Aircraft Extras Inc.

4908 McKenna Ct., Columbus, Ohio, 43221 USA
(614) 876-6345
www.aircraftextras.com sales@aircraftextras.com

Oil Quantity Sensor for Aircraft Engines
Manual Oil Quantity Sensor 8-27-2024.doc
Electronics Enclosure Model: OSE-1
(See sensor documentation for all sensor model numbers)

INSTALLATION and OPERATION MANUAL
Rev - 8/27/2024

THANK YOU! . . . for purchasing our Oil Quantity Sensor from Aircraft Extras, Inc. Please review **ALL** instructions thoroughly before you install and program this product.

SUMMARY DESCRIPTION

This oil quantity sensor with its associated electronics package will give the pilot a real time oil quantity while in flight or on the ground. ***This system is not meant to replace any other traditional methods of checking oil quantity.*** It is a new device that the pilot of a small aircraft can use in flight that he or she never had before. It will also measure oil temperature if that option was selected at purchase. The electronics enclosure features two analog outputs, one for oil quantity and the other for oil temperature. It also features four digital output alarms (open collector type) for sensor out of calibration, oil level warning, oil level caution, and over oil temperature. You may program the alarm trigger values for those outputs and choose a scale for both analog outputs.

Presently, we have three types of oil sensors available. These are based upon the type of oil pan fitting. (See the sensor specifications for available fitting types.) Presently, one sensor will fit a standard Lycoming engine oil pan, another will fit the standard Continental engines, and the other will fit the ULPower type engines. These three sensor fitting types will fit quite a number of engines, oil pans, oil sumps and oil containers. The sensor's length must be determined by the customer at the time of purchase. See the specifications at the end of this manual to see if one of these fittings will fit your aircraft. Sensors with other fitting types may already be in our design schedule. Inquire by phone or email us.

INSTALLATION

INSTALLING the OIL QUANTITY SENSOR
Please refer to our latest drawing "Oil Quantity Sensor Care and Cable Routing". The oil quantity sensor should be inserted into an existing threaded fitting in the your engine's oil pan. It can also be mounted in any other oil container, as long as the fitting threads are the same type. Refer to the list of fitting or thread types that are presently available. The sensor will not work if mounted close to horizontal. It can be oriented at a small angle from vertical. We suggest a maximum of 50° from vertical, from a top or bottom mounting. Always, use safety wire to lock the sensor fitting after torquing. The customer or installer will determine if the sensor will hit any obstruction within the oil pan.

INSTALLING the OIL QUANTITY SENSOR (from the TOP)
You may install the sensor from the top of your oil pan or oil container. Please be aware of two situations. First, the temperature sensor is mounted in the base of the sensor. This being the case, it will not give you an accurate oil temperature because it will not be immersed in the oil unless the oil is full. Second, also be aware that when you calibrate the sensor by adding your quarts of oil, the sensor may not sense your lowest oil level. This is because your sensor tip may not extend to the oil level when you add your first quart. For the sensor to be accurately calibrated, when you add your first quart of oil, the oil level must be between the sensor base and the sensor tip. If it is not, you might choose adding two quarts as your increment instead of a one quart increment. This may allow the oil level to be in-between the sensor base and the sensor tip. It is up to the installer to determine where your lowest oil level is for your installation.

MOUNTING the ELECTRONICS ENCLOSURE
We recommend that the associated electronics enclosure be installed between 4 and 6Ft, depending upon the sensor's cable length. We recommend purchasing a sensor with the shortest distance cables, that will allow the electronics unit to be installed out of the hot engine compartment. Presently, our electronics enclosure is not hermetically sealed.   The electronics will work best inside the cockpit rather than in the engine compartment. This is due to the more harsh environment of the engine compartment due to excessive vibration, high temperatures, and oil and gas contaminants. You "may" mount it in the engine compartment if, it can be mounted in an area that experiences a lower heat characteristic, minimum vibration, and as long as it is away from fuel and oil contamination.

SENSOR INTERCONNECTING CABLES
We provide one or two cables for each sensor. One is unmarked and is the oil quantity cable. The other cable, marked with a (RED BAND), is for the oil temperature if you selected that option at purchase. Make sure the cables are connected to the proper SMA connectors on the electronics.   If they are connected backwards, it will not damage anything. It just will not function properly.

You should not alter the length of the cables. This will change the oil sensor's calibration and accuracy. If you have extra cable length after installing the system, the cables slack can be taken up by making 3 to 4 inch diameter loops in the cables, then tie-wrapping them to the aircraft chassis. Do not route the sensor cables near the exhaust pipes (allow 6" or more) or any other high temperature structures. If you have to route them in these areas, we suggest that they be protected by a heat shield. Details of this shielding is not covered in this manual.

ELECTRONICS WIRING
Review the wiring diagram included, along with the "Standard Aircraft Wiring Practices Guides". Ref: FAA, AC 25-26. There are many others out there. All wires are low amperage wires and can be #20AWG to #24AWG. Fusing of the power in can be done with a 1/4 Amp fuse.

DSUB CONNECTOR REAR
(SOLDER SIDE VIEW)

```
1                    8
 ○  ○  ○  ○  ○  ○  ○  ○
   ○  ○  ○  ○  ○  ○  ○
 9                  15
```
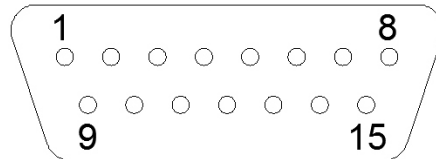
1 COMMON   9 OIL LEVEL ANALOG OUT
2 LED RED EXTERNAL   10 TEMP ANALOG OUT
3 LED GRN EXTERNAL   11 SENSOR OUT OF CALIBRATION ALARM
4 OIL LEVEL WARNING ALARM   12 DO NOT CONNECT !
5 OIL LEVEL CAUTION ALARM   13 OIL OVER TEMPERATURE ALARM
6 PB SWITCH EXTERNAL   14 DO NOT CONNECT !
7 DO NOT CONNECT !   15 DO NOT CONNECT !
8 (+9 to 30V) POWER IN

     (DO NOT CONNECT !) Damage to unit may occur!

CAUTION !!
To <u>avoid electrical interference</u>, avoid routing wiring for the oil quantity sensor electronics in the vicinity of your radio transmitter antenna cabling or the strobe light systems. This also includes devices such as the transponder, ADS-B or other types of RF transmitters, or devices that put transients on the +12V or 24V power bus.

DETAILED OVERVIEW

ALARMS
    There are four digital alarm outputs. Each alarm output is in the form of an open collector transistor. These outputs can be connected to a number of different devices, or not used at all. You might want to rely on your EFIS or other systems to give you alerts for these alarms by using our analog outputs only. The open collector outputs were mainly provided for installations without aircraft EFIS type of displays. Your choice.

      Pin 5) Low Oil Level Caution Alarm (should be the higher oil level alarm)
      Pin 4) Low Oil Level Warning Alarm (should be the lowest oil level alarm)
      Pin 13) Over Oil Temperature Alarm
      Pin 11) Sensor Out of Calibration Alarm (For example, this could to indicate a shorted sensor cable, out of programmed calibration range or sensor not connected)

OPEN COLLECTOR ALARM OUTPUTS

The alarm outputs are open collector type, which pull our electronics alarm pins down to common. If you are driving an LED, you will have to connect the LED anode to +V. Then connect a series resistor from the LED cathode to our alarm pin. This resistor should limit the current to 100mA or less.

If you are driving an EFIS display or similar, refer to your device's manual as how to handle an open collector output as an input to your device. In some cases, you may need to connect a pull up resistor from our alarm output pin to +V. If your device only accepts a voltage input, we suggest connecting a 5000 Ohm, 1/2W resistor from your +V bus voltage to one side of this resistor. Tie the other side of this resistor to our open collector alarm output and your device's voltage input.

LED INDICATOR

An LED is mounted on the electronics enclosure, either on the top or on the side. It will be a RED/GREEN LED that will display a RED, GRN or YEL color. This LED will mainly be used for programming. Otherwise, it will let you know the electronics package is functioning normally in mode 1, by flashing GRN approximately once every 4Sec.

LED BLINKING (in MODE 1)

> **NORMAL BLINKING -** Blinks once GRN, then pauses for about 3 Sec., then continuously repeats this. This is a normal operation indication meaning that the oil level sensor is working properly and it it has been programmed.

> **OUT OF CALIBRATION BLINKING -** Alternately Blinking RED/GRN in equal time periods. This means that the the electronics package is sensing that the sensor is monitoring an oil level that is outside the normal programmed range. The sensor wires may even be shorted.

> **MALFUNCTION BLINKING -** Blinking RED/GRN at intermittent or irregular time periods. This means that the the electronics package is sensing that the sensor has been disconnected or wires to it have been cut. It could be that the sensor is not properly connected to the electronics.

EXTERNAL (LED and PUSH BUTTON SWITCH)

Initially, you will have to program this system to your aircraft. Also note: If you change oil types, you may also have to reprogram the system for better oil quantity accuracy. If the electronics enclosure is mounted in an area not easily accessible in your aircraft, we have designed it so that you can connect an external LED and push button switch to program the unit. For this purpose, we brought out 3 pins on the DSUB connector to aid in this situation. These pins are for the connection of a remote 2-color LED (RED, GRN) and push button switch. These pins parallel the LED and push button switch mounted on the electronics enclosure. Below is a diagram for wiring these remote devices.

DIAGRAM, EXTERNAL (LED and PUSH BUTTON SWITCH)

+V

COMMON
ANODE
LED

RED   GRN

RESISTORS
Use 680 Ohms, $\frac{1}{2}$Watt for +12V bus
Use 1400 Ohms, 1Watt for a 24V bus
or a value close to these.

DSUB CONNECTOR REAR
(SOLDER SIDE VIEW)

1   8

COMMON

9   15

SWITCH (NORMALY OPEN)

PROGRAMMING DETAILS

PROGRAMMING (PUSH BUTTON COMMANDS)
In order to maximize the command capability of a "one button" device, the electronics package uses a push button and button command inputs similar to Morse code. One command may be just one press of the button, or it could be two consecutive presses, or even three consecutive presses consisting of a combination of a press time duration as described below.

    A short press is equivalent to a press shorter than 0.8 seconds. ▪
    A long press is equivalent a press longer than 1.0 second. ▬
    A long press longer than 5.0 seconds. ▬▬▬
    NOTE: A pause in-between two consecutive presses should be very brief. (<0.5Sec.)

A combination of these three types of presses will define one command. For example:
▪ or ▬ or ▬ ▬ or ▪ ▪ or ▪ ▬ or ▬▬▬ and etc.
The pauses in between presses need to be very brief.

PROGRAMMING MODES OVERVIEW
After installation, you will need to program the oil quantity sensor and electronics before it will give you useful information for your aircraft. See the details below.

MODES of OPERATION
There are several modes of operation.   Modes 2 thru 5 are programming modes.

Mode   Description
Normal Operating Mode
      1   Normal Operation - This is the mode at start-up. (if the push button is NOT pressed)
Programming Modes
      2   Programming of the oil levels for analog output linearization, (2 to 20 points)
        In this mode, you may also program the oil level alarms. (Trigger values for the Caution
        and/or Warning oil levels) (the Warning level being the lowest oil level alarm)
      3   Selects the alarm trigger value of the over temperature alarm (range 155°F to 295°F)
      4   Selects the output scaling of the oil level (0 to 5V), (0.25V to 4.75V) or (0.5V to 4.5V)
      5   Selects the output scaling of the oil temperature reading.
        (0 to 5V Out = -50 to 300°F), (0 to 5V Out = -33 to 300°F) or (0 to 5V Out = 0 to 300°F)

ENTERING and SELECTING a PROGRAMMING MODE
  1.) Make sure that the oil quantity sensor electronics package is off. While holding the programming
      button in, power up the unit. Release the button.
      You are now in a mode that you can **SELECT a PROGAMMING MODE**.
      This will be indicated by the LED flashing YEL.

  2.) By pressing the button, (with one short press at a time) you can now toggle thru the operating modes
      1 to 5. Press the button one press at a time until you select the correct number of repeated YEL LED
      pulses for the mode you want to enter. The LED will continue to flash YEL.

  3.) NOTE: You are not in your selected mode yet.
      To then enter your selected mode, simply turn off the unit for 5 Sec., then turn the unit back on.
      You are now in the mode you selected.

NOTE:
If you select Operating Mode 1, and you did not yet program the oil levels in using Operating Mode 2, the
unit will not start up in the Normal Operating Mode 1. It will automatically start up in Operating Mode 2, to
force you to program the oil levels.

EXITING a PROGRAMMING MODE
Simply turn the unit off.
      It will return to Mode 1, if the oil levels have been programmed previously and successfully.
      It will return to Mode 2, if the oil levels have not yet been programmed.

PROGRAMMING an OIL LEVEL CAUTION and/or WARNING ALARM (in Mode 2)
Again, programming the oil level alarm trigger values is optional as stated above. If you decide to program
them, you MUST program these alarm values when you are in the process of adding your quarts of oil in
Mode 2, (Step 10) in the procedure called "PROGRAMMING the OIL QUANTITY LINEARITY" below.
You should do this as you are adding oil to linearize your oil level output.

There are two open collector transistor outputs provided for oil level alarms. They are pulled down to
common when your oil level goes below your alarm trigger value. One output is for a Caution oil level. The
other level is a Warning oil level (the lowest oil level alarm). You do not have to program both of these
alarm trigger values. You can only program one of them if you desire. You also have a choice of not
programming or using these oil level alarms at all during this process as stated above.

If you do program both oil level alarms, you should program the Warning oil level first being that it should be the lowest oil level. The Caution oil level should be programmed later as you raise the oil levels during programming, as it should be a higher oil level.

> **NOTE:** When entering Mode 2 for programming the oil level points, all previously programmed alarms will be automatically erased.
> **NOTE:** Before you program any of these alarm levels, you must make sure that that your engine manufacturer approves that your engine can operate safely in the air at those oil levels.

BUTTON PRESSES for PROGRAMMING the Oil Level Alarm Trigger Levels.

WARNING oil level alarm

1 button press (> 1.0Sec) will store this oil level alarm trigger value. The LED will blink RED slower, (6 times in 2.4 Sec.) to acknowledge that you succeeded, then return to Mode 2 blinking.

CAUTION oil level alarm

2 consecutive button presses (> 1.0Sec) will store this oil level alarm trigger value. The LED will blink YEL slower, (6 times in 2.4 Sec.) to acknowledge that you succeeded, then return to Mode 2 blinking.

PROGRAMMING the OIL QUANTITY LINEARITY (in MODE 2)

The analog output for the oil quantity sensor is not always linear until programmed by the customer after installation. The sensor analog output will need to be linear if it is to be displayed on a linear gauge, or an EFIS system. This is the reason the electronics package is designed to be user programmable. Oil pans or oil sumps are all different shapes. Each quart of oil added does not raise the oil level the same amount. Also, the oil sensor output is not linear. The oil quantity sensor output will be linearized with each increment or oil quantity added to the oil pan during calibration. The user will be able to linearize the output for each quantity (Example: Quarts) of oil added to an empty oil sump. This will be accomplished by emptying all of the oil from the oil pan, then adding one quart of oil (or user quantity) at a time while running this linearization programming routine as described in Mode 2. You can program from 2 to 20 oil levels).

FIRST TIME SENSOR INSTALLATIONS

If you are installing the sensor for the first time, it has never had oil in it. Accomplish the following after installation. In order to obtain the best accuracy during oil level programming, you will need to simulate an oil change to get the sensor wet before you program it for the first time.

We suggest putting the aircraft in a normal flight attitude or angle. Plug up the oil pan. Add a quart or two of oil to the engine. Next, allow time (10 Min.) to drain all of that oil out. The sensor is now wet with oil. We will call this level, a "zero oil level". Plug up the oil pan again, then proceed to program the oil levels as you add oil in Mode 2.

MODE 2 LED BLINKING

To program in Mode 2, you will need to understand the LED blinking. When entering Mode 2, the unit will blink twice and pause. This will repeat. The color of the light will indicate the stability of the oil level reading. Stability may take a few minutes each time you add oil quantity.

If the oil level is stable, it will blink twice GRN, pause, then repeat.
If the oil level is rising, it will blink twice RED, pause, then repeat.
If the oil level is falling, it will blink twice YEL, pause, then repeat.

This gives you an indication of the stability of your oil level when you are adding your quarts of oil for linearization. It takes time before the sensor oil level is stable after adding a quart to your sump. When Programming in Mode 2, you **SHOULD NEVER** press the push button in Mode 2 unless the LED is flashing GRN twice. We even suggest a time period of 1 minute after the LED has returned to GRN. This indicates the best oil level stability. You do not want to press the program button if your quart is still slowly rising or falling in your oil sump. Please note, if you are programming in Mode 2 when it is cold, the oil level may take longer to settle.

STEPS to PROGRAM MODE 2
      The user/installer can easily program this oil quantity linearization when changing engine oil. This is only need to be accomplished once unless you change your oil type. Follows these steps:

1   Put your plane in either a "level flight attitude" or a normal attitude that the aircraft is in when you normally check oil. It is your choice. We recommend a "level flight attitude".
2   Empty all oil from the oil pan via the drain plug. Wait 10 Min. to drain.
3   Close or plug all of the oil pan's drain holes.
4   Start with the electronics powered down. Follow the instructions under "ENTERING and SELECTING a PROGRAMMING MODE" to enter (Mode 2).
      This will be indicated by the LED blinking twice, pause, then repeating.
      The LED should initially be RED, but should turn GRN before you can program your empty oil level. NOTE: All previous programming of the oil level points and the oil level alarms will be erased upon entering Mode 2.
5   Wait for the unit to stabilize. This will be indicated by the LED flashing twice, and turning GRN.
6   Press the programming button once to store the "No Oil" or first point. The unit will respond by the LED flashing fast YEL, then returning to a double blink.
7   Add one quart of oil to the oil pan.
8 Wait for the oil to settle and the sensor output to be stable. We suggest waiting 1 minute after LED flashes GRN)
9   Press the programming button once (< 0.8Sec) to store the first oil level point.
      The unit should respond by flashing YEL very fast.

10 *NOTE: If you want to program an (Oil Level "Caution" lowest oil warning) or ("Warning" higher oil level) alarms, you will need to do it here, and/or before you program your last quart. Press the button (> 1.0Sec.) for the Warning Level or two consecutive presses (> 1.0 Sec.) for the Caution Level. The LED will respond by flashing (RED, Warning) or (YEL Caution). For details, see:*
      "PROGRAMMING an OIL LEVEL CAUTION and/or WARNING ALARM"

11 Add another quart of oil to the oil pan.
12 Wait for the oil to settle and the sensor output to be stable. We suggest waiting 1 minute after LED flashes GRN)
13 Press the programming button once (< 0.8Sec) to store the next oil level point.
      The unit should respond by flashing YEL very fast.
14 Was this your last quart or quantity of oil?
      YES, go to Step 15.   NO, go to Step 10.
15 Turn power off. When powered up again, the unit should be in (Mode 1) and functioning normally with your programmed values.

CHECKING YOUR PROGRAMMING

The oil quantity output signal should be nearly linear now, depending upon the number of points that you programmed. The oil level alarms should trigger at the levels you programmed. To guarantee that you have done it correctly, drain the oil and add the quarts again to see if the output is linear, and if the alarms are triggered where you programmed them. Accomplish this in the normal operating mode, (Mode 1).

SENSOR or CONNECTION MALFUNCTION (in MODE 1)

After the successful programming in Mode 2, the electronics will now perform as follows in Mode 1. If the sensor is performing normally, the LED should slowly blink one time GRN, then pause, then continuously repeat.

If the electronics senses the oil quantity sensor, or the connection to the oil quantity sensor, has malfunctioned, two things will happen. The first thing that will happen, is an open collector output (DSUB connector pin 11) will be pulled down to common. The second thing that will happen, is the Oil Level Analog Output will go to zero, (DSUB connector pin 9). You may use this zero voltage reading as an alarm indication if you select an output scaling as (0.25V to 4.75V) or (0.5V to 4.5V). This output will also go to zero if you are using the (0 to +5V) scaling. You can use this for an alarm indication as well and program your EFIS or other device to recognize this as an alarm if you don't utilize our four digital output alarms.

ALSO, see "LED BLINKING (in MODE 1)" for further failure indications.

PROGRAMMING the Over Temperature Alarm Value (in MODE 3)

In order to program an alarm oil temperature value, please study the following table. You will be able to select a temperature value by interpreting the number of RED and GRN LED flashes while in Mode 3. This value is incremented in 5°F steps. If you just want to check what this value is, you may enter Mode 3 without pressing the programming button. After checking the LEDs, simply turn the unit off.

OIL OVER TEMPERATURE ALARM CHART (Programming in Mode 3)

ALARM TEMP °F	ALARM TEMP °C	Numb of Blinks LED RED	Numb of Blinks LED GRN	ALARM TEMP °F	ALARM TEMP °C	Numb of Blinks LED RED	Numb of Blinks LED GRN
155	68.3	0	1	230	110.0	3	1
160	71.1	0	2	235	112.8	3	2
165	73.9	0	3	240	115.6	3	3
170	76.7	0	4	245	118.3	3	4
175	79.4	1	0	250	121.1	4	0
180	82.2	1	1	255	123.9	4	1
185	85.0	1	2	260	126.7	4	2
190	87.8	1	3	265	129.4	4	3
195	90.6	1	4	270	132.2	4	4
200	93.3	2	0	275	135.0	5	0
205	96.1	2	1	280	137.8	5	1
210	98.9	2	2	285	140.6	5	2
215	101.7	2	3	290	143.3	5	3
220	104.4	2	4	295	146.1	5	4
225	107.2	3	0	NO ALARM		6	0

Programming Steps (in Mode 3)

1   Enter Mode 3 as described under "ENTERING and SELECTING a PROGRAMMING MODE".
2   Press the button < 0.8Sec once, to increment the Over Temperature value by 1.
     or Press the button > 0.8Sec once, to increment the Over Temperature value by 50.
3   Note the number of RED/GREEN flashes and refer to the table. If you have not achieved your desired value, repeat step2.
3   After you obtain the correct number of RED/GREEN flashes, turn the unit off.
4   When powered on again, it will start up in Mode 1. It will remember your selected value.

PROGRAMMING the Oil Level Output Scaling (in Mode 4)

■   A button press (< 0.8Sec) will toggle thru these settings

     1 = (No oil to full oil as programmed) = (0 to 5V)   LED will blink GRN 4 times
     2 = (No oil to full oil as programmed) = (0.25V to 4.75V)   LED will blink YEL 4 times
     3 = (No oil to full oil as programmed) = (0.5V to 4.5V)   LED will blink RED 4 times

Programming Steps (in Mode 4)

1   Enter Mode 4 as described under "ENTERING and SELECTING a PROGRAMMING MODE".
2   Press the button (< 0.8Sec) once, to select your desired scaling.
          Note the color of the LED flashes.
3   After you obtain the correct color of LED flashes, turn the unit off.
4   When powered on again, it will start up in Mode 1. It will remember your selected scaling.

PROGRAMMING the Oil Temperature Output Scaling (in Mode 5)

■   A button press (< 0.8Sec) will toggle thru these settings

     1 = (0 to 5V Out) = (-50 to 300°F)   LED will blink RED 5 times
     2 = (0 to 5V Out) = (-33 to 300°F)   LED will blink YEL 5 times
     3 = (0 to 5V Out) = (0 to 300°F)   LED will blink GRN 5 times

Programming Steps (in Mode 5)

1   Enter Mode 5 as described under "ENTERING and SELECTING a PROGRAMMING MODE".
2   Press the button (< 0.8Sec) once, to select your desired scaling.
          Note the color of the LED flashes.
3   After you obtain the correct color of LED flashes, turn the unit off.
4   When powered on again, it will start up in Mode 1. It will remember your selected scaling.

SOFTWARE and SAFETY UP-DATES
The oil quantity sensor electronics package is micro-controller based. If there are any product software enhancement up-dates, we will post these notices on our Website for each product. Please check our Website for the latest up-dates for this product. This also applies to safety alerts.

DRAWINGS / DOCUMENTS (refer to the latest revisions)
This document: "Manual Oil Quantity Sensor Rev-8-27-2024.doc"
"Oil Quantity Sensor Care and Cable Routing 8-27-2024"
"Oil Quan Sensor Continental OandM 8-27-2024.pdf"
"Oil Quan Sensor Lycoming OandM 8-27-2024.pdf"
"Oil Quan Sensor ULPower OandM 8-27-2024.pdf"
"Will the sensor fit 8-27-2024.pdf"
"Oil Quantity Sensor Preorder Form 8-27-2024.pdf"

SPECIFICATIONS

Model: OSE-1 (Electronics package)

Power in:	+9Vdc to +30Vdc, (NEGATIVE ground system only)
Current Draw	Current draw, 80mA Typical, (200mA Max.)
Connector Types	D-Sub 15 pin, Connector Wiring, #20AWG aircraft wire suggested
	SMA male connector for sensor cables

Analog Outputs   Oil Quantity (scaling is selectable)
            (Empty to Full) = (0.0 to 5.0V)
            (Empty to Full) = (0.25V to 4.75V)
            (Empty to Full) = (0.5V to 4.5V)

            Oil Temperature (scaling is selectable)
            (0.0 to 5.0V) = (0 to 300°F)
            (0.0 to 5.0V) = (-33 to 300°F)
            (0.0 to 5.0V) = (-50 to 300°F)

Alarms Outputs: Open Collector Output, (100mA, 30VDC Max.) for
            Low oil quantity Caution alarm
            Low oil quantity Warning alarm
            Over oil temperature alarm
            Oil sensor Out of Calibration Range alarm

Programmable Oil Increments: Oil quantity linearity increments (2 to 20 oil levels)
            (This includes the NO oil and FULL oil points)

Programmable Levels: Oil quantity Caution level
            Oil quantity Warning level
            High temperature Warning level

Weight
   Electronics Enclosure   3.4 oz. (97.0 grams)

Enclosure Material   ABS - Fire Retardant (not hermetically sealed)

Enclosure Dimensions   4.375" x 2.47" x 1.25" (111.12 x 62.72 x 31.8 mm)
      Mounting Centers   2 Holes, 0.188" (4.775mm) Dia, Distance apart 3.875" (98.425mm)

Sensor Models:

    Example: S(sensor height in.)_(fitting type)_(cable length in.) (Temp Sensor installed? t or nt)
          Model: S6.25_5/8-18_48.0_t   (Temperature sensor installed)
          Model: S6.25_5/8-18_48.0_nt   (No temperature sensor installed)

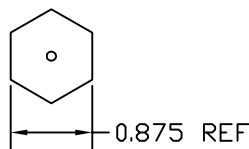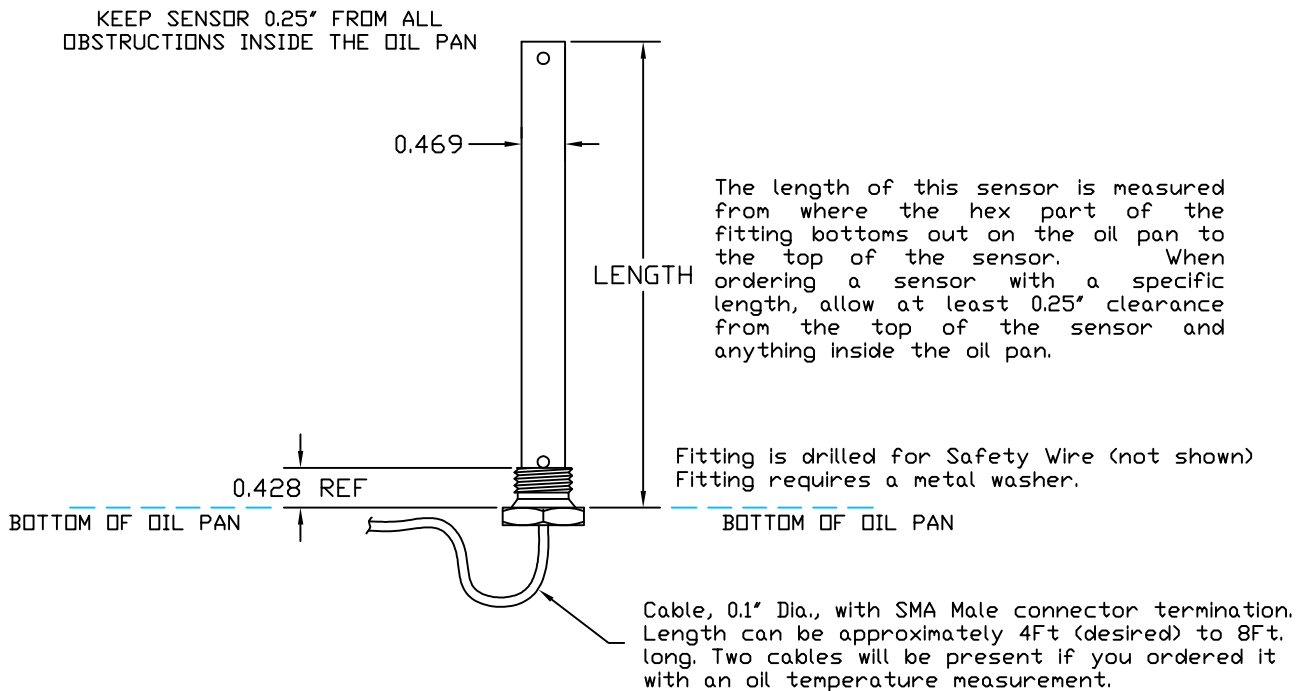   **Sxx.x_5/8-18_xx.x**
              Sxx.x_1/2NPT-18_xx.x
              Sxx.x_14MMx1.5_xx.x

Sensor Thread Types	1/2NPT for typical Lycoming engines & others
	5/8-18 for typical Continental engines & others
	14MMx1.5 for typical ULPower engines & others
	(Other fitting types will be added and available and as needed.)

Sensor Height   Sensor height will vary depending upon application.
                           (measured from the bottom of the fitting hole to the top of oil quantity sensor)
                           See our Outline and Mounting drawings of each sensor type for specifics.

Temperature Limits:
    Sensor   -30 to 302°F, (-34 to 150°C)
    Sensor Cables   -40 to 392°F, (-40 to 200°C)
    Electronics   -30 to 160°F, (-34 to 71°C)
                           (Radiated heat from exhausts pipes, etc. need to utilize heat shields to ensure
                            that these components remain within limits.)

Sensor Weight   for Lycoming, S5.50_1/2-NPT-18_48.0
                           (5.5" long with 4ft. cables), 3.1oz. (88.0 grams)
                           (actual weight of other sensors depends upon sensor type and configuration)

GOOD LUCK, have FUN, and please FLY with SAFETY!

(On the web: www.aircraftextras.com,   By e-mail: sales@aircraftextras.com)

OIL QUANTITY SENSOR
OUTLINE and MOUNTING
for
CONTINENTAL ENGINES

KEEP SENSOR 0.25" FROM ALL
OBSTRUCTIONS INSIDE THE OIL PAN

0.469

LENGTH

The length of this sensor is measured
from where the hex part of the
fitting bottoms out on the oil pan to
the top of the sensor. When
ordering a sensor with a specific
length, allow at least 0.25" clearance
from the top of the sensor and
anything inside the oil pan.

0.428 REF

BOTTOM OF OIL PAN

Fitting is drilled for Safety Wire (not shown)
Fitting requires a metal washer.

BOTTOM OF OIL PAN

Cable, 0.1" Dia., with SMA Male connector termination.
Length can be approximately 4Ft (desired) to 8Ft.
long. Two cables will be present if you ordered it
with an oil temperature measurement.

0.875 REF

CONTINENTAL PLUG, THREAD TYPE, 5/8-18
SAFETY WIRE HOLES NOT SHOWN IN THIS DRAWING

CONTINENTAL FITTING, (THREAD TYPE 5/8-18)
for REF ONLY, used on:
Continental A65, A75 & A80, Continental C125, C145 & O-300,
Continental C75 & C85, Continental C90 & O-200, Continental
E185 & E225, Continental GO-300, Continental O-470

Aircraft Extras Inc.

Oil Quantity Sensor Continental 8-27-2024.dwg
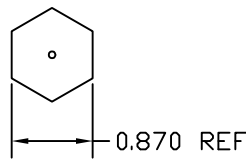ALL dimensions in inches.
R.A.M. 8/27/2024

OIL QUANTITY SENSOR
OUTLINE and MOUNTING
for
LYCOMING ENGINES

KEEP SENSOR 0.25" FROM ALL
OBSTRUCTIONS INSIDE THE OIL PAN

0.625
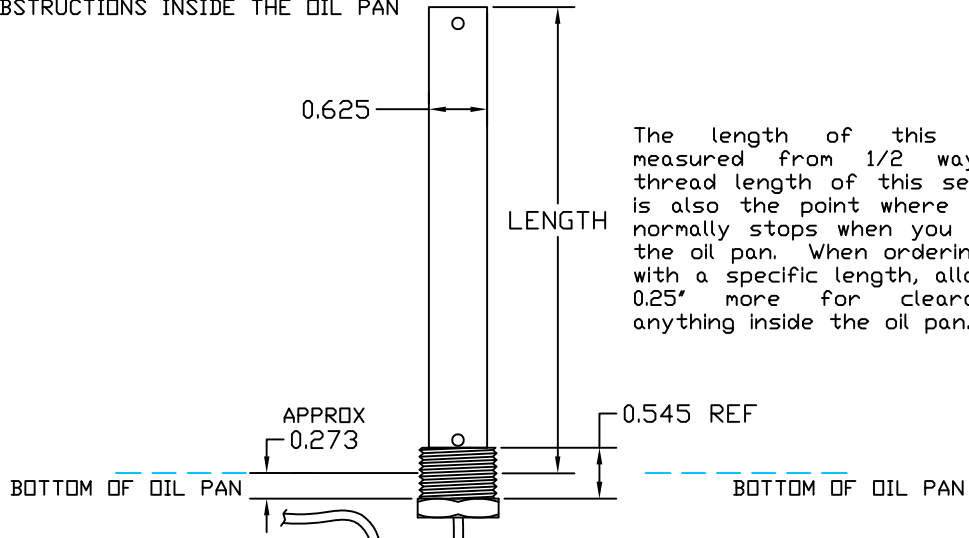
LENGTH

The length of this sensor is measured from 1/2 way up the thread length of this sensor. This is also the point where the sensor normally stops when you screw it in the oil pan. When ordering a sensor with a specific length, allow at least 0.25" more for clearance from anything inside the oil pan.

APPROX
0.273

0.545 REF

BOTTOM OF OIL PAN

BOTTOM OF OIL PAN

Cable, 0.1" Dia., with SMA Male connector termination. Length can be approximately 4Ft (desired) to 8Ft. long. Two cables will be present if you ordered it with an oil temperature measurement.
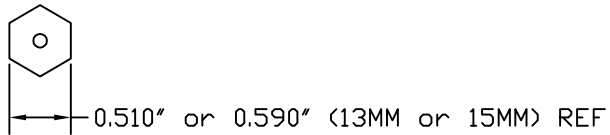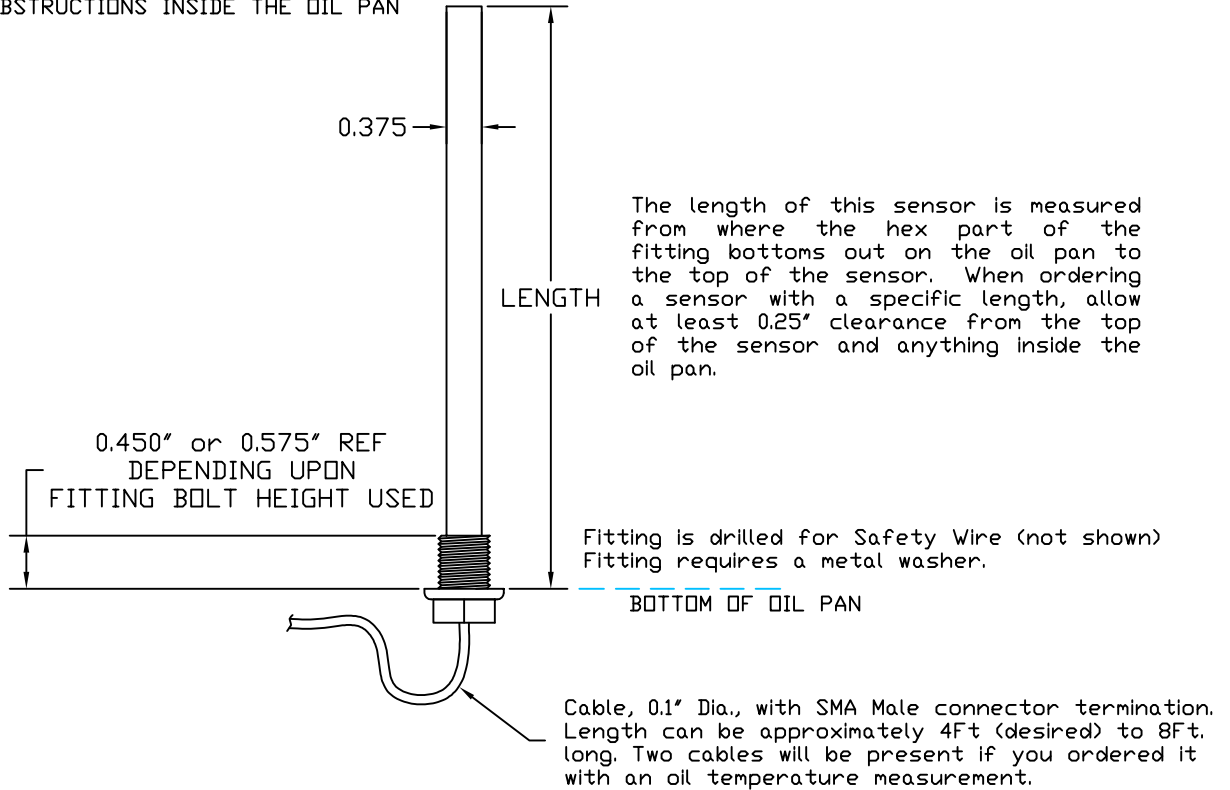
0.870 REF

LYCOMING PLUG, THREAD TYPE, 1/2NPT
SAFETY WIRE HOLES NOT SHOWN IN THIS DRAWING

OIL QUANTITY SENSOR
OUTLINE and MOUNTING
for
ULPower TYPE ENGINES

KEEP SENSOR 0.25" FROM ALL
OBSTRUCTIONS INSIDE THE OIL PAN

0.375

LENGTH

The length of this sensor is measured
from where the hex part of the
fitting bottoms out on the oil pan to
the top of the sensor. When ordering
a sensor with a specific length, allow
at least 0.25" clearance from the top
of the sensor and anything inside the
oil pan.

0.450" or 0.575" REF
DEPENDING UPON
FITTING BOLT HEIGHT USED

Fitting is drilled for Safety Wire (not shown)
Fitting requires a metal washer.

BOTTOM OF OIL PAN

Cable, 0.1" Dia., with SMA Male connector termination.
Length can be approximately 4Ft (desired) to 8Ft.
long. Two cables will be present if you ordered it
with an oil temperature measurement.

0.510" or 0.590" (13MM or 15MM) REF

ULPOWER ENGINE PLUG (THREADS, M14x1.5)
(REQUIRES USE OF 13MM or a 15MM WRENCH,
DEPENDING UPON FITTING BOLT SIZE USED)

Aircraft
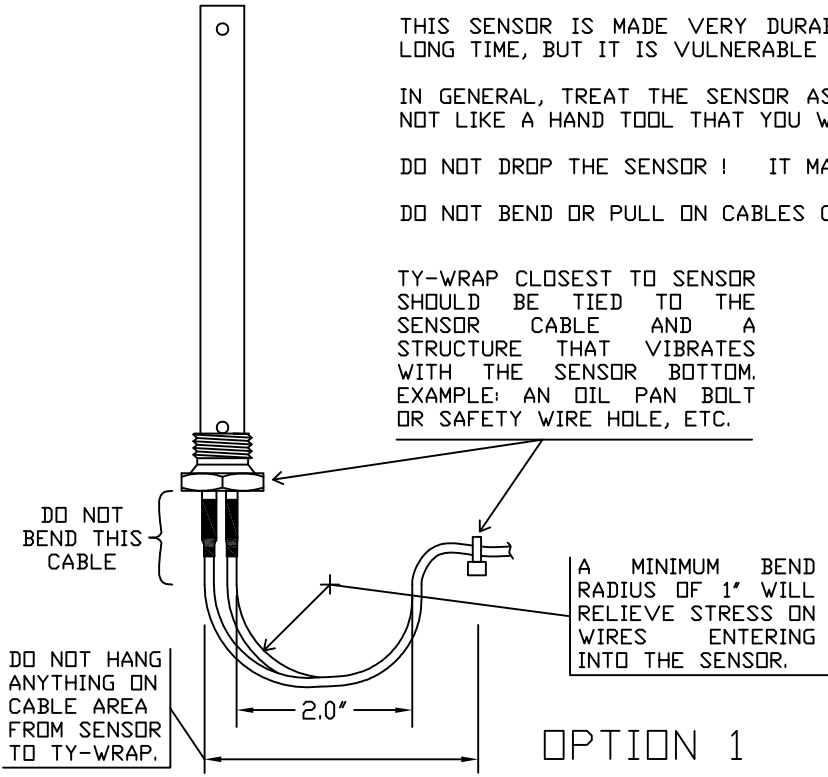**Extras** Inc.

SENSOR INSTALLATION and CARE

THIS SENSOR IS MADE VERY DURABLE AND VIBRATION PROOF AND SHOULD LAST A LONG TIME, BUT IT IS VULNERABLE TO MIS-HANDLING DURING INSTALLATION.

IN GENERAL, TREAT THE SENSOR AS A PRECISION INSTRUMENT WHEN INSTALLING IT, NOT LIKE A HAND TOOL THAT YOU WOULD DROP OR THROW AROUND.

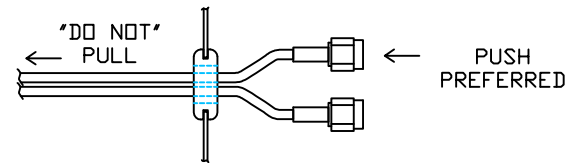DO NOT DROP THE SENSOR !   IT MAY DAMAGE ITS INTERNAL COMPONENTS.

DO NOT BEND OR PULL ON CABLES COMING OUT OF THE SENSOR.

TY-WRAP CLOSEST TO SENSOR SHOULD BE TIED TO THE SENSOR CABLE AND A STRUCTURE THAT VIBRATES WITH THE SENSOR BOTTOM. EXAMPLE: AN OIL PAN BOLT OR SAFETY WIRE HOLE, ETC.
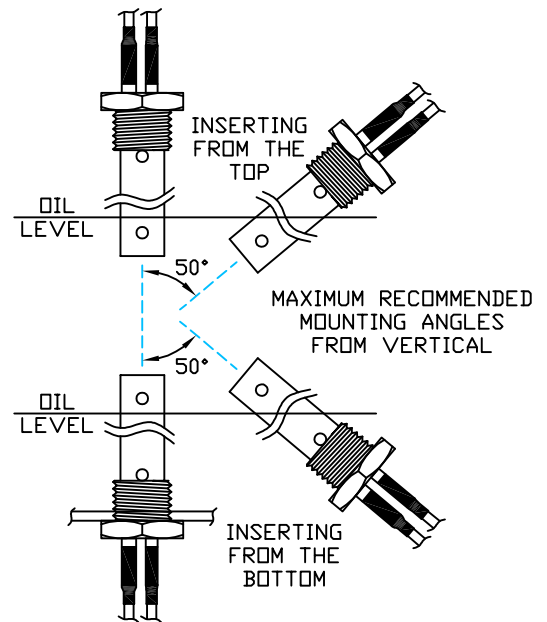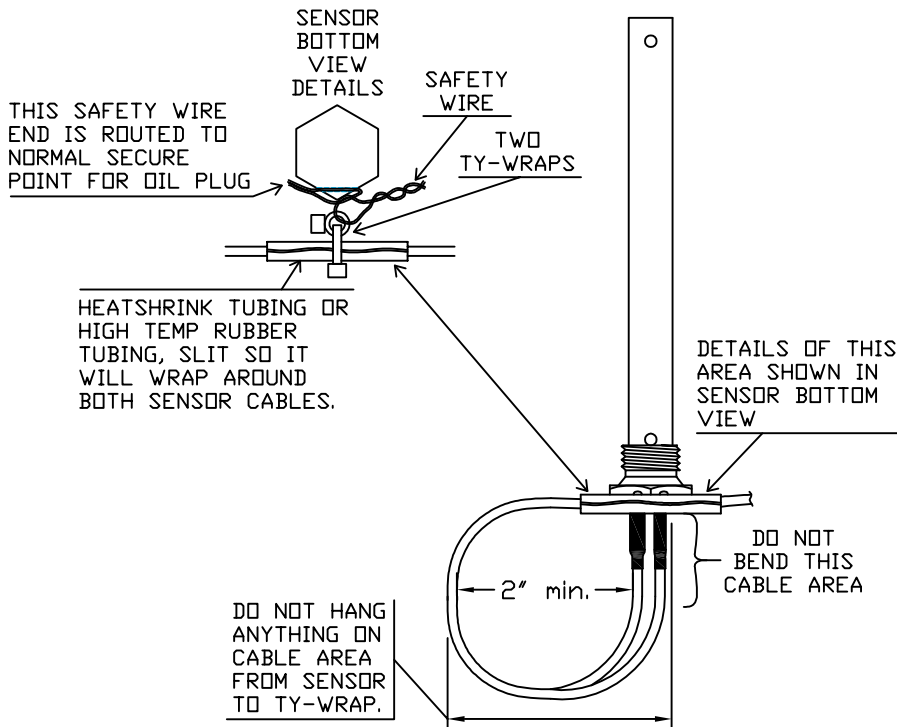
DO NOT BEND THIS CABLE

A MINIMUM BEND RADIUS OF 1" WILL RELIEVE STRESS ON WIRES ENTERING INTO THE SENSOR.

DO NOT HANG ANYTHING ON CABLE AREA FROM SENSOR TO TY-WRAP.

2.0"

OPTION 1

OPTION 2

'DO NOT' PULL SMA WIRED CONNECTORS BACK THRU A GROMMET OR CABLE HOLE. THE SMA CONNECTOR MAY COME OFF.

IF YOU DESIRE BACK OUT THE CABLES AND SMA CONNECTORS THRU A GROMMET OR HOLE, PUSH ON THE SMA CONNECTOR END WITH YOUR FINGER, NOT A TOOL. DO NOT PULL THE CABLES BACK THRU THE HOLES.

'DO NOT' PULL

PUSH PREFERRED

SENSOR BOTTOM VIEW DETAILS

SAFETY WIRE

TWO TY-WRAPS

THIS SAFETY WIRE END IS ROUTED TO NORMAL SECURE POINT FOR OIL PLUG

HEATSHRINK TUBING OR HIGH TEMP RUBBER TUBING, SLIT SO IT WILL WRAP AROUND BOTH SENSOR CABLES.

DETAILS OF THIS AREA SHOWN IN SENSOR BOTTOM VIEW

DO NOT BEND THIS CABLE AREA

2" min.

DO NOT HANG ANYTHING ON CABLE AREA FROM SENSOR TO TY-WRAP.

OIL LEVEL

INSERTING FROM THE TOP

50°

50°

OIL LEVEL

INSERTING FROM THE BOTTOM

MAXIMUM RECOMMENDED MOUNTING ANGLES FROM VERTICAL

THIS DRAWING IS ONLY A SUGGESTION HOW TO SECURE AND ROUTE THE SENSOR CABLES. IT IS UP TO THE INSTALLER TO ENSURE THAT THE CABLES ARE INSTALLED AS TO NOT DAMAGE OR STRESS THE SMALL DIAMETER SENSOR CABLES. ENSURE THAT THE SENSOR CABLES ARE NOT CUT BY THE SAFETY WIRE OR OTHER PANEL ENTRY HOLES. THE SENSOR CABLES ARE RATED TO 200°C, BUT THEY ARE NOT TO BE ROUTED NEAR THE ENGINE EXHAUST PIPES. IN THESE CASES, YOU MAY HAVE TO UTILIZE HEAT SHIELDS TO PROTECT THE SENSOR CABLES FROM EXCESSIVE HEAT.

Aircraft Extras Inc.

Oil Sensor Install Care and Cable Routing 8-27-2024.dwg
R.A.M. 8/27/2024