

# QMI MULTIPLEX<sup>TM</sup> Oil Mist

## OPERATING INSTRUCTIONS

By a function, place  
FLAT over specified circle ☐

☐ Circle

☐ Channel number

☐ Alarm level + ☐ Channel number

☐ Test

Alarm level + ☐ Test + ☐ Channel  
number

Alarm level + ☐ Channel number

Alarm level + ☐ Reset + ☐ Channel number

## FAULT DIRECTORY

Channel	Reading	Fault condition
1-12	F1	Cable fault
1-12	F2	Detector dirty
1-12	F3	Detector faulty
1-12	IC	Isolated circuit
C	F4	Fan failure

NOTE: if 'No CPU' light  
'on' on test

UK.

# QMI

## QMI MULTIPLEX<sup>TM</sup> Oil Mist Detection System Manual

ATMOSPHERIC SENSOR

AM8/SEPTEMBER 2018

# ***QMI***

**Oil Mist Detection Systems**

# **QMI** Atmospheric Oil Mist Detection System

## **QMI MULTIPLEX™ Atmospheric Oil Mist Detection System Manual**

**AM8/SEPTEMBER 2018**

You have chosen the QMI MULTIPLEX™ Atmospheric Oil Mist Detection System to locate hazardous levels of oil mist in confined areas such as: engine rooms, pump rooms, bow thrusters, purifier rooms, hydraulic pack areas, and test cells.

We can provide the smaller QMI TRIPLEX™ Atmospheric Oil Mist Detection Systems for spaces that require up to three Sensors.

The QMI MULTIPLEX™ Oil Mist Detection Systems have been providing a fast response without false alarms to protect lives and prevent fires since the early eighties. Our Engine Oil Mist Detection Systems provide engine condition data to continuously monitor when and where repairs are needed thus avoiding unnecessary engine wear and the resulting danger.

This system is designed to measure oil mist between 3 and 10 microns.

For more information please see our website: [www.oilmist.com](http://www.oilmist.com)

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Errors and omissions excepted. As we strive to improve our service and products specifications may change or vary.

Type Approval from:





# Table of Contents

## PART 1

### INTRODUCTION

Technical Specifications	Part1-2
QMI MULTIPLEX Monitor	Part1-3
MULTIPLEX Central Monitor Unit (CMU) Layout	Part1-4
Description of Central Monitoring Unit (CMU)	Part1-5
Description of Sensor (Q10)	Part1-7
Photograph of Sensor (Q10)	Part1-8
Drawing of Atmospheric Sensor	Part1-9

## PART 2

### INSTALLATION

General Wiring Layout for MULTIPLEX Atmospheric System	Part2-2
Cut out for QMI Panel/Wall Mounted Monitor	Part2-3
Positioning and Location of Sensors	Part2-4
Positioning of QMI Atmospheric Sensor (Q10)	Part2-5
Schematic of Positioning of Sensor and Best Practice	Part2-7
Monitor with Harting Connectors	Part2-9
Cable Specifications	Part2-10
Wiring Description	Part2-11
Wiring of Socket	Part2-12
Multi-core Cable Sizing Table When Less than 10 Atmospheric Sensors are used	Part2-13
Multi-way Junction Box PCB with 12V PSU (Q07)	Part2-14
Connector (Q01H1) Details for QMI MULTIPLEX CMU - Junction Box	Part2-15
Cable Details for Atmospheric Sensors 6 Pole Socket (Q1006)	Part2-16
Connector Details for QMI MULTIPLEX CMU - Junction Box when used with Atmospheric Sensors (Q10)	Part2-18
Wiring Details for Junction Box to Atmospheric Sensors (Q10)	Part2-19
Overall View of Connector No. 4 For QMI MULTIPLEX Mains 110/240V Power Socket (Q01H4)	Part2-20
110/240V Power Supply Wiring	Part2-21
Cable Details for QMI MULTIPLEX Relay Alarm Output (Q01H3)	Part2-22
Cable Details for QMI MULTIPLEX Relay Shutdown Output (Q01H2)	Part2-23
Alarm Output Wiring	Part2-25
Optional Plant Shutdown Wiring	Part2-26
Graph to show relationship between mg/L, Digital Readout of Percentage of Alarm Level and the Percentage of LEL	Part2-27
QMI MULTIPLEX 4-20mA Data Logger Output	Part2-28
Cable Details for QMI MULTIPLEX 4-20mA Data Logger Output (Q01H5)	Part2-29

## PART 3

### STARTING UP/RUNNING PROCEDURE

Operation	Part3-2
Operation of Alarm Relays	Part3-3
Setting and Changing Alarm Levels	Part3-4
Test Sequence	Part3-5
Checking Alarm Levels and Reading Channels	Part3-6
Changing the Number of Sensors	Part3-7
Setting Up of Sensors Required	Part3-8
To Isolate or Restore a Channel	Part3-8
Response to Alarm	Part3-9

## PART 4

### FAULT FINDING

Drawing – Layout of Transistors and Fuses	Part4-2
Fault Directory	Part4-3

## PART 5

### MAINTENANCE

Maintenance Procedures	Part5-2
Lens Cleaning Procedure	Part5-3
Replacing Fan (Q1004) in Sensor	Part5-5
Maintenance Kit (Q1005)	Part5-6
Suggested Maintenance Plan for Atmospheric Sensors	Part5-7

## PART 6

### SPARES

Codes and Description for Replacement Parts and Spares	Part6-2
Returns Procedure	Part6-3
QMI Continual Support Information Request	Part6-4

# ***QMI***

**Oil Mist Detection Systems**

# PART 1

# INTRODUCTION

## TECHNICAL SPECIFICATIONS

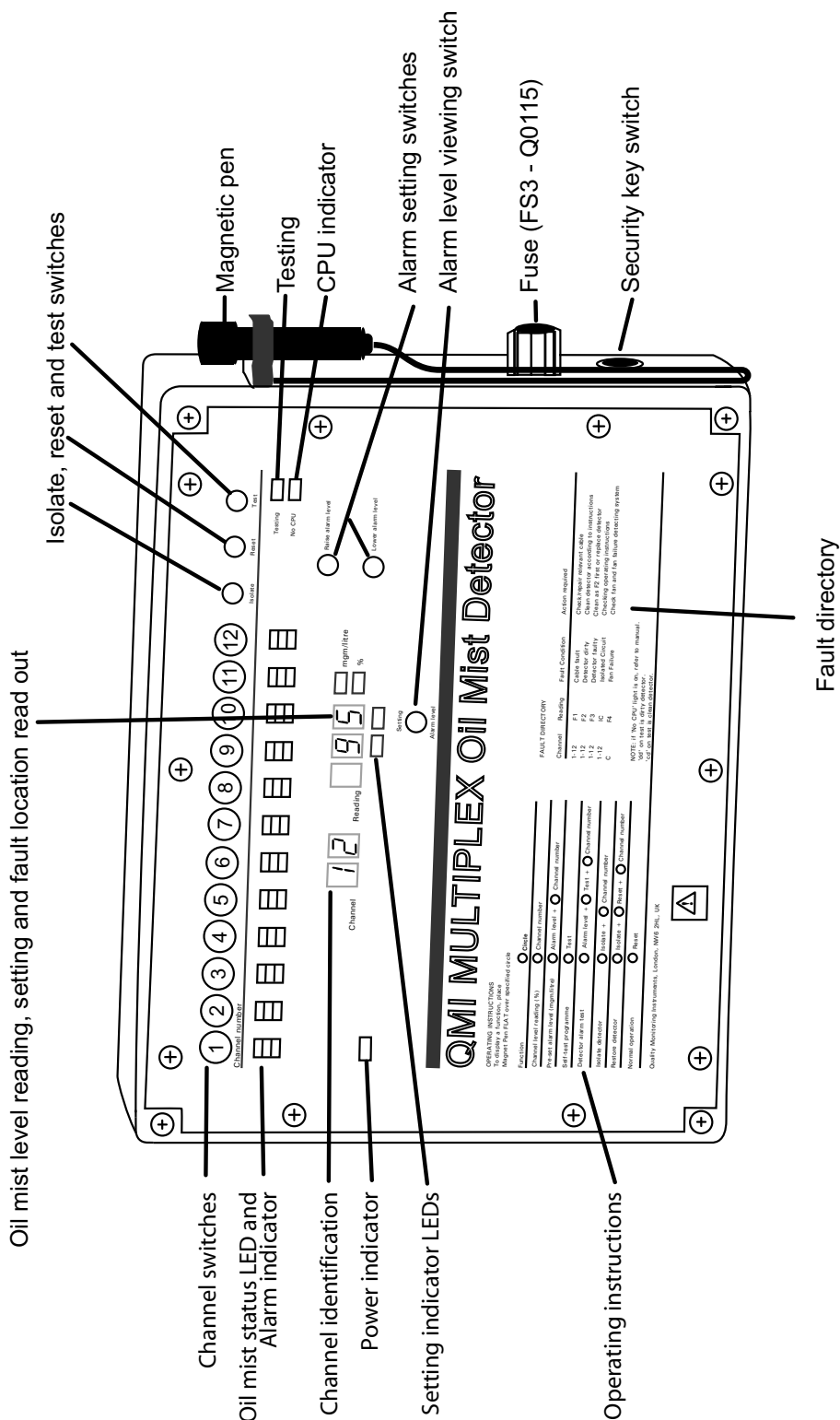
<b>POWER SUPPLY</b>	Nominally 110/240VAC 50/60 Hz	
<b>MAXIMUM POWER CONSUMPTION</b>	100W	
<b>MAXIMUM SAMPLING CHANNELS</b>	12	
<b>CYCLE TIME</b>	500 milliseconds simultaneously on all channels	
<b>MEASURING SYSTEM</b>	Time multiplex analogue signal	
<b>SYSTEM OUTPUTS - RELAYS</b>	All relays fitted with maximum change contacts voltage rating 110V@8A to 240V 5A	
Main alarm	Normally energised with 1 set of change over contacts	
Early warning alarm	Normally energised with 1 set of change over contacts	
Function shutdown alarm	Normally de-energised with 1 set of change over contacts.	
Fault alarm	Normally energised with 1 set of change over contacts	
<b>OPERATING TEMPERATURE</b>	5-70°C	
<b>MULTIPLEX</b>	<b>DIMENSIONS (mm)</b>	<b>WEIGHT (kg)</b>
Central Monitoring Unit (CMU)	403 x 312 x 128	10
Sensor (DH)	359 x 113 x 73	2.30
<b>MONITOR SEAL</b>	Monitor is sealed to IP65	
<b>MAXIMUM DISTANCE</b>	Maximum cable length between DHs and CMU is 100 metres. (for longer lengths contact QMI)	
<b>FUSE ARRANGEMENTS:</b>		
Internal FS1	-Head Interface 1.25A anti-surge	
Internal FS2	-12V DC Fan Failure Supply 400mA anti-surge	
Internal FS3	-400mA Data Logger PCB Protection	
External FS4	-110/240VAC 3.15A anti-surge	
<b>OPERATING TEMPERATURE:</b> Monitor (Q01H)	5° - 70°C	
<b>FEATURES</b>	Continuous self-monitoring fault diagnosis Manual test facility of all functions Functional shutdown (e.g. hydraulic pack)	
<b>OPTIONAL</b>	4-20mA output for up to 12 individual alarms or data-logging of alarms See Part 2-29 and 2-30.	



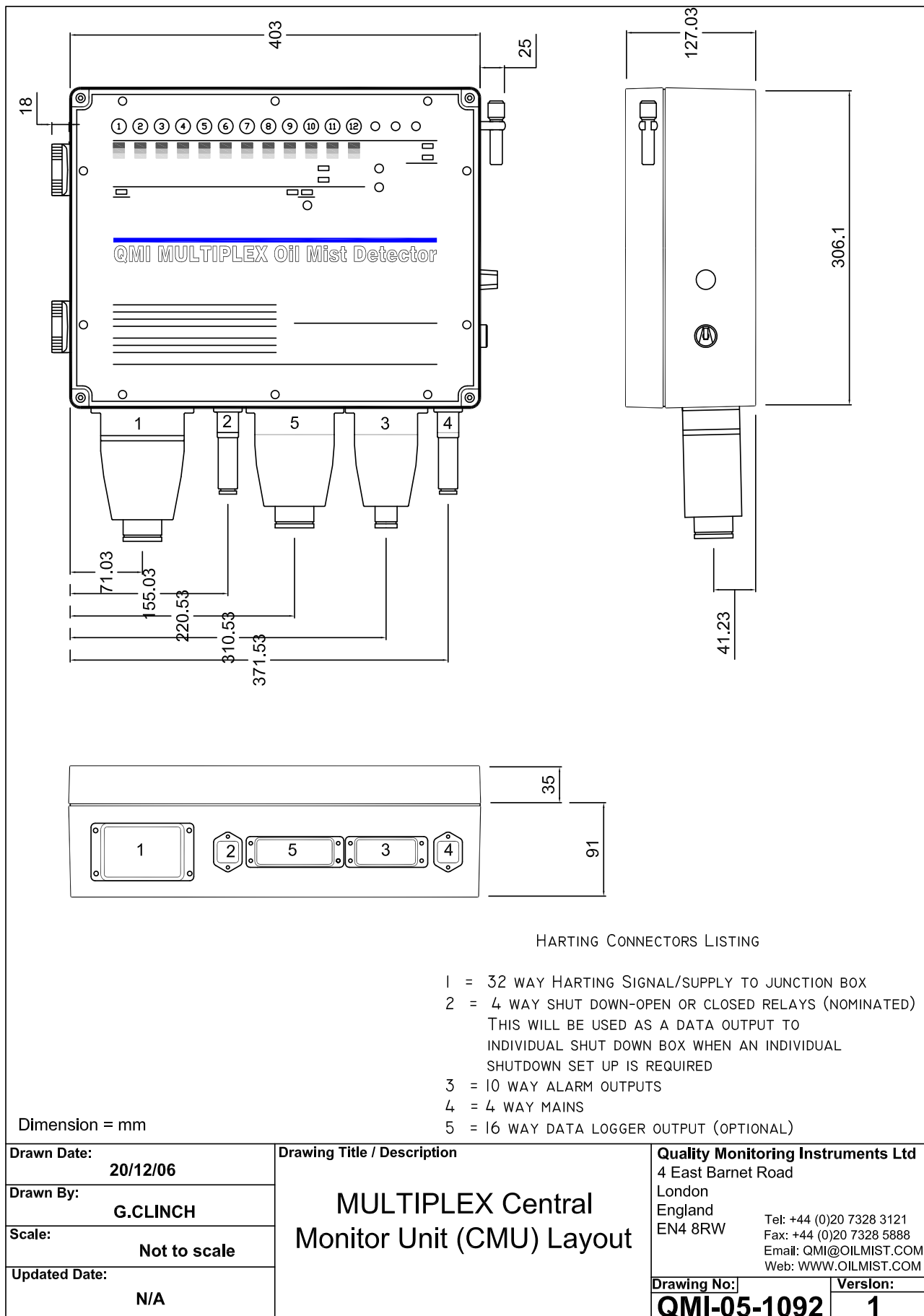


# Atmospheric Oil Mist Detection System

## QMI MULTIPLEX MONITOR



# QMI Atmospheric Oil Mist Detection System





## DESCRIPTION OF CENTRAL MONITORING UNIT (CMU)

The CMU contains:

1. Display panel with MULTIPLEX PCB
2. Power Supply Board with Power Supply Unit (PSU)
3. Multi-way connectors using terminal plugs and Harting connectors for wiring of alarms and functions, Sensors and mains power supply
4. Fuses (FS1, FS2, FS3 and FS4)
5. Security key switch assembly (Part 1-3)

### 1. DISPLAY PANEL (Part 1-3)

Access to the CMU is by way of the hinged Display Panel sub - assembly. The 4 x M6 socket head screws retain the display panel. Upon removal of the screws the panel can be swung away from the main enclosure.

### PCB (Q0106) (Part 1-3)

The display panel sub-assembly carries the main MULTIPLEX PCB type MP12 v 3.2 Processing Board, with the Binary Switch and Flash Memory Chip which is attached to the display (Monitor faceplate) by 6 x cheese head screws.

### 2. POWER SUPPLY BOARD with PSU

The Power Supply Board consists of a switch mode power supply unit mounted on a PCB. The PCB holds the fuses, the transistor TR1 (Q0111), and the terminal plugs and carries the alarm relays.

### 3. MULTI-WAY CONNECTORS

The terminal plugs and Harting connectors used for wiring are provided as part of the QMI MULTIPLEX system. It is very important that the installers pay attention to the pins of connectors so as not to damage the plugs or sockets and to ensure a good connection.

## 4. FUSES

There are 4 fuses on the MULTIPLEX Power Supply Board, see Fault Directory in Part 4.

**FS1** (Q0114) is a 1.25A anti-surge fuse. This is connected to TR1 and is the supply to the Sensors. The LED 1, which is underneath, will flash when all is well.

**FS2** (Q0112) is a 400mA anti-surge fuse for 12V power to the fans. The LED will light when all is well.

**FS3** (Q0112) is a 400mA anti-surge fuse to protect the Data Logger PCB and also has a Green LED3 light which is lit constantly (not flashing).

**FS4** (Q0115) is a 3.15A anti-surge fuse and is fitted to the side of the Monitor.

## 5. SECURITY KEY SWITCH (Part 1-3)

The Chief Engineer possesses the only set of keys (Q0103) to change settings. It is possible to check the settings without using the security key switch, see Part 3-4.

**NOTE:** The Monitor does not have an on/off switch this is to prevent the oil mist Sensors from being switched off. To turn off the power disconnect the power supply.



## DESCRIPTION OF SENSORS (Q10)

See photo Part 1-8

The Sensor operates using the principle of light scatter (nephelometry). The power and signal are transmitted to and from the Monitor through a single cable sending a timed analogue signal. All Sensors sample simultaneously and continuously every half-second (500 milliseconds).

The assembled Sensor comprises:

- (a) Articulated Joint and mounting flange
- (b) Chamber

### a) ARTICULATED JOINT AND MOUNTING FLANGE

See drawing Part 1-9

The Articulated Joint is fitted to bulkhead or deckhead allowing the Sensor to be positioned facing the flow of air in the chamber being monitored.

The sub-assembly is fitted to the Articulated Joint by 4 screws, which can be removed if and when the Sensor lens requires cleaning.

### b) CHAMBER

Inside the unit are the PCB, integral fan, and sensing lenses. Power is supplied to the 12V fan by a single cable, which is connected to the Monitor (or to a Junction Box). The fan draws the sample of air past the sensors through the outlet ports.

In the front of the Sensor unit are the air intake louvers, and an LED, which shows green when the fan is working. The electronics are mounted on the back of the chamber casing and are protected by the cover sealed to IP65.

At the back of the unit is the multi-purpose power and signal socket. Next to the socket is the mounting spigot.

**NOTE:** The integral fan is interchangeable without recalibrating the Sensor.



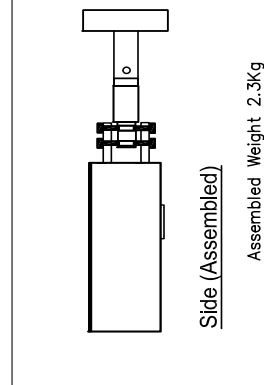
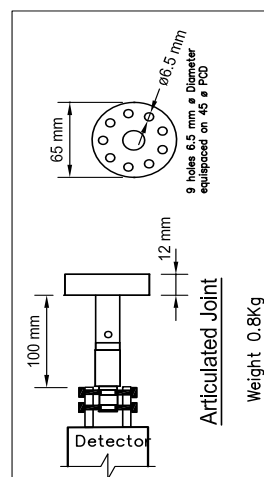
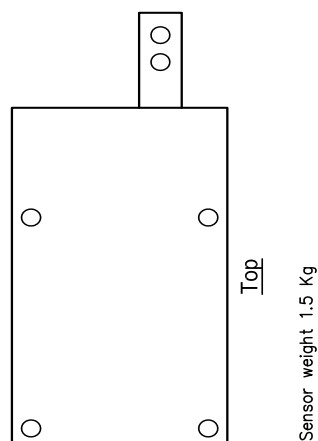
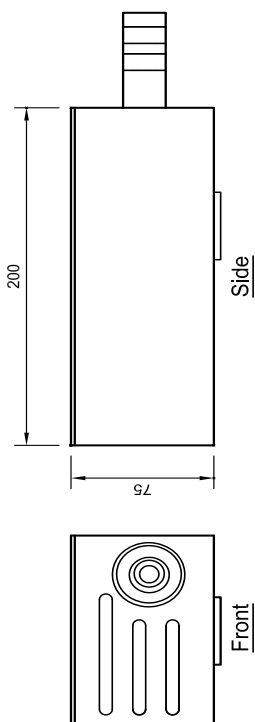
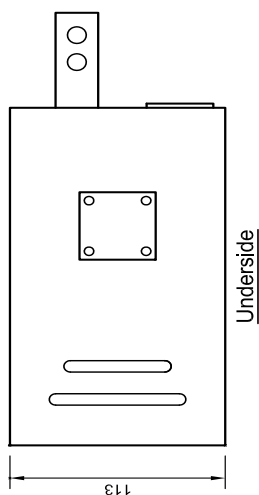
# **QMI** Atmospheric Oil Mist Detection System

## PHOTOGRAPH OF SENSOR (Q10)



## DRAWING OF ATMOSPHERIC SENSOR

### Drawing of Q10 Atmospheric Sensor - Not to Scale



	Drawing Title / Description		<b>Quality Monitoring Instruments Ltd</b> 4 East Barnet Road London EN4 8RW United Kingdom  Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5888 Email: QMI@QILMIST.COM Web: WWW.QILMIST.COM
	Drawn Date:	23/05/2014	
	Drawn By:	JW	
	Scale at A3:	Not to scale	
	Updated Date:	N/A	
Drawing No:		Version:	
		<b>QMI-14-1147</b>	<b>0</b>

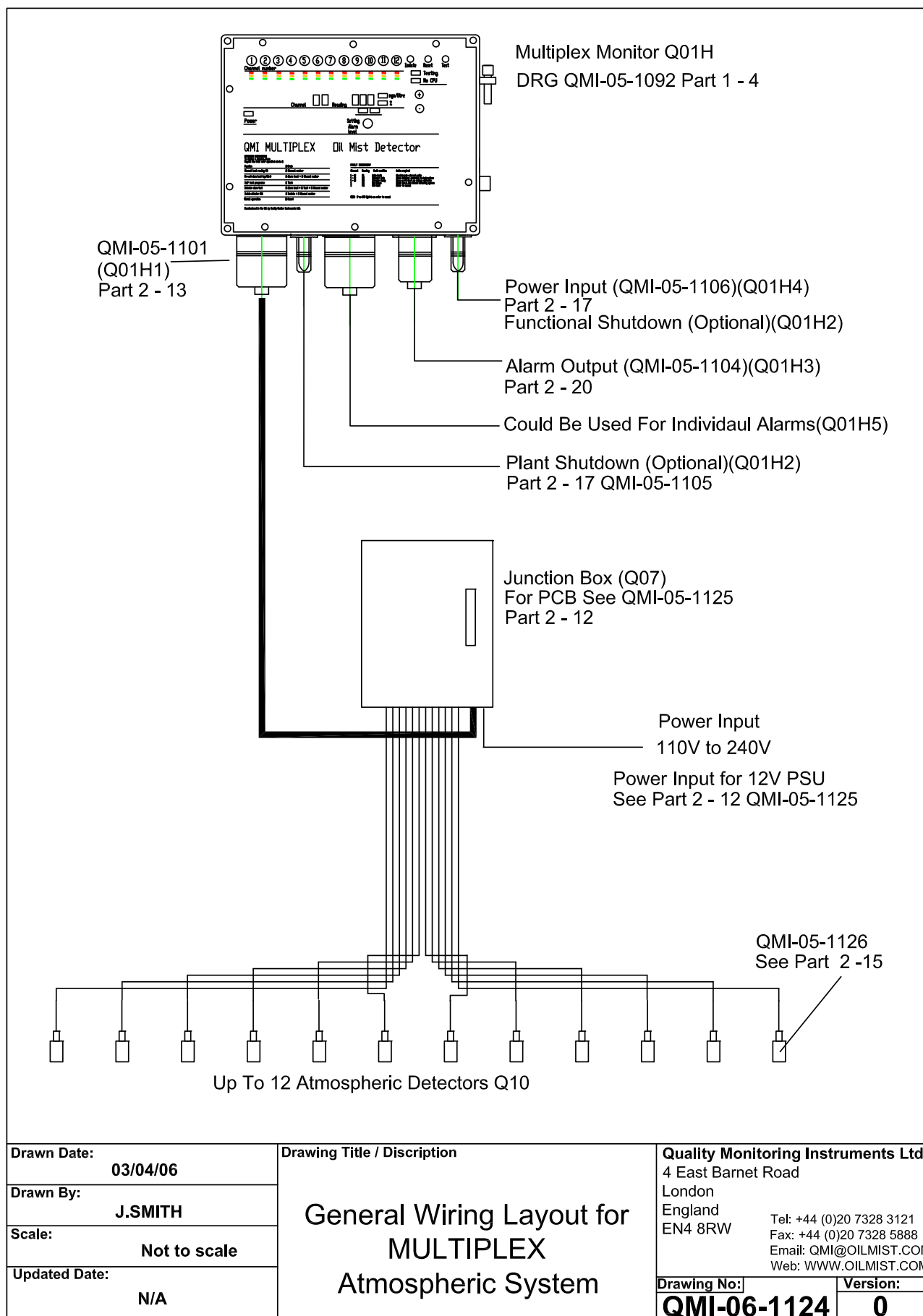
**QMI**

**Oil Mist Detection Systems**

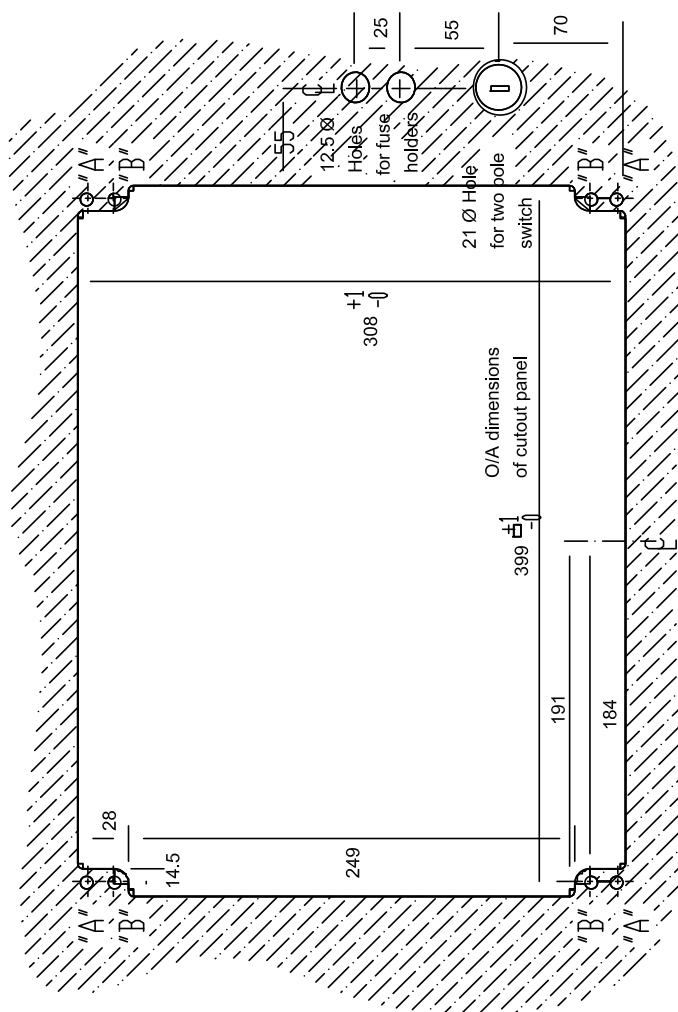
## PART 2

## INSTALLATION

# QMI Atmospheric Oil Mist Detection System



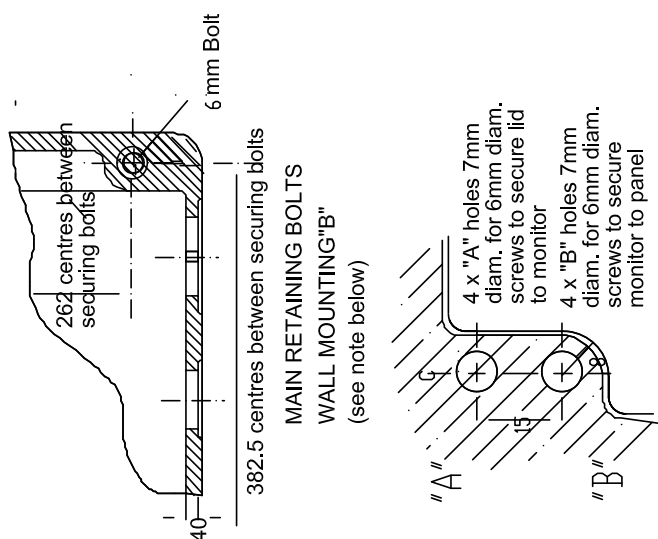




FRONT VIEW OF TEMPLATE FOR CUT OUT TO HOUSE THE CMU

To access the unit open the cover which will hinge at the left via 4 socket screws to expose 4 counter bored holes to suit M6 x 55mm socket head screws to attach the CMU to either a panel or onto a prefabricated wall bracket.

For panel mounting use dimension shown



## DETAIL OF TEMPLATE HOLES

<p>Drawn Date: 12/11/05</p> <p>Drawn By: G.CLINCH</p> <p>Scale: 1:1</p> <p>Updated Date: N/A</p>	<p>Drawing Title / Description</p> <p>Cut out for QMI Panel/Wall Mounted Monitor</p>	<p>Quality Monitoring Instruments Ltd</p> <p>4 East Barnet Road</p> <p>London</p> <p>England</p> <p>EN4 8RW</p> <p>Tel: +44 (0)20 7328 3121</p> <p>Fax: +44 (0)20 7328 5888</p> <p>Email: QMI@QIMLIST.COM</p> <p>Web: WWW.QIMLIST.COM</p>
<p>Drawing No: QMI-05-1097</p>		<p>Version: 0</p>

## POSITIONING AND LOCATION OF SENSORS

### NUMBER OF SENSORS REQUIRED

It must be taken into consideration that the number of Sensors will depend on the pressure being released into the atmosphere which is relative to the volume of the space. It will also depend on the amount of air movement.

In a large engine room you may need 4 or 5 Sensors, for a hydraulic pack room 1 to 3 Sensors are sufficient. In purifier and compressor rooms one is usually enough. For all other spaces such as steering gear or bowthruster housing use 1 or 2 Sensors.

Remember, any spare channels can be used later.

**NOTE: Sensors cannot be used in cargo pump rooms as they have not been certified for hazardous zones.**

### LOCATION OF SENSORS

Please follow the guidelines outlined below to get the best results.

We recommend using a smoke test aerosol or smoke generator to judge the way the air flows over the machinery. Normally air will move toward ventilation extractors or the turbo charger, therefore, the Sensor must be placed in the air stream as close as possible to the machinery.

The Sensor comes with a fixing flange which is welded on the Articulated Joint. We suggest the length of cable that runs to the Sensor is longer than required to enable the Sensors to be moved at a later date if deemed necessary.

To confirm that the Sensors are correctly positioned you should carry out the following test; wait until the engines, ventilation and other machinery are fully operational, then once again use your smoke test aerosol or smoke generator to prove the Sensors are correctly positioned. The Sensor should be rotated until positioned mid airflow as indicated by the movement of smoke.

**NOTE: Always place the Sensor in a position so that it can be easily maintained as the Sensors should be cleaned regularly.**



## POSITIONING OF QMI ATMOSPHERIC OIL MIST SENSOR (Q10)

We discuss below how the movement of oil mist in the atmosphere responds in working environments and suggest how the placement of Sensors in an optimum position is determined by flow of air. The Sensors may have to be adjusted when setting up the system or even later when any structural alterations, machinery changes or more powerful fans are introduced within the area.

There are so many variables in the detection of oil mist in the atmosphere that it is by no means an exact science. Common sense has a part to play when positioning Sensors.

### HOW MUCH AIR DOES THE SENSOR DRAW?

It pulls through 23 cubic feet/min or 0.65 m<sup>3</sup>/min

### WHAT IS THE DETECTING RANGE?

There is no detecting range for the Sensor. The Sensor uses its internal fan to draw in air, which is measured for oil mist. Three sensors inside the atmospheric Sensor measure backscatter of light in the air drawn into the Sensor, and dirt on the lenses.

### WHAT ARE THE FACTORS THAT DETERMINE THE POSITIONING AND NUMBER OF SENSORS NEEDED?

Four factors determine good positioning and number of Sensors. These factors should be considered together and a smoke generator is a good way to observe air movement and test positioning of the Sensors.

#### a. **Size of room or chamber (e.g. hydraulic pack area or engine room)**

The fan in the Sensor has a through-put of 0.65m<sup>3</sup> per minute. In a large room, more Sensors will allow a faster response. Also, dispersal of oil mist will be greater in a larger space and will require more careful positioning on the Sensors in the path of airflow.

#### b. **Air circulation**

In addition, the movement of air affects how many Sensors should be installed. If a room has only one vent then the Sensor placed near this vent will be able to sample the air extracted from the room. However, if there is more than one vent or point of extraction a Sensor is best placed in each path of air being drawn from towards each of these vents. This is why a smoke test aerosol or a smoke generator is used to ensure that the Sensor points towards the potential source of oil mist. The Sensor should be installed with the intake louvers facing the path of the smoke as shown by the smoke generator. The smoke generator will also show any eddies or paths that the air may follow in the chamber which is important to ensure that Sensors are correctly positioned.

In hydraulic pack areas there should be a Sensor between each extractor and the packs which normally means 2 to 3 Sensors especially if the pack is in the engine room. This should be bourn in mind with any areas are being monitored.

# **QMI** Atmospheric Oil Mist Detection System

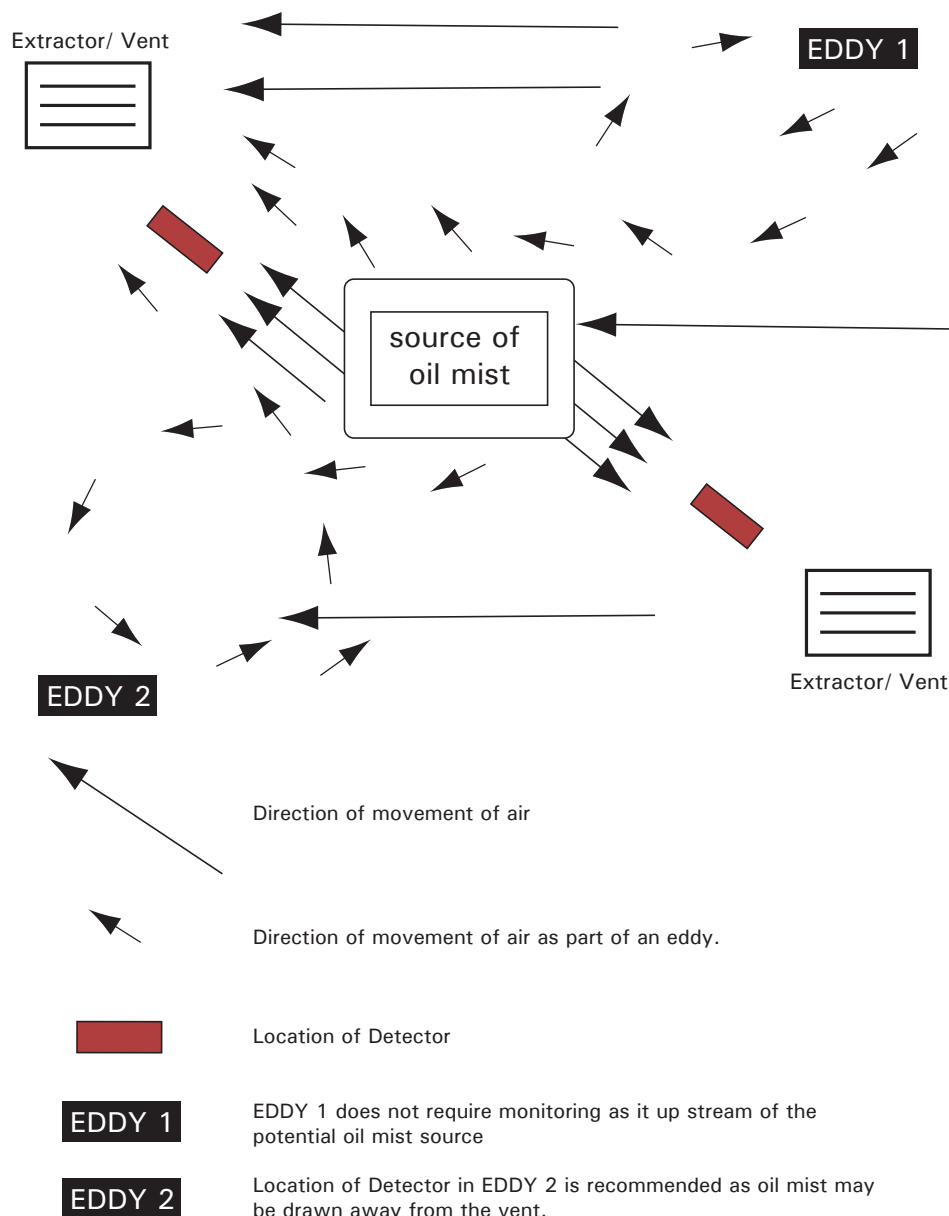
**c. Proximity to potential source of oil mist**

A Sensor should be placed downstream of the airflow around a potential source of oil mist (e.g. hydraulic pump). The closer the Sensor is to the machinery, the faster the response time should be.

**d. Number of potential sources of oil mist**

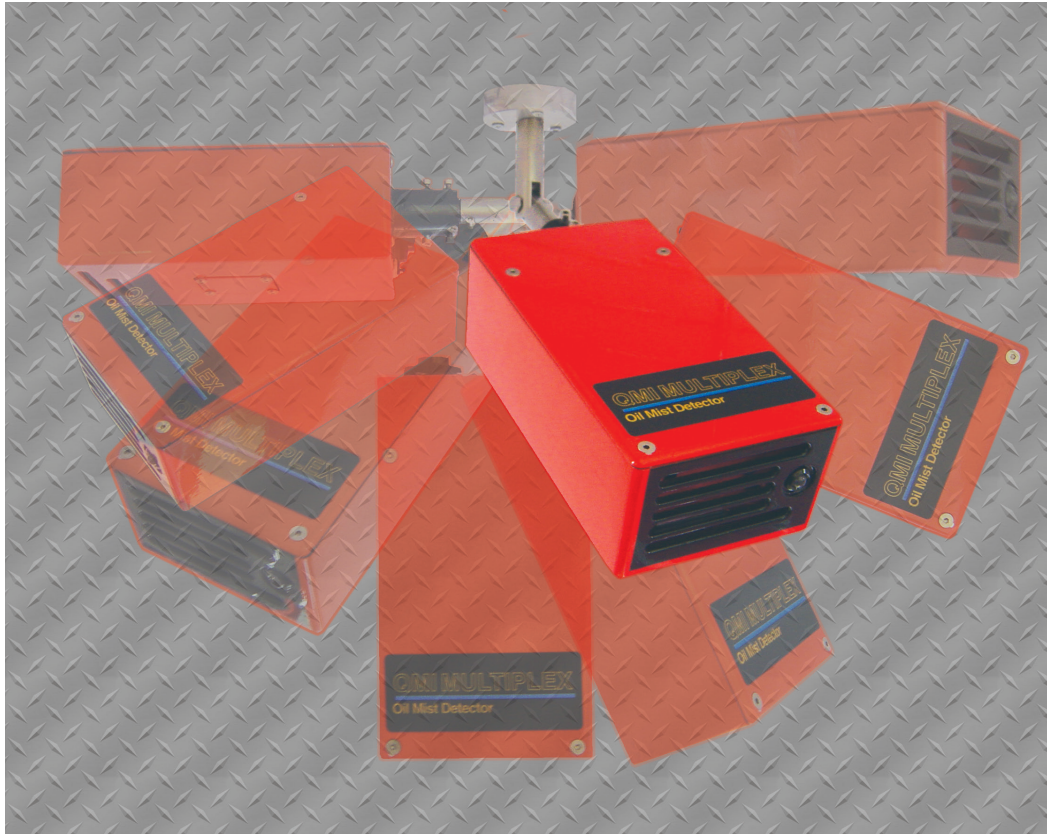
A fourth factor is the number of potential sources of oil mist. To make it easier to determine the source of oil mist, each piece of machinery or potential oil mist source should have a Sensor installed immediately down-stream of the airflow to ensure the fastest response possible.

In an engine room several Sensors are needed but the exact location will vary according to airflow.





## SCHEMATIC OF POSITIONING OF SENSORS AND BEST PRACTICE



The Articulated Joint allows the Sensor to be positioned mid airflow.

See Part 1-9 for the drawing of the Sensor and Articulated Joint.

### BEST PRACTICE

Until the ship is in operation, to avoid contamination of the lenses after installation, cover Sensors with a plastic bag. This will prevent paint or other materials dirtying or damaging the lenses, blocking the Sensor louvers and fan. This outcome permanently damages the Sensors and may require Sensors to be returned to QMI for repair.

**When oil mist detection system is in operation:**

- Do not conduct painting in the space with the Sensors
- Never cover Sensors

**When Sensors are installed but not in operation:**

- Keep Sensors in sealed plastic bag



# **QMI** Atmospheric Oil Mist Detection System

## **SETTING ALARM LEVELS**

For setting alarm levels see Part 3-4 of this manual for this procedure. Begin by setting all the Sensors at 0.05mg/L. There will always be areas where there is oil mist; for instance in the purifier room. The alarm level must be set to a higher level than needed so that the system does not go into alarm when there is no problem.

## **TEST PROCEDURE**

As these Sensors are sensitive to smoke, steam or oil mist, artificial smoke can be used to test the Sensors. This is the most effective way of proving the Sensors are working.

## MONITOR WITH HARTING CONNECTORS

See Part 1-4

1. 32-way (1-16 female, 17-32 male) signal; supply to Multi-way Junction Box
2. 4-way female shut/slowdown output open or relay
3. 10-way female alarm output
4. 4-way male mains input
5. 16-way female data logger output (optional)

## MATING CONNECTORS FOR THE ABOVE

	Connector	Part No.
<b>1</b>	32-way (1-16 male, 17-32 female) - maximum overall dimension of cable 30mm	Q01H1
<b>2</b>	4-way male - maximum overall dimension of cable 12mm	Q01H2
<b>3</b>	10-way male - maximum overall dimension of cable 20mm	Q01H3
<b>4</b>	4-way female - maximum overall dimension of cable 12mm	Q01H4
<b>5</b>	16-way male - maximum overall dimension of cable 20mm	Q01H5

## CABLE SPECIFICATIONS

For the following connection we RECOMMEND THE MINIMUM TYPE AND SIZE as follows:

Halogen free instrumentation, control and communication cable for fixed installation in ships or equivalent appropriate specifications for application.

**Conductor:** Standard copper conductor, annealed, IEC228 CLASS 2

**Insulation:** According to appropriate standards

**Pairs:** Two core twisted cable size 1 x 4 x 0.5mm<sup>2</sup> or 0.75mm<sup>2</sup>

**Stranding:** Pairs stranded together

**Screening:** Braid of Annealed Copper Wires. Filler tape under braid

Connector	Connection	Number of conductors and Cross section (n x mm <sup>2</sup> )
1	Monitor to Junction Box	19 x 2 x 0.75mm <sup>2</sup>
2	Monitor to Alarms or Shutdown (optional)	4 x 2 x 0.5mm <sup>2</sup>
3	Monitor to Main Alarm	4 x 2 x 0.5mm <sup>2</sup>
4	Monitor Power	3 x 1.5mm <sup>2</sup> rating Minimum 3A LNE (LN $\perp$ ) not twisted
	Junction Box to Sensors	4 x 2 x 0.5mm <sup>2</sup> (for lengths over 100m, 0.75mm <sup>2</sup> size wire should be used)
	Power to Junction Box	3 x 1.5mm <sup>2</sup> rating Minimum 3A LNE (LN $\perp$ ) not twisted

Example supplier: Helkama of Finland (LKM - HF for 3 x 1.5 power cable) and RFE - HF for 4 x 2 x 0.5mm<sup>2</sup> twisted connection cables.

## WIRING OF ALARM

If wiring just one side of each relay is either open or closed, use 6 cores.

If both sides of relay are being wired 9 cores will be required.

## EARTHING OF SENSORS

The screen is normally connected to Pin 5. No earth should be made at the Sensor end as this could result in ground loops. Earths made to any other point from the screen wire between Monitor and Sensor will be ineffective and could cause additional interference.



# Atmospheric Oil Mist Detection System

## WIRING DESCRIPTION

The wires are terminated into Harting plugs. These plug into the connectors on the MULTIPLEX power supply board (PSB).

### WIRING FOR POWER SUPPLY 110/240 VAC

The Mains connector is a 4-pin with Live, Neutral, and Earth. On the Power Supply Board this is marked L, N + See drawing of connector QMI-05-1106, Part 2-20.

Cable is 3 core of 1.5mm<sup>2</sup> and can be sourced from Helkama, part number is LKM - HF 3 x 1.5.

### WIRING FOR SENSORS

The Sensors are wired using 3 twisted - pair cable. Each connector is wired left to right and numbered 1 to 6. The cable specification is 3 twisted pair of 0.5mm<sup>2</sup> or 3 twisted pair of 0.75mm<sup>2</sup> where distance is over 100 meters.

This cable can be sourced from Helkama: part number is RFE - HF 4 x 2 x 0.5mm<sup>2</sup> or 4 x 2 x 0.75mm<sup>2</sup>.

Terminal 1 = Sensor supply +  
Terminal 2 = Sensor signal  
Terminal 3 = Sensor supply common  
Terminal 4 = Sensor signal common  
Terminal 5 = Drain wire/screen  
Terminal 6 = Fan 12V DC supply

See drawings for wiring connectors Part 2-19 and QMI-05-1105 on Part 2-23. Also wiring of socket QMI-05-1104 Part 2-22.

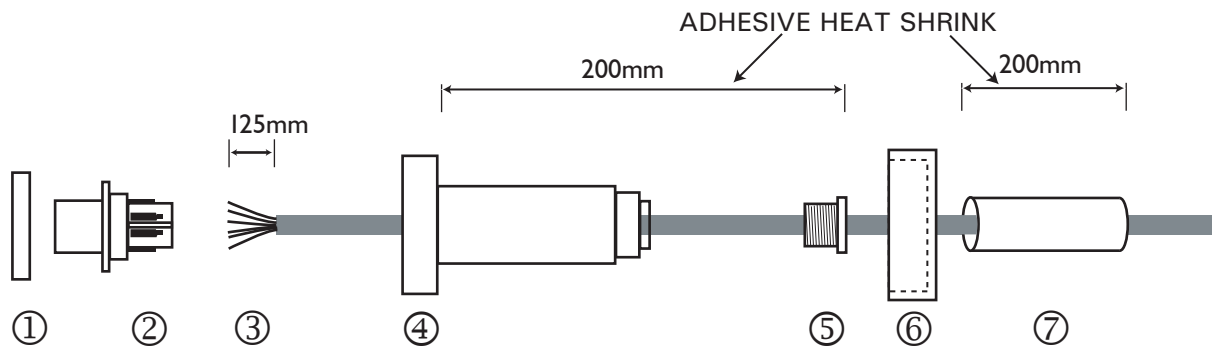
There are three warning alarms: Early warning, Shutdown, and Main. There is also a Fault Alarm.

The cable to use for wiring of alarms can be the same as used for wiring of air sensors. If you intend to use all four alarms you will need a 4 twisted pair cable.

Wiring for Monitor to Junction Box QMI-05-1101 Part 2-15.

Wiring for functional relay see drawing QMI-05-1105 Part 2-23.

## WIRING OF SOCKET



- ① Retaining ring
- ② Connecting block with terminals
- ③ Bared and tinned wires
- ④ Main housing of socket
- ⑤ Cable locking screw
- ⑥ Main securing thread to hold socket to plug
- ⑦ 24mm adhesive heat shrink sleeving (not supplied by QMI)

## ASSEMBLE INSTRUCTIONS

1. Strip back about 125mm of outer sheathing of cable and separate the wires. Then tin the ends of wires and the drain wire/screen being used.
2. Assemble socket on to wire in the sequence shown in illustration. By passing wires through parts ④ ⑤ ⑥ and ⑦
3. Wire bared wires and screen to correct numbered terminals of Part 2. Numbers are shown by the terminals. Use drawing QMI-05-1126 Part 2-16.
4. Reassemble and lock with part number ①
5. Pull heat shrink ⑦ over first part of ④ and wires to main cable and then shrink in the appropriate way.



## MULTI-CORE CABLE SIZING TABLE WHEN LESS THAN 10 ATMOSPHERIC SENSORS ARE USED

It is not necessary to use a 19 twisted pair cable between the CMU and the Multi-way Junction Box if less than 10 Sensors are installed.

Below is a chart on how to select a multi-core cable. If fewer Sensors are to be used the terminals to be wired in the Junction Box are as follows:

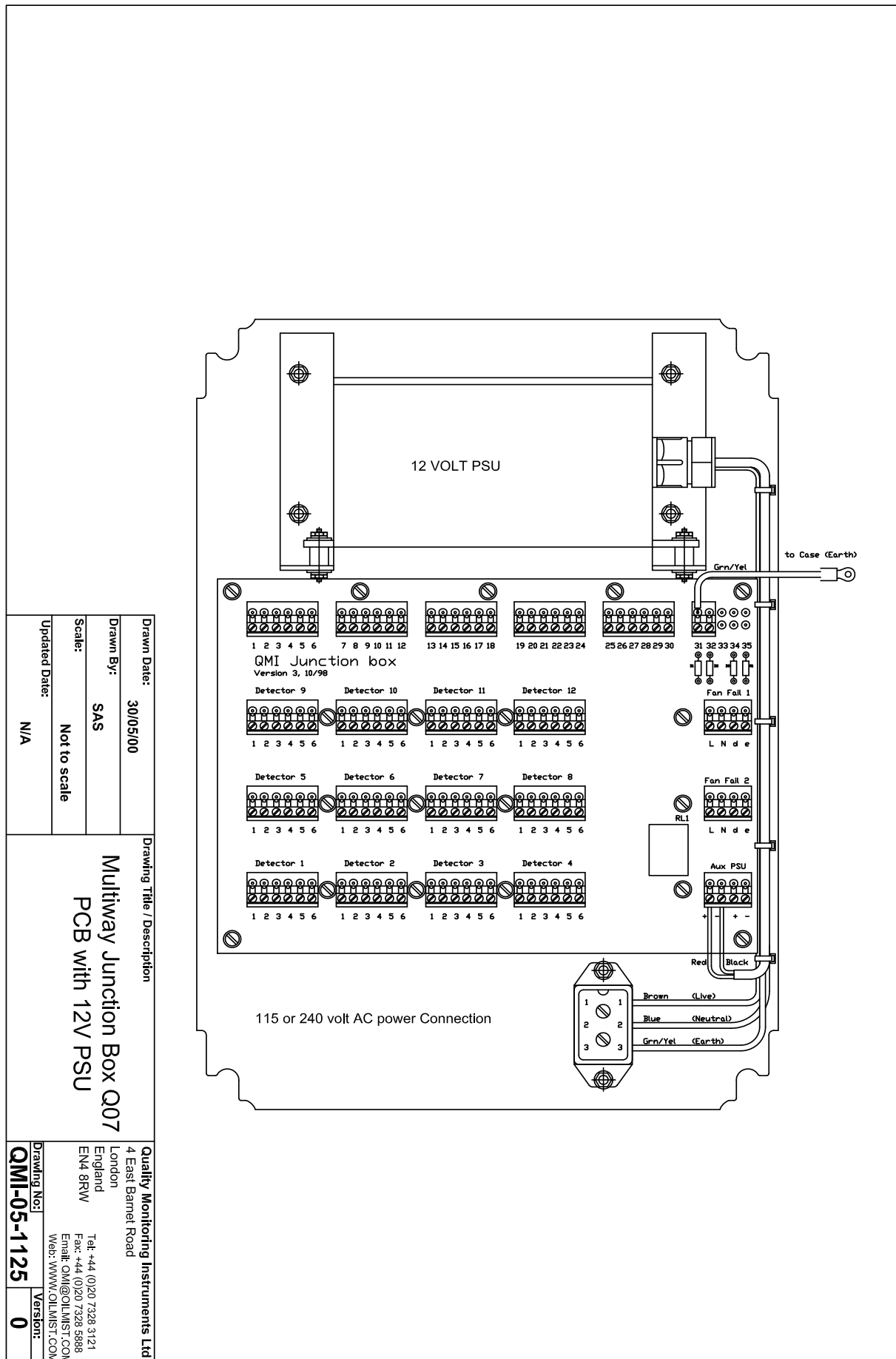
- drain connection (31) must always be used
- supply common (25) is used when only 3 or 4 Sensors are used
- supply common (25 & 26) are used when more than 3 or 4 Sensors are used
- supply + (27) is used when only 3 or 4 Sensors are used
- supply + (27 & 28) is used when more than 4 Sensors are used
- fan failure connections (29 & 30) are always used
- 12V Fan Failure connection (32) is always used

**NOTE:** For further wiring details turn to Part 2-16.

Numbers (25) to (32) refer to terminals.

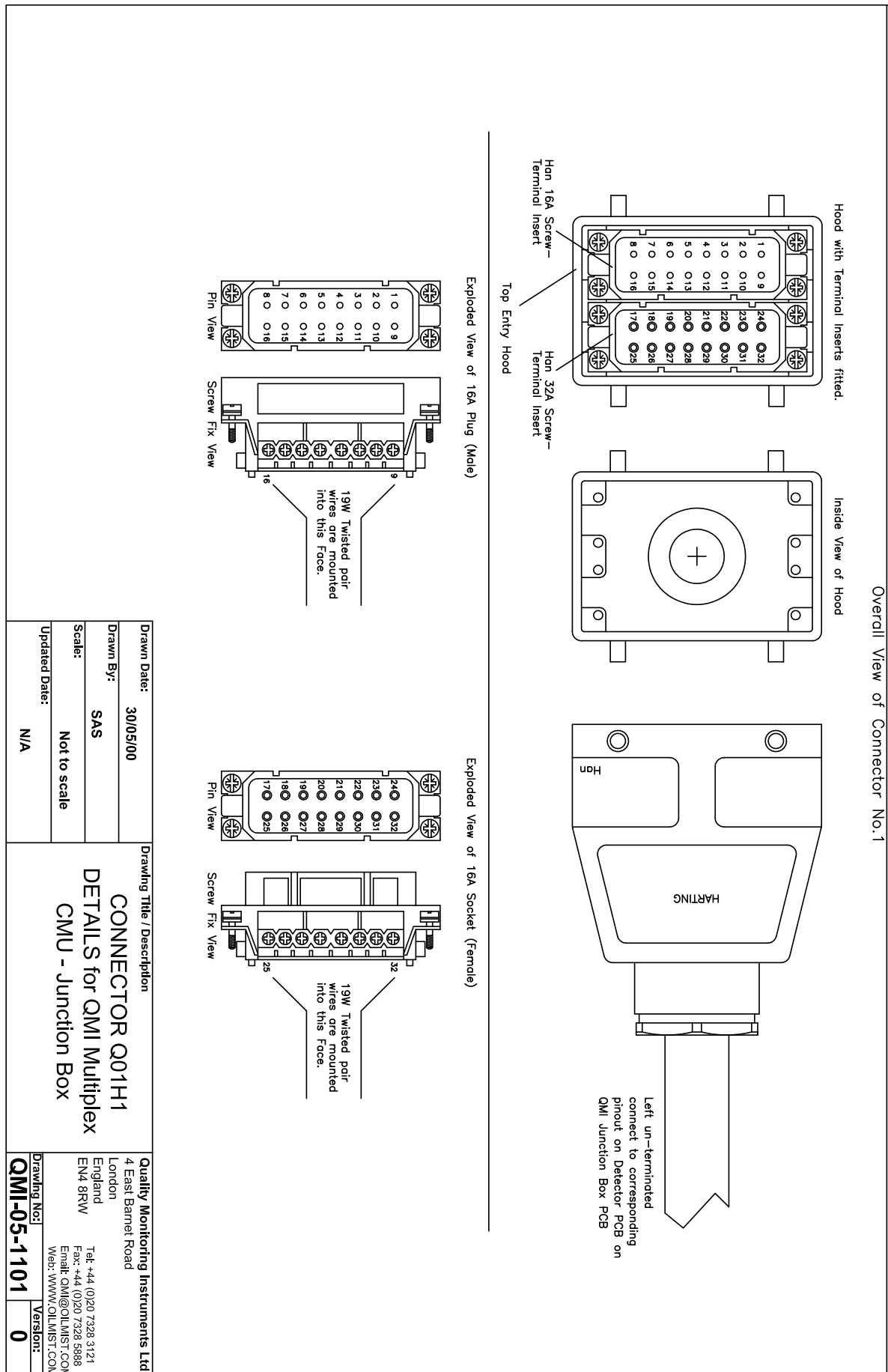
No of Sensors	No of Twisted Pairs	25 & 26 Supply Common		27 & 28 Supply +		29 & 30 Fan Failure		32 12V Fan Failure	
		Wire No.	Pair No.	Wire No.	Pair No.	Wire No.	Pair No.	Wire No.	Pair No.
3	7	7 & 8	4	9 & 10	5	11 & 12	6	13 & 14	7
4	8	9 & 10	5	11 & 12	6	13 & 14	7	15 & 16	8
6	12	13 & 14 15 & 16	7 8	17 & 18 19 & 20	9 10	21 & 22	11	23 & 24	12
7	13	15 & 16 17 & 18	8 9	19 & 20 21 & 22	10 11	23 & 24	12	25 & 26	13
8	14	17 & 18 19 & 20	9 10	21 & 22 23 & 24	11 12	25 & 26	13	27 & 28	14
9	15	19 & 20 21 & 22	10 11	23 & 24 25 & 26	12 13	27 & 28	14	29 & 30	15

# QMI Atmospheric Oil Mist Detection System



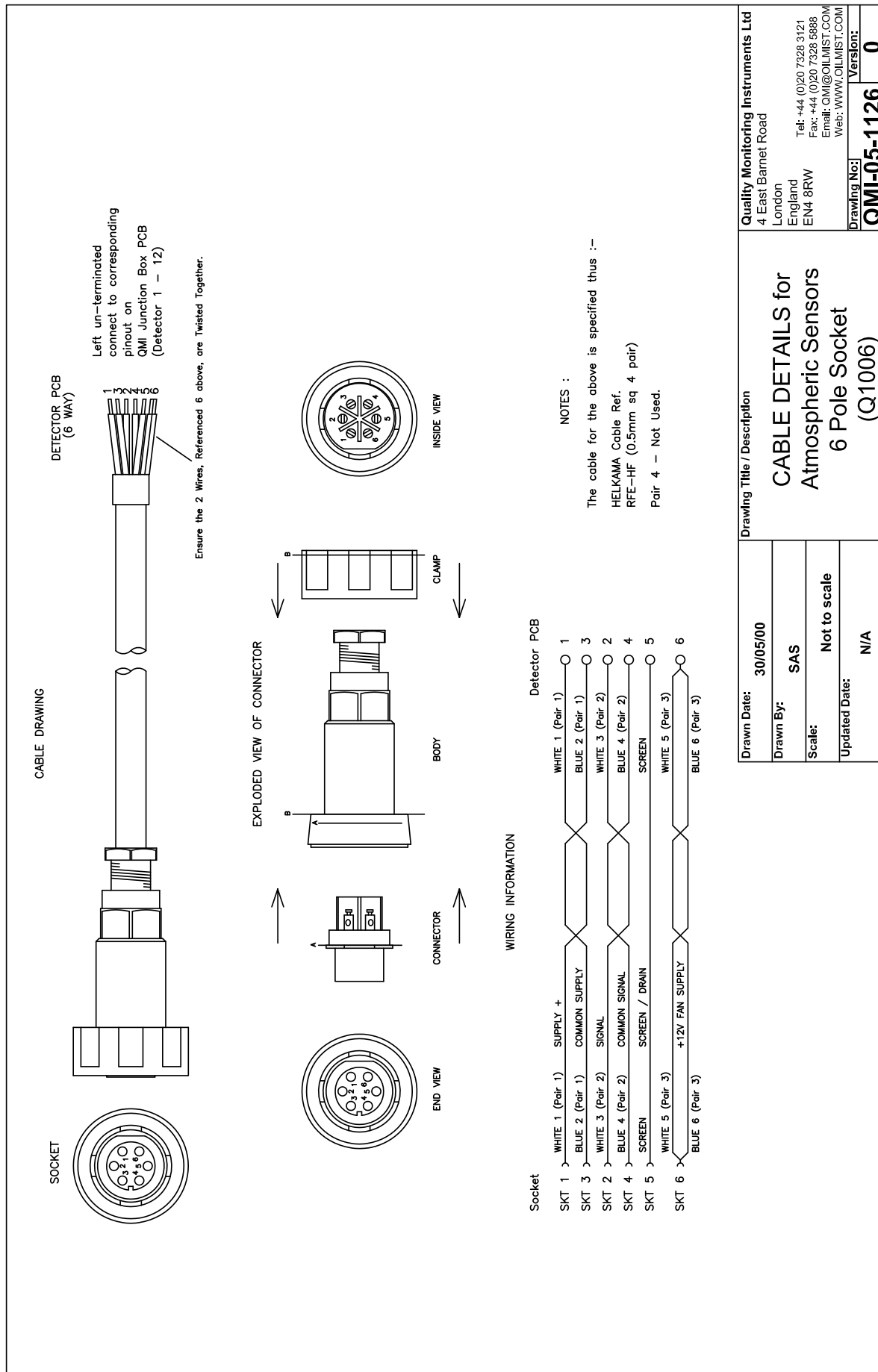


# Atmospheric Oil Mist Detection System





# Atmospheric Oil Mist Detection System

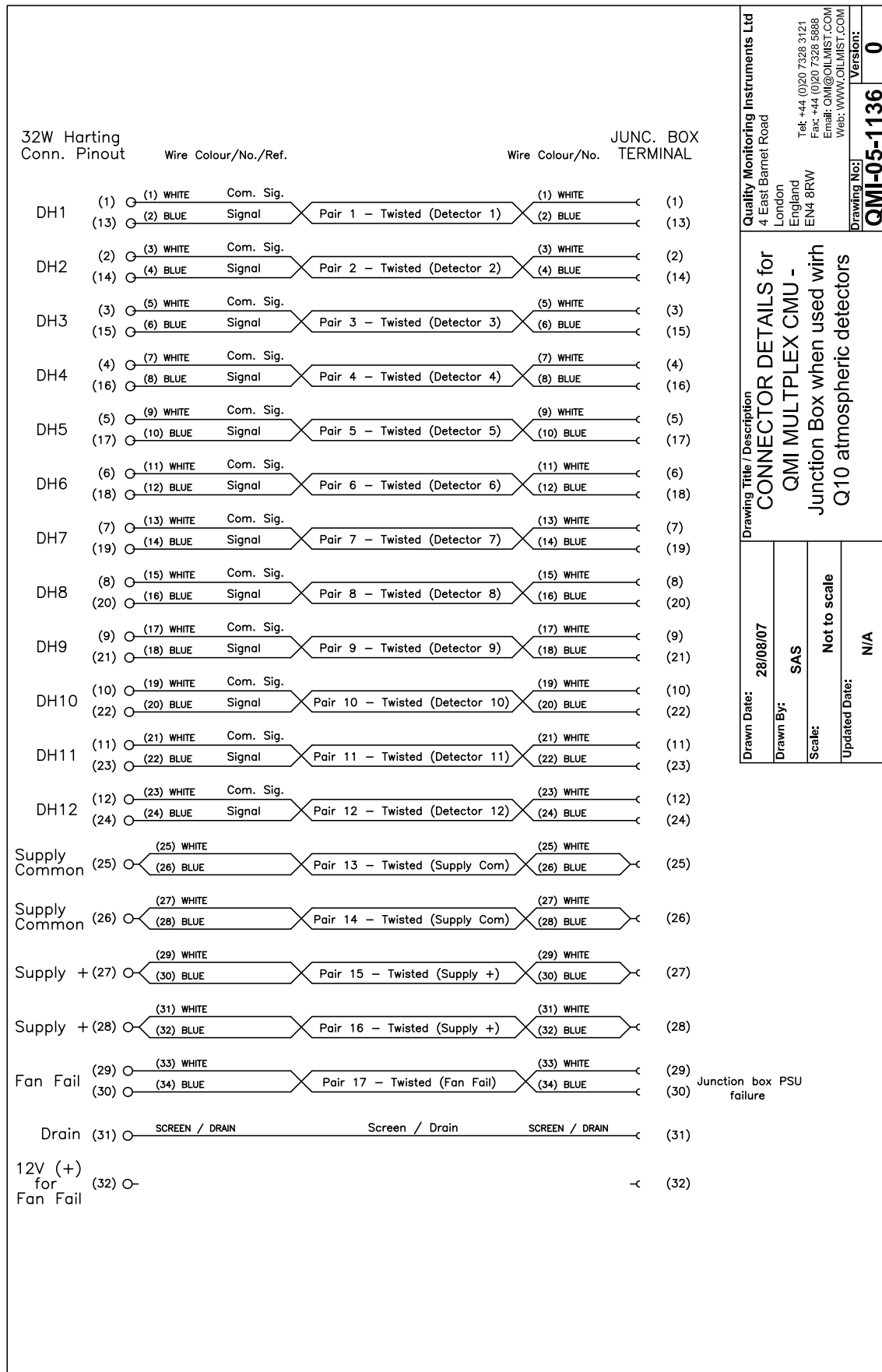


# **QMI**

**Oil Mist Detection Systems**



# Atmospheric Oil Mist Detection System



Quality Monitoring Instruments Ltd 4 East Barnet Road London England EN4 8RW Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5988 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM			
Drawing No:			Version: 0
QMI-05-1136			
Drawing Title / Description CONNECTOR DETAILS for QMI MULTIPLEX CMU - Junction Box when used with Q10 atmospheric detectors			
Drawn Date:	28/08/07	Drawn By:	SAS
Scale:	Not to scale	Updated Date:	N/A





# Atmospheric Oil Mist Detection System



View from inside of Socket



View from inside of Socket



View from inside of Socket



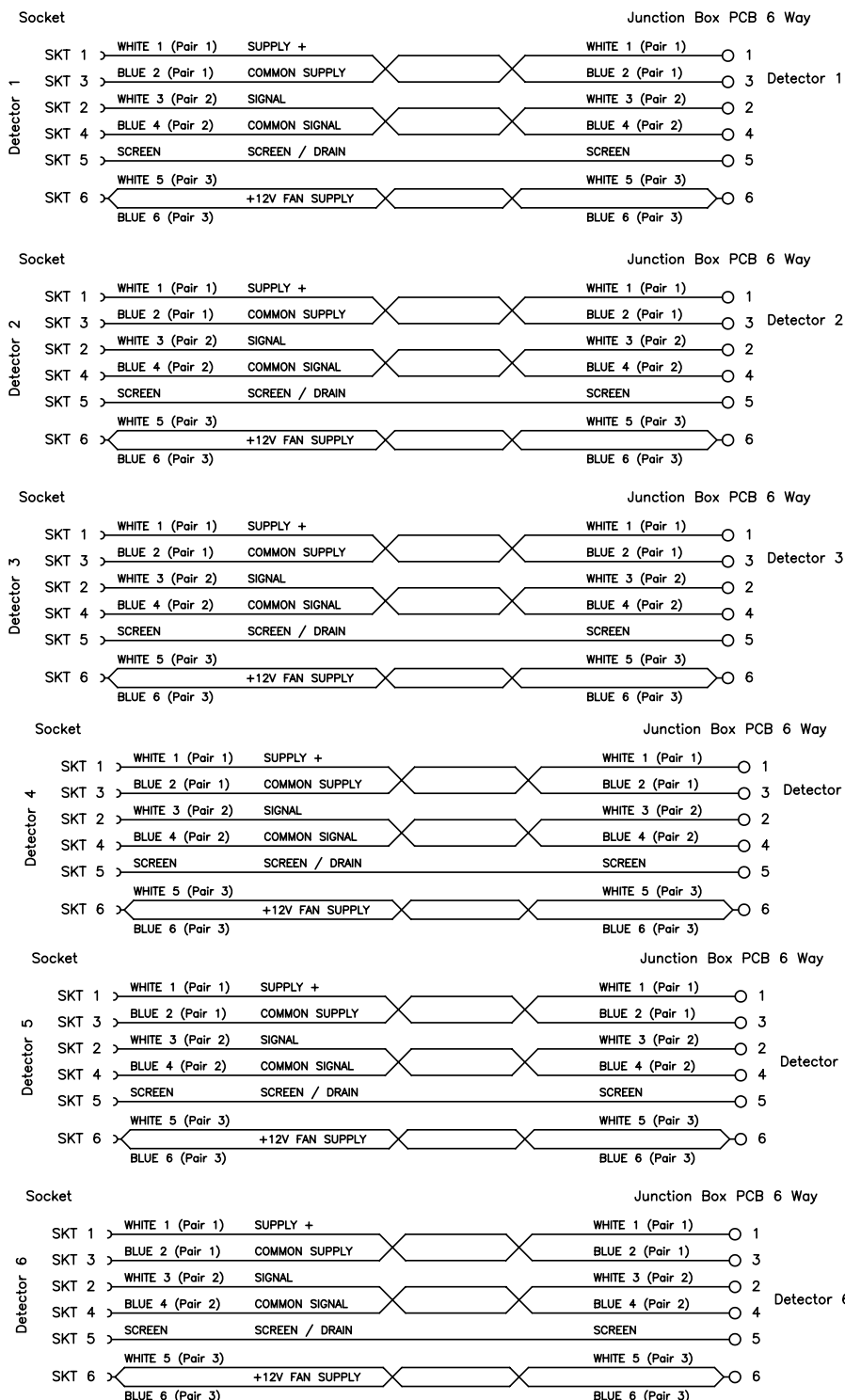
View from inside of Socket



View from inside of Socket



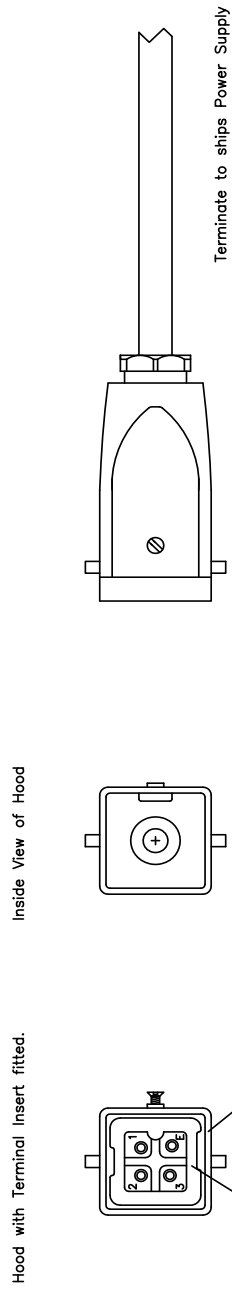
View from inside of Socket



Please Repeat Wiring For Detectors 7 to 12

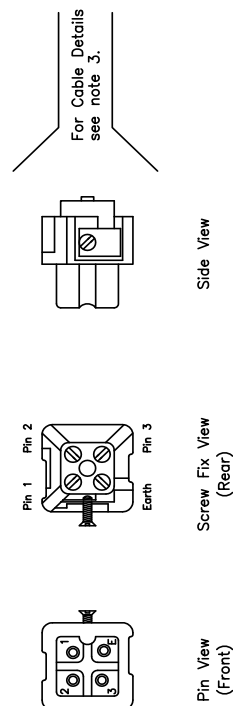
Drawn Date:	30/05/00	Drawing Title / Description	Quality Monitoring Instruments Ltd	
Drawn By:	JBS		4 East Barnet Road	
Scale:	Not to scale		London	
Updated Date:	N/A		England	
			EN4 8RW	
		WIRING DETAILS for Junction Box to Atmospheric Sensors (Q10)	Tel: +44 (0)20 7328 3121	
			Fax: +44 (0)20 7328 5888	
			Email: QMI@OILMIST.COM	
			Web: WWW.OILMIST.COM	
		Drawing No:	QMI-05-1127	
		Version:	0	

## Overall View of Connector No.4



See Next Page For 110/240V Power Supply Wiring

## Exploded View of Han 3A Screw Terminal Insert (Socket)



Drawn Date:	30/05/00	Drawing Title / Description	Quality Monitoring Instruments Ltd 4 East Barnet Road London England EN4 8RW Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5888 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM
Drawn By:	SAS	Overall View of Connector No.4 For QMI MULTIPLEX Mains 110/240V Power Socket (Q01H4)	
Scale:	Not to scale		
Updated Date:	N/A		
		Drawing No:	QMI-05-1106
		Version:	0

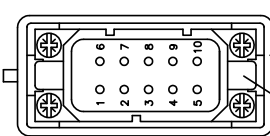
## 110/240V POWER SUPPLY WIRING

1. The 110/240VAC power supplies the Control Monitor Unit (CMU).
2. Below shows the wiring for 110/240 VAC Power Supply.
3. The cable used should be of minimum 3 cores and can range from a minimum thickness of 0.25mm<sup>2</sup> up to 2.5mm<sup>2</sup> maximum.
4. Do not use twisted cables.

Harting Pin No	Function
1	Live
2	Neutral
3	No connection
4	Earth

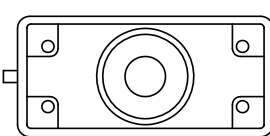
# QMI Atmospheric Oil Mist Detection System

Overall View of Connector No.3

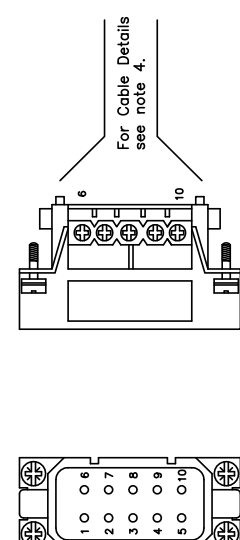


Hood with Terminal Insert fitted.

Inside View of Hood

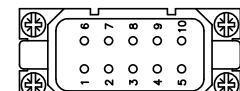


Exploded View of Han 10A Screw Terminal Insert (Plug)

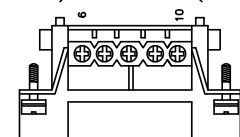


See Next Page For Alarm Output Wiring

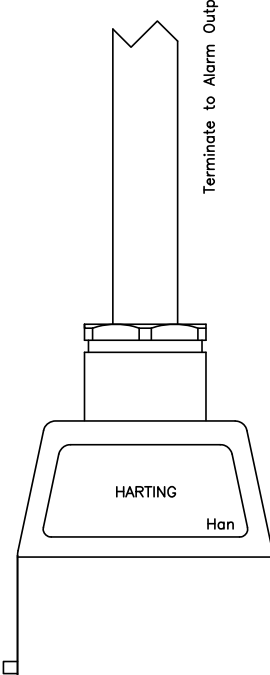
Pin View



Screw Fix View



For Cable Details see note 4.



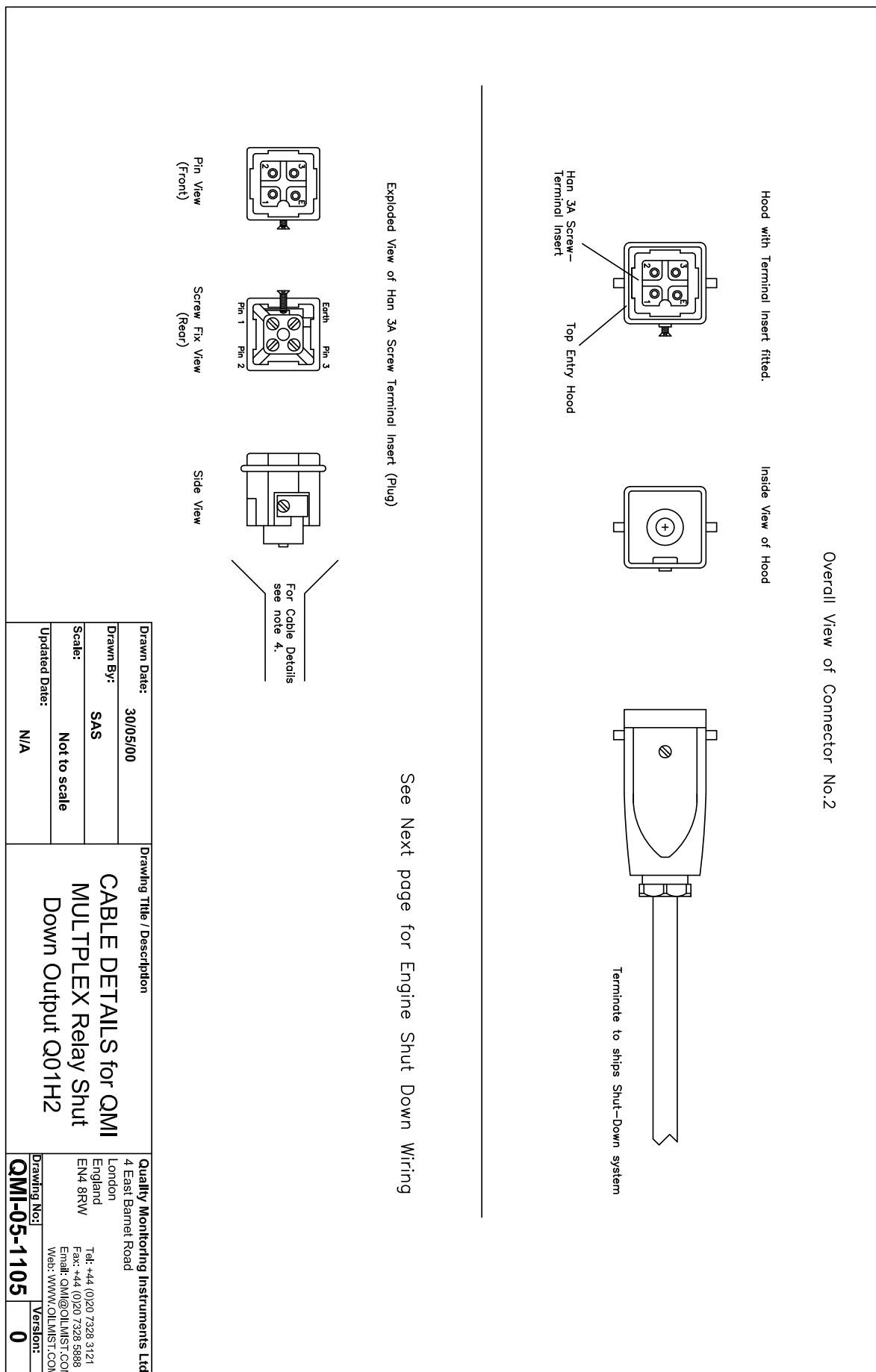
Terminate to Alarm Output system

Drawn Date:	30/05/00	Drawing Title / Description	<b>CONNECTOR Q01H3</b> <b>DETAILS for QMI</b> <b>MULTIPLEX Relay Alarm</b> <b>Output</b>
Drawn By:	SAS	<b>QMI-05-1104</b> <b>Version: 0</b>	
Scale:	Not to scale		
Updated Date:	N/A		

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# Atmospheric Oil Mist Detection System



# **QMI**

**Oil Mist Detection Systems**



## ALARM OUTPUT WIRING

1. The alarm outputs are transmitted from the Control Monitor Unit (CMU).
2. The Alarms operate via Open or Closed contacts (Relays).
3. Below are wiring details for the following Alarm types:
  - i. Main Alarm (Relay 10)
  - ii. Early Warning Alarm (Relay 7)
  - iii. Functional Shutdown Alarm
  - iv. Fault Alarm (Relay 8)
4. The cable used should be a minimum 6 - cores and can range from a minimum thickness of 0.25mm<sup>2</sup> up to a maximum 2.50mm<sup>2</sup>.

Relay No.	Terminal Block	Function	Non - Alarmed	Alarmed
	1	Early Warning Alarm	Connect to Pin 2	Disconnect
RL7	2	Common		
	3	Early Warning Alarm	Disconnect	Connect to Pin 2
	4	Fault Alarm	Connect to Pin 5	Disconnect
RL8	5	Common		
	6	Fault Alarm	Disconnect	Connect to Pin 5
	7	Main Alarm	Connect to Pin 8	Disconnect
RL10	8	Common		
	9	Main Alarm	Disconnect	Connect to Pin 8



## OPTIONAL PLANT SHUTDOWN WIRING

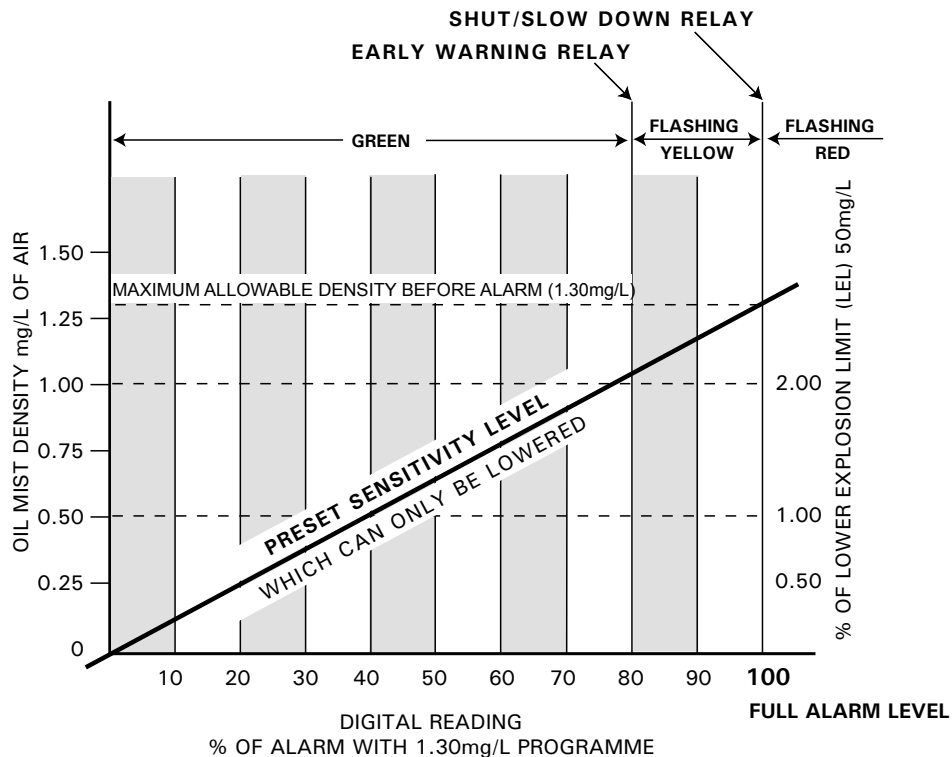
1. The Plant Shutdown outputs are transmitted from the Central Monitor Unit (CMU) via a 4-way Harting Plug.
2. The Shutdown operates via Open or Closed Contacts (Relay).
3. Below shows the wiring for Plant Shutdown (Relay 9).
4. The cable used should be of a minimum 2 cores and can range from a minimum thickness of 0.25mm<sup>2</sup> up to 2.5mm<sup>2</sup> maximum.

Relay No	Harting Pin No	Function	Un-alarmed	Alarmed
RL9	1	Plant Shutdown	Disconnect	Connect to Pin 2
	2	Common		
	3	Plant Shutdown	Connect to Pin 9	Disconnect

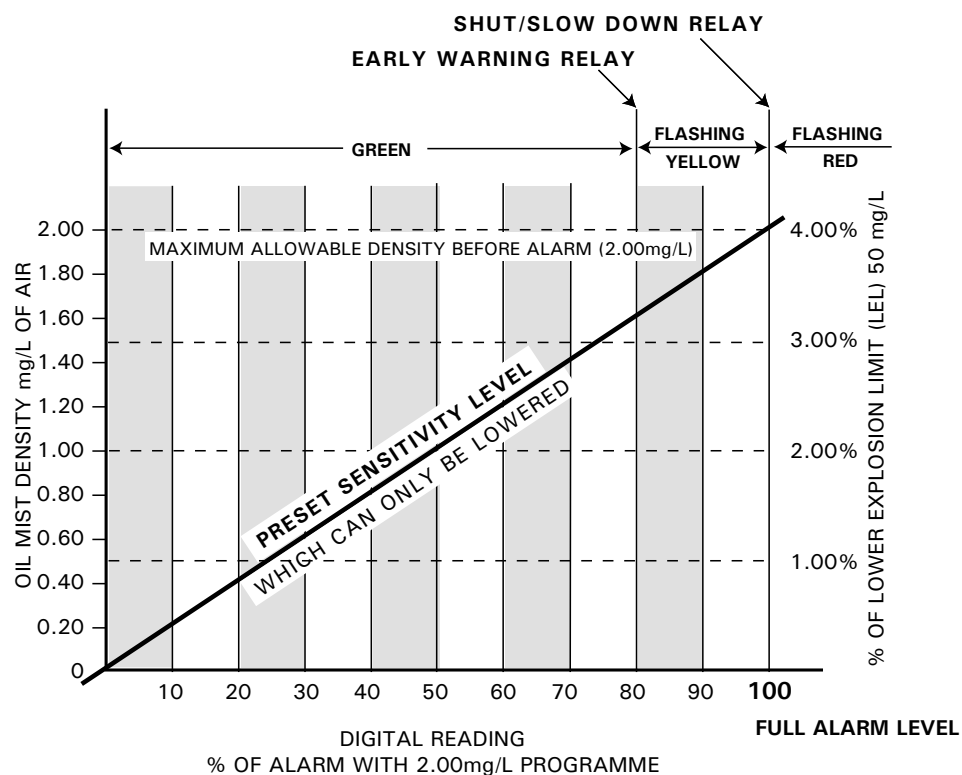


# Atmospheric Oil Mist Detection System

## GRAPH TO SHOW RELATIONSHIP BETWEEN MG/L, DIGITAL READOUT OF PERCENTAGE OF ALARM LEVEL AND THE PERCENTAGE OF LEL



Calibration Graph for 1.30mg/L Relationship to % of LEL



Calibration Graph for 2.00mg/L Relationship to % of LEL

## QMI MULTIPLEX 4-20mA DATA LOGGER OUTPUT

(Q08 - Data Logger Output - optional extra at time of ordering)

The data logger function in Atmospheric Systems is used for alarm panel integration or black box data recording.

The Monitor sends out a 4-20mA signal corresponding to the displayed mist percentage for each Sensor. This is a digitally calculated reading taking into account temperature non-linearity of the Sensors and oil deposit build-ups within the Sensor.

The signal can be used on a master alarm panel, or data logger and corresponds to the reading shown in the display.

$$\text{Current} = (\text{Display \%} \times 16 \div 156) + 4$$

<b>Display</b>	0	10	20	30	40	50	60	70	80	90
<b>mA</b>	4	5.0	6.0	7.1	8.1	9.1	10.2	11.2	12.2	13.2

<b>Display</b>	100	110	120	130	140	150	160
<b>mA</b>	14.3	15.30	16.30	17.30	18.40	19.40	20.41

<b>Display</b>	170	180
<b>mA</b>	21.40	22.50

The 4-20mA output from the Monitor is available on the 16-way connector No.5 in the centre of the box. See drawing QMI-05-1103 Part 2-29.

Pins 1 to 12 = Channel numbers

Pin 13 not used

Pin 14 is common +12v to get reading in mA

Pin 15 not used

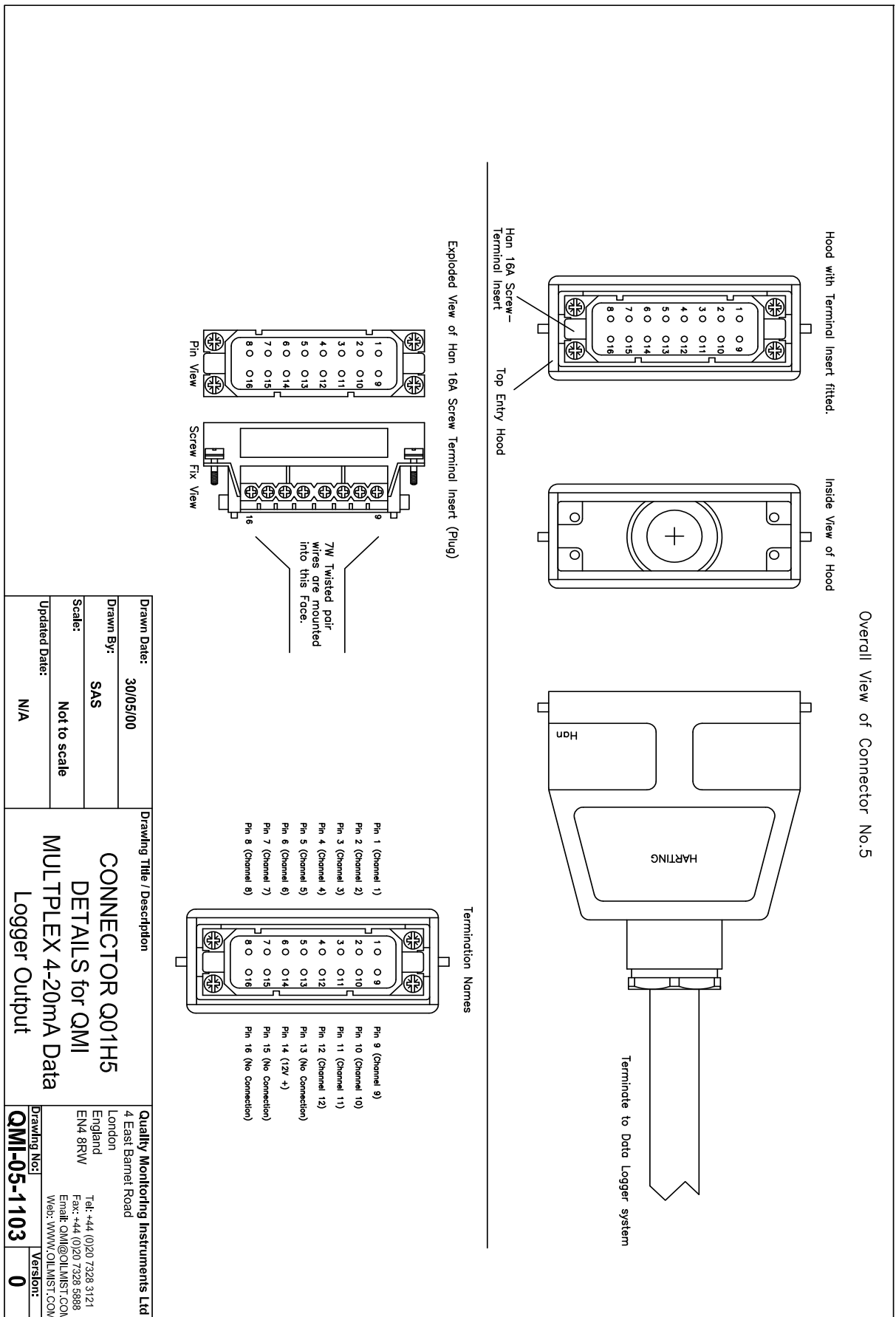
Pin 16 not used

You will need to connect Channel Pin 1 to 12 and Pin 14 +12v to get current output.

The FS3 400mA Fuse has been built in to protect the Data Logger PCB. It has a LED3 Green light which is constantly lit (not flashing) showing there is no fault with the Data Logger.



# Atmospheric Oil Mist Detection System



# ***QMI***

**Oil Mist Detection Systems**

## PART 3

# STARTING UP/RUNNING PROCEDURE

## **OPERATION**

A sample of air is continuously drawn through each Atmospheric Sensor and the level of oil mist density is monitored. This process is continuous at each Sensor. The signals are fed to the micro-processor which is located in the CMU.

The signals are scanned at 500 millisecond intervals and the data is presented as a digital display reading from 0% to 100% of alarm level.

Although oil mist samples are measured in mg/L the reading per channel is presented as a percentage of the alarm setting.

## **RELAY AND LED CHART**

	% Alarm Level	Lights Displayed
	0% to 79%	green
	80% to 99%	amber flashing
	100%	red flashing
Relays activated	80%	early warning alarm
	100%	alarm and plant shutdown

## **OPERATING RANGES**

0 - 1.30mg/L

0 - 2.00mg/L

as a percentage of the alarm setting.



## OPERATION OF ALARM RELAYS

The relays work in conjunction with the lights on the CMU display panel:

### ALARM SEQUENCE

The minimum alarms used are the Main alarm and Fault alarm. The functional shutdown (or slowdown) can be used to shutdown the plant.

If used, the functional first relay activates at 80% and is an early warning alarm.

The second main alarm and third (slow or shutdown) alarm are activated at 100%.

### FAULT ALARM

See Part 3-10

A fault alarm relay is completely divorced from the other relay systems and is only activated after a fault has developed in the Oil Mist Detection System. No relays will activate for 2.5 seconds, as the Monitor will check first that the fault is in the system and not a problem with the environment.

Even when this fault alarm relay is activated the instrument goes on monitoring unless there is a major malfunction of the Monitor or Sensor. Information is also being continuously given as a digital display of the highest concentration of oil mist and its location.

The digital display will always indicate the channel (i.e. area) with the highest level of oil mist. **IN THE EVENT OF A FAULT ALARM IT WILL BE THE FIRST CHANNEL TO GO INTO THE FLASHING GREEN, AMBER, RED CONDITION THAT IS INDICATED ON THE DISPLAY (F1, F2, AND F3).**

**NOTE: THERE IS A ONE-MINUTE DELAY** when the fault alarm sounds. After a self-test or a channel check the display will always revert to the channel with the highest oil mist level reading.

### ALARM OPERATING RANGES

With Binary switch 5 set to OFF the range is from 0 up to 1.30mg/L.

With Binary switch 5 set to ON the range is from 0 up to 2.00mg/L.

## SETTING AND CHANGING ALARM LEVELS

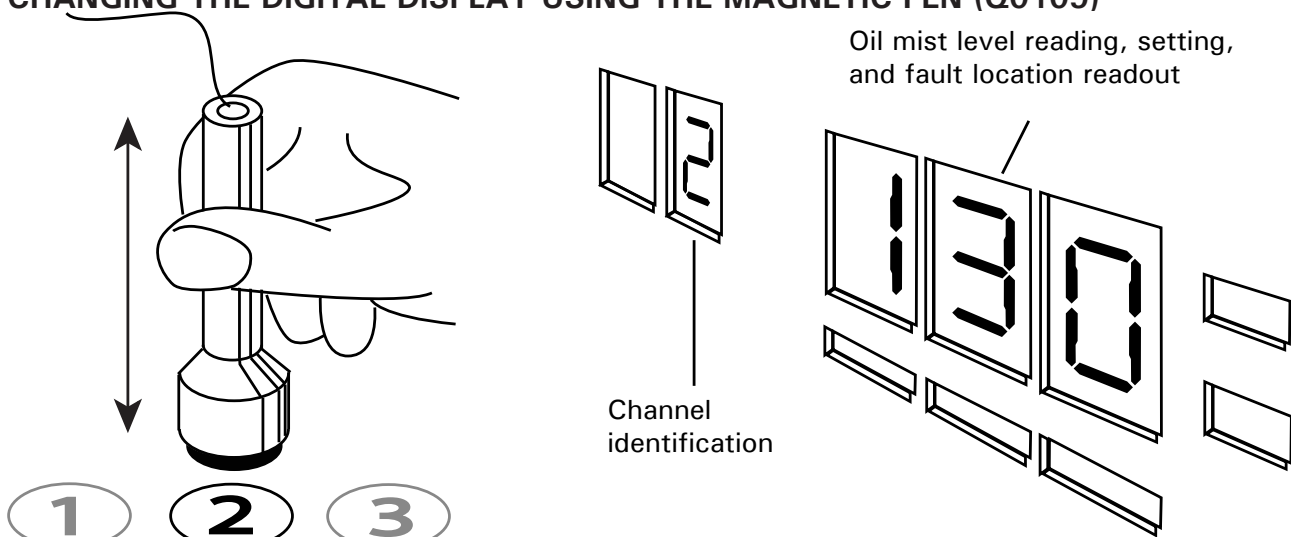
The QMI MULTIPLEX System is pre-set. However should the settings require adjustment and the alarm level set lower, then follow the procedure outlined below.

Normal setting for atmospheric systems should be as low as possible, say 0.04 to 0.05mg/L. This is so that once oil mist starts to form it will be detected as soon as possible.

During the setting-up procedure normal operation of the CMU is disabled, therefore to set and change alarm levels:

1. With the security key supplied (Q0103), release the security switch, which is fitted to prevent unauthorised adjustment of the system.
2. Turn the key clockwise  $\frac{1}{4}$  turn (and no more). The light above 'Check Alarm Settings' will illuminate.
3. Place the magnetic pen (Q0109) flat against the circle marked 'Check Alarm Settings'.
4. Place the magnetic pen flat against the 'Raise' Alarm Level circle marked with '+' or the 'Lower' Alarm Level circle marked with '-'. Raise or Lower the level, each time removing the pen away from the circle for each increment of Oil Mist level until the required level is reached. The level will be indicated on the digital 'Reading'.
5. Place the magnetic pen flat against the circle marked 'Channel Number' to set that channel to the level indicated at the digital reading.
6. To set another channel repeat steps 4 and 5.
7. When setting is complete turn the key anti-clockwise back  $\frac{1}{4}$  turn, this locks the system, then remove the key.
8. Now the system is locked, it is possible to check the settings by placing the pen on 'Check Alarm Settings' then on 'Channel Number'. The new set level will then be displayed.
9. To reset any channel ALL above items MUST be repeated.

## CHANGING THE DIGITAL DISPLAY USING THE MAGNETIC PEN (Q0109)





## TEST SEQUENCE

Before beginning the test procedure warn the Chief Engineer and the Captain. To activate the test procedure make sure the security key is turned to running mode then place the magnetic pen over the circle marked 'TEST'. The sequential testing system will commence as follows:

1. Testing indicators will illuminate Software Version – 1.03.
2. The running (green), anticipatory (amber) and alarm (red) indicators will illuminate in sequence.
3. All digital read-outs will indicate '8'.
4. All digital read-outs will then indicate '111' showing that all segments of the numerical display are working with no fade.
5. Each Sensor lens will be indicated (**NOTE:** 'Cd' indicates clean lens). When 'dd' (dirty Sensor) appears on the display, Sensor lenses are under 80% clean. Refer to lens cleaning instruction, Part 5-3. When dirty, 'F2' will automatically show on the display. If ignored it will go to 'F3'.
6. All external relays with the exception of the functional relay will operate for 10 seconds. If the system has an audio alarm system it is recommended that the personnel should be warned of the impending test. The test includes a test of the fault monitoring circuit, i.e. watchdog, when 'F9' will appear momentarily. In the event of a CMU failure 'F9' will be displayed continuously. In this case the PCB of the Power Supply Relay Board must be replaced.
7. After the relays have been tested the CMU will automatically return to display the channel with the highest concentration of oil mist.
8. **NOTE:** After 'Power On' or 'RESET' procedures are implemented, the relay outputs are inhibited for 60 seconds in the event of an alarm. This must be noted if smoke testing is carried out on a Sensor.
9. **NOTE:** When using the self - test facility, the display will show the condition of the Sensor i.e. 'dd' (the Sensor is dirty) or 'Cd' (the Sensor is clean). **HOWEVER, ONE FULL MINUTE SHOULD ELAPSE BEFORE USING THE SELF-TEST FACILITY AGAIN.** This is to allow the software to latch back into the correct running mode; otherwise erroneous signals may be displayed. During this sequence isolated Sensors may be displayed 'Cd'.

Should any function throughout the sequence fail to operate as specified, please refer to Fault Finding Section, see Part 4.

## **CHECKING ALARM LEVELS AND READING CHANNELS**

### **TO CHECK ALARM LEVEL SETTING**

To check the pre-set alarm level setting for each individual channel, first place the magnetic pen over the circle marked 'ALARM LEVEL'. The alarm level indicator will illuminate. Place the pen over the 'CHANNEL' number. The channel identification digital display will be shown digitally as a milligrams per litre value in mg/L of oil mist density. Should the alarm level need to be adjusted then follow the 'Initial Setting-up Procedure' (changing alarm levels) and 'RESET' the system as previously described.

### **TO READ INDIVIDUAL CHANNELS**

Place the magnetic pen over the required channel circle. The channel number selected will be shown digitally on the 'Channel Identification' display alongside the digital read-out of the percentage density of the pre-set alarm level at the channel. After one minute the display will revert to the channel with the highest oil mist reading.

## CHANGING THE NUMBER OF SENSORS

Setting up the QMI MULTIPLEX System CMU for a different number of Sensors.

The QMI MULTIPLEX can have a total of 12 Sensors plugged into it. The display will show 12 positions illuminated.

The number of Sensors in use can be adjusted by switches located on the back of the MP12 PCB v 3.2.

There is a 10 way Binary switch located on MP12 PCB v 3.2. Switches 1 to 4 are for the number of Sensors to be set up.

Switches 1-4 are for the number of Sensors to be set up.

Sensors required	Switch 1	Switch 2	Switch 3	Switch 4
01	on	off	off	off
02	off	on	off	off
03	on	on	off	off
04	off	off	on	off
05	on	off	on	off
06	off	on	on	off
07	on	on	on	off
08	off	off	off	on
09	on	off	off	on
10	off	on	off	on
11	on	on	off	on
12	off	off	on	on

Switch 5 is for the oil mist range.

With Switch 5 set to **OFF** the range is from 0 up to 1.30mg/L

With Switch 5 set to **ON** the range is from 0 up to 2.00mg/L

After changing the set Switch from OFF to ON or ON to OFF, the alarm levels should be adjusted for each channel.

Switch 6 should always be set to **OFF**.

Switch 7 should always be set to **OFF**.

Switch 8 should always be set to **OFF**.

Switch 9 is for Channel selection display.

Switch 9 is set to **OFF** the Monitor display will show Channels 1-12.

Switch 9 is set to **ON** the Monitor display will show Channels 13-24.

If a change is made to Switch 9, the Monitor will need to be reset by placing the magnetic pen over the reset circle, or turning the key a quarter turn, and then back.

Switch 10 should always be set to **OFF**.

## SETTING UP OF SENSORS REQUIRED

The first thing to be displayed is the Software Version.

If the display is showing 12 channels and (for example) only 7 Sensors have been fitted then the display will show positions 8 to 12 as flashing amber, green and red lights. Also the display reading will show 'F1' fault.

To correct or change the QMI MULTIPLEX Monitor to show only 7 channels and cancel the other positions showing, the following procedure is carried out:

1. Turn off QMI MULTIPLEX Monitor to switch off the system.
2. For safety, unplug the 3-pin power connector from the Monitor.
3. Using the 'T' handled Allen key provided, unscrew the front 4 x M6 screws, one located at each corner of the Monitor.
4. The front of the Monitor is hinged and the front panel can now be swung open. The display MP12 PCB v 3.2 can be seen screwed in the lid. There is no need to remove or unscrew this PCB from the lid.
5. The Binary switch blocks are located on the back of the MP12 PCB v 3.2. There are a total of 10 Binary switches.
6. To program the switches for a number of Sensors, switch to the positions shown in the above table.

## TO ISOLATE OR RESTORE A CHANNEL

If a Sensor becomes faulty and requires changing 'F3' will appear on the display and the green, amber and red display will flash. If a Sensor requires cleaning 'F2' will appear on the display. If either the Sensor is not changed or the lens not cleaned, the fault number will obscure all other readings and the oil mist reading will not be displayed.

As a temporary measure it is possible to isolate the Sensor from the Monitor panel ('isolate' in this instance is to remove the Sensor signal from the Monitor via the software).

To carry out the isolate function, turn security switch key to set mode, place the magnetic pen on 'ISOLATE' circle, then place it over the 'CHANNEL' number. Turn the key back to 'RUN' mode. The channel/Sensor is now isolated and the display will now be blank. If the pen is placed over the isolated 'CHANNEL' number 'IC' will appear on the display.

After the Sensor has been replaced and/or the lens cleaned, reinstate the channel by turning the key to set mode, place the magnetic pen on 'ISOLATE' circle then on to 'RESET'. Finally place the magnetic pen on to the 'CHANNEL' number and turn the security key to operating mode. This will put the channel and associated Sensor back on line.



## RESPONSE TO ALARM

There are two stages of oil mist alarm indication:

### 1. ANTICIPATORY/EARLY WARNING

At 80% the light will assume the 'flashing' mode.

The channel number will be indicated and the digital reading will indicate the percentage density of the pre-set mist alarm level. The early warning alarm relay will operate.

**NOTE:** This alarm is automatically operated when the oil mist density level reaches 80% of the pre-set alarm level.

### 2. FULL ALARM

At 100% of alarm level the red indicator will flash indicating that the oil mist level is above the pre-set alarm level. The offending channel will be displayed alongside the digital read-out level. The functional shutdown relay alarm RL9 will operate if wired into the system. At this level RL10, the main alarm, will be activated. Further action should be taken in accordance with the standard procedures.

Over-riding the QMI MULTIPLEX system during procedures that may introduce particles into the atmosphere (e.g. painting) is at the operator's discretion. If such a function is required it should be incorporated in the ship's overall system.

**IMPORTANT:** When any alarm sounds all personnel should leave the area.

#### IMPORTANT NOTICE:

With Atmospheric Oil Mist Detection Systems, the alarm point should be set quite low, so that the Main Alarm activates as soon as there is any Oil Mist sensed in the Atmosphere.

The Oil Mist level will increase so quickly that the Early Warning and Main Alarm will activate almost simultaneously.

The Early Warning Alarm would normally be used in Engine Crank Case Oil Mist Detection systems where the Oil Mist increase, usually, more slowly.



## 3. FAULT ALARMS

The fault alarms indicate if there is any fault in the monitoring system. The Monitor faceplate has a list of the fault alarms and their significance. This uses relay RL8. See table below for the fault conditions as presented on the Monitor faceplate. For more information see the Fault Directory in Part 4.

Channel	Reading	Response
1 - 12	F1	Check and repair relevant cable
1 - 12	F2	Clean Sensor according to instructions
1 - 12	F3	Clean Sensor Check Sensor fan Replace Sensor See Fault Directory Part 4
1 - 12	F4	System fault alarm
C	IC	Channel isolated

If 'No CPU' light is on, there is a processor fault.

'dd' on test indicates when the Sensor is dirty so it is necessary to clean the lens.

'cd' on test indicates when the Sensor is clean.



Atmospheric Oil Mist Detection System

## PART 4

# FAULT FINDING



# Atmospheric Oil Mist Detection System

## Notes:

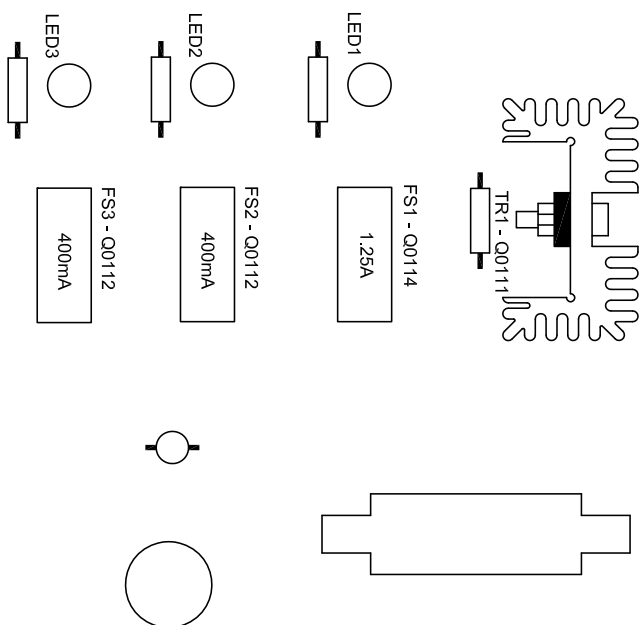
LED 1 will flash when 12V power is being supplied to the detector heads. If LED 1 is not flashing then fuse FS 1 has blown, it needs to be replaced with a 1.25A anti-surge fuse.

If FS 1 continues to blow, check system for faults in wiring or a faulty detector.

LED 2 will light continuously when 12V is being supplied to the Junction Box PSU failure.

If LED does not light then fuse FS 2 may have blown, check wiring for faults, then replace FS 2 fuse with a 400mA anti-surge fuse.

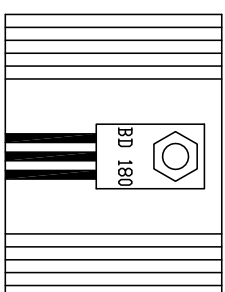
LED 3 This is to protect the data logger PCB. The LED is constantly lit (not flashing) this will always be present or not in the system.



## Notes:

If LED 1 is not flashing and you have checked the fuse is ok, it could be that TR 1 is faulty. You should then check the system for wiring faults or shorts. If you are satisfied that the system is ok, TR 1 can be replaced using the replacement from the maintenance kit.

## FRONT VIEW OF TRANSISTOR AND HEATSINK



Drawn Date:	30/05/00	Drawing Title / Description	Quality Monitoring Instruments Ltd
Drawn By:	SAS	Layout of Transistor TR1, LEDs and Fuses on PCB	4 East Barnet Road London England EN4 8RW
Scale:	Not to scale	Q0106	Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5888 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM
Updated Date:	25/03/15		Drawing No: QMI-05-1110
			Version: 1



## FAULT DIRECTORY

FAULT	ACTION	REMEDY
F1 and Sensor number is displayed	<ol style="list-style-type: none"><li>1. Make up a short lead with 6 pin male and female connectors from the Maintenance Kit</li><li>2. Plug spare Sensor into Monitor on the defective channel number shown</li></ol> If the display becomes steady this confirms there is a fault in the cable between the Monitor and Sensor	<p>Check the cable is earthed between the Monitor and Sensor as the manual directs</p> <p>Check there are NO OTHER earth leads, or copper earth trips as these will give interference</p>
F1 and Sensor number is displayed	Check cable between Monitor and Sensor	<p>F1 denotes cable fault</p> <p>Check for split or damaged cable or incorrect earthing - see wiring instructions</p>
F1 and all Channel Lights Flash	<ol style="list-style-type: none"><li>1. Check Fuse FS1 on the Power Supply Board</li><li>2. See Part 4-2</li></ol>	<p>If the fuse has blown replace it with a 1.25A fuse</p> <p>If the fuse blows again, check complete wiring of the system for short - circuits or damaged wires</p>
F1 and all Channel Lights Flash	<ol style="list-style-type: none"><li>1. Check the Fuse FS1 on the Power Supply Board</li><li>2. See Part 4-2</li></ol>	If the fuse is OK, then TR1 should be replaced
F2	<ol style="list-style-type: none"><li>1. Remove Sensor</li><li>2. Clean lens</li><li>3. See Part 5-2</li></ol>	If a Sensor needs frequent cleaning investigate source of dirt
F3 and Sensor number is displayed	Check Sensor lens	<ol style="list-style-type: none"><li>1. Take Sensor off</li><li>2. Clean lens</li><li>3. Replace Sensor</li></ol> <p>If F3 still shows, return Sensor to QMI for repair. Isolate channel if there are no spare Sensors</p>
F3 and Sensor number is displayed  LED on front of the Sensor flashes RED	Check Sensor fan	<ol style="list-style-type: none"><li>1. Isolate and remove Q10 Sensor</li><li>2. Replace fan with Q1004 following instructions supplied</li></ol>

# Atmospheric Oil Mist Detection System

FAULT	ACTION	REMEDY
F4 on display	Mains power to the Junction Box has failed or has been turned off	Check that there is mains power getting to the Junction Box
	Fuse on the PSU in the Junction Box has blown	Replace the fuse with a 3.15A fuse from the spares kit. (Q0115)
	Fuse on the PSU in the Junction Box has blown again	If the fuse blows again, the PSU has failed and is faulty. Order a replacement PSU
	Bad connection between Monitor and Junction Box (in the multi-twisted pair cable)	<ol style="list-style-type: none"> <li>1. If the PSU is working, remove the mains power to the Junction Box</li> <li>2. Connect a piece of wire between terminals 29 and 30 on the Junction Box PCB</li> <li>3. Leaving the mains power disconnected to the Junction Box, reset the Monitor</li> <li>4. If F4 has now gone, the cable from the Monitor to the Junction Box is okay</li> <li>5. Remove the links from terminal 29 and 30</li> </ol>
	Bad connection on RED and BLACK wires from PSU to AUX connection + and – on Junction Box PCB	<p>With the power connected to the Junction Box, using a meter when the PSU is working, check that there is a shorted connection between terminals 29 and 30 on the Junction Box PCB</p> <p>If there is an open circuit, it could mean that the red and black wires between the PSU and the PCB have a bad connection or the relay has failed</p>
	Relay on the Junction Box PCB has failed	If the connection is sound, the relay could be faulty. Order a new Junction Box PCB
Fault alarm comes on. QMI Monitor shuts down and display ceases	Check FS4 fuse on side of Monitor above security key	<p>3.15A anti-surge fuse may have blown due to an internal fault in the Monitor. Check FS4 (Q0115) fuse in the Monitor.</p> <p><b>NOTE:</b> Monitors are ex-stock QMI</p>



# Atmospheric Oil Mist Detection System

FAULT	ACTION	REMEDY
Fault alarm comes on. QMI Monitor shuts down	Check fuse on side of the Monitor above security key FS4	If fuse is OK check external power supply to QMI system Fault alarm (will sound) if power is shut down
"No CPU" light on	Check internal connections	The CPU light indicates a fault on MULTIPLEX Power Supply Board  This board is either carried as a spare or is ex-stock QMI
LED 1 on PSB Q0104 not flashing	Check fuse FS1	Change blown fuse
LED 1 for TR1 does not light	FS1 fuse blown	Replace FS1 with 1.25A anti-surge fuse. If fuse keeps blowing then check wiring and Sensor for faults. See Part 4-2
	TR1 Faulty	Replace TR1 with spare in Maintenance kit Q0111 (take care not to short TR1 during soldering)
LED 2 does not light	FS2 fuse blown	Replace FS2 with 400mA anti-surge fuse If LED 2 still does not light, check for fault in PSU. See Part 4-2
On start up of the system Monitor the display is erratic and does not settle down	Check if cable is screened	If cable is screened, check that screen is connected to Pin 5 at both ends of the cable. Make sure the braid or drain wire does not come into contact with other terminals at either end of the cable  If cable is not screened, check to see if cable runs near any electrical power source. If it does, cover cable in steel conduit. There is no need for extra earthing, however the screen needs to be connected to Pin 5 at both ends

# ***QMI***

**Oil Mist Detection Systems**

## PART 5

## MAINTENANCE



## **MAINTENANCE PROCEDURES**

The QMI MULTIPLEX incorporates an operational fault finding system, which will identify operational and component breakdowns. During operational breakdowns, a fault code is displayed against the relevant Sensor number. The possible fault codes are listed on the Monitor front plate.

In the event of a component breakdown or fault, the CPU light will come on, see Fault Directory, Part 4.

With all fault indications the fault warning relay is non - energised. The relay may be returned to normal through the 'RESET' function. The warning indication on the digital display will persist until the fault is corrected or the channel isolated.

### **SENSOR CLEANLINESS**

A large percentage of returns under Warranty are in fact due to dirty lenses. Very often, due to difficult working conditions and lack of experience, the lenses in the Sensor are not properly cleaned. This problem is made more difficult because the operator has to return to the Monitor in order to check the cleanliness of the lenses. The cleaning process is outlined in Part 5-3.

#### **CLEANING SENSOR LENSES**

The Monitor will indicate when the lenses need cleaning (Fault Directory Part 4).

To clean the lenses see Part 5-3.

#### **REPLACING SENSOR FAN (Q1004)**

The Monitor will indicate when there is a Fan Fault and F3 will appear (Fault Directory Part 4-3 & 4-4).

To replace the Fan see Part 5-5.

**NOTE: IT IS HIGHLY RECOMMENDED THAT A CLEAN AND WORKING SPARE SENSOR BE INSTALLED WHILE CLEANING A SENSOR.**












## LENS CLEANING PROCEDURE

The "F2" Fault indicator indicates need for lens cleaning on the relevant channel on the MULTIPLEX CMU (Q01H).

It is advisable to have a clean and working spare Q10 Sensor.

To clean, the lens in the event of oil or condensation build up, use the following guidelines:

1. Isolate the relevant channel on the CMU:
  -  Turn Security Key (Q0103) to Setting Mode
  - Using Magnetic Pen (Q0109):
    -  Touch Isolate Button
    -  Touch Channel Button
  -  Turn Key back to Working Mode
2. Unplug cable from Sensor.
3. Holding the Sensor, undo the 4 screws fixing the Sensor body to the Articulated Joint. Use the Allen Key tool from the Maintenance Kit.
4. Replace with a spare Sensor, if available. Proceed to item (8).
5. In a clean area, remove cover plate by undoing the 4 Button Head Screws. The tool is in the Maintenance Kit.
6. 3 lenses will be visible inside the chamber. Using a clean cloth and the cleaning solution "Clean All" to wipe the lenses clean. For badly contaminated lenses, repeat until clean. Polish the lenses with a clean and dry cloth.  
**DO NOT SATURATE THE LENSES WITH FLUID.**
7. Ensure the chamber is dry. Replace the cover plate.
8. Replace Sensor on Articulated Joint. Make sure Sensor is in original position.
9. Reset the Sensor on CMU:
  -  Turn key to setting mode.
  - Using magnetic Pen:
    -  Touch Isolate Button,
    -  Touch Reset Button,
    -  Touch Channel Button,
  -  Turn Key to Operate Mode

**SEE IMPORTANT NOTES OVERLEAF**

# Atmospheric Oil Mist Detection System

## IMPORTANT NOTES

1. The Sensor electronics are factory calibrated and cannot be serviced on site. In the event of a fault the Sensor must be sent back to QMI unless it is a faulty fan, then just change the fan as shown in Part 5-5.
2. DO NOT USE diesel oil, acetone or kerosene to clean Sensors and Sensor lenses.
3. DO NOT IMMERSE Sensor in any cleaning solution.



## REPLACING FAN (Q1004) IN SENSOR

Remove lid by taking out the four countersunk Allen screws using 2.5mm Allen key (Q1007).

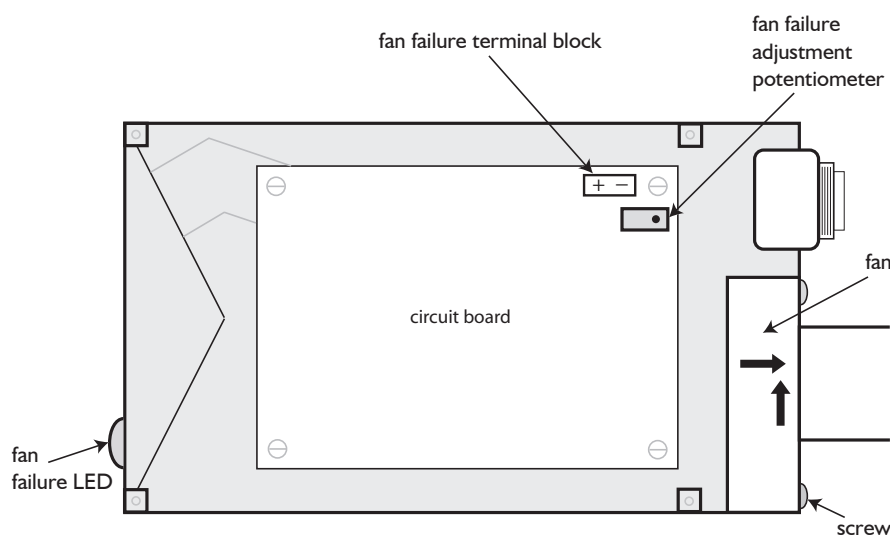
Remove **RED** and **BLACK** wires from fan failure terminal block.

Remove four buttonhead Allen screws holding fan to air sensor using 2.5mm Allen key.

Fit new fan by replacing four buttonhead Allen screws. Check direction arrows on fan.

Fit **RED** wire to the + terminal of fan failure terminal block.

Fit **BLACK** wire to the - terminal of fan failure terminal block.



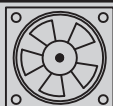

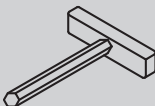

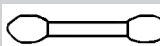
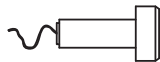


## ADJUSTING FAN FAILURE ON Q10 - FH FAN

**WARNING:** Any attempt to adjust other components on the circuit board will invalidate the guarantee and may stop the sensor working.

1. Turn the potentiometer screw fully anti - clockwise (15 turns).
2. Connect air sensor to Monitor. The LED on the front of the air sensor will flash **GREEN**.
3. Allow 2 minutes before adjusting, by this time the LED should be **AMBER** with a **RED** pulse.
4. Slowly turn the potentiometer clockwise until the LED turns to a steady **GREEN**.
5. When the LED is showing steady **GREEN**, turn the same potentiometer a further quarter turn clockwise.
6. Test for fan failure operation by gently stopping the fan with your finger.
7. Check that the LED flashes **RED**.
8. Refit Sensor lid using the four countersunk Allen screws, ensuring red and black wires are not trapped.
9. Wait for two minutes and ensure LED remains constant **GREEN**.
10. Installation of the Q1004 fan is now complete. Refit Sensor in chosen position.

# Atmospheric Oil Mist Detection System

## MAINTENANCE KIT (Q1005)

Code	QMI Product	Description	
Q1004	Replacement Fan	For Q10 Sensor - Includes fixing screws	
Q1006	Replacement Socket	6 Pin Bulgin Socket for Sensor	
Q1007	M 2.5 Hexagonal Allen Key	For Sensor lid, inspection cover and fan	
Q1008	M 3 Hexagonal Allen Key	For Articulated Joint	
Q0113	M 4 Hexagonal Allen Key	To open Monitor lid	
Q0103	Monitor Security Keys	For changing settings on MULTIPLEX Monitor Q01H (Pack of 2)	
Q1009	Cotton Buds	For cleaning Q10 Sensor lenses. (Approximately 100 buds per pack)	
Q0109	Magnetic Pen	To activate displays on Monitor	
Q0111	TR1 Transistor	On Power Supply Board of Q01H Monitor	
Q0112	400mA Anti-Surge Fuse	For FS2 on Power Supply Board For FS3 Data Logger Protection FS2 only on Monitors with 3 Fuses (Pack of 5)	
Q0114	1.25 Amp Fuse	For FS1 on Power Supply Board (Pack of 5)	
Q0115	3.15 Amp Fuse	For FS4 on side of Monitor for Monitors with 4 Fuses For FS3 only on Monitors with 3 Fuses For Power Supply Fuse in Q07 Junction Box (Pack of 5)	

Please Note: QMI Recommended IPA (Isopropyl Alcohol) to clean the Q10 Sensor Lenses. Clean All is no longer available.

It is recommended that a spare Atmospheric Sensor (Q10) is purchased.

Checked by:



## **SUGGESTED MAINTENANCE PLAN FOR ATMOSPHERIC SENSORS**

The only regular operation that can be built into a planned maintenance is to clean the lenses but if the manual test programme is initiated on the Monitor on a say weekly basis. The indication "dd" on any channel will mean that you have 20% of dirt on the lenses so it's a good idea to clean the lenses as soon as it is feasible. The system however can compensate for up to 40% of contamination.

See Part 5-3 on Lens Cleaning Procedure.

# **QMI**

**Oil Mist Detection Systems**

## PART 6

## SPARES



## CODES AND DESCRIPTION FOR REPLACEMENT PARTS AND SPARES

Code	QMI Product	Description
Q01H	QMI MULTIPLEX Monitor	With Harting Connectors
Q01H1	Monitor Connector	Harting 32-Way Mating Connector 1 (To MULTIPLEX Junction Box)
Q01H2	Monitor Connector	Harting 4-Way Plug Mating Connector 2 (To Shutdown Output)
Q01H3	Monitor Connector	Harting 10-Way Plug Mating Connector 3 (To Alarm Output)
Q01H4	Monitor Connector	Harting 4-Way Socket Mating Connector 4 (To Power Input)
Q01H5	Monitor Connector	Harting 16-Way Plug Mating Connector 5 (To Datalogger Output)
Q0103	Monitor Security Keys	Monitor Security Switch to change settings (Pack of 2)
Q0104A	PCB Type MP12 v 3.2 Processing Board	For Monitor contains Flash Memory Chip
Q0106	Switch Mode Power Supply	No case, for Power Supply Unit for Monitor
Q0109	Magnetic Pen	To activate displays on Monitor
Q0111	TR1 Transistor	Power Supply Board of Q01H Monitor
Q0112	400mA Anti-surge Fuse	For FS2 on Power Supply Board For FS3 Data Logger Protection FS2 only on Monitors with 3 Fuses (Pack of 5)
Q0113	M 4 Hexagonal Allen Key	To open Q01T Monitor lid
Q0114	1.25 Amp fuse	For FS1 on Power Supply Board (Pack of 5)
Q0115	3.15 Amp fuse	For FS4 on side of Monitor for Monitors with 4 Fuses For FS3 only on Monitors with 3 Fuses For Power Supply Fuse in Q07 Junction Box (Pack of 5)
Q10	Atmospheric Sensor	With Integral Fan
Q10C	Atmospheric Sensor Complete	With Integral Fan, Mating Connector & Articulated Joint
Q1004	Replacement Fan with Fixing Screws	For Q10 Sensor, includes fixing screws
Q1005	Maintenance Kit	See Part 5-6
Q1006	Replacement Socket	For Sensor, 6 Pin Bulgin Socket
Q1007	M 2.5 Hexagonal Allen Key	For Sensor lid, inspection cover and fan
Q1008	M 3 Hexagonal Allen Key	For Articulated Joint on Sensor
Q1009	Cotton Buds	For cleaning Q10 Sensor (Approximately 100 Buds per Pack)



# Atmospheric Oil Mist Detection System

## RETURNS PROCEDURE

**Guarantee Statement: Sensors returned for service or repair will be guaranteed for 18 months.**

1. The equipment being returned has a report with it stating the fault with the equipment; list the fault number shown on the monitor, the Serial No. of the Monitor (On the Monitor front plate) and the Serial No. of the Sensor (stamped on the top edge of the Sensor) and the Serial No. of the Fan Unit if relevant.

Return the Equipment CLEAN with LEADS and CONNECTORS intact.

2. Issue a Numbered Purchase Order, with Invoice and Return address Otherwise goods will not be processed.
3. Manifest/Packing note with shipment contents.
4. A note to advise us the return address for repaired or serviced equipment.
5. The above documents should be faxed and emailed to QMI, London.

Fax: +44 (0) 20 7328 5888

Email: [qmi@oilmist.com](mailto:qmi@oilmist.com)

6. Despatch returned goods to:

Attn: QMI Repair Manager

Quality Monitoring Instruments Ltd.

C/o Cambertronics Ltd.

Unit 12, Manfield Park Industrial Estate

Guildford Road, Cranleigh

Surrey GU6 8PT

UK

Tel: +44 (0) 1483 267619

Fax: +44 (0) 1483 267700

Email: [qmi@oilmist.com](mailto:qmi@oilmist.com), cc: [QMI@Cambertronics.ltd.uk](mailto:QMI@Cambertronics.ltd.uk)

Please ensure that you have included the information and documents in your fax or email to QMI to request repair of equipment. Providing this information will increase the speed at which we can repair and return the goods.

### CHECKLIST

- ☐ Fault Report included/attached
- ☐ Fault Number Displayed F1 \_\_\_\_ F2 \_\_\_\_ F3 \_\_\_\_
- ☐ Monitor Serial Number
- ☐ Sensor Serial Number
- ☐ Equipment is clean
- ☐ Numbered Purchase Order with Invoice and Return address. E-mailed and included
- ☐ Manifest/Packing Note of shipment contents, E-mailed and included
- ☐ Name of Contact person email address, telephone number and fax number

## QMI CONTINUAL SUPPORT INFORMATION REQUEST

Now that you are in charge of a

### NEW QMI MULTIPLEX Atmospheric Oil Mist Detection System

If you would take the time to provide us with the information outlined below. It will help us to respond more quickly to any questions or problems you might have in the future.

1. Name of vessel/or site: \_\_\_\_\_

2. Location of system: \_\_\_\_\_

3. Serial Number of Monitor:    \_\_\_\_    \_\_\_\_    \_\_\_\_    \_\_\_\_

4. Number of Sensors: \_\_\_\_\_

5. Serial Number of Sensors: A \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_ to A \_\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_

6. Email address: \_\_\_\_\_

7. Fax number: \_\_\_\_\_

8. Return address for equipment: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

If you have any technical problems, please contact us on the following:

Email: [qmi@oilmist.com](mailto:qmi@oilmist.com)

Tel: +44 (0) 20 7328 3121

Fax: +44 (0) 20 7328 5888

Should you need to return equipment for service or repair, please see Part 6-3 of this manual for details on how the equipment should be returned.

# **QMI**

**Oil Mist Detection Systems**



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v 3.2

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[www.oilmist.com](http://www.oilmist.com)