



5S3

User Manual

Commercial in Confidence

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Installation

1.1 Physical mounting

The sensor is housed in a diecast box fitted with mounting lugs (details in section 1.6). The instrument should be screwed to a suitable surface using the two mounting holes.

1.2 Gas connections

The sensor may either monitor gas in the surrounding atmosphere or a flow adapter can be inserted into the gas port inlet to allow monitoring of pumped sample gas from a remote location.

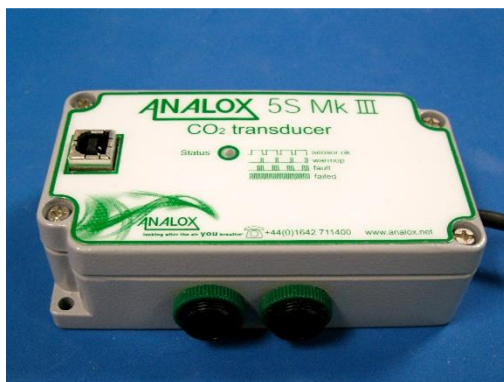
When used to monitor a pumped sample, Analox recommend that any tubing connected to the flow adapter exhaust be kept short (10-30cm). Care should be taken to ensure that the sample flow rate is within specification and that any exhaust line is not restricted, otherwise gas pressure within the sensor may be increased, resulting in false, elevated CO₂ readings.



Single port sensor (% ranges) monitoring local atmosphere



Single port sensor (% ranges) monitoring a remote atmosphere via a sample line.



Dual port sensor (ppm ranges) monitoring local atmosphere



Dual port sensor (ppm ranges) monitoring a remote atmosphere via a sample line

The sensor must be mounted with the gas ports facing downwards so that any accumulation of condensation cannot pool in the gas inlets.

1.3 Electrical connections

Electrical connections with the sensor are made via a short screened cable. The cable screen is internally connected to the diecast box and made off into a green/yellow wire.

CORE COLOUR	SIGNAL	DETAILS
Red	+SUPPLY	Power Supply 9-36V DC to Sensor
Blue	-SUPPLY	
Yellow	+OUTPUT	Signal Output from Sensor (0-2V, 4-20mA)
Green	-OUTPUT	
Green/Yellow	Earth	Screen

Use of the screen will depend on the particular installation. It is best connected to a clean Earth to form a shield around the sensor. Note that it is not recommended for the screen to be connected to the negative supply line.

It is advised to avoid ground loops. Therefore if the case is adequately earth bonded by the user's fixings, it may not always be desirable to connect the screen to another earth connection. If unsure, it is suggested that the screen wire be connected to earth in the first place and then if there are problems, any earth loop can be broken by disconnecting one of the connections in the earth arrangement.

The standard output range is either 0 – 2V or 4 – 20mA. Maximum load resistance for 4-20mA output is 400Ω.

1.3.1 USB connection

The 5S3 is fitted with a USB port to facilitate calibration - calibration software and instructions can be downloaded from the Analox website. Connection to the USB port is not required in normal use.

Operation

During operation the unit continuously runs various self checks. If a fault is detected then the output is driven over-range (to a nominal 20.5mA for current output and 2.5V for voltage output) and the flash pattern of the green LED changes to a double flash. If the sensor suffers a software failure then the flash pattern changes to a very rapid flash and, again, the output is driven over-range.

After switch on, the sensor takes about thirty seconds to warm up. During this time the LED will provide very brief flashes and the output is driven over-range. After the warm up period completes, the output will be driven to be proportional to the CO₂ concentration, as per the specification. The LED will now flash more slowly.

Calibration

When the sensor is fitted into an Analox 5001, Divex G30 or an SDA CO₂ monitor, then calibration should be done via that instrument, in accordance with its user manual.

When the sensor is used as a stand-alone unit it is possible to calibrate the sensor using a PC, proprietary software and a USB cable. Software and instructions are [downloadable](#) from the Analox website.

Status indications

Event	Indicator	Signal Output	Action
Warm Up Period (30s from switch on)	Short flashes (more off than on)	>2V (0-2V) >20mA (4-20mA)	None
Normal Operation	Long flashes (more on than off)	0-2V or 4-20mA proportional to CO2 concentration	None
Fault	Double flashes	>2V (0-2V) >20mA (4-20mA)	Service required Return to Analox
Fatal error	Rapid flashing	>2V (0-2V) >20mA (4-20mA)	Service required Return to Analox

Specification

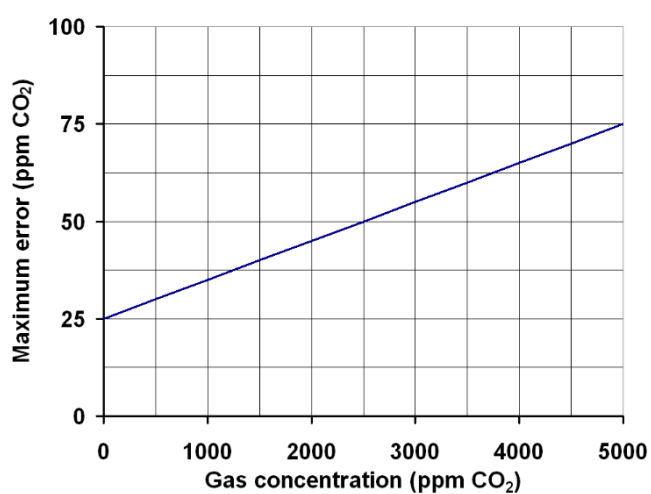
Ranges	Resolution
0-5000ppm	2ppm
0-10000ppm	5ppm
0-1%	0.0005%
0-2%	0.001%
0-5%	0.002%
0-10%	0.005%
0-20%	0.01%
0-100%	0.05%
Warm up time:	30 Seconds
Response Time:	T90 in <30 Seconds
Detection Technique:	Infra Red Absorption
Storage Temperature:	-20 to +70°C
Humidity:	0 - 99% Non Condensing
IP Rating (Standard 5S3):	IP22
IP Rating (5S Mk III+):	IP55
Flow Range:	0.1 - 2 litres/minute
Power Supply:	9-36VDC Regulated 5V option also available
EMC emissions:	To EN50270 2006, Type 1
EMC susceptibility:	To EN50270 2006, Type 2 Max deviation under 10V/m testing is 150ppm
Output:	Either 0-2V DC into load of >1000 Ohms Or 4-20mA into load of <=400 Ohms (Specify at time of order)
Warm-up/Fault conditions:	Either >2VDC (0-2VDC option) Or >20mA (4-20mA option)
Enclosure:	Die cast Aluminium
Dimensions (Standard 5S3):	115 x 70 x 40 (w h d), including flow adapter

Sensors are provided optimised for either helium or nitrogen balance gases and must be used as such to achieve specified performance.

1.4 Accuracy – Diving grade sensors

The 5000ppm diving-grade units meet the requirements of DNV for use in commercial diving to a depth of 350m and across the following variations in environmental conditions:

Temperature range:	-5°C to +55°C (23°F – 131°F)
Ambient pressure:	950mbar – 1050mbar (712.5mmHg – 787.5mmHg)
Humidity:	0 – 99% non-condensing
Vibration:	Compliant to DNV OS-D201 Oct 2008, Section 3 B201
Sensor error:	Less than 25ppm plus 1% of the sensor reading at Standard Temperature and Pressure, see graph:



Temperature error:	Less than 2.5ppm/°C of temperature shift
Long term sensor drift:	Less than 5ppm per week

1.5 Accuracy – Standard grade sensors

These sensors have a generic accuracy of 1% of the sensor full scale output, plus 2% of the indicated reading, across the following environmental conditions:

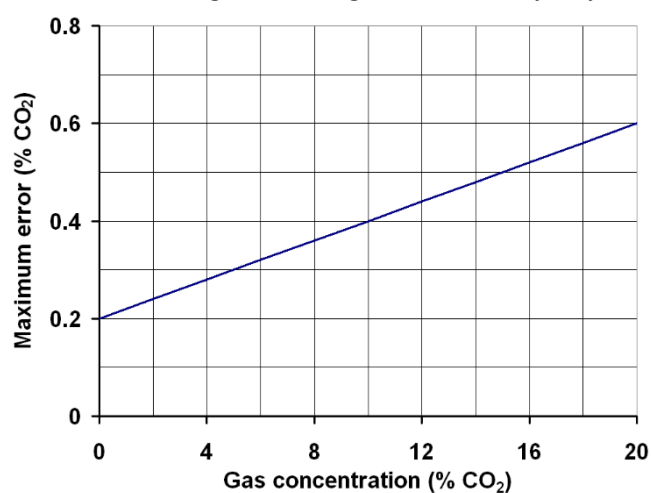
Temperature range: -5°C to +55°C (23°F – 131°F)

Ambient pressure: 950mbar – 1050mbar (712.5mmHg – 787.5mmHg)

Humidity: 0 – 99% non-condensing

Sensor error: Less than 1% of the sensor full scale output plus 2% of the sensor reading.

Taking a 20% range instrument by way of example:



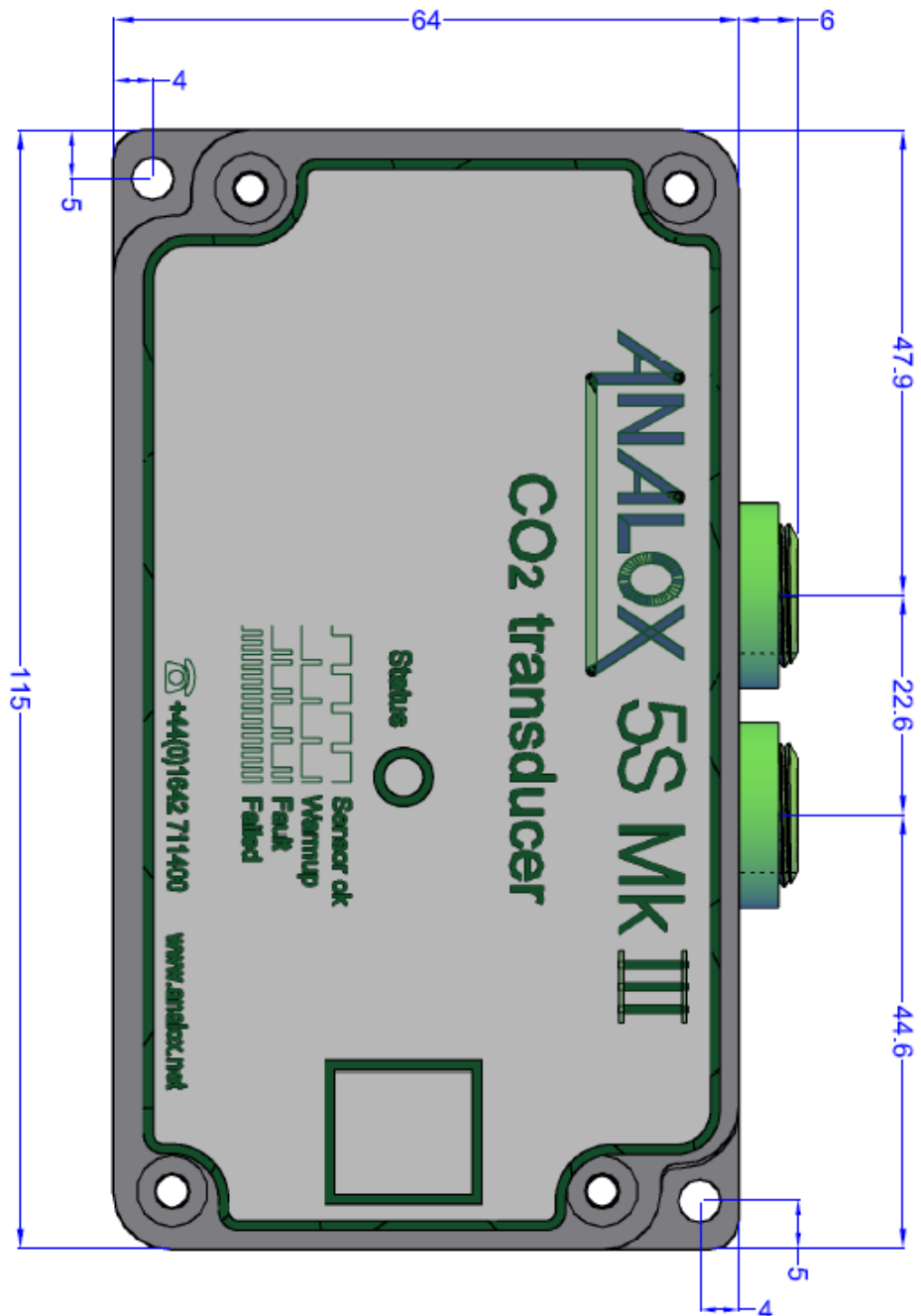
Temperature error: Less than 0.1% of the full scale output /°C of temperature shift

Long term drift: 0.2% of sensor full scale reading per month

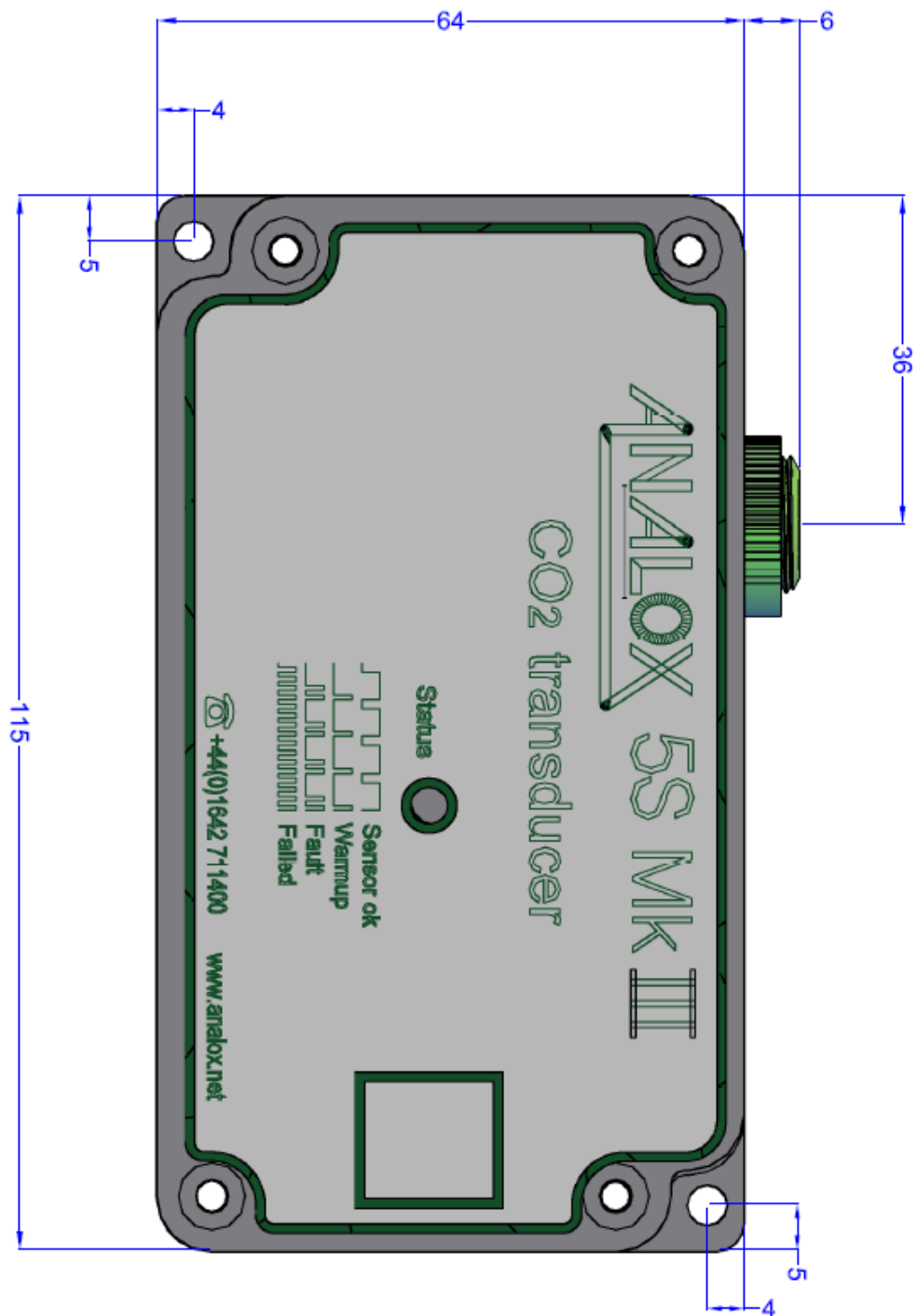
Appendices

1.6 Dimensions & mounting information

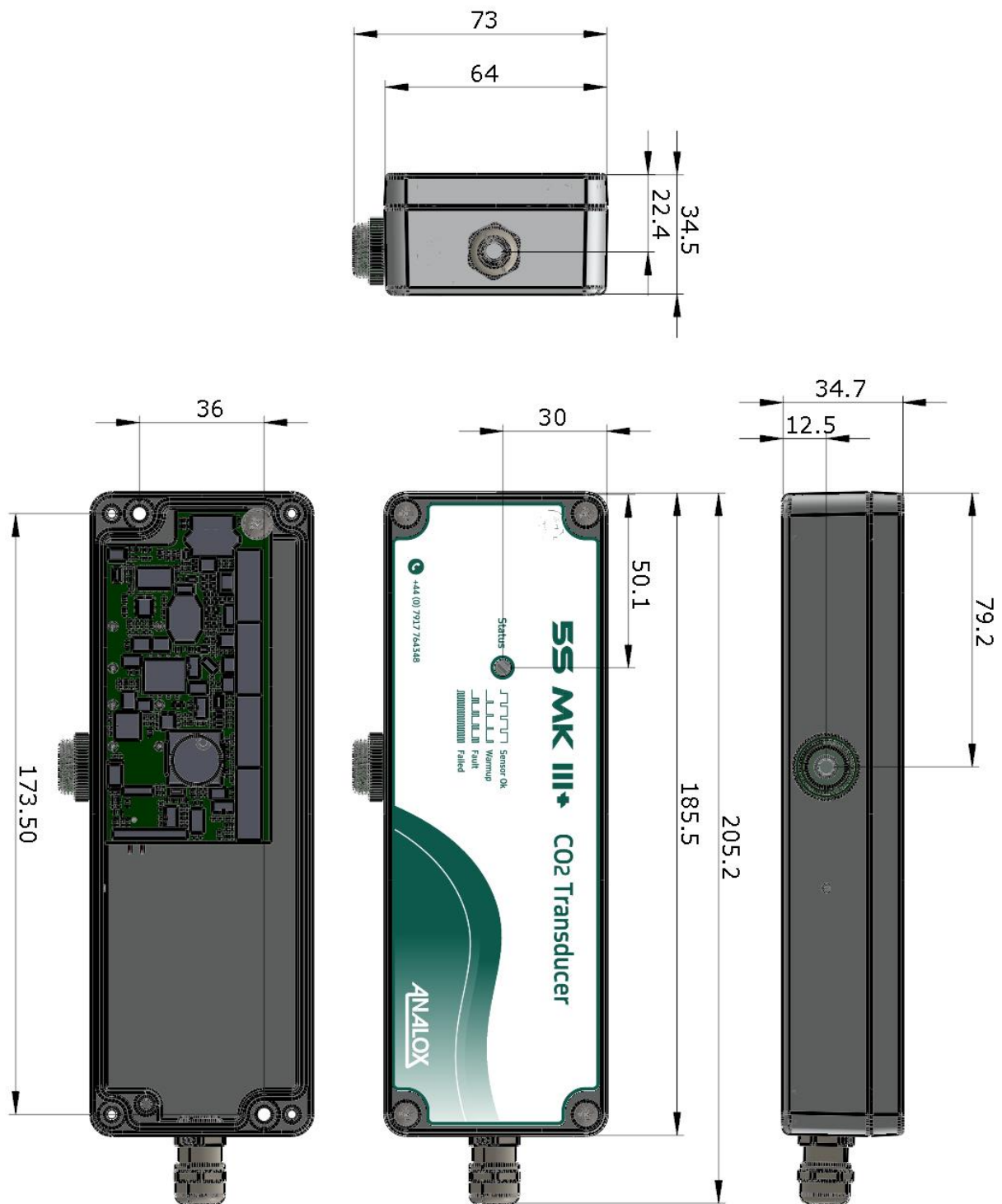
1.6.1 Dual port instruments (ppm ranges)



1.6.2 Single port instruments (% ranges)



1.6.3 5S Mk III+ instruments (% ranges)



UK Declaration of Conformity

Declaration number: 5S3-C003-00

Manufacturer's name: Analox Limited

Manufacturer's address: 15 Ellerbeck Court
Stokesley Business Park
Stokesley
North Yorkshire
TS9 5PT

It is declared that the following product:

Product name: Analox 5S3 CO2 Sensor

Product code: A5S3

Conforms to all applicable requirements of: BS EN50270:2006 (Type 1 & 2)
BS EN61000-6-3:2007 A1:2011

- Complies with the Electromagnetic Compatibility Regulations 2016
- Complies with the requirements of UK RoHS 2012
- Complies with the requirements of WEEE Regulations 2013

Note: The 5S3 will be used as a component part of a larger device/system.

The above product is UKCA-marked and satisfies the relevant legislative requirements of the UK



Signed on behalf of: Analox Limited

Date: 18th June 2021

Signed:

A handwritten signature in black ink, appearing to read 'P. Branton'.

Name: Paul Branton

Position: Technical Director

Declaration of Conformity**DECLARATION OF CONFORMITY**

Number: 5S3-960-02

Manufacturers name: Analox Sensor Technology Ltd

Manufacturers address: 15 Ellerbeck Court
Stokesley Business Park,
Stokesley,
North Yorkshire
TS9 5PTIt is declared that the following
product:Product name: Analox 5S3
Product code: A5S3Conforms to all applicable requirements of: EN50270:2006 for Type 2 equipment
EN61000-6-3:2007 A1:2011 for type
1 equipment

- The above product complies with the requirements of the EMC Directive 2014/30/EU
- The above product complies with the requirements of the Low Voltage Directive 2014/35/EU, as amended
- The above product complies with the requirements of the RoHS2 Directive 2011/65/EU
- The above product complies with the requirements of the WEEE Directive 2012/19/EU

Signed on behalf of: Analox Sensor Technology Ltd
Date: 21/12/15

Signed:

Name: Mark Lewis
Position: Managing Director

SA127 Issue 3 February 2011