



MICROPACK
FIRE & GAS

FDS300

VISUAL FLAME DETECTOR

SAFETY & TECHNICAL
MANUAL

Ref: 2401.6000





HELP US TO HELP YOU

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Micropack (Engineering) Ltd would greatly appreciate being informed of any errors or omissions that may be found in our documents. To this end we include a form, given in Appendix B, for you to photocopy, complete and return to us so that we take the appropriate action. **Thank you.**

TABLE OF CONTENTS

| | | | |
|----------|-------|---------------------------------|-----------|
| 1 | | Introduction | 4 |
| | 1.1 | Features | 4 |
| 2 | | Safety Instructions | 5 |
| | 2.1 | Warnings | 5 |
| | 2.2 | Cautions | 6 |
| | 2.3 | Important Safety Notices | 6 |
| 3 | | Installation | 8 |
| | 3.1 | Detector Enclosure | 8 |
| | 3.2 | Mounting & Orientation | 9 |
| | 3.3 | Wiring Procedure | 11 |
| | 3.3.1 | 4-20mA Output | 12 |
| | 3.3.2 | Relay Output | 13 |
| | 3.3.3 | Internal Inter-connections | 14 |
| | 3.4 | Installation Checklist | 15 |
| | 3.4.1 | Mechanical | 15 |
| | 3.4.2 | Electrical | 15 |
| 4 | | System Design Guidelines | 16 |
| | 4.1 | Power Supply | 16 |
| | 4.2 | Cable Selection | 16 |
| | 4.2.1 | DC Power | 16 |



| | | |
|-------------------|--------------------------------------|-----------|
| 5 | Application Guidelines | 17 |
| 5.1 | Positioning Requirements | 17 |
| 5.2 | Detection Coverage | 18 |
| 5.3 | Exposure to Flare Radiation | 18 |
| 5.4 | Optical Contamination | 18 |
| 5.5 | Enclosed Areas | 19 |
| 5.6 | Detector Sensitivity | 19 |
| 6 | Maintenance and Commissioning | 20 |
| 6.1 | Procedure | 20 |
| 6.2 | Functional Testing | 22 |
| 7 | Fault Finding | 23 |
| 7.1 | Removal of the Electronics | 23 |
| 7.2 | Replacement of the Electronics | 23 |
| 7.3 | Diagnostics | 23 |
| 7.4 | LED Indication | 24 |
| 7.5 | Power Fault | 25 |
| 8 | Technical Specification | 26 |
| 8.1 | Electrical Specification | 26 |
| 8.2 | Mechanical Specification | 26 |
| 8.3 | Environmental Specification | 27 |
| 8.4 | Certification and Approvals | 27 |
| 8.5 | Operating Specification | 27 |
| Appendix A | Acronyms, Terms & Abbreviations | 28 |
| Appendix B | Help us to help you | 29 |
| Appendix C | Field of View | 30 |



1 Introduction

The MICROPACK FDS300 is a flame detector that has unsurpassed false alarm immunity.

The Micropack flame detection range are the safest and most advanced flame detectors on the market today, and their track record on the numerous facilities where they are installed has proven the technology to be robust, even in the harshest of environments.

FDS300 flame detectors identify flame using certified flame recognition software. FM Approvals ensures that our flame recognition software is fit for purpose through rigorous research and testing in a range of difficult environments.

Production losses caused by common sources of alarm from existing flame detection technologies are addressed by the FDS300 flame detector.

The FDS300 has been designed for use in standalone operation.

1.1 Features

- The FDS300 has 120° horizontal x 80° vertical field of view with an increased range of 60 metres to an n-heptane 0.1m² pan fire.
- Single detection sensitivity setting because the FDS300 is unaffected by the background radiation experienced in industrial environments.
- Superior False alarm immunity to common sources of unwanted alarms such as hot process, Hot Work, Hot CO₂ emissions and Flare Reflections.
- Advanced optical verification test assuring readiness to perform when needed.
- Outputs include both relay contact and 4-20 mA.
- Separate termination chamber for ease of installation.
- Flame simulation tester to verify operation from distances of 3-8 metres, removing the need for scaffolding or ladders.
- FDS300 can operate via a standard 3 or 4 wire termination.



2 | Safety Instructions

For the correct and effective use of this equipment, to maintain safety and avoid hazards it is essential that you read and understand these instructions fully, act accordingly BEFORE installing, operating or maintaining the equipment.

PAY ATTENTION TO ALL SAFETY WARNINGS AND CAUTIONS

2.1 Warnings

This equipment is certified and intended for use in potentially hazardous areas. Install and use the equipment in accordance with the latest regulations.

For European (ATEX) installations IEC/EN60079-14 'Electrical Installations in Hazardous Areas' and ICE/EN60079-17 'Inspection and Maintenance in Hazardous Areas' should be strictly observed.

For installations in North America the National Electrical Code (NEC) should be strictly observed. In other countries the appropriate local or national regulations should be observed.

The equipment must be properly earthed to protect against electrical shock and minimise electrical interference.

Do not drill holes in any housing or enclosure as this will invalidate the explosion protection. Ensure that the enclosure lid is fully tightened and locked into position before energising the equipment.

Do not open the enclosure in the presence of an explosive atmosphere.

All permits and proper site procedure and practises must be followed and the equipment must be isolated from the power supply before opening the enclosure in the field.

Operators must be properly trained and aware of what actions to take in the event of a fire being detected.

Cable to be used for installation is to be selected with a temperature rating of greater than 25 degrees Celsius above the maximum ambient temperature. The metric cable entries are fitted with an internal stop. This will result in threads of the cable gland being visible. Do not over tighten.



2.2 Cautions

Use only approved parts and accessories with this equipment.

Do not attempt to replace the window as the glass and the front cover are individually matched pairs to meet the stringent requirement of the Hazardous area certification.


The threaded portions of the detector are flame paths. These threads and the flame paths around the window are not to be repaired.

To maintain safety standards, commissioning and regular maintenance should be performed by a qualified person.

2.3 Important Safety Notices

Pay attention to the guidelines given throughout this document.

If in any doubt about the instructions listed within this manual then please contact Micropack (Engineering) Ltd. Micropack (Engineering) Ltd takes no responsibility for installation and/or use of its equipment if this it is not in accordance with the appropriate issue and/or amendment of the manual. Micropack (Engineering) Ltd reserve the right to change or revise the information contained herein without notice and without obligation to notify any person or organisation of such action.

Only those parameters and configurations highlighted with the FM diamond () have been tested and approved by Factory Mutual.

Warning

Do not open the detector assembly in a hazardous area when power is applied. The detector contains limited serviceable components and should never be opened except by trained personnel.

Caution

The wiring procedures in this manual are intended to ensure functionality of the device under normal conditions. Due to the many variations in wiring codes and regulations, total compliance to these ordinances cannot be guaranteed. Be certain that all wiring complies with the all local ordinances. If in doubt, consult the authority having jurisdiction before wiring the system. Installation must be done by trained personnel.

Caution

To prevent unwanted actuation or alarm, extinguishing devices must be inhibited/isolated prior to performance testing or maintenance.



Detector Orientation

Detectors should be mounted with the earth stud/status led directly below the lens to ensure the 120° horizontal field of view is achieved.

Detector Positioning

Detectors should be positioned to provide the best unobstructed view of the area to be protected.

The following factors should also be taken into consideration:

- Identify all high risk fire ignition sources. Ensure that enough detectors are used to adequately cover the hazardous area.
- Locate and position the detector so that the fire hazard(s) are within both the field of view and detection range of the device.
- For best performance, the detector should be mounted on a rigid surface in a low vibration area.
- Extremely dense fog or blizzard conditions could eventually block the vision of the detector.
- For indoor applications, if dense smoke is expected to accumulate at the onset of a fire, mount the detector on a side wall (approximately 1 metre, 3 feet) down from the ceiling.
- The FS301 flame simulator can be used to verify correct detector positioning and coverage.
- The FDS300 has one sensitivity setting, this is factory set, and no changes can be made to set-up except by fully trained Micropack engineers.
- The detector carries out continuous internal hardware diagnostic testing to ensure correct operation is relayed to the control system.
- The FDS300 is not designed to annunciate diagnostic failures of signal returns via external wiring. Control systems and fire panels generally have fault monitoring for such an eventuality.







3 Installation

The FDS300 design has been developed to allow simple installation. The detector comprises two key components, the detector enclosure and the detector internal assembly. The detector assembly located in the front of the enclosure should not be removed except by trained personnel. Unauthorised removal or disassembly of the detector assembly will invalidate the warranty. Only the rear end cap can be removed for terminal access.

3.1 Detector Enclosure

The detector electronics are housed in an enclosure certified for use in hazardous areas. For the exact certification and conditions of use see certification label on the device, or the example drawing below:

| | | | | | |
|--|---|--|--|---|--|
|  <p>Micropack ABERDEEN, SCOTLAND, AB12 4RR TYPE: FDS300 SERIAL No: <input type="text"/> Year: <input type="text"/> ENTRY: M25 <input type="checkbox"/> 1/2" NPT <input type="checkbox"/> Single <input type="checkbox"/> M20 <input type="checkbox"/> 3/4" NPT <input type="checkbox"/> Dual <input type="checkbox"/></p> |  |  APPROVED AMBIENT: -60°C +85°C |  <p>AMBIENT: -60°C +85°C FM07ATEX 0033 IECEX FME 07.0002 Maximum Voltage: 30VDC Maximum Current: 250mA</p> | <p>TYPE 4, IP66 Class I DIV 1 GROUPS B,C,D,T4 AMBIENT: -60°C +85°C Class I Zone 1 AEx/Ex db IIC T4 AMBIENT: -60°C +85°C DO NOT REPAIR FLAME PATHS SEAL CONDUIT WITHIN 18" OF ENCLOSURE ENTRANCE</p> |  APPROVED |
| WARNING: DO NOT OPEN WHEN EXPLOSIVE ATMOSPHERE MAY BE PRESENT WARNING: REFER TO FDS300 TECHNICAL MANUAL 2401.6000 BEFORE INSTALLING OR MAINTAINING THIS UNIT | | | | | |

The enclosure comprises the front enclosure cover (including the faceplate window), the rear enclosure cover, the enclosure body (with certification label), and the mounting bracket.



3.2 Mounting & Orientation

The mounting bracket allows the detector's vertical orientation to be adjusted from 0 to 45°, and allows a horizontal rotation of +/-45°.

Figure 1: Detector Mounting Bracket & Orientation

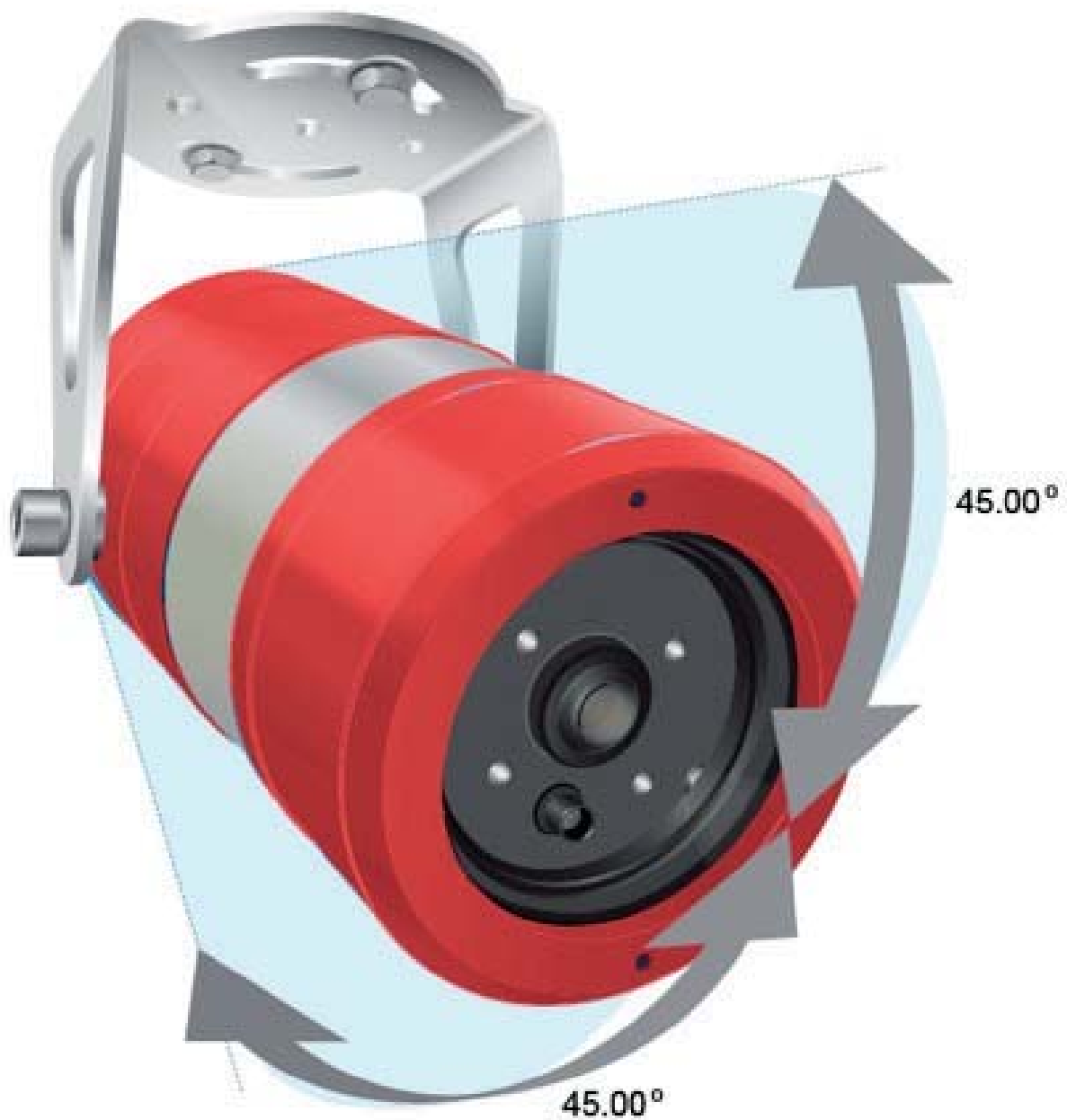




Figure 2: Ceiling Mount

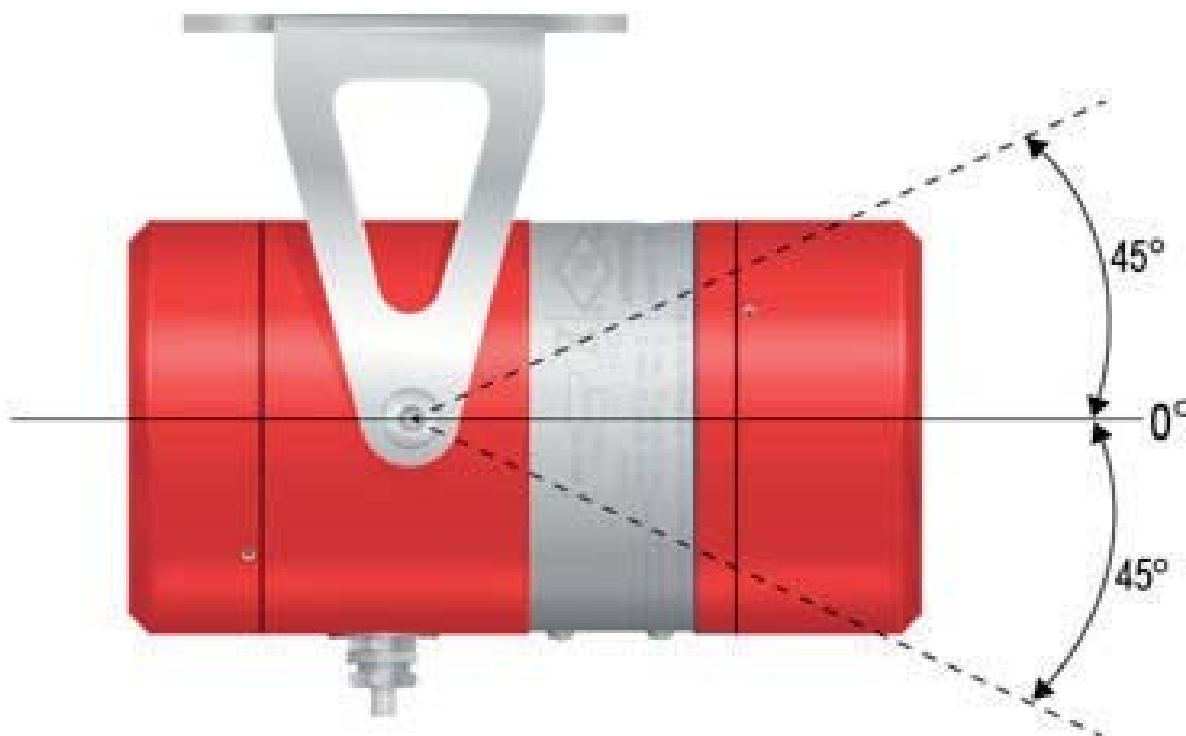
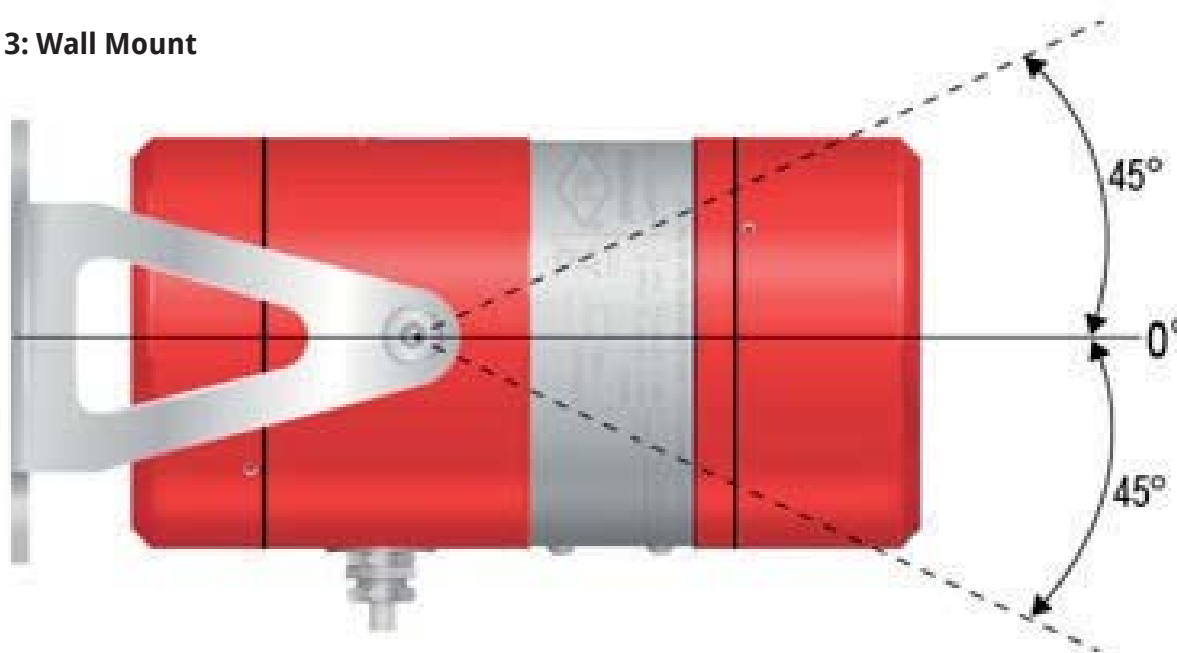


Figure 3: Wall Mount



Firm, vibration free mountings are essential for trouble free operation of optical systems and the detector should be fixed to a rigid mounting. When mounting on a wall in this orientation allow for the cable gland and cable as this may restrict the downward rotation of the detector.



3.3 Wiring Procedure

The wiring terminals are located in the rear section of the detector enclosure and are accessible by removal of the end cap.

The front section of the enclosure should only be accessed by trained personnel.

The terminal schematic detailed below shows the view looking inside the detector following removal of the end cap.

Figure 4: Terminal Schematic



The detector has two types of alarm output available simultaneously

- 4-20mA (source)
- Relay (Alarm & Fault)

Listed below are wiring options dependant on the functional requirements of the detector.



3.31 4-20mA Output

The following wiring connection diagram shows wiring the detector when a 4-20mA output is required.

Figure 5: 3 Wire Terminations

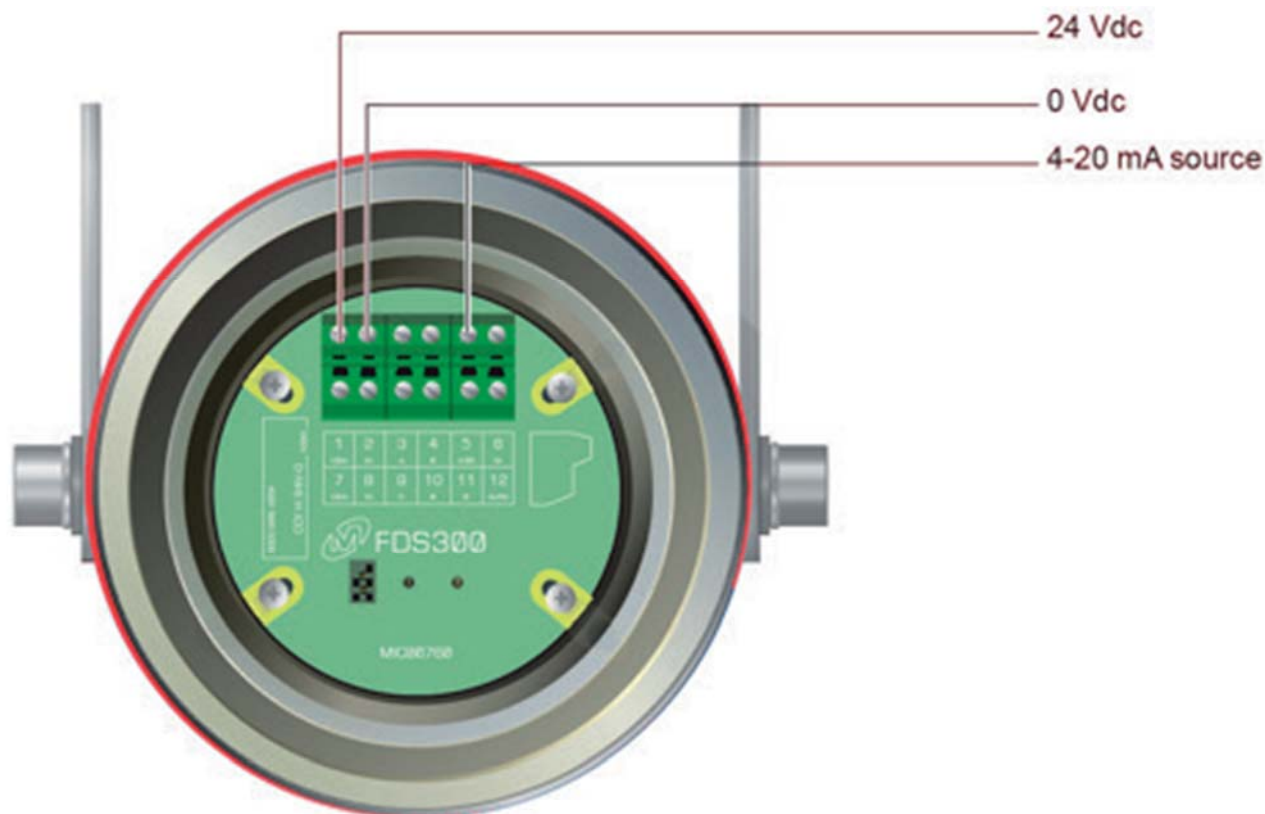


Table 1: Current Level Output Indicators

Factory Fixed Values

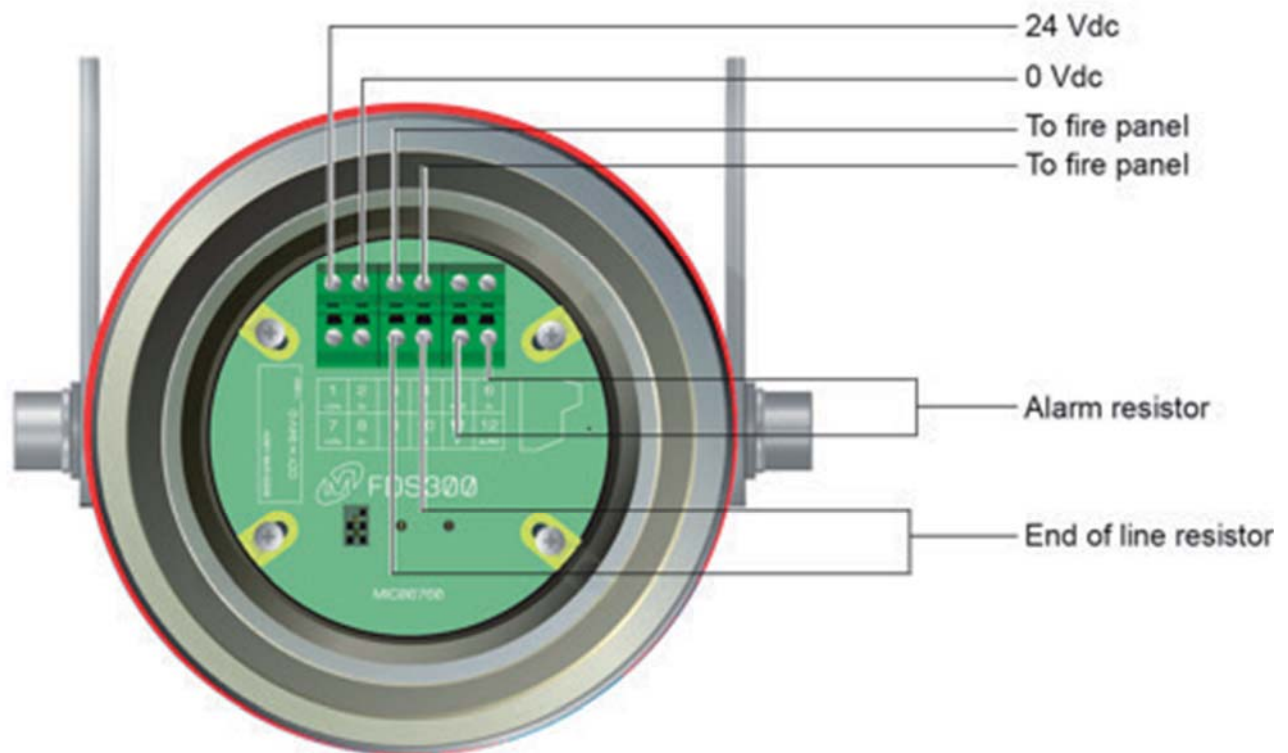
| Current Output | Event |
|----------------|----------------------|
| 0mA | Power/Detector Fault |
| 2mA | Optical Fault |
| 4mA | Healthy |
| 18mA | Alarm |
| 21mA | Over-range |



3.32 Relay Output

The following wiring connection diagrams shows wiring the detector when a relay output is required.

Figure 6: 2 Pair Termination



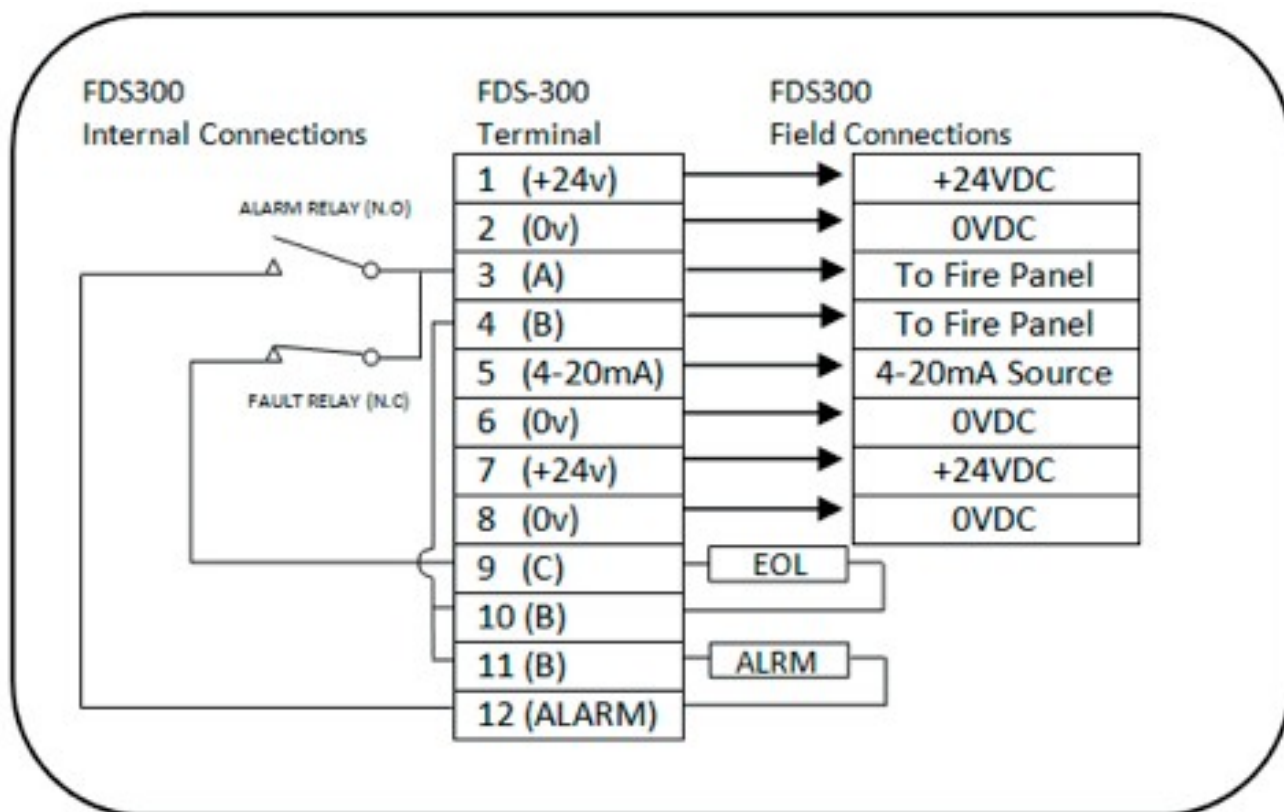
NOTE: EOL and Alarm resistors values are defined by the client and the control system/fire panel which the detectors are being integrated into



3.33 Internal Inter-connections

The following diagram shows the internal inter-connections of the alarm and fault relay contacts and jumpers. Each field connection is listed on this diagram for clarity.

Figure 7: FDS300 Internal Inter-connections





3.4 Installation Checklist

Experience has shown that poor installation and commissioning practice may result in an unreliable fire detection system that fails to meet the site performance targets. Before installing the detector it is important to take into account where it is to be located and how it is to be mounted. In order to maintain compliance with the EMC regulations it is essential the electrical installation be engineered correctly.

3.41 Mechanical

| | |
|--------------|---|
| Notes | When locating the detector consideration should be given to maintenance access to the detector. The detector mounting should be secure and vibration free. It is advisable to check the detection locations, prior to fabrication of the mounting supports, as changes are frequently made during construction at site which can affect detector coverage. The installation should allow subsequent space for detector removal, for maintenance or repair, to be easily achieved. |
| 1 | The detector should be fixed to a stable supporting structure using the mounting bracket provided. The supporting structure must allow for horizontal adjustment of the detector orientation. The support structure should be in place prior to detector installation. Information on mounting is available from Micropack (Engineering) Limited. |
| 2 | The threaded flame path of the enclosure cover and body must be protected from damage during installation. Any such damage can destroy the validity of the enclosure. |
| 3 | The detector electronics shall be protected from mechanical damage and external sources of EMI such as X-rays, RFI and electrostatic discharge. The detector should not face directly towards the sun. |
| 4 | Fit the mounting bracket to the support structure using 8mm bolts (not provided). The detector (bracket) should be oriented to provide the desired coverage. |
| 5 | The detector enclosure body should be fitted to the mounting bracket. The bolts locate into the bracket. Twist the enclosure to locate the bolts; these are then tightened using a 6mm Allen key. |
| 6 | Ensure the detector is orientated such that the status led/earthing stud is directly beneath the lens. |
| 7 | Glanding should be carried out by trained personnel. The gland should be fitted in line with installation standards for potentially explosive atmospheres that is 5 full threads minimum with the IP seal washer fitted at the bottom of the thread. This sealing arrangement will result in a number of threads of the cable gland being visible. The gland should be torqued between 15 to 20 NM (11 to 15 lbf-ft). |

3.42 Electrical

| | |
|--------------|---|
| Notes | It is advisable to check the detection locations, prior to fabrication of the mounting supports, as changes are frequently made during construction at site. Detector cabling must be segregated from cables carrying high-speed data or high energy and/or high frequency signals and other forms electrical interference. The detector requires a clear unobstructed view of the local hazard. In order to avoid local obstructions, such as pipe-work and cable trays, a 2m helix should be allowed in the detector cabling. The detector should only be fitted just prior to commissioning the detector. Experience shows that the detector can be damaged due to cable testing operations (Insulation Tests, etc). |
| 1 | Isolate all associated power supplies. Ensure that they remain OFF until required for commissioning. |
| 2 | The threaded flame path of the enclosure cover and body must be protected from damage during installation. Any such damage can destroy the validity of the enclosure. |
| 3 | The electronics subassembly shall be protected from mechanical damage and external sources of EMI such as X-rays, RFI and electrostatic discharge. |
| 4 | The enclosures external earth stud should be connected to a local earth point. |
| 5 | Remove the blanking plug(s) from the enclosure body gland entries. |
| 6 | Fit approved cable glands. |



4 System Design Guidelines

The following guidelines are intended to assist with the electrical design and engineering of systems where it is intended that flame detectors will be used.

4.1 Power Supply

The detector requires an absolute minimum supply voltage of 18V, as measured at the detector terminals. The system power supply voltage and power distribution should be arranged such that on the longest cable run the detector(s) has a supply voltage of greater than 18V.

4.2 Cable Selection

Cable to be used for installation is to be selected with a temperature rating of greater than 25° Celsius above the maximum ambient temperature.

The metric cable entries are fitted with an internal stop. This will result in threads of the cable gland being visible. Do not over tighten.

The installation and local regulations and standards determine the overall cable specification. This section specifies suitable cable characteristics to ensure correct operation of the flame detector.

4.21 DC Power

NOTE: Table 2 shows absolute maximums for cable lengths; try not to approach these values.

Table 2: Maximum Cable Lengths (24V supply)

| Installation based on 24V nominal supply | Number of Flame Detectors | Maximum Power (W) | Maximum Cable Length (m) with 1.5mm ² Conductors (12Ω/km) | Maximum Cable Length (m) with 2.5mm ² Conductors (7.6Ω/km) |
|--|---------------------------|-------------------|--|---|
| Detector | 1 | 3 @ 24V | 2,000 | 1,578 |

Table 3: AWG Conversions

| Cross Sectional Area (mm ²) | American Wire Gauge (AWG) | Typical Conductor Resistance per km (3280 ft.) DC Ohms /km @ 20°C (approximate) |
|---|---------------------------|---|
| 0.5 | 22 | 36 |
| 1 | 18 | 19 |
| 1.5 | 16 | 12 |
| 2.5 | 14 | 7.6 |



5 Application Guidelines

In considering the application of the detector it is important to know of any conditions that may prevent the detector from responding. The detector provides reliable response to visible flames within its field of view, and insensitivity to common false alarm sources. Solid obstructions or a direct view of intense light sources may result in a reduction in the coverage and/or a reduction in the detector sensitivity. Scaffolding or tarpaulins in the detector's field of view may reduce coverage. Contamination of the detector window may result in a reduction in sensitivity.

The detector has a horizontal field of view of 120° and a vertical field of view of 80°. The location and orientation of the detector in relation to the protected area determines the actual footprint. Achieving the desired coverage depends on congestion within the protected space, the location of the detector(s) and the distance of the detector from the hazard. It may be necessary to install more than one detector within an area in order to achieve adequate coverage.

The detector sensitivity, expressed as fire size at a distance, is determined visually by the apparent size of the fire. This is a function of the fuel source, how it is released and distance from the detector to the fire. The detector response time is relatively independent of fuel type and/or distance.

In common with other forms of flame detection the detector's sensitivity is reduced and potentially blinded by dense obscurants such as smoke, fog and other airborne particulates. The detector is insensitive to arc welding, however this should not be conducted within 5m of the detector.

5.1 Positioning Requirements

The following guidelines have been based on operational feedback, reflecting commonly experienced problems which can be traced to a failure to observe the following:

- Ensure the mounting position is free from vibration or movement.
- Prevent accidental knocking or forcing out of alignment.
- Isolate as far as possible from local electrical interference sources.
- Ensure sufficient detection to achieve adequate coverage for all likely hazards.
- Minimise exposure to contamination of the detector face plate.
- Ensure ease of maintenance access to detector (i.e. direct, ladder or scaffold access).

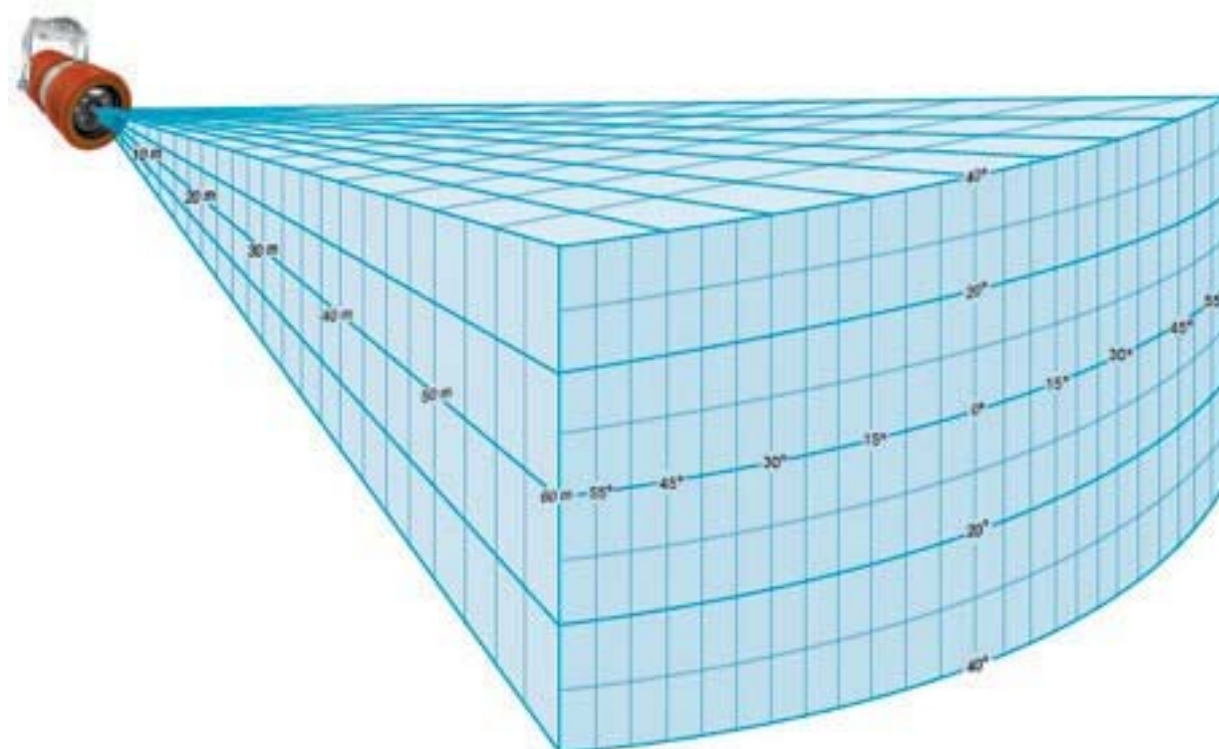
All these issues are of crucial importance to a successful installation and they should be afforded great attention during the detailed design, construction and commissioning phases of the work.



5.2 Detection Coverage

Detector locations can be chosen from computer models or from site surveys. The detectors should be aligned to view the intended hazard taking into account any obstruction and congestion. Software analysis of the actual detector coverage may be required to ensure adequate coverage of the hazards. This analysis can also be used to optimise the number of detectors and the loop configuration. The cones of vision are detailed in Appendix C.

Figure 8: FDS300 Coverage & Field of View



5.3 Exposure to Flare Radiation

Flame detectors are frequently used where hydrocarbon fire hazards are expected; these are quite often processing plants where a flare stack is in use nearby. The detector should not have a direct view of the flare.

5.4 Optical Contamination

There are many sources of contamination such as oil, water (deluge water, rain and sea-spray), snow, ice, and internal misting. Excessive contamination of the detector faceplate may result in an increased maintenance requirement and potentially reduce the detector's sensitivity. Where detectors are mounted at low level, care should be taken to avoid contamination (such as water and oil) from equipment above the detector. Care should be taken in sighting the detector to minimise the likelihood of such contamination. The detector is designed such that an optical fault is indicated when half of the detection range remains. This is indicated by the Fault output and is evident by the yellow colour of the LED on the face of the detector. The optical fault condition indicates that the detector requires cleaning or service. The optical fault indication is self-clearing.

5.5 Enclosed Areas

In enclosed areas, if dense smoke is expected to accumulate at the onset of the fire, the detector should be mounted 1 to 2 metres below the ceiling level.

5.6 Detector Sensitivity

The detector's response to a fire is a function of the fuel source and how it is released, fire size and distance, orientation to the detector and local ambient conditions. The typical figures are based on in-house tests except where marked with the FM logo these tests were conducted and certified by Factory Mutual. As with all tests the results must be interpreted according to the individual application taking into account all possible variables.

The detector sensitivity to different fuel sources is dependent on the apparent size of the flame, the detectors typical response is shown below (see table 4).

Table 4: Typical FDS300 Response Characteristics

| Fuel | Fire Size | Distance | |
|--|------------------|----------------|---|
| Methane Jet Fire | 3ft plume | 26m (86 feet) |  |
| Ethanol | 0.3m x 0.3m pan | 30m (100 feet) |  |
| Diesel | 0.3m x 0.3m pan | 50m (165 feet) | |
| Crude Oil (heavy fuel oil) Pan Fire | 0.5m x 0.5m pan | 50m (165 feet) | |
| Wax Inhibitor (Clear 10) Pan Fire | 0.3m x 0.3m pan | 50m (165 feet) | |
| Anti-Foam (Surflo AF-300) Pan Fire | 0.3m x 0.3m pan | 50m (165 feet) | |
| Wood Stack | 0.3m x 0.3m crib | 50m (165 feet) | |
| n-Heptane Pan Fire | 0.3m x 0.3m pan | 60m (200 feet) |  |
| n-Heptane Pan Fire in direct sunlight | 0.3m x 0.3m pan | 60m (200 feet) |  |
| n-Heptane Pan Fire in modulated sunlight | 0.3m x 0.3m pan | 60m (200 feet) |  |
| n-Heptane Pan Fire in the presence of modulated black body radiation | 0.3m x 0.3m pan | 60m (200 feet) |  |
| n-Heptane Pan Fire in the presence of Arc welding | 0.3m x 0.3m pan | 60m (200 feet) |  |
| n-Heptane Pan Fire in the presence of a 1000watt lamp | 0.3m x 0.3m pan | 60m (200 feet) |  |
| Gasoline pan Fire | 0.3m x 0.3m pan | 60m (200 feet) | |
| JP4 | 0.6m x 0.6m pan | 90m (300 feet) | |
| Silane | 2ft plume | 17m (55 feet) |  |



6 | Maintenance and Commissioning

6.1 Procedure

This maintenance schedule/ commissioning procedure is intended for guidance only. The actual level of maintenance required will depend on the severity of the operating environment and the likelihood of damage or the rate of contamination from oil, sea spray, deluge system etc. It is advisable to regularly review maintenance reports and adapt the maintenance period to the operating environment.



| Step | Periodic Inspection and Maintenance | Suggested Interval |
|--------------|---|---|
| 1-6 | General Inspection and maintenance of the detector and faceplate | 6 monthly |
| 6-14 | Specific inspection and maintenance of the detector enclosure | 12 monthly |
| 16 | Detector function testing | 6 monthly |
| 1-5 15-17 | Commissioning Procedure | Post Installation |
| Step | Activity | Key Points |
| 1 | Detectors that require maintenance/ commissioning should be taken off line and inhibited. Detectors which require to be opened up will need to be isolated electrically. | Ensure that panel wiring and terminations associated with all units under test are in good order. |
| 2 | Ensure that detector mounting arrangements are secure and undamaged. | |
| 3 | Ensure that the detector enclosure is intact and undamaged. | |
| 4 | Ensure that all associated cables and glands are correctly made up, secure and undamaged. | |
| 5 | Clean the enclosure faceplate (outside) with a mild detergent solution and a soft cloth until the window is clear of all contamination. Wash the window thoroughly with clean water and dry with a clean lint free cloth or tissue. | Assess requirement for opening the enclosure, for maintenance or cleaning, follow steps 6 to 14. |
| 6 | Open up the detector enclosure if required, by removing the enclosure cover. This exposes the enclosure flame path and detector lens. | Avoid damage to the flame path, faceplate and lens |
| 7 | Clean the enclosure cover and body flame paths with a dry clean cloth to remove any contamination. If the flame path or threads are badly pitted the component should be replaced. | |
| 8 | Check the 'O' ring seal on the enclosure cover is not damaged or perished, replace as required. Note the ingress protection is compromised if the seal is not correct. | |
| 9 | Clean the enclosure faceplate (inside) with a mild detergent solution and a soft cloth until the window is clear of all contamination. Wash the window thoroughly with clean water and dry with a clean lint free cloth or tissue. | |
| 10 | Non-setting waterproof grease should be evenly applied to the flame path on both the enclosure cover and body. | |
| 11 | Clean the detector lens. This should be done with a soft, dry and clean cloth. | Avoid touching the optics or electronics. |
| 12 | Clean the detector enclosure faceplate. Use a degreasing agent on the outside in order to remove deposits. | |
| 13 | The enclosure cover must be screwed on to a minimum of 5 full turns or until fully tight and secured using the locking screw provided. | |
| 14 | Reinstate the detector back into service. | |
| 15 | Ensure that inhibits are applied, then, using the flame test torch, function test the detector. Note the detector LED indicator, within the detector housing, changes colour to RED. | Check the complete display system for correct function and indication. |
| 16 | Isolate the power to the detector and ensure a fault is initiated within the control system. Check the mA output is indicating 0mA. | |
| 17 | De-isolate the detector and ensure the status LED indicates green. Reinstate the detector back into service. | |



6.2 Functional Testing

The detector can be function tested using the FS301 Flame Simulator, which has been specifically designed to provide a convenient means of field testing the detector. Refer to the FS301 Flame Simulator user manual (ref. 2301.6042) for instructions on its use.

Failure of the detector to respond to the FS301 flame simulator should be reported to Micropack (Engineering) Limited (info@micropack.co.uk). It should be ensured that the flame detector and flame simulator are being used correctly in the first instance by referring to their manuals.

Detector/simulator returns along with a written statement describing any fault should be sent to the address listed below:

Micropack Engineering Repairs Ltd
c/o Norcott Technologies Ltd
Unit 1
Sunset Business Centre
Widnes
Cheshire
WA8 0QR





7 | Fault Finding

7.1 Removal of the Electronics

Warning there are no user replaceable parts within the electronic module. Any attempt to repair or dismantle the electronic sub-assemblies will void the warranty. If any fault is suspected within the electronics module the module is to be returned to Micropack for investigation and repair if required. Any faults should be reported to Micropack as per the instruction in section 6.2.

Removal of the electronics should only be performed by competent personnel.

The following is the procedure for removal of the electronic module:-

1. Loosen the allen screw that secures the lens cap to the housing.
2. Un-screw the lens cap assembly and remove.
3. Gently un-screw the three screws indicated on the label until they freely turn.
4. Please note these screws are not removable.
5. Grasp the two screws positioned at the bottom of the detector and pull the electronics module out of its housing.

7.2 Replacement of the Electronics

The following is the procedure for installation of the electronic module:-

1. Insert the electronic module with the LED positioned at the bottom of the housing.
2. Rotate the module clockwise and anti-clockwise until the locating pins click into position.
3. Push the electronic assembly into the housing until the face plate is flush with the front of the housing. Note: This should take minimum force if the locating pins are in position.
4. Gently screw the three screws indicated on the label in until they bottom into their counter sinks Note: Do not over tighten.
5. Grease and replace the lens cap.
6. Tighten the lens cap Allen locking screw.

7.3 Diagnostics

It is impossible to provide fault diagnostics for every possible detector fault. In all cases it is advised that the following best practise is followed:

- Only make one change at a time (changing more than one thing makes diagnosis very difficult).
- Check the most obvious possible causes first.
- Work systematically through the problem.
- Keep good notes on the original problem, each step taken and the results observed.



7.4 LED Indication

The detector LED indicator is used to reveal the detectors current state, as shown below:

Figure 9: FDS300 Fascia - Status LED



Table 5: LED Status Diagnostic Chart

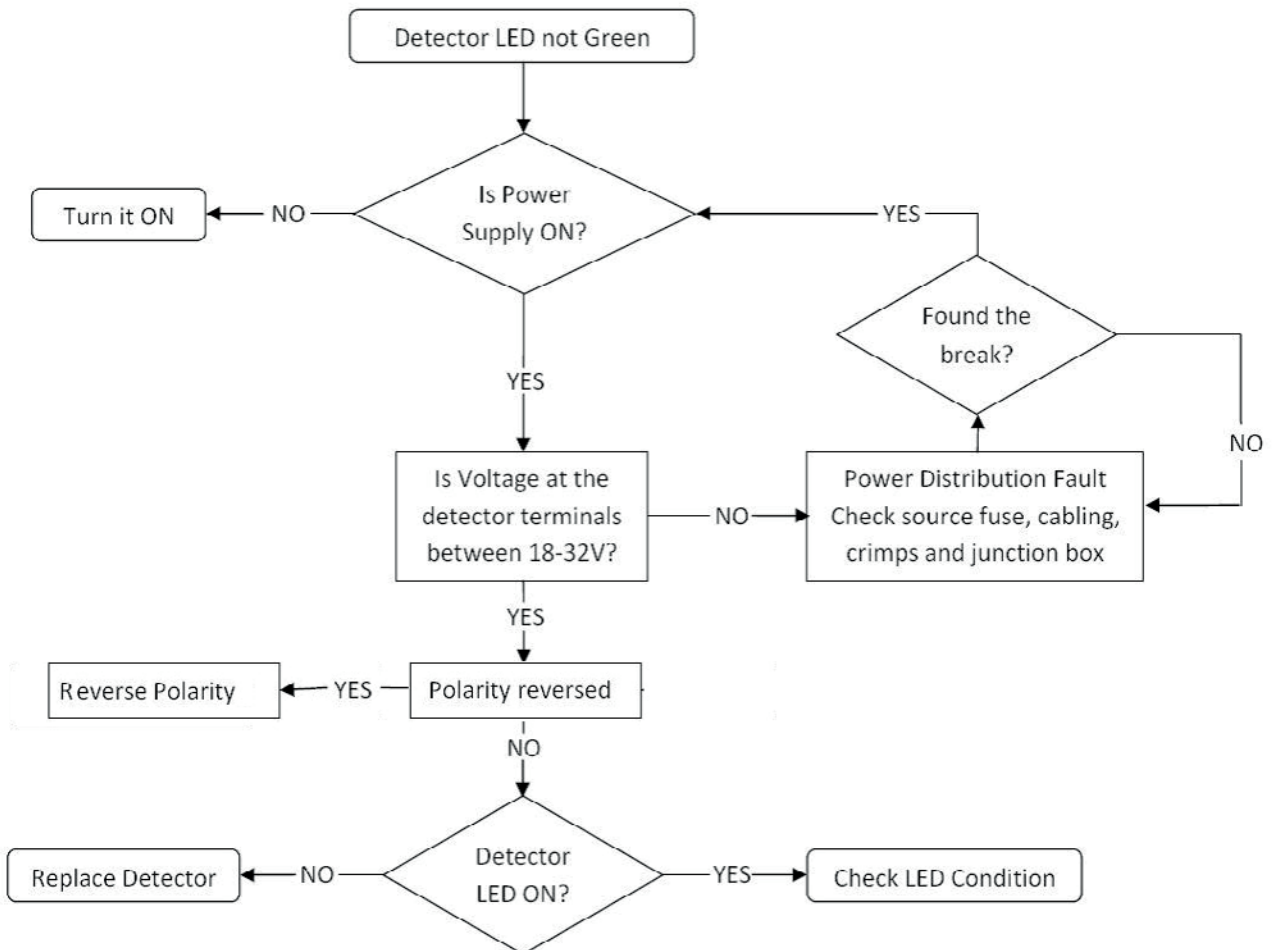
| LED Colour | Status | Indicator |
|---------------|------------------------------------|-----------|
| Green | Healthy | |
| Steady OFF | 24V/0V Terminals Polarity Reversed | |
| Steady OFF | No Power/Major Internal Fault | |
| Steady Yellow | Fault | |
| Red | Alarm | |



7.5 Power Fault

If the detector LED indicator is OFF then there may be a power supply fault, as shown below:

Figure 10: Power Supply Diagnostic Chart



When investigating power supply faults it is important to check that all voltages are within the detectors operating range (18V to 32V) under full load conditions as the voltages measured under no load conditions can be misleading.



8 Technical Specification

8.1 Electrical Specification

| Parameter | Units | Min | Nominal | Max | Comment |
|--|--------|------|---------|-----|-------------|
| Power Supply | | | | | |
| Supply Voltage | V | 18 | 24 | 32 | Inc. ripple |
| Supply Ripple | Vpk-pk | 1 | 1 | 1 | |
| Detector Power Consumption | W | 2.28 | 2.8 | 3.6 | In Alarm |
| Detector shutdown voltage (low supply) | V | <17 | | | |

8.2 Mechanical Specification

| Parameter | Units | Value | | Comment |
|-----------------------------|-----------------|---------------------------|-------|---------------------------|
| Enclosure | | | | |
| Overall Dimensions | mm | 100 Diameter x 200 Length | | |
| Shipping Weight | Kg | 2.5 | 6 | |
| Material | | HE30 Aluminium | 316SS | |
| Coating | Colour | Red Epoxy Coated Finish | | |
| Cable Entries | mm/inches | M25, 3/4 NPT | | Other variants on request |
| Terminal Wire Size | mm ² | 2.5 | | |
| Ingress Protection | IP | 66 (NEMA 4X) | | |
| Mounting Bracket | | | | |
| Support Fixings | mm | 2 x M8 | | |
| Vertical Adjustment | Degrees | 0 to 45 | | |
| Horizontal Adjustment | Degrees | 0 | | Provided by support |
| Axial (horizontal) Rotation | Degrees | +/-45 | | |



8.3 Environmental Specification

| Parameter | Units | Min | Max | Comment |
|-------------------------------|-------|------|------|-------------------|
| Operating Ambient Temperature | °C | - 60 | + 85 | T4 |
| Storage Ambient Temperature | °C | - 60 | + 85 | |
| Relative Humidity | % RH | 0 | 90 | Non Condensing |

8.4 Certification and Approvals

| Parameter | Authority/Standard | Approval | Certificate |
|------------------------------|---------------------------|--------------------------------|-----------------|
| Hazardous Area Certification | ATEX | Ex II 2 G Ex db II C T4 IP66 | FM07 ATEX 0033 |
| Hazardous Area Certification | NEC 505 | Class1 Zone 1 A Ex db IIC T4 | 3029978 |
| Hazardous Area Certification | NEC 500 | Class 1 Div 1 Groups B,C and D | 3029978 |
| Hazardous Area Certification | IECEX | Ex II 2 G Ex db IIC T4 IP66 | FME07.0002 |
| Fire Service Listing | FM | Class 3260, 3600, 3615, 3810 | 3009845 |
| CE Marked (Emissions) | EN61000-6-3:201 | UKS | 9567TC2/9762TC2 |
| CE Marked (Immunity) | EN50130-4+A1:1998+A2:2003 | UKS | 9567TC2/9762TC2 |

8.5 Operating Specification

| Parameter | Units | Min | Max | Comment |
|---------------------------------|---------|-----|-----|---------------|
| Detector Range (depth of field) | m | 2 | 60 | |
| Horizontal Field of View | Degrees | 120 | 120 | |
| Vertical Field of View | Degrees | 80 | 80 | |
| Detector Response Time | Seconds | 4.2 | 30 | |
| Power on reset delay | Seconds | 5 | 5 | |
| Optical Verification | - | - | - | Default - Off |



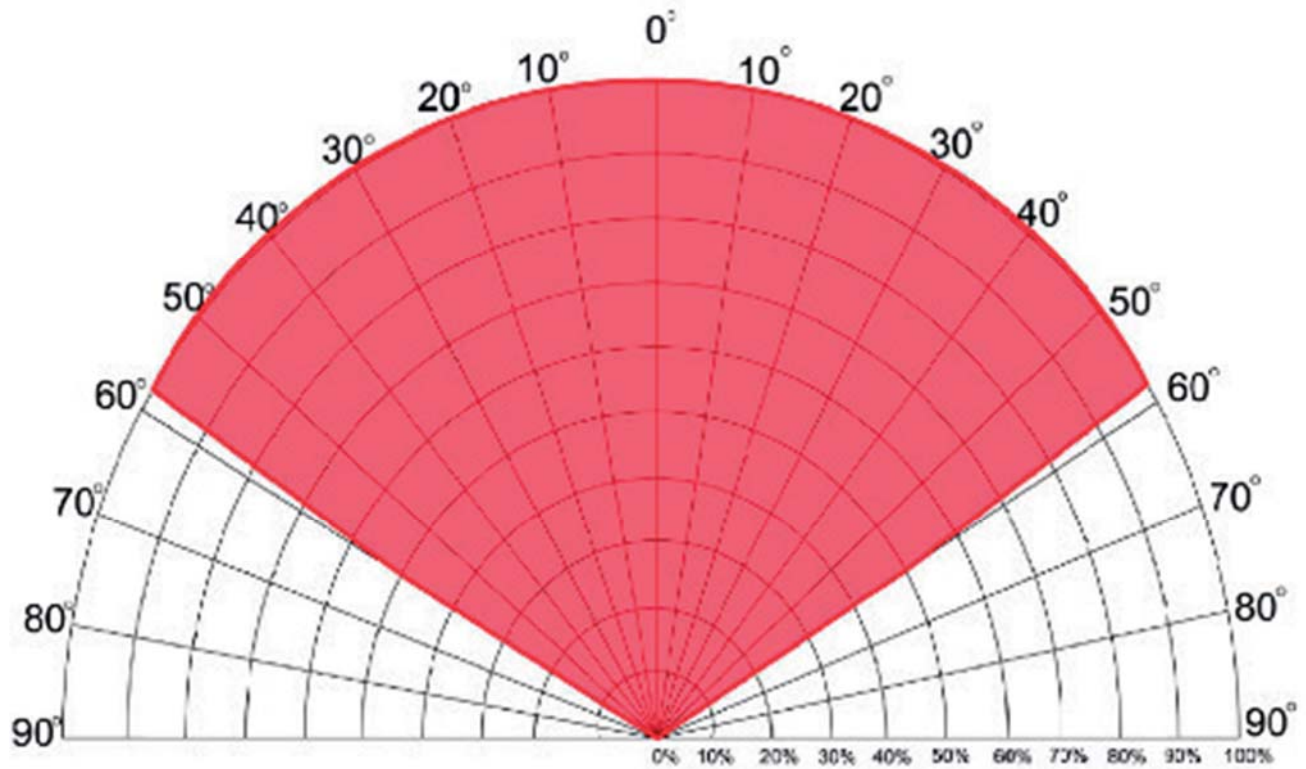
Appendix A - Acronyms, Terms & Abbreviations

| Term | Description |
|-----------------|---------------------------------------|
| AC | Alternating Current |
| ATEX | Atmosphere Explosive |
| AWG | American Wire Gauge |
| BS | British Standard |
| CCTV | Closed Circuit Television |
| CE | European Commission (approval) |
| CO ₂ | Carbon Dioxide |
| CSA | Canadian Standards Association |
| dB | Decibel |
| DC | Direct Current |
| EMC | Electromagnetic Compatibility |
| EN | European National (standard) |
| FM | Factory Mutual |
| FOV | Field of View |
| I or A | Electrical Current or Ampere |
| JB | Junction Box |
| Km | Kilometre |
| kW | Kilo Watt |
| LED | Light Emitting Diode |
| MEL | Micropack (Engineering) Ltd |
| mH | Milli Henry – Inductance |
| MOR | Meteorological Optical Range |
| NEC | National Electrical Codes |
| nF, pF | Nano Farad, Pico Farad – Capacitance |
| PC | Personal Computer (IBM PC Compatible) |
| R or Ω | Ohms (electrical resistance) |
| V | Voltage |
| Vs | Versus |
| W | Watts (Wattage) |

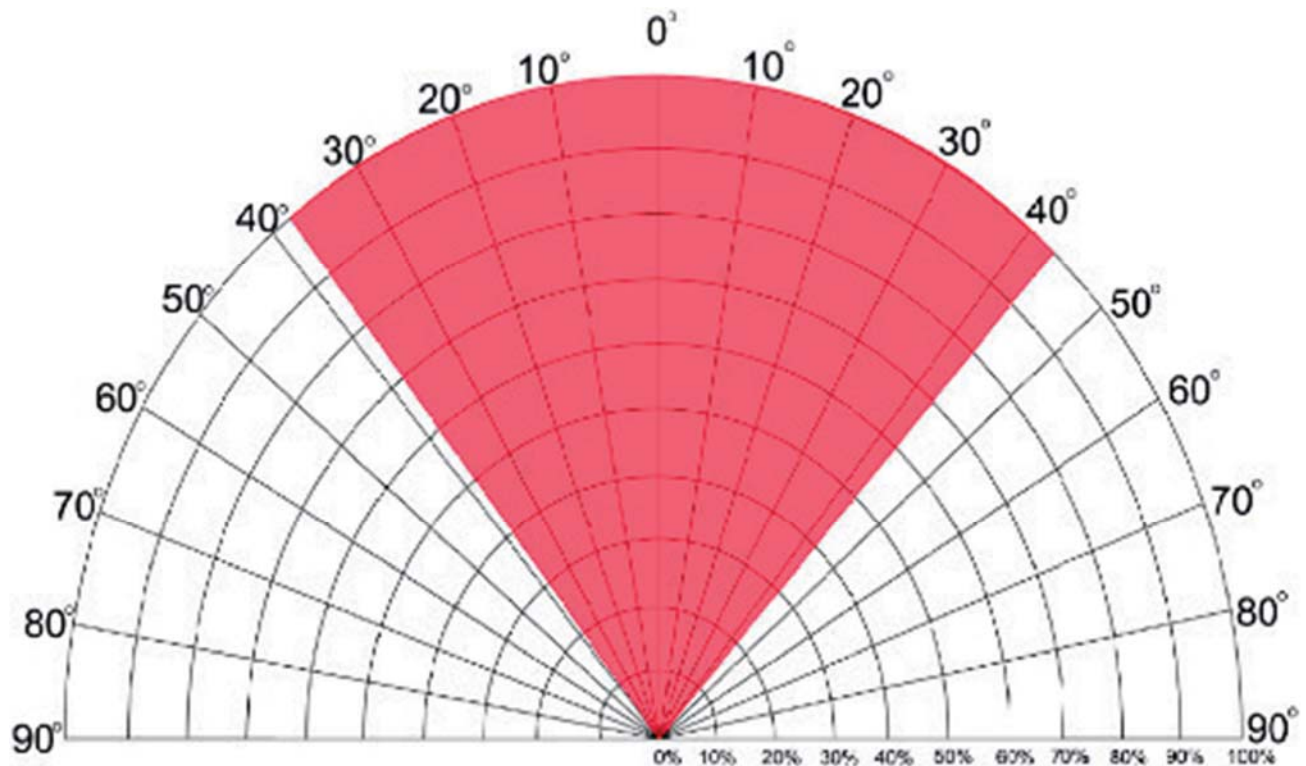


Appendix C - Field of View

Horizontal Field of view to a 0.1 metre² N-heptane pan fire with an alarm response time of less than 10 seconds 100%= 60 metres.



Vertical Field of view to a 0.1 metre² N-heptane pan fire with an alarm response time of less than 10 seconds 100%= 60 metres..





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FDS300 Flame Detector

FDS300 Safety and Technical Manual

31

Page 24 of 60

Rev: 2.3 ECN: 4436



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