

SLICK SLEUTH SS100EXd-LED OIL SPILL MONITOR

Installation, Operation, and Maintenance Manual
Revision D

REFERENCE ONLY



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1 DESCRIPTION

The Slick Sleuth Oil Spill Monitor (OSM) is a remote sensing device for the detection of oil pollution on a surface. It detects oil by stimulating fluorescence in the oil and then detecting the fluorescence. A short burst of collimated UV light is directed onto the surface. The resulting fluorescence is filtered and detected by a focused optical system.

The Oil Spill Monitor is enclosed in a NEMA 4X (IP66) enclosure to provide water-tight integrity and reliability. External power is provided to the Oil Spill Monitor via a cable through a conduit port. A second cable provides communication to the user's equipment.

The Oil Spill Monitor makes periodic detections and reports the results through the communication cable on a pre-set period. The period is pre-set at IOS but may be changed by the user through an internal USB serial port.

SPECIFICATIONS

Input Power, AC			
Input Voltage	100-240 VAC		
Input Frequency	50/60 Hz		
Input Current	0.2/0.1 amp typ.	(115/230 VAC)	
Inrush Current	40 A max.	(230 VAC)	
Input Power, DC			
Input Voltage	24 VDC $\pm$ 10%		
Input Current (24V in)	207 milliamps average 1.25 A peak		
Input Power (24V in)	7.3W average		

NOTE

Input current is dependent on operating setup. Values listed as "average" represent a 5 second period with 200 pulses/sample.

Environmental Protection Rating	IP66
Operating Temperature Range	-10°C to +60°C
Weight	10 lb (4.5 kg)
Detection Range:	0.4 - 3 meters

Communications Interfaces

Oil Detect and Status Relays

Configuration:	SPST
Rating:	110 VDC/0.3 A – 33 W
	30 VDC/2.0 A – 60 W
	120 VAC/0.5 A – 60 VA
	240 VAC/0.25 A – 60 VA

State:

Oil detect

No Detect	Open
Detect	Closed

Equipment Status

Normal	Closed
Fault	Open

0-20ma Current Loop

Source Mode

Compliance: 0 - 650 ohms

Serial Communications (local access)

USB

Serial Communications

RS485, 4-wire

RS485, 2-wire

RS232

Hazardous Location Rating

See Drawing No. 73586 1336 in Section 5

2 INSTALLATION

2.1 UNPACKING

Upon receiving the Oil Spill Monitor inspect for external signs of shipping damage. If shipping damage has occurred, immediately file a claim with the carrier and contact InterOcean Systems.

NOTE

Step-by-step instructions to perform the installation and initialization of the Slick Sleuth OSM are provided in the Slick Sleuth OSM Quick Start Instructions in Section 5 to assist the first-time user. The installation information that follows in Section 2 is provided for the experienced user and is referenced where appropriate from the Quick Start instructions.

A software utility program is available to facilitate installation and maintenance. IOS strongly recommends that the user obtain a copy of the program for use during installation. The procedure in the Quick Start Instructions have been developed based on the use of the utility program. Instructions for the use of the utility program are provided in Appendix A.

2.2 MECHANICAL

The Oil Spill Monitor mounts vertically above the surface as shown in the Installation drawing in Section 5. The area beneath the Oil Spill Monitor, depicted as a cone in the Installation drawing, must be clear of all obstructions to allow the full surface to be illuminated.

Mounting to the user platform is done using four tapped holes in the boss as shown on the Installation drawing.

2.3 ELECTRICAL

2.3.1 Power

When AC power is provided from an external AC power source the wiring connection is shown in Figure 2.3-1. IOS recommends that a 3.15A slo blo fuse be used on the input power to the OSM.

When DC power is provided from an external DC power source the wiring connection is shown in Figure 2.3-1. IOS recommends that a 2.0A slo blo fuse be used on the input power to the OSM

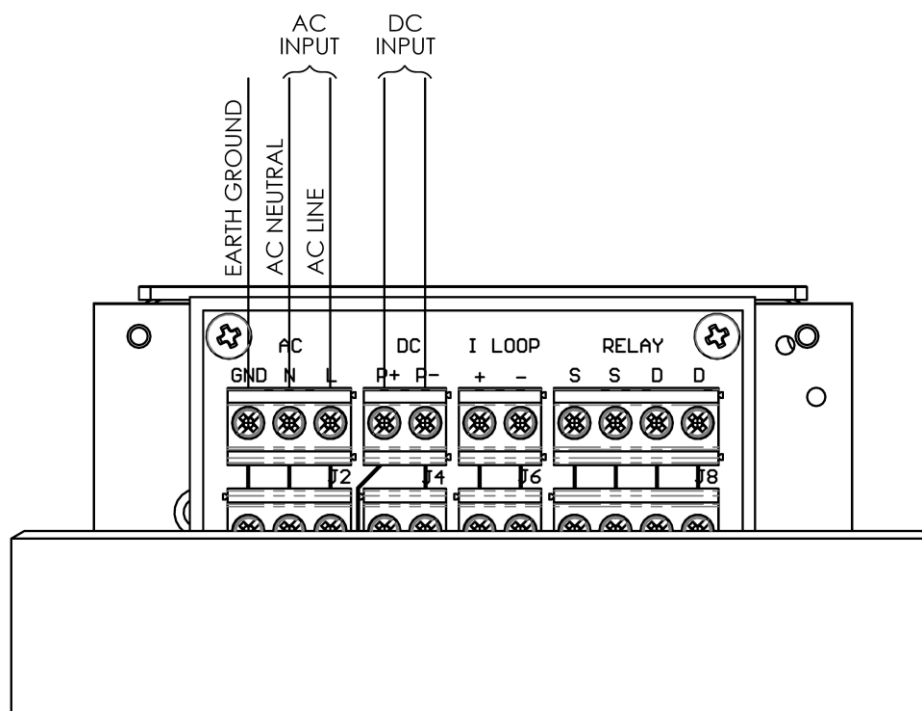


Figure 2.3-1
Power Wiring

2.3.2 Alternate Power Configuration

The OSM typically ships from the factory with the power pre-configured to the specified user input power. If the user chooses to change the input power the power select jumper must be re-located. The power select jumper is located on the right side of the power supply assembly. The power supply assembly is located on the side of the cartridge assembly opposite the field termination terminals. See Figure 2.3-2 to locate the jumper terminal block (J2).

Prior to changing the power select jumper ensure that power to the OSM is disconnected. Grip the jumper with a small needle nose plier, then loosen the screws retaining it. Move the power select jumper over to the adjacent pair of terminals to select the alternate power configuration. Secure the terminal screws, then apply power to the OSM.

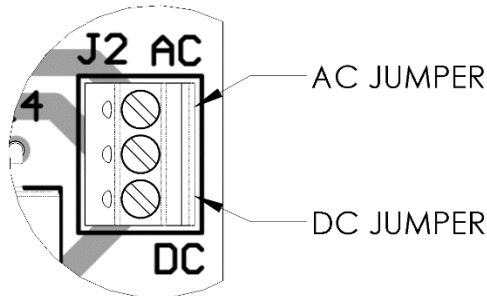


Figure 2.3-2
Alternate Power Jumper Selection

2.3.3 Interface

For an Oil Spill Monitor using a relay communication interface, the cable to the user's equipment is either a 2-wire cable or a 4-wire cable. The communications cable must meet the requirements of the Installation drawing.

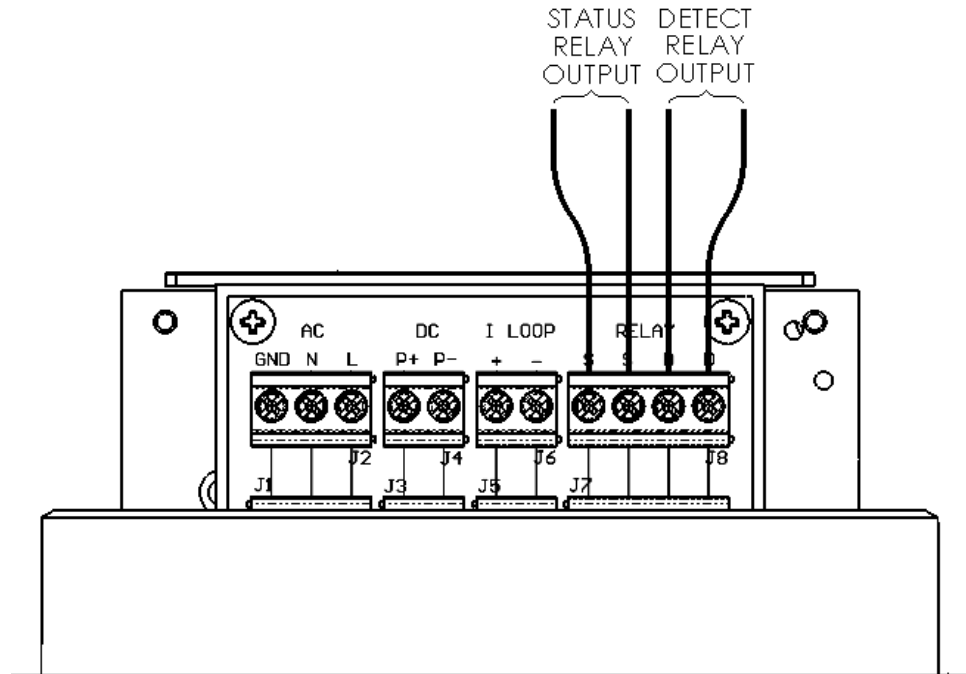


Figure 2.3-3
Relay Output wiring

For an Oil Spill Monitor using a current loop communications interface, the communications cable to the user's equipment is a 2-wire 0-20 ma current loop. The wiring connection is shown in Figure 2.3-3. The communications cable must meet the requirements of the Installation drawing.

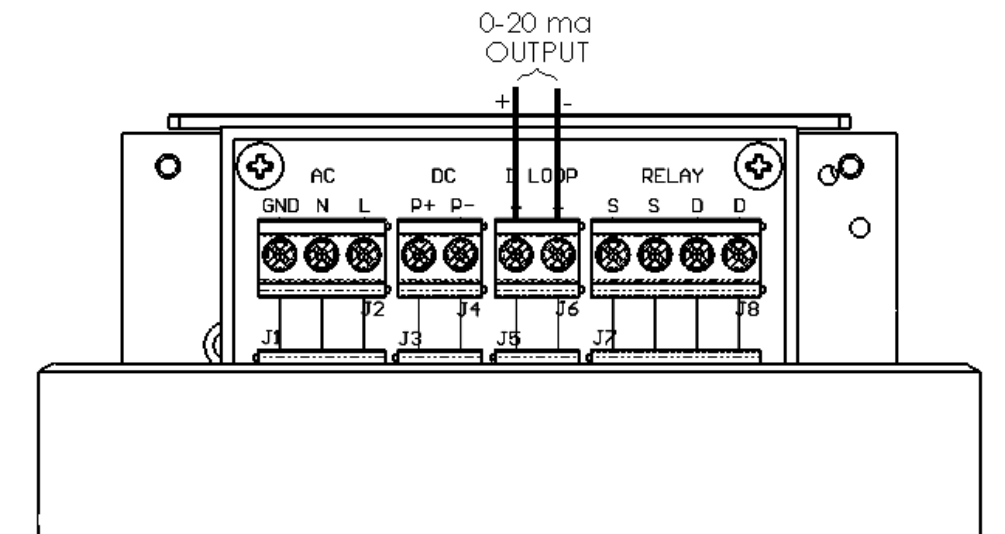


Figure 2.3-4
0-20ma Current Source Output Wiring

2.3.4 Serial Interface

For local access, typically for initial setup or periodic maintenance, a USB port is provided under the top cover of the enclosure.

For remote serial interface the RS232 or RS485 ports are used. See Appendix H.

2.4 INITIALIZATION

The Oil Spill Monitor is shipped from IOS configured to operate immediately upon application of power. Only one initialization procedure is required to optimize the performance of the Oil Spill Monitor. The procedure directs the Oil Spill Monitor to make measurements to establish the ambient conditions from which the detection threshold is set. This measurement is referred to as a “baseline” measurement.

When making the baseline measurement ensure that no oil pollution or other foreign matter is present below the Oil Spill Monitor as it will bias the measurement. If, however, an oil sheen or some amount of foreign matter is present and is expected to always be present, the baseline should be done to establish the “normal” operating conditions.

2.4.1 Quick Initialization

The OSM may be quickly initialized using the procedures in the Quick Start Instructions in the section titled ‘Quick Setup’. This procedure directs the OSM to make a baseline measurement. This procedure does not require that the OSM be opened, thus simplifying the process in a hazardous environment. This procedure may be performed at any time to re-establish the baseline for the OSM.

The application of the magnetic activation tool to initiate the ‘Quick Setup’ is illustrated in Figure 2.4-1



Figure 2.4-1
Quick Setup

2.4.2 Advanced Initialization

When the user needs to manage the OSM in greater detail than just the setting of the baseline, the procedures in the Quick Start Instructions in the section titled 'Advanced Setup' may be followed. The baseline measurement is performed by sending the Baseline 'I' command to the OSM. The OSM responds with an average detection count, which is the baseline measurement. Record this value for future reference.

In addition to establishing the baseline during the initialization process, other settings may also be adjusted. For example, the lower threshold offset (detection threshold = baseline + lower threshold offset) may be increased or decreased according to the users requirements and desired sensitivity. A small lower threshold offset will make the Oil Spill Monitor sensitive to small amounts of oil but may also increase the probability of false alarms. A large lower threshold offset will minimize the probability of false alarms but will also increase the amount of oil required to cause a detection. Refer to the Quick Start Instructions in Section 5 and the Theory of Operation in Appendix B for implementation and guidelines.

2.5 COVER

After installation and initialization are complete, install Cover P/N 956005523 on the top of the OSM. The Cover prevents the pooling of water from rain or snow which can be a nuisance during routine service.

3 OPERATION

3.1 REPORTING

Immediately after power is applied the Oil Spill Monitor begins a periodic detection and reporting cycle at the pre-set period. The period is once every 5 seconds, unless specified otherwise at time of order or changed by the user.

3.1.1 Detect Relay Interface

A single relay contact pair is available. The relay contacts close when oil is detected as “present.” The determination is based upon background and threshold levels established at the factory or by the user during routine setup of the Oil Spill Monitor. The OSM maintains the relay in its state for the last condition reported until the next detection cycle reporting a change in condition. The relay is an SPST relay.

3.1.2 Status Relay Interface

A single relay contact pair is available. The relay contacts close when the OSM status is healthy. The relay contacts open when a fault is detected in the OSM. The OSM maintains the relay in its state for the last condition reported until the next measurement cycle reporting a change in condition. The relay is an SPST relay.

3.1.3 Current Loop Interface

The message transmitted through the current loop interface is formatted in one of the following formats:

a. Discrete (Yes/No) Output

Yes/No output means that oil is reported as either detected or not detected. This determination is based upon background and threshold levels established by the user during routine setup of the Oil Spill Monitor. There is also an output level to indicate ‘fault’ status. With the “Yes/No” protocol:

3 mA = Indicates ‘Fault’ (equipment/power system out of specification or faulty)

6 mA = Indicates ‘NO Oil Detected’, & ‘monitor OK’

20 mA = Indicates ‘YES Oil Detected’, & ‘monitor OK’

The Oil Spill Monitor will maintain output level for the last condition reported, until a new condition is detected and reported at the corresponding output level. During normal operation the OSM will set the output at a nominal 6 mA, and hold the output at 6 mA indefinitely or until a change of conditions. If a positive detection decision is made, the output is set to a nominal 20 mA and held at 20 mA until there is no longer oil detected or until a fault occurs. If oil is no longer present the output returns to a nominal 6 mA.

b. Scaled Output

Scaled output means that output is scaled proportionally to the signal strength (amount/type) of oil detected. This detection protocol is for users who want the signal to reflect the actual reading or raw number of “counts”. As with both protocols, the monitor maintains output level for the last condition reported until a new condition is detected and reported at the corresponding output level. With the “Scaled Output” protocol:

- 3 mA = Indicates ‘Fault’ (equipment/power system out of specification or faulty)
- 4-20 mA = Output is proportional to the fluorescence signal returned from any oil detected – with 4 mA representing ‘No Return’, and 20 mA representing ‘Full Scale Return’. See Appendix B for a detailed description of the scaling.

c. Scaled/Corrected Output

The data format is the same as B) Scaled Output except that the ambient (or background) signal is subtracted from the signal before it is output on the current loop interface. The correction is the baseline measurement made during initialization (Ref. Section 2.4) or as measured by the adaptive baseline, if enabled.

3.2 SETUP

The Oil Spill Monitor is setup at the factory and can require a programming change in the field after the unit has been installed and initialized. If setup changes are required, the Oil Spill Monitor must be setup through the serial interface using the Slick Sleuth utility program (ref. Appendix A).

Features affecting performance that the user may wish to change are the following:

Detection Period

The time interval between periodic reports. Send Command 'P' with the desired time interval (in seconds). The default period is 5 seconds.

Number of Samples

The number of pulses used in a detection sequence. Increasing the number of samples improves detection reliability. However, it increases power consumption and may decrease UV LED life. Send Command 'B' with the desired number of pulses. The default number of samples is 200.

Sample Interval

The time interval between pulses in a detection sequence. Send Command 'C' with the desired time interval (1 millisecond steps). The default interval (and minimum interval) is 02 (2 milliseconds).

Lower Threshold Offset

The threshold for detection. The offset added to the baseline is the counts threshold for detection. This is the sensitivity control. Send command 'T' with the desired offset. The default offset is 250 counts.

Detection occurs when the measured signal exceeds the sum of the baseline (the normal "background") and the offset (also referred to as "threshold"). Mathematically this is when:

$$\text{Signal (counts)} > \text{Baseline (counts)} + \text{Lower Threshold Offset}$$

For example, if the Baseline measurement is 550 counts and the offset is 250 counts, detection occurs for any signal greater than $550 + 250 = 800$ counts. See Appendix B for a detailed discussion of the detection methodology.

Upper Threshold Offset

The Upper Threshold Offset is used to discriminate against highly fluorescent nuisance objects such as white paper. The Upper Threshold Offset must be set higher than the highest expected signal from substances requiring detection. The highest expected signal from substances requiring detection can be determined by placing a sample of each substance in a container beneath the OSM at the shortest expected distance. The Upper Threshold Offset must be set higher than this measurement. An alternative method of setting the Upper Threshold Offset is to place white paper under the OSM, again at the longest expected distance. Setting the Upper Threshold Offset 10% below this measured count should provide adequate discrimination while not interfering with desired detections.

Mode

The selected mode specifies the type of output(s) that Slick Sleuth can provide and whether the OSM operates autonomously (i.e. the OSM makes detections on a periodic schedule) or idles in standby. The following table lists the modes and for reference the associated “healthy” status word.

Mode	Description	“Healthy” Status Word
0	Standby	0000
1	Autonomous, relay	2000
4	Autonomous, current loop discreet output, and relay	8000
5	Autonomous, current loop scaled output, and relay	A000
6	Autonomous, current loop scaled/corrected output, and relay	C000

Current Loop FS (Full Scale)

The range in counts of the current loop output is user selectable. The Current Loop FS sets the counts above the 4 ma output for 20 ma output.

In Mode 5, which is scaled proportional to counts, 4 ma represents 0 counts and 20 ma represents the Current Loop FS counts. In Mode 6, which is scaled/corrected output, 4 ma represents Baseline and 20 ma represents Baseline plus the Current Loop FS counts. See Appendix B for a graphical representation.

Adaptive Baseline

Automatic correction for ambient conditions. The averaging period in minutes used to compute the correction. Send command 'M' with the desired time period in minutes. To disable the adaptive baseline send command 'M' with '00' as the minutes. To enable enter 01-99 as the minutes.

Adaptive baseline is used when the distance between the Oil Spill Monitor and the surface is expected to change over time. An example is storm water discharges that intermittently increase the water level, as well as storm water sumps.

Probability of Detection

This feature is used to define what (how many positive detection samples) constitute an alarm in order to reduce the probability of false detection and/or provide alarm filtering parameters. Two commands work together to establish a filter that rejects spurious detections due to the potential variability of the monitoring environment. The first command establishes a time window over which the OSM evaluates detections. The time window is specified in multiples of four samples, from four to ninety-six samples. The second command sets the minimum percentage of samples within the time window required to declare a detection. The percentage can range from 0 to 100 %. Setting the percentage to 0 % disables the feature, allowing the OSM to declare a detection on any single sample.

As an illustration, an OSM running at a period of 5 seconds takes 12 samples in one minute. If the user wants to use one minute as the sampling window, 12 is entered as the time window. Entering 25 for the minimum percentage of samples, a 25% probability detection percentage is established. With this setup the OSM must make at least 3 detections (25% of 12) within one minute before it will report a detection. Selecting 50% would require 6 detections within the one-minute window and selecting 100% would require 12 continuous detections before a detection would be reported by the OSM.

For more information regarding Probability of Detection refer also to step #5 of the 'Advanced Setup' section in the "Quick Start Instructions" within this manual.

4 MAINTENANCE

4.1 PREVENTATIVE MAINTENANCE

IOS recommends that the user institute a preventative maintenance (PM) schedule. Detailed PM guidelines are provided in Appendix E.

4.1.1 Desiccant Packs

Desiccant packs should be periodically replaced. The frequency of replacement is highly dependent on the installation and the frequency with which the OSM is serviced. 6 – 12 months is a recommended minimum replacement schedule, but replacement could be required more often in humid environments. If the color stripe on the desiccant packs is pink, the desiccant packs must be replaced immediately.

It is recommended that the desiccant packs be replaced every time the SS100-LED is opened to ensure the integrity of the SS100-LED.

4.2 UV LED REPLACEMENT

Each UV LED has very long estimated life, on the order of 5 years under typical operating conditions. In the event that a UV LED fails or degradation becomes evident, as evidenced by a status report message (using the Slick Sleuth Utility Program), perform the UV LED Replacement Procedure in Appendix F. The determination of which UV LED is faulty is most easily done by removing the lower cover and placing a piece of white paper under the two flash optics. A square spot of blue light will be visible under a good UV LED and not under a faulty UV LED.

4.3 TROUBLESHOOTING

The built-in test and status reporting functions of the Oil Spill Monitor can identify many problems. In order to access the built-in test and status reporting the Oil Spill Monitor must be locally accessed using the Slick Sleuth Utility Program. See Appendix C for interface definition.

The status report is obtained by sending the 'S' command. The Oil Spill Monitor responds with the following report:

```
AA | s XXXX | y | @(carriage return)(linefeed)
```

XXXX is the status message. Interpretation of the status message is provided below in Section 4.3.1. There are only three problems that can be troubleshot in the field: 1) UV LED degradation or failure, 2) input power below minimum, or 3) dirt obscuring the optics. The first two problems may be identified through the status report, and the latter by visual inspection. Correction of the first and last problems are dealt with in Sections 4.1 and 4.2. Troubleshooting of the input power is the responsibility of the user.

4.3.1 Status Message

The status word can be interpreted as shown in the table below.

Status word	Label	Function
X004	+ 12V low	Regulated + 12V supply below min
X008	- 12V low	Regulated – 12V supply below min
X020	Flash signal low	Flash light output below min
X100	Overtemp	Internal temperature is above specified max
X200	Undertemp	Internal temperature is below specified min
X400	Background high	High ambient light detected, may cause detector sensitivity loss

“X” (the first digit) denotes the current operating mode of the system. Operating mode can be 0, 1, 8, A, or C. See ‘Mode’ in Section 3.3. The remaining three digits provide fault reporting.

As an example, C020 indicates that the unit is operating in mode 6 with a low flash signal status. In this case the current loop will signal the fault with a 3-ma output current.

If any of the fault reporting digits is something other than that shown in the table, the unit has multiple faults. It is recommended that IOS be contacted for assistance in interpreting the message. Otherwise, refer to the last section of Appendix D for the guidelines on interpreting complex status words.

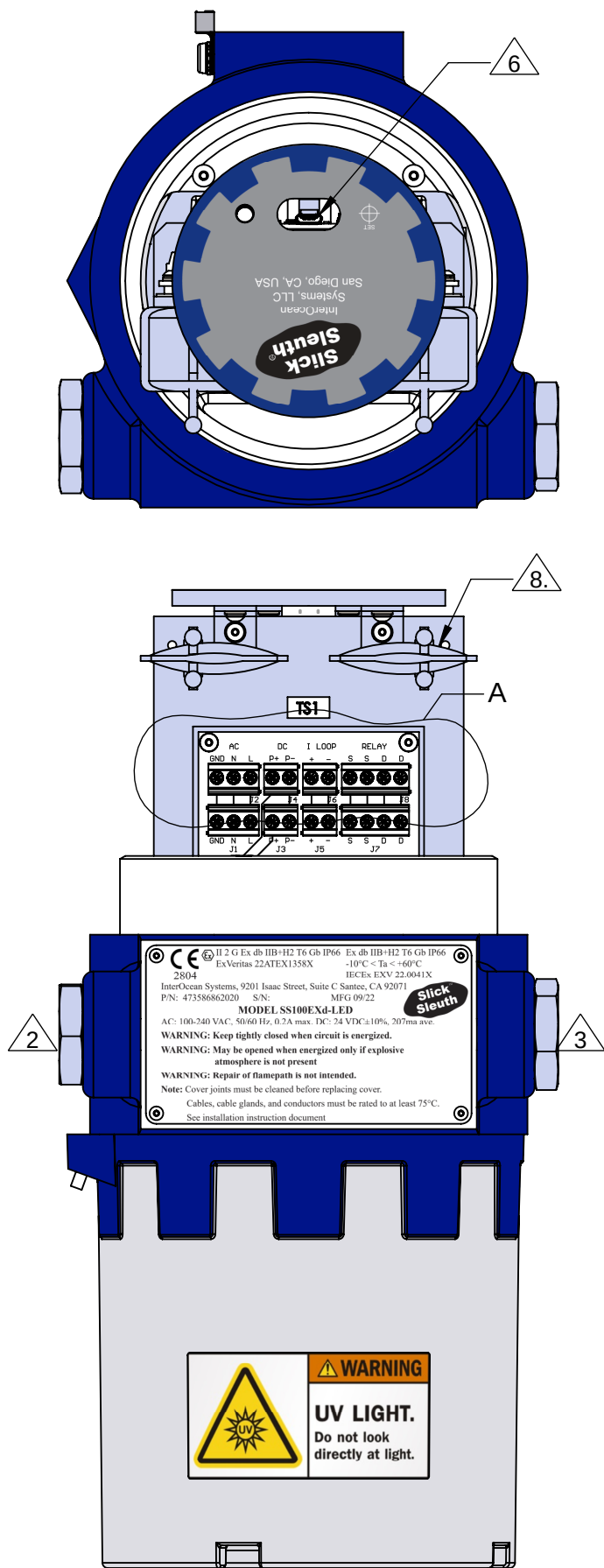
4.4 RECOMMENDED SPARES

Qty	Part Number	Description	Unit Type
2	4-73586 3212-01	UV LED, 365 nm	5
2	4-73586 3214-01	UV LED, 265 nm	6
2	941860100	Desiccant Pack	All
1	956005523	Cover	All
1	4-73586 1262-00	Source Control Drawing, ¾" NPT Plug, EXd	

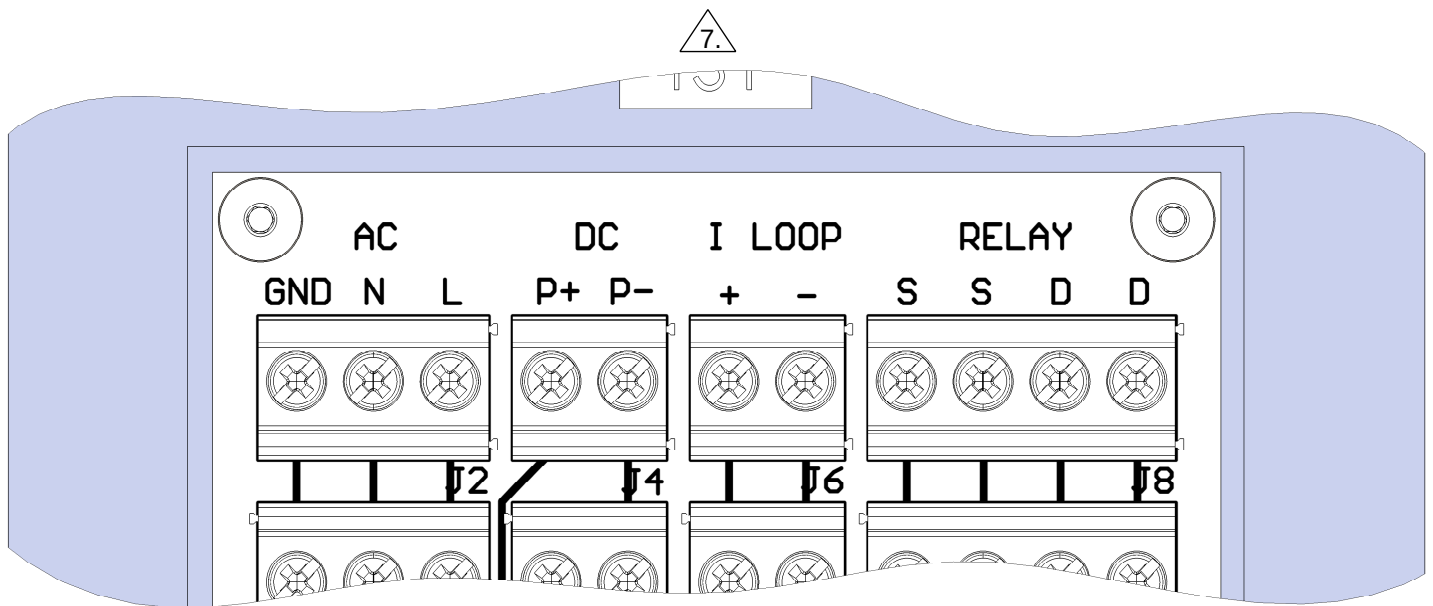
5 DRAWINGS

<u>Drawing No.</u>	<u>Title</u>	<u>Rev</u>
73586 0082	Installation Drawing	C
73586 1315	Slick Sleuth SS100-LED Quick Start Instructions	B
73586 1336	Hazardous Location Installation, SS100LED	D
73586 XXXX	Conversion Instructions, Type 5 to Type 6, SS100LED	A

A

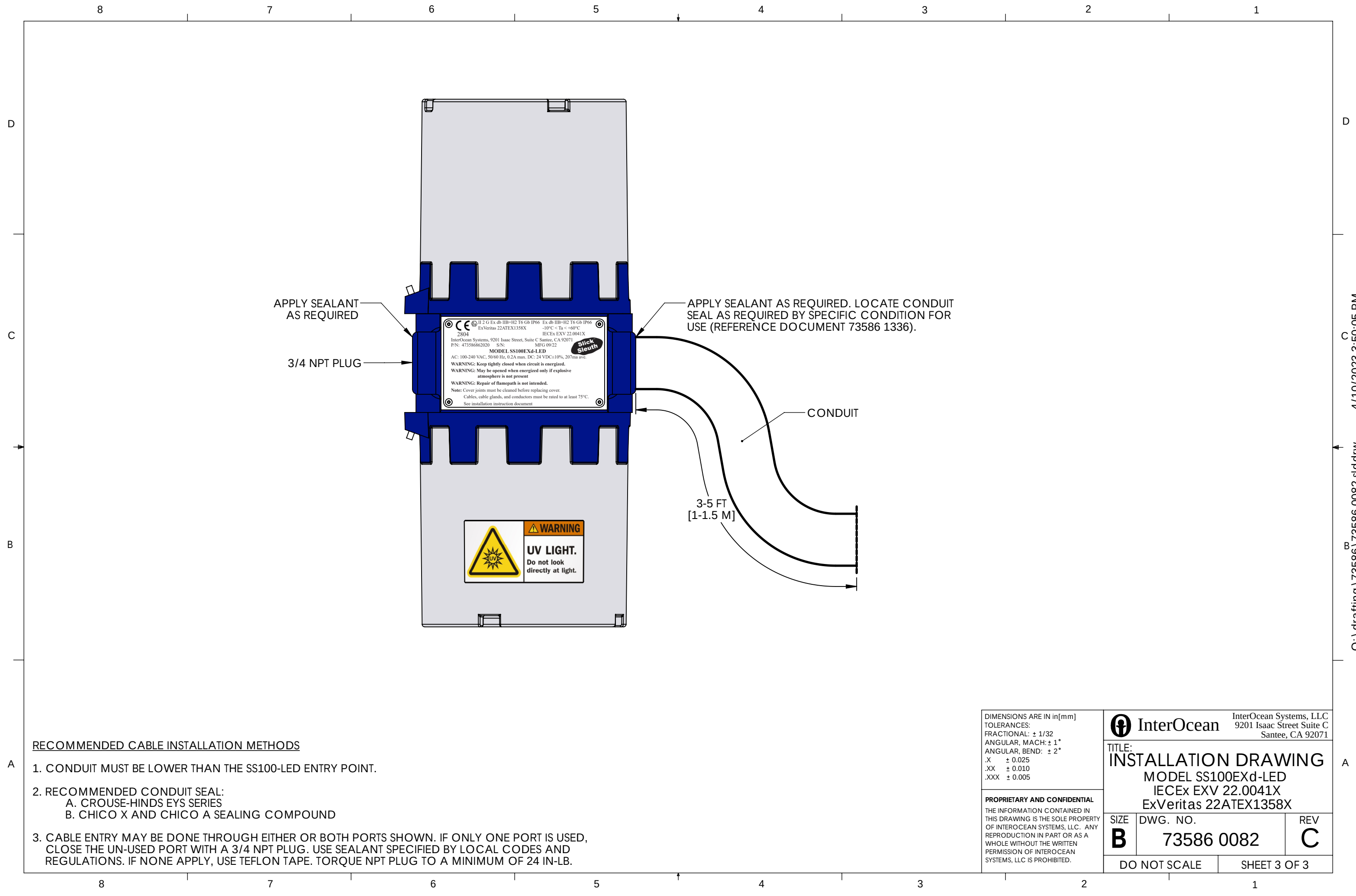


FIELD WIRING
(COVER REMOVED)



DETAIL A
SCALE 2 : 1

DIMENSIONS ARE IN in[mm] TOLERANCES: FRACTIONAL: ± 1/32 ANGULAR, MACH: ± 1° ANGULAR, BEND: ± 2° .X ± 0.025 .XX ± 0.010 .XXX ± 0.005		 InterOcean InterOcean Systems, LLC 9201 Isaac Street Suite C Santee, CA 92071	
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		SIZE B	DWG. NO. 73586 0082
		REV C	
		DO NOT SCALE	SHEET 2 OF 3



RECOMMENDED CABLE INSTALLATION METHODS

1. CONDUIT MUST BE LOWER THAN THE SS100-LED ENTRY POINT.
2. RECOMMENDED CONDUIT SEAL:
 - A. CROUSE-HINDS EYS SERIES
 - B. CHICO X AND CHICO A SEALING COMPOUND
3. CABLE ENTRY MAY BE DONE THROUGH EITHER OR BOTH PORTS SHOWN. IF ONLY ONE PORT IS USED, CLOSE THE UN-USED PORT WITH A 3/4 NPT PLUG. USE SEALANT SPECIFIED BY LOCAL CODES AND REGULATIONS. IF NONE APPLY, USE TEFLON TAPE. TORQUE NPT PLUG TO A MINIMUM OF 24 IN-LB.

DIMENSIONS ARE IN in[mm] TOLERANCES: FRACTIONAL: ± 1/32 ANGULAR, MACH: ± 1° ANGULAR, BEND: ± 2° .X ± 0.025 .XX ± 0.010 .XXX ± 0.005		InterOcean Systems, LLC 9201 Isaac Street Suite C Santee, CA 92071	
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SIZE B	DWG. NO. 73586 0082	REV C	
DO NOT SCALE		SHEET 3 OF 3	

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This document is the Slick Sleuth OSM quick start guide. Several steps refer to information in the Slick Sleuth OSM Technical Manual TM so it is advisable to have the Technical Manual on hand.

INSTALLATION

STEP	INSTRUCTION	TECHNICAL MANUAL REFERENCE
1	Mount the OSM at the desired location using the ¼-20 holes in the boss and the hardware provided by IOS. Mounting dimensions and clearance requirements are provided in the TM. Install the OSM above the high-water line. The optimum height above the water surface is highly dependent on the expected range of the surface elevation. Contact InterOcean Systems (IOS) for a recommendation. Call 858-565-8400 (US) or email sales@interoceansystems.com.	Installation drawing Section 5
2	Connect the appropriate power to the OSM. The power cable is brought into the enclosure through a conduit port on the side of the enclosure. The location of the conduit port and the requirements for the cable are provided in the TM. The power cable is terminated at TS1, the terminal block in the upper end of the enclosure. DO NOT APPLY POWER AT THIS TIME.	Installation drawing Section 5 Section 2.3
3	Connect the signal interface to the OSM. The signal cable is brought into the enclosure through a conduit port on the side of the enclosure. The location of the conduit port and the requirements for the cable are provided in the TM. The signal cable is terminated at TS1, the terminal block in the upper end of the enclosure. The termination is a 2-conductor source current loop, and/or an SPST detect relay, and/or an SPST status relay.	Installation drawing Section 5 Section 2.3, Figures 2.3-2 and 2.3-3
4	Apply power to the OSM. Observe that the indicator light in the cover lights green, indicating that the OSM has a healthy status.	

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TITLE:

QUICK START INSTRUCTIONS
SLICK SLEUTH SS100-LED OSM

SIZE

A

DWG NO.

73586 1315

REV

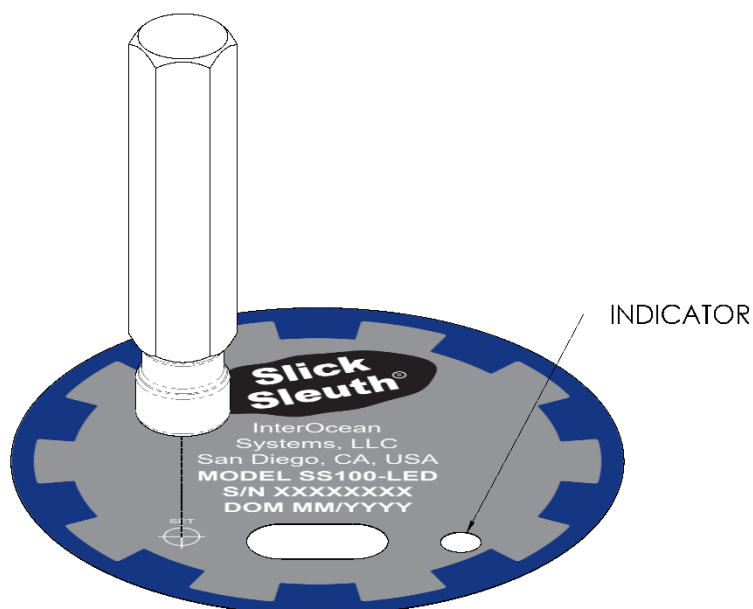
B

DO NOT SCALE

SHEET 1 OF 6

QUICK SETUP

STEP	INSTRUCTION	TECHNICAL MANUAL REFERENCE
1	Place the IOS provided magnetic activation tool over the 'SET' bulls eye under the top glass cover. See Figure below.	Section 2.4.1
2	Observe that the indicator light turns yellow and flashes on – off.	
3	Remove the magnetic activation tool from the top glass cover.	
4	Observe that the indicator light turns green within a few seconds after the removal of the magnetic activation tool.	
5	If the indicator light remains yellow for 10 seconds after the removal of the magnetic activation tool, the OSM is signaling that the "baseline" set exceeds 50% of full scale. The condition may limit the performance of the OSM. Contact IOS Engineering for guidance on Advanced Setup procedures to optimize performance.	



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TITLE:

QUICK START INSTRUCTIONS
SLICK SLEUTH SS100-LED OSM

SIZE

A

DWG NO.

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REV

B

DO NOT SCALE

SHEET 2 OF 6

ADVANCED SETUP

The instructions that follow are provided for the advance user that wishes to change operating parameters beyond the factory setup and the minimum initialization provided in the Quick Setup.

STEP	INSTRUCTION	TECHNICAL MANUAL REFERENCE
1	Connect a PC running Windows 7, Windows 8, or Windows 10 to the USB port in the upper end of the enclosure. If this is the first time connecting to a OSM using the IOS supplied interface hardware, you may be prompted to install the USB serial driver. Follow the Windows' prompts to do so.	Appendix C.
2	Establish serial communications with the OSM. Serial communications with the OSM is accomplished using the utility program provided by IOS, the Slick Sleuth Utility Program. The following procedures have been developed based on the Utility Program. Install the Utility Program on the PC by inserting the CD. The installation should start automatically. If it does not, go to the root directory on the CD and launch the installation program, setup.exe. The program may also be installed from a USB drive or from files copied onto the PC hard drive. Follow the on-screen installation instructions to complete the installation. Launch the Utility Program. Select the BAUD rate for communication with the OSM. Unless specified otherwise, the default BAUD rate for the OSM is 9600 baud. Select the COM port to be used by clicking on the drop-down menu in the Comm Port box of the Utility Program. If in doubt as to the correct COM port, use this procedure: Make a note of all COM ports listed in the drop-down menu Disconnect the USB cable to the Slick Sleuth, then click on the REFRESH button on the Utility Program. Click on the drop-down menu and observe which COM port is missing from the menu. This is the COM port that Windows has assigned to the OSM. Re-connect the USB cable, wait a few seconds for Windows to re-establish the link, then click on the REFRESH button. Click on the drop-down menu and select the OSM COM port.	Appendix A.

InterOcean Systems, LLC
9201 Isaac Street Suite C
Santee, CA 92071

TITLE:

QUICK START INSTRUCTIONS
SLICK SLEUTH SS100-LED OSM

SIZE

A

DWG NO.

73586 1315

REV

B

DO NOT SCALE

SHEET 3 OF 6

2 cont.	NOTE The operating system will assign a new/unique COM Port number to each OSM, unless the COM Port assignment is manually changed through the Device Manager Enter the address (two digits) for the OSM in the Address box, if the OSM has an address other than '00'. The default address is '00' so this step may not be required. Click Read Setup. If the OSM is powered up and connected correctly, the OSM should reply with an answer in the Message Received box and fill in data in the Detection Setup box. If the Message Received box indicates ">>Disable Auto Mode!" select the Mode (L) command with a value of '0' (polled or 'standby' mode) and SEND the command. The answer should look similar to this: 00 L 0 k @. The number following the 'L' defines the operating mode of the OSM. If the command is not sent successfully repeat until it is sent successfully. If the OSM responds, continue with initialization. If the OSM responds with the message "Timeout>>", it will be necessary to determine the reason for the non-response. Verify that the OSM has power, verify the wiring between the PC and the OSM, and verify that the selected COM port is functional and/or choose another COM port until you have selected one that responds.	
3	Initialize the OSM and Establish Baseline If the 'L' command in step 2 returned a number other than 0, it is necessary to change the mode to facilitate the initialization. If this is the case, follow these steps: - Record the mode number read in Step 2 (you will need to re-enter it into the OSM at a later step). - Select the 'L' command and enter 0 when asked to enter the mode. - Select 'OK'. - Click on the SEND COMMAND button. - Observe that the OSM responds with 00 L 0 k @ or a similar response. Verify that the conditions below the OSM are typical (i.e. that there is no oil present or other abnormal conditions). Select the 'I' command, then click on the SEND COMMAND button. This command tells the OSM to make a baseline measurement. Record the response from the OSM for future reference.	
4	Enable Factory Commands Click the Real Time Logging button. A new window will open. In the lower left-hand corner of the window click the Factory Setup button. Enter '73586' as the factory password, then select 'OK'. Return to the main window. Additional commands are now available for use with setup.	

5	Read and/or Change the Offset The Offset is used to set the Detection Threshold as follows: Detection Threshold = Baseline + Offset Read the existing Offset by following these steps: 1. Select the 'T' command, then select 'OK' without entering a data value. 2. Click on the SEND COMMAND button. 3. Observe that the OSM responds with 00 T XXXXX x @ where XXXXX is the existing Offset. To change the Offset to a new Offset (lower for greater sensitivity, higher for lower sensitivity), follow these steps: 1. Select the 'T' command and enter the new Offset value (4 digits, including zeroes if necessary). 2. Select 'OK'. 3. Click on the SEND COMMAND button. 4. Observe that the OSM responds with 00 T XXXXX x @ where XXXXX is the new Offset.	Section 2.4 Section 3.2, Appendix B				
6	Read and/or Change the Upper Threshold Offset The Upper Threshold Offset is used to discriminate against false detects caused by highly fluorescent flotsam such as white paper. The Upper Threshold Offset is set as follows: Upper Threshold = Baseline + Upper Threshold Offset Fluorescent signal above the Upper Threshold Offset will not cause a detection. Read the existing Upper Threshold Offset by following these steps: 1. Select the 'R' command, then select 'OK' without entering a data value. 2. Click on the SEND COMMAND button. 3. Observe that the OSM responds with 00 R XXXXX x @ where XXXXX is the existing Upper Threshold Offset. To change the Upper Threshold Offset to a new Upper Threshold Offset (lower for greater sensitivity, higher for lower sensitivity), follow these steps: 1. Select the 'R' command and enter the new Upper Threshold Offset value (5 digits, including zeroes if necessary). 2. Select 'OK'. 3. Click on the SEND COMMAND button. 4. Observe that the OSM responds with 00 R XXXXX x @ where XXXXX is the new Upper Threshold Offset.					
InterOcean Systems, LLC 9201 Isaac Street Suite C Santee, CA 92071		TITLE: QUICK START INSTRUCTIONS SLICK SLEUTH SS100-LED OSM		SIZE A	DWG NO. 73586 1315	REV B
				DO NOT SCALE		SHEET 5 OF 6

7	Probability of Detection The 'd' and 'e' commands are used to lower the probability of falsely detecting an oil slick. These commands work in conjunction with each other to establish a filter that will reject spurious detections due to the variability of the natural environment. The 'e' command is used to set a sample window from 4 to 96 in increments of 4 over which the number of detected events is evaluated. When the number of detected events exceed a percentage of the window size, as set by the 'd' command, the OSM will indicate that a slick has been detected. In order to execute the 'd' and 'e' commands the OSM must be in the idle state. This is done by issuing the 'L' command as follows: 1.Select the 'L' command and enter 0 when asked to enter the mode. 2.Select 'OK'. 3.Click on the SEND COMMAND button. 4.Observe that the OSM responds with 00 L 0 k @ or a similar response. The 'd' command is used to set one of five percentage values from 000, 025, 050, 075 and 100 percent. This function is disabled when the percentage is set to 000. To change the percent window size to a new value follow these steps: 1. Select the 'd' command and enter the new percent value (3 digits, including leading zeroes if necessary). 2. Select 'OK'. 3. Click on the SEND COMMAND button. 4. Observe that the OSM responds with 00 d XXX x @ where XXX is the new percent. The 'e' command is used to set the size of the detection window from 4 samples to 96 samples in increments of 4. To change the window size to a new value follow these steps: 1. Select the 'e' command and enter the new window value (2 digits, including leading zeroes if necessary). 2. Select 'OK'. 3. Click on the SEND COMMAND button. 4. Observe that the OSM responds with 00 e XX x @ where XX is the new percent. Use the 'L' command as described above to put the OSM back into operation under control of the new settings.	<table><tr><th colspan="2">'d' Command</th></tr><tr><th>Value</th><th>Percent</th></tr><tr><td>000</td><td>Disable</td></tr><tr><td>025</td><td>25%</td></tr><tr><td>050</td><td>50%</td></tr><tr><td>075</td><td>75%</td></tr><tr><td>100</td><td>100%</td></tr></table>	'd' Command		Value	Percent	000	Disable	025	25%	050	50%	075	75%	100	100%
'd' Command																
Value	Percent															
000	Disable															
025	25%															
050	50%															
075	75%															
100	100%															
8	Placing the OSM into operation Once the baseline, background values and optional parameters have been set, the OSM can be placed into autonomous operation (if not already done so) using the 'L' command. If the 'L' command had to be used to change the mode in Step 3, restore the operational setup by following these steps: 1. Select the 'L' command and enter the previously recorded operational setting when asked to enter the mode. 2. Select 'OK'. 3. Click on the SEND COMMAND button. Observe that the OSM responds with 00 L X a @ where X is the operational setting you entered. The character (the checksum) following the X may be different from written here.	Section 3 Appendix A														

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1 Specific Condition for Use:

- Keep cover tightly closed when circuits are energized.
- May be opened when energized only if explosive atmosphere is not present.
- When mounting the enclosure in a hazardous area, all entries into the enclosure shall be sealed with cable glands, blanking elements and thread adapters certified for protection type 'db' and providing a minimum degree of protection of IP66 in accordance with the requirements of IEC 60529.
- The hazardous location solutions reducers shall not be used for the direct inter-connection of enclosures.
- Only one hazardous location solution reducer shall be used with any single cable entry on the associated equipment.
- All conduit sealing fittings must be certified as flameproof "db" and have a minimum IP66 rating equal to the marking on the enclosure.
- When a conduit fitting device is used with the equipment the end user is required to fit an Ex db certified conduit seal (for example a conduit stopping box) as close as reasonably practical to the entry. The distance from the seal to the enclosure shall not exceed the diameter of the conduit or 50mm, whichever is the lesser.
- The OX3 close up plug is for one time use only.
- The equipment window was tested for low risk of mechanical danger and must be installed in such a way so that the sapphire window is not likely to be impacted.
- Equipment must be mounted with the detector window facing down.



2 Specifications

Input Power

AC

Input Voltage:	100-240 VAC	
Input Frequency:	50/60 Hz	
Input Current:	0.2A Maximum/0.1A Typical	(115/230 VAC)
Inrush Current:	40A Maximum	(230 VAC)

DC

Input Voltage:	24 VDC $\pm$ 10%
Input Current (24Vin):	207 mA Average/1.25A Peak
Input Power:	7.3W Average

Operating Temperature Range -10°C to +60°C

Weight 10lb (4.5kg)

Detection Range 0.4m to 3.0m

Communication Interfaces

Oil Detect and Status Relays

Configuration:	SPST
Rating:	110VDC/0.3A/33W 30VDC/2.0A/60W 120VAC/0.5A/60VA 240VAC/0.25A/60VA

0-20 mA Current Loop

Source Mode Compliance: 0-650 Ω

Serial Communications

Local Access:	USB
External Access:	4-wire RS-485/2-Wire RS-485/RS-232



Hazardous Locations Ratings

ATEX

Ex II 2 G Ex db IIB+H₂ T6 Gb
-10°C ≤ Ta ≤ +60°C
ExVeritas 22ATEX1358X
EN 60079-0, EN 60079-1

IEC

Ex db IIB+H₂ T6 Gb
-10°C ≤ Ta ≤ +60°C
IECEX EXV 22.0041X

Standards:

IEC 60079-0:2011, 6th Edition
IEC 60079-1:2014, 7th Edition

3 Recommended Spares

Qty	Part Number	Description	Type
1	4-73586 1262-00	Source Control Drawing, 3/4 NPT Plug, EXd	All
2	4-73586 3212-01	UV LED PCA, 365nm	5
2	4-73586 3214-01	UV LED PCA, 265nm	6
2	9-4186 0100	Desiccant Pack	All
1	9-5600 5523	Cover	All



4 Installation

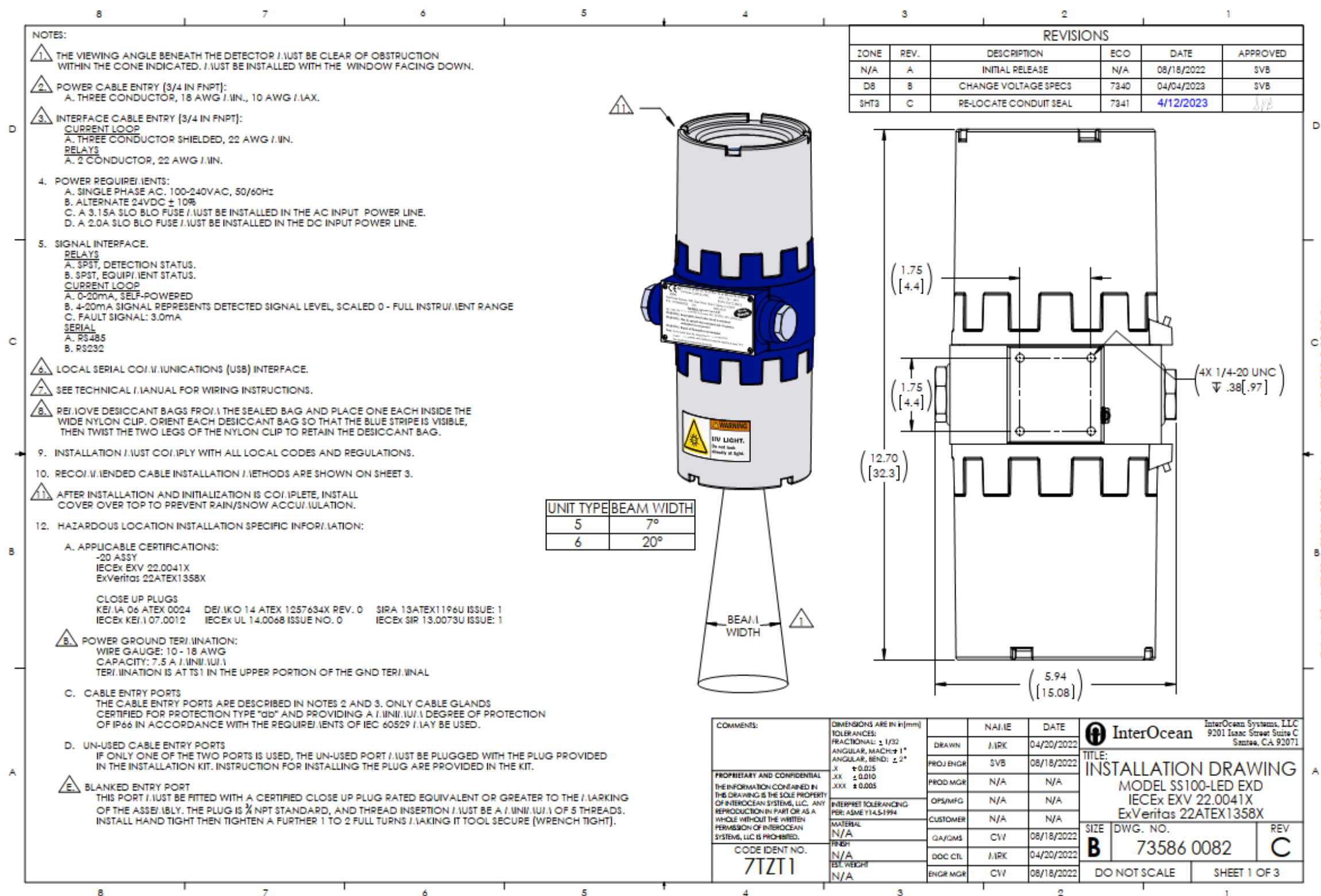
4.1 Warnings and Cautions

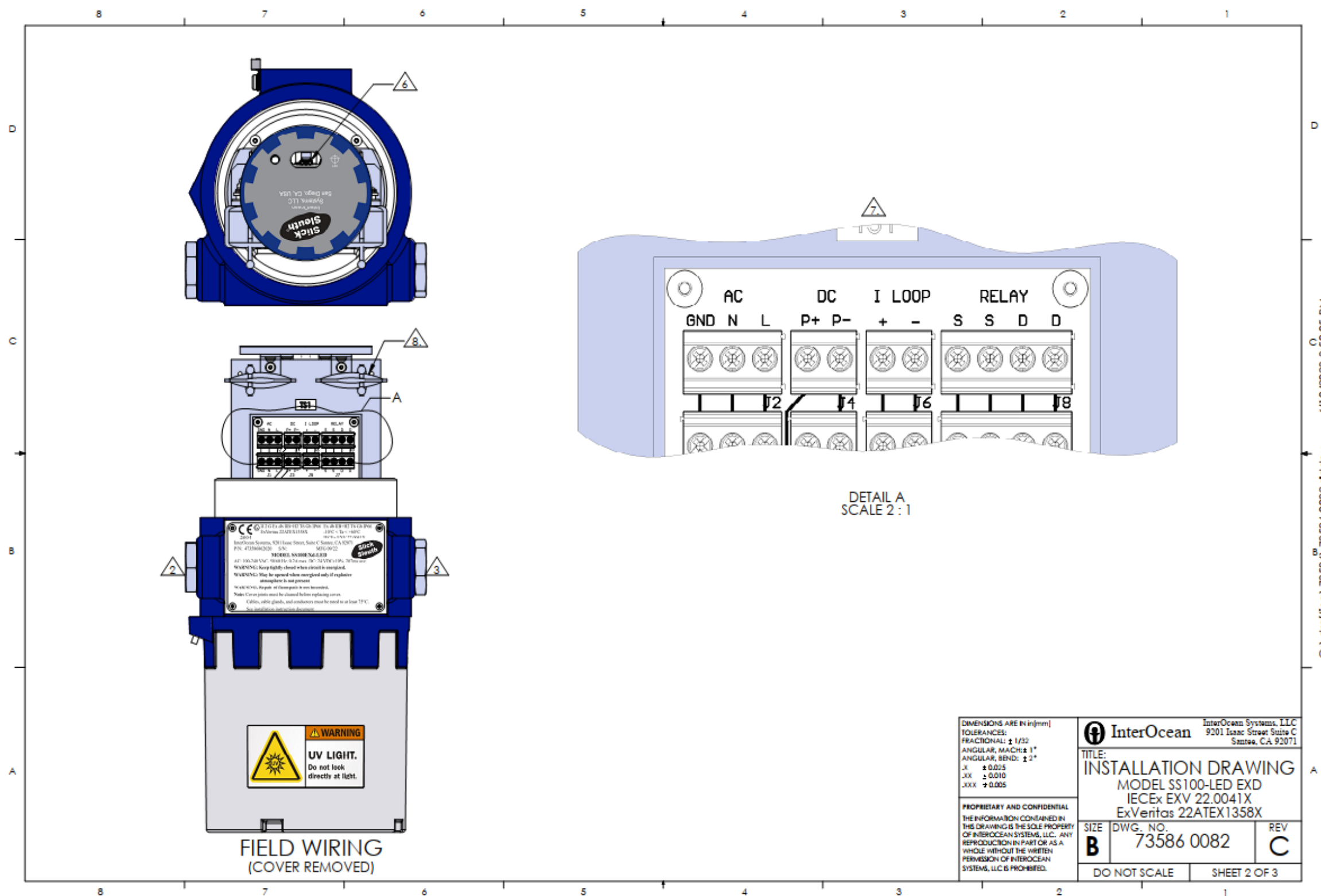
READ ALL INSTRUCTIONS

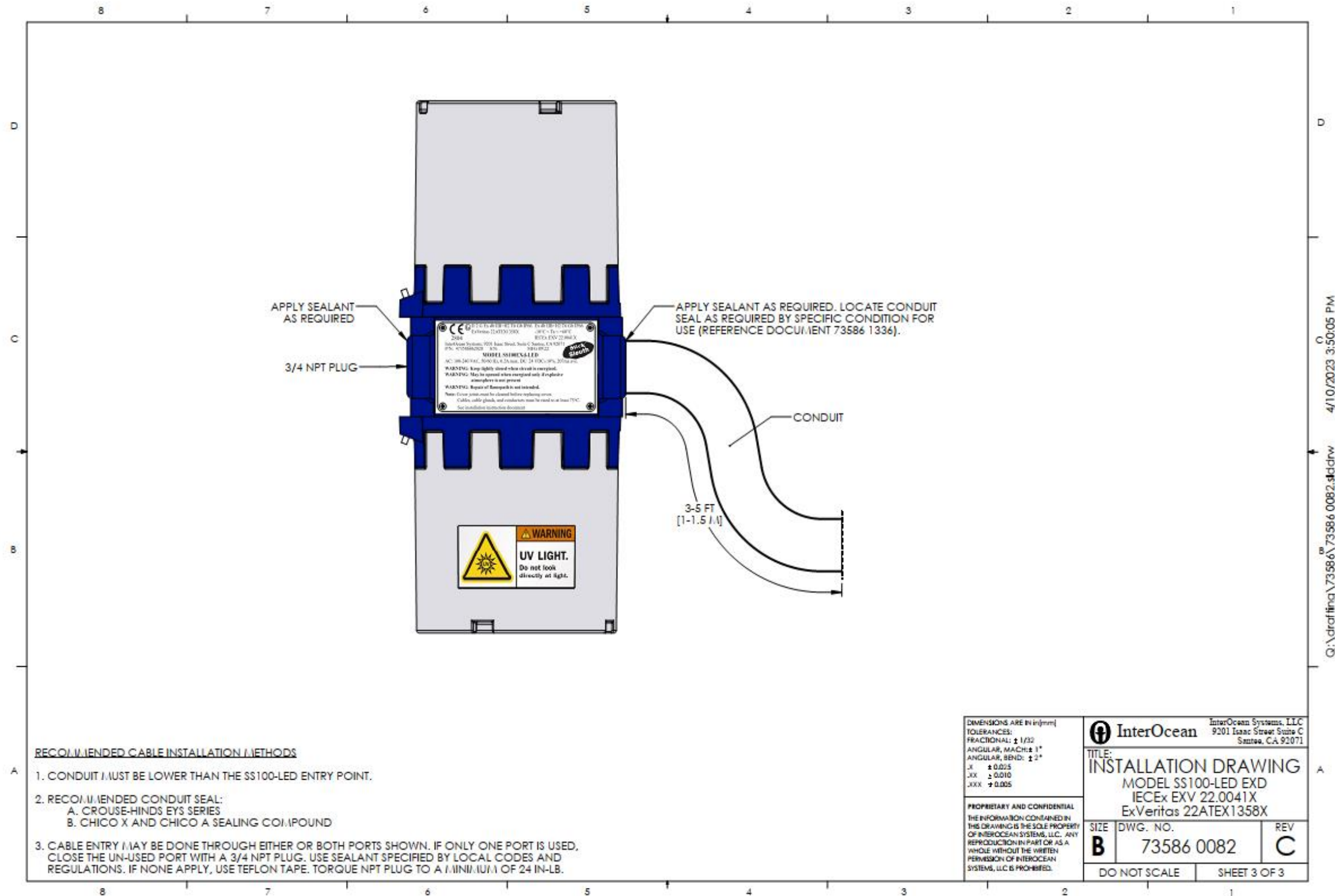
Failure to follow the following statements may result in serious personal injury or death.

- | | | |
|--|------------------------|---|
| | <u>WARNING:</u> | Risk of explosion. Keep cover tightly closed when circuits are energized. |
| | <u>WARNING:</u> | May be opened when energized only if explosive atmosphere is not present. |
| | <u>WARNING:</u> | To reduce the risk of explosion, conduit must be sealed within 18" of the enclosure or according to the requirements of local codes and regulations. |
| | <u>CAUTION:</u> | Installation must be performed according to the installation and wiring drawings contained in this manual. |
| | <u>WARNING:</u> | Repair of flame path is not intended. |
| | <u>CAUTION:</u> | Installation must be done by appropriately qualified personnel. |
| | <u>CAUTION:</u> | Installation must conform to all local electrical codes and regulations. |
| | <u>CAUTION:</u> | Clean cover joints before re-assembling unit. |

4.2 Installation Drawing









5 Preventative Maintenance (PM) Slick Sleuth Oil Spill Monitor

Every 30 Days, 60 Days, or As Required PM. See attached check list for example.

- 1) Conduct a thorough physical inspection of the Oil Spill Monitor.

Check the optics for obstructions; i.e. spider webs, salt, water spots, or foreign film. *If necessary* clean optical glass using the following procedure:

- i. Use compressed dry air and/or distilled water to flush away any film or debris build-up on the surface of the glass window.
- ii. **Caution:** when examining the glass surface on the underside of the sensor it is recommended that the unit be stopped (mode 0) to avoid extended direct eye exposure to UV light.
- iii. If dirt or impediment is still present after rinsing with distilled water, use lens tissue or a soft clean cloth to wipe away and clean optical glass surfaces. Commercial glass cleaner may be used if necessary to remove difficult dirt.
- iv. Use caution not to scratch optical glass.
- v. Use caution so that no oil or fingerprints are left on the optical glass surface.
- vi. Return unit to normal operating mode and setup parameters.
(Section 3.2 of the manual covers this procedure).

- 2) Inspect the sample area (water/ground) directly beneath the sensor for any obstructions, contaminants, and abnormalities. Observe area both above, on and below the water line.
- 3) Periodic field assurance test may also be conducted. At a fixed distance (for example ½ meter below sensor) place a sample of oil. If using oil is not an option, a sheet of white paper can be used to simulate oil, or material smeared with oil. For consistency the same type(s) and amount(s) of oil or 'oil simulating' material should be used to test alarm. Place oil beneath the sensor and confirm that local alarm activates, as well as in control room or wherever remote oil alarm output is monitored. Likewise confirm that PLC / externally activated devices such as pumps, valves, skimmers activate accordingly.
- 4) If any settings are changed using the Utility Program, record changes in instrument record and/or on check list. To check existing settings, select any command (i.e. Offset "T" command). Enter no value (leave blank), click OK, and then Send Command. Existing value is reported in message received window.



Every 6-Month, 1-Year, or As Required PM. See attached check list example.

- 5) Conduct thorough physical inspection described in item 1 above. Additionally:
- 6) Put the unit into mode 0 and power off prior to interior inspection and cleaning.
- 7) Inspect the conduit fittings to ensure they are secure.
- 8) Inspect each cover seal. Check for cracking, tearing, and for proper seal.
- 9) Inspect enclosure interior for debris (wire strands, loose hardware, etc) and remove as necessary. If dust build-up is present, carefully vacuum interior and/or blow out enclosure using compressed dry air.
- 10) Clean the enclosure of all debris and particulate matter.
- 11) Clean the window as described in Step 1. Replace desiccant packs as described in Section 4.1.1 on the IO&M Manual. If the color stripe on the desiccant packs are pink, the desiccant packs must be replaced immediately.

It is recommended that the desiccant packs be replaced every time the SS100-LED is opened to ensure the integrity of the SS100-LED.

- 12) Perform diagnostic check:
 1. Connect portable computer to the unit.
 2. Using SS Utility Program, put unit into mode 0 ("L" command).
 3. Issue a Status Request command ("S" command).
The result of a fully functional unit should be 0000. See Figure 1 for Example.
(all indicators should be green)
 4. If a number other than 0000 is present (if diagnostic fault is detected); consult the Status Report table in Appendix D (Operations Manual).
 5. Troubleshooting is covered in Section 4.3 of the manual.
 6. For further assistance contact InterOcean Systems: tel.858.565.8400 USA.



- 13) Issue a "Debug" (1) command to check the flash count.
1. This procedure is located in Appendix F.
 2. The Normalized Flash count is shown at the bottom of the window.
 3. Calculate a new pulse threshold value that is 80% of the flash count number observed in Step b. Enter the new value into the OSM by performing the following steps using the Utility Program:
 1. Go to the Real Time Logging window, select 'Factory Setup', then enter the factory password.
 2. Return to the main window.
 3. Select 'Pulse Threshold (Y)'.
 4. When the data entry window appears enter the 80% value calculated as the new pulse threshold value. Select 'OK'
 5. SEND the new value to the Slick Sleuth

EXAMPLE:

The flash count number observed in Step b. is 676. Calculate the new pulse threshold value:

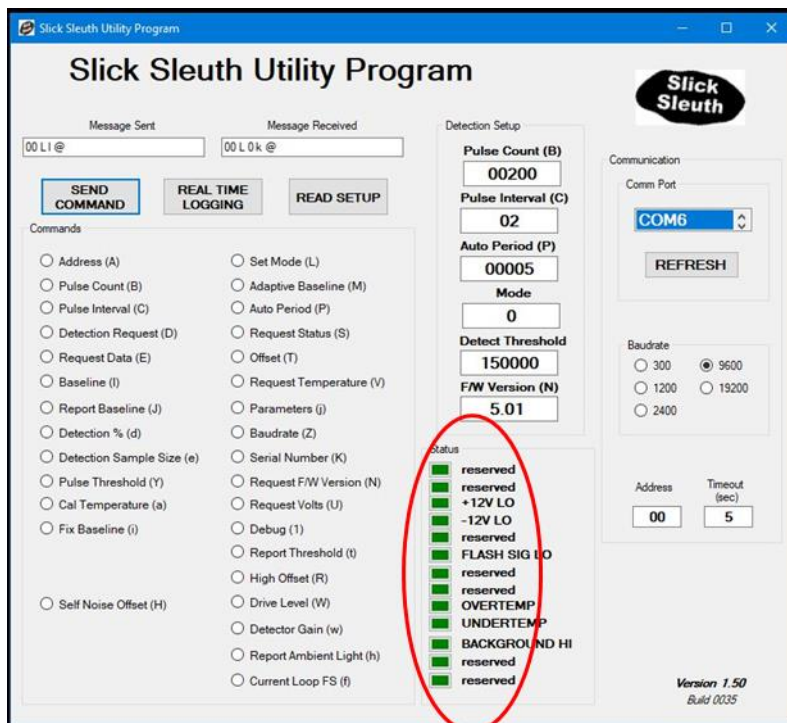
$$\text{Pulse Threshold Value} = 80\% * 676 = 541$$

This new value would be entered into the Slick Sleuth using the command sequence in Step c. The value would be entered as '0541'.

- 14) The anticipated UV LED life is approximately 5 years at the highest sampling rate. The fault alarm will alert the user to UV LED failure. Each UV LED (the SS100-LED contains two UV LED's) can be replaced at that time or can be treated as a periodic / preventative maintenance item and replaced on a cyclical schedule. Note that if UV LED failure is suspected, the first course of action is to perform items 12 and 13 above. If UV LED replacement is necessary (either failure or as PM), please refer to Section 4.2 for the replacement procedure. This will also direct you to Appendix F for completing the replacement process.



Figure 1 (on right)
#1 Status 0000 (in Message Received window). No faults
#2 Status Green Light. No fault.





Example: PM Checklist & Instrument Record



PREVENTATIVE MAINTENANCE CHECKLIST

MODEL SS100

Name:	
Date:	

		☒	Comments
Preventative Maintenance - Monthly			
1 Physical Inspection	☐		
2 Inspect Sample Area	☐		
3 Inspect desiccant & replace	☐		
4 Inspect Accessories	☐		
5 Field Assurance Test (Optional)	☐		
6 Settings - Utility Program (Optional)	☐		

Preventative Maintenance - Semiannually or Annually			
7 Physical inspection Items 1-5	☐		
8 Set mode to "0"	☐		
9 Inspect - Cable Glands	☐		
10 Inspect - Cover Seals	☐		
11 Inspect - Enclosure	☐		
12 Clean Window	☐		
13 Clean Enclosure and Accessories	☐		
14 Diagnostic Check	☐		
15 Flash Count Check	☐		
16 Flash Lamp Check	☐		
17 Return to Normal Operating Mode	☐		

		Record Value
Saved Configuration		
S Request Status	(i.e. 0000)	
J Report Baseline	(i.e. 50)	
T Send Offset	(i.e. 60)	
L Set Mode	(i.e. 4)	
P Autonomous Mode Period	(i.e. 0005 = 5 sec)	
M Enable Adaptive Baseline	(i.e. 00 Disabled/XX Enabled)	
B Flash Count	(i.e. 10)	
C Flash Interval	(i.e. 01 = 1 msec)	

Q:\manuals\DOC_CTRL\Documents\73586\73586 1307.xlsx73586 1307.xlsx 4/26/2021 12:36 PM



6 SLICK SLEUTH UV LED REPLACEMENT

References

Dwg. No. 735861315	Slick Sleuth OSM Quick Start Instructions
P/N 73586600104	Slick Sleuth Utility Program, V1.50

Procedure

NOTE

The following procedures have been developed based on use of the Utility Program.

- 6.1.1 Disconnect power to the Oil Spill Monitor (OSM).
- 6.1.2 It is recommended that this procedure be performed in a shop environment. The UV LED's are located in the lower portion of the housing on the mounting surface side. If there is open access to the UV LED's from the mounting surface side the UV LED's may be replaced in the field. If access is restricted in any way the OSM must be moved to a shop area to change one or both of the UV LED's.
- 6.1.3 Remove the cover on the bottom of the enclosure.
- 6.1.4 Locate the UV LED assemblies as shown in Figure 1.
- 6.1.5 Disconnect the plug on the UV LED that is to be replaced (see Figure 2).
- 6.1.6 Using a 3/32" Allen wrench remove the two screws that retain the UV LED (see Figure 3). If this is done in a shop area it works best to hold the OSM vertical so that the small screws are more easily managed.
- 6.1.6 Remove the UV LED from its mount by lifting up and then pulling out from the assembly.
- 6.1.7 Re-assembly is completed in reverse order.
- 6.1.8 After a UV LED is replaced an initialization measurement must be done (See Section 2.4 Initialization). UV LED's vary in performance, so it is critical that the Oil Spill Monitor be initialized to achieve good performance.
- 6.2.1 Cover each optics hole with opaque black electrical tape. Do not let the tape touch the surface of the optics.



- 6.2.2 Establish serial communications with the OSM using Step 2 in the Advanced Setup section of the Quick Start Instructions.
- 6.2.3 If the 'L' command returned a number other than 0, it is necessary to change the mode to facilitate this procedure. Write down the number returned in the 'L' command for re-initialization after completion of this procedure, then proceed with the following steps:
1. Select the 'L' command and enter 0 when asked to enter the mode. Select 'OK'.
 2. Click on the SEND COMMAND button.
 3. Observe that the OSM responds with 00 L 0 k @ or a similar response.
- 6.2.4 Click on the REAL TIME LOGGING button.
- 6.2.5 In the Real Time Logging window click on the Factory Setup button and enter the password '73586'.
- 6.2.6 Return to the main window.
- 6.2.7 Select the 'H' command and enter 00000 when asked to enter the Self Noise Offset. Click on the SEND COMMAND button.
- 6.2.8 Select the 'D' command. Click on the SEND COMMAND button. Wait for the unit to stop flashing before sending the next command.
- 6.2.9 Select the 'E' command. Click on the SEND COMMAND button.
- 6.2.10 The 7-digit number reported is the measured Self Noise offset. Record for reference.
- 6.2.11 Select the 'H' command and enter the number recorded in Step 2.10 when asked to enter the Self Noise Offset. Click on the SEND COMMAND button.

NOTE

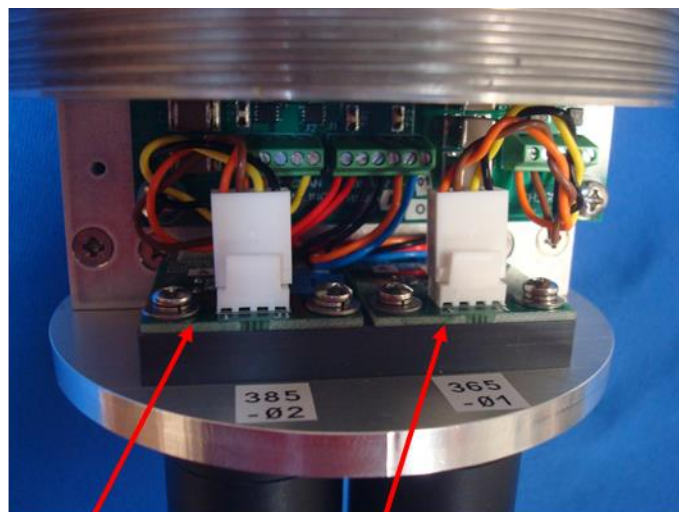
The entered number must be 4 digits in length. For example, if the measured and reported Self Noise Offset was '234', enter '0234'.

- 6.2.12 Remove the black electrical tape from the optics holes.
- 6.3.1 Select the '1' (Debug) command. Click on the SEND COMMAND button.



- 6.3.2 Wait approximately 5 seconds for the unit to complete its full self-diagnostics test. The response will appear in the large text box.
- 6.3.3 Locate the Normalized Flash counts See Figure 5.
- 6.3.4 Calculate a number that is 80% of the number read in Step 3.3. Round the number down to a whole integer. Example: the number read in Step 3.3 is 676. Calculating the value, $80\% * 676 = 540.8$. Rounding down, the number becomes 540.
- 6.3.5 Using the utility program, perform the following steps:
 - 6.3.5.1 Go to the Real Time Logging window and select 'Factory Setup'. Enter the password '73586'.
 - 6.3.5.2 In the main window select 'Pulse Threshold (Y)'.
 - 6.3.5.3 When the data entry window appears enter the value calculated in Step 3.4, then click on 'OK'. For the example in Step 3.4, the value entered would be '0540'.
 - 6.3.5.4 SEND the new value to the OSM.
- 6.4.1 Select the 'L' command and enter the number recorded in Step 2.3 to restore the normal operating mode.
- 6.4.2 Click on the SEND COMMAND button.
- 6.4.3 Observe that the OSM responds with 00 L X a @, and that the OSM returns to its normal operating mode. X is the number you entered for the mode. The '00' and the checksum may be different than written here.

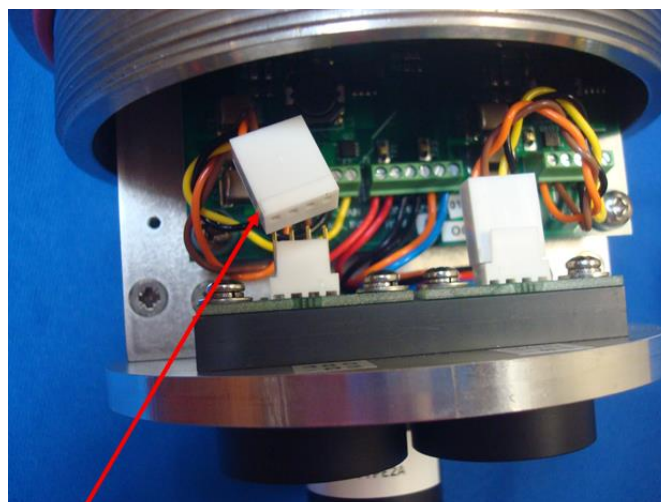
PROCEDURE COMPLETE



UV LED
Position #2

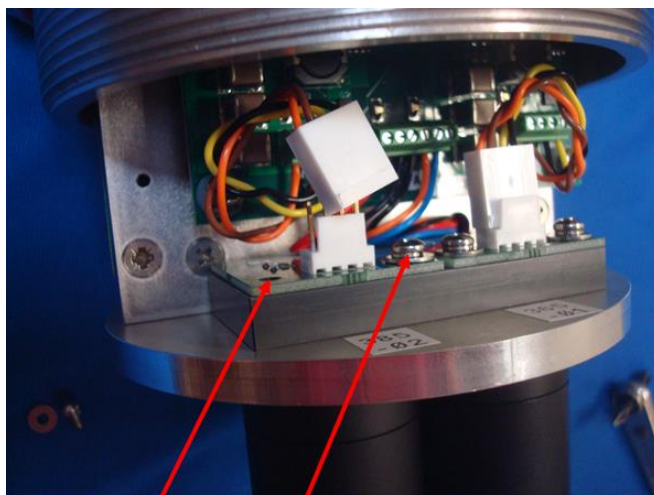
UV LED
Position #1

Figure 1
UV LED Assemblies



Disconnect Plug

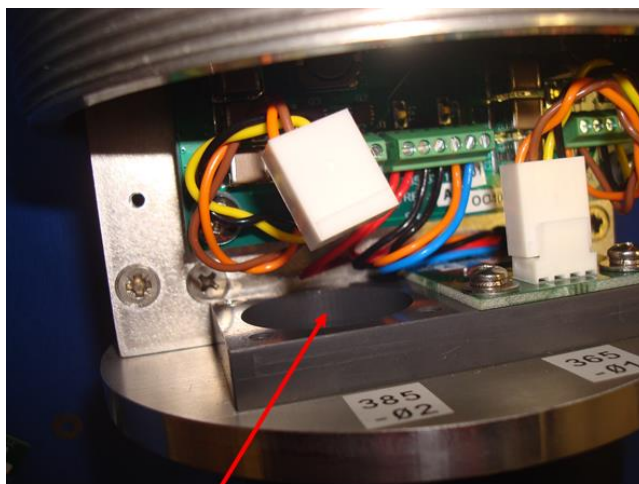
Figure 2



Remove Screws

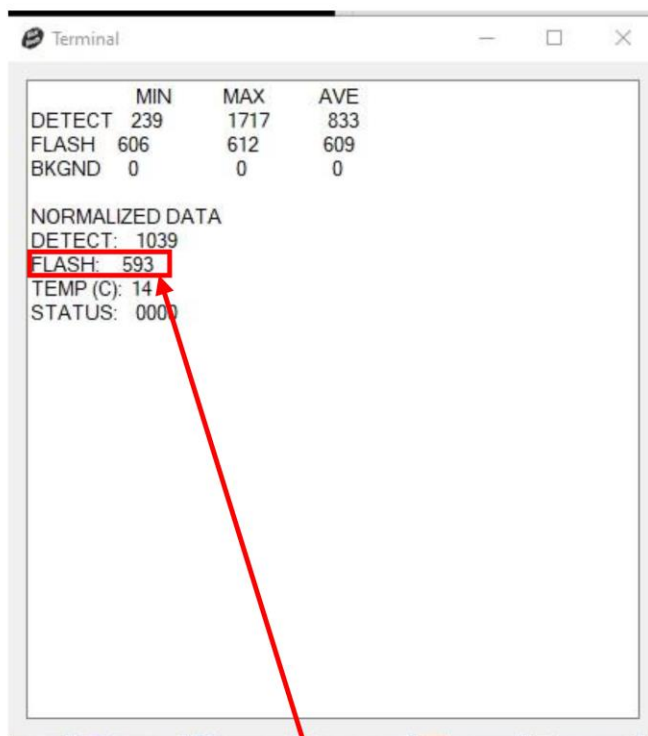
(left screw has been
removed in this view)

Figure 3



UV LED in Position #2
removed

Figure 4



Normalized Flash Count

Figure 5

APPENDIX A

SLICK SLEUTH UTILITY PROGRAM

APPLICATION NOTES
SLICK SLEUTH UTILITY PROGRAM
Version 1.50 May, 2021

SOFTWARE INSTALLATION

Operating System: Microsoft Windows 7, 8, 10

Place the program CD in the PC's CD drive or copy the Utility Program folder from external media onto the PC.

Launch setup.exe and follow the on-screen instructions.

HARDWARE INSTALLATION

The connection to the Slick Sleuth must be done through a cable as described in Appendix C of the Technical Manual.

If the Slick Sleuth has been setup at a different baudrate than the 9600-baud default, click on the appropriate baudrate in the User Baudrate box.

Click on the COM port to be used in the Comm Port box. If the port is not available (in use by another application or is not present), the program will alert the user.

BEFORE PROCEEDING

Read all instructions in this file before sending commands to the Slick Sleuth. It is also highly recommended that the Quick Start guide be reviewed as it may contain more current information on the operation of the Slick Sleuth.

BAUDRATE

The default baudrate of the Slick Sleuth is 9600 baud. The Utility Program always starts with this as its baudrate. If the Slick Sleuth has been set to a different baudrate, it will not respond to commands from the Utility Program (as evidenced by the message "Time Out>>" in the Message Received box). To determine the proper baudrate select "19200", then re-send the command. If the Slick Sleuth does not respond (i.e. "Time Out>>"), change the baudrate to another value and repeat this process until the Slick Sleuth responds.

SENDING COMMANDS

Before commands can be sent to the Slick Sleuth, the address of the Slick Sleuth must be entered in the Address box. Typically, every Slick Sleuth has address '00' (a Slick Sleuth in a polled system would be the exception). To change the address, always type a two-digit address in the Address box.

NOTE

It is advisable to set the Slick Sleuth mode to 0 (polled) before sending other commands to the Slick Sleuth. Follow the instructions in Steps 1-3 of the Quick Start to set the mode and then restore the factory mode setting when done.

To send a command follow these steps:

1. Click on the command to be sent.
2. If the command can send a setting to the Slick Sleuth, a box will open requesting the value and providing guidance on the range and format of the value.
3. If the user only wishes to read the setting from the Slick Sleuth, no value is entered and the 'OK' button is clicked.
4. If the user wishes to send a new setting to the Slick Sleuth, a new value is entered and the 'OK' button is clicked.

NOTE

If the user chooses to select another command rather than send the selected command, he may simply click on the new command.
If the user chooses to change the selected command (e.g. change a mistakenly entered value), click on the command button again and re-enter the command.

5. Click on the SEND COMMAND button.
6. Observe the response from the Slick Sleuth in the Message Received box.

Examples:

- A. Read the Offset from the Slick Sleuth:
 1. Click on the 'T' command
 2. A box opens requesting the value. Click on 'OK' without entering a value.
 3. Click on the SEND COMMAND button.
 4. The Slick Sleuth responds in the Message Received box. The number after the 'T' in the response is the offset value.
- B. Send a new Offset to the Slick Sleuth:
 1. Click on the 'T' command
 2. A box opens requesting the value. Enter the new Offset and click on 'OK'.
 3. Click on the SEND COMMAND button.
 4. The Slick Sleuth responds in the Message Received box. The number after the 'T' in the response should be the same as the number sent (if the Slick Sleuth accepted the change).

The B, C, and P commands control the measurement timing of the Slick Sleuth. If any one command is entered with a value that conflicts with the other two, the Utility Program will prevent the change and prompt the user to enter an acceptable value. To ensure proper performance, verify that the settings meet the criterion of this equation:

$$P > (B * C + 500) / 1000$$

Example:

Pulse count = 200
Pulse interval = 2
Period = 5

$(200 * 2 + 500) / 1000 = 2.5$
Since $5 > 2.5$ the setup is a valid setup.

COMMAND SUMMARY

<u>Command</u>	<u>Description</u>	<u>Range</u>
A	Address - set or read Slick Sleuth address	001 – 500
B	Pulse Count - set or read number of pulses/sample	01 – 10
C	Pulse Interval - set or read interval between pulses (1 msec/unit)	01 – 99
D	Detection Request - command the Slick Sleuth to take an immediate sample	
E	Request Data - request report of last sample taken (generally following the 'D' command)	
H	Self Noise Offset – set or read Self Noise Offset Correction	0 – 9999
I	Set Baseline - command Slick Sleuth to take an immediate sample to establish the baseline	
J	Report Baseline - request report of the baseline measurement (generally following the I command)	
L	Set Mode - set or read the operating mode. The mode identification is provided in the table below. 0 - polled 1 - autonomous, with or without relay output only (no current loop) 4 - autonomous, current loop discrete output 5 - autonomous, current loop scaled output 6 - autonomous, current loop scaled and corrected output	
f	User selectable current loop full scale range (counts)	500 - 32767
M	Enable Adaptive Baseline - disable adaptive baseline or set the time span (min.)	00 (disable) – 99
P	Autonomous Mode Period - set or read the period for autonomous mode sampling (sec)	0000 - 9999
S	Request Status - request an immediate status measurement and report. The status word includes the mode identification. The status word representing a healthy Slick Sleuth is listed in the table below for each mode.	

Mode	'Healthy' Status Word
0	0000
1	2000
4	8000
5	A000
6	C000

T	Send Lower Threshold Offset - set or read the offset used for the detection threshold	0 – 9999
R	Send Upper Threshold Offset - set or read the offset used for discrimination against nuisance objects	100 – 35000
V	Request Temperature - request report of internal temperature (deg. C)	
Y	Pulse Threshold – set or read Pulse Threshold	0000 – 0999
d	Detection Probability Percentage – set or read Detection Probability Percentage	0,25,50,75,100
e	Detection Probability Sample Size (# of samples) – set or read Detection Probability Sample Size	4,8,12,...,96
t	Read detection threshold (counts)	
i	Baseline – set or read the baseline	0 – 9999
j	Parameters list	
1	Debug – perform the self test function	

USER ASSISTANCE

If assistance is needed in the use of the Utility Program or in the operation of the Slick Sleuth, contact InterOcean Systems at: 858-565-8400 Phone (U.S) or sales@interoceansystems.com

APPENDIX B

THEORY OF OPERATION

The SS100-LED Oil Spill Monitor is a remote sensing device for the detection of oil pollution on any surface, most commonly a water surface. It detects oil by stimulating fluorescence in the oil and then detecting the fluorescence. A short burst of collimated UV light is directed onto the surface. The resulting fluorescence is filtered and detected by a focused optical system.

The detected fluorescence is digitized by a 24-bit A/D scaled to 15 significant bits. The fluorescence level for each pulse within a sample (typically 200 pulses) are averaged together to reduce noise and improve signal integrity. The result is an integer number in the range of 0 – 32,767 “counts” (engineering units).

The signal measured by the A/D has several components. Figure B-1 illustrates the components. Starting at the bottom of the figure, the Oil Spill Monitor has some inherent self-noise and offset, typically on the order of 200 counts. The self-noise count is subtracted from all measurements before the measurement counts are reported and/or used for detection and output.

The ambient condition, which can consist of several things but is predominantly unwanted reflection from a water surface, adds to the measurement. When a “baseline” measurement is performed, the level that is recorded and used as a part of a detection algorithm is the level of the ambient condition. Added above the ambient condition (baseline) is the fluorescence from any oil detected.

For purposes of discrete detection (i.e. discrete current loop output, relay, or “Y/N” digital output) a “detection threshold” is established. This is accomplished by inputting an “offset”, a variable that the operator uses to establish the detection threshold and thereby the detector sensitivity. Any count value above the detection threshold is a detection. Mathematically the detection threshold is expressed as:

$$\text{Detection Threshold} = \text{Baseline} + \text{Offset}$$

The current loop output has one or more corrections applied to it, dependent on operating mode. In Scaled Output (mode 5) the self-noise is subtracted from the measured counts and then converted to current output. In this case 4 ma out represents the level of the self-noise (200 counts typ in Figure B-1). Full scale output is the user-specified I Loop FS counts minus the self-noise. In Figure B-1 full scale is 20,000 counts (user-specified).

In Scaled/Corrected Output (mode 6) both the self-noise and the baseline are subtracted from the measured counts and then converted to current output. In this case 4 ma out represents the baseline level (250 counts typ in Figure B-1) plus the self-noise (200 counts typ in Figure B-1). Full scale output is the user-specified I Loop FS counts minus the baseline and the self-noise. In Figure B-1 full scale would be 19,550 counts.

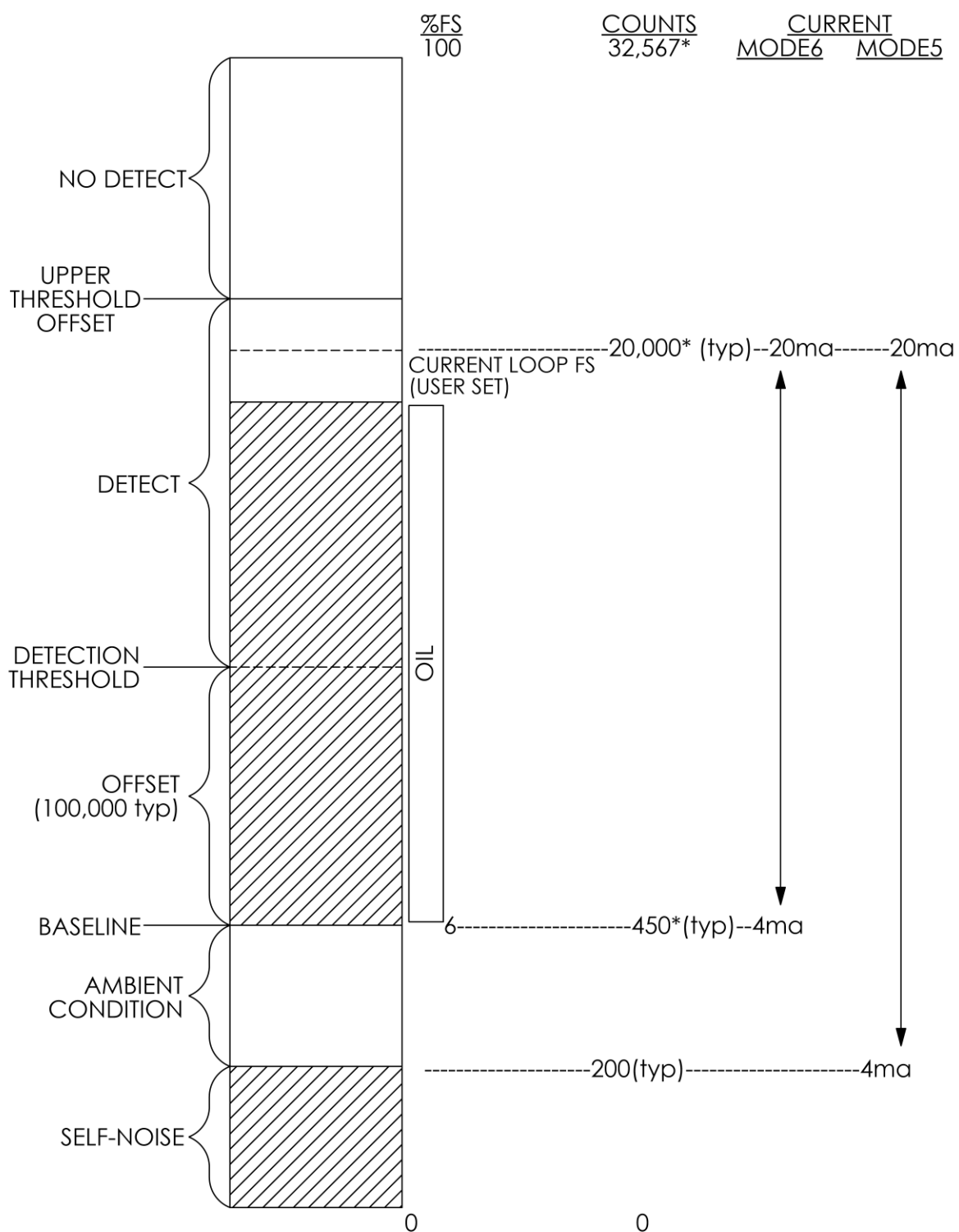


Figure B-1
Detection Output
*counts after self-noise has been subtracted

APPENDIX C

**EXTERNAL
SERIAL COMMUNICATIONS INTERFACE**

The external serial communications interface is a USB port which communicates through a virtual COM port on a PC. It is typically configured for 9600 baud, 8 bit, 1 stop bit, no parity. The baudrate is programmable and may be set during production as specified by the purchase order. If the baudrate is not specified by the purchase order, the baudrate is set at the default value of 9600 baud.

The interconnection between the OSM and the PC is a 5-pin micro USB connector located under the top glass cover. A mating cable, IOS P/N 940012522, is provided to make this interconnection.

APPENDIX D

SERIAL COMMUNICATIONS PROTOCOL

SLICK SLEUTH

SERIAL COMMUNICATIONS PROTOCOL SLICK SLEUTH

A. SERIAL COMMUNICATION

For local access, typically for initial setup or periodic maintenance, a USB port is provided under the top cover of the enclosure. The port provides the user with two capabilities: 1) The ability to change setup parameters and obtain a status report on the health of the Station, and 2) access to the periodic detection report in digital format.

B. OIL SPILL MONITOR FACTORY SETUP

During factory setup the Oil Spill Monitor accepts simple setup commands for test and configuration. The Oil Spill Monitor replies with an acknowledgement.

C. FIELD SETUP

Each Oil Spill Monitor may be setup in the field as required. Typically, all setup (excluding baseline) is done at the Factory prior to shipment and no further setup is required. Baseline measurement must be done at installation to ensure that the detection threshold is set properly.

The typical response from an OSM in the 'Message Received' window of the Utility Program has this form for reference:

AA C XXXX M@

Where:

AA – unit address (typically '00')

C – An echo of the command character sent to the OSM

XXXX – the data requested by the command

M@ - checksum and end character

The Request Data and Status commands have a response in this form:

AA C X XXXX Y SSSS M@

Where:

SSSS – status word

Y (or N) – detect or no detect (N)

STATUS REPORT

Equipment status is reported as a four ASCII character representation of a two-byte hex-encoded self-test status word. The bits of the status word are encoded as follows:

BIT	NIBBLE	LABEL	FUNCTION			
0	4		Reserved			
1			Reserved			
2		+12V LO	Regulated +12V supply below min.			
3		-12V LO	Regulated –12V supply below min.			
4	3		Reserved			
5		FLASH SIG LO	Flash light output below min.			
6			Reserved			
7			Reserved			
8	2	OVERTEMP	Internal temperature above specified max.			
9		UNDERTEMP	Internal temperature below specified min.			
10		BKGND HI	High ambient light detected, may cause detector sensitivity loss			
11			Reserved			
12	1		Reserved			
13		MODE0	Three- <i>bit</i> representation of autonomous operating mode:			
14 15		MODE1	MODE	MODE2	MODE1	MODE0
		MODE2	4-20 discrete	1	0	0
	4-20 scaled		1	0	1	
		4-20 scaled/corrected	1	1	0	

When any one of bits 0-12 is set, it indicates that a fault has occurred. Bits 13-15 are a 3-bit encoded representation of the operating mode of the Oil Spill Monitor.

When status is reported by the Oil Spill Monitor it is reported in the following format:

(Nibble 1) (Nibble 2) (Nibble 3) (Nibble 4)

Normal (healthy) operational status is reported as 8000 in the 4-20 discrete output mode, A000 in the 4-20 scaled output mode, and C000 in the 4-20 scaled/corrected output mode.

Hexadecimal to Binary Conversion Table

Status Digit (Hexadecimal)	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

APPENDIX E

PREVENTATIVE MAINTENANCE

**Preventative Maintenance (PM)
Slick Sleuth Oil Spill Monitor**

Every 30 Days, 60 Days, or As Required PM. See attached check list for example.

- 1) Conduct a thorough physical inspection of the Oil Spill Monitor.

Check the optics for obstructions; i.e. spider webs, salt, water spots, or foreign film. *If necessary* clean optical glass using the following procedure:

- i. Use compressed dry air and/or distilled water to flush away any film or debris build-up on the surface of the glass window.
- ii. **Caution:** when examining the glass surface on the underside of the sensor it is recommended that the unit be stopped (mode 0) to avoid extended direct eye exposure to UV light.
- iii. If dirt or impediment is still present after rinsing with distilled water, use lens tissue or a soft clean cloth to wipe away and clean optical glass surfaces. Commercial glass cleaner may be used if necessary to remove difficult dirt.
- iv. Use caution not to scratch optical glass.
- v. Use caution so that no oil or fingerprints are left on the optical glass surface.
- vi. Return unit to normal operating mode and setup parameters.
(Section 3.2 of the manual covers this procedure).

- 2) Inspect the sample area (water/ground) directly beneath the sensor for any obstructions, contaminants, and abnormalities. Observe area both above, on and below the water line.
- 3) Periodic field assurance test may also be conducted. At a fixed distance (for example ½ meter below sensor) place a sample of oil. If using oil is not an option, a sheet of white paper can be used to simulate oil, or material smeared with oil. For consistency the same type(s) and amount(s) of oil or 'oil simulating' material should be used to test alarm. Place oil beneath the sensor and confirm that local alarm activates, as well as in control room or wherever remote oil alarm output is monitored. Likewise confirm that PLC / externally activated devices such as pumps, valves, skimmers activate accordingly.
- 4) If any settings are changed using the Utility Program, record changes in instrument record and/or on check list. To check existing settings, select any command (i.e. Offset "T" command). Enter no value (leave blank), click OK, and then Send Command. Existing value is reported in message received window.

Every 6-Month, 1-Year, or As Required PM. See attached check list example.

- 5) Conduct thorough physical inspection described in item 1 above. Additionally:
- 6) Put the unit into mode 0 and power off prior to interior inspection and cleaning.
- 7) Inspect the conduit fittings to ensure they are secure.
- 8) Inspect each cover seal. Check for cracking, tearing, and for proper seal.
- 9) Inspect enclosure interior for debris (wire strands, loose hardware, etc) and remove as necessary. If dust build-up is present, carefully vacuum interior and/or blow out enclosure using compressed dry air.
- 10) Clean the enclosure of all debris and particulate matter.
- 11) Clean the window as described in Step 1. Replace desiccant packs as described in Section 4.1.1 on the IO&M Manual. If the color stripe on the desiccant packs are pink, the desiccant packs must be replaced immediately.

It is recommended that the desiccant packs be replaced every time the SS100-LED is opened to ensure the integrity of the SS100-LED.

- 12) Perform diagnostic check:
 - a. Connect portable computer to the unit.
 - b. Using SS Utility Program, put unit into mode 0 ("L" command).
 - c. Issue a Status Request command ("S" command).
The result of a fully functional unit should be 0000. See Figure 1 for Example.
(all indicators should be green)
 - d. If a number other than 0000 is present (if diagnostic fault is detected); consult the Status Report table in Appendix D (Operations Manual).
 - e. Troubleshooting is covered in Section 4.3 of the manual.
 - f. For further assistance contact InterOcean Systems: tel.858.565.8400 USA.
- 13) Issue a "Debug" (1) command to check the flash count.
 - a. This procedure is located in Appendix F.
 - b. The Normalized Flash count is shown at the bottom of the window.
 - c. Calculate a new pulse threshold value that is 80% of the flash count number observed in Step b. Enter the new value into the OSM by performing the following steps using the Utility Program:
 1. Go to the Real Time Logging window, select 'Factory Setup', then enter the factory password.
 2. Return to the main window.
 3. Select 'Pulse Threshold (Y)'.
 4. When the data entry window appears enter the 80% value calculated as the new pulse threshold value. Select 'OK'
 5. SEND the new value to the Slick Sleuth

EXAMPLE:

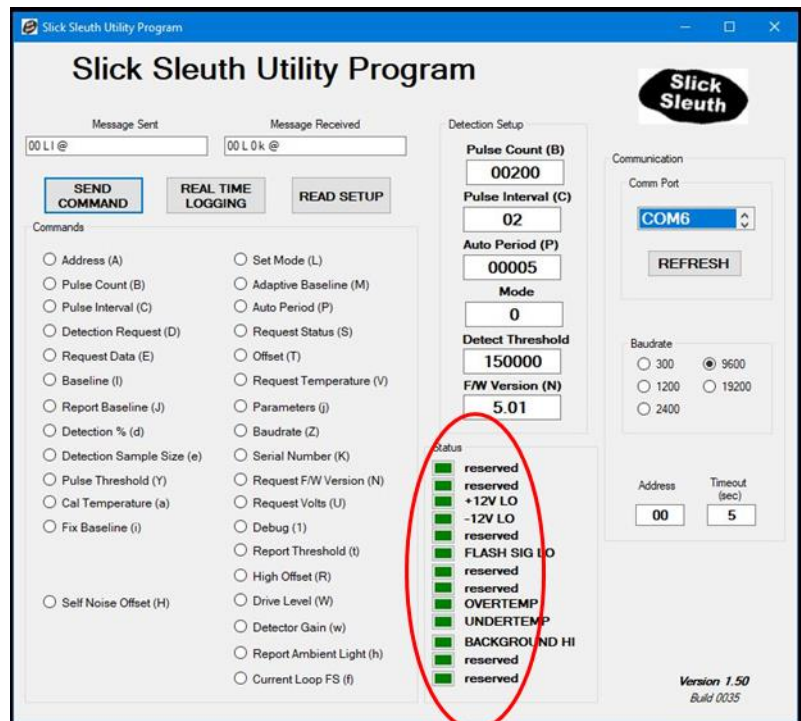
The flash count number observed in Step b. is 676. Calculate the new pulse threshold value:

$$\text{Pulse Threshold Value} = 80\% * 676 = 541$$

This new value would be entered into the Slick Sleuth using the command sequence in Step c. The value would be entered as '0541'.

- 14) The anticipated UV LED life is approximately 5 years at the highest sampling rate. The fault alarm will alert the user to UV LED failure. Each UV LED (the SS100-LED contains two UV LED's) can be replaced at that time or can be treated as a periodic / preventative maintenance item and replaced on a cyclical schedule. Note that if UV LED failure is suspected, the first course of action is to perform items 12 and 13 above. If UV LED replacement is necessary (either failure or as PM), please refer to Section 4.2 for the replacement procedure. This will also direct you to Appendix F for completing the replacement process.

Figure 1 (on right)
#1 Status 0000 (in Message Received window). No faults
#2 Status Green Light. No fault.





PREVENTATIVE MAINTENANCE CHECKLIST MODEL SS100

Name:	
Date:	

	☒	Comments
Preventative Maintenance - Monthly		
1 Physical Inspection	☐	
2 Inspect Sample Area	☐	
3 Inspect desiccant & replace	☐	
4 Inspect Accessories	☐	
5 Field Assurance Test (Optional)	☐	
6 Settings - Utility Program (Optional)	☐	

Preventative Maintenance - Semiannually or Annually		
7 Physical inspection Items 1-5	☐	
8 Set mode to "0"	☐	
9 Inspect - Cable Glands	☐	
10 Inspect - Cover Seals	☐	
11 Inspect - Enclosure	☐	
12 Clean Window	☐	
13 Clean Enclosure and Accessories	☐	
14 Diagnostic Check	☐	
15 Flash Count Check	☐	
16 Flash Lamp Check	☐	
17 Return to Normal Operating Mode	☐	

		Record Value
Saved Configuration		
S Request Status	(i.e. 0000)	
J Report Baseline	(i.e. 50)	
T Send Offset	(i.e. 60)	
L Set Mode	(i.e. 4)	
P Autonomous Mode Period	(i.e. 0005 = 5 sec)	
M Enable Adaptive Baseline	(i.e. 00 Disabled/XX Enabled)	
B Flash Count	(i.e. 10)	
C Flash Interval	(i.e. 01 = 1 msec)	

APPENDIX F

SLICK SLEUTH UV LED REPLACEMENT INSTRUCTIONS

SLICK SLEUTH UV LED REPLACEMENT INSTRUCTIONS

References

Dwg. No. 735861315 Slick Sleuth OSM Quick Start Instructions
P/N 73586600104 Slick Sleuth Utility Program, V1.50

Procedure

NOTE

The following procedures have been developed based on use of the Utility Program.

- 1.1 Disconnect power to the Oil Spill Monitor (OSM).
- 1.2 It is recommended that this procedure be performed in a shop environment. The UV LED's are located in the lower portion of the housing on the mounting surface side. If there is open access to the UV LED's from the mounting surface side the UV LED's may be replaced in the field. If access is restricted in any way the OSM must be moved to a shop area to change one or both of the UV LED's.
- 1.3 Remove the cover on the bottom of the enclosure.
- 1.4 Locate the UV LED assemblies as shown in Figure 1.
- 1.5 Disconnect the plug on the UV LED that is to be replaced (see Figure 2).
- 1.6 Using a 3/32" Allen wrench remove the two screws that retain the UV LED (see Figure 3). If this is done in a shop area it works best to hold the OSM vertical so that the small screws are more easily managed.
- 1.7 Remove the UV LED from its mount by lifting up and then pulling out from the assembly.
- 1.8 Re-assembly is completed in reverse order.
- 1.9 After a UV LED is replaced an initialization measurement must be done (See Section 2.4 Initialization). UV LED's vary in performance, so it is critical that the Oil Spill Monitor be initialized to achieve good performance.
- 2.1 Cover each optics hole with opaque black electrical tape. Do not let the tape touch the surface of the optics.
- 2.2 Establish serial communications with the OSM using Step 2 in the Advanced Setup section of the Quick Start Instructions.

- 2.3 If the 'L' command returned a number other than 0, it is necessary to change the mode to facilitate this procedure. Write down the number returned in the 'L' command for re-initialization after completion of this procedure, then proceed with the following steps:
1. Select the 'L' command and enter 0 when asked to enter the mode. Select 'OK'.
 2. Click on the SEND COMMAND button.
 3. Observe that the OSM responds with 00 L 0 k @ or a similar response.
- 2.4 Click on the REAL TIME LOGGING button.
- 2.5 In the Real Time Logging window click on the Factory Setup button and enter the password '73586'.
- 2.6 Return to the main window.
- 2.7 Select the 'H' command and enter 00000 when asked to enter the Self Noise Offset. Click on the SEND COMMAND button.
- 2.8 Select the 'D' command. Click on the SEND COMMAND button. Wait for the unit to stop flashing before sending the next command.
- 2.9 Select the 'E' command. Click on the SEND COMMAND button.
- 2.10 The 7-digit number reported is the measured Self Noise offset. Record for reference.
- 2.11 Select the 'H' command and enter the number recorded in Step 2.10 when asked to enter the Self Noise Offset. Click on the SEND COMMAND button.

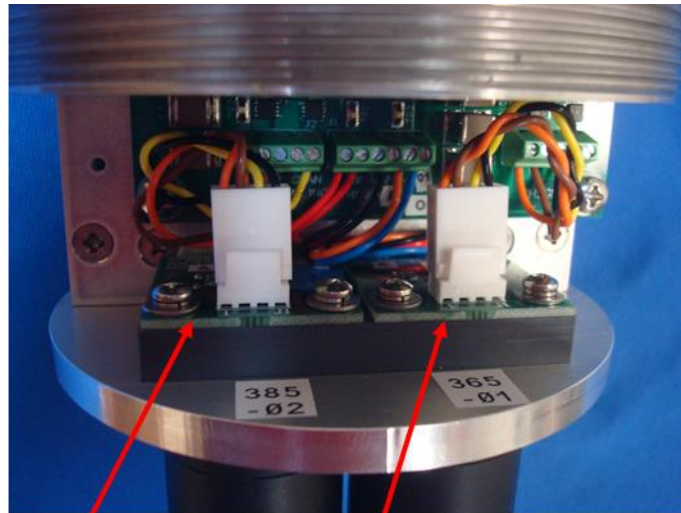
NOTE

The entered number must be 4 digits in length. For example, if the measured and reported Self Noise Offset was '234', enter '0234'.

- 2.12 Remove the black electrical tape from the optics holes.
- 3.1 Select the '1' (Debug) command. Click on the SEND COMMAND button.
- 3.2 Wait approximately 5 seconds for the unit to complete its full self-diagnostics test. The response will appear in the large text box.
- 3.3 Locate the Normalized Flash counts See Figure 5.
- 3.4 Calculate a number that is 80% of the number read in Step 3.3. Round the number down to a whole integer. Example: the number read in Step 3.3 is 676. Calculating the value, $80\% \times 676 = 540.8$. Rounding down, the number becomes 540.

- 3.5 Using the utility program, perform the following steps:
- 3.5.1 Go to the Real Time Logging window and select 'Factory Setup'. Enter the password '73586'.
 - 3.5.2 In the main window select 'Pulse Threshold (Y)'.
 - 3.5.3 When the data entry window appears enter the value calculated in Step 3.4, then click on 'OK'. For the example in Step 3.4, the value entered would be '0540'.
 - 3.5.4 SEND the new value to the OSM.
- 4.1 Select the 'L' command and enter the number recorded in Step 2.3 to restore the normal operating mode.
- 4.2 Click on the SEND COMMAND button.
- 4.3 Observe that the OSM responds with 00 L X a @, and that the OSM returns to its normal operating mode. X is the number you entered for the mode. The '00' and the checksum may be different than written here.

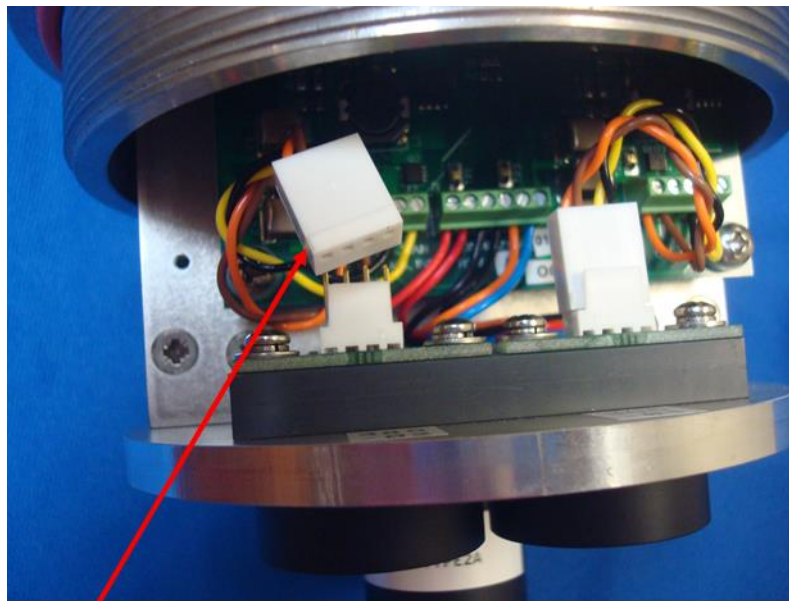
PROCEDURE COMPLETE



UV LED
Position #2

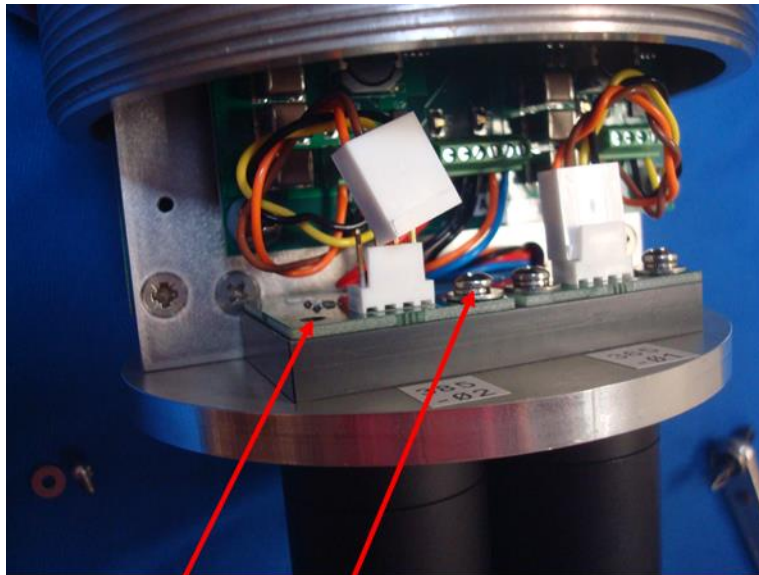
UV LED
Position #1

Figure 1
UV LED Assemblies



Disconnect Plug

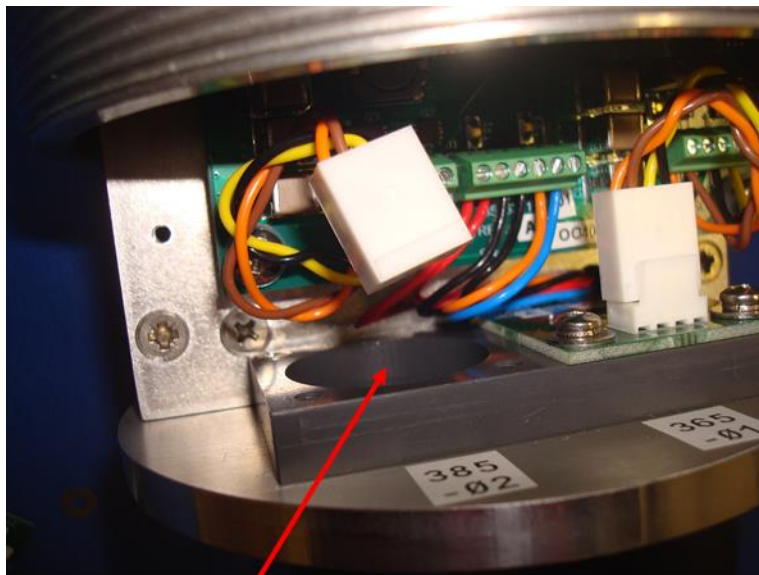
Figure 2



Remove Screws

(left screw has been
removed in this view)

Figure 3



UV LED in Position #2
removed

Figure 4

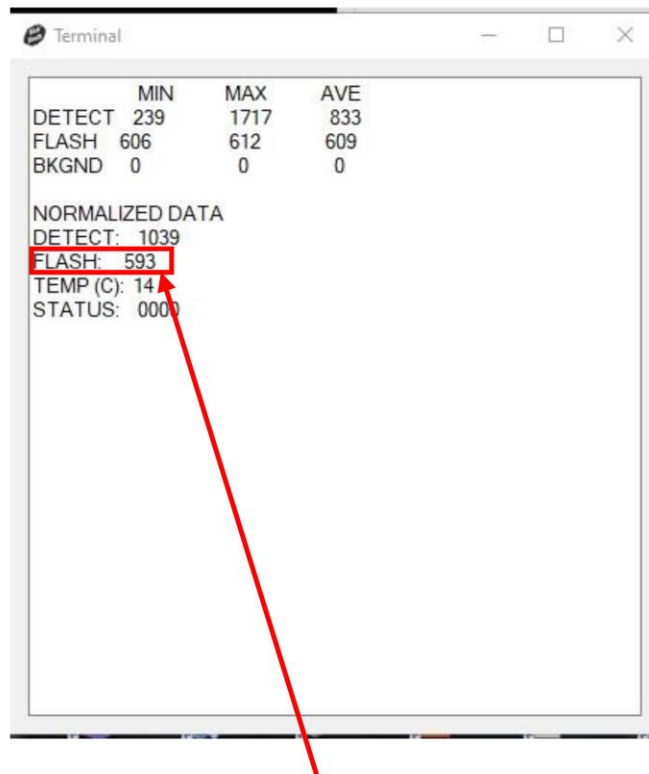


Figure 5

APPENDIX G

USB DRIVER INSTALLATION

INTRODUCTION

The USB port on the Oil Spill Monitor requires drivers to be installed on the connected PC. Generally, the drivers supplied by Microsoft are suitable, but depending on the operating system (OS) and the hardware platform the drivers may not perform properly. In this case drivers must be downloaded from the manufacturer of the USB interface hardware and installed to insure proper performance.

DRIVER INSTALLATION

1. Connect the PC to the Internet and go to ftdichip.com.
2. On the left side of the home window select 'DRIVERS'.
3. Under 'DRIVERS' select 'VCP DRIVERS'.
4. The window that appears is the Virtual COM Port Drivers window. On this window:
 - a. Select 'Installation Guides'. Locate the Installation Guide appropriate to the OS of the PC, download and open it.
 - b. Return to the Virtual COM Port window and select the driver appropriate to the OS and download it.
5. Follow the instructions in the Installation Guide to install the driver.

APPENDIX H

RS485/RS232

SCOPE

This Appendix provides information specific to the RS485 and RS232 ports for the Slick Sleuth SS100-LED.

The two serial ports are user-selectable and are mutually exclusive. Only one port can be used at a time. By default the RS485 port is selected from the factory unless otherwise directed by customer order.

1 RS485

1.1 DESCRIPTION

The RS485 port provides the user with a screw terminal plug that provides a 4-wire RS485 serial connection to the SS100-LED. This connection provides the means for the user to remotely monitor the operation of the SS100-LED and to perform changes to operating characteristics as required.

1.2 SPECIFICATIONS

Screw Terminal Plug

Wire Gauge 18 - 26 AWG (stranded)

1.3 INSTALLATION

1.3.1 4-Wire Connection

Field wiring is done using cable with a minimum of 5 conductors conforming to the wire gauge specification. It is recommended that the wire be grouped in two twisted shielded pairs (TSP) plus a minimum of one wire, or that the cable have an overall shield, to minimize the risk of external interference. If TSP cable is used, one pair must be used for transmit (TX) and one pair must be used for receive (RX).

Field wiring is routed through one of the two conduit hubs located adjacent to terminal strip TS1. The screw terminal plug for the RS485 wire termination, TS2, is a small green plug located underneath TS1. The plug may be removed from its mating receptacle to facilitate wiring.

The wire termination is done as shown in Figure 1 below. The terminal numbers for TS2 are marked at the back of the plug receptacle.

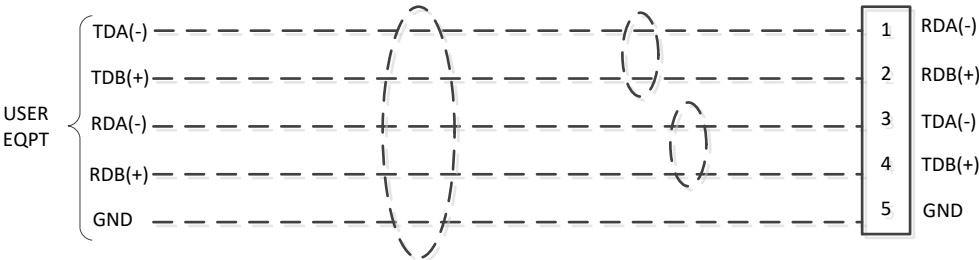


Figure 1

4-Wire RS485 Field Wiring

1.3.2 2-Wire Connection

Field wiring is done using cable with a minimum of 3 conductors conforming to the wire gauge specification. It is recommended that the wire be grouped in one twisted shielded pair (TSP) plus a minimum of one wire, or that the cable have an overall shield, to minimize the risk of external interference.

Field wiring is routed through one of the two conduit hubs located adjacent to terminal strip TS1. The screw terminal plug for the RS485 wire termination, TS2, is a small green plug located underneath TS1. The plug may be removed from its mating receptacle to facilitate wiring.

The wire termination is done as shown in Figure 2 below. The terminal numbers for TS2 are marked at the back of the plug receptacle.

Prior to applying power to the SS100-LED remove the lower cover and locate switch JP3 on the Controller board. Set switches JP3-1 & JP3-2 to the ON position.

If required by the installation (e.g. if the unit is at the end of a long cable or at the end of a daisy chain of units) the internal termination resistor (121 ohms) may be connected by setting JP3-3 to the ON position.

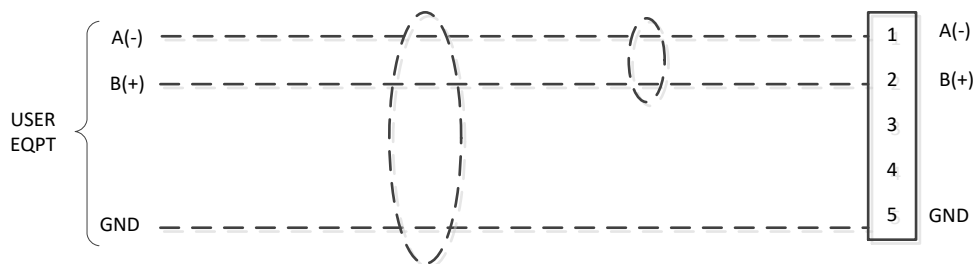


Figure 2

2-Wire RS485 Field Wiring

1.4 OPERATION

The RS485 port provides serial communications capabilities equivalent to the function of the USB port at the User Interface. The description of these capabilities is provided in the IO&M Manual, Section 3.2.

2 RS232

2.1 DESCRIPTION

The RS232 port provides the user with a screw terminal plug that provides a 3-wire RS232 serial connection to the SS100-LED. This connection provides the means for the user to remotely monitor the operation of the SS100-LED and to perform changes to operating characteristics as required.

2.2 SPECIFICATIONS

Screw Terminal Plug

Wire Gauge

18 - 26 AWG (stranded)

2.3 INSTALLATION

Field wiring is done using cable with a minimum of 3 conductors conforming to the wire gauge specification. It is recommended that the cable have an overall shield to minimize the risk of external interference.

The wire termination is done as shown in Figure 3 below. The terminal numbers for TS3 are marked at the back of the plug receptacle.

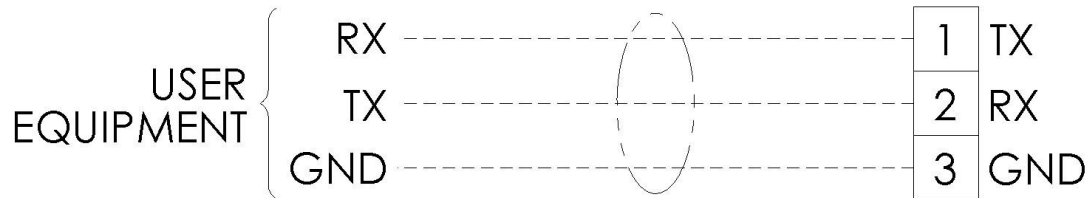


Figure 3
RS232 Field Wiring

2.4 OPERATION

The RS232 port provides serial communications capabilities equivalent to the function of the USB port at the User Interface. The description of these capabilities is provided in the IO&M Manual, Section 3.2.

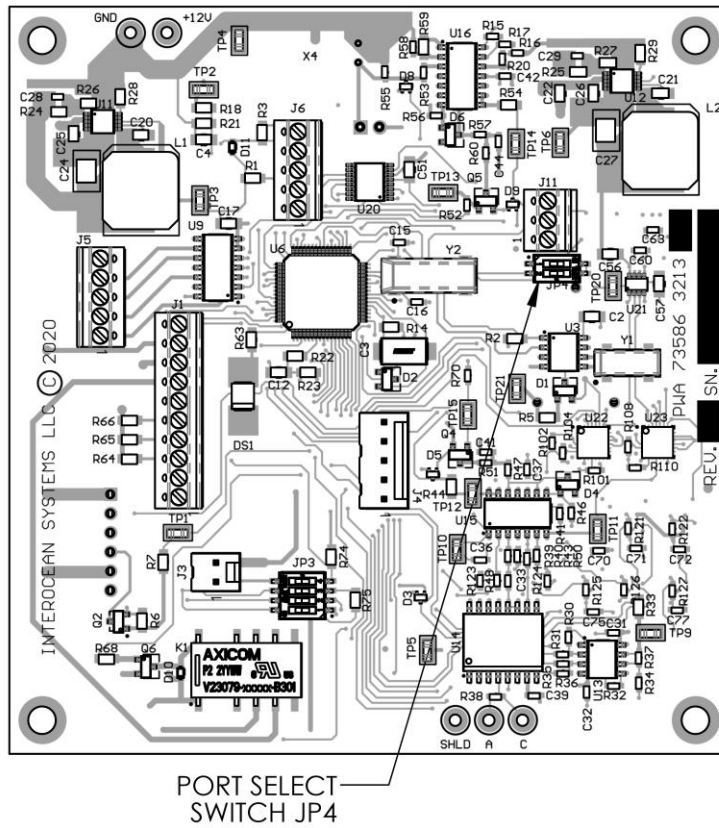
3 PORT SELECTION

To change the port follow these steps:

- Disconnect power to the SS100-LED.
- Remove the lower cover on the enclosure.
- Locate the port select switch as shown in Figure 4. The port select switch is recessed inside the housing, which requires a small light to be able to view the switch.
- Using a tool with a fine point such as a dental pick, slide the two switches into the proper position of the port selected. See Figure 5 for the switch positions.

CAUTION Do not set both switches to ON at the same time. Damage to the equipment can result.
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- Restore power to the SS100-LED.



PORT SELECT
SWITCH JP4

Figure 4

Port Select Switch Location

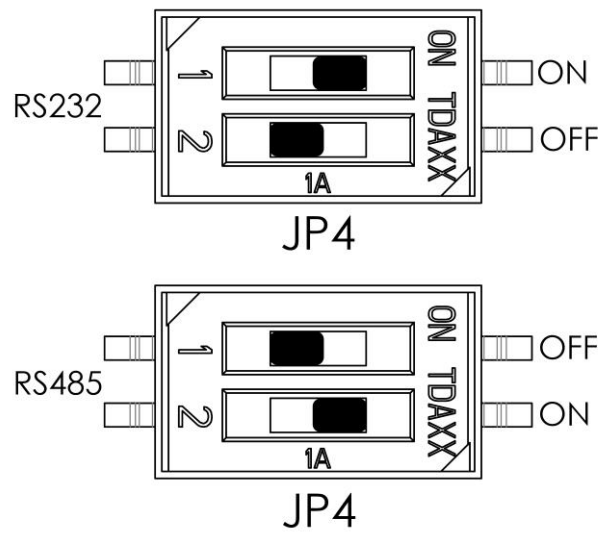


Figure 5

Port Select Switch Positions