



Operators Manual

# OIL STREAK

Streak Sensing Unit

35651 · R5



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## Precautions & Symbols

The following symbols, used to identify safety instructions, are defined as follows:



Non-compliance will affect safety.



Electrical safety is involved.

**ATTENTION**

Safe operation of the lubricator and/or protection of the lubricator should be considered.



Electrical connections made to Earth ground.

**WARNING**

Conditions and actions that pose hazards to the user.

**N**

Electrical connections made to the neutral conductor are identified with the capital "N"

All safety and/or warning labels affixed to the Streak Sensing Unit must be maintained in a completely legible condition. Also, any modifications made to the Streak Sensing Unit (or to any of its components) must be approved by Bijur Delimon International prior to its use; otherwise the warranty and any liability by Bijur Delimon International will be null and void.

## Manufacturer's Statement

The manufacturer and/or distributor has provided the parts list and assembly diagram in this manual as a reference tool only. Neither the manufacturer or distributor makes any representation or warranty of any kind to the buyer that he or she is qualified to make any repairs or replace any parts to the product. In fact, the manufacturer and/or distributor expressly states that all repairs and parts replacements should be undertaken by certified and licensed technicians, and not by the buyer. The buyer assumes all risk and liability arising out of his or her repairs to the original product or replacement parts thereto, or arising out of his or her installation of replacement parts thereto.

## General

Before installing this unit, please read this *Operators Manual* carefully. Failure to follow these instructions can result in damage to the product and/or serious bodily injury. You will need this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures, parts list and assembly diagram. Keep your invoice with this manual. Write the invoice number on the inside of the front cover. Keep this manual and invoice in a safe and dry place for future reference.

## Application

The Streak Sensing Units are versatile and allow for multiple configurations that enable them to be used in most air/oil applications.

## Overview

The Streak Sensing Unit is designed to detect oil traces in the air tube, down to 5mm<sup>3</sup>/min. The product has been designed using a primary/secondary concept. The primary sensor, while monitoring a single tail tube, also incorporates a 4-segment LED display, 3 soft keys for programming and configuring, and an M12 electrical connector for power supply and fault alarm output. The secondary sensors may be piggybacked to the primary sensor, up to a maximum of 3, or may be remotely connected via an interconnecting cable. One secondary sensor can monitor one tail tube. The sensors are designed for either 4mm or 6mm tube.

The sensor works by detecting and counting pulses, generated from the oil particles in the air stream passing through optical components of the sensor. The count value is checked periodically and compared with the calibrated value. Should the count value fall below a certain predetermined point, then the unit will initiate an alarm. The calibrated value is the value as determined by a calibration sequence which is initiated by the user, on initial setup, and once a steady-state stream of oil can be clearly seen in the tubes. Various other parameters may be configured through the menu on the primary sensor.

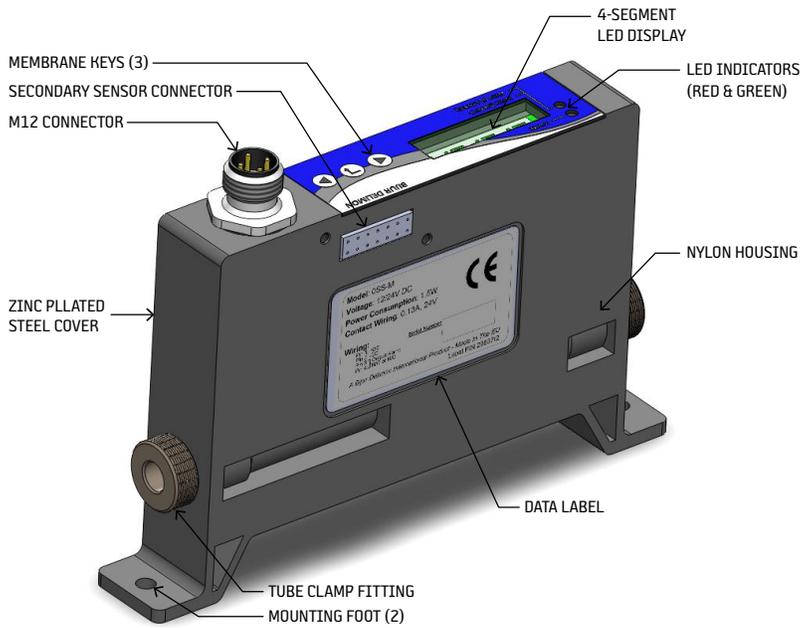
The sensors may be sold separately, as a kit, within an IP rated enclosure, or may come incorporated in an Air-Oil spindle lubrication system panel. On such a panel, the sensors have been designed to interface directly with the SureFire Lubricator with a controller.

### ATTENTION

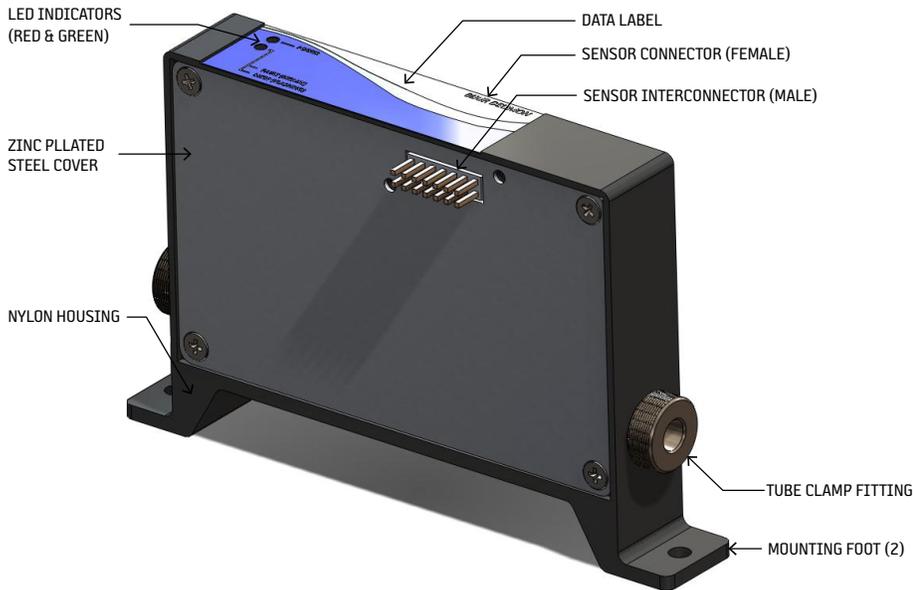
*See back cover for location listing and contact information.*

# Streak Sensing Unit at a Glance

## Primary Sensor



## Secondary Sensor



## Technical Data

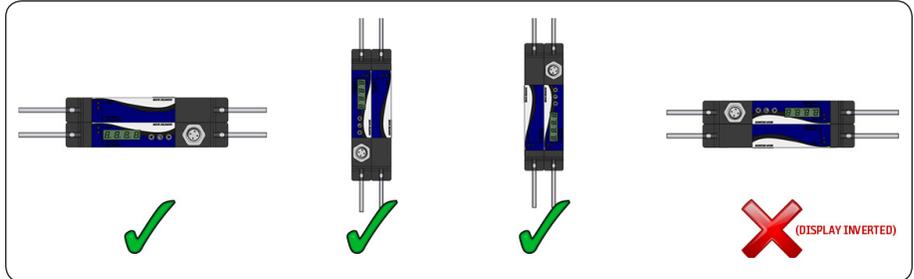
<b>Operating Voltage</b>		10 to 30 VDC
<b>Operating Temperature</b>		32°F to 122°F (0°C to 50°C)
<b>Certification</b>		CE
<b>Fault Alarm Relay Contact Rating</b>		0.13 A, 24 V
<b>IP Enclosure Rating</b>	Without Enclosure	IP-54
	In Enclosure	IP-66
<b>Weight</b>	Primary	50g
	Secondary	40g
<b>Materials</b>	Main body	Nylon 66 (black)
	Cover	Zinc plated steel
	Fastners	Zinc plated steel
	Tube fittings	Nickel plated Brass
	M12 connector	Nickel plated Brass
<b>Power Consumption</b>	Primary	1.5 W
	Secondary	0.5 W

### ATTENTION

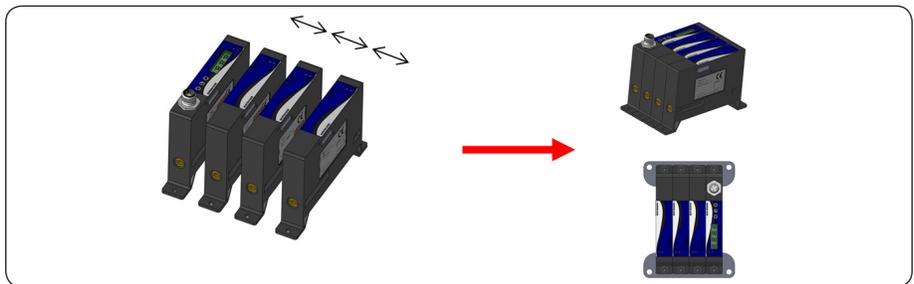
The Oil Streak Sensing Unit is for indoor use only.

## Installation

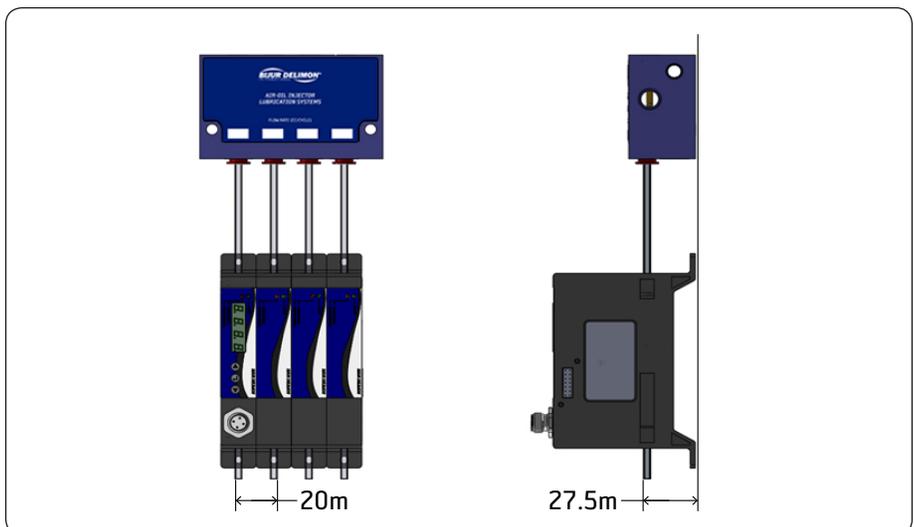
### Orientation



The oil streak sensor is installed downstream of the air oil mixing block, but upstream of the bearing point. The exact location is usually dependant on the type of machinery involved and on the accessibility. The sensors may be installed with the tubes running either vertically or horizontally, with little or no effect on function.

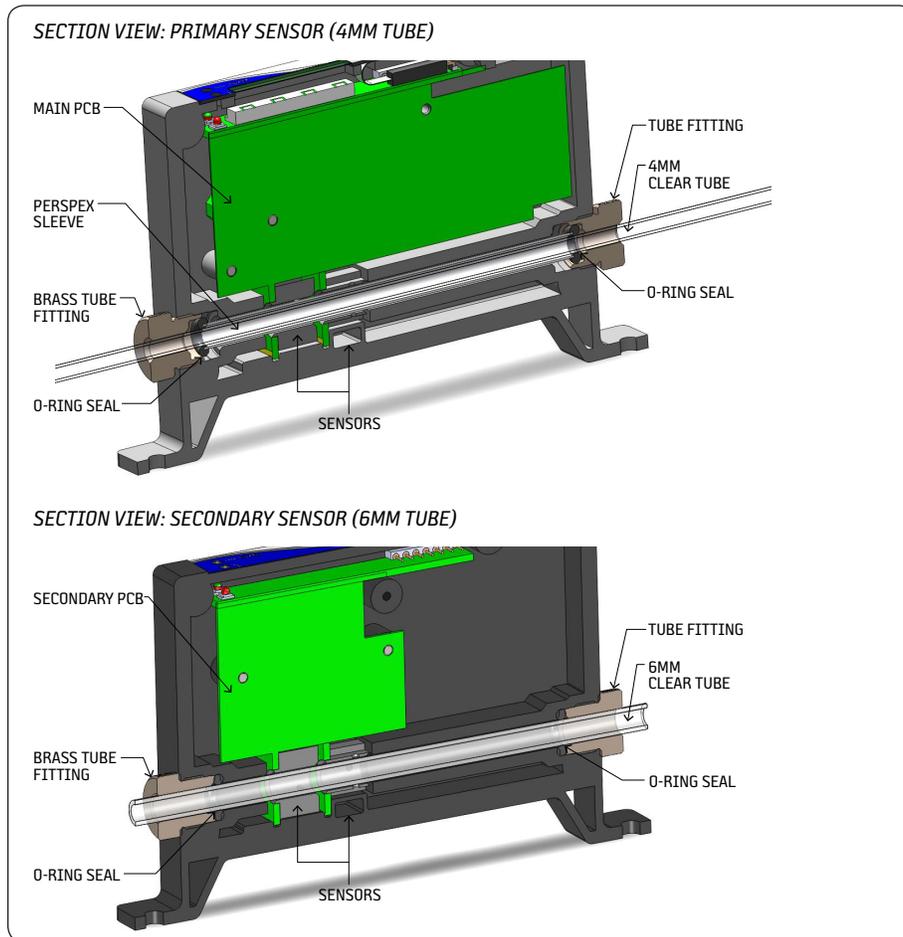


Where secondary sensors are piggybacked on the primary sensor, the units should be carefully interconnected via the electrical connector and pushed flush. 2-way, 3-way and 4-way brackets are offered as an accessory to assist in joining the units together.



The width of an individual sensor equates to the pitch of the lubrication outlets on the air oil mixing block, thus allowing the sensor to be directly mounted underneath the block on the air oil panel, if so required.

## Tail - Tube Insertion



Once the location and orientation of the sensors has been finalized, it is recommended that the tubes be inserted in the sensors prior to permanently mounting the sensors. To insert the tube:

1. Ensure that the tube diameter matches the sensor's tube fitting. The sensor comes with either 4mm or 6mm tube fittings.
2. Ensure the tube is of a clear material. BDI recommends clear, unmarked polyurethane tubing, but if this is not readily available, the sensor will also perform satisfactorily with some markings/writing on the tube.
3. Slide the tube through the tube fitting. An o-ring behind this fitting will create some resistance. If the tube is excessively tight going in, simply back off the tube fitting a fraction.
4. As the tube exits the sensor, there is a second o-ring, again which will offer some resistance. If the tube is excessively tight, simply back off the tube fitting a fraction (by hand) and thread the tube through.
5. Continue to pull the tube through carefully until the tube is long enough to be re-connected to the system.
6. Tighten tube fittings once more (by hand) to seal the tube.

## Start-Up Instructions

This *Operators Manual* covers fundamental concepts, which are to be observed for installation, operation and maintenance. Therefore, it is absolutely necessary that the *Operators Manual* be studied by the person doing the installation prior to installation and start-up. It is also necessary to have this *Operators Manual* nearby and available for reference in the future. The safety instructions mentioned in this *Operators Manual*, as well as all national operating and safety regulations for the safe operation of such equipment are to be observed.

### Calibration

The lubrication system should be allowed to prime and run for a period of time until there is a steady state flow of oil streaks in the tube. Once the operator is satisfied this is the case, the sensors should be powered on and the calibration sequence should be initiated. Steps for calibration are as follows:

1. Hold down the  key for 3 seconds.
2. Display should read **CON1**. Red LEDs should flash continuously on each sensor.
3. Navigate to **CON6** using the right or left arrow keys and hit .
4. Display should read **CAL**. Hit  to begin calibration or hit  to get **CAnc**, followed by  to cancel calibration at this time.
5. The calibration period lasts 180 seconds, and a countdown timer illustrates this period of time. At anytime during the calibration, you may abort by hitting the  key once more.
6. Once the calibration has been completed, the sensor will systematically go through each of the sensors displaying whether they have passed or failed, and the count value obtained on each channel. It will be necessary to hit  to sequence through the channels. For example, on completion of a 4-channel calibration, the following screens might be displayed:

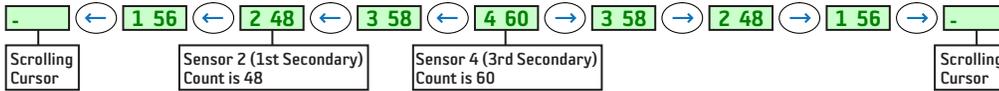
**C1 P**  **80**  **C2 P**  **67**  **C3 P**  **77**  **C4 P**  **62**  **CON6**

#### *Explanation:*

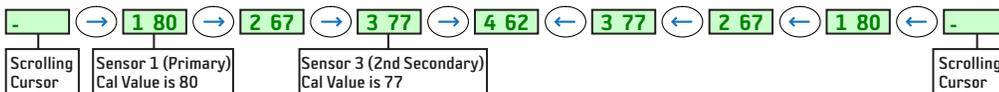
- + The primary sensor was successfully calibrated with a count value of 80.
  - + The 1st secondary sensor was successfully calibrated with a count value of 67.
  - + The 2nd secondary sensor was successfully calibrated with a count value of 77.
  - + The 3rd secondary sensor was successfully calibrated with a count value of 62.
7. If there are insufficient counts on a channel during this calibration period, then the sensor will fail on this channel. F will be displayed instead of P. For example: **C1 F**  **4**. Here, the primary sensor has failed calibration as it only registered 4 counts during the calibration period. The minimum count value for a channel to pass calibration is 5.
  8. Navigate to the **run** screen using left and right arrow keys and hit . This exits the sensor from calibration mode and enters the run mode of the sensor.
  9. If the sensor enters run mode, following on from a failed calibration, the sensor will fault and show an alarm after a period of 20 seconds. From the example above, the following would be displayed, **ALC4** telling the user that Channel 4 has alarmed, due to a calibration failure (“C” meaning calibration).

## Run Mode

1. The display should show a scrolling cursor, which means that the sensors are all running and monitoring flow.
2. A green LED on each sensor should be illuminated.
3. In run mode, the sensor is sensing the oil streaks and counting them. Every 20 seconds, it refreshes this pulse value for each sensor.
4. To view the actual count value for each sensor, proceed as follows:



5. To view the calibration value for each sensor, proceed as follows:



## Alarm Mode

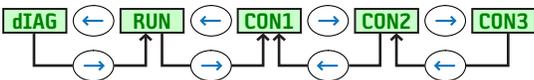
If sensor alarm occurs the following will be displayed:

- AL1 Primary
- AL2 Secondary
- AL3 Secondary
- AL4 Secondary

To reset the alarm, press the key.

## Setup Mode

To access the setup, hold down the key for 3 seconds. **CON1** should appear on the display.



The red LED on each sensor should flash continuously. To navigate through different menus, hit the or keys.

To enter any individual menu, hit the key.

For example, to enter the **CON1** screen, hit the key, toggle between selections using the and keys. Once the desired selection has been made, hit the key to return to the **CON1** screen once more.

To save the new settings, navigate to **RUN** and hit the key.

## Configuration Menu

Menu	Description	Parameters	Default
CON1	Number of Channels	CH 1, CH 2, CH 3, CH 4	CH 1 (primary sensor only)
CON2	Time to Alarm (seconds)	t0, t20, t40 to t300	t100 (100 seconds)
CON3	Sensitivity Level	SL 1, SL 2, SL 3, SL 4, SL 5	SL 1 (least sensitive)
CON4	Start-up Action	AU 1 (automatic) AU 0 (manual)	AU 1
CON5	Auto Wait Time (minutes)	S0 to S60	S1 (1 minute)
CON6	Calibration	Cal (calibrate) Canc (do not calibrate)	Cal
CON7	Fault Output Contacts	NO (normally open) NC (normally closed)	NC
CON8	Fault Reset Time (seconds)	S000 to S999	S100 (100 seconds)
SOF t	Firmware Version	N/A	S.X.X.X
D I a g	Diagnostic Check	N/A	N/A
RUN	Exit Setup & Enter RUN mode	N/A	N/A

### CON1 (Number of Channels)

This menu enables the user to set the number of channels which are being monitored. If, for example, 2 channels are being monitored, one channel by the primary sensor and the other channel by a secondary sensor, then CH 2 should be set in this menu. A higher than actual setting will cause a calibration failure on those channel(s) that are missing. A lower than actual setting will only calibrate and monitor this lower number of channels.

### CON2 (Time to Alarm)

This menu enables the user to set the time which may elapse after detecting a low flow condition before a fault output signal is generated by the sensor. This timer is reset if an acceptable flow level is detected within this period, and consequently will not display a fault. The higher the setting, the lower the number of fault alarms. A user may enter a value from 0 to 300 seconds, in multiples of 20. The default setting is 100 seconds.

### CON3 (Sensitivity Level)

This menu enables the user to set the level for acceptable count value. The level corresponds to a % of the count value obtained during calibration. There are five sensitivity levels as follows:

Sensitivity Level	Minimum Acceptable Count Value as % of Cal Value
1 (least sensitive)	10
2	20
3	25
4	30
5 (most sensitive)	35

To illustrate this by way of an example, say that after calibration, the count value on CH1 (primary sensor) was 100. If the sensitivity level was set to 5, then this sensor would only initiate a fault if the count value drops to less than 35 (35% of 100). If the sensitivity level was set to 1, then the sensor would only initiate a fault if the count value drops to less than 10 (10% of 100).

## CON4 (Start-up Action)

This menu enables the user to determine how the sensor should behave on start-up. There are 2 possibilities: Manual and Automatic. If manual is selected ( **AU 0** ), then the sensor, on power-up, will revert to a stand-by mode and will display **Strt**. The user must hit the  key to initiate monitoring. No fault alarm will be generated during this stand-by mode.

If Auto is selected ( **AU 1** ), then the sensor, on power-up, will initiate a countdown, based on a value set in the CON5 menu. No fault alarm will be generated during this countdown period. Once this time has elapsed, the sensor will begin monitoring.

## CON5 (Auto Wait Time)

This menu enables the user to set the desired countdown time period after powering up the sensor, before the sensor will begin monitoring, (assuming “Auto” had been set in the previous menu). This menu is designed to prevent fault alarms while the air/oil line is being primed. The user may set a value from 0 to 60 minutes. (Note: The countdown timer will display this time in seconds.)

For example, say **CON5** was programmed for S 5. Then, on start-up, and having selected **AU 1** previously on **CON4**, then the display will start with **300**, **299**, **298**, etc.

## CON6 (Calibration)

This menu enables the user to initiate calibration on a new or modified installation. (See Calibration section on page 8.)

## CON7 (Fault Output Contacts)

This menu enables the user to select the desired fault output configuration, obtained from pins 2 and 4 of the M12 connector. The default setting of NC (normally closed) will mean that in normal operation (non-fault condition), the switch between pins 2 and 4 will be closed. This switch will only open when powered off or in alarm condition. The NC setting is considered the failsafe mode as a power failure to the device will also signal an alarm. The user may however select NO (normally open) mode instead. In this instance, the switch between pins 2 and 4 is always open, only closing when there is a fault condition. When this sensor is used together with the Surefire Controller Lubricator, NC must be selected as the fault output.

## CON8 (Fault Reset Time)

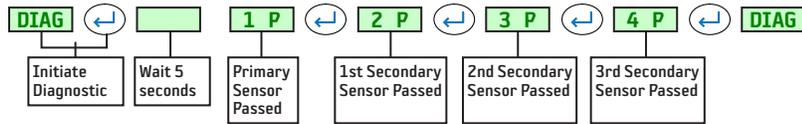
This menu enables the user to set a time period which may elapse, after correcting a fault, before the unit will check for a fault condition once more. A user may enter a value from 1 to 999 seconds. The default setting is 100 seconds. This menu is particularly important when the sensor is connected directly to the SureFire Lubricator. A sensor fault would disable the pump (provided this option is enabled in the pump controller) and hence prevent the system from recovering.

## SOft (Software Version)

This menu simply displays the current version of the firmware in the form S.X.X.X. It may be useful for troubleshooting.

## DIAG (Diagnostics)

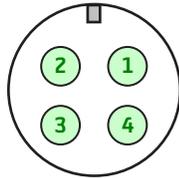
This menu enables the user to initiate a diagnostic routine to determine if the sensors are operating correctly. The routine involves checking for proper function of each individual sensor pair in each unit. There are 4 sensor pairs on each sensor, so this routine can check a maximum of 16 sensor pairs (4 channels). Upon completion of the diagnostic, the following screens will be displayed:



A diagnostic should preferably be carried out with clean, dry tubing as there is a small possibility of a diagnostic failure if there is oil present in the tube.

## Electrical Connections

The primary sensor comes with an M12, 4-pole connector. Pin-outs are as follows:



Pin #	Wire Color	Description
1	Brown	10 to 30 VDC
2	White	Fault alarm
3	Blue	0 VDC
4	Black	Fault Alarm

N/O or N/C  
See Setup- CON7

### ATTENTION

Hot plugging (hot swapping) of the Oil Streak Sensing Units and M12 cables is not recommended.

Please ensure system is powered down prior to connection/disconnection of M12 connecting cable.

Power is supplied via Pins 1 and 3, while Pins 2 and 4 are the fault contacts. Power is supplied to the secondary sensors via this primary sensor and the 14 way electrical interconnectors. An illuminated green LED on a sensor indicates power is being supplied to the sensor.

When the sensor is used on air-oil lubrication panel in conjunction with the SureFire Controller Lubricator, the sensor is connected to the pump via an M12 extension cord (see *Accessories* section on page 14). This cord is plugged into a corresponding M12 connector on the SureFire Lubricator. No further wiring is needed. The status of the fault relay should be set to N/C in CON7 of the setup.

## Count Values

The count value is an indication of the presence of oil droplets in the tail tube. However, the count value is not linearly related to the quantity of oil being injected in the tube. The count value is more closely related to the degree in which the oil particles are broken up in the tail tube. The count value may vary and is dependant on many factors:

1. The airflow in the tail tube. (Dictated by Inlet Air Pressure, Turns-Open of the Air Adjustment Needles, Restriction at the bearing). The higher the airflow, the more broken up the oil particles, the higher the count value. Too high an airflow will dry out the tail tubes between pump on times and consequently lead to fluctuating count values. Ultimately, the aim is for the air pressure and turns open to be adjusted to provide for a reasonably consistent count value at all times.
2. The injector size. The higher the injector size, the more oil is injected into the tail tube. Count values will vary with the degree in which the oil is broken up.
3. The pump off-time. The longer the pump remains off, the lower the count value will go, until the pump turns on again. Again, the aim is to set the pump off time to provide for a consistent count value through the off-time duration, resulting in steady oil flow to the bearing point.
4. The viscosity of the oil. The lower the viscosity, the less pronounced the formation of streaks in the tail tube, the lower the count value. Therefore, it is advisable that the oil has reached its maximum temperature, before doing a calibration.
5. The diameter of the tail tube. A 6mm tube will necessitate higher airflow than 4mm tube in order to achieve similar count values. The oil particles will only break up after a certain air velocity has been reached.
6. Distance between sensor and air-oil block. The closer the sensor is to the block, the more the count value will fluctuate in a given lubrication cycle. The closer the sensor is to the bearing point, the smoother the count values will become. Testing has also shown that calibration values tend to be higher, the further way the sensor is from the block.

## How to Order

Name	Description	Part #	
Streak Sensing Unit	Primary	4mm tubing	OSS-M4
		6mm tubing	OSS-M6
	Secondary	4mm tubing	OSS-S4
		6mm tubing	OSS-S6
Streak Sensing Unit: Primary & Secondary Sensors (Complete assembly w/brackets)	2-way assembly, 4mm tubing (1 Primary & 1 Secondary)		OSS-B42
	3-way assembly, 4mm tubing (1 Primary & 2 Secondary)		OSS-B43
	4-way assembly, 4mm tubing (1 Primary & 3 Secondary)		OSS-B44
	2-way assembly, 6mm tubing (1 Primary & 1 Secondary)		OSS-B62
	3-way assembly, 6mm tubing (1 Primary & 2 Secondary)		OSS-B63
	4-way assembly, 6mm tubing (1 Primary & 3 Secondary)		OSS-B64

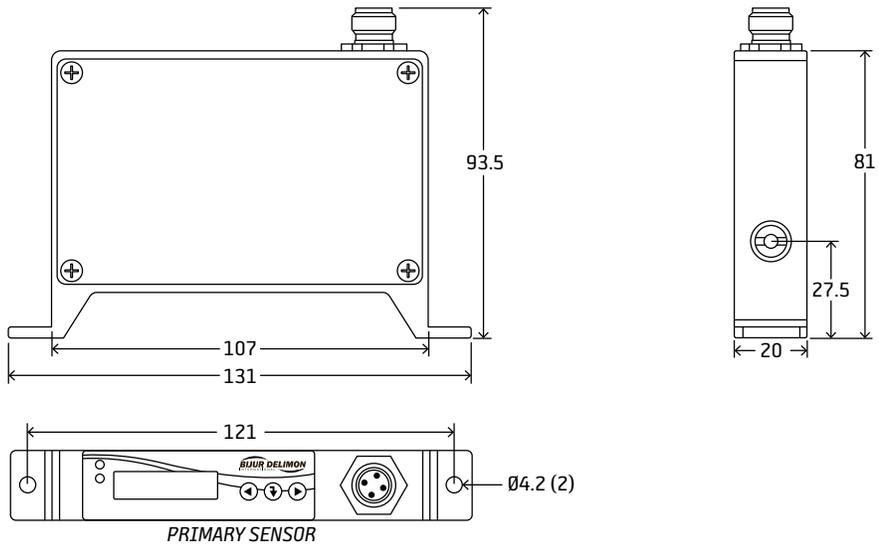
When ordering, specify by name, description and part number, e.g. Streak Sensing Unit, Primary, 4mm tubing, Part #OSS-M4.

## Accessories

Description		Part #
Mounting Bracket	2-way, complete with mounting fasteners	OSS-B2
	3-way, complete with mounting fasteners	OSS-B3
	4-way, complete with mounting fasteners	OSS-B4
Electrical Cord	M12, straight, 2m long (connects to sensor)	M124S02U34
	M12, 90°, 2m long (connects to sensor)	M124A02U34
	M12, straight, 5m long (connects to sensor)	M124S05U34
	M12, 90°, 5m long (connects to sensor)	M124A05U34
	M12, straight, 10m long (connects to sensor)	M124S10U34
	M12, 90°, 10m long (connects to sensor)	M124A10U34
Electrical Cord Extension	M12, straight, 1m long (connects to sensor & SureFire)	M124SS01EXT
	M12, straight, 3m long (connects to sensor & SureFire)	M124SS03EXT
	M12, straight, 5m long (connects to sensor & SureFire)	M124SS05EXT
	M12, straight, 10m long (connects to sensor & SureFire)	M124SS10EXT
M12 Connector (no cable supplied)	Field-wireable, straight (connects to sensor)	23694
	Field-wireable, angled (connects to sensor)	23694-1
	Field-wireable, straight (connects to SureFire)	23846
	Field-wireable, angled (connects to SureFire)	23846-1
OSS Tube Size Conversion Kit	Convert sensor from 6mm to 4mm	OSS-K4
	Convert sensor from 4mm to 6mm	OSS-K6
IP66 Enclosures	4-way enclosure for 4mm tubing	OSS-E4
	4-way enclosure for 6mm tubing	OSS-E6
Complete Enclosure Assemblies	1-way Enclosure for 4mm tubing (c/w primary sensor & 5m trailing cable)	OSS-E41
	2-way Enclosure for 4mm tubing (c/w primary & secondary sensor & 5m trailing cable)	OSS-E42
	3-way Enclosure for 4mm tubing (c/w primary & 2 secondary sensors & 5m trailing cable)	OSS-E43
	4-way Enclosure for 4mm tubing (c/w primary & 3 secondary sensors & 5m trailing cable)	OSS-E44
	1-way Enclosure for 6mm tubing (c/w primary sensor & 5m trailing cable)	OSS-E61
	2-way Enclosure for 6mm tubing (c/w primary & secondary sensor & 5m trailing cable)	OSS-E62
	3-way Enclosure for 6mm tubing (c/w primary & 2 secondary sensors & 5m trailing cable)	OSS-E63
	4-way Enclosure for 6mm tubing (c/w primary & 3 secondary sensors & 5m trailing cable)	OSS-E64

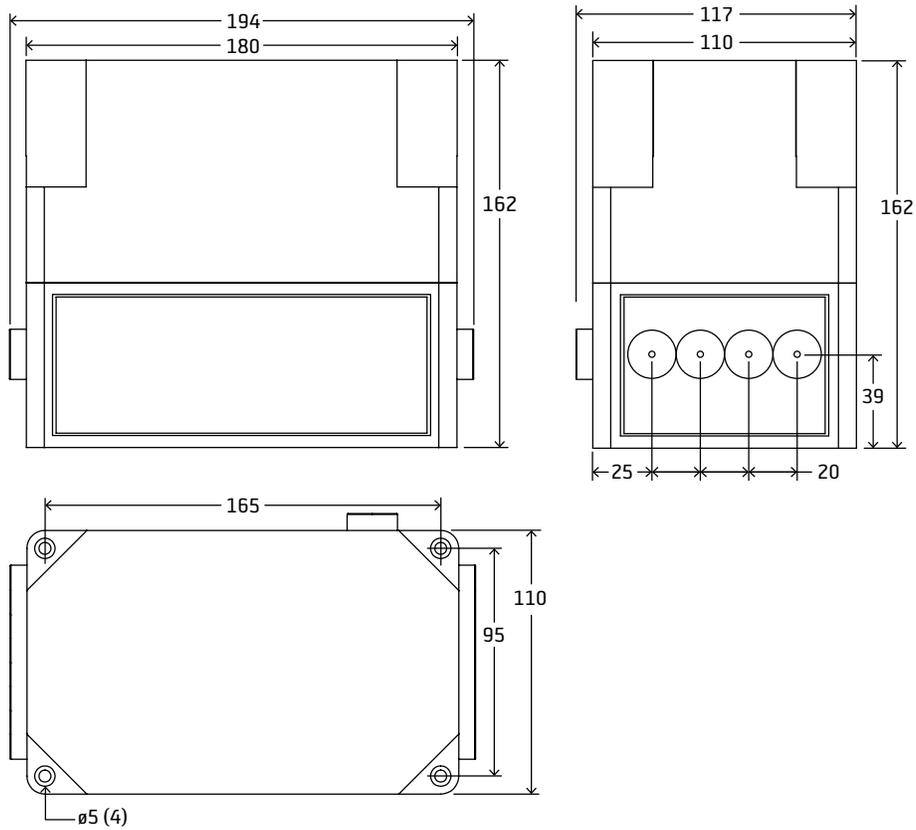
## Dimensional Schematics

### Sensors



Measurements shown in millimeters.

### IP Enclosure



# Innovators of engineered lubrication technology since 1872

Bijur Delimon International operates engineering, sales, manufacturing and logistical service centers in nine strategic locations around the globe while constantly striving for improvement in everything we do. Our customers, internal and external, expect nothing less!



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