



**GENERAL MONITORS**

# **Models FL3110/FL3111**

**UV/IR and UV only  
Flame Detectors**



The information and technical data disclosed in this document may be used and disseminated only for the purposes and to the extent specifically authorized in writing by General Monitors.

**Instruction Manual**

**09/10**

General Monitors reserves the right to change published specifications and designs without prior notice.

**Part No.  
Revision**

**MANFL3110/11-EU  
G/09-10**

## Warranty Statement

General Monitors warrants the Models FL3110/3111 to be free from defects in workmanship or material under normal use and service within two years from the date of shipment.

General Monitors will repair or replace without charge any such equipment found to be defective during the warranty period. Full determination of the nature of, and responsibility for, defective or damaged equipment will be made by General Monitors' personnel.

Defective or damaged equipment must be shipped to General Monitors plant or representative from which the original shipment was made. In all cases this warranty is limited to the cost of the equipment supplied by General Monitors. The customer will assume all liability for the misuse of this equipment by its employees or other personnel.

The customer will assume all liability for the misuse of this equipment by its employees or other personnel. All warranties are contingent upon proper use in the application for which the product was intended and do not cover products which have been modified or repaired without General Monitors' approval or which have been subjected to neglect, accident, improper installation or application, or on which the original identification marks have been removed or altered.

Except for the express warranty stated above, General Monitors disclaims all warranties with regard to the products sold, including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of General Monitors for damages including, but not limited to, consequential damages arising out of, or in connection with, the performance of the product.

## Warnings



**WARNING** - Installation and Maintenance must be carried out by suitably skilled and competent personnel only.



# General Monitors Model FL3110/3111

## E C Declaration of Conformity in accordance with EC & ATEX Directives

We at General Monitors Ireland Ltd., Ballybrit Business Park, Galway, Republic of Ireland, hereby declare that the equipment described below, both in its basic design and construction, and in the version or versions marketed by us, conforms to the relevant safety and health related requirements of the appropriate EC Directives, only as follows:

- a) Conforms with the protection requirements of Council Directive 89/336/EEC, + Amd 92/31 EEC + Amd 92/68 EEC relating to Electromagnetic Compatibility and Conforms with the protection requirements of IEC 1010-1: 1990 + Amd 1:1992 + Amd 2: 1995 relating to safety by the application of:

A Competent Body Certificate No. 85EA1460A/5726 issued by: ERA Technology Ltd. Cleeve Road, Leatherhead Surrey KT22 7SA, England. Tel: +44 1372 367000

- b) Sira Certification Services, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive. Certificate No. Sira 10ATEX1344.

Relevant Standards: EN60079-0:2009      EN60079-1:2009      EN60079-7:2009      EN60079-31:2009

This declaration shall cease to be valid if modifications are made to the equipment without our approval.

### **PRODUCTS: FL3110 UV/IR and FL3111 UV Flame Detectors**

It is ensured through internal measures and our ISO9001: 2008 certifications, that series production units conform at all times to the requirements of these current EC Directives and relevant standards.

General Monitors Ireland Ltd. in order to comply with ATEX, will provide this Instruction Manual in a European Language required to operate the product upon request. Should this be necessary, General Monitors Ireland Ltd. should be notified of this request to allow adequate time to process the request.

### **ATEX Certificate Markings.**

**Sira 10 ATEX 1344**

**CE 0518 Ex II 2GD**

**Ex ed IIC T5/T4 Gb**

**Ex tb IIC T100C/T135C Db IP6X**

**Tamb-40°C to +75C/90°C**

**Note: Cable used should be rated to at least 110°C  
Cable Glands must have a minimum IP rating of IP66**

Responsible Person:

Date: 14-Dec-11

Cecil Lenihan  
General Manager

The signatory acts on behalf of company management, and with full power of attorney

## Table of Contents

	Page
<b>Warranty Statement</b> .....	<b>i</b>
<b>Warnings</b> .....	<b>i</b>
<b>E C Declaration of Conformity in accordance with EC &amp; ATEX Directives</b> .....	<b>ii</b>
<b>Table of Contents</b> .....	<b>iii</b>
<b>1.0 Introduction</b> .....	<b>1</b>
1.1 General Description .....	1
1.2 Principle of Operation .....	2
<b>2.0 Specifications</b> .....	<b>5</b>
2.1 System Specifications.....	5
2.2 Mechanical Specifications .....	6
2.3 Electrical Specifications .....	6
2.4 Environmental Specifications.....	7
2.5 Modbus RTU Protocol .....	7
<b>3.0 Installation</b> .....	<b>8</b>
3.1 Upon Receipt of Your Equipment .....	8
3.2 Choosing Detector Locations.....	8
3.3 Detector Installation.....	9
3.4 Interconnecting Cable Guidelines .....	10
3.5 Installation Instructions .....	10
3.6 Terminal Connections.....	14
3.7 User Selectable Options .....	17
3.8 Factory Default Settings .....	19
<b>4.0 Maintenance</b> .....	<b>21</b>
4.1 General Maintenance .....	21
4.2 Cleaning the Lenses/Light Rod.....	21
4.3 Sensitivity Check .....	22
4.4 Storage.....	22
<b>5.0 Trouble Shooting</b> .....	<b>23</b>
5.1 Trouble Shooting Chart.....	23
<b>6.0 Spares &amp; Accessories</b> .....	<b>24</b>
6.1 Spare Parts.....	24
6.2 Test Lamps.....	24



<b>7.0</b>	<b>Modbus Serial Communications .....</b>	<b>26</b>
7.1	Baud Rate .....	26
7.2	Data Format.....	26
7.3	Modbus Read Status Protocol (Query/Response) .....	26
7.4	Modbus Write Command Protocol (Query/Response) .....	27
7.5	Exception Responses and Exception Codes .....	28
7.6	FL3110 Command Register Locations.....	30
7.7	FL3110 Operational Mode Command Register Details.....	31
	<b>Customer Satisfaction Questionnaire.....</b>	<b>36</b>

## Table of Figures

Figure 2	Spectral Response of UV and IR Detectors .....	3
Figure 3A-1	FL3110 Horizontal Field of View.....	11
Figure 3A-2	FL3110 Vertical Field of View.....	11
Figure 3A-3	FL3111 Horizontal Field of View.....	12
Figure 3A-4	FL3111 Vertical Field of View.....	12
Figure 3-B	Outline Drawing.....	13
Figure 3-C	Base Assembly with Terminal Block.....	14
Figure 3-D	Strip Length.....	14
Figure 3-E	Relay Outputs .....	16
Figure 3-F	Field Loop Outputs .....	17
Figure 3-G	Front Cap Assembly.....	20

# 1.0 Introduction

## 1.1 General Description

Fire is a phenomenon of combustion. Combustion is the continuous chemical reaction of a reducing agent (*fuel*) and an oxidizing agent (*oxygen, etc.*) with the evolution of thermal energy (*heat*). Fire is usually manifested in heat (*IR*), smoke, light (*visible*), and flame (*UV*). Flame is the gaseous region of a fire where vigorous combustion chain reactions take place. These reactions emit radiation covering the Infrared, Ultraviolet and the Visible Spectral Regions.

The General Monitors Model FL3110 is an Ultraviolet/Infrared (UV/IR) Flame Detector. It detects the Ultraviolet and Infrared spectral regions of the flame to produce a system which is highly immune to false alarms caused by lightning, arc-welding, hot objects, and other sources of radiation.

The Model FL3111 is an Ultraviolet (UV) flame detector. It only responds to UV and has been optimised for speed of response.

The Models FL3110 and FL3111 features include:

- Compact unitised design.
- Continuous optical path monitoring.
- Wide field of view.
- High false alarm immunity.
- 0-20mA, Relays, Field Loop and Modbus RTU RS-485 serial communications output versions.
- Visual indicators.
- Stainless Steel body with integral mounting bracket.
- Rated for continuous 90°C operation.

## 1.2 Principle of Operation

### UV Detector – FL3111

The Model FL3111 is a Flame Detector, which contains an ultraviolet phototube that responds to Ultra-Violet (UV) radiation in the 185 to 260 nanometer region (Figure 2). When radiation from a flame reaches the cathode plate within the UV detector tube, electrons are ejected from the cathode plate. These electrons are accelerated towards the positively charged anode of the tube. They collide with molecules of an ionisable gas, with which the tube is filled. This emits more electrons and produces an avalanche condition. More electrons are released which creates a momentary electron flow from the cathode to the anode. This momentary current (pulse) recurs at a rate proportional to the intensity of the UV radiation.

The Flame Detectors process these UV signals with a microcomputer and, depending on the version, produces the following outputs:

- 0 to 20 milliampere signal.
- Immediate WARN relay contacts.
- Time delayed ALARM relay contacts.
- FAULT relay contacts.
- RS-485 MODBUS RTU serial communications ports.

*(See Sections 2 & 3 for more information on detector outputs)*



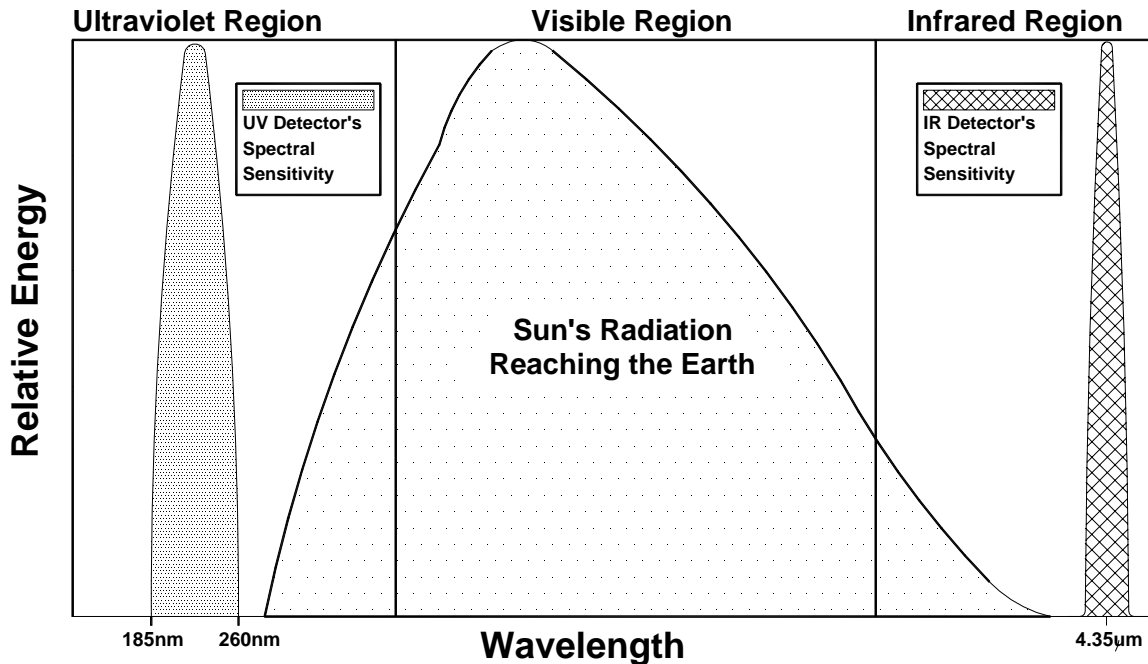


Figure 2 Spectral Response of UV and IR Detectors

#### UV/IR Flame Detector – FL3110

The Model FL3110 is a discriminating UV/IR Detector, which makes use of an ultraviolet radiation sensitive phototube in addition to an infrared detector (see figure 2). This combination provides a flame detection system, which is highly immune to false alarms.

The UV portion of the detector, as described in UV Detector, is combined with an infrared detector, which reacts to changes in the intensity of infrared radiation. By sensing very specific wavelengths in both the UV and IR spectra and then processing these signals with a microcomputer, a very high degree of discrimination is achieved.

Incorporated in the IR circuitry is a flicker discrimination circuit. This permits the detector to ignore steady IR sources such as hot objects. The inherent flickering of flame provides the necessary modulation to activate the IR circuit.

Since a flame is a copious source of both ultraviolet and infrared radiation, discrimination is provided when both UV and IR emissions are detected. If only UV is detected, as in the case of arc welding, no alarm is given. If only IR is detected, such as a large modulating hot object, no alarm is given. However, if both conditions are met in the correct combination and intensity, as determined by an algorithm in the microcomputer, a fire is identified and the alarm outputs are activated.

### COPM Circuitry

A self-testing feature called Continuous Optical Path Monitoring (COPM) checks the optical path, the detector(s), and the related electronic circuitry once every minute. If foreign material impairs the optical path of the UV detector tube (both Models FL3110 and FL3111) or infrared detector (Model FL3110 only) for two consecutive checks, the unit will indicate FAULT. The optical FAULT outputs are, depending on the version, a 2.0 mA signal or de-energizing of the FAULT relay. The FAULT status is available via the RS-485 serial communications port. (see *Section 3-6 Terminal Connections*). After a COPM FAULT, a COPM check is performed every ten seconds until the obstruction is removed. Then the COPM check will resume checking once per minute check.



**WARNING** – Dirty or partially blocked windows can significantly reduce the detector's field of view and detection distance.

**NOTE:** Since the optical path is checked once per minute and it requires two check failures to produce a FAULT, it may take up to two minutes for the unit to detect an obstruction.

### Alarm Test

The Model FL3110 and FL3111 Flame Detector's have a built-in Alarm Test feature. This test may be activated via the serial communications port (see *Section 3-6 Terminal Connections*).

The Flame Detectors will immediately go into WARN and then into time delayed ALARM. After two to ten seconds the Flame Detectors will activate the ALARM. A latching WARN and/or ALARM will remain latched until reset.

### Visual Indicators

Two light emitting diodes (LEDs) are visible through the IR window. LEDs are provided for a visual indication that corresponds with the detector's outputs. The following blinking sequence indicates the operating condition:

- Timeout (10 seconds when the unit is first powered) – Green and red LEDs blinking alternately.
- Ready – Green LED that flashes off 1 second, every 5 seconds.
- WARNING – Slow blinking red LED.
- ALARM – Fast blinking red LED.
- COPM FAULT – Slow blinking green LED.
- Low Voltage FAULT – Fast blinking green LED.

## 2.0 Specifications

### 2.1 System Specifications

**Certification\*:**

EExed – IIC T4 T135 -40°C to +90°C (-40°F to +194°F)  
EExed – IIC T5 T100 -40°C to +75°C (-40°F to +167°F)  
IP66/67

FL3110 only: Bureau Veritas Rules for the Classification of Steel Ships  
EN54-10:2002 (4-20mA – only, Relays and Relays + EOL versions)

**IR Detector centre wavelength:**

4.35 microns

**UV Detector Pass Band:**

185 to 260 nanometres

**Typical Alarm Activation Response Times\*:**

FL3110 < 3 sec. @ 50 ft. (15.2m)  
FL3111 < 1 sec. @ 50 ft. (15.2m)

**Minimum Detector Response Times:**

FL3110 < 500 ms.  
FL3111 < 100 ms.

**Field of View\*:** (*Figure 3-A*)

FL3110 120° maximum conical  
FL3111 120° maximum conical

**Sensitivity:**

50 feet (15.2m); Maximum distance for a 1 square foot (.092m<sup>2</sup>) gasoline fire to be reliably detected.

**Maximum Cable Parameters:**

4-20mA Output Signal  
9000 feet (2750 m), maximum 50 Ohms loop, with maximum 250 Ohms input impedance of readout unit.

Remote power supply

3000 feet (930 m), maximum 20 Ohms loop and 24 VDC minimum. (See Section 3-4 Terminal Connections)

**Approvals:**

ATEX & CE Mark  
FL3110 only: Bureau Veritas

**Warranty:**

Two Years

**\* NOTE:**

1. Response Times and Field of View data have been derived by testing the Models FL3110 / FL3111 Flame Detectors with a 1 square foot gasoline fire. One cup of unleaded gasoline on top of a one inch layer of water was ignited for each test. These are typical values and different results may occur depending on the variation of each fire.
2. To meet the directional dependence requirements of EN 54-10 the horizontal viewing angle must not exceed ±30°.

## 2.2 Mechanical Specifications

### Enclosure material

Material: Stainless Steel 316  
Colour: Natural

### Dimensions:

Diameter 3.3 in (8.4 cm)  
Length 5.4 in (13.7 cm)  
Weight 5lbs (2.3 kg)

**Cable Entries:** 2 x M20

## 2.3 Electrical Specifications

Supply voltage range: 20 to 36 VDC  
Nominal supply voltage: 24VDC  
Maximum supply current: 150mA

Maximum output signal  
Load @ 24 VDC: 600 Ohms

Output signal range: 0 to 20mA  
FAULT signal: 0 to 0.2mA  
COPM fault signal: 2.0mA  $\pm$  0.2 mA  
Ready signal: 4.0  $\pm$  0.2 mA  
WARN signal: 16.0  $\pm$  0.2 mA  
ALARM signal: 20.0  $\pm$  0.2 mA

Relay Contact Ratings:  
1A MAX @ 30VRMS/42.2 VPK,  
Resistive.

RS-485 Serial Communications Port:  
Modbus RTU Protocol  
128 units MAX. (247 units with repeaters)  
Baud Rate: 2400, 4800, 9600 or 19200

RFI/EMI Protection  
Complies with EN50270, Type 2

Status Indicator:  
Two LEDs indicate status, fault conditions.

## **2.4 Environmental Specifications**

<b>Operating temperature range:</b>	-40°C to 90°C -40°F to 194°F
<b>Storage temperature range:</b>	-40°C to 90°C -40°F to 194°F
<b>Humidity range:</b>	0 to 100% RH non-condensing

## **2.5 Modbus RTU Protocol**

For detailed information on data format, read commands, write commands, register details, and register locations refer to the Serial Communications section in this manual.

## 3.0 Installation



**WARNING** - Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

### 3.1 Upon Receipt of Your Equipment

All items shipped by General Monitors are packed in shock absorbing containers which affords a considerable degree of protection against physical damage. When received, the contents should be carefully removed and checked against the enclosed packing slip. All subsequent correspondence with General Monitors must specify the equipment part number and serial number.

### 3.2 Choosing Detector Locations

Several variables are involved in selecting the locations in which to install detectors to ensure proper flame detection. There are no hard and fast rules defining the optimum location. There are some general suggestions that should be considered in regard to particular conditions at the site where the unit(s) is being installed:

#### **Detector Field of View**

Each Model FL3110 and FL3111 Flame Detector have a maximum cone of vision of 120°. This Cone has its vertex at the center of the detector (see figure 3A-1, 3A-2, and 3A-3).

#### **Optical Sensitivity Range**

The distance at which the detector will respond to a flame is a function of the intensity of that flame. The maximum distance is 50 feet (15.2m) for a gasoline fire with a surface area of 1 square foot (0.92m<sup>2</sup>).

#### Environmental Factors

1. Mounting should be as free from shock and vibration as possible and convenient for visual inspection and cleaning.
2. Detectors mounted in dirty atmospheric conditions will require more frequent inspection, cleaning, and sensitivity checking.
3. Observe the ambient temperature range for the specific model (see section 2-4 Environmental Specifications). For outdoor installations or other areas exposed to intense, direct solar radiation, the detector may reach temperatures well above specifications. For this condition, a cover for shade may be required to bring the detector temperature within specifications. As with any cover or object nearby, make sure the field-of-view of the detector is not obstructed.
4. Avoid conditions of ice build up on the optical detector windows: complete icing over of the detector windows can result in fault conditions.
5. Mount away from possible sources of electrical noise.
6. A constant UV source detected by the unit will cause the FL3110 unit to go into FAULT after 9-10 minutes of exposure. Source must be removed or detector repositioned. (UV detectors can pick-up arc welding up to 2-3 miles away).
7. Users should be aware that any UV detector may be triggered by other sources of EMI, for instance X-rays, sunlight, reflected sunlight, Gamma rays, lightning, arc welding, industrial lighting, fluorescent lighting, etc., and due regard should be paid to the possible presence of such radiation.

### 3.3 Detector Installation

The Model FL3110/3111 Detectors should be mounted tilting downwards so that dust/moisture will not accumulate on the windows. (The detector(s) should be mounted in locations which will avoid either people or objects from obscuring the detector's Cone of Vision.)

Cable glands and stopping plugs should be installed with the o-rings supplied with the flame detector. It is recommended to fit boots over cable glands to prevent water ingress at the cable-to-gland junction.

Mounting hardware should be used as shown in figure 3-B. The overall dimensions of the detector and mounting hardware is also shown.

### 3.4 Interconnecting Cable Guidelines

- The flame detector requires an interconnecting cable with an overall **screen (shield) and armour**. Cables to BS5308 Part 2, Type 2 or equivalent are suitable.
- Interconnecting cables should be segregated from power and other “noisy” cables. Avoid proximity to cables associated with radio transmitters, welders, switched mode power supplies, inverters, battery chargers, ignition systems, generators, switch gear, arc lights and other high frequency or high power switching process equipment. In general, maintain a separation of at least 1m between instrument and other cables. Greater separation is required where long parallel cable runs are unavoidable. Avoid running instrument cable trenches close to lightning conductors earthing pits.
- Complete all cable insulation tests before connecting the cable at either end.
- General Monitors do not recommend the use of cable shoes or crimps on any junction box or housing wiring terminals. Poor crimping can cause bad connection when unit experiences temperature variations. We therefore recommend that it is good practice to just terminate the cable.

### 3.5 Installation Instructions

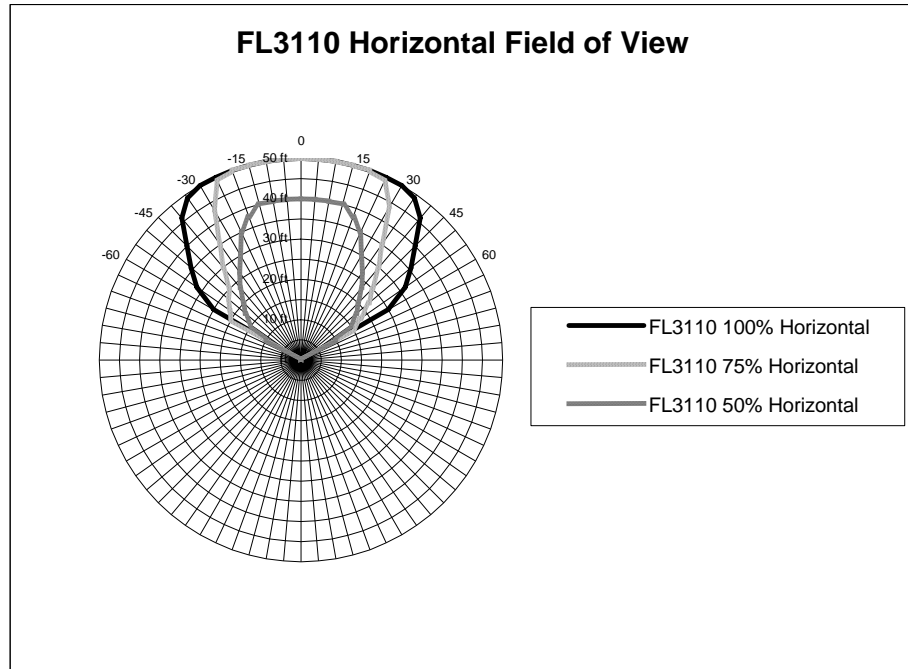
#### 3.5.1 FL3110/3111 Cable Termination

- The flame detector should be installed in accordance with the certification documents and the relevant regulations of the country concerned.
- Ensure that approved Exe cable glands are used and installed according to the manufacturer’s instructions.
- The cable armour must be terminated in the gland to ensure a positive electrical connection.
- The cable screens (drain wires) must not be connected electrically to the electronic circuitry of the flame detector.
- Connect Safety Earth to the chassis grounding screw available on the rear exterior of the base assembly. This Safety Earth wire should have a wire gauge of at least 22 AWG (0.33mm<sup>2</sup>) and be no longer than 3 meters in length.

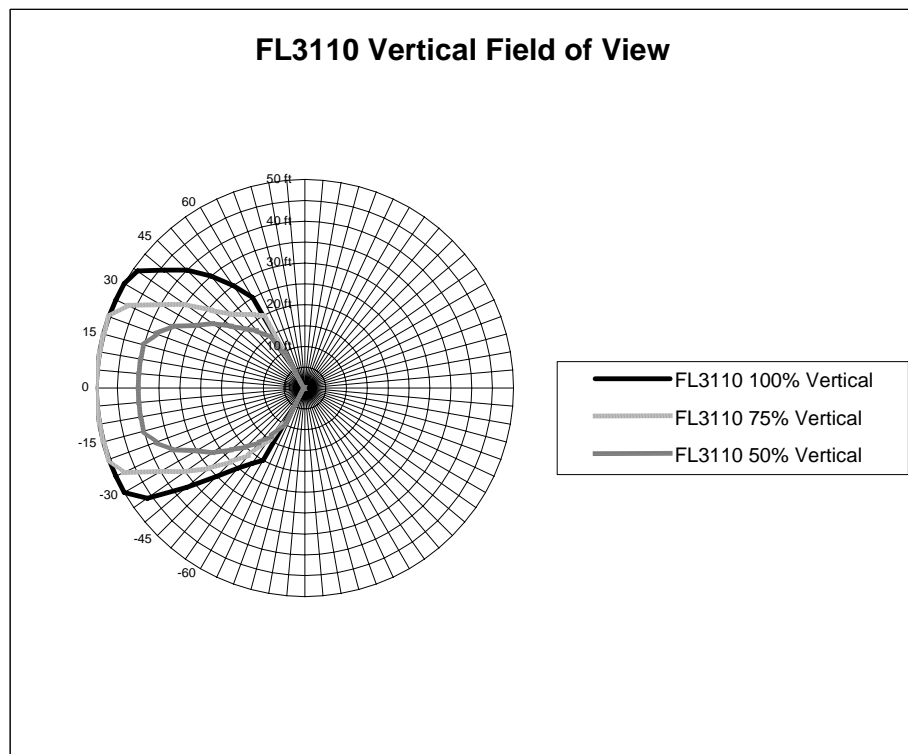
#### 3.5.2 Cable Termination in Safe Area

- The cable armour must be connected to Safety Earth.
- The cable screens (drain wire) and power supply return (OV) must be connected to Instrument Earth.
- The power supply or power distribution system employed should meet the requirements of EN50081- 1/2 and EN60101-1.

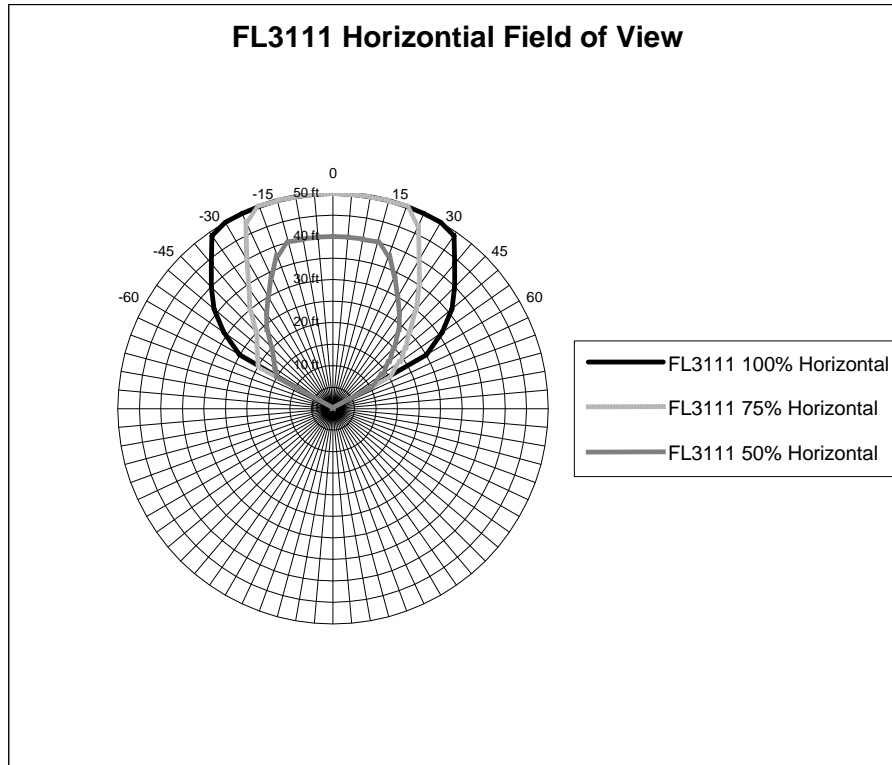




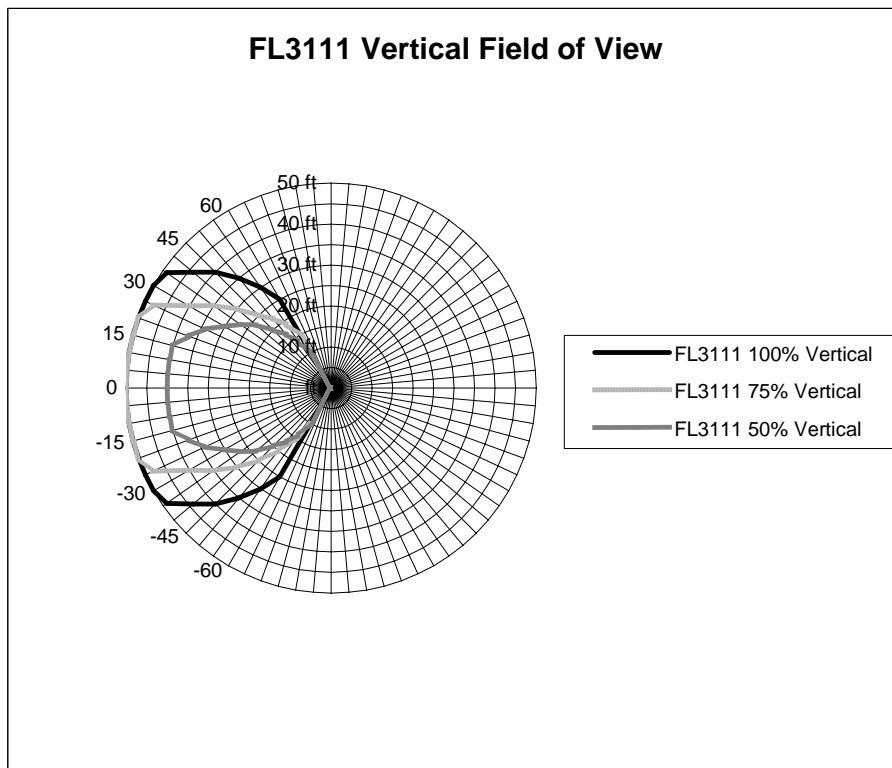
**Figure 3A-1 FL3110 Horizontal Field of View**



**Figure 3A-2 FL3110 Vertical Field of View**



**Figure 3A-3 FL3111 Horizontal Field of View**



**Figure 3A-4 FL3111 Vertical Field of View**

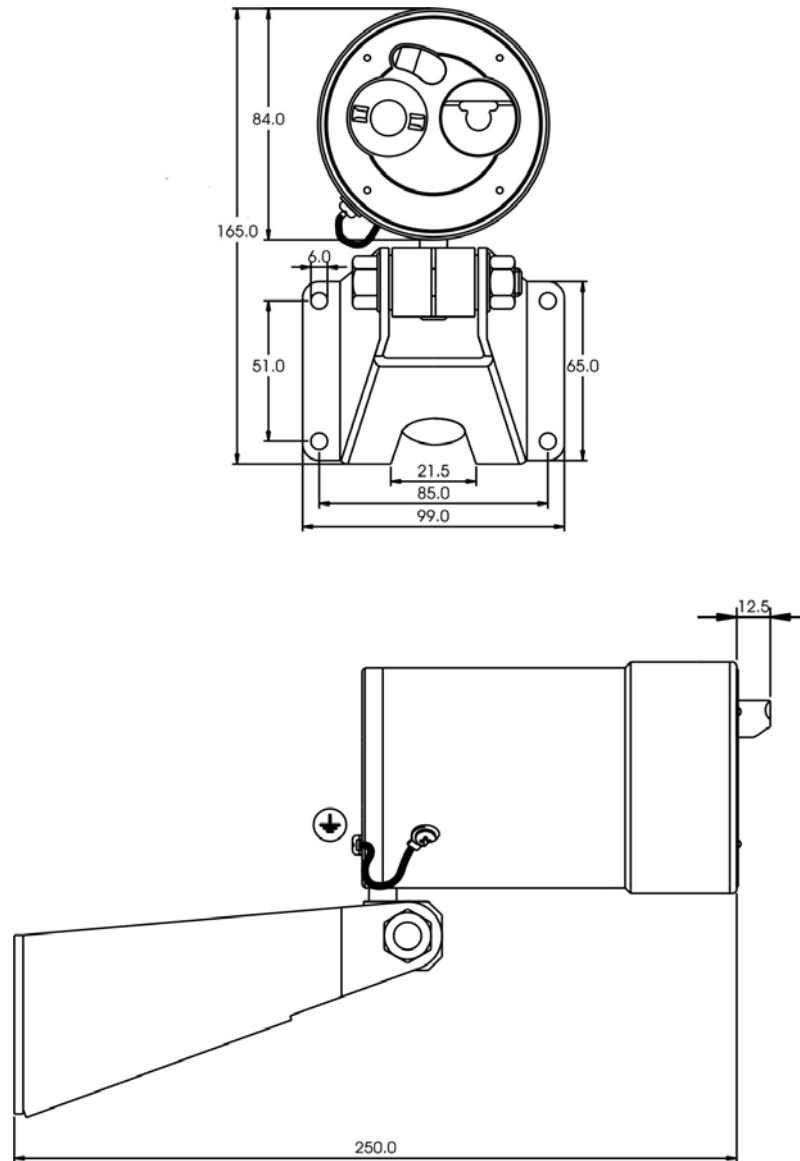
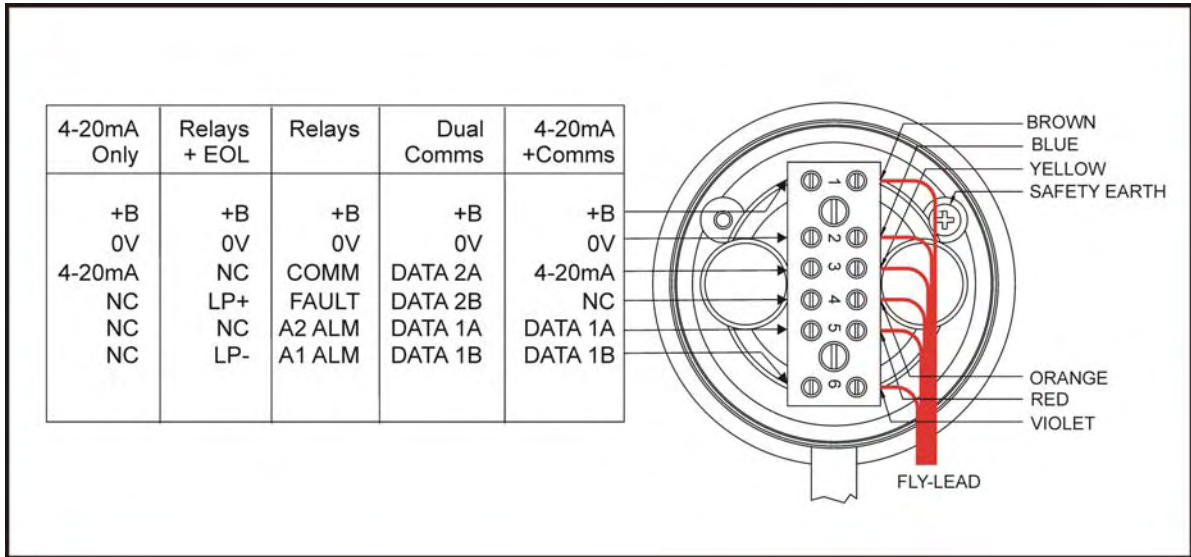


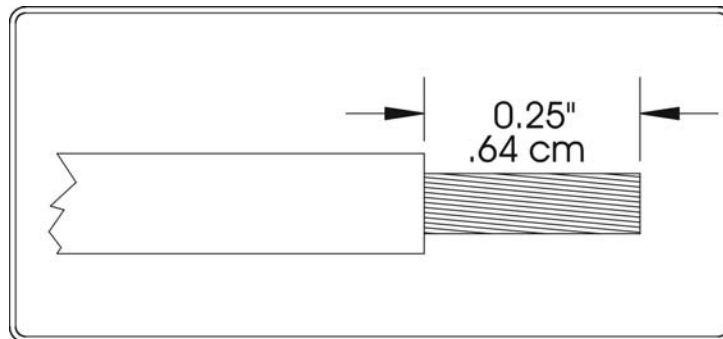
Figure 3-B Outline Drawing



**Figure 3-C Base Assembly with Terminal Block**

### 3.6 Terminal Connections

The Terminal Block is located on the Base Assembly (See *figure 3-C*) and accepts 12 AWG (3.31 mm<sup>2</sup>) to 22 AWG (0.33 mm<sup>2</sup>) stranded or solid core wire. Each wire should be stripped as shown in *figure 3-D*.



**Figure 3-D Strip Length**

Four of the six positions on the terminal block have functions which depend on the FL3110/3111 version selected. The remaining two positions are reserved for the power connections.

Figure 3-C outlines the terminal block connections by version.

On both this and the following pages is a description and specification for each of the signals shown in *figure 3-C*.

**POWER INPUTS  
+B and 0V**

These are the power connections. The supply voltage range is 20 to 36 VDC at the detector (*low voltage is detected at 18.5 VDC*). The following maximum cable lengths apply for a +24VDC supply (*maximum 20 ohm loop*):

AWG	mm <sup>2</sup>	FEET	METRES
14 AWG	2.08	4500	1370
16 AWG	1.31	2340	715
18 AWG	0.82	1540	470
20 AWG	0.52	970	300
22 AWG	0.33	670	205

**ANALOGUE OUTPUT  
4 – 20mA**

The 4 to 20mA output is a current signal that corresponds to the following specification:

FAULT signal:	0 to 0.2mA
COPM Fault signal:	2.0 ± 0.2mA
Ready signal:	4.0 ± 0.2mA
WARN signal:	16.0 ± 0.2mA
ALARM signal:	20.0 ± 0.2mA
Output Load Max.:	600 ohms

For interfacing with 250 ohm input impedance devices, the following maximum cable lengths apply (*maximum 50 ohm loop*):

AWG	mm <sup>2</sup>	FEET	METRES
14 AWG	2.08	9000	2750
16 AWG	1.31	5800	1770
18 AWG	0.82	3800	1160
20 AWG	0.52	2400	730
22 AWG	0.33	1700	520

**COMMUNICATIONS OUTPUTS**

**DATA 1A  
DATA 1B  
DATA 2A  
DATA 2B**

These are the connections for the RS-485 serial communications ports 1 & 2. The RS-485 connection is used to either query the unit's status or to configure the unit. See Section 7 for detailed information on Modbus RTU protocol.

**RELAY OUTPUT (Figure 3-E)**

**A1 ALM**

Description: This connection is the WARN relay contact. The WARN output is immediate and can be normally energised or normally de-energised, latching or non-latching. WARN relay contact rating is 1A @ 30VRMS/42.2V<sub>PK</sub> Resistive.

**A2 ALM**

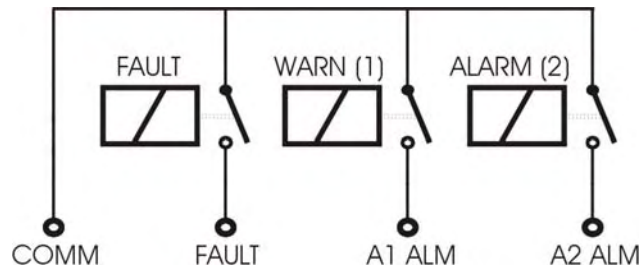
Description: This connection is the ALARM relay contact. The ALARM output is time delayed for 2, 4, 8 or 10 seconds. The ALARM output can be normally energised or normally de-energised, latching or non-latching. ALARM relay contact rating is 1A @ 30VRMS/42.2V<sub>PK</sub> Resistive.

**FAULT**

Description: This connection is the FAULT relay contact. The FAULT output configuration is normally energised and non-latching. This is the standard output configuration and it cannot be changed. The FAULT circuit will be activated during the time-out function, a low power or loss of power condition, and during a failed COPM check. During these conditions the FAULT relay will de-energise and the analogue output signal will drop to 0 mA (2mA for COPM Faults) for the duration of the FAULT. FAULT relay contact rating is 1A @ 30VRMS/42.2V<sub>PK</sub> Resistive.

**COMM**

Description: This is the common connection of the WARN, ALARM and FAULT relay contacts.



**Figure 3-E Relay Outputs**

**FIELD LOOP OUTPUTS (Figure 3 – F)**

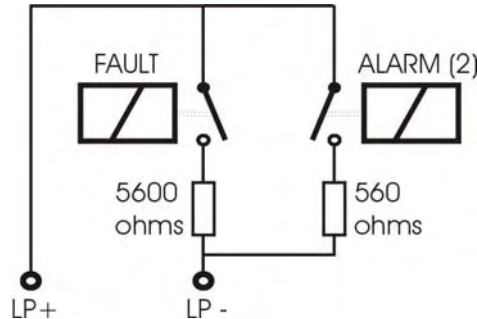
**LP+ and LP-**

Description: These are the field loop connections to a fire card such as General Monitors' IN042.

The FAULT relay, when energised, inserts a 5600ohms, 2Watt End-Of-Line resistor across these connections.

The ALARM relay, when energised, inserts a 560ohms, 2Watt resistor across the End-Of-Line resistor. The WARN relay has no effect.

For a description of relay functionality refer to the section RELAY OUTPUTS above.



**Figure 3-F Field Loop Outputs**

**RESET**

All versions may be reset by interrupting the power supply for a minimum of two seconds. Versions with serial communications can also be reset by using the Remote Reset command. Refer to section 7 for details.

**SAFETY EARTH**

This connects the FL3110/3111 enclosure to Safety Earth. An alternative connection is available on the rear exterior of the base assembly. The Safety Earth wire should have a wire gauge of at least 22 AWG (0.33mm<sup>2</sup>) and be no longer than 3 meters in length.



**WARNING: Under no condition should the retaining strap screws be used for Safety Earth purposes**

**3.7 User Selectable Options**

All user selectable option settings on the Model FL3110/3111 are held in EEPROM. It is recommended the option settings be specified when ordering.

Versions with serial communications capabilities can be (re)programmed via the communications port(s). Refer to section 7 for details. Other versions can be (re)programmed with the Program Card accessory if necessary.

**PROGRAM CARD ACCESSORY**

The Program Card is a small module with a DIP switch which can be read by the FL3110/3111 microprocessor.

DIP switch positions 5 to 8 select the options being programmed, such as Sensitivity and Alarm-time-delay, Relay or Return to Factory Default settings. DIP switch positions 1 to 4 determine the actual parameter settings. Refer to the following tables for details:

**SENSITIVITY and ALARM-TIME-DELAY Options**

DIP	Sensitivity (%)			Alarm-time-delay (sec)			
	100	75	50	10	2	4	8
1				OFF	OFF	ON	ON
2				OFF	ON	OFF	ON
3	OFF	OFF	ON				
4	OFF	ON	OFF				
5	OFF	OFF	OFF	OFF	OFF	OFF	OFF
6	OFF	OFF	OFF	OFF	OFF	OFF	OFF
7	ON	ON	ON	ON	ON	ON	ON
8	ON	ON	ON	ON	ON	ON	ON

**WARN and ALARM Relay Options**

DIP	WARN (1) Relay				ALARM (2) Relay			
	LA	NL	EN	DE	LA	NL	EN	DE
1	ON	OFF						
2			ON	OFF				
3					ON	OFF		
4							ON	OFF
5	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
6	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
7	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
8	ON	ON	ON	ON	ON	ON	ON	ON

**LA** = Latching                      **NL** = Non Latching  
**EN** = Energised                      **DE** = De-Energised

The above options have been represented pictorially on the label attached to the Program Card

**Return to FACTORY DEFAULT settings**

<u>DIP</u>	<u>Default</u>
5	ON
6	ON
7	OFF
8	ON

DIP switch positions 1 to 4 are not relevant here





**WARNING: During the following steps proper anti-static procedures must be observed. Failure to do so may permanently damage the FL3110/3111 electronic circuits and void the warranty.**

To (re)program, remove the detector from the Base Assembly, disconnect the fly-lead and disconnect the retainer strap at the rear of the Base only.

1. Refer to figure 3-G and remove the five screws securing the front cap assembly to the enclosure.
2. Remove the front cap assembly.
3. Disconnect the fly-lead connector from the power supply board.
4. Insert the Program Card with the required DIP switch settings into connector J3 on the microprocessor board.
5. Apply +24VDC to connector J3 pins 1 and 2, as shown in the figure, for a minimum of five seconds. This step allows the microprocessor to read the DIP switch settings on the Program Card.
6. Disconnect the +24VDC power supply.  
If more programming is required, adjust the DIP switch settings and re-apply +24VDC for a minimum of five seconds. Steps 4 to 6 may be repeated as required.  
When programming is completed, remove the +24VDC power supply and the Program Card.
7. Inspect the o-ring on the front cap assembly for damage and the flame path surfaces for contamination. If necessary replace or clean and re-apply a suitable grease to the o-ring and flame path surfaces.
8. Reconnect the fly-lead connector to the power supply board. Insert the front cap assembly into the enclosure, ensuring the o-ring does not snag and secure with the five screws.

Inspect the o-ring on the Base assembly for damage and the corresponding surfaces for contamination. If necessary clean or replace and re-apply a suitable grease to the o-ring and corresponding surfaces.

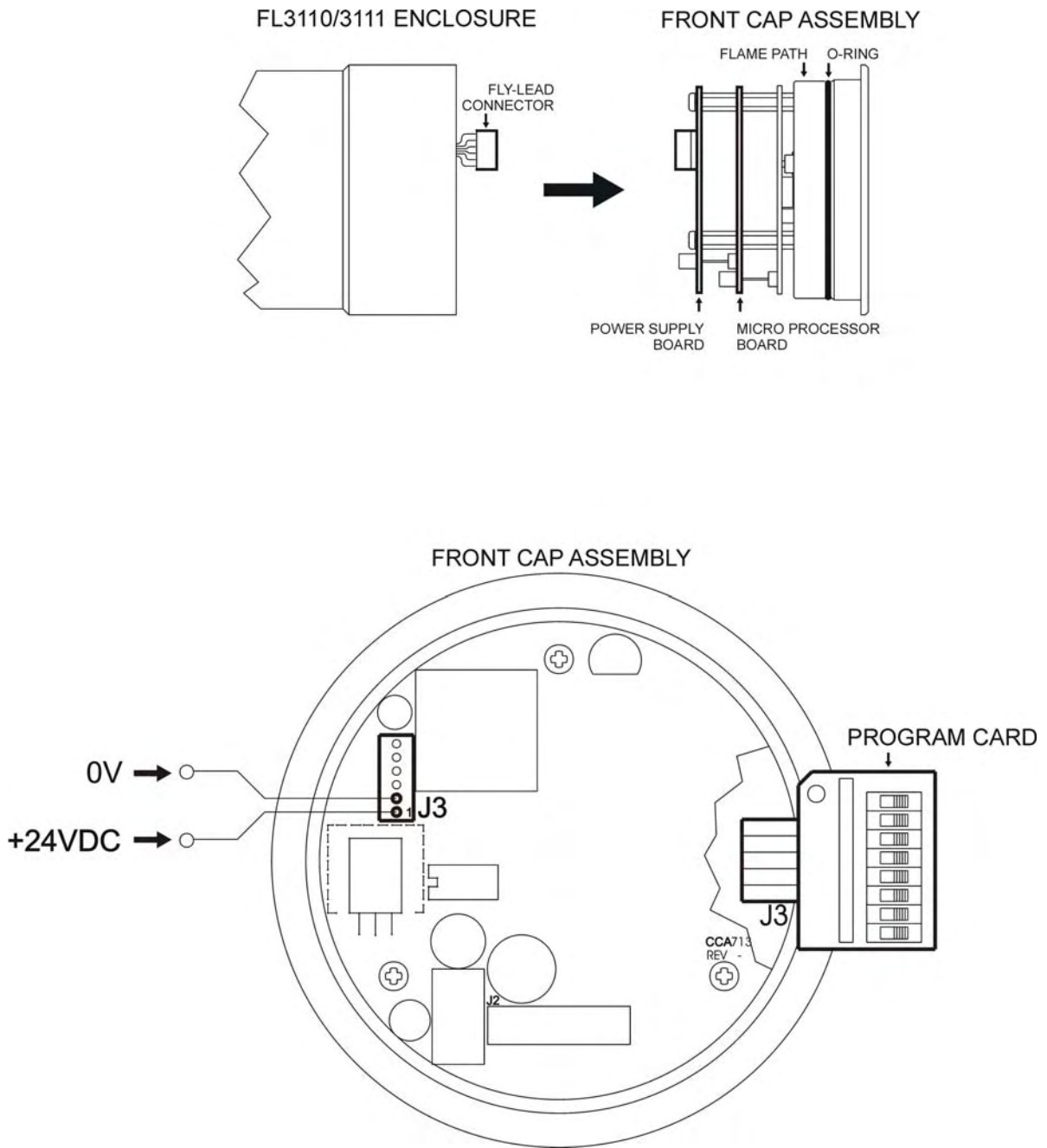
Reconnect the retainer strap at the rear of the Base assembly and reconnect the fly-leads as shown in figure 3-C. Mount the detector on the Base assembly ensuring the o-ring does not snag.

### **3.8 Factory Default Settings**

Return to Factory Default settings only affects FL3110/3111 versions with serial communications capabilities. It provides a mechanism to restore the communications parameters, should they be unknown or corrupted. The Factory Default settings are:

<b>Parameter</b>	<b>Setting</b>
Address	1 (Decimal)
Baud Rate	19200
Data Format	8-N-1

Refer to section 7 for details



**Figure 3-G Front Cap Assembly**

## 4.0 Maintenance



**WARNING** – Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

### 4.1 General Maintenance

Once correctly installed, the unit requires very little maintenance other than regular sensitivity checks and cleaning of the lenses, light rod and reflector. General Monitors recommends that a schedule be established and adhered to.



**Warning:** Disconnect or inhibit external devices, such as automatic extinguishing or fire suppression systems before performing any maintenance.

### 4.2 Cleaning the Lenses/Light Rod

A clean, soft, lint-free cloth, tissue or cotton swab should be used to apply the cleaning solution. Do not touch the lenses with fingers.

- a) Wet the lenses with the solution.
- b) Rub with a dry, unsoiled cloth until clean.
- c) Completely dry the lenses.
- d) Repeat steps a, b and c for the reflector and light rod.

**NOTE:** The removal of particulate matter and any film build-up on the lenses, lightrod and reflector is necessary to ensure proper sensitivity of the system. It is recommended that the lens and reflector be cleaned at least every 30 days' or more often if the detector is located in a particularly dirty environment.



**Warning:** A dirty or partially blocked lens can significantly reduce the detector's field of view and detection distance

DO NOT USE A COMMERCIAL GLASS CLEANER OTHER THAN "INDUSTRIAL STRENGTH WINDEX® with Ammonia D":

The UV lens material is quartz, the IR lens material is sapphire. The cleaning solution should be General Monitors' P/N 10272-1 (Industrial Strength Windex® with Ammonia D).

### 4.3 Sensitivity Check

To verify that each detector is functioning correctly, a General Monitors' Test Lamp and/or the ALARM TEST function should be used. For the Model FL3110 (UV/IR) the General Monitors Model TL103 Test Lamp is recommended. For the Model FL3111 (UV only) the General Monitors Model TL100 Test Lamp is recommended.

#### **Alarm Test**

The Models FL3110 and FL3111 Flame Detectors have a built-in Alarm Test feature. The user can test the alarm outputs of the Flame Detector by activating the Alarm Test feature via serial communications. The Flame Detector will immediately go into WARN and then into the time delayed ALARM. After two to ten seconds the Flame Detector will reset the non-latching WARN and/or ALARM. A latching WARN and or/ ALARM will remain latched until manually reset. If the Flame Detector does not respond to the sources, it will output a FAULT condition and will retest every ten seconds, as in the COPM FAULT case. See section 6, Spares & Accessories for details on test lamps.

### 4.4 Storage

These Flame Detectors should be stored in a clean, dry area and within the temperature and humidity ranges quoted in Section 2-4 Environmental Specifications.

## 5.0 Trouble Shooting



**WARNING** - Installation and Maintenance must be carried out by suitably skilled and competent personnel only.

### 5.1 Trouble Shooting Chart

This section is intended to be a guide in correcting problems which may arise in the field. This section is not all-inclusive, and General Monitors should be contacted for assistance if the corrective actions listed do not eliminate the problem. If equipment or qualified personnel required for various tests are not available it is recommended that the defective unit be returned to General Monitors for repair.

A complete written description of the problem should be included. Be sure to inhibit or disconnect external alarm wiring before making any checks which might send the unit into alarm, if an alarm condition will create problems.

**NOTE:** If the equipment is under warranty, any repairs performed by persons other than General Monitors' authorised personnel may void the warranty. Please read the warranty statement carefully.

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
No output signal and green LED in IR window is off.	No DC Power to the Unit	Be sure the +24 VDC is applied with the correct polarity.
No output signal and green LED in IR window is rapidly blinking.	Low voltage FAULT (voltage at unit less than +18VDC).	Be sure that the unit is powered with at least +20VDC under load.
2mA signal and green LED in IR window is slowly blinking.	COPM FAULT, dirty or obscured optical path (UV or IR window)	Clean UV and IR window and source light rod.
Constant 8mA signal with no known radiation to detector (FL3110 only).	Background IR radiation at detector.	Cover IR portion of FL3110 for ten seconds to determine if there is background IR. If there is, remove IR Radiation source or change FL3110 location. If there is no background IR, replace IR detector in FL3110.
Constant 12mA signal with no known radiation to detector (FL3110 only).	Background UV radiation at detector.	Cover UV portion of FL3110 for ten seconds to determine if there is background UV. If there is, remove UV radiation source or change FL3110 location. If there is no background UV, replace UV detector tube in FL3110.
Constant 16mA or 20mA signal (WARN or ALARM) with no known radiation at detector (FL3111 only).	Background UV radiation at detector.	Cover UV portion of FL3111 for ten seconds to determine if there is background UV. If there is, remove UV radiation source or change FL3111 location. If there is no background UV, replace UV detector tube in FL3111

## 6.0 Spares & Accessories

### 6.1 Spare Parts

When ordering Spare Parts and/or Accessories please contact your nearest General Monitors' Representative or General Monitors directly and give the following information.

<u>DESCRIPTION</u>	<u>PART NR</u>
Instruction Manual	MANFL3110/11
UV Source	70567-3
UV Detector	71521-1
IR Detector	71391-2
TL100 Test Lamp	70300-1
TL100 Test Lamp 110V Charger	70381-1
Lamp, IR Source	70596-2
Program Card	71336-1
High Vacuum Grease, 150g Tube	916-078
TL105 UV/IR Test Lamp	TL105-1-2 – FL3110
TL105 UV/IR Test Lamp	TL105-2-2 – FL3111
Window Cleaning Solution	10272-1

### 6.2 Test Lamps

#### TL100 UV Test Lamp

The General Monitors TL100 Test Lamp is a portable, rechargeable source of ultra-violet radiation, specifically designed to use in testing UV flame detection systems. It emits a wide band of radiation and specifically covers the 185 to 260 nanometer region which corresponds with the response of most ultraviolet flame detectors. The test lamp is CSA certified intrinsically safe for Class I, Division 1, Groups C and D and therefore does not require an explosion-proof housing.

To avoid damaging exposure to ultraviolet radiation, the TL100 provides a Power On indicator so that direct viewing is not necessary. Insert the charging plug into the receptacle. Complete recharging takes a minimum of fourteen hours.

#### TL100 Operating Instructions

The TL100 has two intensity levels, LO and HI, indicated on the rocker switch label. With the switch in the HI position, the Test Lamp is capable of activating General Monitors' UV flame detection systems at distance up to 40 feet (12 meters) from the detector. The LO switch will activate the system at distances up to 20 feet (6 meters).

To operate the Test Lamp switch, aim it directly at the detector to be tested and activate the desired intensity level. The ON LED (green) should light, indicating Power On and the Low Battery (red) should remain off, indicating a sufficient charge for normal operation. The response of the system will depend on the distance from the detector, as well as the sensitivity and /or time-delay settings at the control module. If the system is operating normally, it will respond immediately upon activating the TL100. If the TL100 remains ON for the time period set by the Time Delay adjustment, the flame detector and the control module will go into ALARM.

If the low battery LED (red) is illuminated, the batteries are nearing discharge, however there is a built-in battery reserve of approximately 15 minutes. It is recommended that the batteries be charged as soon as possible after this period. Do not allow the unit to remain in a discharged state.

---

**NOTE** - Recharging the TL100 must be done in a non-hazardous area. Recharging the batteries is required whenever the Low Battery LED (red) is illuminated. Plug the charger into a suitable outlet and insert the charging plug into the charging receptacle located on the back end of the Test Lamp. Fourteen to sixteen hours are required for a complete charge: although overcharging for up to twenty-four hours is tolerable, it will reduce battery life and is not recommended. If the TL100 is not used for an extended period of time, it is recommended that it be charged bimonthly to prevent excessive discharge. Batteries may be recharged an average of 500 times.

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### **TL103 UV/IR Test Lamp**

The General Monitors TL103 Test Lamp is a battery operated, rechargeable, test source specifically designed to test General Monitors' UV, UV/IR, and Digital Frequency IR Flame Detection Systems. It consists of a high-energy broad band radiation source which emits sufficient energy in both the Ultraviolet and Infrared spectra to activate UV and/or IR detectors. To simulate a fire, the test lamp automatically flashes at one of three DIP switch selectable rates. The Model TL103, rated explosion-proof, is CSA certified for use in Class I, Division 1, Groups C and D areas. The test lamp operates on internal lead-acid batteries which, when fully charged, will operate continuously for 25 to 30 minutes. An internal circuit will prevent operation when the batteries are low.

### **TL103 Operating Instructions**

It is always important to start a series of TL103 checks with a fully charged unit. Stand within 20 feet (FL3110/3111) or within 35 feet (FL3111) of the unit to be tested and aim the TL103 squarely into the detector face. Shaking the lamp from side to side or up and down will increase the simulation of flame flicker, and improve the response of the flame detector to the lamp. If the system is operating normally, the detector will go into a WARNING condition after a few flashes of the Test Lamp. If the lamp remains ON for the time-delayed period of the DIP switch setting, the detector will go into ALARM. To conserve charge, do not operate the Test Lamp longer than is necessary to test each detector. When the battery level drops below the level required maintaining the proper intensity of the lamp, an internal low voltage circuit will shut the lamp off until the batteries have been recharged.

### **TL103 Recharging Instructions**

Insert the charging plug into the receptacle. Complete recharging takes a minimum of fourteen hours. A schedule should be established and followed.

**WARNING:** Replace the knurled plug after charging is complete. Charging must be carried out in a non-hazardous area. The charging receptacle is located inside the housing adjacent to the ON button. To gain access, it is necessary to unscrew the knurled plug from the body of the unit. The plug is secured to the ON button by a safety strap to keep it from being lost. It is recommended that the TL103 be kept on charge when not in use to prevent excessive battery discharge. The batteries may be charged an average of 500 times and the battery pack is replaceable.



### **TL105 UV/IR Test Lamp**

Please refer to the TL105 Test Lamp manual for operating instructions

## 7.0 Modbus Serial Communications

### 7.1 Baud Rate

The Baud Rate is a selectable setting via the Modbus Communications Interface. The selectable baud rates are 19200, 9600, 4800 or 2400 bits per second.

### 7.2 Data Format

The Data Format is a selectable setting via the Modbus Communications Interface. The selectable data formats are as follows:

<u>Data Bits</u>	<u>Parity</u>	<u>Stop Bit</u>	<u>Format</u>
8	None	1	8-N-1
8	Even	1	8-E-1
8	Odd	1	8-O-1
8	None	2	8-N-2

### 7.3 Modbus Read Status Protocol (Query/Response)

#### 7.3.1 Modbus Read Query Message

<u>Byte</u>	<u>Modbus</u>	<u>Range</u>	<u>Referenced to FL3110/3111</u>
1 <sup>st</sup>	Slave	1-247* (Decimal)	ID (Address
2 <sup>nd</sup>	Function Code	03	Read Holding Registers
3 <sup>rd</sup>	Register Address Hi**	00	Not Used
4 <sup>th</sup>	Register Address Lo**	00-FF (Hex)	Command Registers
5 <sup>th</sup>	No. of Registers Hi	00	Not Used
6 <sup>th</sup>	No. of Registers Lo	01	No. of 16 Bit Registers
7 <sup>th</sup>	CRC Lo	00-FF (Hex)	CRC Lo Byte
8 <sup>th</sup>	CRC Hi	00-FF (Hex)	CRC Hi Byte

\* Note: Address 0 is reserved for broadcast mode and will not be supported at this time.

\*\* Note: Register Address can be a maximum of 9999 Address Locations (0000-270E)



### 7.3.2 Modbus Read Response Message

<u>Byte</u>	<u>Modbus</u>	<u>Range</u>	<u>Referenced to FL3110/3111</u>
1 <sup>st</sup>	Slave Address	1-247* (Decimal)	ID (Address)
2 <sup>nd</sup>	Function Code	03	Read Holding Registers
3 <sup>rd</sup>	Byte Count	02	No. of Data Bytes
4 <sup>th</sup>	Data Hi	00-FF (Hex)	Hi Byte Status Data
5 <sup>th</sup>	Data Lo	00-FF (Hex)	Lo Byte Status Data
6 <sup>th</sup>	CRC Lo	00-FF (Hex)	CRC Lo Byte
7 <sup>th</sup>	CRC Hi	00-FF (Hex)	CRC Hi Byte

\* Note: Address 0 is reserved for broadcast mode and will not be supported at this time

## 7.4 Modbus Write Command Protocol (Query/Response)

### 7.4.1 Modbus Write Query Message

<u>Byte</u>	<u>Modbus</u>	<u>Range</u>	<u>Referenced to FL3110/3111</u>
1 <sup>st</sup>	Slave Address	1-247* (Decimal)	ID (Address)
2 <sup>nd</sup>	Function Code	06	Preset Single Register
3 <sup>rd</sup>	Register Address Hi**	00	Not used
4 <sup>th</sup>	Register Address Lo**	00-FF (Hex)	Command Registers
5 <sup>th</sup>	Preset Data Hi	00-FF (Hex)	Hi Byte Command Data
6 <sup>th</sup>	Preset Data Lo	00-FF (Hex)	Lo Byte Command Data
7 <sup>th</sup>	CRC Lo	00-FF (Hex)	CRC Lo Byte
8 <sup>th</sup>	CRC Hi	00-FF (Hex)	CRC Hi Byte

\* Note: Address 0 is reserved for broadcast mode and will not be supported at this time.

\*\* Note: Register Address can be a maximum of 9999 Address Locations (0000-270E)

### 7.4.2 Modbus Write Response Message

<u>Byte</u>	<u>Modbus</u>	<u>Range</u>	<u>Referenced to FL3110/3111</u>
1 <sup>st</sup>	Slave Address	1-247* (Decimal)	ID (Address)
2 <sup>nd</sup>	Function Code	06	Preset Single Register
3 <sup>rd</sup>	Register Address Hi **	00	Not used
4 <sup>th</sup>	Register Address Lo**	00-FF (Hex)	Command Register
5 <sup>th</sup>	Preset Data Hi	00-FF (Hex)	Hi Byte Command Data
6 <sup>th</sup>	Preset Data Lo	00-FF (Hex)	Lo Byte Command Data
7 <sup>th</sup>	CRC Lo	00-FF (Hex)	CRC Lo Byte
8 <sup>th</sup>	CRC Hi	00-FF (Hex)	CRC Hi Byte

\* Note: Address 0 is reserved for broadcast mode and will not be supported at this time.

\*\* Note: Register Address can be a maximum of 9999 Address Locations (0000-270E)

### 7.4.3 Function Codes Supported

Function Code 03 (Read Holding Registers) will be used to read status from the slave unit. Function Code 06 (Preset Single Register) will be used to write a command to the slave unit.

## 7.5 Exception Responses and Exception Codes

In a normal exchange, the master device sends a query to the FL3110/3111. The FL3110/3111 receives the query and returns a normal response to the master. If a communications error occurs, the FL3110/3111 will return an exception response.

### 7.5.1 Exception Responses

<u>Byte</u>	<u>Modbus</u>	<u>Range</u>	<u>Referenced to FL3110/3111</u>
1 <sup>st</sup>	Slave Address	1-247* (Decimal)	ID (Address)
2 <sup>nd</sup>	Function Code	83 or 86 (Hex)	MSB is set with Function Code
3 <sup>rd</sup>	Exception Code	01 – 06 (Hex)	Appropriate Exception Code (See below)
4 <sup>th</sup>	CRC Lo	00-FF (Hex)	CRC Lo Byte
5 <sup>th</sup>	CRC Hi	00-FF (Hex)	CRC Hi Byte

**Function Code Field:** In a normal response, the FL3110/3111 echoes the function code of the original query in the function code field of the response. All the Function Codes have a most-significant bit (MSB) of zero (0).

In an exception response, the FL3110/3111 sets the MSB of the function code to a one (1). With the function code's MSB set, the master can recognise the exception response and can process the data field for the exception code from the FL3110/3111 response message.

**Exception Code Field:** In a normal response, the FL3110/3111 returns data and status in the data field, which was requested in the query from the master. In an exception response, the FL3110/3111 returns an exception code in the data field, which describes the FL3110/3111 condition that caused the exception. On the following page is a list of exception codes that are supported by the FL3110/3111:

<u>Code</u>	<u>Name</u>	<u>Description</u>
01	Illegal Function	The function code in the query is not an allowable action for the FL3110/3111.
02	Illegal Command	The command register address received in Register Address query is not an allowable command address for the FL3110/3111.
03	Illegal Data Value	A value contained in the query data field is not an allowable value for the FL3110/3111.
04	Slave Device Failure	An unrecoverable error occurred while the FL3110/3111 was attempting to perform the requested action.
05	Acknowledge	The FL3110/3111 has accepted the request and is processing it, but a long duration of time will be required to do so. This response is returned to prevent a timeout error from occurring in the master.
06	Device Busy	The FL3110/3111 is engaged in processing a long-duration program command. The master should retransmit the message later when the slave is free.

## 7.6 FL3110/3111 Command Register Locations

### 7.6.1 Operational Mode Commands

R – indicates Read Only Access

R/W – indicates Read/Write Access

<u>Parameter</u>	<u>Function</u>	<u>Type</u>	<u>Scale</u>	<u>Reg Access</u>	<u>I/O Addr</u>	<u>Master Refer to</u>		<u>Section</u>
						<u>Addr</u>	<u>Addr</u>	
Analogue	4-20mA Current Output	Value	16-Bit	R	0000	40001		7-7-1
Mode	Indicates Fire Status Mode	Value	(0-11)	R	0001	40002		7-7-2
Status/Error	Indicates error Only or IR Only (FL3110 only)	Bit	8-Bit	R	0002	40003		7-7-3
UV/IR Only	Indicates Detection of UV	Value	(1,2,3)	R	0003	40004		7-7-4
Model Type	Identifies the Model FL311x (x=0 or 1 to indicate Model)	Value	(311x)	R	0004	40005		7-7-5
Software Rev	Indicates the SW Revision	ASCII	2-Char	R	0005	40006		7-7-6
COPM Fault	UV/IR COPM Fault	Bit	8-Bit	R	0006	40007		7-7-7
Not Used					0007	40008		
Options	Indicates Unit Options	Bit	8-Bit	R/W	0008	40009		7-7-8
Address	Unit Address	Value	(1-247)	R/W	0009	40010		7-7-9
Not Used					000A	40011		
Baud Rate	Indicates present Baud Rate (2400, 4800, 9600, 19200)	Value	(0-3)	R/W	000B	40012		7-7-10
Data Format	Indicates Data Format (8-N-1, 8-E-1, 8-O-1, 8-N-2)	Value	(0-3)	R/W	000C	40013		7-7-11
UV Sig Count	Indicates No. of UV Signal Pulses within 500 ms	Value	8-Bit	R	000D	40014		7-7-12
IR Sig Count	Indicates No. of IR Signal Pulses within 500ms	Value	8-Bit	R	000E	40015		7-7-13
UV Fault Total	Indicates Total No. of UV COPM Faults	Value	8-Bit	R	000F	40016		7-7-14
IR Fault Total	Indicates Total No. of IR COPM Faults	Value	8-Bit	R	0010	40017		7-7-15
Remote Reset	Remotely Resets the Alarm & Warn Condition	Bit	1-Bit	R/W	0011	40018		7-7-16
Remote Alarm Test	Remotely Activates Alarm Test	Bit	1-Bit	R/W	0012	40019		7-7-17
Clear COPM Faults	Clears Window/Detector COPM Fault Counters	Bit	1-Bit	R/W	0013	40020		7-7-18

## 7.7 FL3110/3111 Operational Mode Command Register Details

### 7.7.1 Analogue

A read returns a value, which is proportional to the 0 – 20mA output current. The current is based on a 16-bit value. The master scaling is 0 – 65535 Decimal which corresponds to the FL3110/3111 scaling which is 0 – 20mA.

### 7.7.2 Mode

A read returns the fire status mode of the FL3110/3111.

<u>Mode</u>	<u>Decimal Value</u>
Powerup Delay	1
Warn Non-latching Only	2
Warn & Alarm Non-Latching	3
Warn Latching Only	4
Alarm Latching Only	5
Warn & Alarm Latching	6
Ready State (No Fire)	7
Alarm Test	10
COPM Fault Detected	11

### 7.7.3 Status/Error

A read returns the errors that are occurring at the present time which are indicated by bit position.

<u>Byte</u>	<u>Function</u>	<u>Bit Position</u>
Low	EPROM Checksum	8
	EEPROM Checksum	7
	RAM Test	6
	Low (24V) Voltage Check	5
	UV COPM	4
	IR COPM (FL3110 only)	3
	Not Used	2
	Not Used	1
High	Reset line shorted	8
	UV 10 Minute	7
	Not Used	6-1

#### 7.7.4 UV/IR Only

A read indicates the detection of UV only or IR only.

UV Only Detected	=	01 (Lo Data Byte)
IR Only Detected	=	02 (Lo Data Byte) (FL3110 only)

High Data Byte Not Used.

#### 7.7.5 Model Type

A read returns the Decimal Value 311x which identifies the unit by model number.

<u>Model</u>	<u>Version</u>	<u>Decimal Value</u>
FL3110	UV/IR	3110
FL3111	UV Only	3111

#### 7.7.6 Software Rev

A read returns the software revision of the FL3110/3111 in 2 ASCII characters (Usually a blank and then a letter revision ex. A, B, C etc).

#### 7.7.7 COPM Fault

A read returns the type of Continuous Optical Path Monitoring (COPM) Fault, which is a UV COPM Fault or IR COPM Fault. The UV COPM Fault and/or IR COPM Fault indicates either that the window is dirty and needs to be cleaned or there is a hardware problem with the detection circuitry or sensor.

UV COPM Fault	=	02 (Lo Data Byte)
IR COPM Fault	=	04 (Lo Data Byte) (FL3110 only)

High Data Byte Not Used.

### 7.7.8 Options

A read returns the status of the settings for the Detector Sensitivity, Relay Delay, Relay Latching/Non-Latching and Relay Energised/Non-Energised features from EEPROM. A write command changes the settings for the EEPROM.

Exception: If an EEPROM write error occurs, then the Exception Code 04 (Slave Device Failure) is returned.

These Functions operate on the Low Data Byte.

<u>Function</u>	<u>Bit Position</u>	<u>Conditions</u>	<u>Access</u>
Warn Energised	8 (MSB)	1 = Energised 0 = Non-Energised	Read/Write
Alarm Energised	7	1 = Energised 0 = Non-Energised	Read/Write
Warn Latched	6	1 = Latched 0 = Non-Latched	Read/Write
Alarm Latched	5	1 = Latched 0 = Non-Latched	Read/Write
(Time Delay in Seconds)		<u>4</u> <u>8</u> <u>2</u> <u>10</u>	
Alarm Time Delay 2	4	0 0 1 1	Read/Write
Alarm Time Delay 1	3	0 1 0 1	Read/Write
(Sensitivity %)		<u>100</u> <u>75</u> <u>50</u>	
Sensitivity 2	2	0 0 1	Read/Write
Sensitivity 1	1 (LSB)	0 1 0	Read/Write

High Data Byte Not Used

### 7.7.9 Address

A read returns the address of the FL3110/3111. A write changes the address to the requested address. The range of the address is 1 to 247 (01 to F7 Hex). After the address has been changed to the slave unit, the Modbus communications will cease because the address has changed; therefore the master will have to change its query address to the slave's new address in order to restart the communications.

Exception: If an EEPROM write error occurs, then the Exception Code 04 (Slave Device Failure) is returned.

### 7.7.10 Baud Rate

A read returns the Baud Rate of the FL3110/3111 whereas a write changes the Baud Rate that is requested baud. After the baud rate has been changed to the addressed unit, the Modbus communications will cease because the baud rate has changed; therefore the master will have to change its baud rate to the slave's new baud rate in order to restart the communications. These Functions operate on the Low Data Byte

<u>Baud Rate</u>	<u>Low Data Byte</u>	<u>Access</u>
19200	03	Read/Write
9600	02	Read/Write
4800	01	Read/Write
2400	00	Read/Write

High Data Byte Not Used

Exception: If an illegal data value is entered which is not listed above, then the Exception Code 03 (Illegal Data Value) is returned.

Exception: If an EEPROM write error occurs, then the Exception Code 04 (Slave Device Failure) is returned.

### 7.7.11 Data Format

A read returns the data format of the FL3110/3111. A write changes the data format to the requested data format. After the data format has been changed to the addressed unit, the Modbus communications may cease or start producing comm errors because the data format has changed, therefore the master will have to change its data format to the slave's new data format in order to restart or provide proper communications. These Functions operate on the Low Data Byte.

<u>Data</u>	<u>Parity</u>	<u>Stop</u>	<u>Format</u>	<u>Low Data Byte</u>	<u>Access</u>
8	None	1	8-N-1	00	Read/Write
8	Even	1	8-E-1	01	Read/Write
8	Odd	1	8-O-1	02	Read/Write
8	None	2	8-N-2	03	Read/Write

High Data Byte Not Used

Exception: If an EEPROM write error occurs, then the Exception Code 04 (Slave Device Failure) is returned.

### 7.7.12 UV COPM Fault Total

A read indicates the Total Number of UV Channel Window or Sensor COPM Faults that occurred in the slave device. This fault is usually caused by a dirty Window or faulty Sensor or Circuitry. The maximum count is 255 after which the counter will roll over to zero and begin counting again.



### 7.7.13 IR COPM Fault Total

A read indicates the Total Number of IR Channel Window or Sensor COPM Faults that occurred in the slave device. This fault is usually caused by a dirty Window or a faulty Sensor or Circuitry. The maximum count is 255 after which the counter will roll over to zero and begin counting again. (FL3110 only)

### 7.7.14 UV Signal Count

A read indicates the number of UV Signal Counts that have occurred within 500ms which is the time required to detect a fire in the UV spectrum

### 7.7.15 IR Signal Count

A read indicates the number of IR Signal Counts that have occurred within 500 ms which is the time required to detect in the IR spectrum. (FL3110 only)

### 7.7.16 Remote Reset

Writing a (1) to the bit activates the Remote Reset function that resets the Alarm and Warn Conditions. The function is active momentarily and will reset automatically after being used.

<u>Function</u>	<u>Bit (LSB)</u>	<u>Access</u>
Enable	1	Read/Write
Disable	0	Read/Write

### 7.7.17 Remote Alarm Test

Writing a (1) to the bit activates the Remote Alarm Test function that activates the Warn and Alarm relay turn-on along with the analogue current status. Once the Alarm Test is complete the function should be disabled by writing a zero to Remote Alarm Test and then resetting the Alarm and Warn relays by writing a (1) to the Remote Reset (referenced above).

<u>Function</u>	<u>Bit (LSB)</u>	<u>Access</u>
Enable	1	Read/Write
Disable	0	Read/Write

### 7.7.18 Clear COPM Faults

A write to enable the bit activates the Clear COPM Faults function that resets all of the COPM faults. The bit and enable function is active momentarily and will reset to disable and zero after being used.

<u>Function</u>	<u>Bit (LSB)</u>	<u>Access</u>
Enable	1	Read/Write
Disable	0	Read/Write

## Customer Satisfaction Questionnaire

**Attention Field Operations:**

We would appreciate your help in assessing and thus improving the quality of our Equipment and Service and would therefore be grateful if you would complete the Questionnaire below and return it to:

General Monitors Ireland Ltd,  
Ballybrit Business Park,  
Galway,  
Republic of Ireland.

**Thank you for your assistance**

Client \_\_\_\_\_

Client Order No. \_\_\_\_\_

General Monitors Sales Order No. \_\_\_\_\_

(Please tick appropriate box)

	Yes	No
Was the equipment the correct option?	<input type="checkbox"/>	<input type="checkbox"/>
Are sensors correct type and range?	<input type="checkbox"/>	<input type="checkbox"/>
Is mechanical assembly good? (everything proper fit and tight)	<input type="checkbox"/>	<input type="checkbox"/>
Did you receive the necessary accessories to commission the equipment?	<input type="checkbox"/>	<input type="checkbox"/>
Has the equipment been commissioned?	<input type="checkbox"/>	<input type="checkbox"/>
Any problems encountered during commissioning?	<input type="checkbox"/>	<input type="checkbox"/>
Is the equipment functioning correctly at present?	<input type="checkbox"/>	<input type="checkbox"/>

If you have answered **NO** to any of the above, please provide further details overleaf. **Thank you.**

Completed by: \_\_\_\_\_

Date: \_\_\_\_\_