



QMI MULTIPLEXTM 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
'dd' on test

UK.

QMI MULTIPLEXTM

Oil Mist Detection System Manual

ENGINE DETECTOR

EM6 / JANUARY 2019

QMI



Engine Oil Mist Detection System

QMI MULTIPLEX™ Engine Oilmist Detection System Manual

EM6 / JANUARY 2019

You have chosen the QMI MULTIPLEX™ Oil Mist Detection System that has been providing a fast response without false alarms to protect lives and prevent engine damage since the early eighties.

You can use the QMI engine condition data continuously provided by the Monitor to see when and where repairs are needed thus avoiding unnecessary engine wear and the resulting danger.

We can provide QMI atmospheric oil mist sensing systems to pinpoint the location of a hazardous build-up of oil mist in confined areas such as: pumps, bow thrusters, purifier rooms, hydraulic pack areas, test cells and rooms etc. For more information please see our website: **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 |
| General Wiring Layout for Engine Oil Mist Detector System | Part1-5 |
| Central Monitor Unit | Part1-6 |
| Description of (Q02) Engine Detector | Part1-6 |
| Engine Detector Head (Q02) Layout | Part1-7 |
| MULTIPLEX Junction Box (Q06) Layout | Part1-8 |
| QMI Fan (Q03FH) with Fan Failure Housing | Part1-9 |
| Photographs of Fan and Fan Failure Housing | Part1-10 |

PART 2 INSTALLATION

| | |
|--|----------|
| Cut Out for QMI Panel/Wall Mounted Monitor | Part2-2 |
| Advice on Pipe Work and Detector Installation | Part2-3 |
| Detector Mounting and Location | Part2-4 |
| Layout of Pipework | Part2-5 |
| Location and Installation Details of Oil Mist Detectors for 2 Stroke Slow Speed Engine | Part2-6 |
| Layout of Pipework | Part2-7 |
| Installation Details of Oil Mist Detectors for 2 Stroke Slow Speed Engines | Part2-8 |
| 4-Stroke Medium Speed Engine with Threaded or Rigid and Flexible Pipes | Part2-9 |
| When Installed Inside an Engine Inspection Door or Crankcase Wall | Part2-10 |
| MULTIPLEX Monitor with Harting Connectors | Part2-11 |
| Cable Specifications | Part2-12 |
| Wiring of Socket | Part2-13 |
| Multi-core Cable Sizing Table When Less than 10 Engine Detectors are used | Part2-14 |
| Cable Details for Engine Detector Head Six Pole Socket - Junction Box (Q0208) | Part2-15 |
| Connector Details for QMI MULTIPLEX CMU - Junction Box (Q01H1) | Part2-16 |
| Connector Details for QMI MULTIPLEX CMU - Junction Box | Part2-17 |
| Cable Details for MULTIPLEX 4-20mA Data Logger Output (Q01H5) | Part2-18 |
| Cable Details for QMI MULTIPLEX Relay Alarm Output (Q01H3) | Part2-19 |
| Alarm Output Wiring | Part2-20 |
| Cable Details for QMI MULTIPLEX Relay Shutdown Output (Q01H2) | Part2-21 |
| Optional Engine ShutDown Wiring | Part2-22 |
| Overall View of Connector No. 4 For MULTIPLEX Mains 110/240V Power Socket | Part2-23 |

| | |
|---|----------|
| 110/240V Power Supply Wiring | Part2-24 |
| Wiring for QMI Junction Box 1 Fan, Engine Set-up Only | Part2-25 |
| Wiring for QMI Junction Box for 2 Fans | Part2-26 |
| Wiring of the Fan Failure Housing to the Junction Box PCB | Part2-27 |
| QMI MULTIPLEX 4-20mA Data Logger Output | Part2-28 |
| Wiring for Engine Slow/Shutdown | Part2-29 |
| Graphs to Show Relationship Between mg/L, Digital Readout of Percentage of Alarm Level and the Percentage of LEL | Part2-30 |

PART 3

STARTING UP/RUNNING PROCEDURE

| | |
|---------------------------------------|----------|
| Operation | Part3-2 |
| Fault Alarm | Part3-3 |
| Fan Failure Housing Light Sequence | Part3-4 |
| To Change Alarm Levels | Part3-5 |
| Test Sequence & Alarm Levels | Part3-6 |
| Changing the Number of Detector Heads | Part3-7 |
| Detector Head Test Sequence | Part3-8 |
| To Isolate a Channel | Part3-8 |
| Isolating Fan Failure Sensor | Part3-9 |
| Response to Alarm | Part3-10 |

PART 4

FAULT FINDING

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

PART 5

MAINTENANCE

| | |
|--|---------|
| Replacement of Fan Failure Sensor | Part5-2 |
| Maintenance Procedures | Part5-3 |
| Lens Cleaning Procedure | Part5-4 |
| Diagram Showing Position of Lenses | Part5-5 |
| Maintenance Kit Checklist | Part5-6 |
| Suggested Maintenance Plan for Engine Detection System | Part5-7 |

PART 6

SPARES

| | |
|--|---------|
| Codes and Description for Replacement Parts and Spares 1 | Part6-2 |
| Codes and Description for Replacement Parts and Spares 2 | Part6-3 |
| QMI Oil Mist Monitor System Log | Part6-4 |
| Returns Procedure | Part6-5 |
| QMI Request For After Sales Information | Part6-6 |



Engine Oil Mist Detection System

PART 1

INTRODUCTION



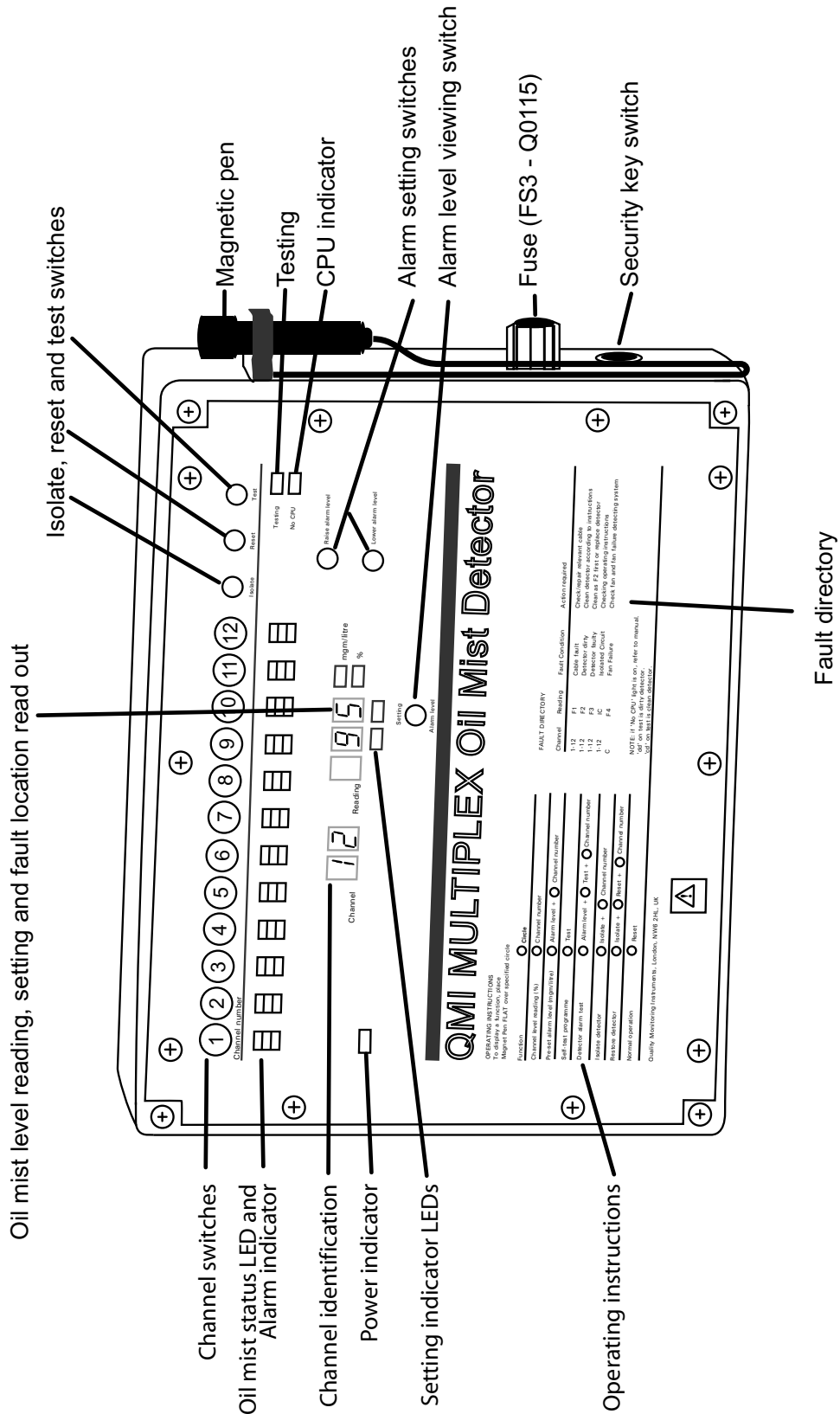
Oil Mist Detection Systems

Engine Oil Mist Detection System

TECHNICAL SPECIFICATIONS

| | | |
|---|---|--------------------|
| POWER SUPPLY | Nominally 110 - 240 VAC 50/60 Hz | |
| MAXIMUM POWER CONSUMPTION | 100W | |
| MAXIMUM SAMPLING CHANNELS | 12 | |
| CYCLE TIME | 0.5 seconds simultaneously on all channels | |
| MEASURING SYSTEM | Time multiplex analogue signal | |
| SYSTEM OUTPUTS - RELAYS | 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 | |
| Engine Slow Down or Shutdown | Normally de-energised with 1 set of change over contacts | |
| Fault Alarm | Normally energised with 1 set of change over contacts | |
| OPERATING TEMPERATURE | 5-70°C | |
| MULTIPLEX | DIMENSIONS (mm) | WEIGHT (kg) |
| Central Monitoring Unit (CMU) | 403 x 312 x 128 | 10 |
| Detector Head (DH) | 166 x 160 x 104 | 2.5 |
| Sealed | Monitor is sealed to IP65 | |
| MAXIMUM DISTANCE | Maximum cable length between DHs and CMU is 100 metres. (for longer lengths contact QMI) | |
| FUSE ARRANGEMENTS | | |
| Internal FS1 | Head Interface 1.25A anti-surge | |
| Internal FS2 | 12V DC Fan Failure Supply 400mA anti-surge | |
| External FS3 | 110 - 240 VAC 3.15A anti-surge | |
| FEATURES | Continuous self-monitoring fault diagnosis. Test facility - all functions Engine Shutdown | |
| OPTIONS These items must be ordered at the time of ordering | 12 Data Logging outputs 4-20mA Multi-way shut/slow downs for up to 12 engines This facility can also be used for 12 individual alarms | |

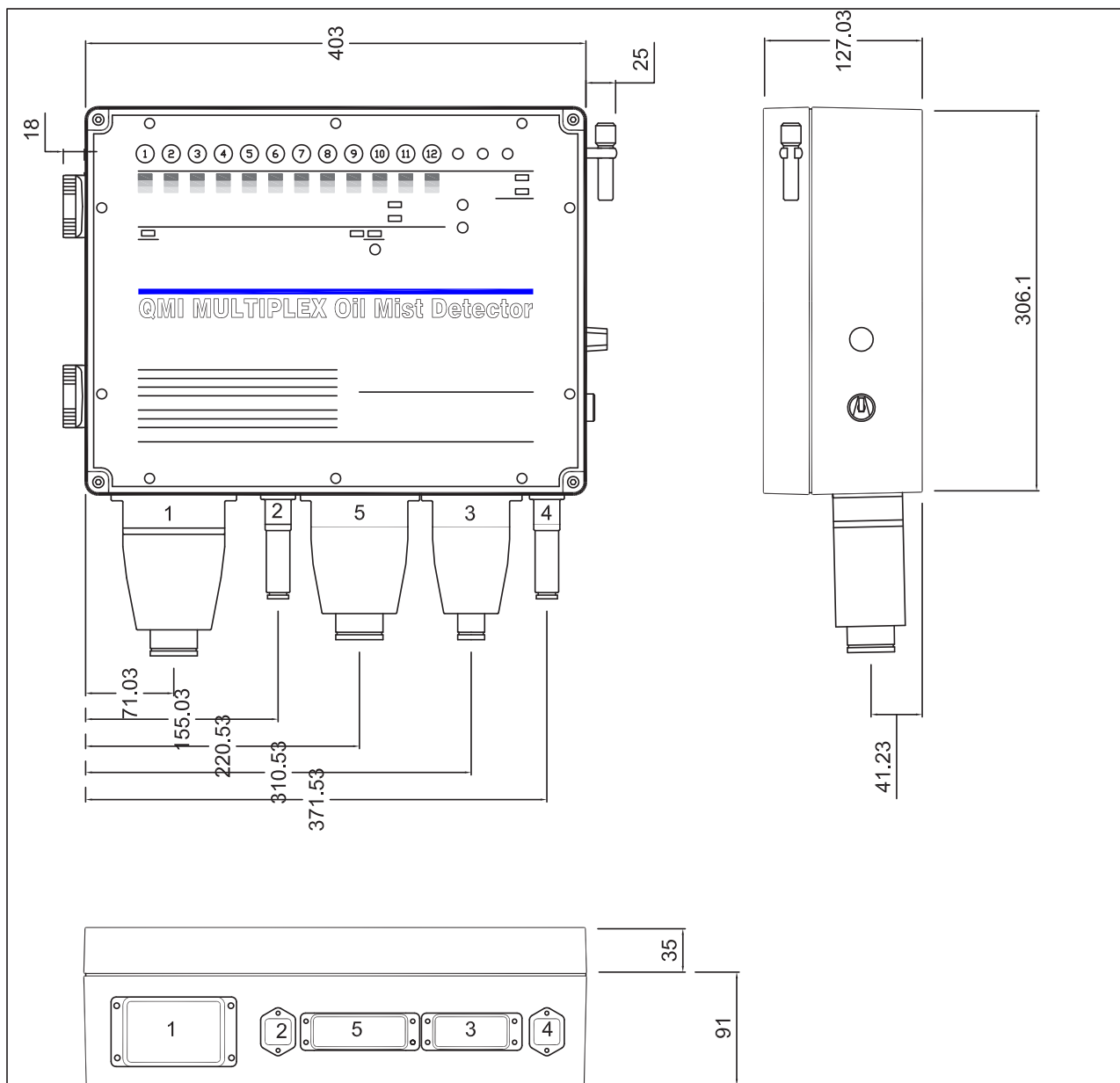
QMI MULTIPLEX MONITOR





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HARTING CONNECTORS LISTING

- 1 = 32 WAY HARTING SIGNAL/SUPPLY TO JUNCTION BOX
- 2 = 4 WAY SHUT DOWN-OPEN OR CLOSED RELAYS (NOMINATED)
THIS WILL BE USED AS A DATA OUTPUT TO
INDIVIDUAL SHUT DOWN BOX WHEN AN INDIVIDUAL
SHUTDOWN SET UP IS REQUIRED
- 3 = 10 WAY ALARM OUTPUTS
- 4 = 4 WAY MAINS
- 5 = 16 WAY DATA LOGGER OUTPUT (OPTIONAL)

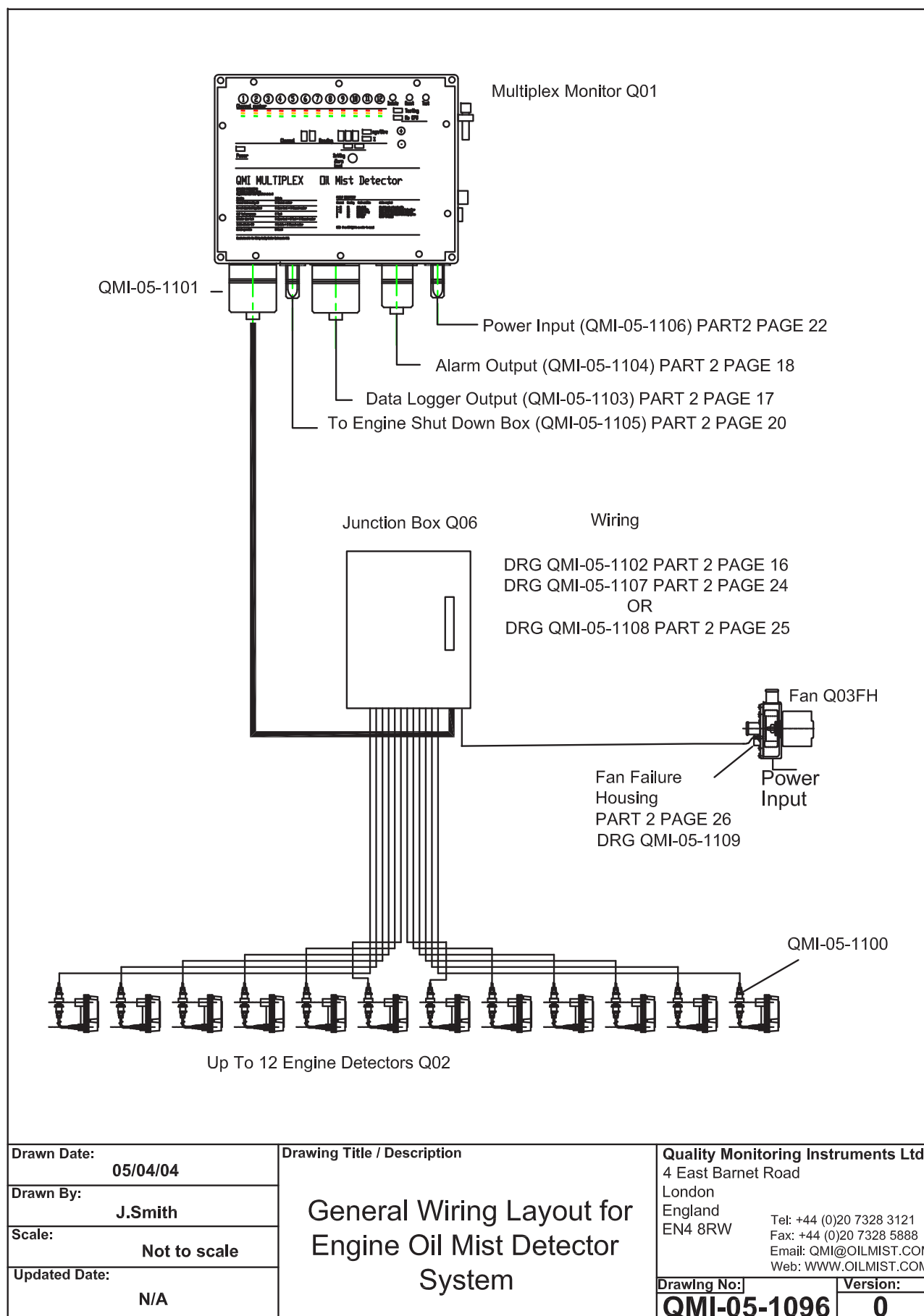
Dimension = mm

| | | | |
|------------------------------------|---|--|--------------------------|
| Drawn Date: <div>20/12/06</div> | Drawing Title / Description <div>MULTIPLEX Central Monitor Unit (CMU) Layout</div> | Quality Monitoring Instruments Ltd 4 East Barnet Road London England EN4 8RW | |
| Drawn By: <div>G.CLINCH</div> | | Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5888 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM | |
| Scale: <div>Not to scale</div> | | | |
| Updated Date: <div>N/A</div> | | | |
| | | Drawing No: <div>QMI-05-1092</div> | Version: <div>1</div> |



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CENTRAL MONITOR UNIT

The CMU contains:

1. Display panel with MP12 PCB v 3.2
2. Power Supply Board (PSB) PCB with Power Supply Unit (PSU) and connectors
3. Multi-way connectors using terminal plugs for wiring of alarms and functions, Detectors and mains power supply
4. Fuses
5. Security switch assembly

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

The display panel sub-assembly carries the main MULTIPLEX PCB type MP12 PCB v 3.2 Processing Board, with the 10-way Binary Switch and Flash Memory Chip which is attached to the display (Monitor faceplate) by 6 x cheese head screws.

The power supply board holds the fuses, the transistor TR1, and the terminal plugs and carries the alarm relays.

DESCRIPTION OF (Q02) ENGINE DETECTOR

See drawing Part 1-7

(Also used for Gearbox, Chain Case and Clutch)

The assembled Detector is made from three alloy castings comprising of:

- (a) Back Plate
- (b) Chamber
- (c) Cover

The Back Plate is permanently fitted to the engine and has inlet and outlet ports through which the oil mist travels via the chamber assisted by a fan. There is a stainless steel filter in the inlet port.

The chamber and cover are a sub-assembly sealed to IP65 which are factory calibrated when manufactured. This unit cannot be calibrated or adjusted by the user.

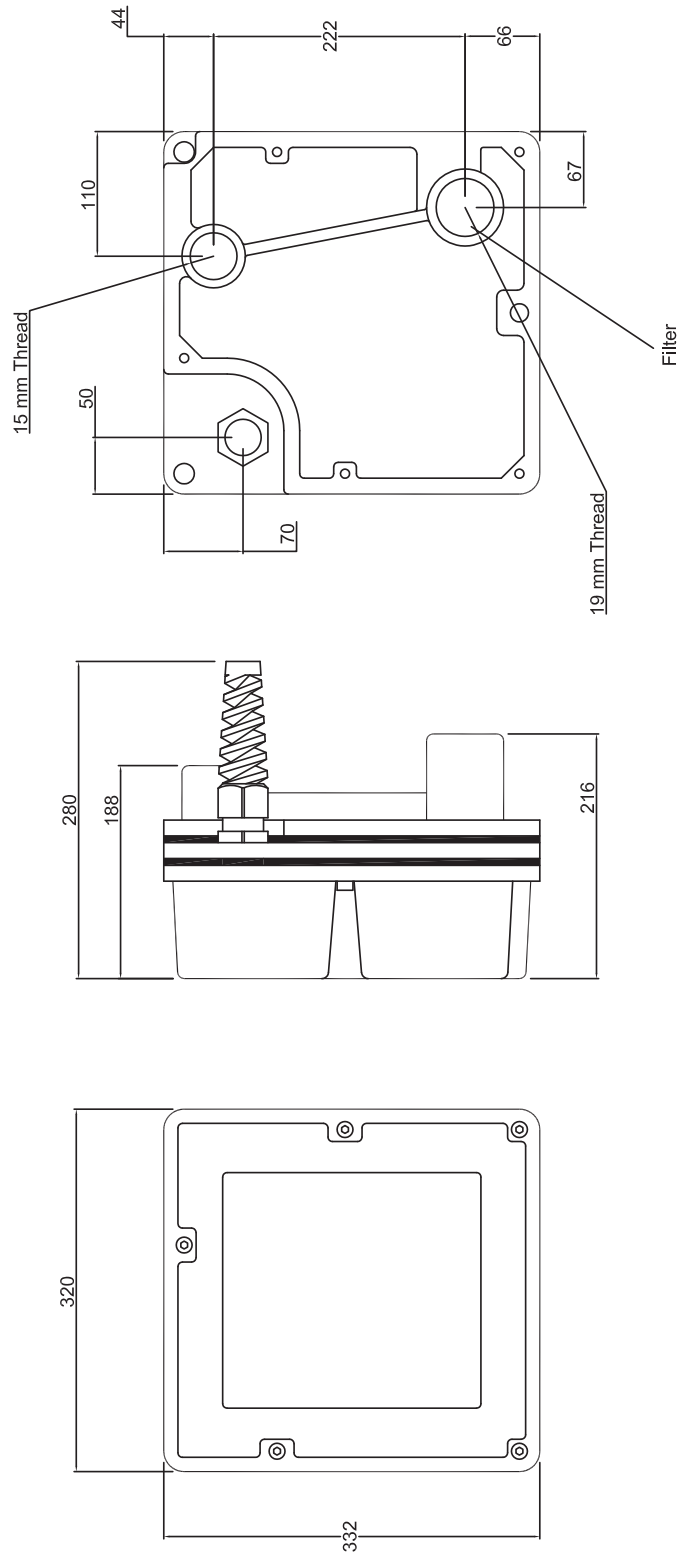
The chamber guides the sample past the sensors. The electronics are mounted on the back of the chamber casing and are protected by the sealed cover. The sub-assembly is fitted to the Back Plate by 5 x screws which can be removed if and when the Detector lens requires cleaning.

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



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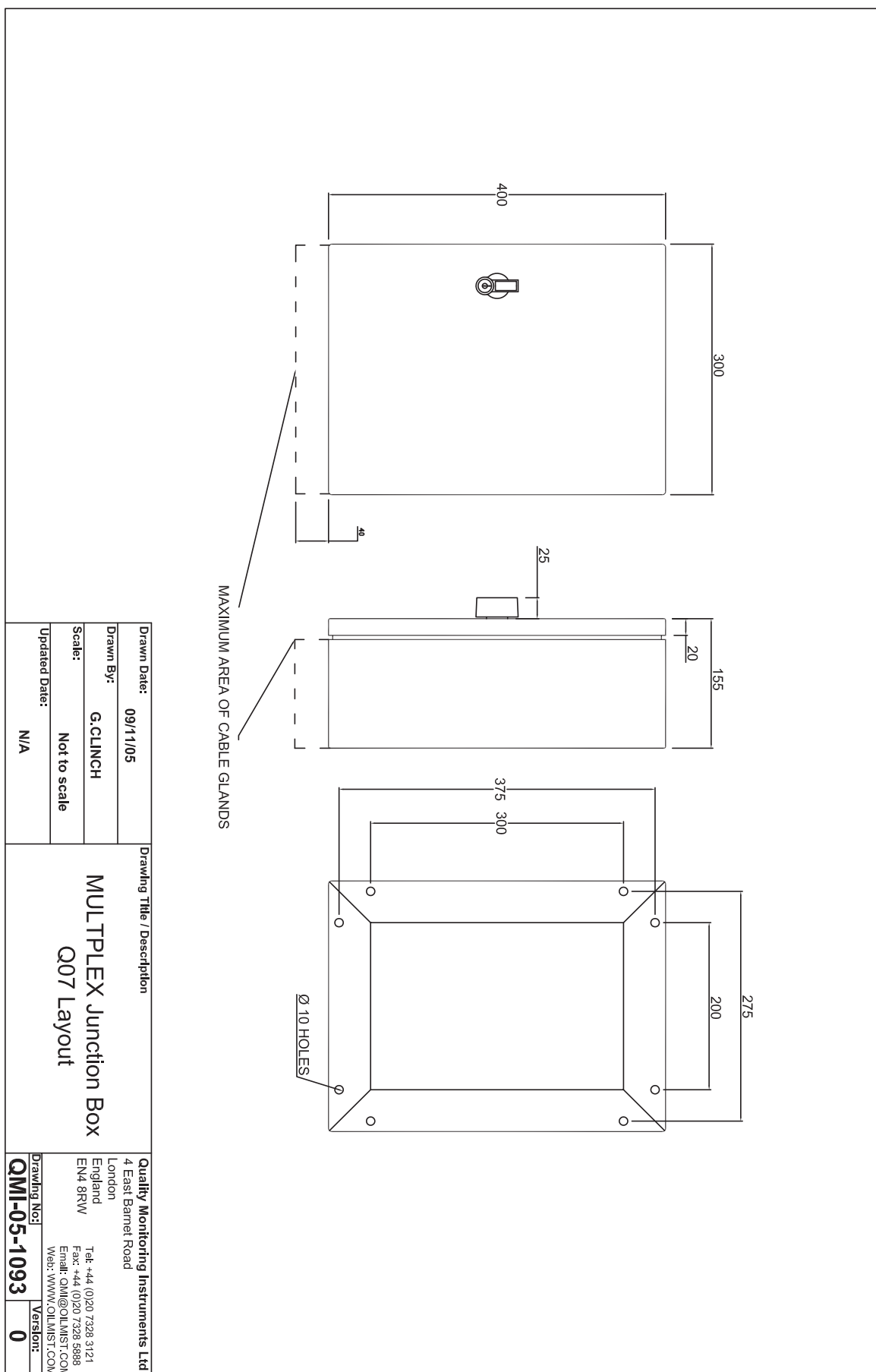


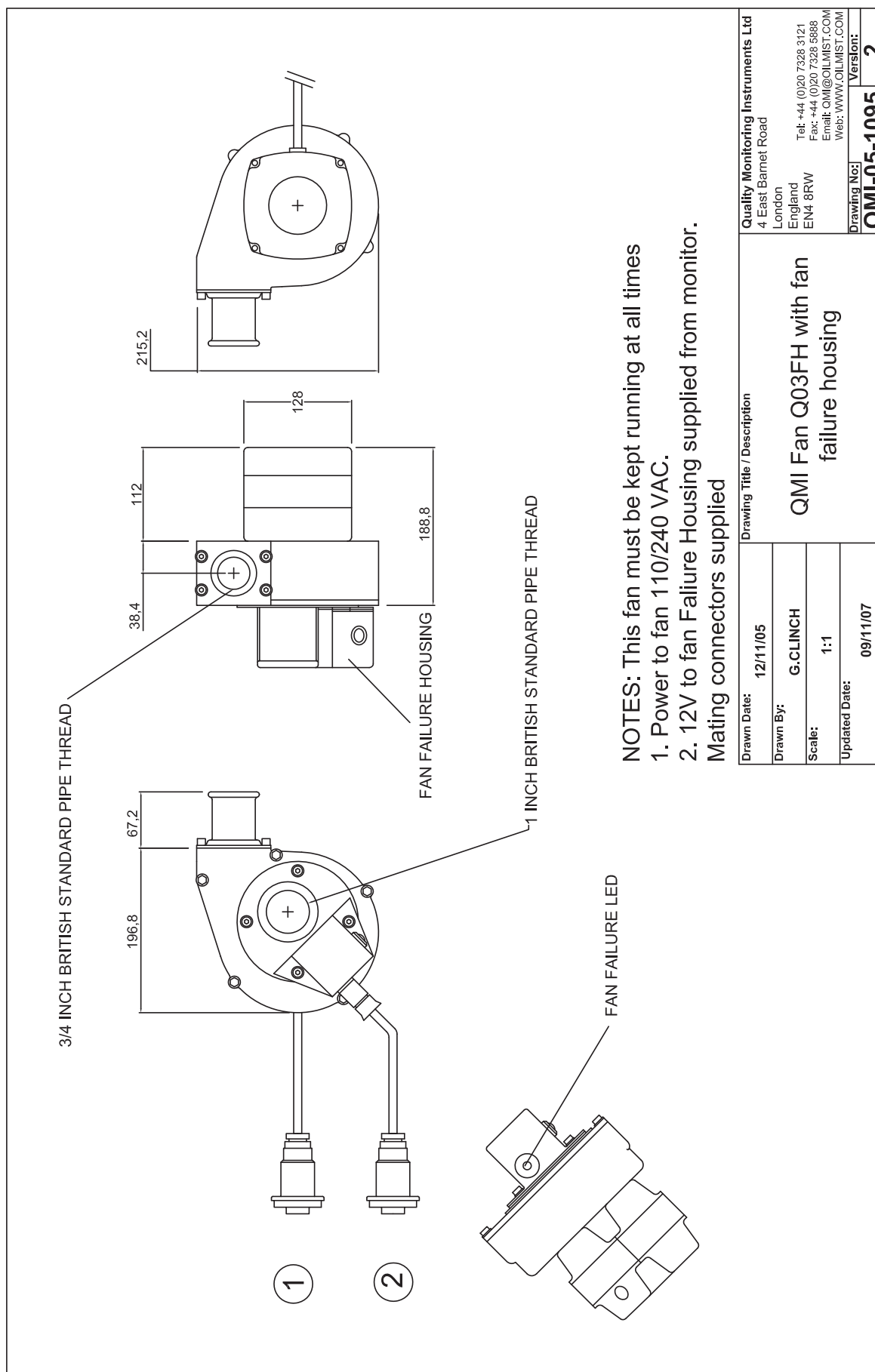
| | | | | | |
|---------------|--------------|-----------------------------|--|---------------|------------|
| Drawn Date: | 09/11/05 | Drawing Title / Description | Quality Monitoring Instruments Ltd 4 East Barnet Road London England EN4 8RW Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5888 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM | Drawing No: 1 | Version: 0 |
| Drawn By: | G.CLINCH | | | | |
| Scale: | Not to scale | | | | |
| Updated Date: | N/A | | | | |



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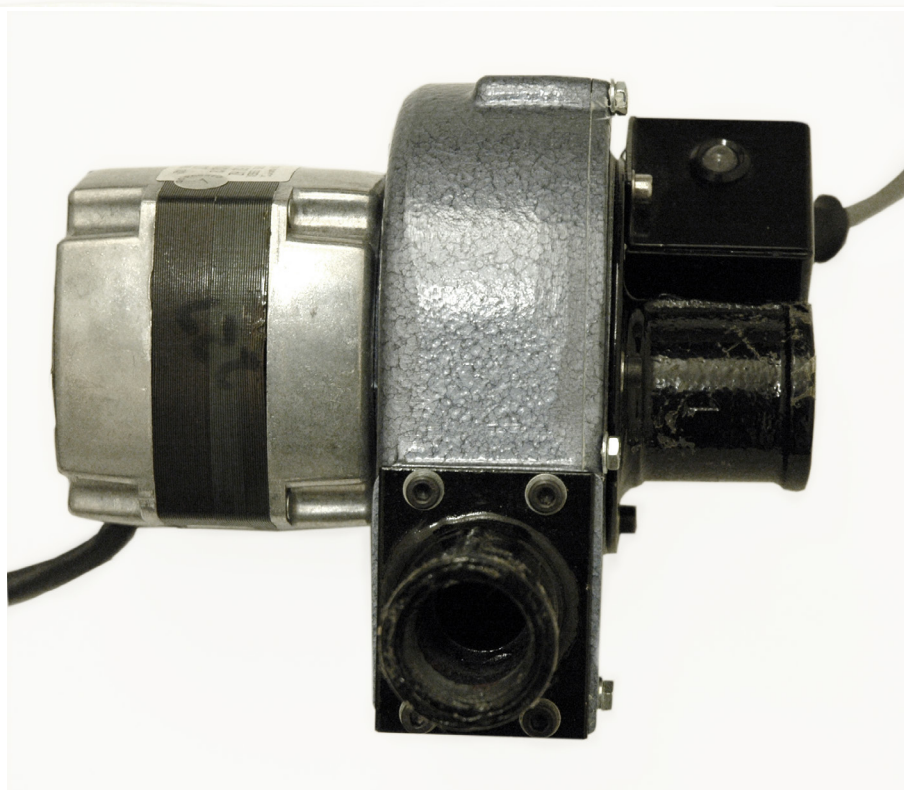




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PHOTOGRAPHS OF FAN AND FAN FAILURE HOUSING



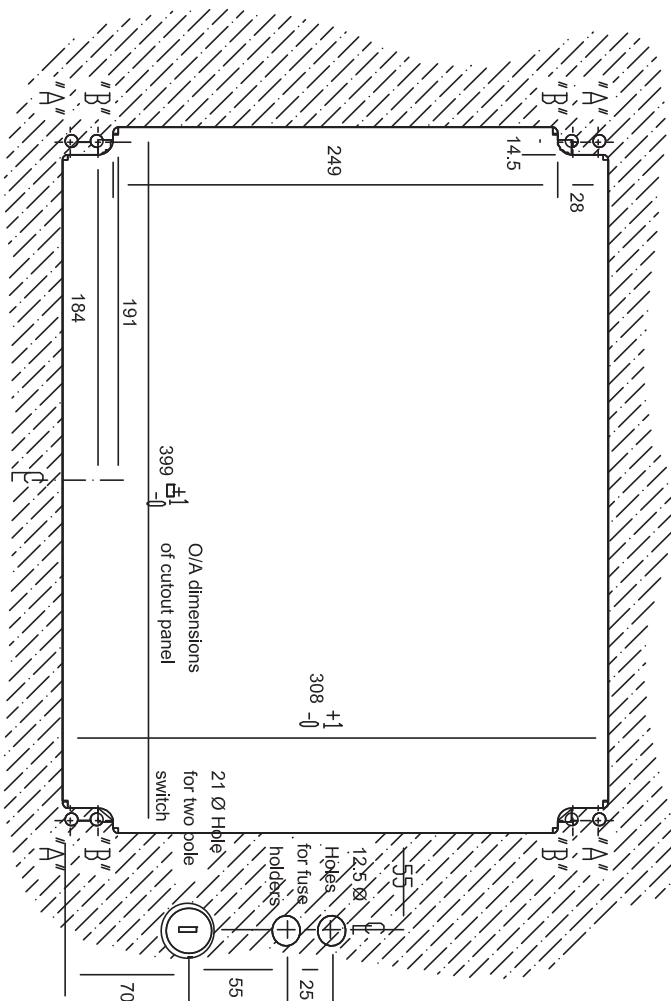


Engine Oil Mist Detection System

PART 2

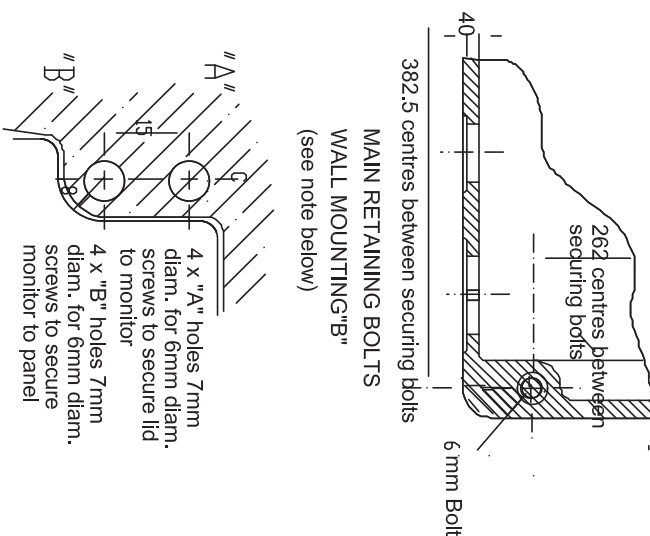
INSTALLATION

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



| | | | |
|---------------|-------------|---|--|
| Drawn Date: | 12/11/05 | 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: | G.CLINCH | Cut out for QMI Panel/Wall Mounted Monitor | |
| Scale: | 1:1 | | |
| Updated Date: | N/A | | |
| Drawing No: | QMI-05-1097 | Version: | 0 |



Oil Mist Detection Systems

Engine Oil Mist Detection System

ADVICE ON PIPE WORK AND DETECTOR INSTALLATION

| | |
|---|---|
| 1 | The Detectors are mounted upright - see drawing QMI-05-1099 Part 2-8 |
| 2 | Make sure the Detectors are mounted on the down side of the engine rotation - see drawing QMI-05-1099 Part 2-8 |
| 3 | The Baffles must be mounted vertically so that oil does not become trapped in the Baffle. |
| 4 | <p>Please ensure:</p> <ul style="list-style-type: none">- There is enough pipework outside the engine to knock out any droplets of oil that have passed the baffle- All pipes are either vertical or horizontal so that no oil traps are formed- A ball valve is placed in the pipework just before the fan to control the air flow through the Detectors- The pipework after the fan should return to either the breather or crankspace so the pressure is equalised. See Part 2-4 and 2-5. If the engine has a fan in the breather pipe, we suggest you take the QMI exhaust pipe to the breather making sure a ball valve is installed to control the air flow through the QMI Detector - see Part 2-5- Make sure the pipework is not under stress |
| 5 | <p>IMPORTANT NOTES:</p> <p>IT IS VERY IMPORTANT THAT NEITHER THE DETECTORS NOR THE FANS ARE BRACKETED TO THE ENGINE</p> <p>THE DETECTORS AND FANS SHOULD BE SUSPENDED ON PIPEWORK THAT IS BRACKETED TO THE ENGINE – see schematic on Part 2-6 and 2-7.</p> |



Engine Oil Mist Detection System

DETECTOR MOUNTING AND LOCATION

LOCATION OF QMI MULTIPLEX OIL MIST DETECTOR HEADS IN THE CRANKCASE

The Detector should always be mounted on the down side of the crank rotation. If the Detector is mounted on the up side of the crank rotation, it may cause contamination of the Head and require more frequent cleaning.

TRUNK PISTON ENGINES

The end of the sampling pipe within the crankspace should be between the piston bearing and the main bearing. This is the area where oil mist is most likely to be trapped. In engines that rotate in one direction only, it is possible to place the extraction point close to the side next to the crankspace compartment wall.

CROSSHEAD ENGINES

The normal place for the sampling pipe is in the upper area of the crankspace. This is the area where the oil mist usually accumulates.

RETROFITS

When a QMI MULTIPLEX Oil Mist Detection System replaces another system, the same entry points into the crankspace may be used. In this instance use an elbow after entering the crankspace and attach a baffle to the sampling end of this elbow.

The pipe on the outside of the engine must be extended to raise the Detector to a height of 150mm to 200mm above the outlet if possible – see Part 2-8.



Engine Oil Mist Detection System

LAYOUT OF PIPEWORK

PIPEWORK LAYOUT

See drawing QMI-05-1098 Part 2-6

The pipework for the MULTIPLEX system should be laid in such a way that there are no low points for condensed oil mist to collect. Failure to lay the pipes properly may cause a blockage thus affecting the efficiency of the system.

The Fan and Detectors should be supported by the pipework and not fixed by brackets to the engine, see QMI-05-1098 Part 2-6 and QMI-05-1099 Part 2-8.

A ball valve is normally placed in the sample extraction pipe to adjust the air flow – see Part 2-6 and 2-7.

When fitting the Detector try to ensure that there is a vertical distance of 150mm to 200mm, if possible between the sample exit point on the engine and the $\frac{3}{4}$ " BSP entry into the Detector Head – see QMI-05-1099 Part 2-8.

The Baffle supplied will reduce heavy oil contamination of the Detector Head and give longer periods between cleaning.

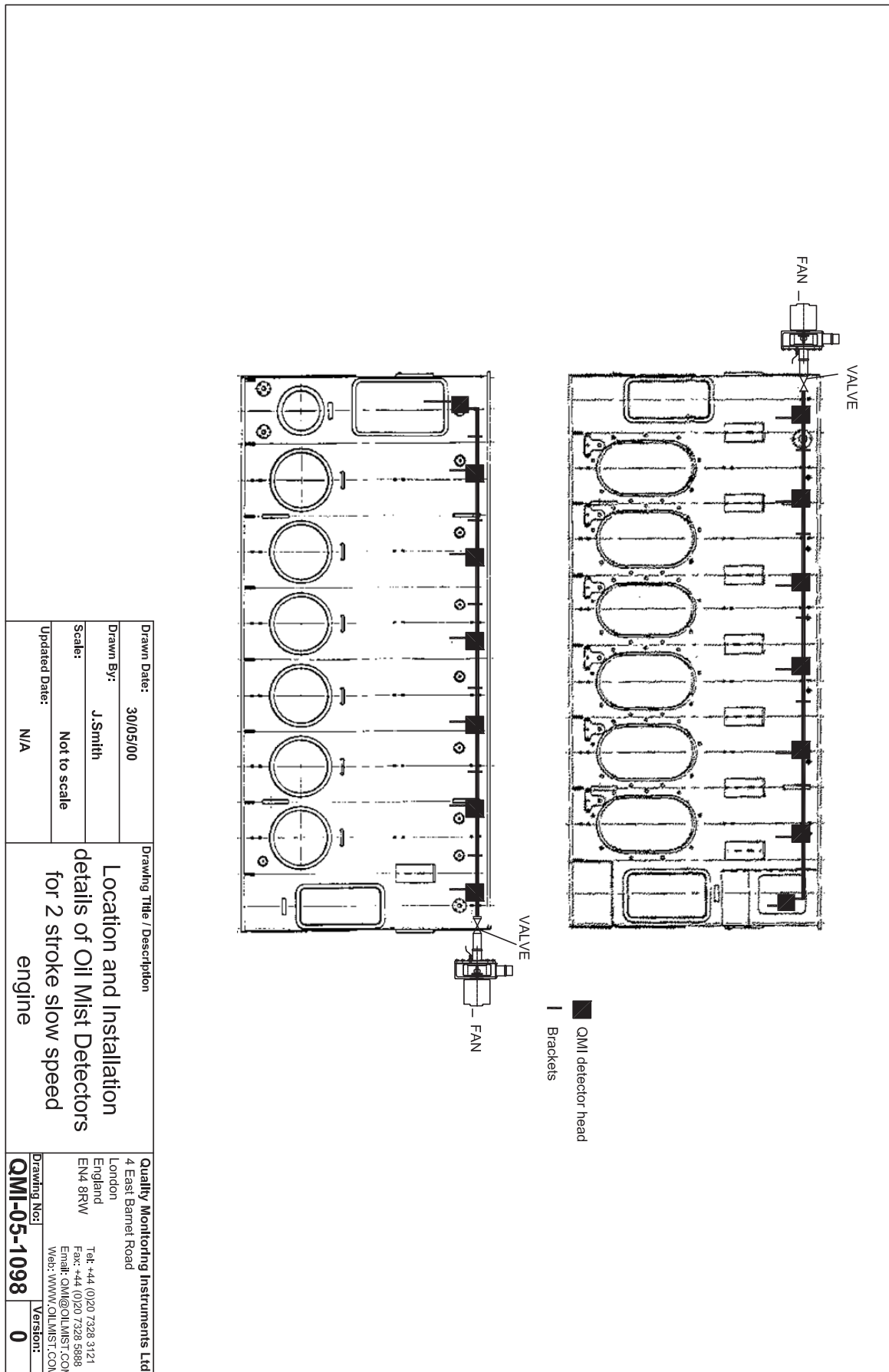
FAN SUCTION ADJUSTMENT

The valve fitted in the suction manifold, just in front of the intake of the fan, is used to control the airflow. This is to minimise the amount of oil and oil mist passing through the Detector so as to obtain the best results.

With the valve fully open and the engine working under full load, note each channel number with its associated oil mist reading. Slowly close the valve until the reading drops by about five points.

Re-open the valve slowly until the original readings return. Secure the valve in this position as this is the setting required to achieve the best readings and reduce Detector maintenance.

The Detector Heads must at all times be fitted vertically to prevent oil mist condensate from blocking the internal labyrinth (see drawing QMI-05-1099 Part 2-8).

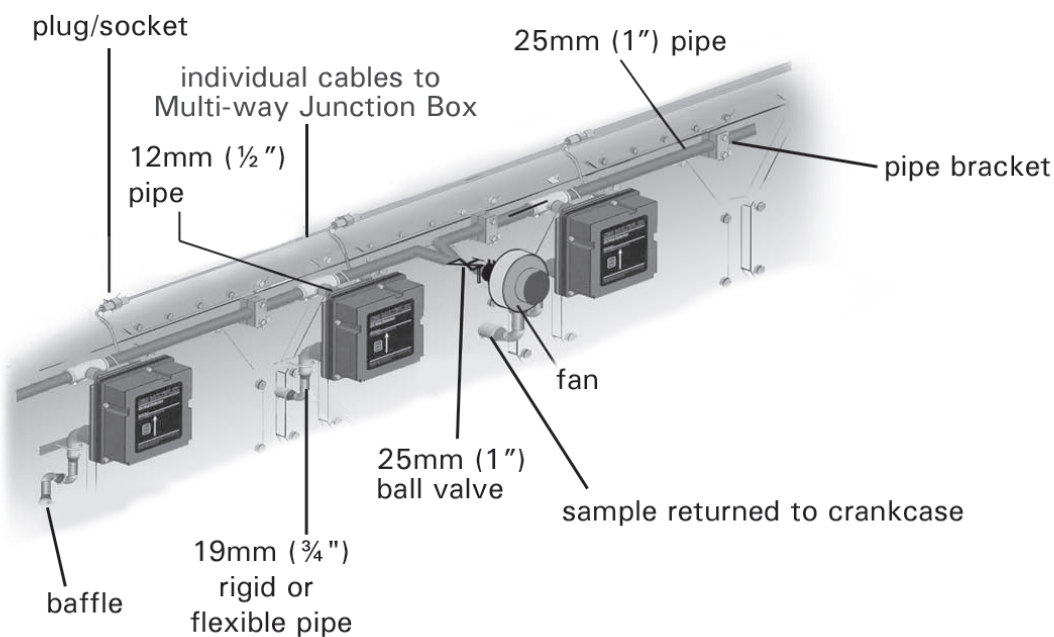


LAYOUT OF PIPEWORK

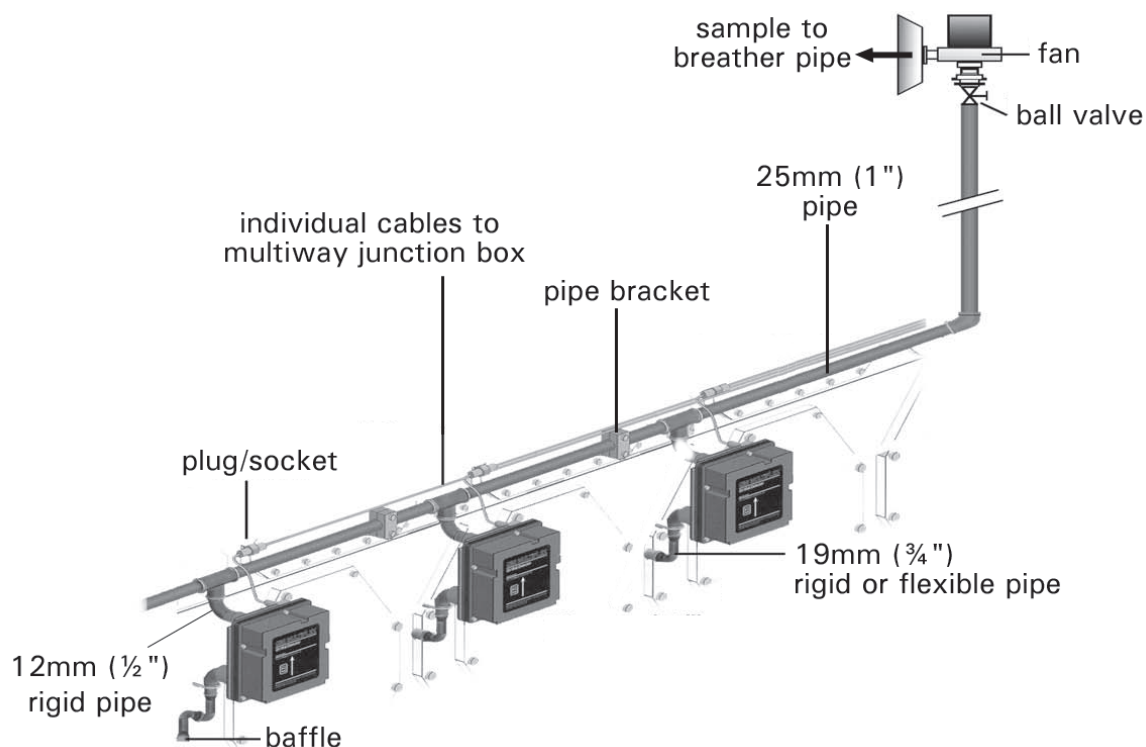
PIPE WORK RETURNING TO CRANK SPACE

PIPE LAYOUTS

Note: On slow speed 2 stroke engine, use 1 1/4" (38mm) manifold pipe in both layouts below.



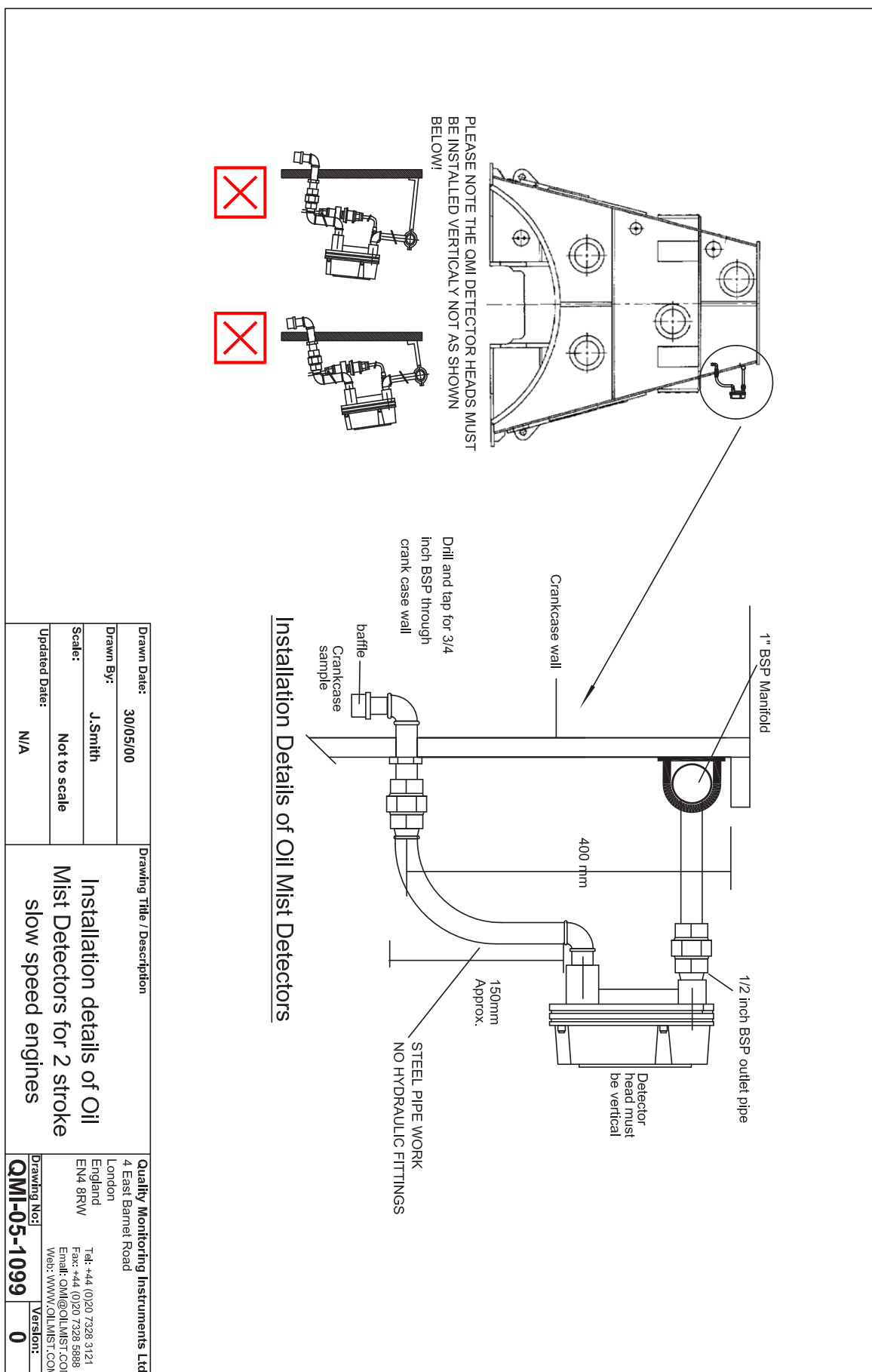
PIPEWORK RETURNING TO BREATHER





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4-STROKE MEDIUM SPEED ENGINE WITH THREADED OR RIGID AND FLEXIBLE PIPES

(To see baffle fitted see Part 2-10)

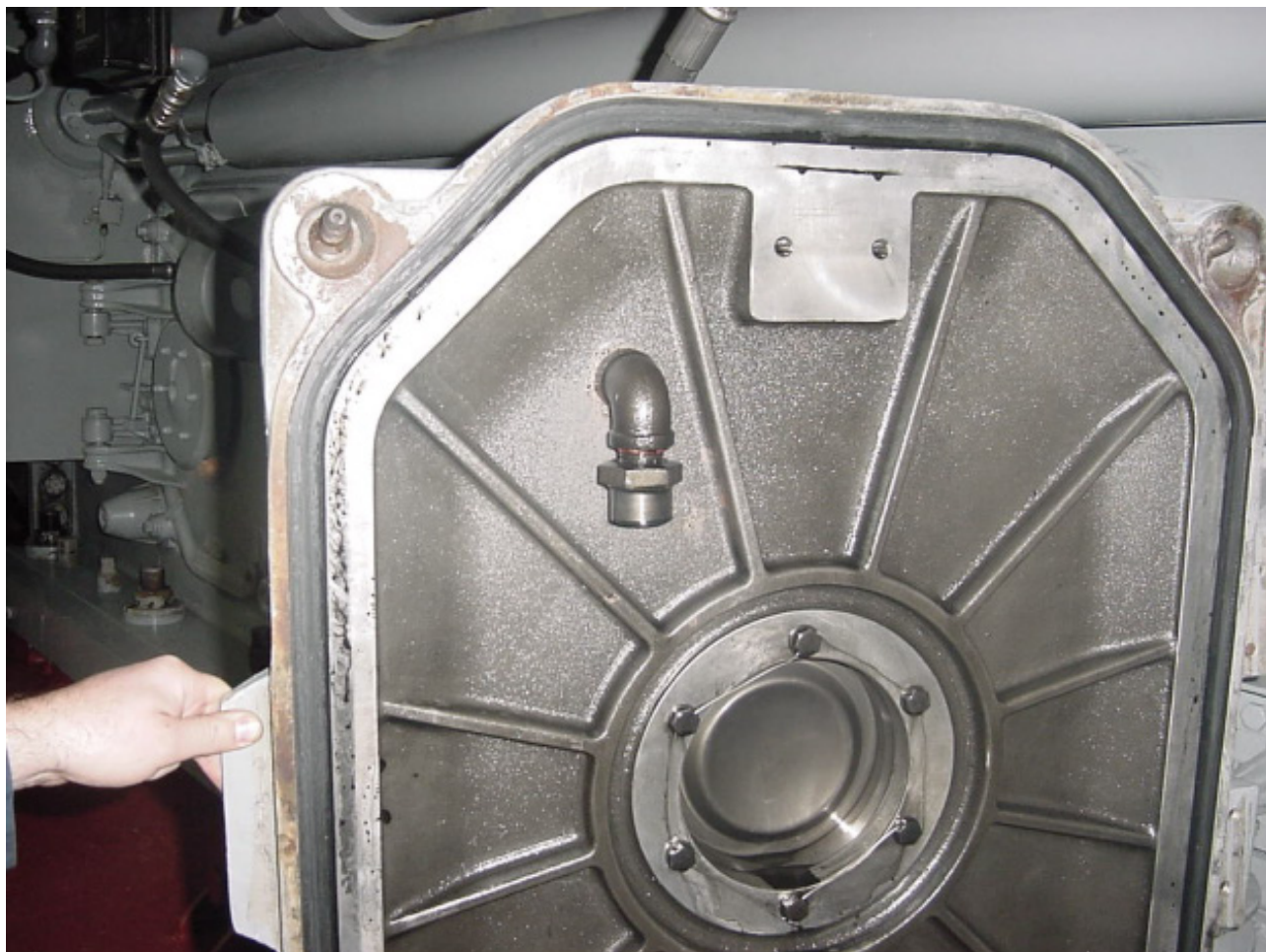




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WHEN INSTALLED INSIDE AN ENGINE INSPECTION DOOR OR CRANKCASE WALL

(To see Detector Head Fitting see Part 2-8 and 2-9)



MULTIPLEX 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 - see Part 2-21
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

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



Oil Mist Detection Systems

Engine Oil Mist Detection System

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.

- Conductor:** Standard copper conductor, annealed, IEC228 CLASS 2
Insulation: Halogen free flame retardant polyolefine
Pairs: Two core twisted together cable size $1 \times 4 \times 0.5\text{mm}^2$ or 0.75mm^2
Stranding: Pairs stranded together
Screening: Braid of Annealed Copper Wires. Filler tape under braid

See drawings QMI-05-1092 Part 1-4 and QMI-05-1096 Part 1-5.

| Monitor Connector | Connection | No. of Conductors and Cross Section (mm^2) |
|-------------------|--------------------------|--|
| 1 | Monitor to Junction Box | $19 \times 2 \times 0.75$ (for less than 10 Detectors – see Part 2-12) |
| 2 | Monitor to Shutdown | $2 \times 2 \times 0.5$ - same as Detector |
| 3 | Monitor to Alarm | $4 \times 2 \times 0.5$ or $7 \times 2 \times 0.5$ - see below |
| 4 | Power to Monitor | 3×1.5 rating min. 3A (L.N.E.) - not twisted |
| 5 | Monitor to Datalogger | $7 \times 2 \times 0.5$ |
| N/A | Junction Box to Detector | $2 \times 2 \times 0.5$ (for lengths over 100 metres, 0.75 size wire should be used) |
| N/A | Junction Box to Fan Fail | $2 \times 2 \times 0.5$ |

WIRING OF ALARM

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

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

EARTHING OF DETECTOR HEADS

The screen is normally connected to Pin 5 (see drawing QMI-05-1100 Part 2-15).

No earth should be made at the Detector Head end as this could result in ground loops.

Earths made to any other point from the screen wire between Monitor and Detector Head will be ineffective and could cause additional interference.

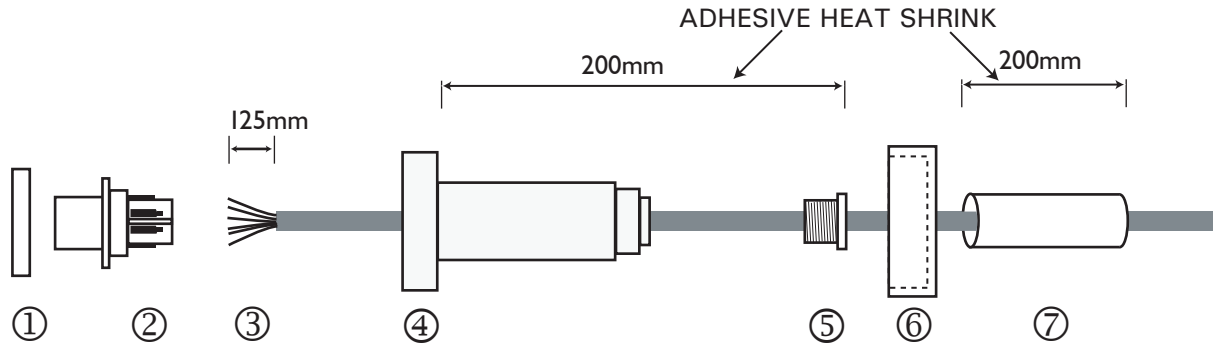
EARTHING OF JUNCTION BOX

It is very important that the Junction Box is earthed using an earth lug on the lid or in the box.

IF BOTH ATMOSPHERIC AND ENGINE DETECTORS ARE BEING USED

All the specifications are the same as for the Engine Detection System except that the cable from the Junction Box to the Atmospheric Detector is $3 \times 2 \times 0.5\text{mm}^2$ and the cable from the Junction Box to Fan fail is omitted.

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

- a. Strip back about 125mm of outer sheathing of cable and separate wires. Then tin ends of wires and screen being used.
- b. Assemble socket on to wire in the sequence shown in illustration. By passing wires through parts ④ ⑤ ⑥ and ⑦
- c. Wire bared wires and screen to correct numbered terminals of Part 2. Numbers are shown by the terminals. Use drawing QMI-05-1126 Part 2-15.
- d. Reassemble and lock with part number ①
- e. 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 ENGINE DETECTORS 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 Detectors are installed.

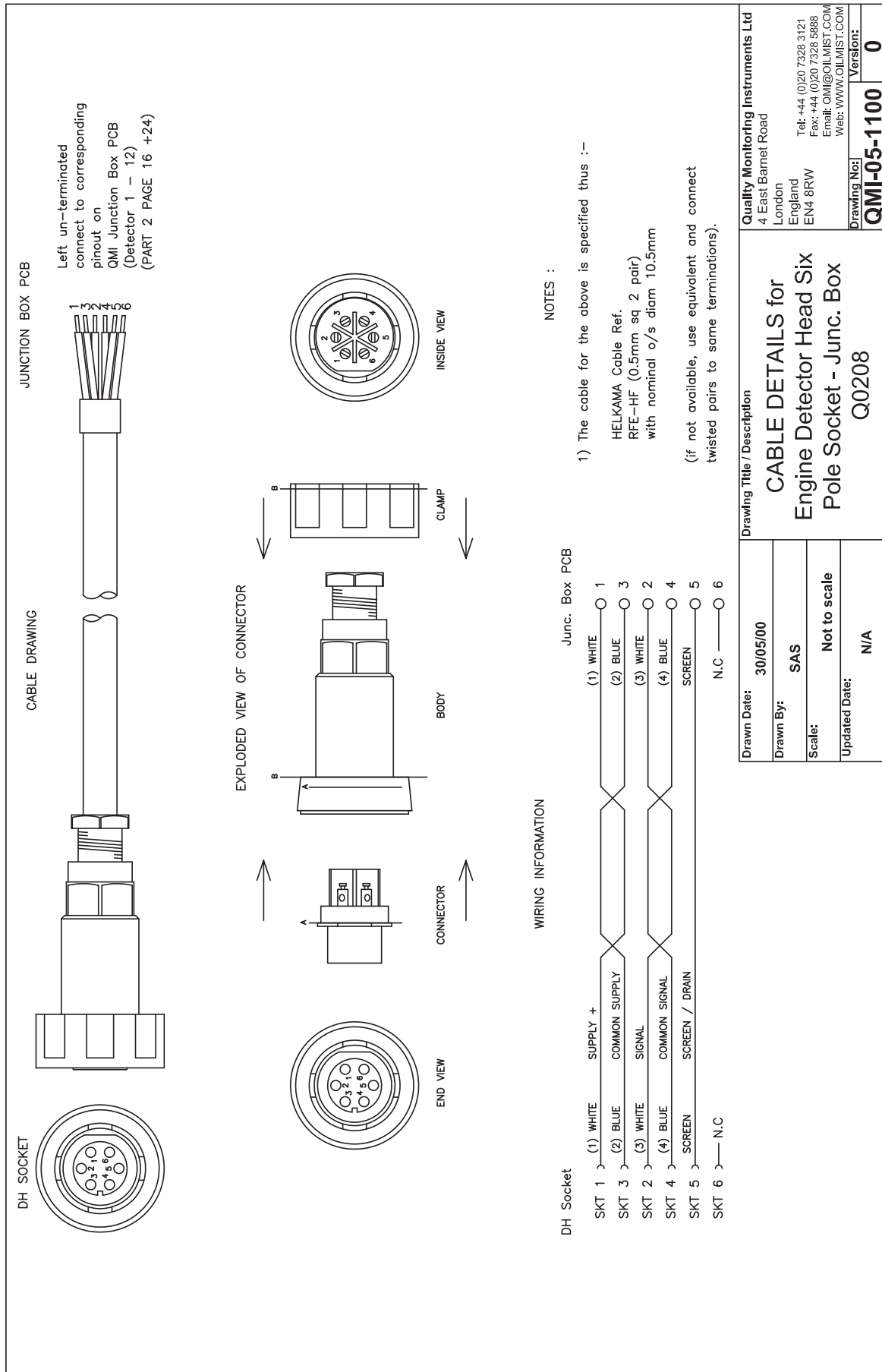
Below is a chart on how to select a multi-core cable. If fewer Detectors are to be used the terminals to be wired in the Junction Box are as follows:

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

NOTE: For further wiring details turn to Part 2-17.

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

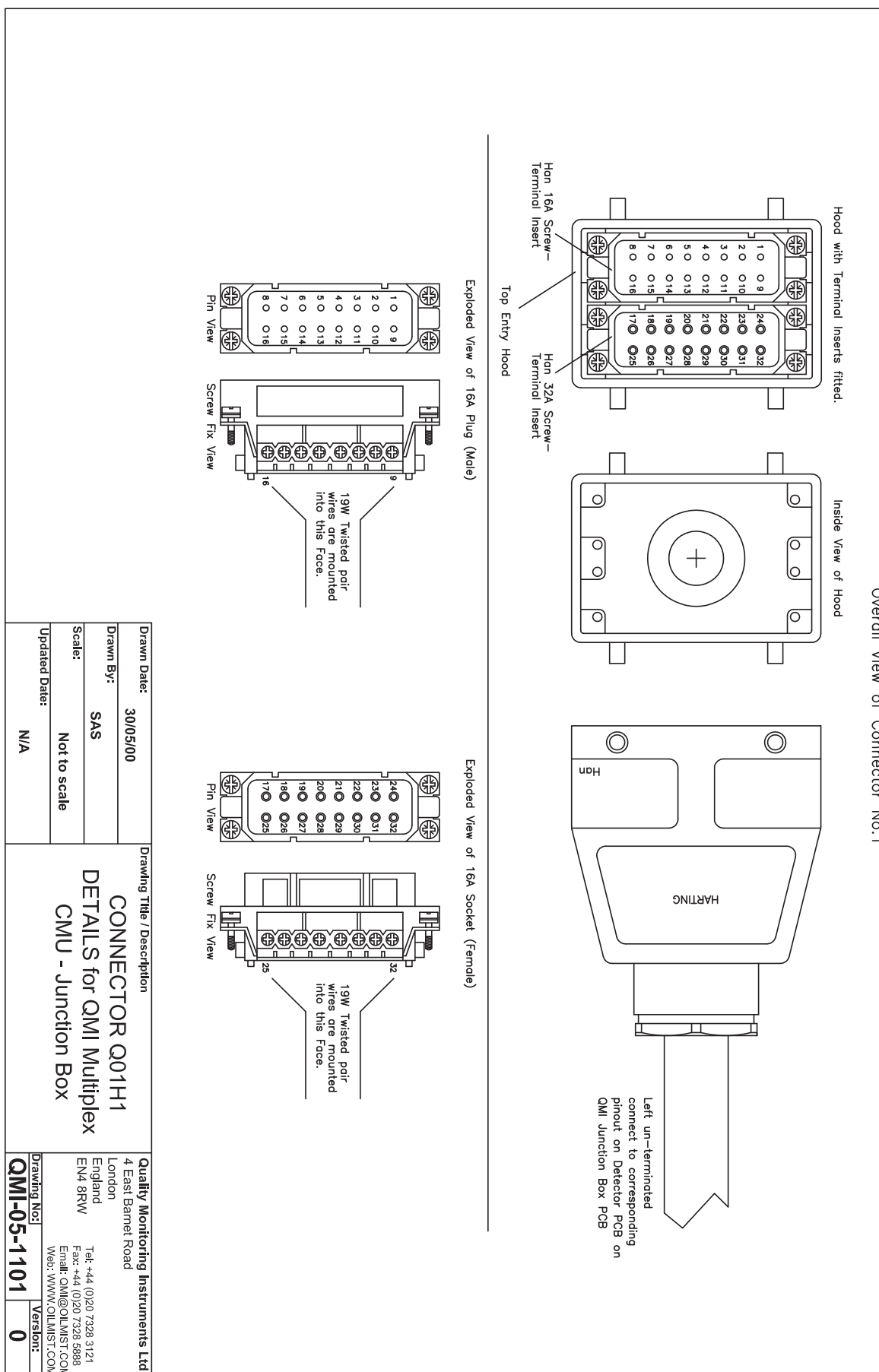
| | | 25 and 26 Supply Common | | 27 and 28 Supply + | | 29 and 30 Fan Failure | | 32 12V Fan Failure | |
|---------------------|----------------------------|-------------------------------|-------------|--------------------------|-------------|--------------------------|-------------|--------------------------|-------------|
| No. of Detectors | No. of Twisted Pairs | 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 |





Oil Mist Detection Systems

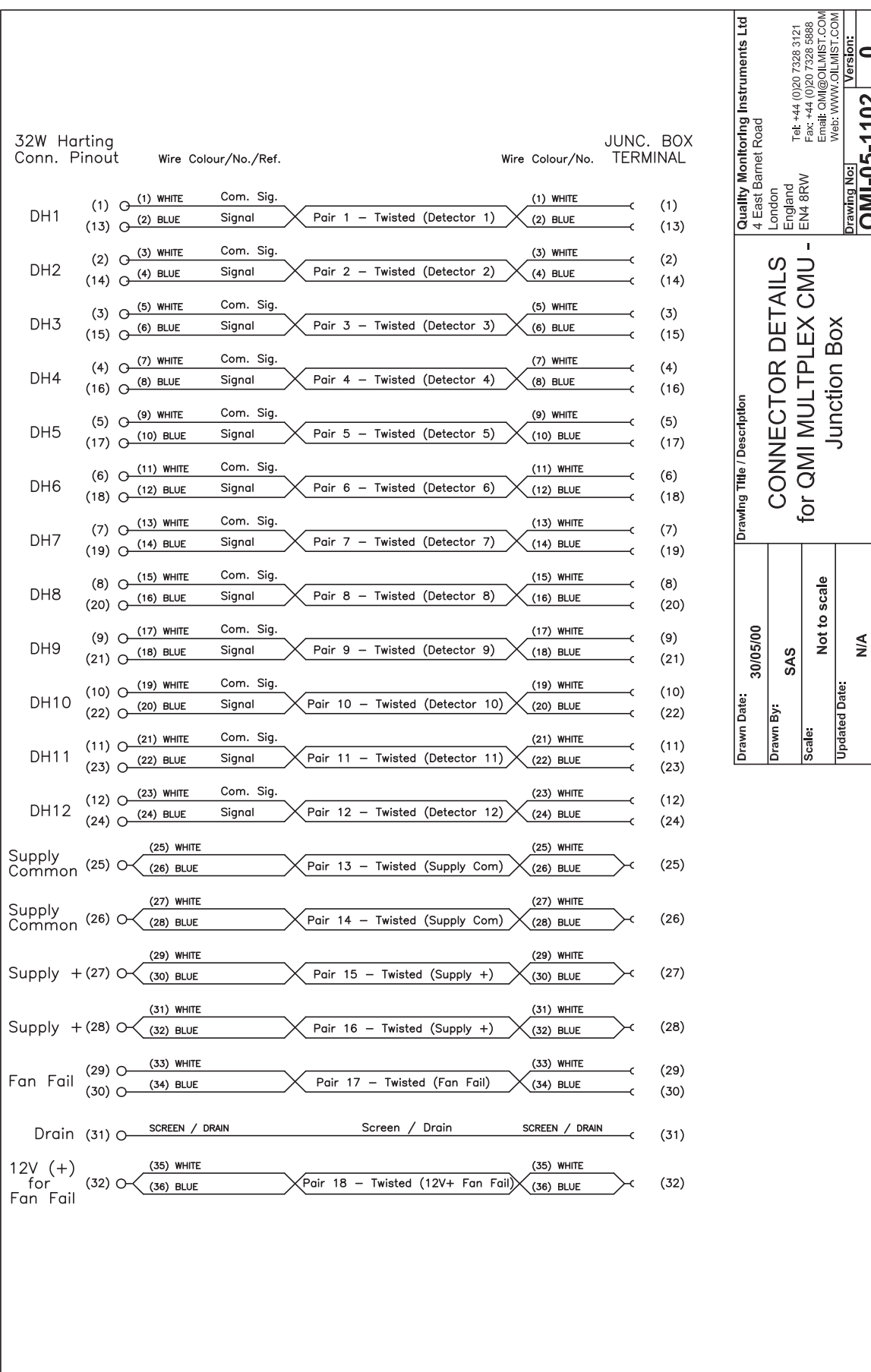
Engine Oil Mist Detection System

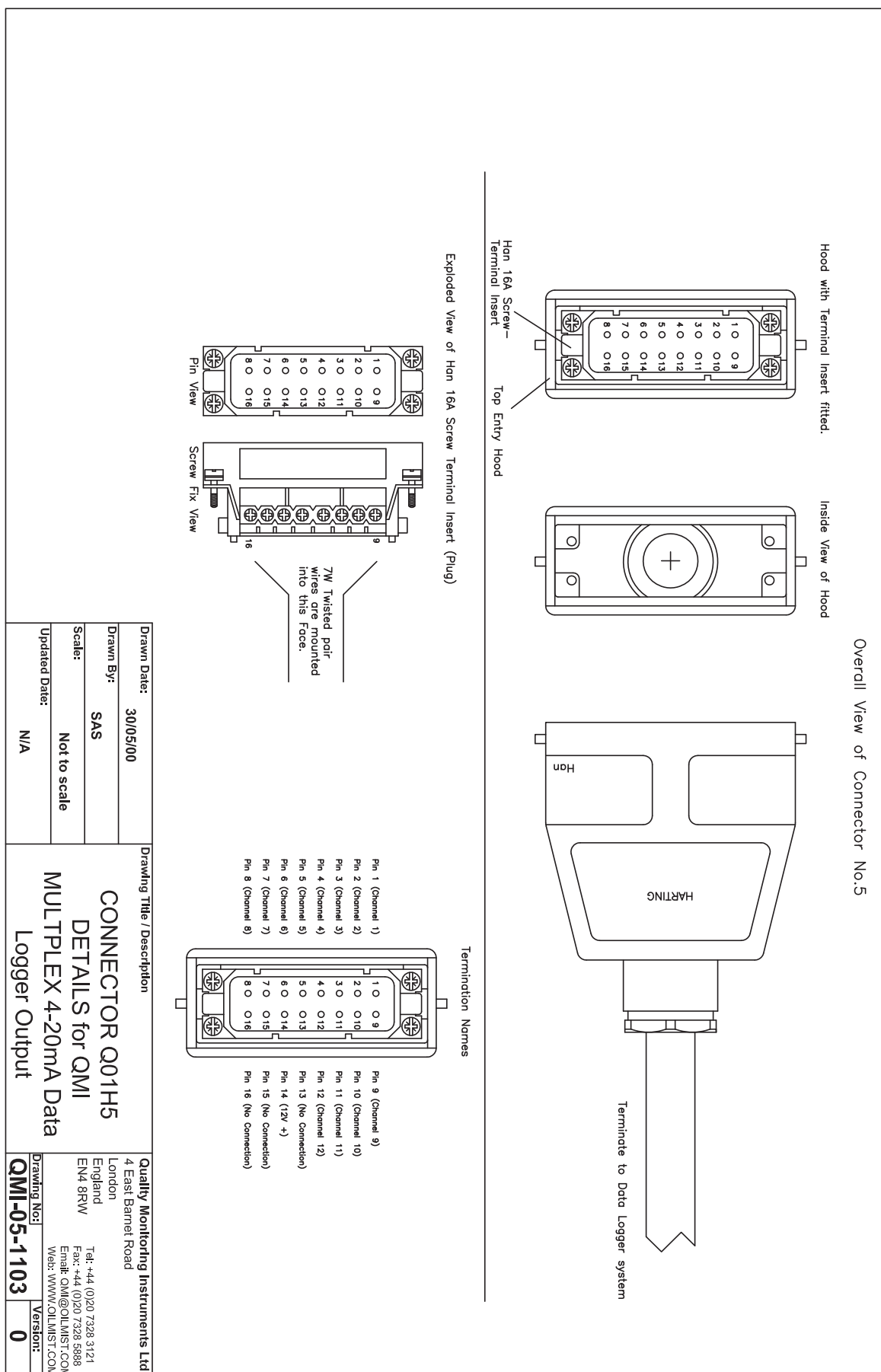


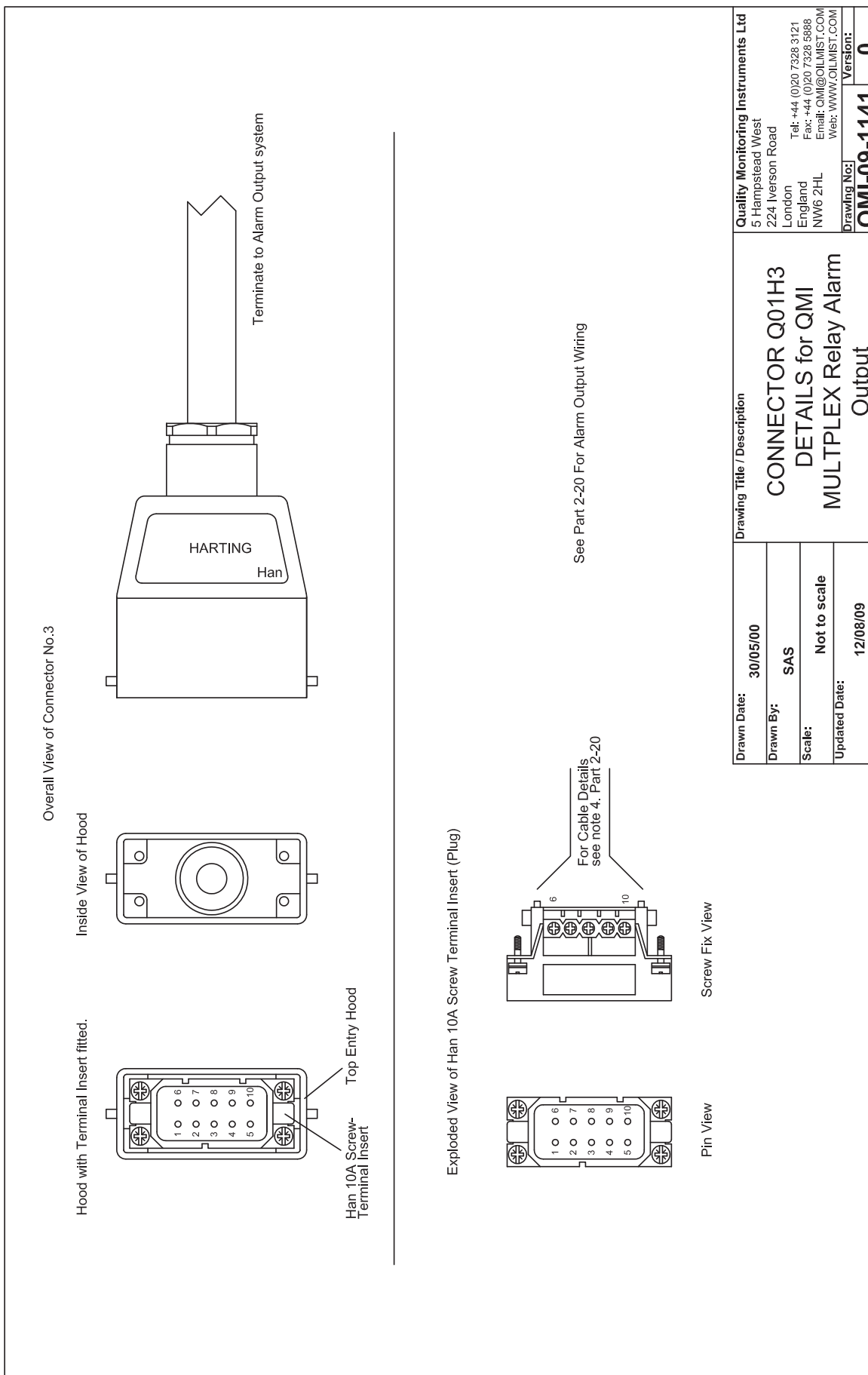


Oil Mist Detection Systems

Engine Oil Mist Detection System







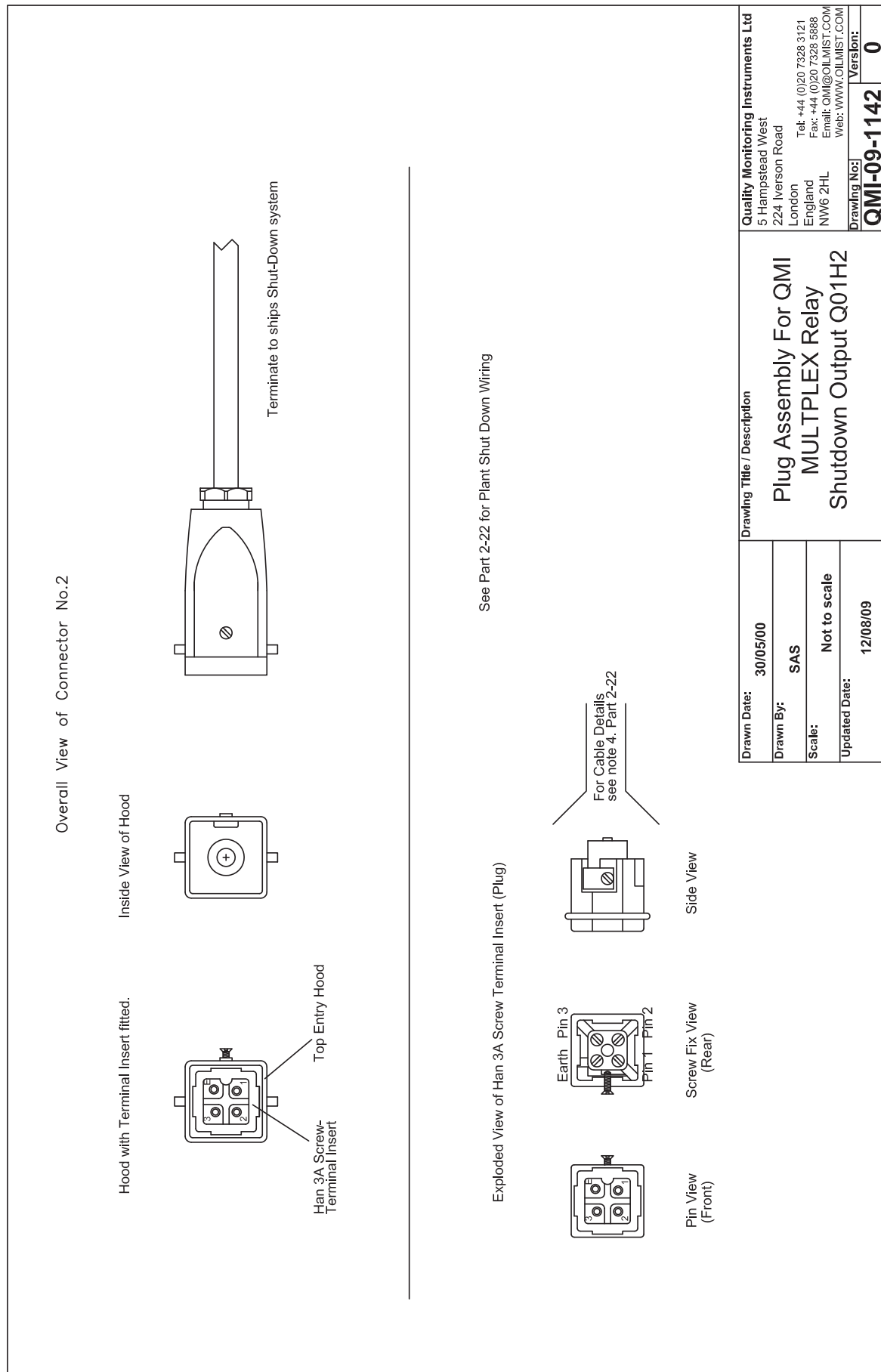


ALARM OUTPUT WIRING

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

| Relay No. | Harting Pin No. | 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 5 |

For Shutdown relays see Part 2-20 and 2-21.



| Drawing Title / Description | | Quality Monitoring Instruments Ltd | |
|-----------------------------|--------------|------------------------------------|----------|
| Drawn Date: | 30/05/00 | 5 Hampstead West | |
| Drawn By: | SAS | 224 Iverson Road | |
| Scale: | Not to scale | London | |
| Updated Date: | 12/08/09 | England | |
| | | NW6 2HL | |
| | | Tel: +44 (0)20 7328 3121 | |
| | | Fax: +44 (0)20 7328 5688 | |
| | | Email: QMI@OILMIST.COM | |
| | | Web: WWW.OILMIST.COM | |
| | | Drawing No: | Version: |
| | | QMI-09-1142 | 0 |

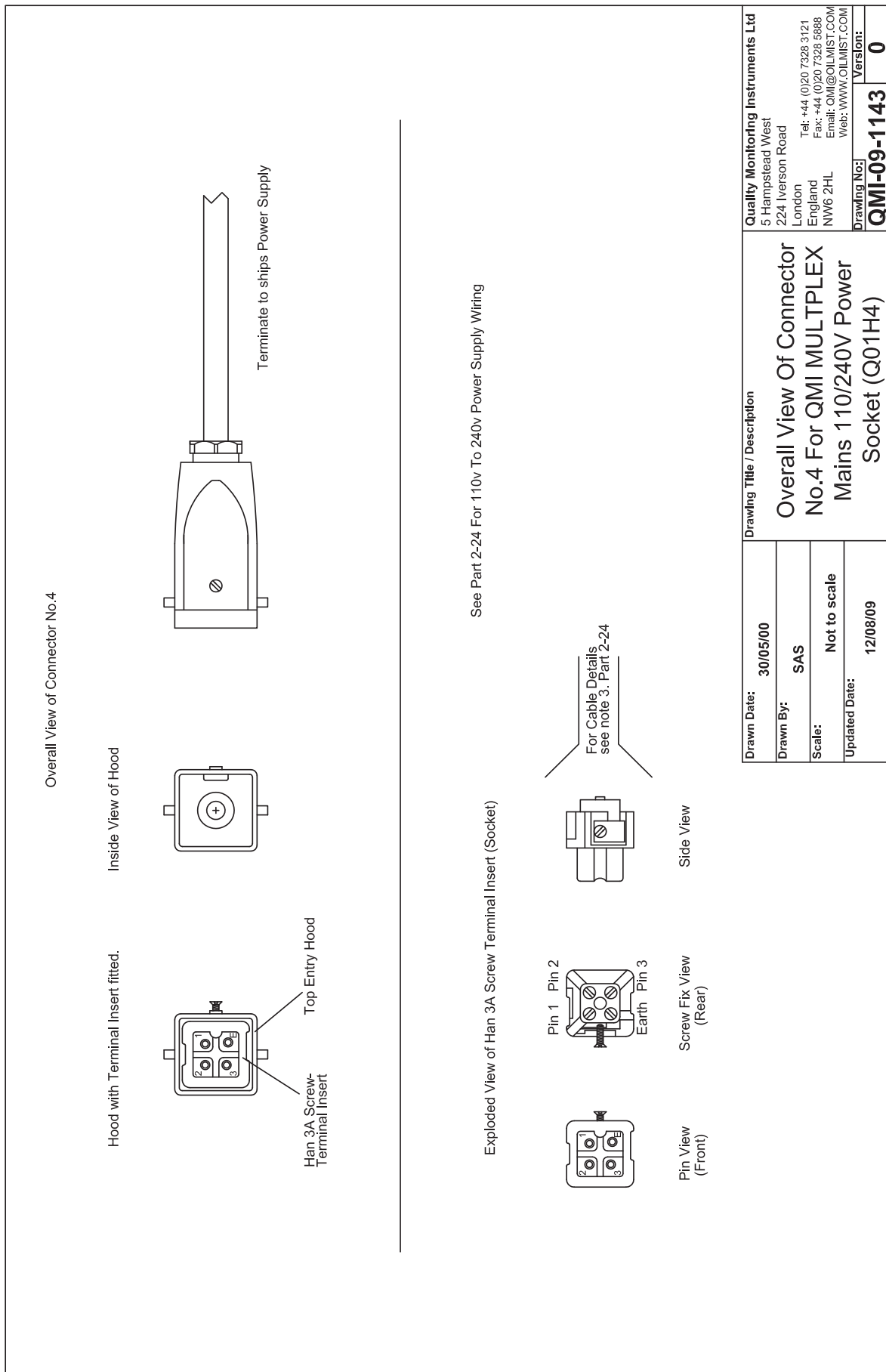
**Plug Assembly For QMI
MULTIPLEX Relay
Shutdown Output Q01H2**



OPTIONAL ENGINE SHUTDOWN WIRING

1. The Engine 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 Engine Shutdown (Relay 9)
4. The cable used should be of a minimum 2 cores and can range from a minimum thickness of 0.25mm² up to 2.5mm² maximum

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





Oil Mist Detection Systems

Engine Oil Mist Detection System

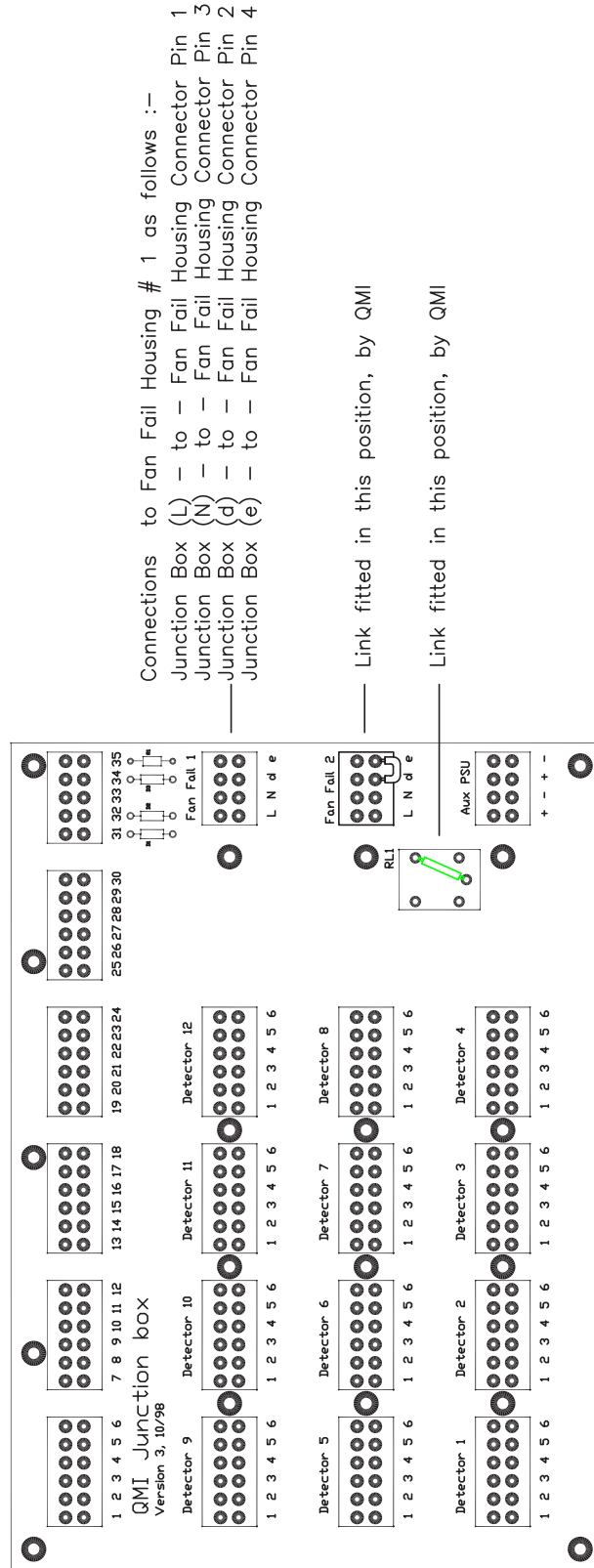
110/240V POWER SUPPLY WIRING

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 0.25mm² up to 2.5mm² maximum
4. Do not use twisted cables

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

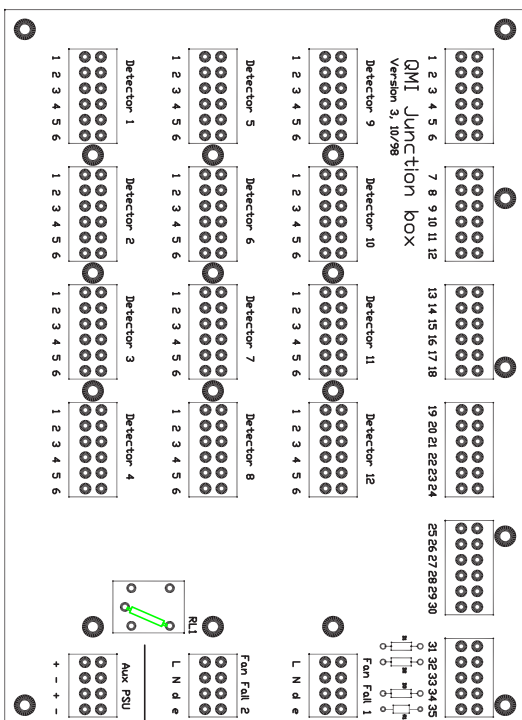
Connections for Fan Failure Housing, when One fan is used on Engine Set-ups ONLY

The same type of cable that is used for Detector Head connections, can be used when connecting Fan Fail Housing to Junction Box.



| | | | |
|---------------|--------------|--|--|
| Drawn Date: | 30/05/00 | Drawing Title / Description | Quality Monitoring Instruments Ltd 4 East Barnet Road London England EN4 8RW |
| Drawn By: | SAS | Wiring of QMI Junc. Box 1 Fan, Engine Set-up Only | Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5888 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM |
| Scale: | Not to scale | Drawing No: | QMI-05-1107 |
| Updated Date: | N/A | Version: | 0 |

Connections for Fan Failure Housing, when Two fan is used on Engine Set-ups ONLY
The same type of cable that is used for Detector Head connections, can be used when connecting Fan Fail Housing to Junction Box.



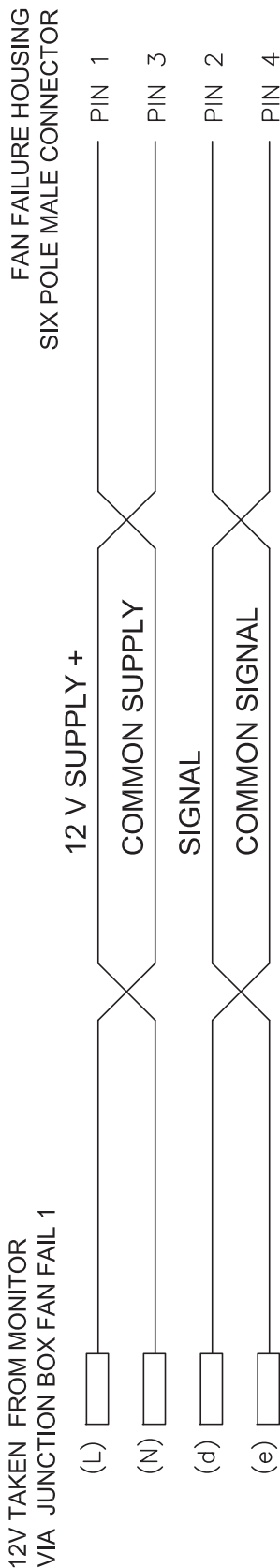
Connections to Fan Fail Housing 1 as follows :-
Junction Box (L) - to - Fan Fail Housing Connector Pin 1
Junction Box (N) - to - Fan Fail Housing Connector Pin 3
Junction Box (d) - to - Fan Fail Housing Connector Pin 2
Junction Box (e) - to - Fan Fail Housing Connector Pin 4

Connections to Fan Fail Housing 2 as follows :-
Junction Box (L) - to - Fan Fail Housing Connector Pin 1
Junction Box (N) - to - Fan Fail Housing Connector Pin 3
Junction Box (d) - to - Fan Fail Housing Connector Pin 2
Junction Box (e) - to - Fan Fail Housing Connector Pin 4

Link fitted in this position, by QMI

| | | | | |
|---------------|--------------|-----------------------------|------------------------------------|------------------------------------|
| Drawn Date: | 30/05/00 | Drawing Title / Description | Wiring of QMI Junc. Box for 2 Fans | Quality Monitoring Instruments Ltd |
| Drawn By: | SAS | | | 4 East Barnet Road |
| Scale: | Not to scale | | | London |
| Updated Date: | N/A | | | England |
| | | | | EN4 8RW |
| | | | | Tel: +44 (0)20 7328 3121 |
| | | | | Fax: +44 (0)20 7328 5888 |
| | | | | Email: QMI@OILMIST.COM |
| | | | | Web: WWW.OILMIST.COM |
| Drawing No: | QMI-05-1108 | Version: | 0 | |

WIRING OF THE FAN FAILURE HOUSING TO THE JUNCTION BOX PCB



Use the same cable that is used on the detector head runs.
(2 x 2 x 0.5mm² Helkama Ref = RFE-HF 2 x 2 x0.5)

There is a flying lead with a six way inline socket fitted to the fan failure housing and a 6 pole plug will be supplied which will have to be wired to the cable above then connected to the junction box.

| | | | |
|---------------|--------------|---|--|
| Drawn Date: | 30/05/00 | Drawing Title / Description QMI Wiring of the Fan Failure Housing to the Junction Box PCB | Quality Monitoring Instruments Ltd 4 East Barnet Road London England EN4 8RW Tel: +44 (0)20 7328 3121 Fax: +44 (0)20 7328 5688 Email: QMI@OILMIST.COM Web: WWW.OILMIST.COM |
| Drawn By: | SAS | | |
| Scale: | Not to scale | | |
| Updated Date: | 09/11/07 | | |
| | | Drawing No: | QMI-05-1109 |
| | | Version: | 1 |



QMI MULTIPLEX 4-20mA DATA LOGGER OUTPUT

It is useful to be able to record the level of oil mist present in the crank space or gearbox.

The data collected can be used to determine the cause of a build-up towards a possible explosion and help find a solution. All oil mist will start somewhere then build up filling each crank space. With data logging you will see where the levels have started to rise first. Then you can investigate that area of the engine to see what is causing the levels to raise.

You can also use the data logger function to send a signal to your master alarm panel. Using the conversion chart below you can program your master alarm panel to identify alarms and early warnings from data output.

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

The signal can be recorded using a chart recorder, or data logger and corresponds to the reading shown in the display.

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

| | | | | | | | | | | |
|----------------|---|-----|-----|-----|-----|-----|------|------|------|------|
| Display | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 |
| mA | 4 | 5.0 | 6.0 | 7.1 | 8.1 | 9.1 | 10.2 | 11.2 | 12.2 | 13.2 |

| | | | | | | | |
|----------------|------|-------|-------|-------|-------|-------|-------|
| Display | 100 | 110 | 120 | 130 | 140 | 150 | 160 |
| mA | 14.3 | 15.30 | 16.30 | 17.30 | 18.40 | 19.40 | 20.41 |

| | | |
|----------------|-------|-------|
| Display | 170 | 180 |
| mA | 21.40 | 22.50 |

The 4-20 mA 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 2-18.



Engine Oil Mist Detection System

WIRING FOR ENGINE SLOW/SHUTDOWN

The Individual Shutdown for up to two engines is built into the Monitor Channels, 1 - 6 are for one engine and 7 - 12 are for the other engine.

You can have either a closed contact that opens on Shutdown or an open contact that closes on Shutdown, this must be specified at time of ordering.

The output for the Shutdown is from a 5 pole socket which is fitted to position 2 on the Monitor - see drawing QMI-05-1096 Part 1-5.

Pins 1 and 2 are for channels 1 - 6
Pins 3 and 4 are for channels 7 - 12

NOTE: Channels that are not being used must be isolated - see Part 3-8.
If an alarm should occur the relays will remain in the alarm state until the Monitor has been reset.

To reset the relays: turn the security key clockwise $\frac{1}{4}$ turn, then turn the key back $\frac{1}{4}$ turn to reinstate.

DETECTOR CONFIGURATIONS

NOTE: It is possible to give any combinations of Detectors with Shutdowns for example - 2 banks of 6.

The appropriate drawing is delivered with each system.

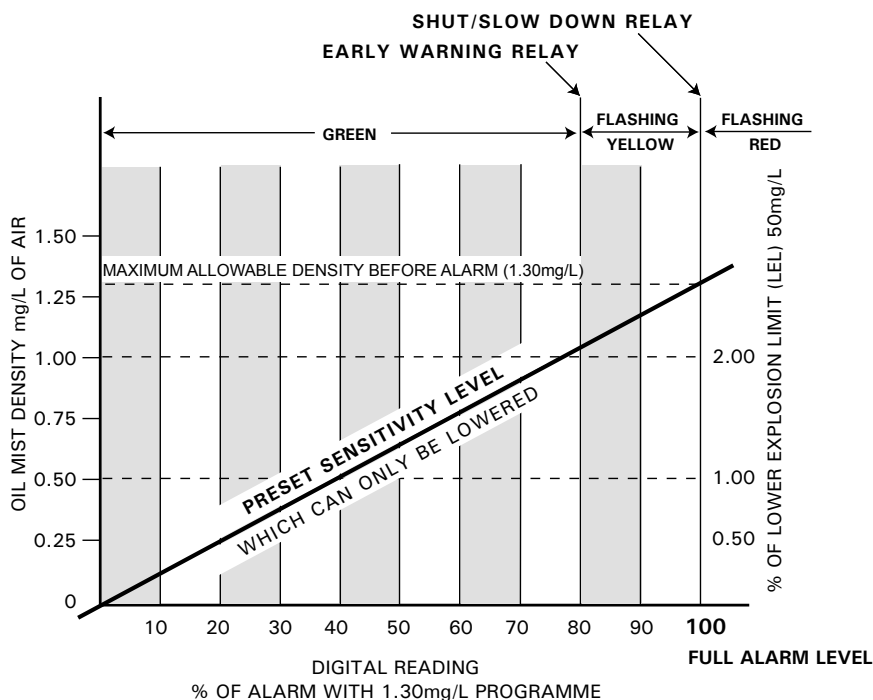
The number of alarms and Shutdowns is determined at the time of ordering the QMI system.



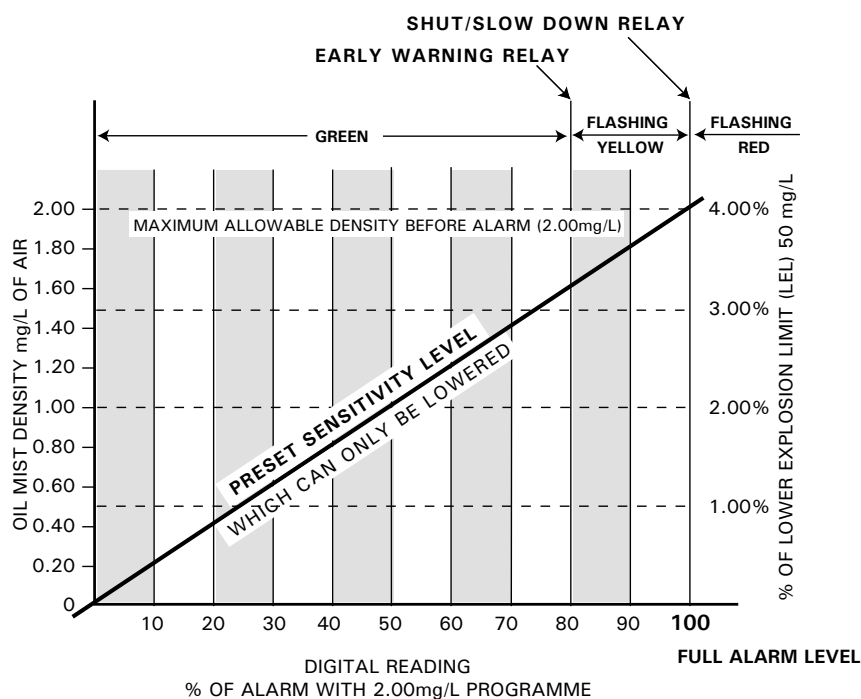
Engine Oil Mist Detection System

Oil Mist Detection Systems

GRAPHS 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



Engine Oil Mist Detection System

PART 3

STARTING UP/RUNNING PROCEDURE



Engine Oil Mist Detection System

OPERATION

Oil mist is continuously drawn through each Detector by a fan which we insist must be kept running at all times so that the oil mist level can be monitored even if the engine is not operating. This process is continuous at each Detector Head. 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 milligrams/L the reading per channel is presented as a percentage of the alarm setting.

ALARM OPERATING RANGES

Using Binary switch 5 on the Main Processor Board MP12 v 3.2.
Switch 5 is for setting the maximum alarm setting allowed.

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.

The 1.30mg/L maximum alarm setting is normally used on 2 stroke slow speed engines, however some times you may need to use the 2.00mg/L setting.

The 2.00mg/L maximum alarm setting is used on medium and high speed engines.

RELAY AND LED FUNCTION

| | % Alarm Level | Lights Displayed |
|------------------|---------------|--|
| | 0% to 79% | green |
| | 80% to 99% | amber flashing |
| | 100% | red flashing |
| Relays activated | 80% | early warning alarm |
| | 100% | main alarm and engine slow or Shutdown |

OPERATING RANGES

0 - 1.30mg/L

0 - 2.00mg/L

as a percentage of the alarm setting.



Engine Oil Mist Detection System

OPERATION - continued

BEST PRACTICE

Always re-set the Monitor so that each Detector has the new maximum programme setting.

The first relay activates at 80% and is an early warning alarm.

The second alarm relay is the main alarm and the third alarm or Shutdown is activated at 100%.

FAULT ALARM

Also see Part 3-10

The second relay (the main alarm relay) and the third relay (engine or Shutdown alarm) may or may not be used at all, this is up to the user to decide.

A fault alarm relay is completely divorced from the other relay system 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 fan. Information is also being continuously given as a digital display of the highest concentration of oil mist and its location.

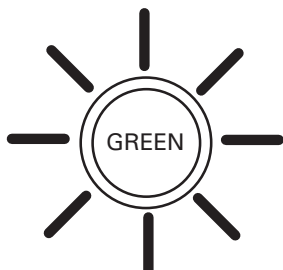
The digital display will always indicate the channel (i.e. area) with the highest level of oil mist. IN THE EVENT OF A FAULT ALARM IT WILL BE THE FIRST CHANNEL TO GO INTO THE FLASHING GREEN, AMBER, RED CONDITION THAT IS INDICATED ON THE DISPLAY (F1, F2, AND F3).

NOTE: THERE IS A ONE-MINUTE DELAY - after a self-test or a channel check it will always revert to the highest channel shown on the display.

Fan Failure Housing Light Sequence

LIGHTS

MEANING



FLASHING GREEN LIGHT

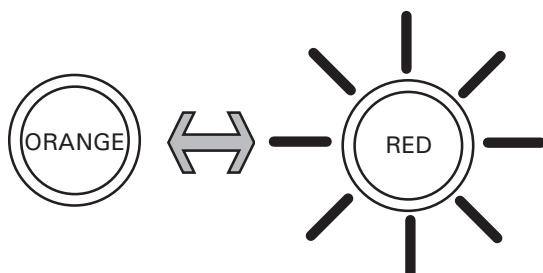
Fan has just started up.

When the fan reaches normal running speed, the light will change to a solid green light.



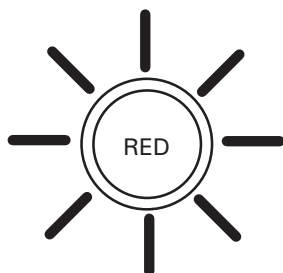
SOLID GREEN LIGHT

Fan is running normally and magnetic sensor is working.



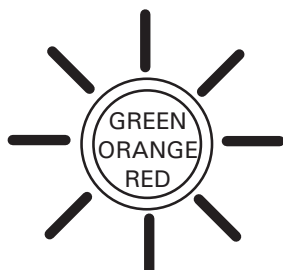
ORANGE LIGHT WITH A RED PULSE

Fan is running slow or may be beginning to fail.



A FLASHING RED PATTERN - F4 ON THE MONITOR

Fan has failed or magnetic sensor has failed or there is a fault in the system.



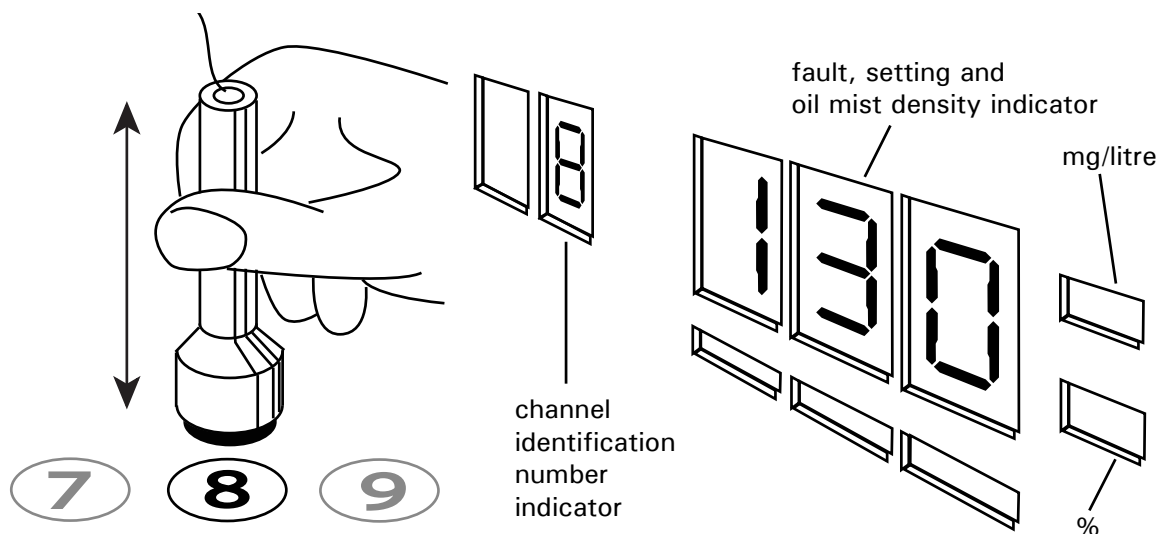
GREEN, ORANGE, RED FLASHING PATTERN

The switch is set in the bypass position and there is no monitoring of the fan.

TO CHANGE ALARM LEVELS

The QMI MULTIPLEX System is pre-set. However should the settings require adjustment and the alarm level set lower, then the procedure is as follows:

1. During the setting-up procedure normal operation of the CMU is disabled.
2. With the key supplied, release the security switch which is fitted to prevent unauthorised adjustment of the system.
3. Turn the key clockwise $\frac{1}{4}$ turn. The setting light will illuminate.
4. Place the magnetic pen flat against the circle marked 'ALARM SETTING SWITCH'.
5. Place the magnetic pen flat against the circle marked 'RAISE ALARM LEVEL' or 'LOWER ALARM LEVEL' Raise and remove the pen away from the circle once for each increment until the required level is reached. The level will be indicated on the digital reading.
6. Place the magnetic pen flat against the circle marked 'CHANNEL NUMBER' to set that channel to the level indicated at the digital reading.
7. To set another channel repeat 5 and 6.
8. When setting is complete turn the key anti-clockwise back $\frac{1}{4}$ turn, this locks the system, then remove the key.
9. After the key has been turned (see above-item '8'), it is possible to check that the setting is correct by placing the pen on 'ALARM LEVEL' then on 'CHANNEL NUMBER'. The new set level will then be displayed.
10. To reset any channel ALL above items MUST be repeated.





TEST SEQUENCE & ALARM LEVELS

Before beginning the test sequence, inform all relevant personnel.

To activate the test procedure:

Place the Magnetic Pen over the circle marked 'TEST'

The sequential testing will commence as follows:

1. Testing indicators will illuminate Software Version - 1.03 followed by all operational LEDs illuminating in the order below:
Operating (GREEN)
Warning (AMBER)
Alarm (RED)
2. All Digital readouts will indicate '8' followed by:
All Digital readouts will then indicate '111' showing that all segments of the numerical display are working without fading.
3. Each detector lens will be indicated thus:
'Cd' Clean detector – indicates clean lens
'dd' Dirty detector – indicates lens meaning that the lens are less than 80% clean and 'F2' will appear on the display; if ignored, the display will show 'F3'.
4. All external relays, with the exception of the functional relay will operate for 10 seconds. The test includes a test of the fault monitoring circuit when 'F9' will appear momentarily. 'F9' permanently displayed indicates a Monitor failure and the Power Supply Board will need replacing.
5. Final part to the test is the 'No CPU' Light which will flash once or twice depending on what part of the data cycle it is in. Both once or twice are normal to show the CPU is functioning.
6. After the Test Sequence is completed the Monitor will automatically return to display the channel with the highest oil mist reading.
7. After 'Power On' or 'Reset' procedures are implemented and completed, the relay outputs are inhibited for 2 minutes, this also applies in the event of an alarm. Therefore two full minutes must pass to enable the system to reset. This is to allow the software to latch back into the correct running mode, otherwise erroneous signals may be displayed. During this sequence, the isolated Head may be displayed 'Cd'.
8. During the Test Sequence should any function fail to operate as specified, refer to the fault finding section.

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. Then place the pen over the 'CHANNEL' number. The channel identification digital display will be shown digitally as a 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 highest reading channel.



CHANGING THE NUMBER OF DETECTOR HEADS

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

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

The number of Detector Heads in use can be adjusted by switches located on the back of the MP12 PCB v 3.2. The 10-way Binary switch located on MP12 PCB v 3.2.

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

| Detector Heads 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**.



DETECTOR HEAD TEST SEQUENCE

If the display is showing 12 channels and (for example) only 7 Detector Heads 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 to show only 7 channels and cancel the other Switches 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 the MP12 PCB v 3.2 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 Detector Heads, switch to the positions shown in the above table. See Part 3-7.

TO ISOLATE A CHANNEL

If a Detector Head becomes faulty and requires changing 'F3' will appear on the display and the green, amber and red display will flash.

If a Detector Head requires cleaning 'F2' will appear on the display.

If it is not convenient to change the Detector Head or clean the lens, then the display is obscured by the fault number and the mist reading is not displayed.

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

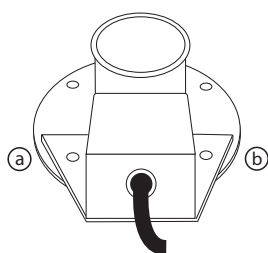
To carry out the isolate function, turn key to set mode, place the magnetic pen on 'ISOLATE' circle, then place it over the 'CHANNEL' number. Turn the key back to RUN mode. The channel/ Detector Head is now isolated and the display will now be blank. If the pen is placed over the isolated 'CHANNEL' number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

When isolating a channel without running the engine, the display may show the channel number and the letters 'IC' (isolate channel). When the engine is running 'IC' will go from the display and be replaced by the highest mist concentration.

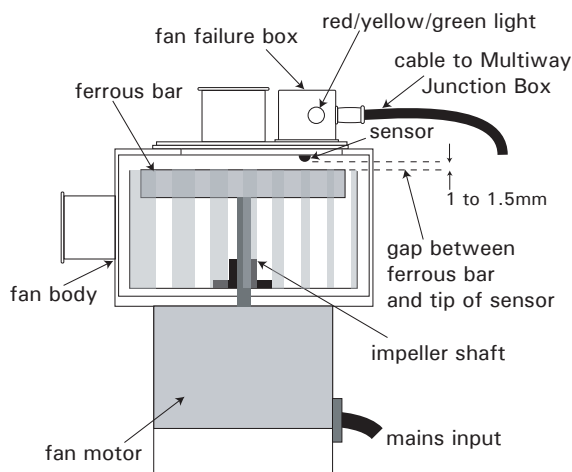
ISOLATING FAN FAILURE SENSOR

General Layout Diagrams

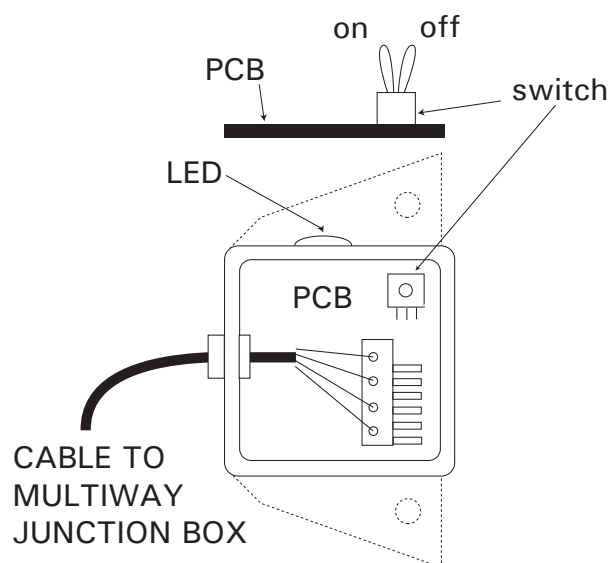
FAN FAILURE HOUSING ASSEMBLED ON FAN



GENERAL ASSEMBLY DRAWING OF FAN AND ACCESSORIES



To Isolate Fan Failure Sensor

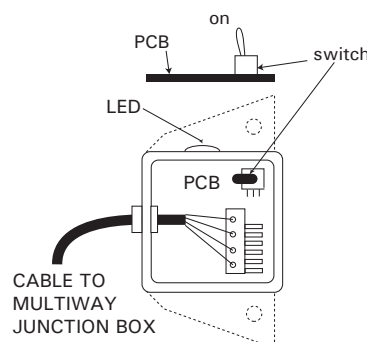


The off switch position is used in the event of fan failure, or sensor failure in order to bypass the sensor.

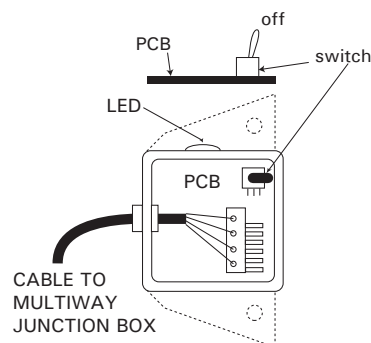
This isolates fan failure sensor until possible to replace.

Remember to switch back when new sensor is installed.

Fan Failure Sensor On



Fan Failure Sensor Off





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 (RL7) 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 engine slow down 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 engine room standing procedures.

Over-riding the QMI MULTIPLEX system during manoeuvring procedures is at the operator's discretion. If such a function is required it should be incorporated in the ship's overall system.

IMPORTANT: It is advisable that during either the anticipatory or full alarm condition that personnel should leave the area.

3. FAULT ALARMS

The fault alarms indicates any fault in the monitoring system as shown on the Monitor faceplate. 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 Detector according to instructions |
| 1 - 12 | F3 | Replace Detector Head |
| 1 - 12 | IC | Checking operating instructions |
| C | F4 | Check fan and fan failure detecting system |

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

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

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



Engine Oil Mist Detection System

PART 4

FAULT FINDING

Notes:

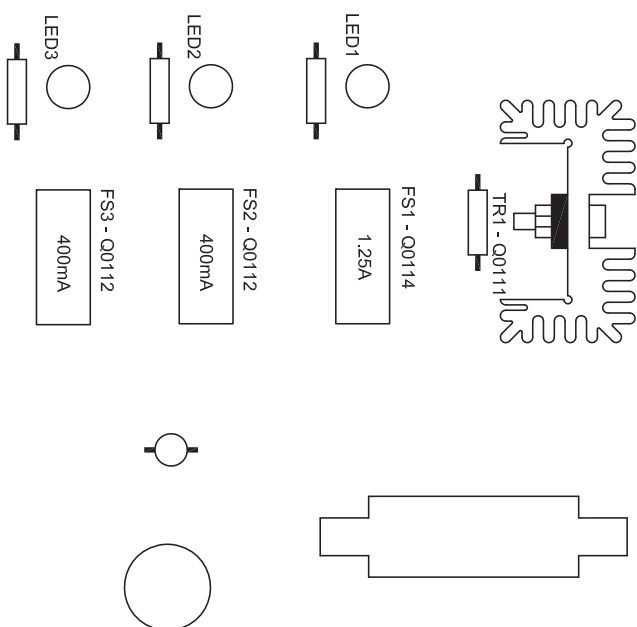
LED 1 will flash when 12V power is being supplied to the detector heads. If LED 1 is not flashing then fuse FS 1 has blown, it needs to be replaced with a 1.25A anti-surge fuse.

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.

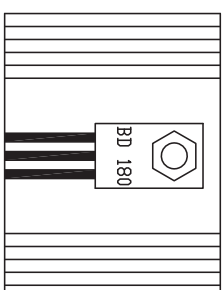
LED 3 This is to protect the data logger PCB. The LED is constantly lit (not flashing) this will always be present or not in the system.



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 | Layout of Transistor TR1, LEDs and Fuses on PCB Q0106 | Quality Monitoring Instruments Ltd |
| Drawn By: | SAS | | | 4 East Barnet Road |
| Scale: | Not to scale | | | London |
| Updated Date: | 25/03/15 | | | 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: | QMI-05-1110 | Version: |
| | | | | 1 |

FAULT DIRECTORY

| FAULT | ACTION | REMEDY |
|---|---|---|
| F1 and Detector number appears on display | Check cable between Monitor and Head | F1 denotes cable fault. Check for split, damaged cable or incorrect earthing - see wiring instructions - (Part 2-13, 2-15, 2-16) |
| F1 and all Channel Lights flash | Check fuse FS1 on the Power Supply Board – see drawing QMI-05-1110 Part 4-2 | If the fuse has blown replace with a 1.25A fuse. If the fuse blows again, check complete wiring of the system for short-circuits or damaged wires |
| F1 and all Channel lights flash | Check the fuse FS1 on the Power Supply board – see drawing QMI-05-1110 Part 4-2 | If the fuse is OK, then the TR1 should be replaced – see drawing QMI-05-1110 Part 4-2 |
| F1 on display and Channel number shown | <p>Make up a short lead with a 6-pin male and female connector from the spares kit.</p> <p>Plug spare QMI Detector Head into Monitor on the defective channel number shown</p> <p>If the display becomes steady this confirms there is a fault in the cable between the Monitor and Detector Head</p> | <p>Check that the cable is earthed between the Monitor and Detector Head as the manual directs</p> <p>Check that there are NO OTHER earth leads, or copper earth trips as these will give interference</p> |
| F2 dirty lens on display | Remove Head. Clean Lens. Check 1" BSP. bypass valve on suction side of fan has not been closed down enough. | <p>If the labyrinth in the Detector Head is very oily, check that there is a filter in the Back Plate and it is still attached to the engine</p> <p>If there is, then, if possible, extend the ¾" BSP pipe. Work to raise the Head above the ¾" BSP aperture hole in crankcase</p> <p>Continual dirty lenses are usually caused by oil being thrown into the Detector Head. Raising the Head is the only long term solution. Fit 40% filter</p> |



Oil Mist Detection Systems

Engine Oil Mist Detection System

| FAULT | ACTION | REMEDY |
|--|--|--|
| F3 and Detector number appears on display | Take Head off. Clean lens | Replace Head. If F3 still shows return to QMI (works) for repair Isolate channel if no spare Heads are available |
| F4 on Monitor display "Fan Failure" | Check Fuse FS2 on the Power Supply Board- see drawing QMI-05-1110 Part 4-2 | If the fuse has blown replace it with a 400mA anti-surge fuse After changing the fuse, if it blows again check the wiring of Fan Failure circuit from the Monitor to the Junction Box and then from the Junction Box to the Fan Failure Control Housing |
| F4 on Monitor display "Fan Failure" | Check Fan | If stopped, change Fan. If replacement Fan has no sensor fitted, short out 2-pin Fan Failure Connector on Monitor or Junction Box then touch "reset" to clear display Disconnect power to Fan Failure Housing before opening If Fan is rotating check Fan Failure Board in Fan Failure Housing If red light is out check Fan Failure Sensor |
| F4 | Check if F4 clears after using the self-test program | This could indicate that the magnetic sensor is faulty To prove this - if the Fan is still running and you are getting F4 this means either the electromagnetic sensor needs to be replaced or the Monitor needs to be re-set after carrying out the self-test program |
| F4 on display | Check if fan is running | Check that Fan Failure Housing indicator is lit or re-set the Monitor |
| F9 on display | Select reset | Return the MP12 PCB v 3.2 to QMI for repair at the earliest opportunity |
| No Central Processing Unit (CPU) lights on display | Check internal connections | The CPU light indicates a fault on MP12 PCB v 3.2 This board is either carried as a spare or is ex-stock QMI |



Oil Mist Detection Systems

Engine Oil Mist Detection System

| FAULT | ACTION | REMEDY |
|---|--|--|
| Fault alarm comes on. QMI Monitor shuts down and display ceases | Check FS4 fuse on side of Monitor above key | Fuse 3.15A anti-surge fuse may have blown due to an internal fault in the Monitor Check fuse in the Monitor |
| Fault alarm comes on. QMI Monitor shuts down | Check fuse on side of the Monitor above Key FS4 | If fuse is OK, check external power supply to QMI system. Fault alarm (will sound) if power is shut down |
| One Detector Head shows 0% oil mist when engine is running. | Change Head for spare. If spare shows % then remedy | If spare Head reads oil mist, return old Head to QMI for repair and recalibration. Check the Back Plate gasket is sound and the Detector Head sits flush on Back Plate |
| Monitor is showing 0% when engine is running on full load | Slow-speed engines normally produce very little oil mist but they do have a large amount of oil splash which will not be indicated on the Monitor. NOTE: if the engine body is cold or lube oil is not up to normal working temperature, you will not get oil mist as it cannot be produced unless there is a hot spot | <ol style="list-style-type: none"> 1. Set Monitor down to 0.5mg/L or lower 2. Check filter is not blocked 3. Pass smoke through Detector to check there is suction and the Monitor responds 4. If not, change the Detector with one that has suction 5. If the new Detector responds, return the faulty unit to QMI |
| Monitor is showing 0% when engine is running on full load | Medium Speed Engine - up to 750rpm NOTE: if the engine is cold or the lube oil is not up to normal working temperature you could get a zero reading as there is no oil mist because it cannot be produced. | <p>Firstly, change the Detector with a working unit. If both work then check the following using smoke:</p> <ol style="list-style-type: none"> 1. Ensure that you are getting suction through the Detector 2. Check that the Detector is on the downward throw of the engine 3. Check the filter is not blocked |



Oil Mist Detection Systems

Engine Oil Mist Detection System

| FAULT | ACTION | REMEDY |
|--|--|--|
| | <p>Other causes of 0% reading that applies to ALL ENGINES</p> <ul style="list-style-type: none"> - air leakage into the Detector - air in the pipework will also give a very low reading | <p>If Detector is not in a vertical position (see drawings QMI-05-1099 Part 2-8 and QMI-05-1096 Part 1-5) oil will collect in the unit and pipework</p> <p>Make sure pipework to the Detector is not under any strain as this will after some time cause the Detector castings to buckle which will result in a large air leak</p> |
| <p>If reading shows 0% when the engine is running</p> | <ol style="list-style-type: none"> 1. Check to see if filter is blocked 2. Check if pipework or Detectors are vertical or horizontal so there is no low point for oil to settle thereby blocking the air flow. 3. Check that pipework has not been installed under stress, castings have warped allowing air into sample chamber which will dilute the oil mist sample. 4. Check exhaust pipework is returning to crankspace or breather 5. Check air control valve is still set properly | <p>If this does not resolve the problem contact QMI giving the Monitor and Detector serial numbers together with an explanation of the fault</p> |
| <p>Detector Heads show up to 5% oil mist when engine is stopped</p> | <p>Check if engine has just shut down, oil mist will linger for a time</p> | <p>Turn OFF Lubricating Pumps</p> |
| <p>On start up of system Monitor display is erratic and does not settle down</p> | <p>Check if cable is screened</p> | <p>If 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 in contact with other terminals at each end of the cable</p> |



Oil Mist Detection Systems

Engine Oil Mist Detection System

| FAULT | ACTION | REMEDY |
|--|---|---|
| On start up of system Monitor display is erratic and does not settle down | Check if cable is not screened | Check to see if cable runs near any electrical power source. If it does, cover cable in steel conduit It is not necessary to have any extra earthing, but the screen must be connected to Pin 5 at both ends |
| If Heads need cleaning too frequently | Check the following | The ball valve has been fitted in front of the Fan and the baffles have been fitted on the end of the pipe in the crank space |
| If readings fall | Check the following | The ball valve in front of the Fan has not been closed down - see drawing Part 2-6 and 2-7 The filter may need cleaning or replacing - see drawing Part 5-3 |
| A RED Flashing Light when F4 is on display indicates: | <p>Check if fan has failed</p> <p>Check if fan is running at 75% or less of normal speed</p> <p>Check the Electromagnetic Fan Fail Sensor</p> | <ul style="list-style-type: none"> - Replace the Fan Fail sensor - for instructions see Part 5-2. Reset the Monitor - If the Monitor resets the Fan Fail Sensor is at fault - If the Monitor will not reset and it still displays F4 – the fault is with the Fan - Remove the Fan Fail Housing from the fan for instructions – see Part 5-2 - Set the by-pass switch to the 'ON' position - for instructions see Part 5-2 - Replace the Fan Fail Housing on the fan - Reset the Monitor and F4 will have been cancelled. The Fan Failure light will now display a sequence of RED, YELLOW, GREEN. Fan must be replaced - Reset the by-pass switch to the 'OFF' position |

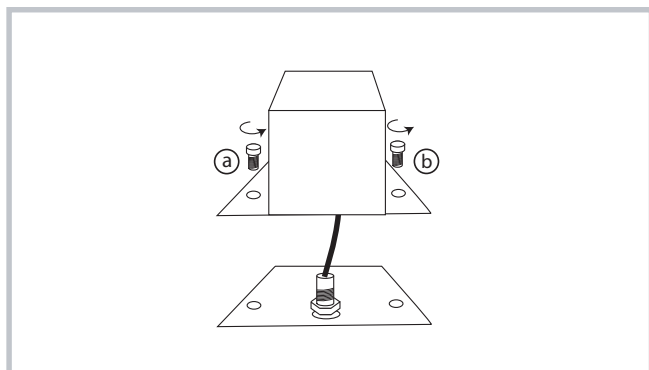


Engine Oil Mist Detection System

PART 5

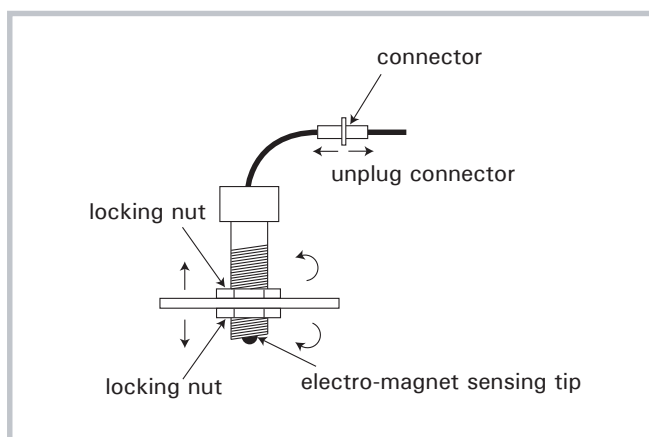
MAINTENANCE

Replacement of Fan Failure Sensor



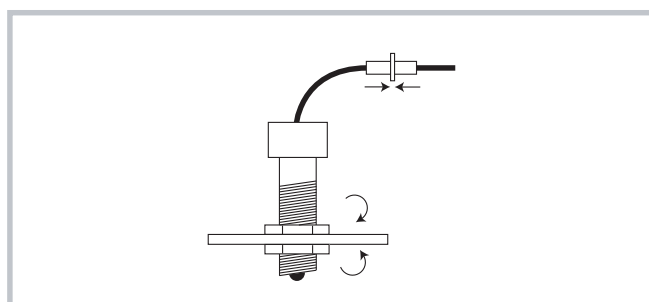
1 TO REMOVE FAN FAILURE HOUSING

Remove fan failure box case by unscrewing (a) & (b) screws only



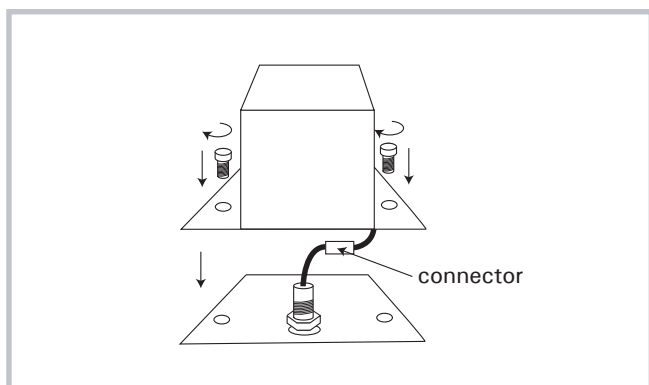
2 TO REPLACE AND ADJUST GAP BETWEEN SENSOR AND BAR

Rotate screw to achieve correct gap



3 TO REASSEMBLE

lock sensor in correct position and reconnect plug



4 REPLACING FAN FAILURE HOUSING

Re-attach box to fan, taking care not to trap wire and connector



MAINTENANCE PROCEDURES

The QMI MULTIPLEX comprehensive fault finding program greatly simplifies the fault analysis procedure. Fault indicators, whether operational or component breakdown, are built into the program. In the event of their occurrence a fault code (listed in the Fault Directory on the right hand side of the display fascia) is displayed digitally against the faulty channel number. In the event of a component failure in the Monitor or fan the CPU light will be displayed (see Fault Directory).

In all fault indications the fault warning relay will de-energise. The relay may be returned to normal through the 'RESET' function. The warning indication on the digital display will persist until the fault is dealt with correctly.

DETECTOR HEAD CLEANLINESS

Very often, due to difficult working conditions and lack of experience, the lenses in the Detector Head 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. A simple way to help the cleaning process is to use the suggestion on Part 5-4.

A large percentage of returns under Warranty are in fact due to dirty lenses.

FILTER CLEANING

It is important to inspect and clean the filters every 30 days

Carry out the following procedure when readings on the Monitor go down. In the inlet boss of the Detector base plate is situated a stainless steel mesh filter that should be cleaned from time to time. There are three ways of doing this:

1. Extract filter from boss and place in a good solvent solution
2. Clean filter in an ultrasonic bath
3. Blow compressed air into the filter (always blow towards the crankspace)

If none of these methods unblock the filter, replace the filter with a new one.



Engine Oil Mist Detection System

LENS CLEANING PROCEDURE

The need for lens cleaning will be indicated by Code "F2" against the relevant channel on the CMU. See diagram in Part 5-5 in connection with the cleaning procedure.

To clean the lens in the event of oil or condensation build up:

1. Disconnect the 6-way connector on the rear of the Detector Head.
2. Remove the 5 x M4 socket head screws on the front of the Detector Head. This will enable the Detector Head to be removed leaving the Back Plate retained and connected to the pipework.
3. Reverse the Detector Head to achieve access to clean the 3 lenses situated in the main channel of the labyrinth.
4. Use the brush supplied in the spares kit with "Clean-All" fluid. Keep the Detector Head upright at all times to prevent residual oil flowing onto the lenses. After cleaning the lenses with the fluid ensure that they are thoroughly polished.
5. To clean the stainless steel filter fitted in the Back Plate, remove from Back Plate and soak in detergent and rinse.
6. Care must be taken when replacing the Detector Head to the Back Plate that the gasket is not damaged, allowing air to be drawn in; and that the stainless steel filter is fitted in the Back Plate.
7. Re-assemble and run the "TEST" program to monitor the lens cleanliness.

IMPORTANT NOTES

The Detector Head electronics are factory calibrated and cannot be serviced on site. In the event of a fault the top section of Detector must be sent back leaving the Back Plate attached to the engine.

DO NOT USE diesel oil, acetone or kerosene to clean Heads.

DO NOT IMMERSE Detector in any cleaning solution.

DO NOT IMMERSE the casting in cleansing fluid.

DO NOT REMOVE the cover after the Detector Head is removed from the Back Plate as this will expose PCB components which are light sensitive.

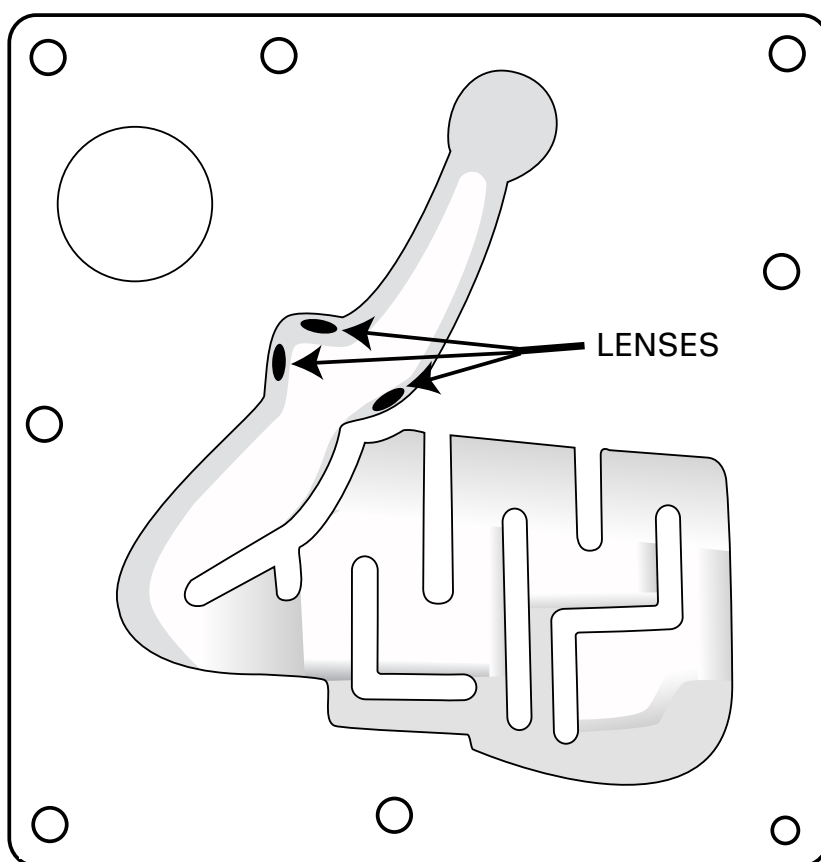
UNDER NO CIRCUMSTANCES remove the cover and try to adjust Head settings. Removal of the cover invalidates the guarantee.



Engine Oil Mist Detection System

Oil Mist Detection Systems

DIAGRAM SHOWING POSITION OF LENSES





Oil Mist Detection Systems

Engine Oil Mist Detection System

MAINTENANCE KIT CHECKLIST

supplied with QMI MULTIPLEX Monitor and Engine Detector

| Code | Item | Quantity |
|--------|---|----------|
| Q0109 | QMI Monitor Magnetic Pen | 1 |
| Q0111 | QMI Monitor TRI Transistor | 1 |
| Q0112 | QMI Monitor Anti-surge Fuse 400mA (Pack of 5) | 1 |
| Q0103 | QMI Monitor Security Keys (Pack of 2) | 1 |
| Q0113 | QMI Monitor M4 Hex Allen Key | 1 |
| Q0114 | 1.25A Fuse for FS1 on the Power Supply Board (Pack of 5) | 1 |
| Q0115 | 3.15A Fuse for FS3 on the side of the Monitor (Pack of 5) | 1 |
| Q0205 | QMI Detector Head Filters (50% Free Volume) | 2 |
| Q0208 | QMI Detector Head 6-Pin In-line Socket | 1 |
| Q0209 | QMI Detector Head 6-Pin In-line Plug | 1 |
| Q0203 | QMI Detector Head Gasket (Back Plate) | 2 |
| Q0212 | QMI Detector Head Lens Cleaning Brush | 1 |
| Q1008 | QMI Detector Head M3 Hex Allen Key | 1 |
| Q0213 | QMI Detector Head Cotton Cleaning Buds | 1 |
| Q03FH1 | QMI Fan Failure Rotation Sensor with plug (suitable for Q03FH) | 1 |

Please Note: QMI Recommend IPA (Isopropyl Alcohol) to clean the Q02 Detector Lenses. Clean All is no longer available.

It is recommended that a spare Detector Head (Q02) is purchased for longer voyages.

Checked by



SUGGESTED MAINTENANCE PLAN FOR ENGINE DETECTION SYSTEM

1. Clear and clean the filter found in the Detector and the baffle which is mounted in the crank space. The best method for doing this is by removing the Detector from its base plate when the crank space doors are open. Remember if you un-plug the cable from the Detector you will have an alarm come up on the Monitor and control room alarm panel.

After you have reconnected the plug you will have to reset the alarm panel and Monitor. Then remove the filter and clean or replace it if it has been blocked and can not be cleared. (As shown in manual). To clean and clear the baffles use a jet of compressed air in towards the crank space. It is very rare to have a blocked baffle as there should not be any contaminants in the area of the baffles.

2. To check the engine Shutdown and alarms just set the alarm levels lower than the normal running values so that the system will go into alarm. Please remember to get permission of the Captain and Chief Engineer before carrying out this simple task. Also remember to reset the Monitor to its original alarm settings.
3. Regularly use the test programme by using the switch on the front of the Monitor. This tests most of the operational functions of the system except the engine slow/Shutdown function. The indication "dd" on any channel will mean that you have over 20% of dirt on the lenses so it is a good idea to clean the lenses as soon as it is feasible. The system however can compensate for up to 40% of contamination.
4. To test out F1 failure simply un-plug one of the Detectors to make sure it alarms and shows on the Monitor.
5. To test the VB3 fan cut the power to it and then "F4" should come up on the Monitor display.

If these few simple tests are carried out you will experience very few problems with your QMI system. Always make sure Monitor is always reset.



Engine Oil Mist Detection System

PART 6

SPARES

CODES AND DESCRIPTION FOR REPLACEMENT PARTS AND SPARES

MULTIPLEX MONITOR

| 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 | QMI Monitor Security Keys (Pack of 2) | Monitor Security Switch to change settings (Pack of 2) |
| Q0104A | MP12 PCB v 3.2 Processing Board | For Monitor 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 |
| Q0112 | Anti-surge Fuse 400mA | For FS2 on Power Supply Board (Pack of 5) |
| Q0113 | M4 Hex Allen Key | To open Q01 Monitor lid |
| Q0114 | 1.25A fuse for FS1 on Power Supply Board | For FS1 on Power Supply Board (Pack of 5) |
| Q0115 | 3.15A fuse for FS3 on side of Monitor | For FS3 on side of Monitor (Pack of 5) |

ENGINE DETECTOR

| Code | QMI Product | Description |
|-------|---|--|
| Q02 | QMI Engine Oil Mist Detector | with lead, fitted Bulgin plug and 50%filter |
| | Engine Detector 12V Auxilliary Fan Unit | with lead, plug, baffle and 12V Auxiliary Fan Unit (Q04) |
| Q0202 | Detector Back Plate complete with filter and gasket | Back Plate complete with filter and gasket |



Engine Oil Mist Detection System

| Code | QMI Product | Description |
|-------|-------------------------------------|---|
| Q0203 | QMI Detector Head Gasket Back Plate | Back Plate Gasket |
| Q0204 | QMI Detector Head Filters | 40% Free Volume |
| Q0205 | QMI Detector Head Filters | 50% Free Volume |
| Q0206 | Small particle baffle | Small particle baffle. 3/4" BSP screw fitting |
| Q0207 | Large particle baffle | Large particle baffle. 3/4" BSP screw fitting |
| Q0208 | QMI Detector Head 6-pin socket | Bulgin 6 Pin in line SOCKET |
| Q0209 | QMI Detector Head 6-pin plug | Bulgin 6 Pin in line PLUG |
| Q0211 | M3 Hexagonal Allen Key | For Detector Head Screws |

| Code | QMI Product | Description |
|-------|----------------------|-------------|
| Q0212 | Cleaning Brush | |
| Q0213 | Cotton Cleaning Buds | |
| Q0215 | Maintenance Kit | |
| Q0216 | Manual | |

FAN

| Code | QMI Product | Description |
|--------|--|---|
| Q0301 | QMI Fan type VBM3 c/w Rotation Sensor | with Rotation sensor (Top Hat) |
| Q0302 | QMI Fan Failure Rotation Sensor - With Top Hat | |
| Q03FH1 | QMI Fan Type VB5 c/w Fan Fail housing and sensor | with Fan Fail Housing and Sensor. No longer supplied. Use Q03FH |
| Q03FH2 | QMI Fan Fail housing sensor | |
| Q05 | QMI Fan Type VB5 with Rotation Sensor | with Rotation Sensor No longer supplied. Use Q03FH |

QMI MULTIPLEX JUNCTION BOX

| Code | QMI Product | Description |
|------|----------------------------|----------------------|
| Q06 | QMI MULTIPLEX Junction Box | for ENGINE Detectors |



Engine Oil Mist Detection System

QMI OIL MIST MONITOR SYSTEM LOG

YOUR REF: _____ VESSEL NAME: _____
OUR REF: _____ ENGINE MAKE/TYPE: _____

COMPANY: _____

| FUNCTIONS | DET 1 | DET 2 | DET 3 | DET 4 | DET 5 | DET 6 | DET 7 | DET 8 | DET 9 | DET 10 | DET 11 | DET 12 | REMARKS |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|---------|
| DET (NO) READS % | | | | | | | | | | | | | |
| ENGINE RPM | | | | | | | | | | | | | |
| DATE / TIME | | | | | | | | | | | | | |
| ENGINE STATUS | | | | | | | | | | | | | |

| FUNCTIONS | DET 1 | DET 2 | DET 3 | DET 4 | DET 5 | DET 6 | DET 7 | DET 8 | DET 9 | DET 10 | DET 11 | DET 12 | REMARKS |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|---------|
| DET (NO) READS % | | | | | | | | | | | | | |
| ENGINE RPM | | | | | | | | | | | | | |
| DATE / TIME | | | | | | | | | | | | | |
| ENGINE STATUS | | | | | | | | | | | | | |

| FUNCTIONS | DET 1 | DET 2 | DET 3 | DET 4 | DET 5 | DET 6 | DET 7 | DET 8 | DET 9 | DET 10 | DET 11 | DET 12 | REMARKS |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|---------|
| DET (NO) READS % | | | | | | | | | | | | | |
| ENGINE RPM | | | | | | | | | | | | | |
| DATE / TIME | | | | | | | | | | | | | |
| ENGINE STATUS | | | | | | | | | | | | | |

| FUNCTIONS | DET 1 | DET 2 | DET 3 | DET 4 | DET 5 | DET 6 | DET 7 | DET 8 | DET 9 | DET 10 | DET 11 | DET 12 | REMARKS |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|---------|
| DET (NO) READS % | | | | | | | | | | | | | |
| ENGINE RPM | | | | | | | | | | | | | |
| DATE / TIME | | | | | | | | | | | | | |
| ENGINE STATUS | | | | | | | | | | | | | |

| FUNCTIONS | DET 1 | DET 2 | DET 3 | DET 4 | DET 5 | DET 6 | DET 7 | DET 8 | DET 9 | DET 10 | DET 11 | DET 12 | REMARKS |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|---------|
| DET (NO) READS % | | | | | | | | | | | | | |
| ENGINE RPM | | | | | | | | | | | | | |
| DATE / TIME | | | | | | | | | | | | | |
| ENGINE STATUS | | | | | | | | | | | | | |

| ENGINE STATUS: | MAN = MANOUEVERING | I/P = IN PORT | A/S = AT SEA | D/D = DRY DOCK |
|----------------|--------------------|---------------|--------------|----------------|
| | | | | |



Engine Oil Mist Detection System

RETURNS PROCEDURE

Guarantee Statement: Detectors 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 Detector (stamped on the top edge of the detector) 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

6. Despatch returned goods to:
Mr. Keith Baverstock
Repair. 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, cc: 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
- ☐ Detector 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



Engine Oil Mist Detection System

QMI REQUEST FOR AFTER SALES INFORMATION

Now that you are in charge of a

NEW QMI MULTIPLEX 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 Detector Heads:_____
5. Serial Number of Detectors:___ ___ ___ ___ to ___ ___ ___ ___
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

Tel: +44 (0) 20 7328 3121

Fax: +44 (0) 20 7328 5888

Should you need to return equipment for service or repair, please see Part6-4 of this manual for details on how the equipment should be returned.

QMI

Oil Mist Detection Systems



9912012019

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London EN4 8RW

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v 3.2

visit our website at
www.oilmist.com



Oil Mist Detection Systems

Engine Oil Mist Detection System

MAINTENANCE KIT CHECKLIST - Q0215 - FFB

supplied with QMI MULTIPLEX Monitor and Engine Detector

| Code | Item | Quantity |
|-------|--|----------|
| Q0109 | QMI Monitor Magnetic Pen | 1 |
| Q0111 | QMI Monitor TRI Transistor | 1 |
| Q0112 | QMI Monitor Anti-surge Fuse 400mA (Pack of 5) | 1 |
| Q0103 | QMI Monitor Security Keys (Pack of 2) | 1 |
| Q0113 | QMI Monitor M4 Hex Allen Key | 1 |
| Q0114 | 1.25A Fuse for FS1 on the Power Supply Board (Pack of 5) | 1 |
| Q0115 | 3.15A Fuse for FS3 on the side of the Monitor (Pack of 5) | 1 |
| Q0205 | QMI Detector Head Filters (50% Free Volume) | 2 |
| Q0208 | QMI Detector Head 6-Pin In-line Socket | 1 |
| Q0209 | QMI Detector Head 6-Pin In-line Plug | 1 |
| Q0203 | QMI Detector Head Gasket (Back Plate) | 2 |
| Q0212 | QMI Detector Head Lens Cleaning Brush | 1 |
| Q1008 | QMI Detector Head M3 Hex Allen Key | 1 |
| Q0213 | QMI Detector Head Cotton Cleaning Buds | 1 |
| Q0301 | QMI Fan Failure Sensor with 1mtr cable (For use with fans with a Fan Failure Control Box) | 1 |

Please Note: QMI Recommend IPA (Isopropyl Alcohol) to clean the Q02 Detector Lenses. Clean All is no longer available.

It is recommended that a spare Detector Head (Q02) is purchased for longer voyages.

Checked by