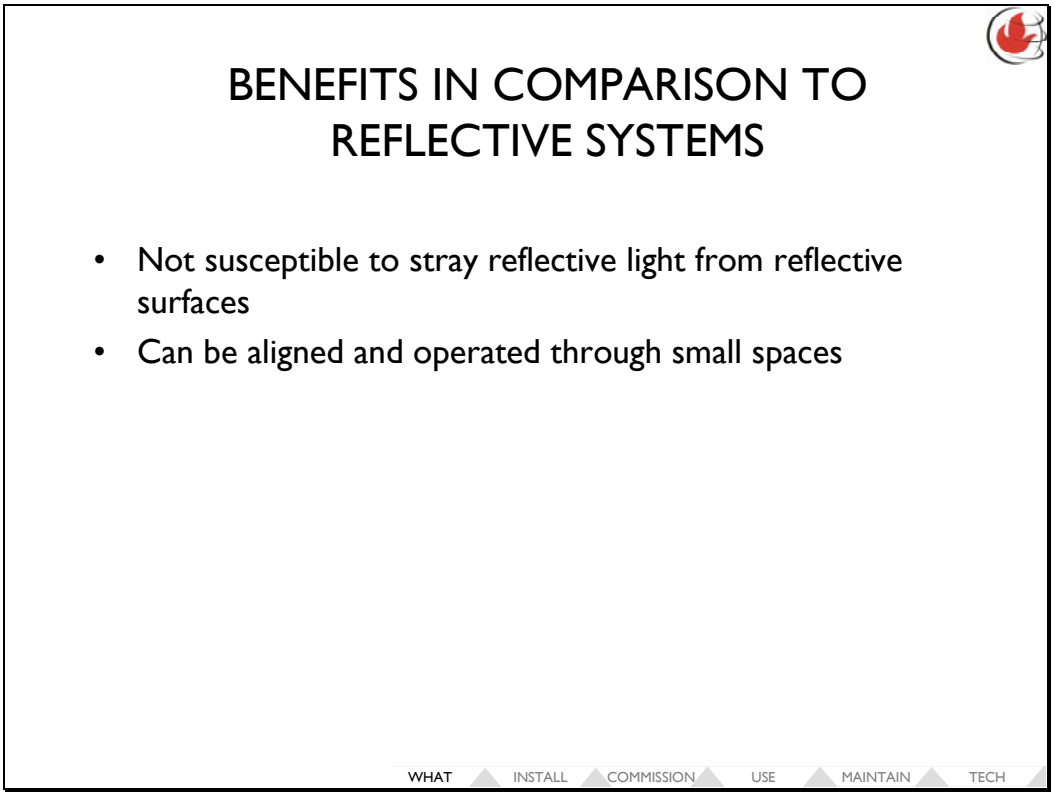
AGENDA

- WHAT IS FIRERAY2000 EExd?
- INSTALLING FIRERAY2000 EExd
- COMMISSIONING FIRERAY2000 EExd
- USING FIRERAY2000 EExd
- MAINTAINING FIRERAY2000 EExd
- TECHNICAL SPECIFICATIONS OF FIRERAY2000 EExd



The Transmitter transmits a diverging beam of infrared light
The Receiver focuses the portion of light falling onto its lens, which then forwards a signal to the Control Unit for analysis
When smoke is present in the beam path, the signal received by the Receiver is reduced relative to the smoke density
If the density of smoke reduces the signal below the preset threshold for a period of 10 seconds, the alarm relay is activated

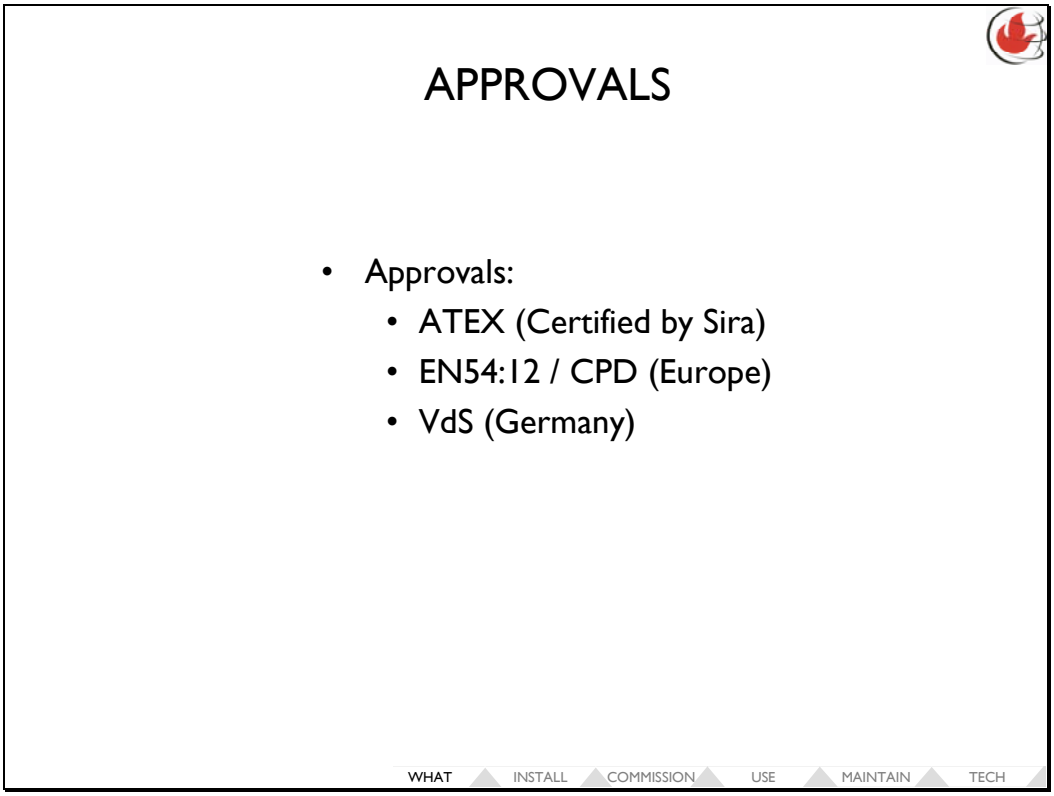
A Control Unit is located within 100 metres cable run of the Receiver Unit, enabling low-level installation and diagnostic capability.



The FIRERAY2000 EExd is not susceptible to stray reflective light from reflective surfaces.

It can be aligned and operated through small spaces and the Transmitter and Receiver heads are small in comparison to the reflective systems.

FIRERAY2000 EExd comes with a three year warranty.



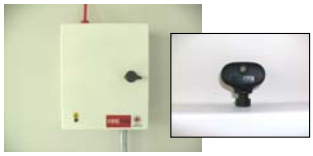
The FIRERAY2000 EExd has these main approvals, which make it popular in many markets.

OUT OF THE BOX PARTS

Transmitter
(plus bracketry
& fixings)

Receiver

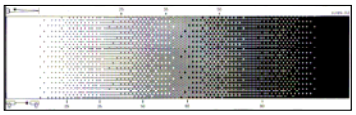
5mm & 10mm
Allen keys



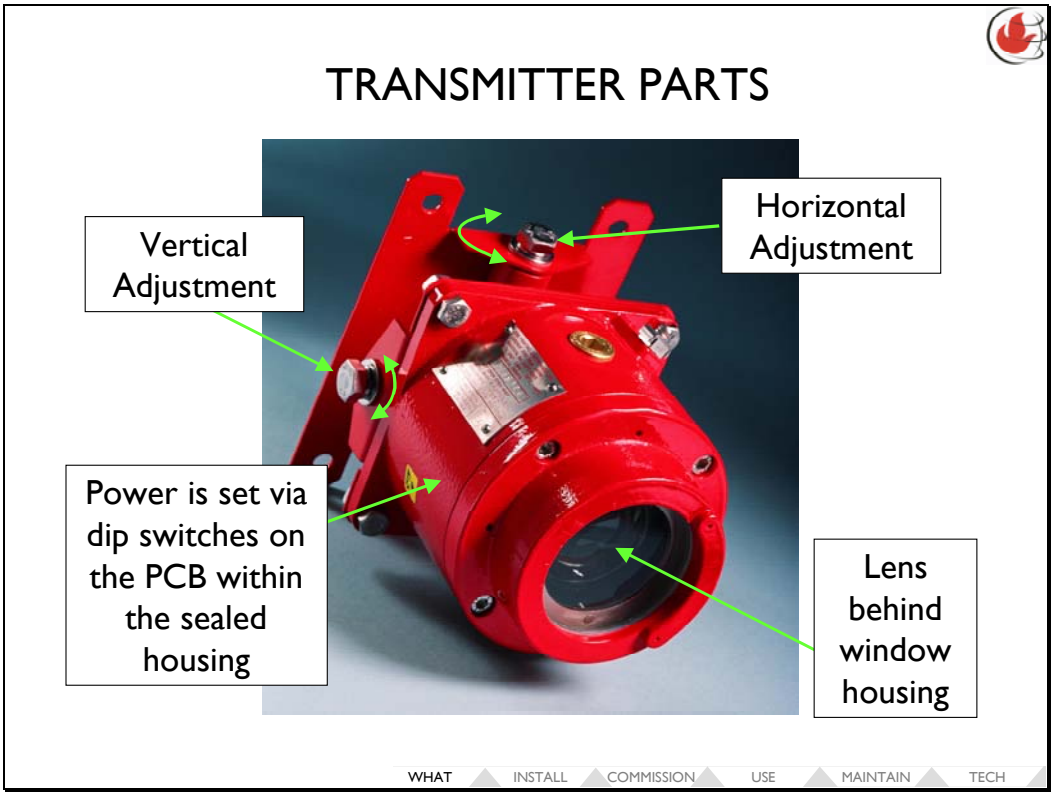
Control Unit
(plus access key)

Installation
Guide

ATEX
Addendum



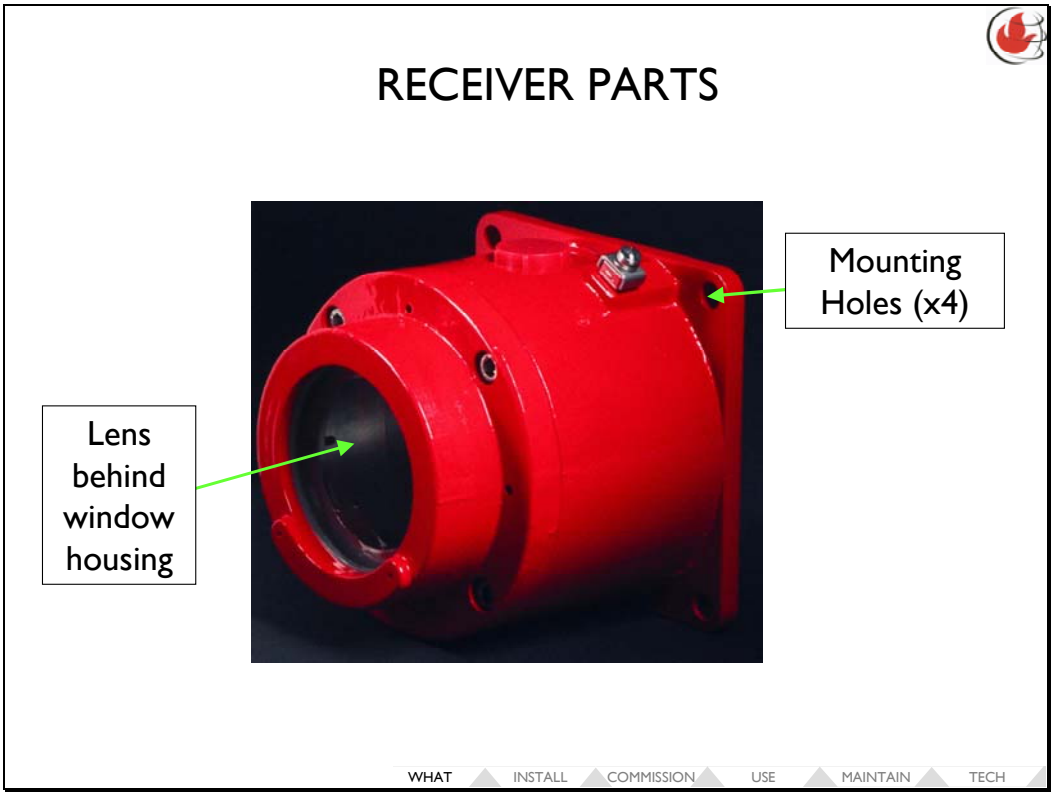
Test Filter



The Transmitter part can be identified by its clear lens.

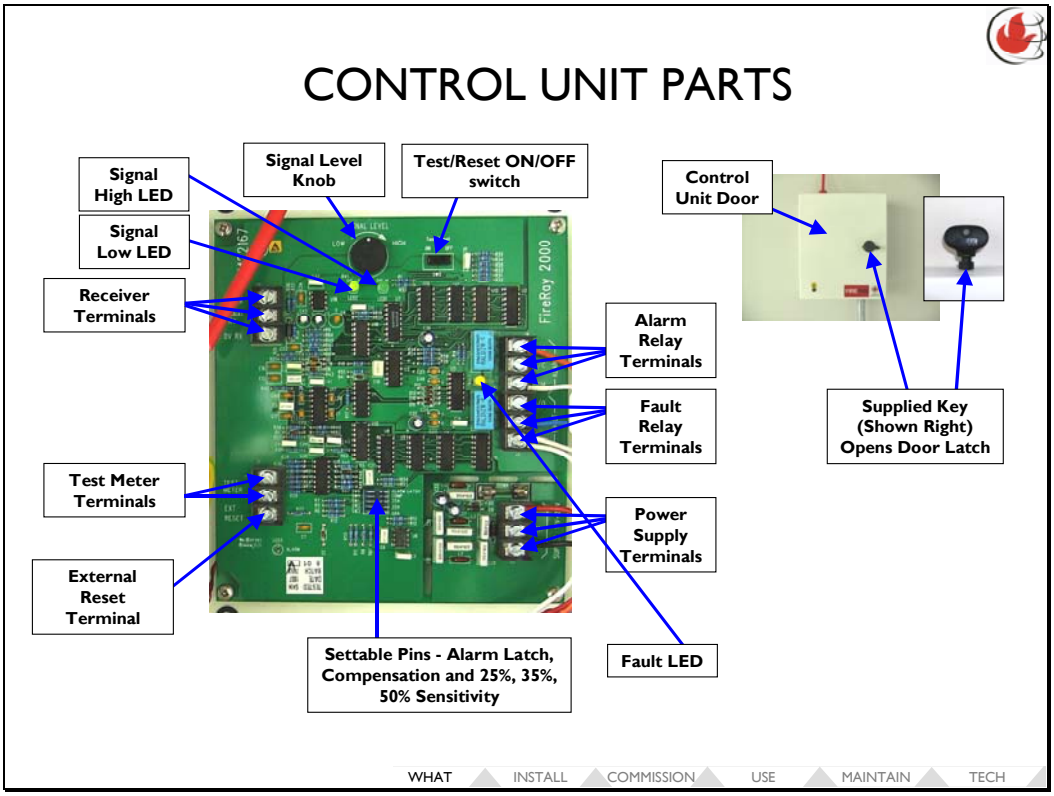
The supplied mounting bracket allows horizontal and vertical adjustment of the Transmitter.

Range switches on the inside of the product set the operating range. These are selectable by the user by removing the window housing. (Range selection is covered later).



The Receiver part can be identified by its dark lens.

The Receiver is not sold with an adjustment bracket as standard.
If the walls are not deemed to be parallel (within 20 degrees of each other) then an additional adjustment bracket must be purchased for the Receiver.



The Control Unit board includes a number of terminals, controls and indications for the FIRERAY 2000 EExd system.

The Control Unit board is housed within a white electrical enclosure accessed with the supplied key.

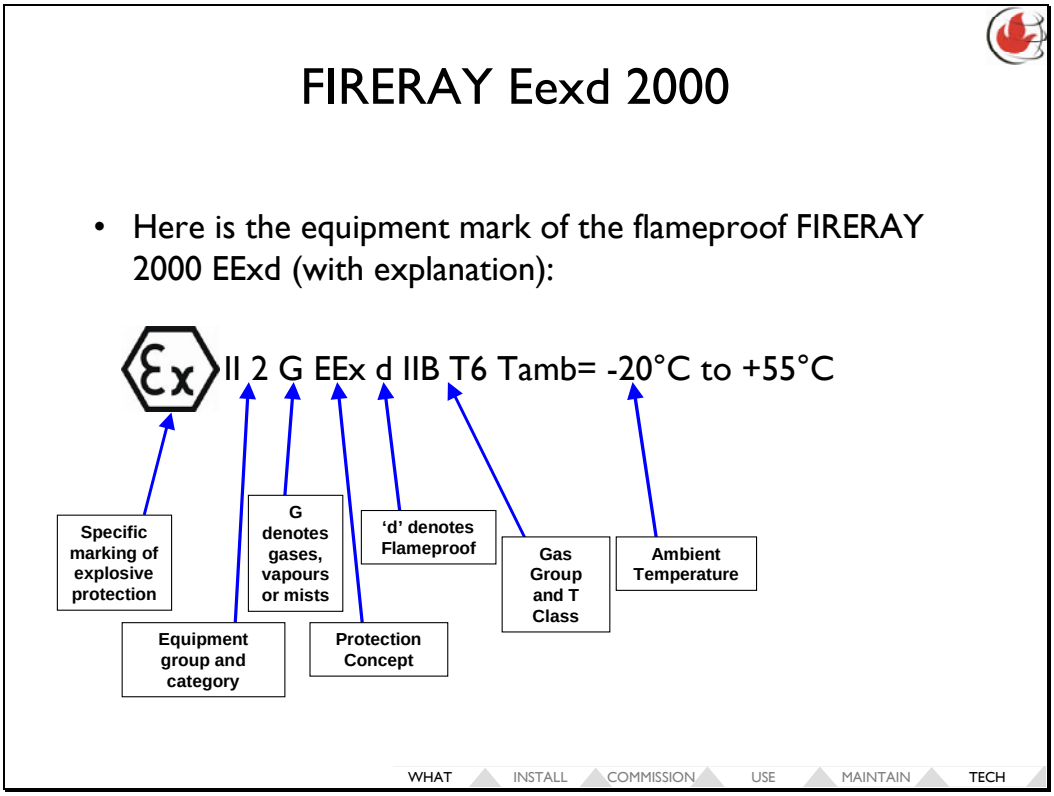
VARIANTS

FIRERAY EExd 2000

(Designed specifically for potentially explosive atmospheres)

FIRERAY 2000 MULTIWAY

(Houses multiple FIRERAY2000 boards in a discreet cabinet with door)

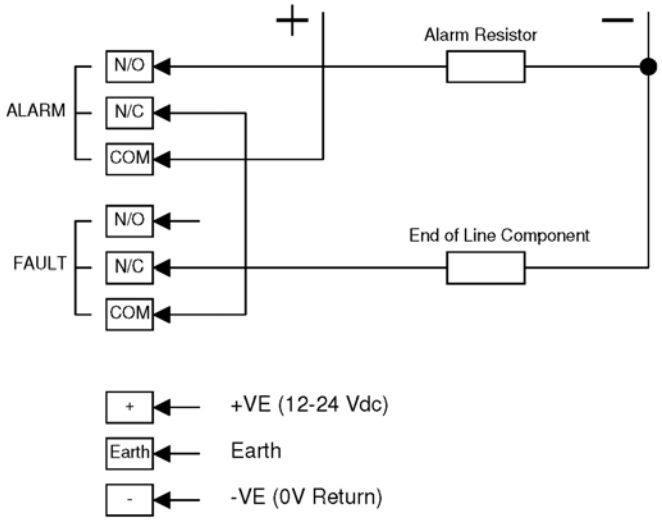


FIRERAY 2000 EExd is our ATEX beam approved for Category 2 (old zone 1) It is EExd is safe for use in flammable liquid and gas stores. Note Optical Beam Smoke Detectors may not be the optimum detector if the combustibles generate colourless smoke.

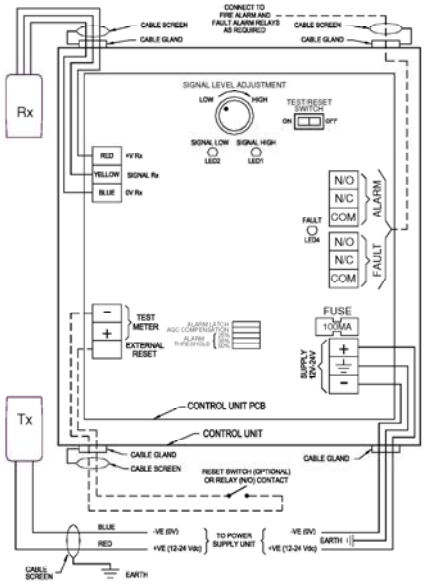
OBSCURATION DEVICE

- After successful installation and alignment, it is important that the transmitted beam has a clear line of sight to the Receiver
- A fundamental part of testing the obscuration thresholds requires the use of the supplied 'Test Filter' obscuration device. (Its use is described later on in this presentation)

ZONE WIRING

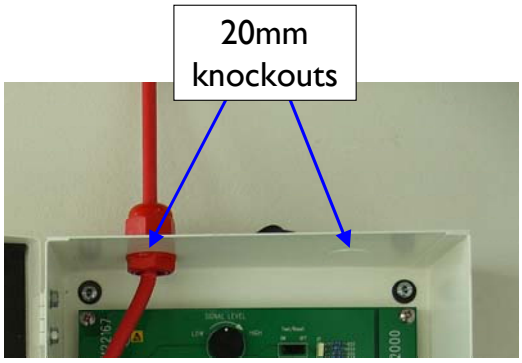


SYSTEM CONNECTIONS

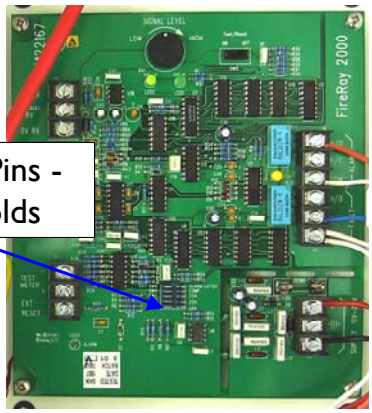


KNOCKOUTS

- There are 2 off 20mm knockout holes on each side face of the Control Unit. (the photo below shows the 2 knockouts (1 in use) on the top face of the unit.)

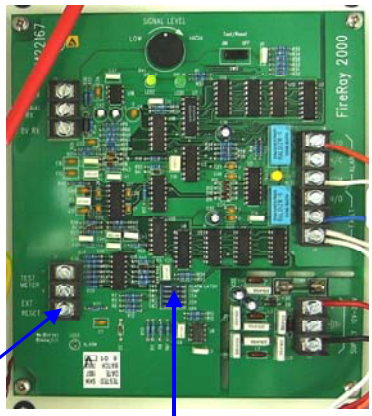


SELECT REQUIRED ALARM THRESHOLDS



- 3 settable pins are provided for each alarm threshold i.e. 25%, 35% & 50%
- Only set ONE of these pins to the CLOSED position to select it (the remaining threshold pins should then be set OPEN)

SELECT EXTERNAL RESET OR AUTO RESET



External Reset Terminal

Settable Pin - Alarm Latch

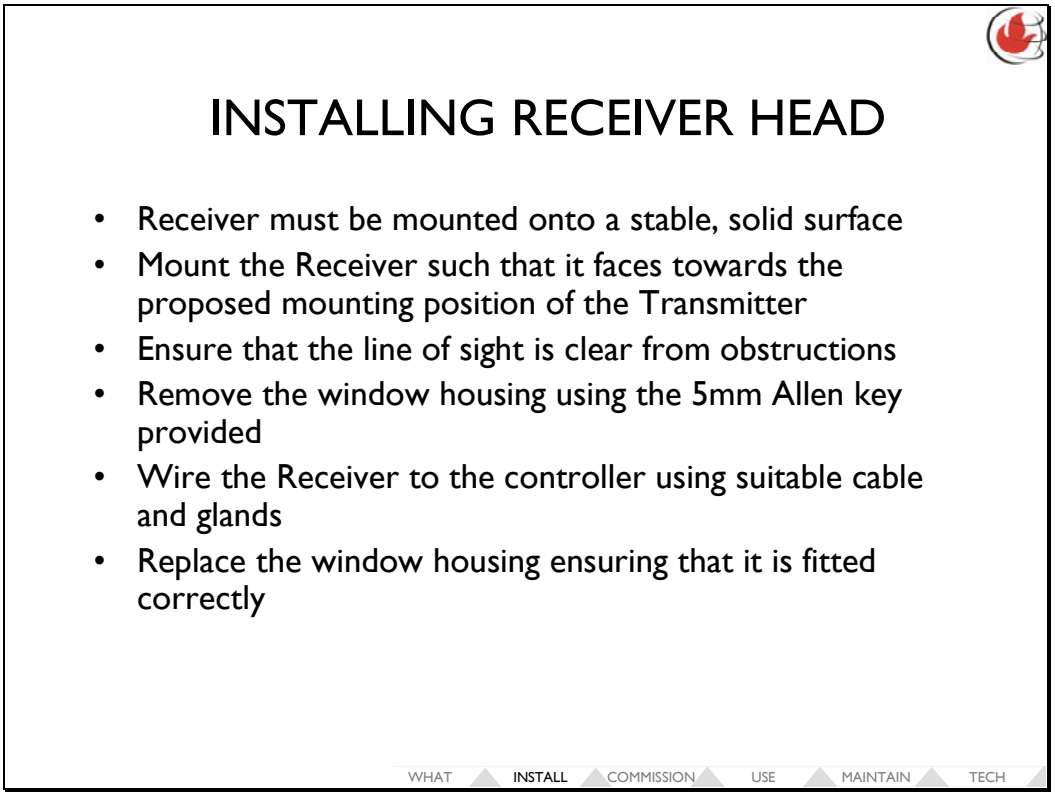
- A settable pin is provided which can be set to either latching or non-latching

WHAT INSTALL COMMISSION USE MAINTAIN TECH

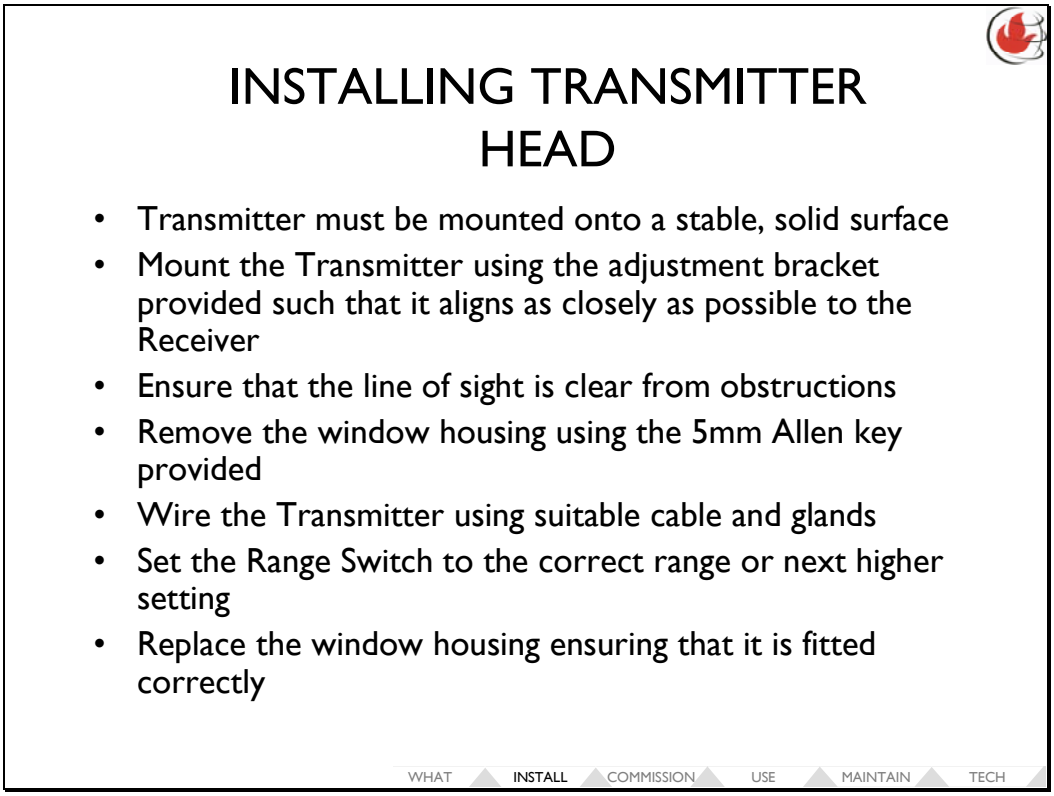
A settable pin is provided which can be set to either latching or non-latching
With non-latching selected, the alarm relay will reset 5 seconds after the smoke has cleared
With latching selected, the alarm relay will remain set until either power down or the LLC receives an external reset (connected terminal shown to test meter negative for 1s).

CONTROL UNIT INSTALLATION

- The Controller MUST be mounted outside of the explosive atmosphere.
- Mount the Control Unit at ground level to a flat surface (preferably a wall) using the fixing holes provided
- Terminate the field wiring as required for zone or loop wiring accordingly



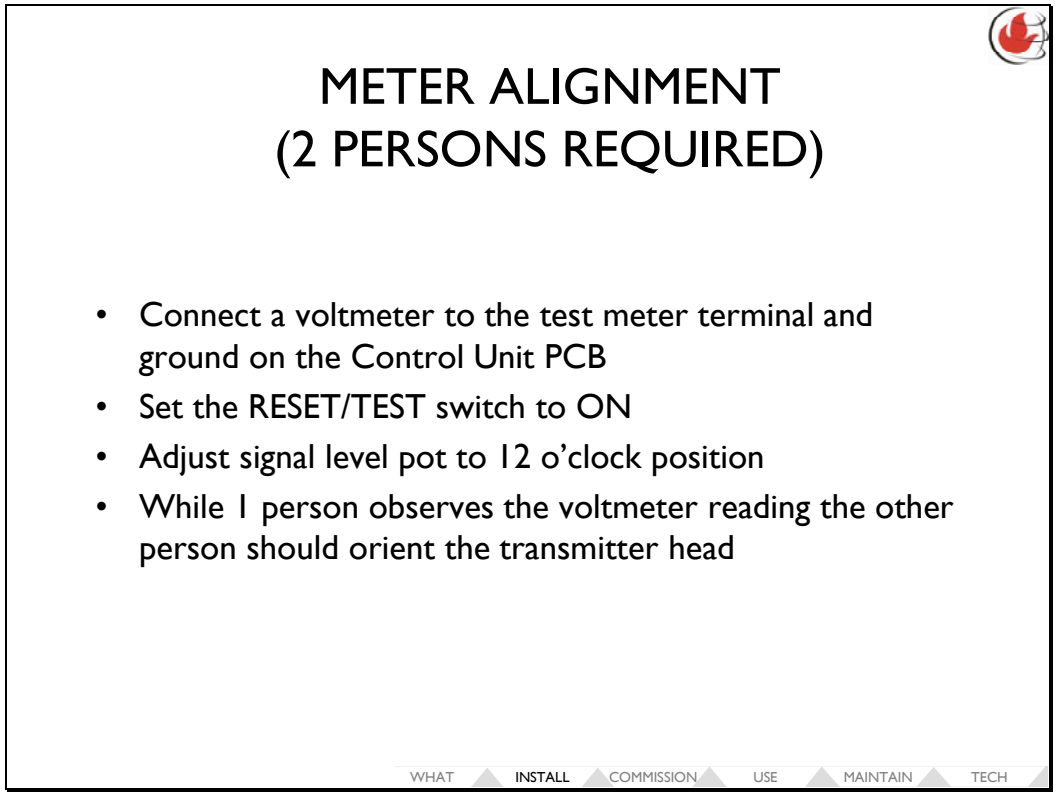
Mount the Receiver first, such that it faces, and has un-obstructed line of sight with the expected final Transmitter position.
Remove the Receiver Window housing (using 5mm Allen key provided).
Connect the system cabling to the 3 way terminal block on the internal pcb.
It is recommended that the External Earth point be used on the Tx and Rx housings, to minimise wiring lengths. This must be taken to the nearest suitable building Earth point. Alternatively, the housing's Internal Earth stud may be connected, via an additional cable core and connected back at the Control Unit Earth.
Check the connections and tighten the cable glands,
Refit the Window housing, taking care to position the 'O' ring seal correctly, just below the flange.
Tighten the 4 securing screws firmly.
For safety reasons, and to give the best EMI rejection, do not omit any of the Earth connections.



Fit the Transmitter head in a position which aligns as closely as possible with the Receiver line of sight, making use of the adjustment bracket provided.
Remove the Transmitter Window housing top (using 5mm Allen key provided) and set the Range Switch to the correct or next higher setting, to match the expected operating range.
Connect the system cabling to the 3 way terminal block on the internal pcb.
Earth the unit housing.
Check the connections and tighten the cable glands.
Refit the Window housing top, taking care to position the 'O' ring seal correctly, just below the flange.
Tighten the 4 securing screws firmly.
For safety reasons, and to give the best EMI rejection, do not omit any of the Earth connections.

PRE-ALIGNMENT

- Apply power to the Control Unit and check voltage is within 11.5 to 28V
- Apply power to the Transmitter (if not connected to the same power supply) and check voltage is within 11.5 to 28V



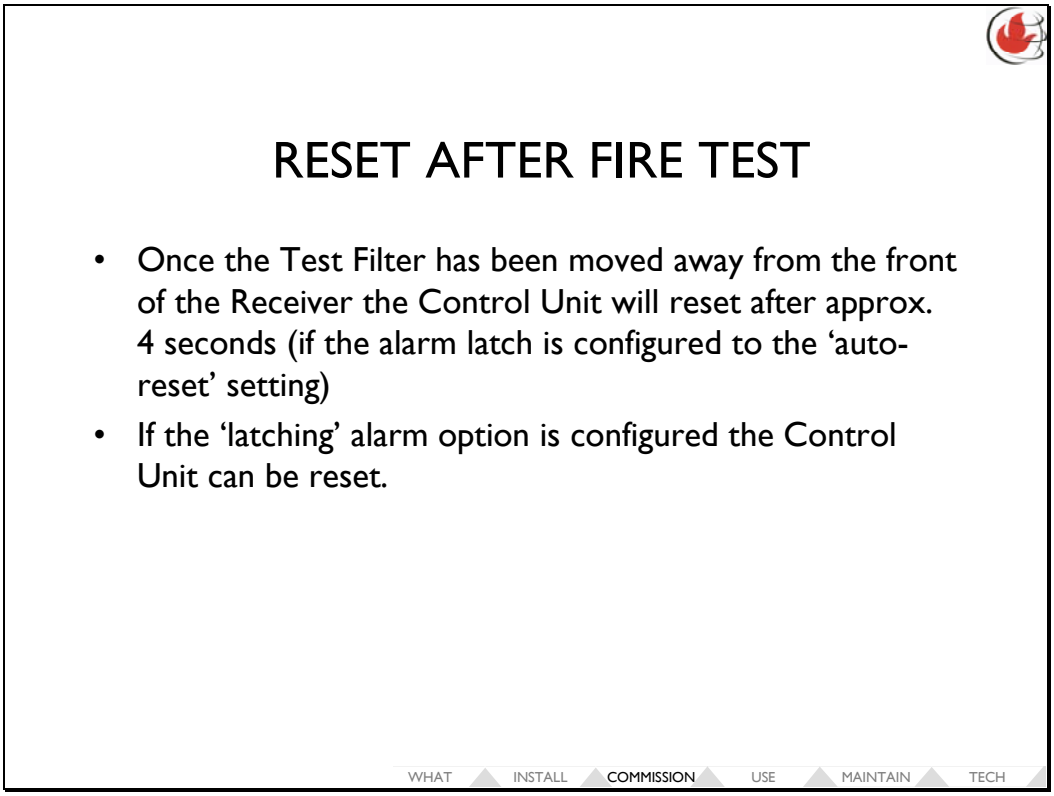
Connect a voltmeter to the test meter terminal and ground on the Control Unit PCB
Set the RESET/TEST switch to ON at the Control Unit
Adjust signal level pot to 12 o'clock position at the Control Unit
While 1 person observes the voltmeter reading the other person should orient the Transmitter head
If moving the Transmitter head causes the voltage to increase continue in that direction to attain the highest voltage possible
A voltage of at least 4.1v is required for correct function.
If the voltage on the meter reads 2.6v +/-0.1 then the Receiver is not seeing the Transmitter
Secure the Transmitter by tightening all bolts on the bracket.
Recheck the voltage.
Go to the Final Settings Slide

FINAL SETTINGS AFTER ALIGNMENT

- At the Control Unit adjust the signal level pot slowly anti-clockwise until the signal high LED just extinguishes
- Confirm that the output at the test meter is 4.2V +/-0.1V
- Disconnect the voltmeter and/or the Alignment Tool wires from the test meter terminals
- Confirm that both signal high and low LED's are both OFF
- Move the RESET/TEST switch to the OFF position and confirm that the fault LED extinguishes
- Wait 45 seconds and confirm that the fault LED is still extinguished

FIRE TESTING

- Take note of selected threshold setting (default 35%)
- Find the mark on the supplied Test Filter that corresponds with the threshold value
- Place the Test Filter over the receiver just past the correct threshold value mark
- The Control Unit will indicate a fire within 10 seconds by activating the RED LED on the Control Unit door and operating the fire relay



Once the Test Filter has been moved away from the front of the Receiver the Control Unit will reset after approx. 4 seconds (if the alarm latch is configured to the 'auto-reset' setting)
If the 'latching' alarm option is configured the Control Unit can be reset by either:
Switching the TEST/RESET switch to ON, then OFF
Disconnecting the power to the Control Unit for more than 1 second.
Shorting the external reset terminal on the Control Unit PCB to the negative terminal for more than 1 second

FAULT TESTING

- The fault relay and the fault LED operate if the beam is totally blocked for approximately 10 seconds.
- The voltage on the meter should read 2.6v +/-0.1
- Removing the obstruction will automatically reset the beam after approximately 4 seconds.

AGC - HOW IT WORKS

- AGC – Automatic Gain Control is used to combat the effects of dirt / dust build-up on the lenses, small changes in the atmospheric conditions and building movement. However, it must be remembered that AGC can only compensate for slow changes in the previously listed conditions for a finite amount of steps – i.e. AGC must not compensate out of a slow burning fire!

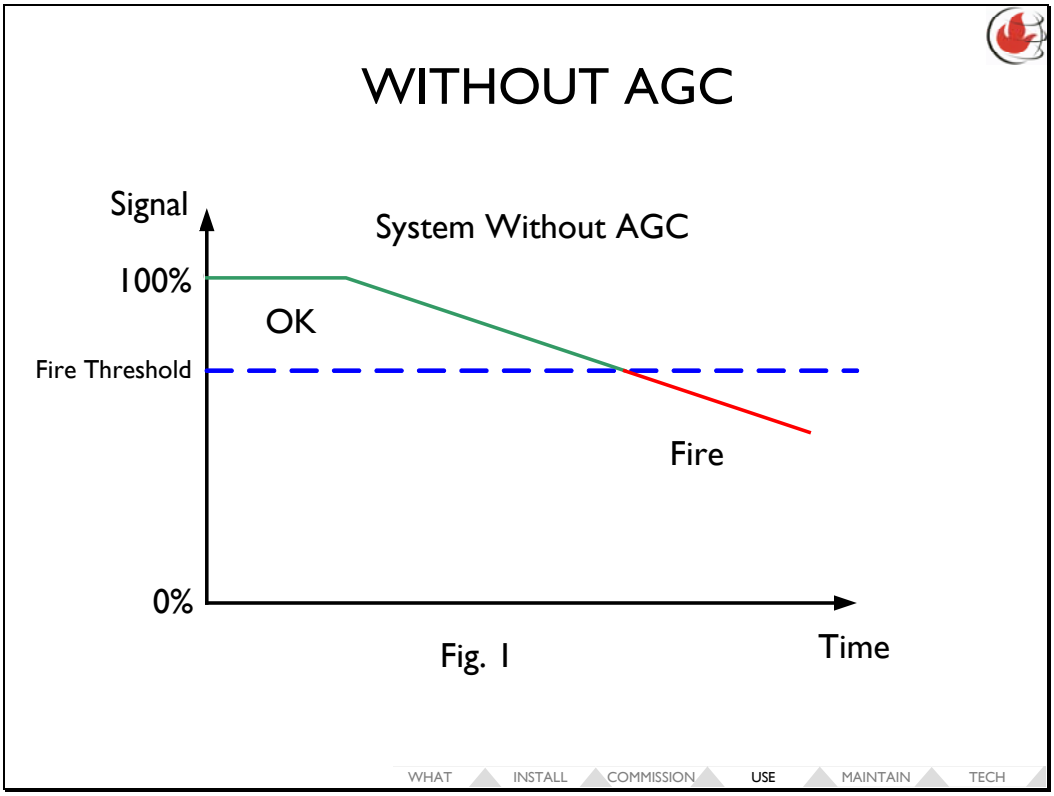


Fig. 1 shows what would happen to the signal level without AGC.
Initially when the beam is setup and commissioned the signal level should be sitting at 100% (approx. 4.2V).
Over time, external influences such as dirt, dust &/or building movement will start to degrade the signal level.
Without AGC, as 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 transmitter and receiver would need to be accessed regularly to keep the surfaces clean and the system perfectly aligned.

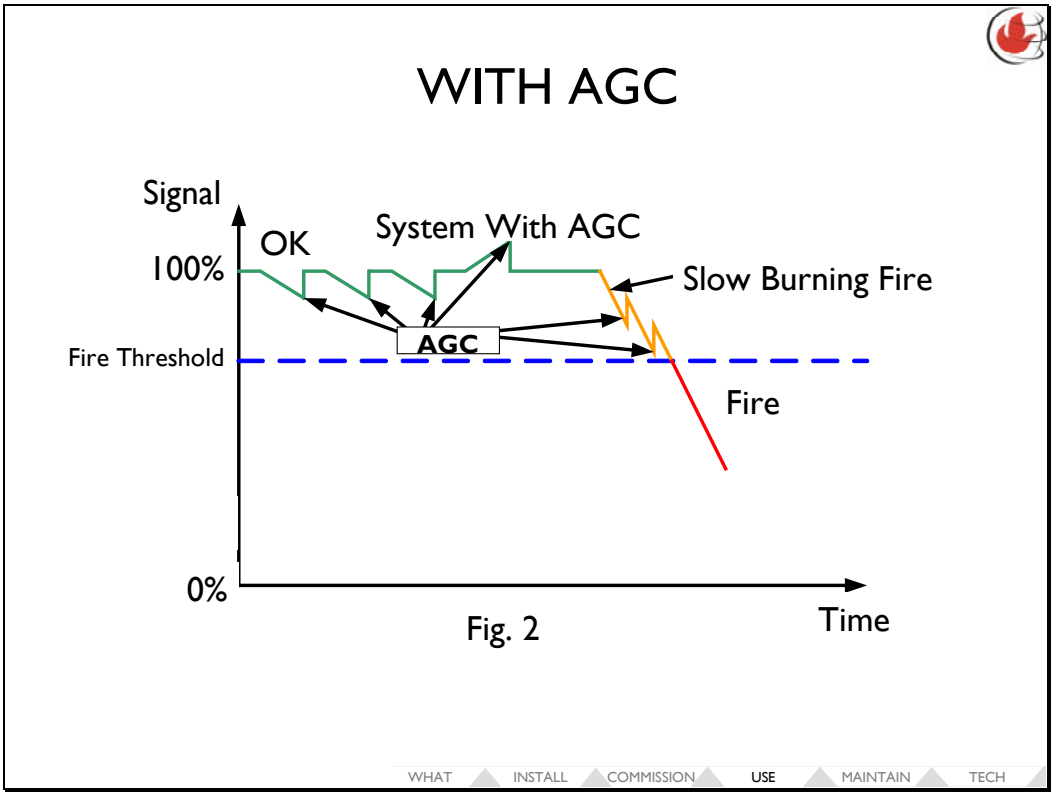
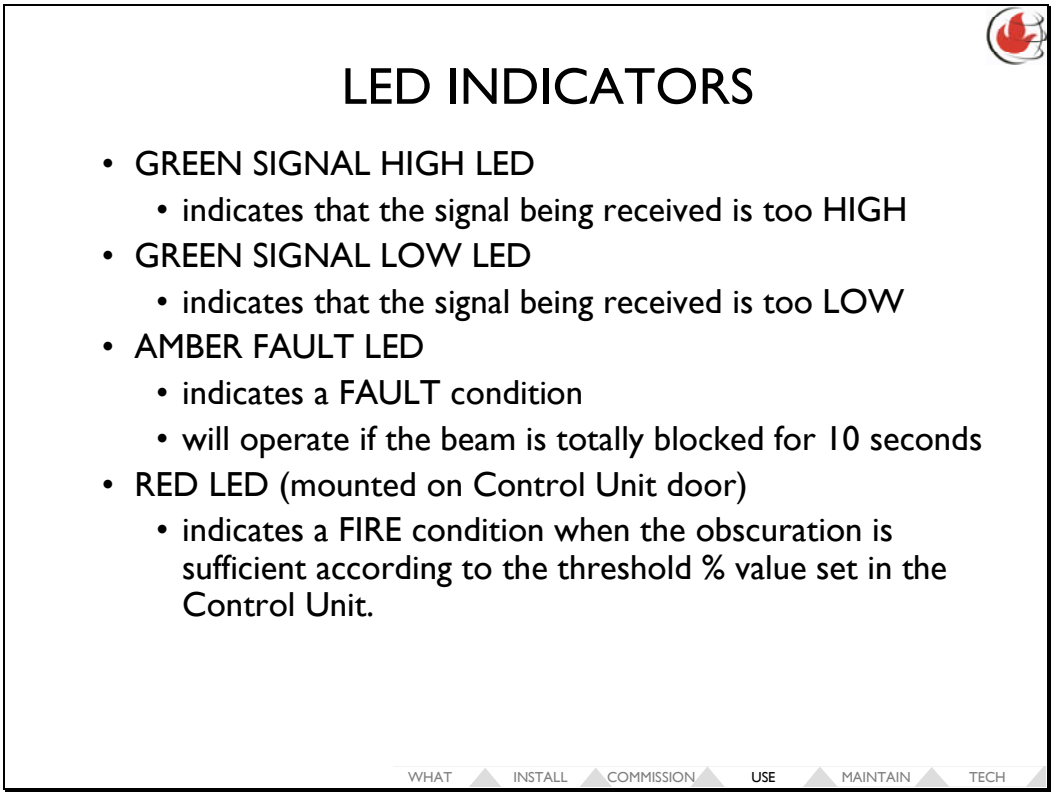
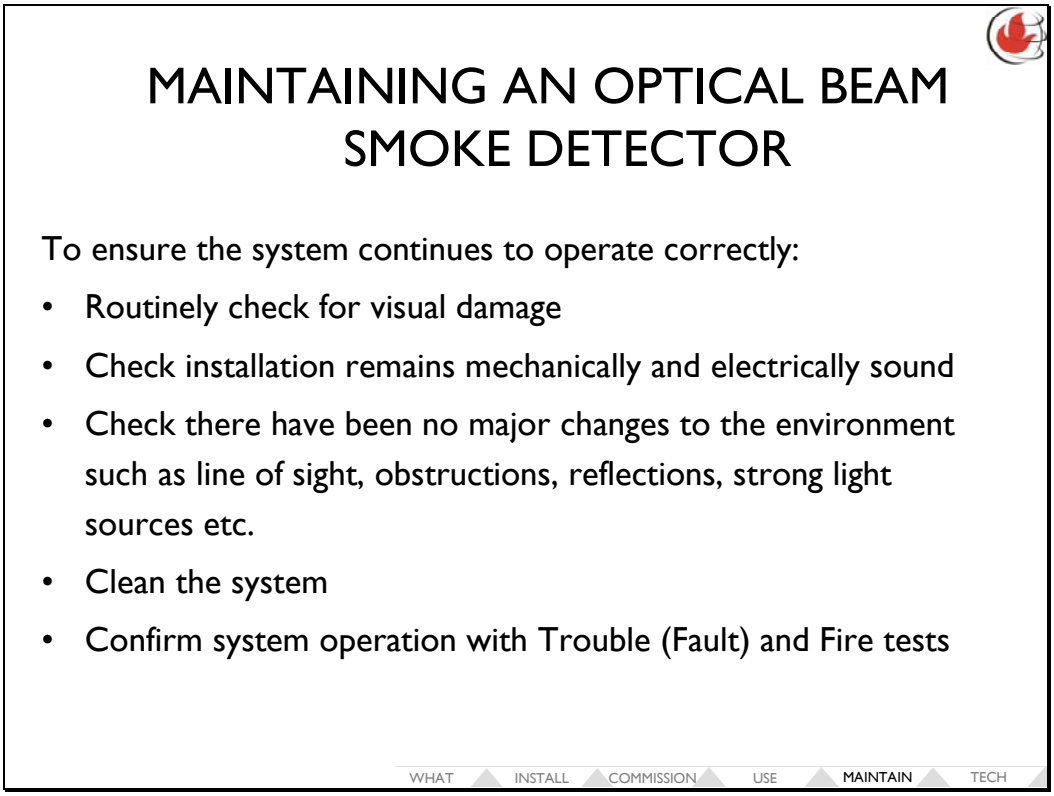


Fig. 2

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.



GREEN SIGNAL HIGH LED
indicates that the signal being received is too HIGH
GREEN SIGNAL LOW LED
indicates that the signal being received is too LOW
AMBER FAULT LED
indicates a FAULT condition
will operate if the beam is totally blocked for 10 seconds
RED LED (mounted on Control Unit door)
indicates a FIRE condition when the obscuration is sufficient according to the threshold % value set in the Control Unit.



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

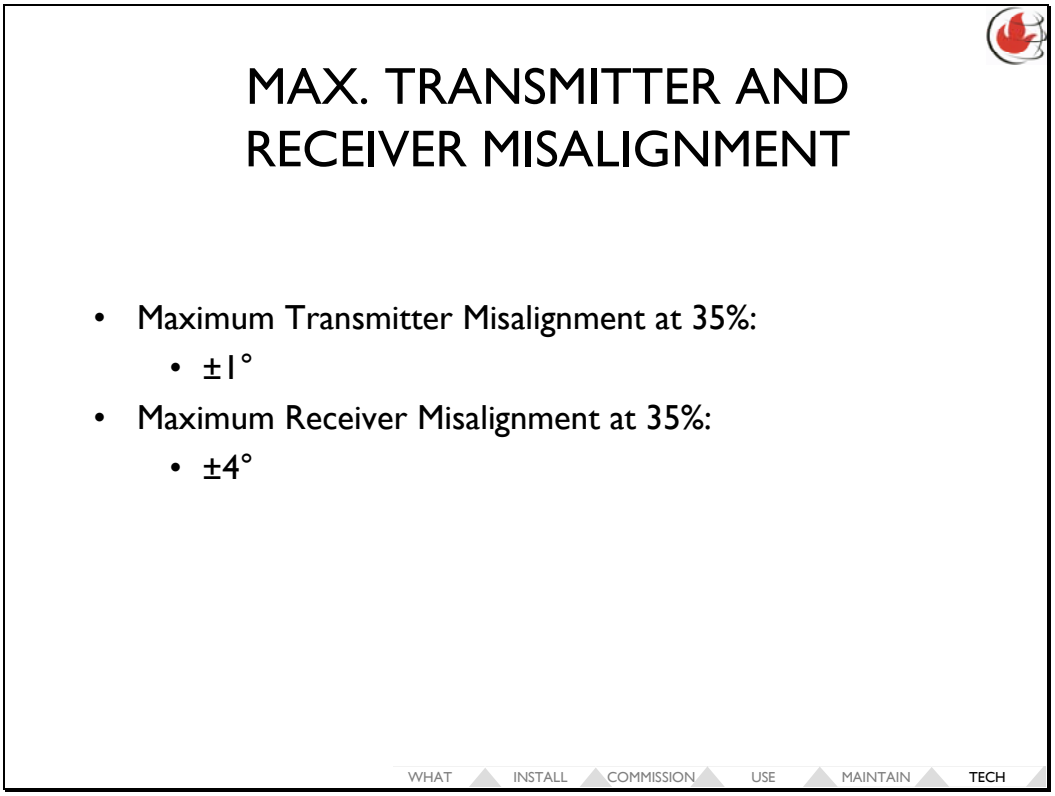
- Fault LED may indicate an AGC fault therefore clean & align

OPERATING VOLTAGES/CURRENT

- Operating Voltage Range:
  - 11.5 to 28V DC
- Transmitter Current:
  - <1.6 to 5.6mA
- Quiescent Current (Control Unit includes receiver):
  - <8mA @24V DC

OPERATING RANGE

- Operating Distance:
  - 10 to 100 Metres



These are the amounts the transmitter or receiver can be moved off axis and still be operational (and still able to detect a fire and fault correctly).

FIRE ALARM THRESHOLDS

- Fire Alarm Thresholds:
  - 1.25dB (25%), 1.87dB (35%), 3dB (50%)

TIME TO FIRE / FAULT

- Between 2 to 12 seconds

OPTICAL WAVELENGTH

- Optical Wavelength:
  - 880nm

FAULT/ALARM CURRENT

- Alarm Current (Control Unit includes Receiver):
  - <16.5mA @24V DC
- Fault Current (Control Unit includes Receiver):
  - <16.5mA @24V DC

RELAY SPECIFICATIONS

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

VFCO = volt-free changeover

GOLDEN RULES

- Install Transmitter and Receiver onto solid structures
- Always perform Fire and Fault Tests
- Ensure that the beam path is clear of any obstructions
- Ensure that the area to be protected is a non-condensing environment

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

FIRERAY2000 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

FIRERAY

FIRE
FIGHTING
ENTERPRISES

THANK YOU