

User Guide

SENSE1 Kit / OQS / OQL Oil Quality Sensor



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DEFINITIONS



WARNING: Risk of injury or death.



CAUTION: Risk of damage to objects



IMPORTANT: Important information

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DISCLAIMER

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service, or maintain. Always ensure the correct configuration, installation, and connection of the sensor in accordance with these instructions prior to any use.

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AMENDMENT RECORD SHEET

Version Number	Amendment(s)	Issued by	Date
1	New document	S Rickards	29 November 2024
2	Section 1 Cable SB listed as an optional extra. Individual dimensional drawings added for each sensor head option	S Rickards	04 February 2025
3	Corrected torque setting to 20 Nm	S Rickards	08 April 2025
4	Update for release of TD Config Software	S Rickards	23 September 2025
5	Corrected dimensional drawing on Page 7	S Rickards	19 December 2025
6	Updated for new product codes in price book	S Rickards	04 February 2026
7	Update specification for latest EMC standards compliance	S Rickards	20 April 2026

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1 PRODUCT INFORMATION - OQS / OQL OIL QUALITY SENSOR



Fig. 1-1 OQS / OQL Sensor



IMPORTANT:

If you purchase a Tan Delta OQS / OQL Oil Quality Sensor on its own, it **will not** be supplied with a Configuration Cable (**Cable J**).

Cable J is needed to configure the sensor to your specifications using the Tan Delta Configuration and Data Management Software (**CADS**).

Cable J is included, along with an OQS / OQL Sensor, in the Tan Delta **SENSE1**, **SENSE2** and **SENSE3** kits. This User Guide covers the basic kit, SENSE1, but the sensor configuration and installation is identical for SENSE2 and SENSE3.

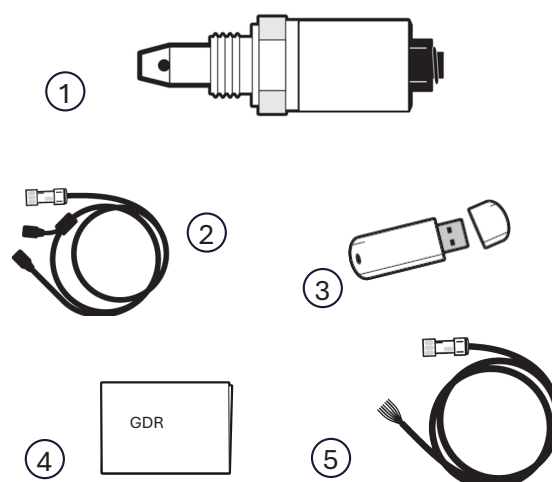


1.1 Kit Content

Check that your kit contains the following items:

What's in the box Product Code: SENSE1-BS1

Item	Description
1	Gen II Oil Quality Sensor (OQS / OQL)
2	Configuration Cable J
3	Quick Start Guide
Recommended cable	
4	Cable SB## - Not included in SENSE1 Kit Recommended for installation of the sensor into third-party telematics systems



1.2 Dimensions

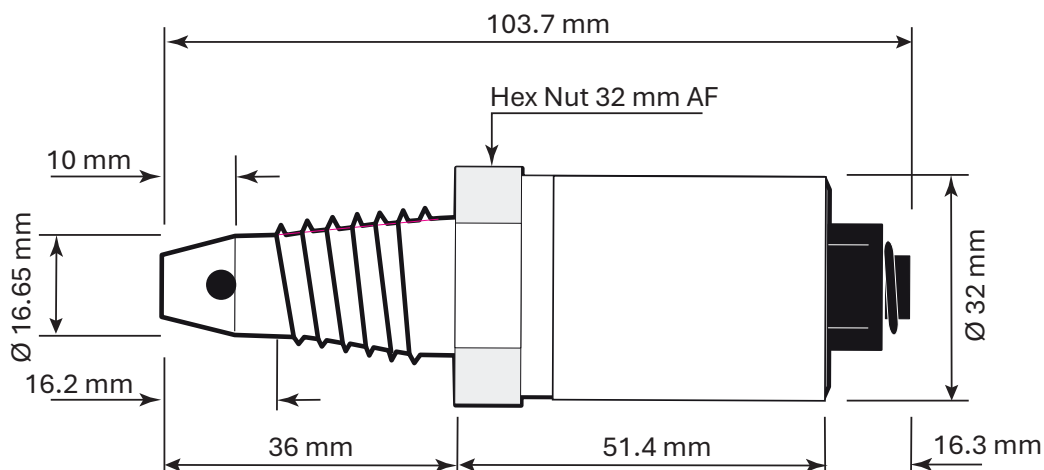
OQS / OQL sensors have a selection of fitting thread and sealing options to suit the majority of applications.

This section of the User Guide gives dimensional information for each thread option. Refer to your sensor Product Code and the relevant dimensional drawing for your sensor.

1.2.1 OQS / OQL NP1

OQS-NP1

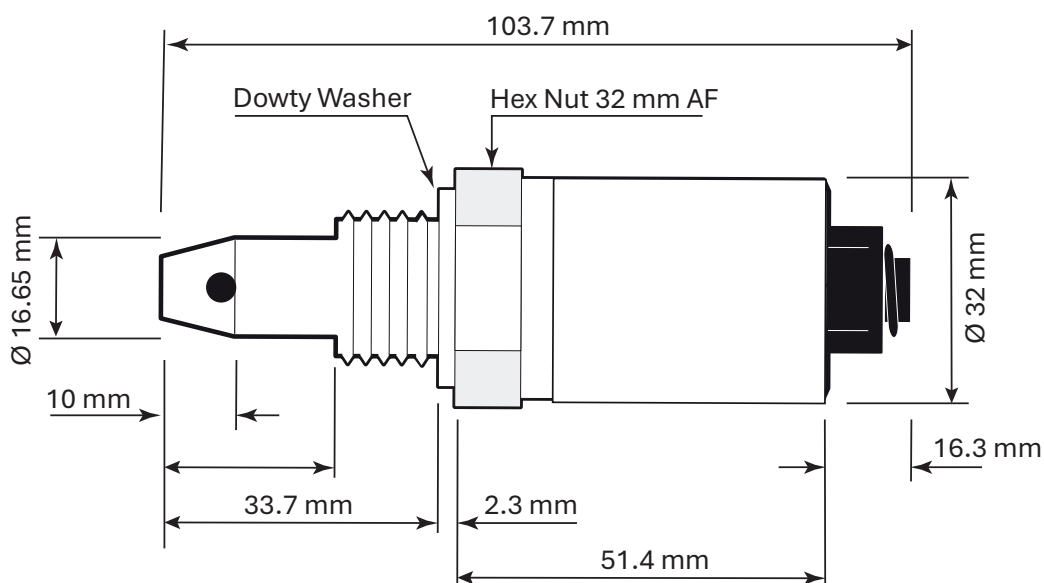
Body: 1/2 in NPT



1.2.2 OQS / OQL BS1

OQS-BS1

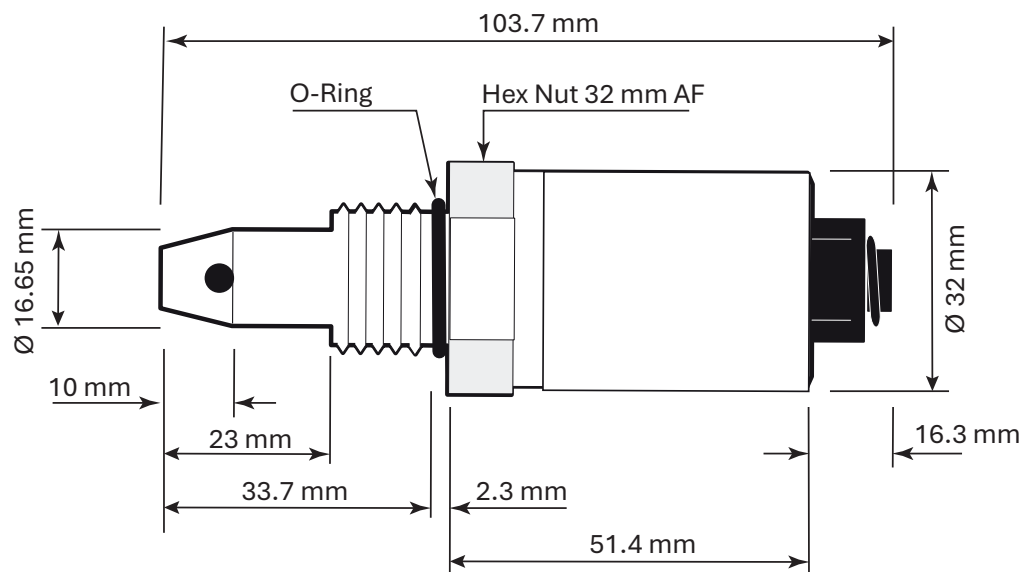
Body: 1/2 in BSPP Flat-Faced



1.2.3 OQS / OQL UN1

OQS-UN1

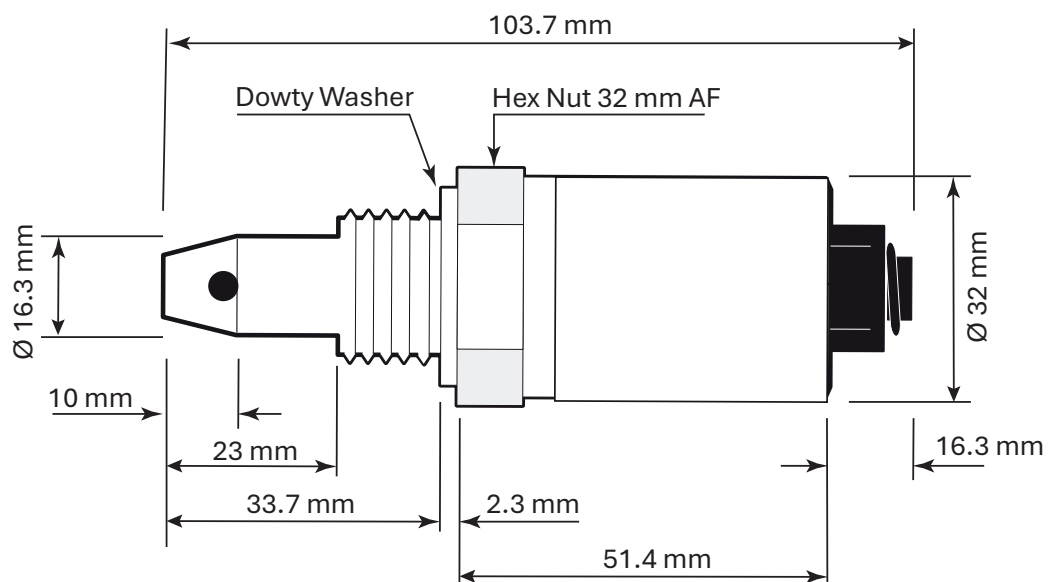
Body 7/8 UNF



1.2.4 OQS / OQL M18

OQS-M18

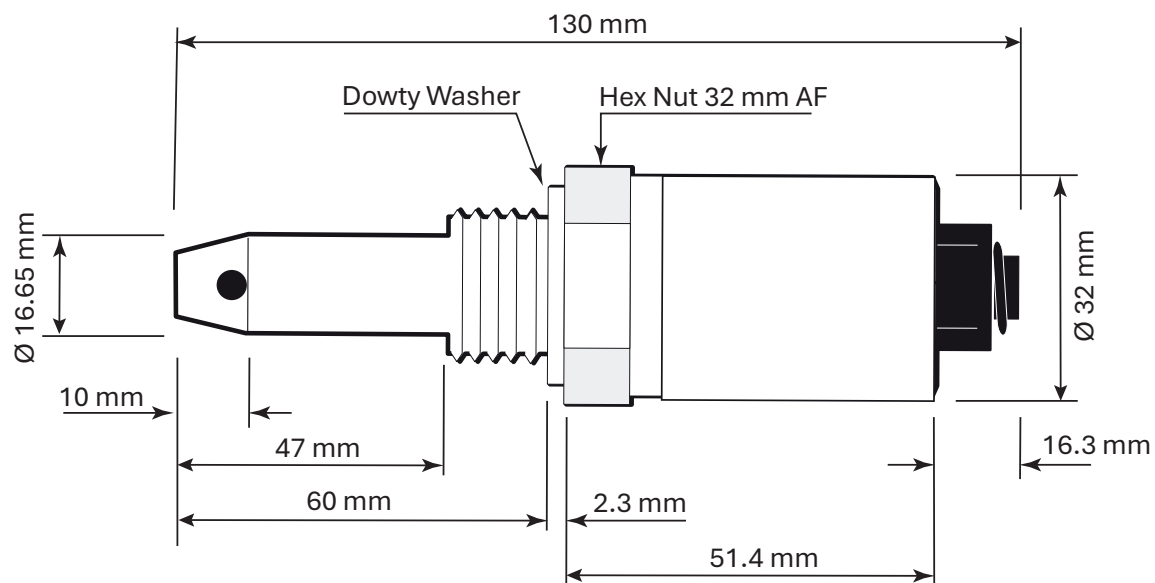
Body: M18 Fine



1.2.5 OQS / OQL B2

OQS-BS2

Body: 1/2 in BSPP Long-Nosed



2 OQS / OQL SENSOR TECHNICAL SPECIFICATION

Environmental Specifications	
Operating Temperature	-40 °C (-40 °F) to +120 °C (+248 °F)
Calibrated Temperature	-20 °C (-4 °F) to +120 °C (+248 °F)
Fluid Temperature	-40 °C (-40 °F) to +120 °C (+248 °F)
Fluid Pressure	up to 70 bar (1015 psi)
Storage Temperature	-55 °C (-67 °F) to +150 °C (+302 °F)
Physical Characteristics	
Material	Stainless Steel AISI304
Dimensions	102 mm x 36 mm (L x W)
Weight	180 g
Connection	32 mm AF Hex Collar
Torque	20 Nm
Available Threads	
Thread	Seal
1/2 in BSPP	Dowty Type
1/2 in NPT	n/a
7/8 in UNF	'O' Ring
M18	Dowty Type
Connections	
Connector	6 pin Bulgin 4000 series
Electrical	
Supply	+9 - 30 V DC
Consumption	0.4 W Average
Data Output/Input	
Digital Output	RS485, CANbus
Protocols Supported	Modbus RTU, CANopen and J1939 on CANbus
Analog Output	4 - 20 mA
Oil Quality Detection Parameters	
Frequency	Every 2 seconds
Output	Tan Delta Number (TDN), Oil Temperature (C or F)
Elements	All wear and contamination
Sensitivity	99 %

Range and Accuracy	
Sensor oil quality normal operating range	- 10 % to + 30 % loss factor
Sensor oil quality accuracy/repeatability	+/- 3 % loss factor
Sensor temperature normalisation accuracy	Pre V 2.4 +/- 3 % loss factor Post V 2.4 +/- 1.5 % loss factor
Sensor oil temperature normal operating range	-20 °C to + 120 °C
Sensor oil temperature accuracy	+/- 3% of full range (+/- 4.2 °C)
Sensor internal temperature operating range	-20 °C to +120 °C
Sensor internal temperature accuracy	+/- 3% of full range (+/- 4.2 °C)
Sensor 4-20 mA accuracy	+/- 1% of full range (+/- 0.2 mA)*
Standards and Certification	
Water & Dust	IP68 when connected
Shock & Vibration	BS EN 60068-2-30 (Test Db - Cyc. Hum.) BS EN 60068-2-6 (Test Fc - Sine Vib.) BS EN 60068-2-27 (Test Ea - Mech. Shock)
EMC	Emissions, Industrial - BS EN IEC 61000-6-4:2019 Immunity, Industrial - EN IEC 61000-6-2:2019
Conformity	CE and UKCA marked

3 SENSOR CONFIGURATION



IMPORTANT:

You must configure the sensor to your specifications using Tan Delta Configuration Software **TD Config**.

TD Config is provided on the Tan Delta USB drive supplied with your Sensor.



NOTE:

The TD Config application **must** be installed on a windows PC or laptop.

TD Config **does not** operate on Mac devices or Chromebook devices.



3.1 Set Up



NOTE:

You will need Administrator privileges on your computer to Install the TD Config application.

Also, when TD Config has installed, we recommend that you connect the Configuration cable to the PC whilst Administrator privileges are still granted, so it will recognise the cable and install any drivers that are needed.

3.1.1 Install the TD Config application onto your PC / Laptop

TD Config is provided on the USB drive supplied with your SENSE1 Kit.

Alternatively, it is available for download online at:

<http://oilconditionsoftware.com/installtdconfig>

- 1) Insert the Tan Delta USB drive into a USB port on your computer.
- 2) When prompted, select **Open folder** to view files.
- 3) Launch the **TDConfig_Installer** file and follow the instructions in the setup wizard.
- 4) When prompted, click on **Install**.
When installation is complete, **TD Config** is home page is displayed, as shown in Fig. 3-1.
- 5) Allow the PC/laptop to automatically update drivers, if needed.



Fig. 3-1 TD Config Home page



NOTE:

If sensors are configured to Modbus/CANbus, you **must** open the software first, and then connect the Sensor.

3.1.3 Connect the Sensor



NOTE:

The order in which you connect the cable and the sensor is important

- 1) First, Insert the USB end of Configuration Cable (**CAB-J**) into a USB port on your PC/laptop.
- 2) Then, connect the free end of CAB-J to the sensor, as shown in Fig. 3-2.
- 3) Once the home screen has loaded, select **Device Configuration** from the options on the home screen.



Fig. 3-2 Setting up a sensor for configuration

(Standard sensor shown)

3.1.4 Select the required configuration

The Device Configuration screen (Fig. 3-3) displays a list of configuration options.

- 1) If your sensor was supplied as part of a SENSE1 Kit, select the **SENSE1 - Sensor Kit** option.
- or...
- If your sensor was supplied as an individual item, select **OQ# Sensor only**.

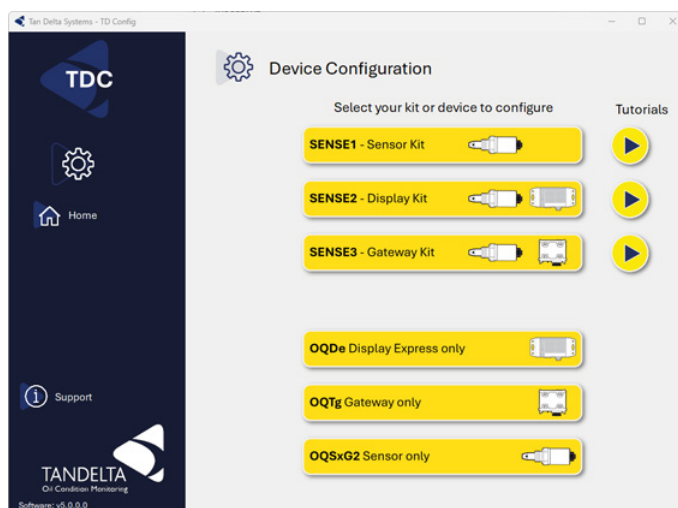


Fig. 3-3 Device Configuration selection screen

The SENSE1 Configuration screen will search for a suitable Cable and Sensor.

Once your Sensor is detected, the **Sensor Found** screen is displayed (Fig. 3-4).

- 2) Click on **Next**.

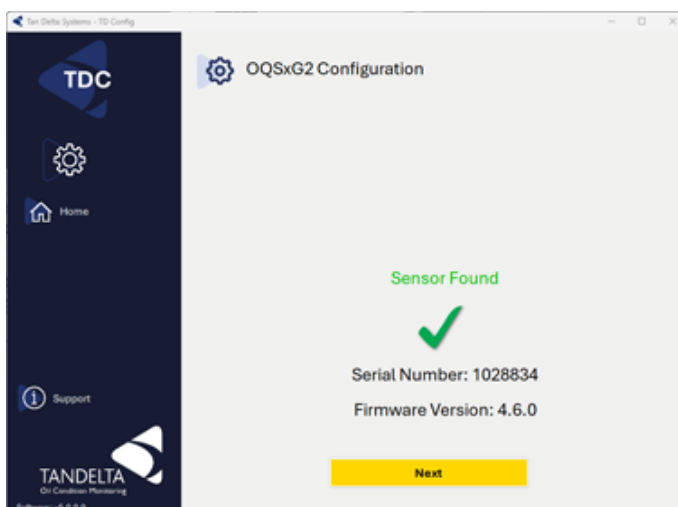


Fig. 3-4 TD Config sensor search

The SENSE1 Configuration screen will display a list of communication options, as shown in Fig. 3-5.

- 3) Click to select the required communication protocol.
- 4) Set the required **Node ID** from the drop down list (1 to 16 permissible for Tan Delta systems).
- 5) Select the required **Baud Rate** option.
- 6) Click on **Next**.

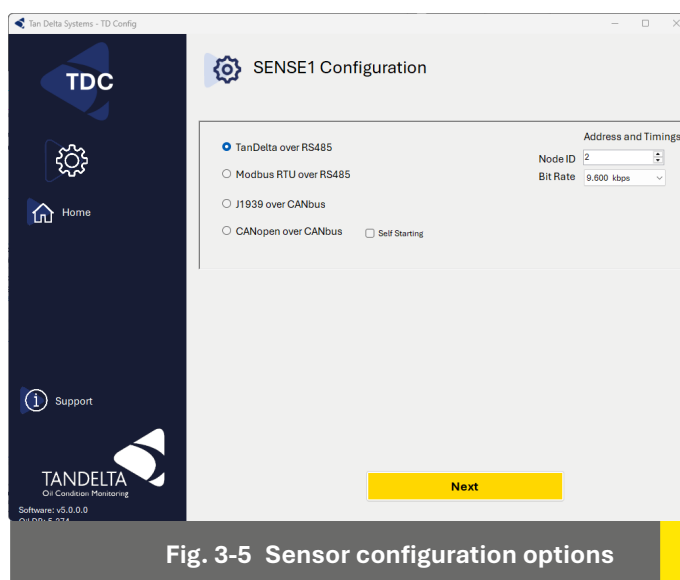


Fig. 3-5 Sensor configuration options

TD Config displays the Oil Database, as shown in Fig. 3-6.



NOTE:

If your oil is not displayed in the database, contact Tan Delta Support.

- 7) You can use the **Custom sensor name** option to give your sensor a name relevant to your application e.g. **Gearbox**.
- 8) You can re-order the list by clicking on the column headings e.g. **Manufacturer**, **Viscosity** etc.
- 9) Select the required oil from the database, then click on **Upload to Sensor**.

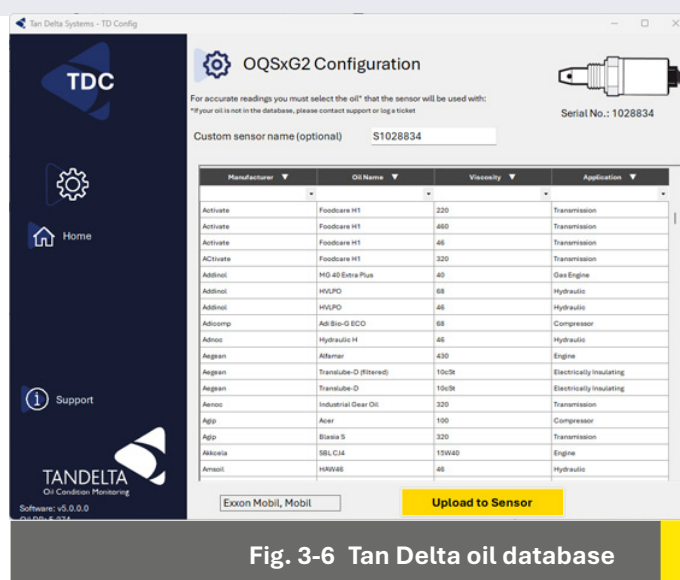


Fig. 3-6 Tan Delta oil database

TD Config will now write the configuration settings to the sensor.

This may take several minutes.

When the configuration is complete, the confirmation screen is displayed, as shown in Fig. 3-7.

Click on **Finish**.

You can now disconnect the sensor.

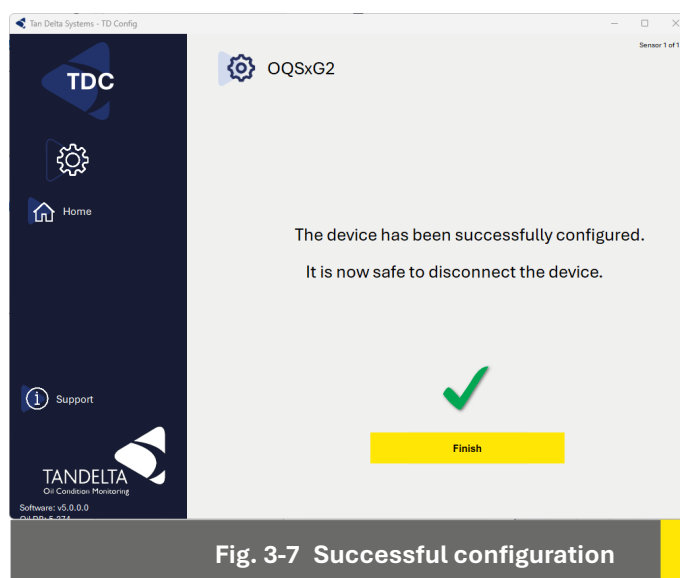


Fig. 3-7 Successful configuration

4 OQS/OQL SENSOR INSTALLATION

4.1 Precautions

Read these instructions before installing the oil quality sensor.

The sensor is robust, however it can be damaged by mistreatment.

The following must be noted:

- Install the sensor into the equipment **before** making electrical/wiring connections.
- Make sure that the fittings being used correspond with the sensor thread size
- Tighten to no more than 20 Nm with a 32 mm spanner.
Do not over tighten.
- Do not attempt to screw or tighten the sensor using the body. Always use the “Hex” head with the correct size spanner (32 mm).
- Refer to Fig. 4-1. To prevent vibration having any adverse effects to the cable/sensor connectors, the cable must either be mounted on the same plane as the sensor, or have a loop fitted to absorb vibration.
- Do not twist the cable relative to the sensor head.
- Keep away from sharp edges which may cut into the cable.
- Do not bend the cable excessively, minimum bend radius = 50 mm (2 inches).
- Where possible, keep the cable away from sources of heat, (such as an engine block), and electrical interfaces.
- Oil pressure must not exceed 70 bar.

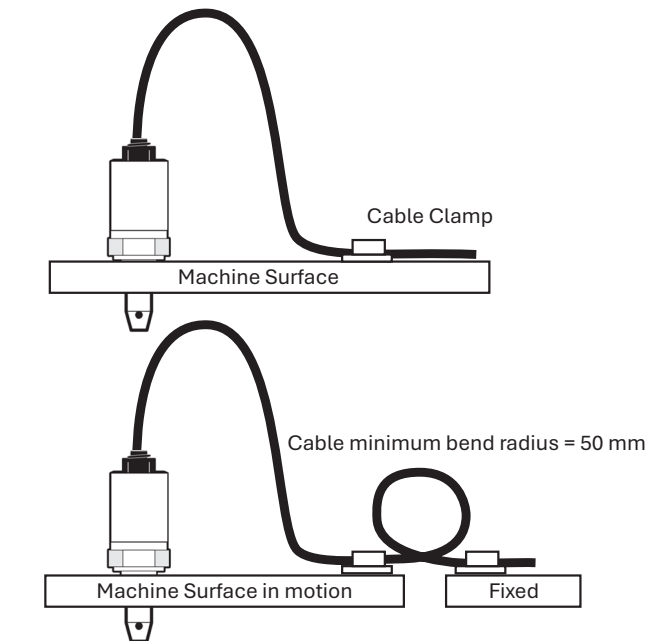


Fig. 4-1 Cable Fitting

4.2 Choosing the Sensor Mounting Location

The performance of the sensor will be enhanced through careful consideration of the mounting location.

Refer to Fig. 4-2.

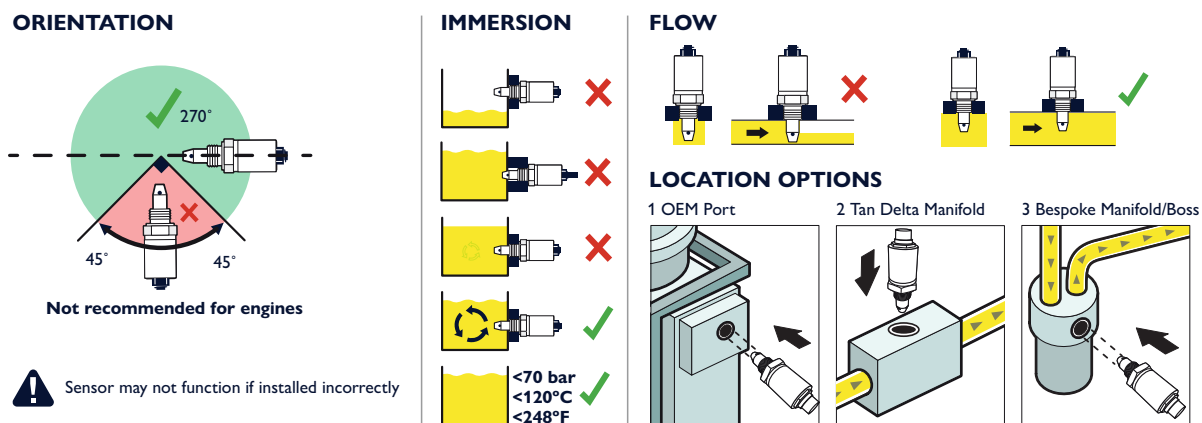


Fig. 4-2 Choosing a mounting location for the Sensor

Follow these guidelines.

- The Sensor must, if possible, be mounted in a horizontal position.
- Whenever possible, the sensor **should not** be mounted in the bottom of a sump, as the sensor head may become restricted which will prevent correct operation.
- Dynamic oil flow is necessary: do not mount in places where the oil is likely to stagnate or be static; The oil in the sensor needs to be representative of the whole system.
- The sensor nose must remain immersed in the oil at all times.
- When the oil quality sensor is mounted in a pipeline, make sure that the sensor will not restrict flow.
- For maximum performance when mounting the oil quality sensor in a lubrication system, make sure that the sensor is located prior to the oil filters, oil coolers etc. This ensures that the oil is representative of the whole system.

→ 4.3 Fitting Method

- Use a 32 mm Torque-adjustable spanner for installation.
- Decide on an appropriate location for the sensor head installation.
- Drain the lubricant sufficiently to allow the sensor to be fitted.
- Install the sensor head into the selected location/position. Torque to 20 Nm, being careful not to over-tighten.
- Route the cable, fixing it with cable ties at appropriate intervals.
- Avoid sharp edges and hot surfaces.
- Connect the sensor to the chosen interface.

→ 4.4 Electrical Connection

4.4.1 Power Supply

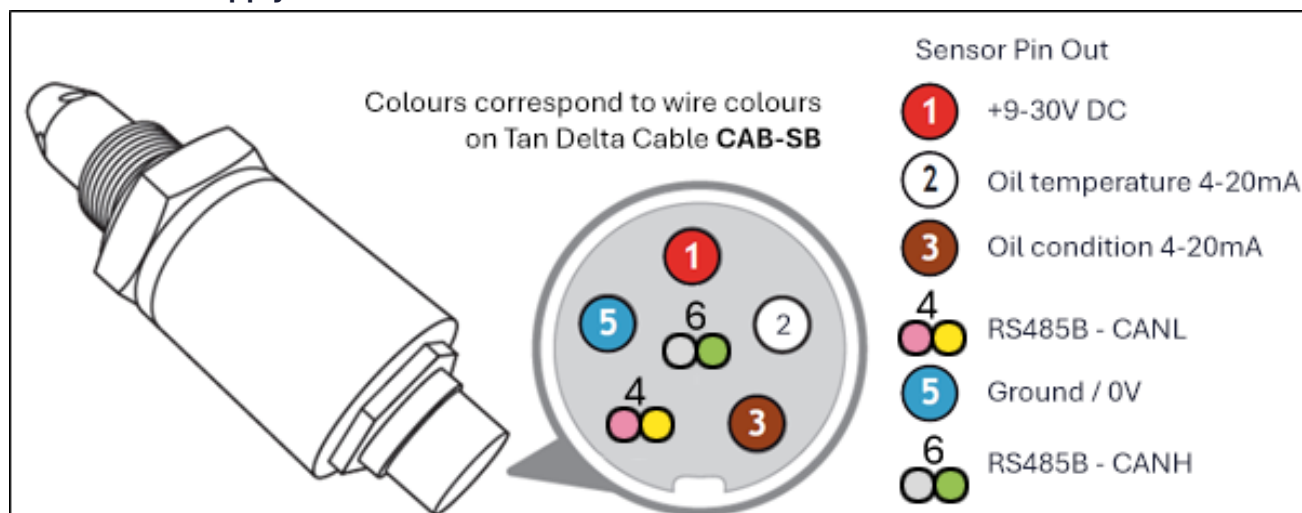


Fig. 4-3 OQSx-G2 cable connector pin out & Tan Delta cable schedule

4.4.2 Connecting the sensor to your system

If the sensor is not used as part of either a SENSE2 or SENSE3 kit, we recommend using a Tan Delta Sensor to Bare Ends cable (**Cable SB** – various lengths available). Refer to Fig. 4-3 for the bare end wire connection details.

Align and slot in the 6-pin connector and then tighten the connector screw-cap.



NOTE:

To prevent possible damage, it is recommended that any unused cable ends are insulated.

4.4.3 Data Output

You can use the output from Pins 2 and 3 to provide an analog indication of the oil temperature and condition on other, third party, data acquisition and control systems.

Oil condition is output on Pin 3 and is linearly scaled from 4 mA to 20 mA.

This can easily be converted to the TDN using the table in Appendix .

A clean oil should provide an output of about 8 mA.

For some common applications, illustrative the warning and alarm values are shown in Fig. 4-4.

Any value below 4 mA or above 20 mA indicates a fault.

	Engine (e.g. Diesel)	Gas Engine	Hydraulic	Compressor	Transmission
High Alarm	5.6 mA (1140 TDN)	5.6 mA (1140 TDN)	6.4 mA (1060 TDN)	7.7 mA (1050 TDN)	6 mA (1100 TDN)
High Warning	6.4 mA (1160 TDN)	6.4 mA (1160 TDN)	7 mA (1000 TDN)	7 mA (1000 TDN)	7 mA (1000 TDN)
Condition OK					
Low Warning	13 mA (400 TDN)	9.4 mA (760 TDN)	9.4 mA (760 TDN)	10.5 mA (650 TDN)	10 mA (700 TDN)
Low Alarm	14 mA (300 TDN)	10.4 mA (660 TDN)	10.4 mA (660 TDN)	11 mA (600 TDN)	12 mA (500 TDN)

Fig. 4-4 Generic Warnings / Alarms (Inc 4 - 20 mA)

4.4.4 Using the Oil Temperature analog output

The analog output on pin 2 provides a linearly scaled measure of Oil Temperature in °C as follows:

- 4 mA = -30 °C
- 20 mA = +130 °C

Refer to Appendix 2.

5 SENSOR CLEANING & MAINTENANCE



CAUTION:

For accurate results during testing, it is vitally important to do any test using a clean sensor.
Any oil residue from a previous test **MUST** be removed.

To clean the sensor:

- 1) Clean any excess oil from the end of the sensor with absorbent paper.
- 2) Remove the remaining oil by spraying Loctite 7063 cleaner into each of the four holes at the end of the sensor, and all over the outside of the tip.
- 3) Give a general exterior wash on both sides as shown in Fig. 5-1.
- 4) Give a longer blast into the centre hole (2 seconds).
- 5) Give the sensor a sharp shake to dislodge any solvent remaining around the electrode.
- 6) Leave to dry for at least 1 minute.



Fig. 5-1 Cleaning the Sensor



*Loctite 7063 Solvent Cleaner Recommended

Other low residue cleaners may also be suitable, please refer to your distributor for more information. See Section 5.1.



NOTE:

The sensor does not require cleaning once it has been installed, unless the application is relatively high in particulate contamination.



5.1 Cleaning Procedure – Using Odourless Kerosene

- 1) Unplug and remove the sensor then use absorbent paper to wipe off the excess oil from the sensor tip and thread.
- 2) Attach a bottle adaptor to a sample bottle and pour in approximately 15ml of kerosene.
- 3) Screw in the sensor and shake vigorously for 2 minutes to ensure the kerosene washes up around the tip of the sensor.
- 4) Remove the sensor from the adaptor and shake rigorously over the absorbent paper to dislodge any excess kerosene.
- 5) Leave to dry for a few minutes.

6 OQS / OQL SENSOR - SUPPORT

Issue	Possible cause	Checks	What to do if the check fails...
No Output from the sensor Analog Outputs	Power Issue?	Make sure that the power supply is 9-30V DC	Make sure sensor earth connection is properly made.
			Contact Tan Delta Support
No Output from the sensor Digital Outputs	Power Issue?	Make sure that the power supply is 9-30V DC	Make sure sensor earth connection is properly made.
			Contact Tan Delta Support
	Communication issue	Check communication with TD Config using Configuration Cable (CAB-J)	Connect in the correct order: TD Config looking for sensor > Connect CAB-J (ID COM port) > Connect Sensor
			Contact Tan Delta Support
	Cable Issue	Check cable connections are correct	Check the cable for damage
			Disconnect the sensor and receiving device / system, check the cable for continuity
			Check the cable for shorts across wire cores
			Contact Tan Delta Support
Sensor analog output implausible	Connection / integration issue	Is the receiving device / system current sensing?	Install a resistor in parallel to the receiver device (not to exceed 250 R)
Sensor output implausible	Oil condition high (above 1200 TDN)	Sensor nose is in air	Immerse sensor nose in oil continually
			Check that the correct oil profile is being used
	Oil Condition extremely high (above 1500 TDN)	Contact Tan Delta Support	
	Oil Condition low (Below 300 TDN)	Oil likely to be very worn or contaminated	Change Oil
	Oil condition extremely low (Below 0 TDN)	Oil likely to be highly contaminated	Change Oil
	Oil condition extremely low (Below -1000 TDN)	Has sensor got an oil profile loaded?	Configure sensor with an oil profile
			Sensor possibly in water or contaminated with metallic particles. Clean sensor and investigate source of contamination
			Contact Tan Delta Support
Sensor output unstable (Noisy or unreadable)	Incorrect oil profile being used	Check oil profile is correct	Contact Tan Delta Support
	Air / cavitation	Install sensor where it will be continually immersed in oil with no air bubbles	Contact Tan Delta Support
	Heavy contamination	Replace Oil & investigate the source of the contamination	Contact Tan Delta Support

7 SOFTWARE USER AGREEMENT

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Please read carefully before using the Software.

Your use of this computer program is subject to the terms and conditions of the following Software User Agreement. If you do not wish to accept these terms and conditions, do not install or use this Software and please return this Software to the place you obtained it for refund.

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8 APPENDIX 1

 Oil Condition Conversion Chart

The table below gives illustrative and guideline figures only.

For further advice on setting your alarms, contact our support team

www.tandeltasystems.com/support/

Number Format

TDN = Always 4 digits

Conversion

4 - 20 mA to TDN = (mA - 17) * -100

4 - 20 mA	TDN	Alarm Setting
<4		
4 mA	1200	High Alarm
5 mA	1200	
6 mA	1100	High Warning
7 mA	1000	
8 mA	0900	
9 mA	0800	
10 mA	0700	
11 mA	0600	
12 mA	0500	
13 mA	0400	Low Warning
14 mA	0200	Low Alarm
15 mA	0200	
16 mA	0100	
17 mA	0000	
18 mA	0000	
19 mA	0000	
20 mA	0000	

9 APPENDIX 2

→ Oil Temperature Analog Output

The table below shows how the Oil Temperature output (4 - 20 mA) converts to temperature.

The conversion from mA to °C and °F is as follows:

Output	Pin	Calculation	Unit	Low	High
Oil Temperature	2	$^{\circ}\text{C} = (\text{mA} * 10) - 70$	$^{\circ}\text{C}$	4 mA = - 30 $^{\circ}\text{C}$	20 mA = 130 $^{\circ}\text{C}$
		$^{\circ}\text{F} = (\text{mA} * 18) - 94$	$^{\circ}\text{F}$	4 mA = -22 $^{\circ}\text{F}$	20 mA = 266 $^{\circ}\text{F}$

OQSxG2 Output 4-20 mA value	Temperature Conversion	
	$^{\circ}\text{C}$	$^{\circ}\text{F}$
20	130	266
19.5	125	257
19	120	248
18.5	115	239
18	110	230
17.5	105	221
17	100	212
16.5	95	203
16	90	194
15.5	85	185
15	80	176
14.5	75	167
14	70	158
13.5	65	149
13	60	140
12.5	55	131
12	50	122
11.5	45	113
11	40	104
10.5	35	95
10	30	86
9.5	25	77
9	20	68
8.5	15	59
8	10	50
7.5	5	41
7	0	32
6.5	-5	23
6	-10	14
5.5	-15	5
5	-20	-4
4.5	-25	-13
4	-30	-22
<4	Fault	

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