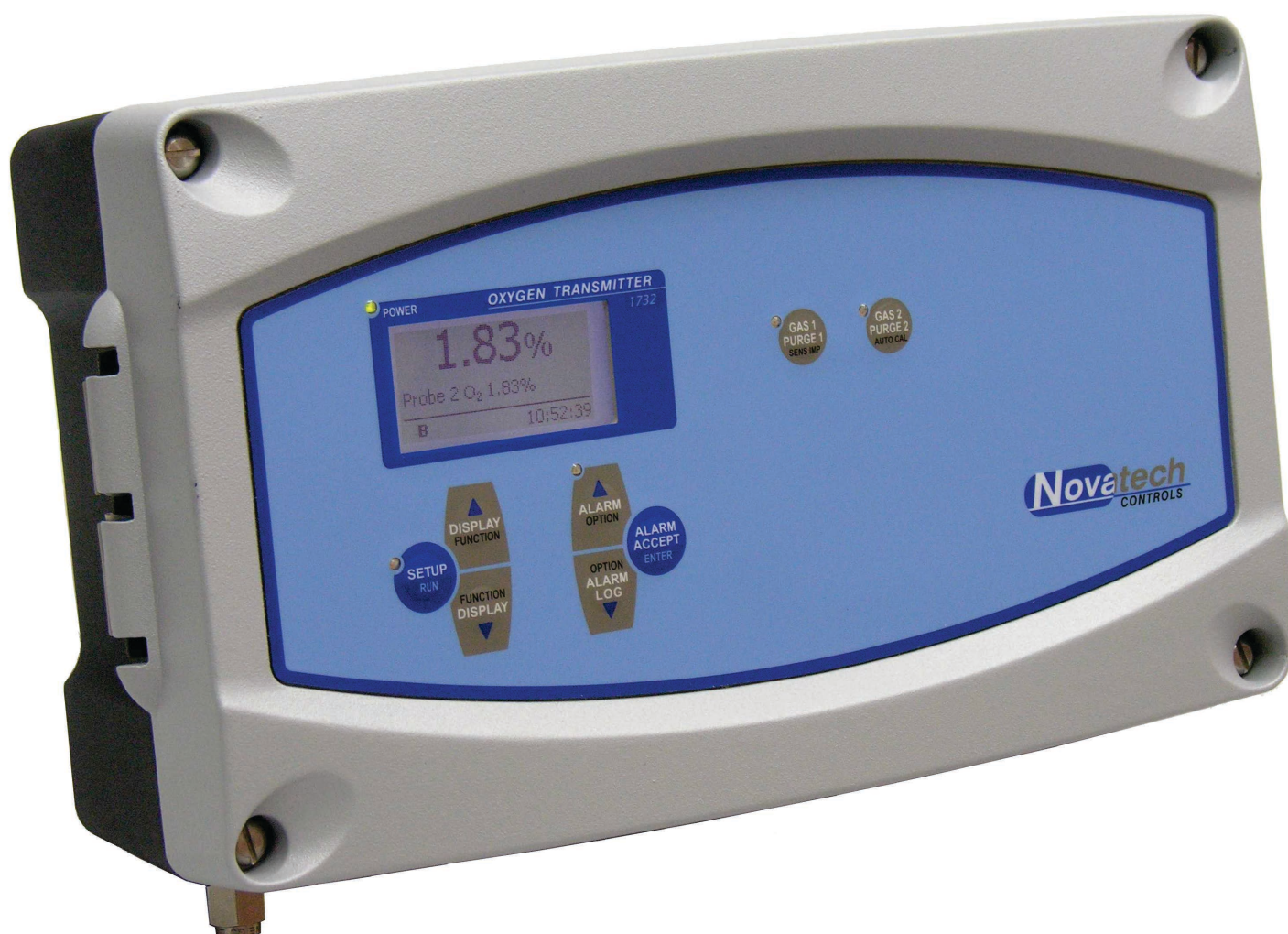


## Dew Point Transmitter

### Model 1738 Operators Manual





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This manual describes the transmitter firmware version 1.04, April 2014

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# 1. USING THIS MANUAL

This manual is intended to be used by the operator. It is not intended to describe how the 1738 Dew Point Transmitter should be connected, configured or serviced. If more detailed information is required than is shown in this manual the 1738 Technical Manual should be used. This is supplied with each transmitter and is also available on the Novatech web site at [www.novatech.com.au](http://www.novatech.com.au)

It is assumed in this manual that the transmitter has been installed by competent personal and that the wiring to the main power supply, the oxygen probe and all the associated signal devices complies with the local safety codes and regulations.

## 1.1 Cautions

Please read the safety information below before connecting power to the transmitter.

### CAUTION 1

The probe heater is supplied with mains voltage. This supply has electrical shock danger to maintenance personnel. Always isolate the transmitter before working with the probe. The EARTH wire (green) from a heated probe must ALWAYS be connected to earth.

### CAUTION 2

Combustion or atmosphere control systems can be dangerous. Burners must be mechanically set up so that in the worst case of equipment failure, the system cannot generate explosive atmospheres. This danger is normally avoided with flue gas trim systems by adjustment so that in the case of failure the appliance will not generate CO in excess of 400 ppm in the flue. The CO level in the flue should be measured with a separate CO instrument, normally an infrared or fuel cell type.

### CAUTION 3

The oxygen probe is heated to over 700°C/1290°F and is a source of ignition. Since raw fuel leaks can occur during burner shutdown, the transmitter has an interlocking relay that removes power from the probe heater when the main fuel shut-off valve power is off. If this configuration does not suit or if it is possible for raw fuel to come into contact with a hot oxygen probe then the Model 1738 transmitter with a heated probe will not be safe in your application. An unheated probe can be utilised in such applications, however the oxygen readings are valid only above 650°C/1200°F.

### CAUTION 4

The reducing oxygen signal from the transmitter and the associated alarm relay can be used as an explosive warning or trip. This measurement assumes complete combustion. If incomplete combustion is possible then this signal will read less reducing and should not be used as an alarm or trip. A true excess combustibles analyser, normally incorporating a catalyst or thermal conductivity bridge, would be more appropriate where incomplete combustion is possible. Also read the probe electrical shock caution in the probe heater interlock caution in chapter 4.7 of the Model 1738 Technical Manual.

### CAUTION 5

FIL-3 filter. If the optional FIL-3 has been fitted to the 1231 probe in this installation, please read the Important Notice in the Technical Manual.

## 1.2 Warning Symbols



Danger, high voltage. Risk of electrical shock.



Caution hot surface.



Caution, risk of danger. See additional information in the manual.

## 2. INTRODUCTION

---

The Novatech 1738 Dew Point Transmitter provides in-situ measurement for one or two oxygen probes in annealing and other furnaces with protective atmospheres of hydrogen / nitrogen. The transmitter provides local indication of oxygen and dew point as well as several other process related variables.

The model 1738 Dew Point Transmitter is based on the well known model 1638 transmitter. It includes a number of hardware and software improvements such as a graphic display, larger characters, faster microprocessor, simplified set up menu, alarm logging, faster probe heater control and more calculated values such as burner efficiency.

The 1738 Dew Point Transmitter has a variety of user-selectable functions. They are simple to use because each selection is menu driven. For options you are not sure about, read the manual on that particular item in chapter 5, SETUP mode.

Features include:-

### Inputs

Two zirconia oxygen probe, heated or unheated

Oxygen range from  $1 \times 10^{-30}$  to 100%

Furnace, kiln or flue thermocouple, field selectable as type K, J, R or S

Main flame established safety interlock (for heated probes only)

Purge flow switch

### Outputs

Two linearised 4-20mA or 0-20mA DC isolated outputs, max. load  $1000\Omega$ , 12 bit resolution

The output function and the range are field selectable

Common alarm relay (programmable)

Three other alarm relays with selectable functions

### Computer

RS 232-C or RS 485 for connection of a computer terminal or printer for diagnostics of the transmitter, probe or combustion process. This connection is suitable for network connection to a computer, DCS or PLC using MODBUS™ protocol.

### Display

Multi font graphical display

Large characters for the oxygen on the top line

Multiple lower line items for the secondary functions. ie Probe temperature, % Oxygen for the second probe

Alarm display mode that shows the time the alarm occurred and the acceptance time

Alarm log mode that keeps the time the alarm occurred, the acceptance time and the time the alarm was cleared for the last 4,000 alarms

### Power

Universal mains supply voltage, 100 to 240VAC

Automatically detects the mains voltage and frequency and set the power control accordingly

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## 3. SPECIFICATIONS

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### 3.1 Hardware Specifications

Number of oxygen probes:	1 or 2
Oxygen range:	1 x 10 <sup>-30</sup> to 100%
Dew Point range	-60°C to 40°C
Pre Reactive Oxygen range	0 to 10%
Oxygen accuracy:	±1% of actual measured oxygen value with a repeatability of ±0.5% of the measured value
Thermocouple types:	Type K, J, R and S
Temperature accuracy:	+/- 2°C
Analog outputs:	0-20mA or 4-20mA field selectable – see section 3.2 Active outputs

**(WARNING: DO NOT LOOP POWER OUTPUTS. Use only passive receivers for commissioning and testing. The use of loop powered receivers will damage the output)**

Analog output load:	1000 ohm max
Alarm relays:	4
Alarm relay contacts:	2Amp 240VAC, 2A 30VDC <b>(WARNING: Do not use both mains voltage and low voltage connections to adjacent alarm contacts)</b>
Mains voltage supply:	100 to 240VAC, -6 +10%, 50/60 Hz
Overvoltage:	Category II (IEC60364-4-443)
Power:	5 Watts for controller plus probe power 530W max., 25% duty cycle each probe on 240VAC 110W max., 100% duty cycle each probe on 110VAC 2.5A max
Environmental Rating:	Operating Temperature -25°C to 55°C Relative Humidity 5% to 95% (non-condensing)
Altitude:	2000m maximum
Degree of Protection:	IP65 IP54 with internal reference air pump
Case Size:	315mm (12.4") wide, 190mm (7.5") high, 110mm (4.3") deep
Case Weight:	3 Kg (6.6 lbs.)

## 3.2 Operational Specifications

Range of Analog outputs:

Field selectable from the following:

Function		Min Range	Max Range
Probe 1 or 2 Dew Point		20°C	-60°C to 40°C
Average Dew Point	**	20°C	-60°C to 40°C
Probe 1 or 2 Linear Oxygen		1%	0 to 100%
Average Oxygen	**	1%	0 to 100%
Probe 1 or 2 Reducing Oxygen		2 decades	1x10 <sup>-30</sup> % to 100%
Average Reducing Oxygen		2 decades	1x10 <sup>-30</sup> % to 100%
Probe 1 or 2 Pre-Reactive Oxygen		1%	0 to 10%
Average Pre-Reactive Oxygen		1%	0 to 10%
Probe 1 or 2 EMF		100mV	0 to 1300mV
Aux TC Temperature		100°C	0 to 1400°C
No Output		-	-

Output 1 transmits process variables for Probe 1, Output 2 transmits process variables for Probe 2 if enabled, otherwise Probe 1. Output ranges for averaged process variables are only available when transmitter is configured with two probes are enabled.

Local display, top line

Selectable from the following:

	Range
Probe 1 Dew Point	-60°C to 100°C
Probe 1 Pre-Reactive Oxygen	0 to 10.0%
Probe 1 Oxygen	1x10 <sup>-30</sup> to 100%

Local display, secondary functions:

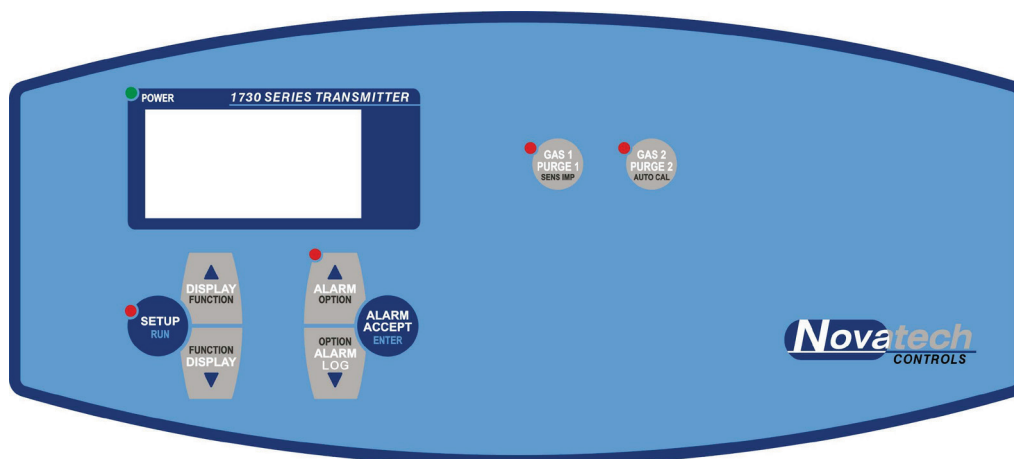
	Range
Probe 1 Dew Point	
Probe 2 Dew Point	** -60°C to 100°C
Average Dew Point	**
Probe 1 TC Temp	
Probe 2 TC Temp	** Up to 1760°C/3200°F
Probe 1 EMF	
Probe 2 EMF	** -30 to 1350mV
Probe 1 Impedance	
Probe 2 Impedance	** 0 to 300k Ω
Probe 1 Oxygen %	
Probe 2 Oxygen %	** 1x10 <sup>-30</sup> to 100%
Average Oxygen %	**
Probe 1 Pre-Reactive Oxygen	
Probe 2 Pre-Reactive Oxygen	** 0 to 10.0%
Average Pre-Reactive Oxygen	**
Auxiliary TC Temp	Up to 1760°C/3200°F
Ambient Temperature	0 to 70°C
Ambient RH%	5 to 95%
Flue Pressure	varies
Runtime	
Service Date	
4-20mA Output 1	
4-20mA Output 2	0 to 24.0mA

\*\* Process variables for second probe or averaging of two probes are only available when the transmitter is configured with two probes enabled.

## 4. DISPLAY AND KEYPAD

The 1738 Dew Point Transmitter has a graphic display, 8 keys that are accessed from the outside of the cabinet and 5 LED indicators to show the status of the transmitter. All the keys have a dual function. The black text on the key is the function while the transmitter is in the RUN mode and the white text on the key is the function in the SETUP mode.

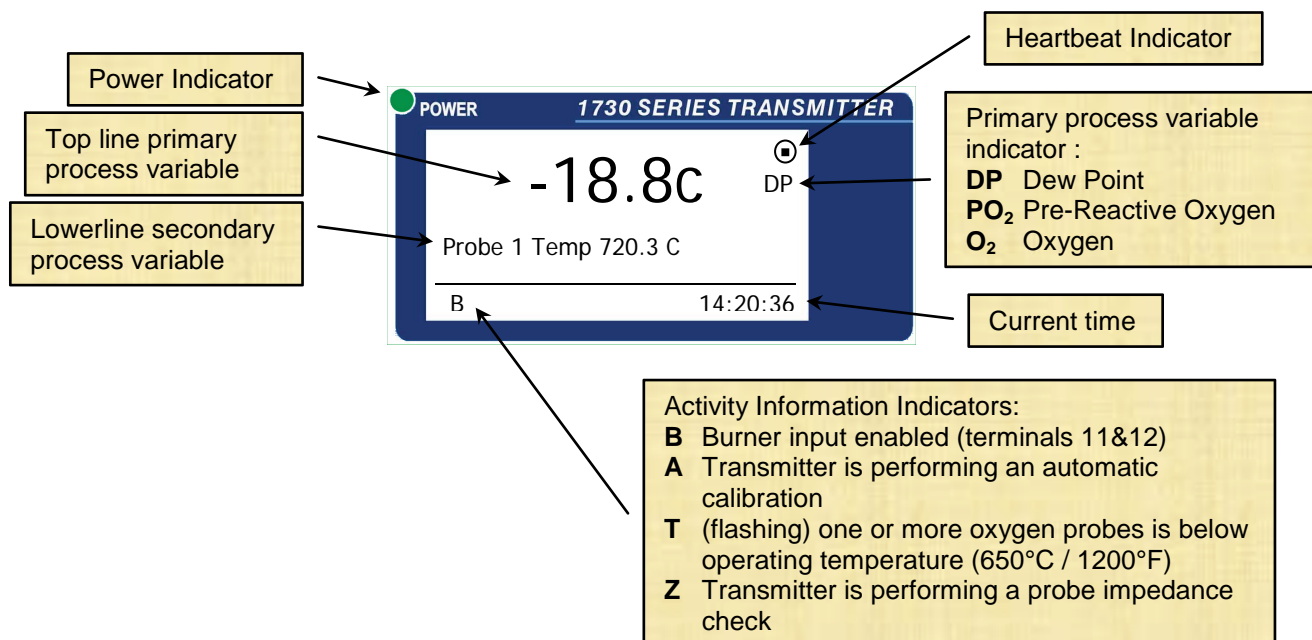
The SETUP mode is accessed by pressing the SETUP key. The transmitter will return to the RUN mode when the SETUP key is pressed again or one minute after the last key is pressed.



The front panel of the model 1738 dew point transmitter

### 4.1 Display

The display is used to show the primary process variable clearly identified on the top line in large text and on the second line a series of secondary variables in smaller text. The default display is shown below with probe #1 dew point on the top line and the probe #1 temperature on the lower line.



In addition to displaying various input and process variables, the display is also used to show the current and active alarm conditions and to configure the transmitter. This is achieved by entering the SETUP mode (see chapter 5). The backlight will switch off automatically if the case temperature is over 35°C. It will switch on again as soon as a key is pressed and remain on for 60 seconds.

## 4.2 Top Line Display

The top line of the display shows the primary process variable in large text. The primary process variable is selected using the Configuration Menu as described in the Technical Manual. Primary process variable can be one of the following options;

Dew Point	(DP)
Pre-Reactive Oxygen	(PO <sub>2</sub> )
Oxygen	(O <sub>2</sub> )

## 4.3 Keypad

There are 8 keys built into the decal on the outside of the door of the 1738 transmitter. The key function is printed in BLACK and WHITE to identify the function of the key in either RUN mode or SETUP mode.

Key text	RUN mode (WHITE text)	SETUP mode (BLUE/BLACK text)
<b>SETUP / RUN</b>	<i>Enter SETUP mode</i>	<i>Return to RUN mode</i>
<b>DISPLAY / FUNCTION ▲</b>	<i>Display scroll up</i>	<i>Function scroll up</i>
<b>DISPLAY / FUNCTION ▼</b>	<i>Display scroll down</i>	<i>Function scroll down</i>
<b>ALARM / OPTION ▲</b>	<i>Alarm scroll up</i>	<i>Option scroll up</i>
<b>ALARM / OPTION ▼</b>	<i>Alarm scroll down</i>	<i>Option scroll down</i>
<b>ALARM ACCEPT / ENTER</b>	<i>Alarm accept</i>	<i>Enter</i>
<b>GAS 1 PURGE 1 / SENS IMP</b>	<i>Gas 1 / Purge 1 manual activate</i>	<i>Probe impedance</i>
<b>GAS 2 PURGE 2 / AUTO CAL</b>	<i>Gas 2 / Purge 2 manual activate</i>	<i>Auto calibrate</i>

### 4.3.1 Keypad in RUN Mode

When the transmitter is turned on, and has gone through the start-up procedure, it will go to the RUN mode. In this mode the top line of the display will show the oxygen measurement from probe 1. The other key functions are –

#### SETUP / RUN Key

Pressing this key once will put the transmitter into the SETUP mode. The function of all the keys will then change to the functions that they have in the SETUP mode. Pressing the SETUP / RUN key again will return the transmitter to the RUN mode, or it will return automatically one minute after the last key press.

#### DISPLAY UP / DISPLAY DOWN Keys

The display keys are used to scroll the lower line up and down through the variety of measurements that are available on the lower line display. The list can be changed to suit the operator by using SETUP function #4.

#### ALARM UP Key

If there is either a new alarm or an active alarm the ALARM UP key can be pressed to examine the alarm status. The alarm light will be flashing if there is a new alarm or steady if there is an existing alarm. (see chapter 6, Alarms).

#### ALARM DOWN Key

When the transmitter is in the run mode or the alarm mode (the ALARM UP key has been pressed), the ALARM DOWN key and the ALARM UP key allow the operator to examine the alarm log. The date / time of last 4000 alarms can be scrolled through. Each alarm record consists of the alarm name and the date / time that the alarm was initiated, accepted and cleared (see chapter 6, Alarms).

#### ALARM ACCEPT Key

The ALARM ACCEPT key is used to accept a new alarm (see chapter 6, Alarms).

#### GAS 1 / PURGE 1 and GAS 2 / PURGE 2 Keys

These two keys are used to turn on the gas / purge solenoids. When the transmitter is in the manual cal / purge mode (Commissioning function #20) the solenoid will be activated for as long as the key is pressed. When the transmitter is in the auto cal / purge mode the automatic cal / purge cycle is started. The cycle can be stopped by pressing any key. (See chapter 7, Gas Calibrate and Purge)

### 4.3.2 Keypad in Setup Mode

When the SETUP / RUN key is pressed once, the transmitter will go into the SETUP mode.

For information about the additional user-selectable options, see the 1738 Technical Manual.

*The following key functions are then available in the SETUP mode.*

#### **SETUP / RUN key**

Pressing this key once will put the transmitter into the SETUP mode. The function of all the keys will then change to the functions that they have in the SETUP mode. Pressing the SETUP / RUN key again will return the transmitter to the RUN mode, or it will return automatically one minute after the last key press.

#### **FUNCTION UP / FUNCTION DOWN Keys**

These two keys allow the selection of the required setup function from the list shown at the start of chapter 5.1 (SETUP mode).

#### **OPTION UP / OPTION DOWN keys**

These two keys allow for the selection of the options that are available in the selected function. See the details of these in chapter 5.2 (Setup mode details).

#### **ENTER key**

The ENTER key saves the selected option. If the ENTER key is not pressed when a new option is chosen, the previous option will be retained.

#### **SENSOR IMPEDANCE key**

When this key is pressed the transmitter will measure the impedance of the sensor in the probe(s). This will only happen if the burner is enabled (terminals 10 and 11) and the probe temperature is over 700°C/1290°F.

#### **AUTO CALIBRATE key**

When this key is pressed the transmitter will calibrate the analog output channels. This is done by directing the output current away from the output terminals (terminals 12 & 13 and 14 & 15) and directing the current back into the transmitter input. The transmitter will then calculate a zero and a span calibration factor for each of the output channels. The output calibration will only happen if the channel is not set to manual output calibration. (See Technical Manual for more details)

### 4.3.3 Information Screen

The 1738 Dew Point Transmitter has an information screen available to the user to allow more detailed information about the running of the transmitter to be easily read by the user.

The information available is:

1. Model and version of the current firmware
2. The date/time that the firmware was compiled
3. The maximum temperature that the transmitter has measured inside the cabinet
4. Current date and time
5. The time of all the next timed events (Impedance test, cal/purge 1, cal/purge 2)
6. ADC calibration data (analogue input calibration)
7. DAC calibration data (analogue output calibration)
8. Probe temperature record (probe 1 and 2)

The information screen is entered from the run mode by pressing (and holding) the ALARM ACCEPT key and then pressing the SETUP key. The first data appears at the top of the screen and there is a scroll bar down the left hand side. The data can be scrolled through by using the DISPLAY up and down keys. The data cannot be changed.

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## 5. SETUP MODE

This chapter describes the functions available when the SETUP mode is selected on the transmitter.

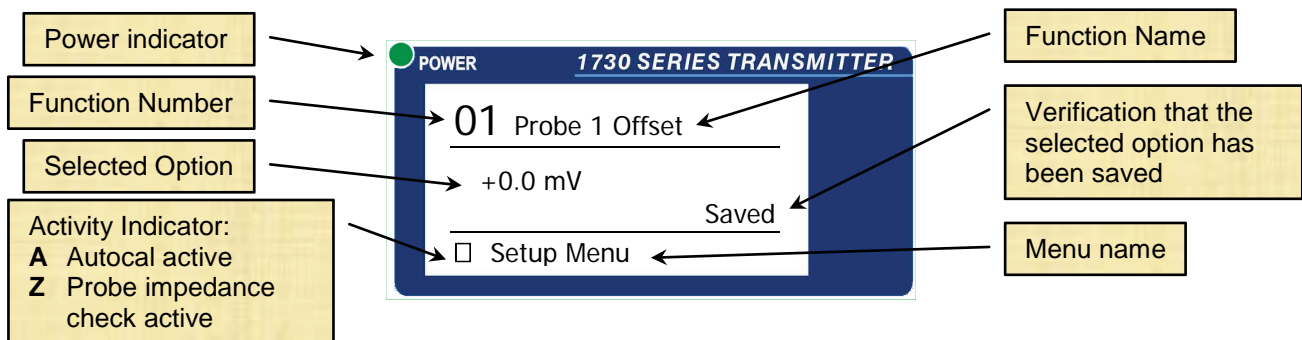
The SETUP mode is accessed by pressing the SETUP key. The transmitter will return to the RUN mode when the SETUP key is pressed again or 1 minute after the last key is pressed.

### 5.1 Setup Mode Function Summary

When the transmitter is in the SETUP mode the SETUP light will be on. The following table shows the SETUP menu functions:

Menu #	Function name (top line)	Range	Default value
01	Probe 1 offset	-6.0 to +6.0mV	0.0mV
02	Probe 2 offset	-6.0 to +6.0mV	0.0mV
03	Lower line items	-	See SETUP function #3 for details (chapter 5.2.2)
04	Oxygen display units	Oxygen % / Oxygen ppm	Oxygen%
05	Damping factor	No damping to 10 samples averaged	5 samples averaged
06	Process alarms	Enabled / Disabled	Disabled

### 5.2 Setup Mode Details



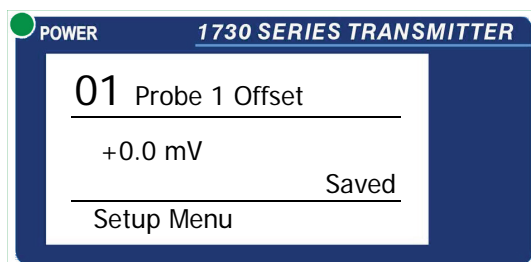
#### 5.2.0 To Change an Option in the Setup Menu

1. Select the SETUP mode by pressing the SETUP / RUN key once. The SETUP light will come on and the display will have the format shown above. The operations of the keys are now the operations written in white on the keypad. The menu name is written at the bottom of the display.
2. When the SETUP mode has been selected the required function can be found by using the FUNCTION UP and FUNCTION DOWN keys.
3. The options available for that function can be seen by using the OPTION UP and OPTION DOWN keys.
4. When the required option is on the display the ENTER key is used to save that option.
5. Press the SETUP / RUN key to return to the RUN mode.

The details of each function are given below.

NOTE: An asterisk next to a listed option denotes default state after a COLD-START

## 5.2.1 Probe 1 & Probe 2 Offset



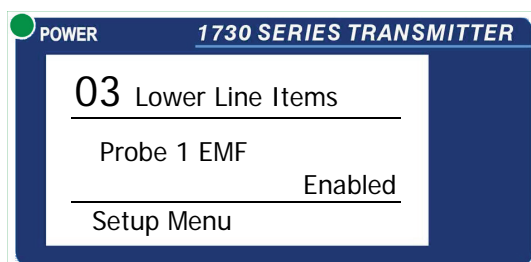
Each Novatech probe has an offset calibration value printed on a tag that is attached to the probe when it is dispatched. The offset value must be entered into this setup function to achieve the most accurate measurements. The value is usually between -1.0 to +1.0mV.

RANGE: -6.0 to +6.0mV (0.0mV is set after a COLD-START)

NOTE: An error of 1mV in the probe offset will change the oxygen reading by about 1% oxygen when the probe is in ambient air. However, the reading is changed by much less when the probe is in a process. At a process gas oxygen concentration of 2%, the 1mV offset error will only change the reading by 0.1%. If in any doubt about the correct offset value, set it to 0.0mV.

The function '02 Probe 2 Offset' will only appear if the transmitter has been configured for 2 probes.

## 5.2.2 Lower Line Items



This function allows the operator to change the items that are available to be displayed on the lower line of the transmitter when it is in the RUN mode. If the word "Enabled" appears on the display for a selected lower line measurement option, the measurement will be available to be shown on the display in the RUN more by scrolling through the list using the DISPLAY up and DISPLAY down keys.

A lower line selection can be "Enabled" or disabled by pressing the ENTER key.

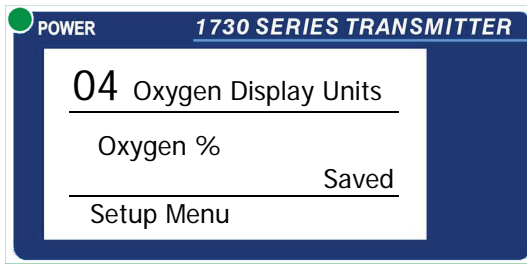
### OPTIONS:

Probe 1 Dew Point  
 Probe 2 Dew Point  
 Average Dew Point  
 Probe 1 TC Temperature  
 Probe 2 TC Temperature  
 Probe 1 EMF  
 Probe 2 EMF  
 Probe 1 Impedance  
 Probe 2 Impedance  
 Probe 1 Oxygen %  
 Probe 2 Oxygen %  
 Average Oxygen %

Probe 1 Pre-Reactive Oxygen %  
 Probe 2 Pre-Reactive Oxygen %  
 Average Pre-Reactive Oxygen %  
 Auxiliary TC Temperature  
 Ambient Temperature  
 Ambient Relative Humidity %  
 Flue Pressure  
 Runtime  
 Service Date  
 4-20mA Output 1  
 4-20mA Output 2



### 5.2.3 Oxygen Display Units

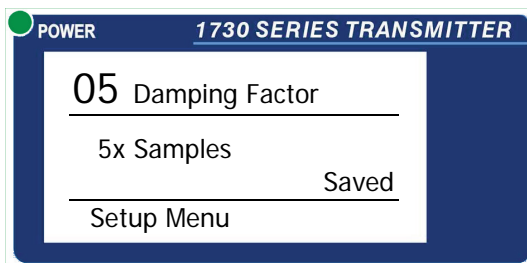


The top line of the display that shows the oxygen measurement can be displayed in either % or ppm (see chapter 4.1, Display)

**OPTIONS:**

- Oxygen % \*
- Oxygen PPM

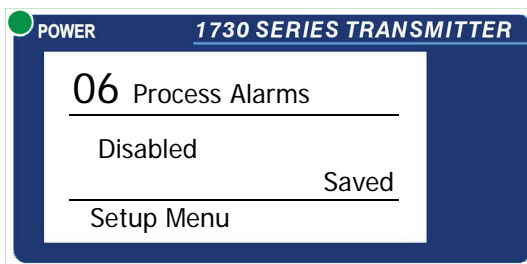
### 5.2.4 Damping Factor



The oxygen measurement can be damped if there are annoying fluctuations in the process gas. Of course any damping will slow down the reaction time of the transmitter. The larger the number selected here, the steadier the measurement will be. The damped oxygen value is also used in the calculation of all other parameters that are based on the oxygen value.

RANGE: "No Damping" to 10 (5 x Samples is set after a COLD-START)

### 5.2.5 Process Alarms



This function allows the operator to "Disable" process alarms. Setup functions 7 to 14 show the alarm trip points that have been set in the transmitter.

**OPTIONS:**

- Enabled
- Disabled \*

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## 6. ALARMS

The 1738 has 4 alarm relays and a built in alarm annunciator and an alarm log. When an alarm occurs and the ALARM up key is pressed, the transmitter goes into the alarm display mode. In this mode some of the keys take on a special function.

Key text	RUN mode	ALARM mode
<b>SETUP / RUN</b>		<i>Return to RUN mode</i>
<b>DISPLAY / FUNCTION up</b>		<i>Next alarm time</i>
<b>DISPLAY / FUNCTION down</b>		<i>Previous alarm time</i>
<b>ALARM / OPTION up</b>	<i>Enter ALARM display mode</i>	<i>Next Alarm</i>
<b>ALARM / OPTION down</b>	<i>Enter ALARM log mode</i>	<i>Previous Alarm</i>
<b>ALARM ACCEPT / ENTER</b>		<i>Accept alarm</i>

When the alarm mode has been entered the SETUP light flashes once a second.

All relays have fail-safe alarm contacts. That is –

- When the transmitter is off the contacts are open circuit
- When the transmitter is on but there are no alarms the contacts are closed
- When there is a current alarm event the contacts are open circuit

All alarms drive the alarm light on the front door.

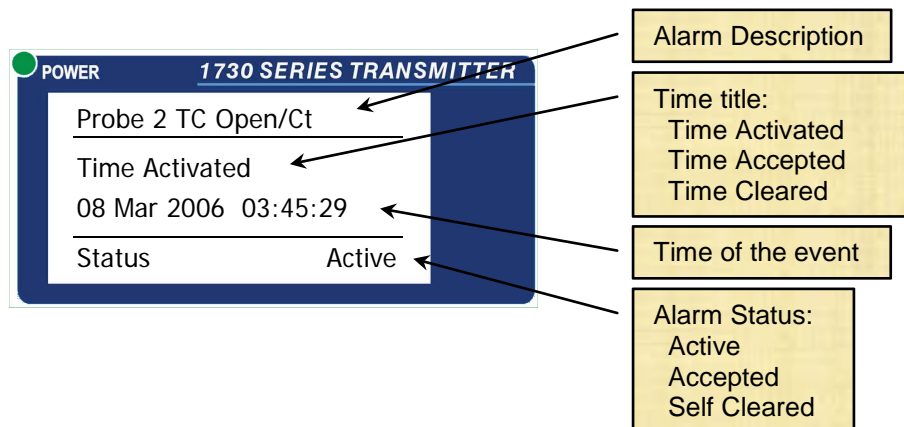
- The light will be off if there are no alarms current
- The light will flash if there is a current alarm that has not been accepted
- The light will be on steady if there are current alarm(s) that have been accepted
- The light will flash faster as more alarms occur

### 6.1 Checking and Accepting an Alarm

When a new alarm occurs, either a process alarm or an alarm that will appear in the common alarm list, the ALARM light will flash. The more new alarms there are, the faster the light will flash.

To check the cause of the alarm –

1. Press the ALARM up key. This will put the transmitter into the current alarm mode. The SETUP light will flash.
2. The alarm screen will appear displaying the cause of the alarm on the top line.



3. Press the ALARM ACCEPT key to accept the alarm.
4. Press the OPTION up key to see the next active alarm or the OPTION down to see the previous active alarm.
5. When all the new alarms have been ACCEPTED the ALARM light will stop flashing.
6. Accept each alarm and then press the SETUP / RUN key to return to the run mode.

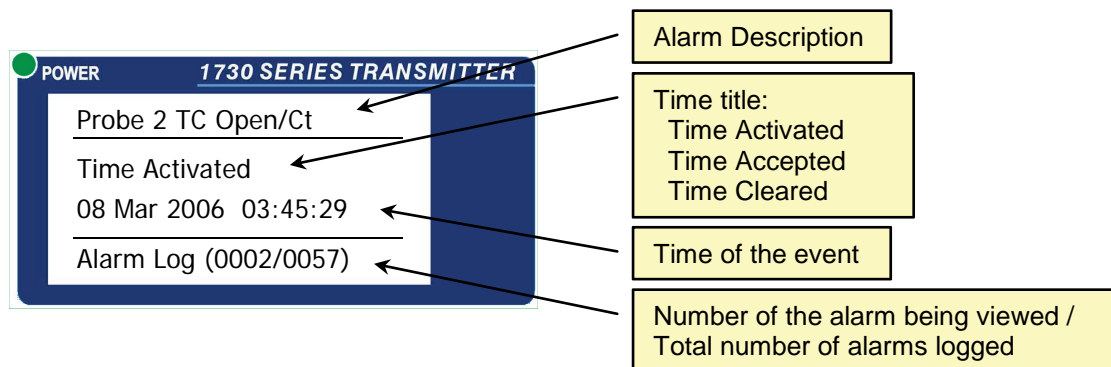
### 6.1.1 Current Alarms

To view the alarms that are still current press the ALARM up key from the RUN mode and then use the ALARM up and down keys to view all alarms. Use the DISPLAY up and down keys to view the Time Activated, Time Accepted and the Time Cleared of each alarm.

### 6.1.2 Alarm Log

The alarm log keeps a record of the alarm events after the cause of the alarm has been cleared. It will hold a record of up to 1000 alarm events and will be retained even with the transmitter power off.

To view all the alarms that have occurred in the alarm log press the ALARM down key from the RUN mode. The display will look like this:



Use the OPTION up and down to scroll through the alarm events that have been saved in the alarm log. The alarm event will be transferred to the alarm log when the alarm has been cleared.

The alarms are stored in the alarm log in chronological order. However, it may be seen that the current alarm number will skip some numbers. These numbers have been reserved for alarm events that are still current. When the alarm cause has been removed, these alarm events will be transferred to the alarm log.

## 6.2 Alarm Relays

The common alarm relay is used to monitor faults within the transmitter and the probe. The list of events that will cause the common alarm relay to be activated is shown in chapter 6.3, Common Alarms. The relay contacts will be open circuit if there is a current alarm condition.

The other three alarm relays are user defined and are used to monitor the process. The function of the process alarm relays is user selectable. See chapter 6.4, Selectable Process Alarms, and the Technical Manual for further information.

## 6.3 Common Alarms

The events that drive the common alarm relay are –

1. 'Probe 1 High Impedance'
2. 'Probe 2 High Impedance'

Oxygen probe or electrode failure (high impedance). This alarm is inhibited when the probe temperature is under 650°C/1200°F.

3. 'Probe 1 Heater Fail'
4. 'Probe 2 Heater Fail'

In the first 20 minutes of power being applied to the heater after being switched on, this alarm will not occur, but a 'T' display will be shown on the bottom of the display. If an ADC alarm occurs, the heaters will automatically be turned off. If the probe has not reached 650°C/1200°F in 20 minutes the 'Probe 1(2) Heater Fail' alarm will be raised.

5. 'Probe 1 TC Open Circuit'

6. 'Probe 2 TC Open Circuit'

Probe thermocouple is open circuit. The heater in heated probes will switch off.

7. 'Auxiliary TC Open Circuit'

Stack thermocouple is open circuit. If the thermocouple is not needed, select "NO T/C" for "Aux TC Type" or place a short circuit between terminals 7 & 8.

8A. 'Reference Air Pump Fail'

The reference air pump in the transmitter is either disconnected or is drawing <20mA.

8B. 'Reference Air Pump Overload'

The reference air pump in the transmitter has drawn >300mA. The power will be turned off to the pump to avoid damage to the pump driving circuit. The 1738 will attempt to restart the pump every minute. To force a restart, disconnect the pump and reconnect it.

9. 'ADC Calibration Fail'

The analog to digital converter has been found to fall outside the normal calibration specifications. In this case the probe heater will automatically be turned off.

10. 'Output 1 Failure'

11. 'Output 2 Failure'

The digital to analog and voltage isolator circuit has been found to fall outside the normal calibration specifications. This check is only performed when the 'AUTO CAL' button is pressed.

Refer to chapter 4.2.2.

12. 'BBRAM Fail'

All of the setup options are held in the battery backed memory (BBRAM). This is the battery shaped device at the bottom centre of the 1730-1 PCB labeled MEM1. This alarm will occur when this device fails and will need to be replaced.

13. 'Heater 1 SSR Failure'

14. 'Heater 2 SSR Failure'

15. 'Heater SSR Leakage'

The 1738 has the ability to monitor the operation of the heater current. As a result, the transmitter will give an alarm within 1 second of a heater power control switch (Solid State Relay) failure. If either of the SSR's are found to be faulty, both heaters will be turned off immediately and the alarm will be raised. The SSR must be replaced. The 'SSR Leakage' alarm will occur if one of the heater SSR's are partly shorted.

If probe #1 SSR has failed and only one probe is being used, the 1738 Technical Manual describes how the SSR for probe #2 can be selected instead. If 2 probes are being used but neither of the solenoid outputs are being used consult the Technical Manual.

16. 'Probe 1 Filter Blocked'

17. 'Probe 2 Filter Blocked'

Blocked probe filter. This test is only performed when automatic purging of the probe is selected. Refer to the Technical Manual for further details. This alarm will not reset until the next purge cycle that can be initiated manually or automatically, or the power to the transmitter is turned off and back on.

18. 'Gas 1 Calibration Error'

19. 'Gas 2 Calibration Error'

This alarm will only be raised if the oxygen measurement during an automatic gas calibration check falls outside the set gas % limits. This alarm will not reset until the next purge cycle that can be initiated manually or automatically, or the power to the transmitter is turned off and back on.

## 6.4 Selectable Process Alarms

There are three user configurable alarm relays. Any or all of the following functions can be selected for each relay.

Refer to the 1738 Technical Manual for details on setting alarm thresholds and alarm delay times.

**NOTE:** The process alarms will only be activated if they are enabled in SETUP menu function 06.

20. 'Oxygen 1 High'

21. 'Oxygen 2 High'

The measured oxygen level on the indicated probe has exceeded the alarm threshold level set in the Calibration Menu for a period of time exceeding the delay time for the particular alarm.

22. 'Oxygen Deviation'

The difference between the oxygen level measured on probe #1 and the oxygen level measured on probe #2 is greater than the alarm threshold level set in the Calibration Menu.

23. 'Dew Point 1 High'

24. 'Dew Point 2 High'

The measured dew point on the indicated probe has exceeded the alarm threshold level set in the Calibration Menu for a period of time exceeding the delay time for the particular alarm.

25. 'Dew Point Deviation'

The difference between the dew point level measured on probe #1 and the dew point level measured on probe #2 is greater than the alarm threshold level set in the Calibration Menu.

26. 'Pre-React 1 Warning'

27. 'Pre-React 2 Warning'

28. 'Pre-React 1 Alarm'

29. 'Pre React 2 Alarm'

The measured pre-reactive oxygen on the indicated probe has exceeded the alarm threshold level set in the Calibration Menu for a period of time exceeding the delay time for the particular alarm. There are two alarm thresholds, named 'warning' and 'alarm' which can be set to differing levels and the alarm conditions set to trigger individual output relays.

## 6.5 Warning Messages

27. 'Probe 1 Temperature Low'

28. 'Probe 2 Temperature Low'

The probe temperature is under 650°C/1200°F. The oxygen reading is therefore invalid. If the probe heater has been on for more than 20 minutes and the temperature is less than 650°C/1200°F a 'Probe 1(2) Heater Fail' alarm will occur. There will be a flashing 'T' symbol on the bottom left hand corner of the display until the temperature of the probe(s) is over 650°C/1200°F.

**NOTE:** The 'Probe 1(2) Temperature Low' function is also used with unheated probes to show that the probe temperature is below 650°C/1200°F when the process temperature falls below this level.

29. 'Cal 1 in Progress'

30. 'Cal 2 in Progress'

A calibration check is occurring, either manual or automatic mode.

31. 'Purge 1 in Progress'

32. 'Purge 2 in Progress'

A probe purge is occurring, either manual or automatic mode.

## 7. GAS CALIBRATE AND PURGE

The Novatech oxygen sensor that is used in the Novatech oxygen probe is extremely predictable, stable and reliable. For this reason, the calibration of a Novatech oxygen system does not require the use of calibration gases.

However, all Novatech oxygen probes have a built in gas connection that does allow the accuracy of the probe to be checked. This chapter describes the operation of this gas checking system. For further details see the 1738 Technical Manual.

The 1738 has a timer and solenoid driving system that can be configured to admit a certified calibration gas into the probe or an air supply to purge the probe filters through the gas connection. Both the calibration gas and the filter purge gas must be piped to the port on the probe labelled "CAL/PURGE".

There are two solenoids drivers in the 1738 transmitter. They can be used for a variety of combinations of gas checking and probe purging functions. The available options depend on the way that the transmitter has been configured.

### Single Probe

#### Configuration

Gas 1 & Purge 2	Solenoid 1 should be connected to calibration gas and Solenoid 2 should be connected to the purge gas
Gas 1 & Gas 2	Solenoid 1 should be connected to calibration gas #1 and Solenoid 2 should be connected to calibration gas #2

### Dual Probe

#### Configuration

Purge 1 & Purge 2	Solenoid 1 should be connected to the purge gas on probe #1 and Solenoid 2 should be connected to the purge gas on probe #2
Gas 1 & Gas 2	Solenoid 1 should be connected to calibration gas #1 and Solenoid 2 should be connected to calibration gas #2

The transmitter can also be configured to be in a MANUAL or AUTOMATIC purge and gas check mode.

The information on configuring the transmitter is contained in the 1738 Technical Manual.

## 7.1 Actions that Occur when the Gas Solenoid Keys are Pressed

Purge and Gas check mode	Number of probes	Gas option	
Automatic	Single	Gas 1 & Purge 2	Pressing the GAS 1/ PURGE 1 key will start the timed gas check cycle on solenoid #1 to probe #1 Pressing the GAS 2/ PURGE 2 key will start the timed filter purge cycle on solenoid #2 to probe #1
Automatic	Single	Gas 1 & Gas 2	Pressing the GAS 1/ PURGE 1 key will start the timed gas check cycle on solenoid #1 to probe #1 Pressing the GAS 2/ PURGE 2 key will start the timed gas check cycle on solenoid #2 to probe #1
Automatic	Dual	Purge 1 & Purge 2	Pressing the GAS 1/ PURGE 1 key will start the timed filter purge cycle on solenoid #1 to probe #1 Pressing the GAS 2/ PURGE 2 key will start the timed filter purge cycle on solenoid #2 to probe #2
Automatic	Dual	Gas 1 & Gas 2	Pressing the GAS 1/ PURGE 1 key will start the timed gas check cycle on solenoid #1 to probe #1 Pressing the GAS 2/ PURGE 2 key will start the timed gas check cycle on solenoid #2 to probe #2
Manual	Single	Purge 1 & Purge 2	Pressing the GAS 1/ PURGE 1 key will turn on solenoid #1 to purge probe #1 for as long as the key is pressed Pressing the GAS 2/ PURGE 2 key will turn on solenoid #2 to purge probe #1 for as long as the key is pressed
Manual	Single	Gas 1 & Gas 2	Pressing the GAS 1/ PURGE 1 key will turn on solenoid #1 to pass calibration gas to probe #1 for as long as the key is pressed Pressing the GAS 2/ PURGE 2 key will turn on solenoid #2 to pass calibration gas to probe #1 for as long as the key is pressed
Manual	Dual	Purge 1 & Purge 2	Pressing the GAS 1/ PURGE 1 key will turn on solenoid #1 to purge probe #1 for as long as the key is pressed Pressing the GAS 2/ PURGE 2 key will turn on solenoid #2 to purge probe #2 for as long as the key is pressed
Manual	Dual	Gas 1 & Gas 2	Pressing the GAS 1/ PURGE 1 key will turn on solenoid #1 to pass calibration gas to probe #1 for as long as the key is pressed Pressing the GAS 2/ PURGE 2 key will turn on solenoid #2 to pass calibration gas to probe #2 for as long as the key is pressed

Refer to the person responsible for the commissioning to find out how the transmitter has been configured.



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# Declaration of Conformity

**Application of Council Directives:**

2004/108/EC  
2006/95/EC

**Standards to which conformity is declared:**

EN50270:1999

Electromagnetic compatibility – Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen

**CFR47 FCC Part 15, Subpart B (Class A)**

Telecommunications

**Vibration and Shock**

IEC-68-2-2

IEC-68-2-3

*Manufacturer's name:*

**Novatech Controls Pty Ltd**

*Manufacturer's address:*

309 Reserve Road  
Cheltenham VIC 3192  
AUSTRALIA

*Type of equipment:*

Oxygen Transmitter

*Model Number:*

1730 Series Transmitter

1231 Oxygen Probe

1232 Oxygen Probe

1234 Oxygen Sensor

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*I hereby declare that the equipment specified herein conforms to the above directive(s) and standards(s) in 2007.*



Full Name:

**Fraser Chapman**

Position:

**R & D Manager**