TAN DELTA

OPERATING AND MAINTAINANCE MANUAL

Contents

TECHNICAL SPECIFICATION

Analogue Output	4-20 mA
Communications	CAN, RS232 & RS485
Connections	Standard 1/2" BSP male thread (alternate thread size available as request)
Detection	Oil condition (0-100 oil quality units)
Fluid Compatibility	Mineral & synthetics oils (or any lubricating oil)
Fluid Temperature	-10 to 110 C (-14 to 230 F)
Inputs	Calibration by push button or contact closure
Max Fluid Pressure	10 Bar (145) PSI
Options	Various cable lengths can be accommodated with mating connector. Alternative connection options and standalone display unit available by request
Power Supply	9-30 VDC
Protection	IP67
Range	0-100 Oil Q unit
Repeatability	3%
Weight	160g
Output connection	Industry standard 6 pin connector

Safety notes

Please pay attention to following safety notes:

- Sensor should not be used near combustible gases or liquid
- Never reassemble, repair or tamper with the sensor
- Ensure that the supply voltage is within the specified range
- Ensure the load currents do not exceed the rated value
- Check all the wiring for correct connection before powering the unit
- Ensure the sensor case is earthed

Overview

The reliability and longevity of an engine is crucially dependent upon the quality of its lubricating oil. The TanDelta oil condition sensor, allows real time reporting of the condition of the oil in a piece of machinery. The sensor utilises internal micro processing to indicate the condition of oil, including the contamination levels, relative to the initial condition of new oil.

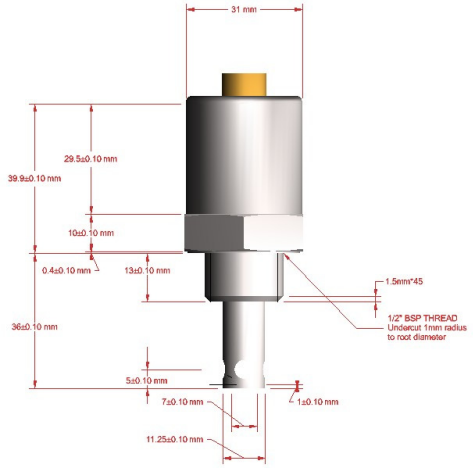
Based on the sensor output, the oil drain down intervals may be extended on large industrial gearbox's, engines, compressors etc where the cost of replacing and monitoring the oil is expensive. The sensor triggers an investigation into the quality of the oil, preventing the need for expensive routine maintenance.

Tan-Delta Oil Condition Sensor can reduce the overall operating cost of machinery through the removal of routine inspections, waste oil disposal and subsequent renewal.

Detection

The TanDelta parameter can measure the degradation of oil due to oxidisation, viscosity breakdown, presence of excessive soot, water ingress, glycol, metallic particles or generation of any polar molecules of various sources such as electrical breakdown.

Sensor Head Dimensions



Sensor Head Installation

Precautions

Please read these instruction before installing the oil condition sensor. The sensor has been designed as robust as possible, however it is liable to damage through mistreatment. The following must be noted:

- Install the sensor head before attempting electrical/wiring connections.
- Do not attemp to screw or tighten the sensor using the body. Always use the “Hex” head with the correct size spanner.
- 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, minimum bend radius = 50mm (2 inches).

Choosing Sensor Mounting Location

The performance of the sensor will be enhanced through careful consideration of the mounting location. The following guidlines should be followed:

- The sensor should not be mounted in the bottom of a sump since the sensor head may become restricted preventing correct operation.
- Dynamic oil flow is necessary; do not mount in places where the oil is likely to stagnate or be static, since the oil in the sensor needs to be representative of the whole system.
- When the oil condition sensor is mounted in a pipeline, please ensure that the sensor will not restrict flow
- When mounting the oil condition sensor sensor in a lubrication system, for maximum performance, please ensure the sensor is located prior to the oil filters, oil coolers etc to ensure oil is representative of the whole system.

Mechanical Installation

The standard thread is ½ inch BSP. Please take a note of following guidlines:

- To avoid thread damage do not use with taper fittings
- Tighten with a adjusted size spanner and do not over tighten.

Cable

Do not twist the cable relative to the sensor heah as irreparable damage mey result. Do not excessively bend or fold the cable (the minimum bend radius is 50mm (2 inches).

Routing of cable

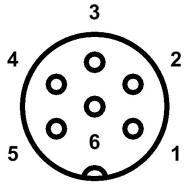
- Keep the cable away from sharp edges which may cut into the cable.
- Do not fold the cable, minimum bend raduius = 50mm (2inches).
- Where possible, keep the cable away from sources of heat, (such as an engine block), and electrical interfaces.

Fitting Method - Summary

1. Decide on an appropriate location for sensor head installation.
2. The system to be fitted with the sensor will have the lubricant drained sufficiently for fitment.
3. Install the sensor head into the selected location/postion, being careful not to over tighten.
4. Route the cable, fixing(cable ties) at appropriate intervals. Avoid sharp edges and hot surfaces.
5. Connect the sensor to the chosen interface: 4-20 mA, computer/PLC, CAN or optional display.
6. For the display box, securely locate the IP64 rated display box in a dry and dust free envireoment- such as a control room. The display will perform best at stable temperature. Connect the cable and lock the connector nut.
7. Connect power to the sensor. Use the supplied power lead when using the optional display box. Ensure the sensor

Sensor Interface

The Tan Delta sensor is designed to be easy to use in a variety of configurations depending on the monitoring equipment to which you would like to interface. It uses a simple four wire connection to connect to its power supply, switch/calibrate input and 4-20mA current sink output, with an additional two wires if you would like to use an RS232 or RS485 (optional) interface to connect to a PC or laptop. The connections and recommended wire colours are as follows:



Seen from rear of sensor

Pin 1 - Yellow (4-20m current sink output)
Pin 2 - White (switch/calibrate output)
Pin 3 - Red (+10 to +30V dc power supply)
Pin 4 - Black (0V and power supply common)
Pin 5 - Blue (RS232 RXD)
Pin 6 – Green (RS232 TXD)

Power Supply

Power up the sensor using a suitable DC supply of between 10 and 30V d.c., ensuring the correct polarity on pins 3 and 4.

4-20 mA

The sensor's 4-20mA output is linearly scaled to output between -25% (4mA) and +100% (20mA) oil condition over its range, or similarly between -25C and +100C if outputting temperature. This means that zero oil

condition or temperature is represented by 7.2mA current flow.

Oil Temperature

The default output is oil condition, but oil temperature can be selected by taking the switch/calibrate input high (between +5V and +30Vdc) and holding it high. This can be tested by connecting the (white) wire from pin 2 to the +ve supply. The output will revert to oil condition when the input is allowed to return to a low level.

Calibrating Sensor

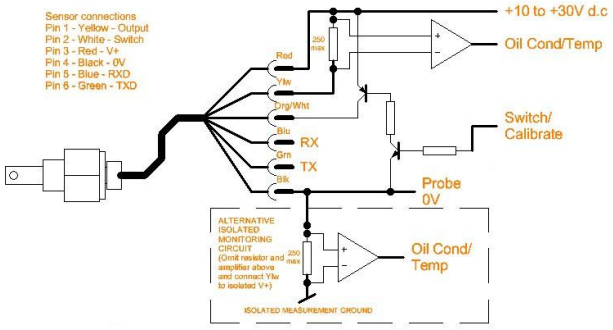
The sensor is supplied ready calibrated and zeroed on a sample of typical lubricating oil which may differ from the oil you are using, unless you have pre-arranged for us to use your specific oil type and have supplied us with a sample. If not, for the best accuracy you should zero the sensor on a clean sample of oil before use. If you know that the oil in the application for which you are going to use the sensor is new, clean oil, this can be done in situ; otherwise the sensor should be immersed in a clean container of new oil and tilted to expel any air bubbles which may collect in the sensing gap, and then zeroed using the following procedure. Ideally this should be done while the sensor is fully connected to your measuring circuit. Follow the below steps:

1) Use the switching device (e.g. relay) in your monitoring circuit to pulse the voltage on the (white) wire from pin 2 as described below. If the sensor is not yet connected to the monitoring circuit, connect a pushbutton switch between the +ve power supply and the switch/calibrate input, or if this is not possible, the sensor can be zeroed by touching the (white) wire from pin 2 to the +ve supply repeatedly; in this case, make sure that the wire is placed firmly on the +ve and held there for the relevant periods, then removed

cleanly without multiple connections and disconnections.

2) Note down the current flowing into the sensor using your monitoring circuit, or connect a suitable current meter (e.g. a DMM on 20mA current range) between the +ve supply (+) and the 4-20mA current sink output – the (yellow) wire coming from pin 1. (This is not essential but helps you to track the zeroing process.)

3) Pulse the switch/calibrate input high for between 1 and 2 seconds, then low for the same period, then high, then low, then high, then low to make three full high-low cycles with each level lasting between 1 and 2 seconds. This can be done using your monitoring circuit, the pushbutton or by touching the white wire to the +ve supply. You should see the current on the meter or monitoring circuit drop to 0mA, and then increase in 1mA steps to 6mA as you go through the cycles, and then settle at or near the zero oil condition value of 7.2mA.



Output Range

The oil condition output represents a measure of the lubricating ability of the oil, with 0% (or slightly negative) representing new, clean oil, and the percentage increasing as the oil deteriorates. We would recommend that an acceptable oil quality is taken as being between 0% (7.2mA) and 30% (11mA), after which the oil should be condemned. A useful warning level is normally set at 25% (10.4mA), above which an oil sample should be taken and analysed and the condition monitored carefully for any further increase.