MODEL 3150
SUSPENDED SOLIDS ANALYZER

MODEL 35/35L
OPTICAL SUSPENDED SOLIDS SENSOR

REVISION – 17 Oct 2014

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GENERAL INFORMATION

Product Description

The Model 3150 Suspended Solids Analyzer is a handheld analyzer designed for the measurement of suspended solids in aqueous solutions. The microprocessor-based electronics of the Model 3150 analyzer provide a high degree of flexibility and ease of use. The instrument is designed to operate in a variety of applications. The sensor operates on the principle of single gap light absorption as a means of detecting the presence of suspended solids.

The Model 35 sensor has been designed for medium ranges (0 to 30,000 mg/l) as commonly found in aeration basins and activated sludge lines of wastewater treatment plants. The Model 35L sensor has been designed for low ranges (0 to 1500 mg/l) as commonly found in effluent streams. Both sensors utilize an infrared emitter to minimize color effects and compensates for emitter variations due to temperature by measuring source brightness.

The Model 3150 has built-in data logging. Up to 50 points may be logged with a time stamp. Each point may be labeled with a six character location description.

Packaging

The analyzer is housed in a watertight handheld enclosure and is designed for harsh environments.

Batteries and Charging

The Model 3150 is powered by a three cell rechargeable NIMH battery pack. A battery charger is included with the Model 3150. The red LED on the charger's connector indicates the batteries are in quick charge mode when illuminated or trickle charge when not illuminated. Fully discharged batteries will take about four hours to charge. The Model 3150 may be connected to the charger for extended periods of time without damage.

A fully charged battery can provide approximately 12 hours of continuous use. A low battery message appears on the display when recharge is necessary.

Automatic Shutoff

If no keys are pressed, the Model 3150 will automatically shut off after 15 minutes.

Display Backlighting

The Model 3150 has a backlit display, but this backlighting is the main power consumer of the analyzer. To conserve battery power, this backlight turns itself off after 2 minutes. It can easily be turned on again without disturbing the operating mode of the analyzer by pressing the ON key.

OPERATION

Run Mode

The RUN mode is the normal operating mode of the analyzer and is entered upon power-up. When the Run mode is entered, the analyzer will begin displaying the TSS value. When running in MLSS or RASS measurement modes (CAL1 or CAL2 modes for the Model 35L), the TSS reading takes about 15 seconds to stabilize. The display is continuously updated with the current date, time, TSS value, and measurement mode. In the event of an error or alarm condition the display will indicate the problem in plain English text.

```
MLSS    10/21 11:23:31


2560 MG/L


PRESS ENTER TO LOG
```

The analyzer and sensor have been zero calibrated at the factory and given a default span. In most cases, the factory default span will read reasonable values, but a span value based upon lab analysis should be performed as soon as possible. Span calibration can be accomplished using the snapshot/span feature described later in this manual. Separate span values for MLSS and RASS samples are available to insure maximum accuracy throughout the plant.

Once a TSS reading is stable, the operator may log the current TSS value. Pressing the ENTER key will display the Select Log Locale screen.

```
SELECT LOCALE FOR LOG

   BASIN1
   BASIN2
   BASIN3            .
   * NEW LOCALE *
PRESS ^, V TO SELECT,
THEN ENTER
```

A log locale may be selected by pressing the UP and DOWN keys until the desired locale is highlighted. Pressing the ENTER key will display a Log conformation screen.

```
LOG  2560 TO BASIN3



PRESS ENTER TO LOG,
PRESS MENU TO CANCEL.
```

Pressing the ENTER key a second time will log the TSS value to the selected locale along with a timestamp. Up to 50 TSS values may be logged at any one time. If 50 values have been logged and a new value is desired to be logged, a Log Full message will be displayed. The operator will have the option of overwriting the oldest log entry or cancel the log operation.

If a new locale entry is desired, highlight the NEW LOCALE selection and press the ENTER key. The operator is prompted to enter a six character locale description. Up to 50 locales may be entered. To return to the normal Run screen, press the MENU key.

```
   LOCALE ENTRY
BASIN4



ENTER A LABEL OF
UP TO 6 CHARACTERS
USING ^, V AND ENTER
```

Main Menu

The Main Menu is accessed by pressing the "MENU" key while in the RUN mode of operation. There are five options available from the main menu. Use the arrow keys to switch between RUN, VIEW LOG, PC EXTRACT, SETUP, & TEST and then press the "ENTER" key to select.

```
     MAIN MENU
     RUN
     VIEW LOG
     PC EXTRACT
     SETUP
     TEST
PRESS ^, V TO SELECT,
THEN ENTER.
```

To return to the RUN MODE from the MAIN MENU, use the "ARROW" keys to move the cursor to the run option, then press the "ENTER" key.

View Log

This mode of operation allows the operator to view all logged values with locales and timestamps.

```
        LOGGED DATA
LOCALE   MG/L DAY TIME
BASIN1   2480 05 08:38
BASIN2   3260 05 08:02
BASIN3   2560 05 07:32
BASIN4   1940 05 06:29
PRESS ^, V TO SELECT,
THEN ENTER TO REMOVE.
```

The operator may scroll through the logged values by using the UP and DOWN arrow keys. The logged value may be removed by first highlighting the value and then pressing the ENTER key. Pressing the ENTER key a second will remove the selected entry or pressing the MENU key will cancel the remove.

PC Extract

When the Model 3150 is in the "PC Extract" mode, the logged data within the meter may be copied to a connected personal computer for the purposes of printing the data or saving it in a spreadsheet or word processor compatible format on the PC. The supplied download kit includes a communications cable, a USB-to-serial port adapter, and the "PortaLog" software application for extracting the data.

The PC to be used must be operating under the Windows XP, Vista, 7, or 8 operating systems to run the PortaLog software. Earlier versions of Windows are not compatible. InsiteIG freely distributes PortaLog, and it may be installed on multiple computers as needed. Insert the supplied USB "Manuals and Software" flash drive, and navigate to the "InsiteIGPortaLogSetup.exe" file. This program will guide you through the installation of the PortaLog application to the PC, and create an icon and start menu program entry for PortaLog.

The PC must be connected to the portable meter through a standard serial (COM) port. Since many recently built computers and laptops do not include this type of port as a standard feature, a USB-to-Serial adapter has been supplied by InsiteIG with the portable download kit. If the computer to be used already has a working serial port (a COM port with a 9 pin "D" connector that matches our supplied cable), it is not necessary to use the adapter provided by InsiteIG, simply connect the portable meter to your existing port and start PortaLog. However, if you need to use the adapter, Windows will need to install 2 hardware drivers for the adapter when it is plugged into a USB port for the first time. On some newer versions of Windows 7 and 8, these drivers will already be resident on your computer, and Windows will complete their installation automatically. On most computers, however, plugging the adapter into the port for the first time will cause Windows to start a hardware installation routine. One of the first Windows that will appear as part of this routine will ask if you would like Windows to check for drivers using Microsoft Windows Update over the internet. If you have an internet connection, choose this option and the correct and most up-to-date drivers will be installed automatically. If the computer does not have an internet connection, you should direct Windows to look for drivers on the supplied USB flash drive. The drivers are in a subdirectory on the flash drive called "data\software\USB_to_Serial_Port_Drivers".

PortaLog may be started at any time by double-clicking its desktop icon or Start Menu entry under the InsiteIG folder. The application begins by checking the computer for the correct serial port hardware. If all is well, PortaLog will display a procedure for copying the data from the portable meter to the PC. Once the data is transferred, clicking the HELP menu item in PortaLog will display a Help window that explains options for printing, sorting, or saving the data in various formats.

Please Note: When logging data with the portable meter, do not use a Location Name that is completely blank. While data saved in this way may be viewed on the meter itself, those logs cannot be copied to the computer with PortaLog.

Setup Mode

This mode of operation allows the user to customize the unit to the specific operation and needs of the facility. There are a total of seven options that may be adjusted.

```
        SETUP
 MEASURE MODE
 CALIBRATION
 CLEAR ALL LOGS
 REMOVE LOCALE


PRESS ^, V TO SELECT,
THEN ENTER.
```

Operation of the Setup MODE proceeds as follows:

First, after pressing the "MENU" key, use the "ARROW" keys to move the cursor to the setup option, then press the "ENTER" key.   A menu with four of the ten options will be displayed. The options are;
> MEASURE MODE
> CALIBRATION
> CLEAR ALL LOGS
> REMOVE LOCALE
> REMOVE ALL LOCALES
> SET LOG MODE
> SET CLOCK

Second, use the "ARROW" keys to move the cursor to the desired setup option, then press the "ENTER" key. When the user is finished making the adjustment, press the "MENU" key to return to the previous page.

Finally, to return to the RUN MODE, press the "MENU" key until the MAIN MENU is displayed. Use the "ARROW" keys to move the cursor to the run option, and then press the "ENTER" key.

Measure Mode
The Model 3150 can operate in one of three measurement modes:
FAST – no data filtering, fast response and factory default span (useful for measuring blanket level depths).
CAL1 - normal 15 second data filtering and low range span calibration factor.
CAL2 – normal 15 second data filtering and high range span calibration factor.

Calibration
This option will display the sensor calibration option menu.

Clear All Logs
This option will erase all logged data entries (but not the locale names).

Remove Locale
This option will remove a single locale and its data. After choosing this option, the list of locale names is presented. The operator may then choose the locale to remove.

Remove All Locales
This option will erase all locales and data from the log memory.

Set LOG Mode
This option is used to select either manual or automatic log mode (see autolog mode section).

Set Clock
This option is used to set the real time clock used for time stamping of the logged data.

Sensor Calibration

To do a complete calibration, three steps are required. The analyzer must first be zeroed in clean water. Secondly, a sample/snapshot reading should be taken in a normal representative water sample. The sample water can then be given a laboratory analysis, and the span of the analyzer can be adjusted by recalling the snapshot and matching the reading to the analysis. As long as the lenses are kept clean, frequent recalibration should not be necessary. Every six months should be more than adequate for a complete calibration. The Model 3150 allows the operator to save both a low range (CAL1) and a high range (CAL2) span calibration. The Model 3150 will use the CAL1 or CAL2 span calibrations as selected by the measure mode.

Any optically based device for measuring suspended solids should only be span calibrated against a typical sample of the actual process water being measured. Synthetic laboratory standards will add unnecessary inaccuracies to the system and are not recommended. The Model 3150 utilizes its microprocessor memory in a unique way to make span calibration as easy and accurate as possible. This calibration is performed as a two step process. First, the SNAPSHOT function of the analyzer is used to store actual process conditions to the instrument's memory. Later, when standard laboratory analysis results are available for those previous conditions, the analyzer's SPAN function will recall the stored value and allow the user to adjust the span value accordingly.

The range of operation of the Model 35 sensor is 0-30,000 mg/l total suspended solids. Within this range, accuracy and repeatability are only specified over a range of +/- 50% of the user's point of calibration. Accuracy will be +/- 5% of the current reading or +/- 100 mg/l, whichever is greater. Repeatability will be +/- 1% of the current reading or +/- 20 mg/l, whichever is greater.

The range of operation of the Model 35L sensor is 0-1500 mg/l total suspended solids. Within this range, accuracy and repeatability are only specified over a range of +/- 50% of the user's point of calibration. Accuracy will be +/- 5% of the current reading or +/- 2 mg/l, whichever is greater. Repeatability will be +/- 1% of the current reading or +/- 2 mg/l, whichever is greater.

All calibration options are passcode protected which will disallow unauthorized access. Note: Setting the passcode to 000 will disable the passcode function and skip the passcode screen.

```
PASSCODE
000
```
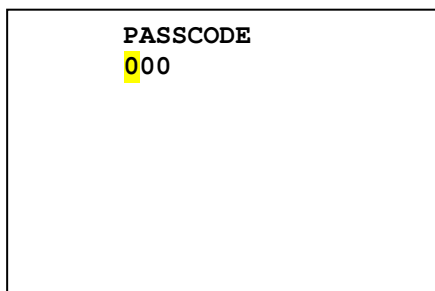
Use the "ARROW" keys to enter the first digit of the passcode, then press the "ENTER" key to proceed to the next digit. Repeat until all three passcode digits are entered.

Operation of the Calibration MODE proceeds as follows:

```
    CALIBRATION
 DEFAULT SPAN
 SENSOR ZERO
 SPANSHOT
 SENSOR SPAN


PRESS ^, V TO SELECT,
THEN ENTER.
```

Use the "ARROW" keys to move the cursor to the calibration option, and then press the "ENTER" key. A menu with four of the six options will be displayed. The options are;
DEFAULT SPAN
SENSOR ZERO
SNAPSHOT
SENSOR SPAN
SENSOR CURVE
PASSCODE

To return to the RUN MODE, press the "MENU" key until the MAIN MENU is displayed. Use the "ARROW" keys to move the cursor to the run option, and then press the "ENTER" key.

Default Span

This calibration mode will replace the current span calibration value (MLSS or RASSS) with the factory default value. This may be useful when using the system in a new application. If the analyzer has been properly zeroed in clean water, the analyzer will read values that are typical for an average waste treatment plant. No absolute accuracy is guaranteed after this procedure, but the numbers will, in the least, be useful for observing trends in the suspended solids concentration over time.

Select the "Default Span" option from the calibrate menu using the up and down arrow keys and press the "ENTER" key. Pressing the "ENTER" key again will cause the analyzer to use the factory default span calibration value. Press the "MENU" key to exit or use the up and down arrow keys to select another calibration mode.

Sensor Zero

Each TSS sensor will have a unique zero reference. This calibration mode will calculate and store the zero reference for the current sensor.

Select the "Sensor Zero" option from the calibrate menu using the up and down arrow keys. Press the "ENTER" key. Submerge the sensor in clean water. It is important that the water used to zero the sensor be clean. At the very least use potable water for this, and distilled water is even better. Do not use plant process water of any type. With the sensor submerged in clean water, wait about 15 minutes and then press "ENTER". The analyzer will take about 15 seconds to zero. The display will return to the calibrate menu

automatically when it is finished. Press the "MENU" key to exit or use the up and down arrow keys to select another calibration mode.

Snapshot

This calibration mode simply stores a reading in a special memory location within the analyzer. The operator should take a physical sample of the process water from the same location so that it can be analyzed using standard laboratory techniques to determine suspended solids concentration. When the lab analysis is complete, this stored reading can be recalled in the SPAN mode. Matching the stored reading to the lab analysis adjusts the span of the analyzer.

With the sensor submerged in the process to be measured and stable, select the "Snapshot" option from the calibrate menu using the up and down arrow keys. Press the "ENTER" key. Pressing the "ENTER" key again will cause the analyzer to take a snapshot of the conditions. The analyzer will take about 15 seconds to obtain a sample value. The display will return to the calibrate menu automatically when it is finished. At this point, the calibration of the analyzer has NOT been altered; only the conditions of the process water have been stored in memory for future use. Press the "MENU" key to exit or use the up and down arrow keys to select another calibration function.

Sensor Span

This step is performed when an accurate laboratory value has been obtained from the sample previously taken during the Snapshot procedure.

Select the "Sensor Span" option from the calibrate menu using the up and down arrow keys and press the "ENTER" key. The value that was previously saved snapshot will be displayed. Use the up and down arrow keys to adjust the analyzer reading to the value of the laboratory analysis. Press the "ENTER" key when done. The system is now calibrated and ready for normal operation. Press the "MENU" key to exit or use the up and down arrow keys to select another calibration mode.

Sensor Curve

This option allows the user to select between the standard TSS curve or a special TSS curve. The standard curve was modeled after typical waste treatment plants and should be used for most applications. In applications that has a very dark sludge or nonstandard characteristics, the special TSS curve may be used. When the special TSS curve is selected, the user will be prompted to enter a brown factor and a black factor. These factors are calculated by the factory based on field data collected at the site.

Passcode

The passcode is a three digit security number which will disallow unauthorized access to the setup mode. To change the passcode, press UP or DOWN until the desired code is displayed, and then press ENTER. The value of "000" will disable the passcode function and the passcode screen will be skipped.

Autolog Mode

The Autolog Mode will cause the Model 3150 to automatically log up to 50 entries at the selected interval. After 50 entries are logged the Model 3150 will turn off.

Note: The Model 3150 should be fully charged prior to the start of an auto log session, because it must remain on for the entire auto log session.

To select the AUTOLOG mode select Log Mode from the Setup menu, then select auto.

```
        SETUP
 REMOVE ALL LOCALES
 SET SALINITY
 SET DISPLAY MODE
 SET LOG MODE

PRESS ^, V TO SELECT,
THEN ENTER.
```

```
       LOG MODE
       AUTO




PRESS ^, V TO CHANGE,
THEN ENTER.
```

Note: When auto log mode is selected, all previous logged entries will be erased.

The Model 3150 will prompt for the log interval and then the locale.

```
       LOG MODE
 LOG INTERVAL    5   MIN




PRESS ^, V TO CHANGE,
THEN ENTER.
```

After the log interval and the locale have been selected, the Model 3150 will return to the main menu.

```
    MAIN MENU
       AUTOLOG START
       VIEW LOG
       PC EXTRACT
       SETUP
       TEST
PRESS ^, V TO SELECT,
THEN ENTER.
PRESS ^  V TO CHANGE
```

The RUN selection is replaced by the AUTOLOG START selection. When AUTOLOG START is selected, the Model 3150 will log the current TSS readings and 49 additional readings at the selected interval. After 50 entries have been logged, the Model 3150 will return to the manual log mode and turn off.

```
04/09 09:34:14
AUTOLOG  LOC. BASIN1

   LOG   1 OF 50
PPM  TEMP    DAY TIME
3.56 19.7    09 09:34

  NEXT LOG 09:39
```

Pressing the MENU while in the autolog mode, will display the main menu and the options available. Logging is suspended until the AUTOLOG RESUME is selected.

Test Mode

This mode of operation allows the user to perform basic test functions to aid in troubleshooting. There are two tests which may be performed.

Operation of the Test MODE proceeds as follows. From the Main Menu use the arrow keys to move the cursor to the Test option, then press the "ENTER" key. Use the arrow keys to select the desired test, and then press the "ENTER" key.

View Sensor Data

This test is intended primarily to aid the InsiteIG technical support engineers in troubleshooting. Additional data may be displayed by pressing the ENTER key. Press the MENU key to exit.

Software Version

Software Version displays the current version of software in the analyzer. To exit, press the "MENU" key.

ERROR MESSAGES

During operation, the Model 3150 analyzer may determine that an error condition exists. If this happens, the display will contain an error message. The 3 possible error messages are as follows:

Sensor not Responding
This error message indicates that the analyzer is not receiving any data from the sensor. This would most likely be caused by a faulty sensor cable or possibly a faulty sensor or analyzer electronics.

Zero Sensor
The analyzer is indicating that a zero cal operation is required for proper operation. This can occur if the sensor was not properly zeroed and the current sensor reading is 5% above (negative) the pervious stored zero value.

Ambient Error
This error message will be displayed if the sensor is exposed to too much ambient light (exposed to direct sunlight). Or the sensor LED is faulty.

MAINTENANCE

The analyzer does not require any periodic maintenance. The sensor must be kept clean for accurate readings.

GUARANTEE AND REPAIR POLICY

Model 3150 Suspended Solids Analyzer & Model 35 suspended solids sensors and related items are guaranteed for two years against defective materials and workmanship. They will be replaced or repaired free of charge during the guarantee period. Call the factory at 985-639-0006 for a return authorization number for traceability. Mark the package to the attention of the R/A number and address it to the factory at 80 Whisperwood Blvd., Suite 107, Slidell, LA 70458. Freight to the factory is to be paid by the customer and items should be insured in case of damage or loss of shipment.

All shipments are insured. If you receive a damaged unit, please notify InsiteIG Instrument immediately at 985-639-0006.

Repairs to the equipment not covered by the guarantee will be billed per standard service charges.
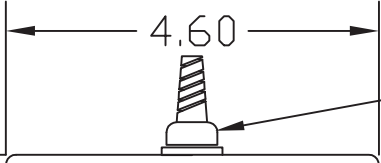
Model 3000

SUSPENDED SOLIDS

4.60

10.28

3.28

MENU ↑

ENTER ↓

ON OFF

SENSOR CABLE ENTRY

CHARGING/COM PORT DB-9, WATERPROOF
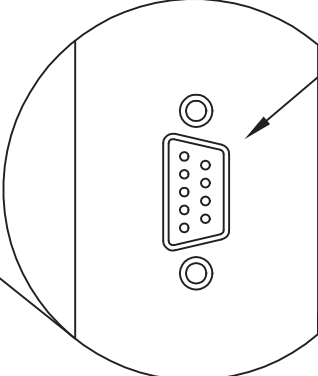
SIDE VIEW
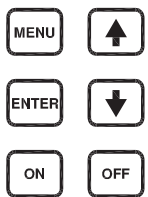
BATTERY COMPARTMENT ON BACKSIDE.

REV: —

DWG. No IIG05N003

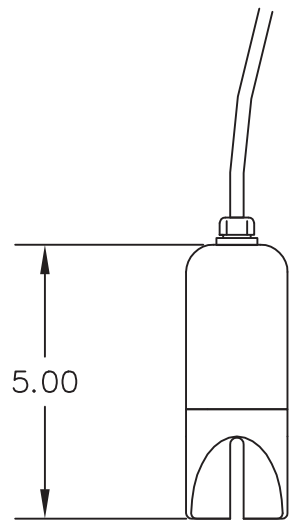| UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES	CONTRACT NO.		Insite IG	1550 W. Lindburg Dr. Slidell, LA 70458		
DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005	DRAWN	DATE				
DO NOT SCALE DRAWING	CHECK		TITLE	OUTLINE DRAWING MODEL 3000 SERIES		
MATERIAL —	DESIGN					
FINISH —	APPROVED		SIZE C	DWG NO. IIG05N003		REV —
SPEC.	CUSTOMER					
			SCALE NTS			SHEET 1 OF 2

CABLE TO
ANALYZER

5.00

1.90

Notes:

1) Material: Epoxy, Polyurethane, & PVC
2) For best accuracy, Suspended Solids measurements should be taken 2ft. below the surface and 3ft. from the wall.

REV. —
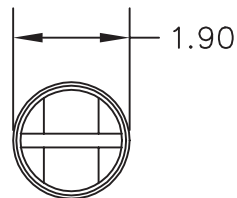
DWG. No IIG05N003

SIZE	DWG NO.		REV
C	IIG05N003		—
SCALE NTS			SHEET 2 OF 2