INSITE PORTABLE METER

REVISION – 02 March 2018

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GENERAL INFORMATION

Meter

The Insite Portable Meter (IPM) is a handheld digital meter designed for use with any Insite portable sensor. Available sensors include the Portable Dissolved Oxygen sensor (PDO), the Portable Suspended Solids sensor (PSS), the Portable Suspended Solids Low-range sensor (PSSL), the Portable Electrode Holder with pH electrode (PEH51), and the Portable Electrode Holder with ORP electrode (PEH52). The IPM has a connector to provide quick and easy exchange of any sensor. The IPM will automatically detect the type of sensor connected and display readings and menus appropriate for that sensor. The standard IPM also includes a data logging feature, allowing storage of up to 250 readings that can be a mix of any sensor type. Each of the stored points includes a time stamp, a location name, and, of course, the sensor type.

Dissolved Oxygen

The PDO sensor measures dissolved oxygen (D.O.) in aqueous solutions. It is an optical type sensor that measures the fluorescence and quenching reactions of a ruthenium complex immobilized in a sol-gel matrix. This configuration is exceptionally stable, and calibration is not required on a routine basis, nor is calibration required with initial use. The IPM will display dissolved oxygen content in PPM, MG/L, or %SATURATION. The resolution in PPM or MG/L mode is 0.01 over the range of 0.00 to 3.99 and 0.1 over the range of 4.0 to 25.0. The resolution in %SAT mode is 0.1% over the range of 0.0 to 99.9 %SAT and 1% over the range of 100 to 400 %SAT. Temperature is displayed in 0.1 degree Celsius increments over a 0.0 to 50.0 degree Celsius range or 1 degree Fahrenheit increments over a 32 to 122 degree Fahrenheit range.

Suspended Solids

The PSS and PSSL sensors measure suspended solids in aqueous solutions. These sensors operate on the principle of single gap light absorption as a means of detecting the presence of suspended solids. The PSS 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 PSSL 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. The sensors also compensate for emitter variations due to temperature by measuring source brightness. The IPM/PSS will display SS with a resolution of 1 mg/l over the range of 0 to 30,000 mg/l. The IPM/PSSL will display SS with a resolution of 0.1 mg/l over a range of 0.0 to 10.0 mg/l and a resolution of 1 mg/l over the range of 10 to 1500 mg/l.

pH

The PEH51 sensor is a microprocessor based preamp holder with a replaceable pH electrode cartridge. The IPM will display the pH value in 0.01 pH resolution over a range of 2.00 to 12.00 pH. Water temperature is also measured for automatic temperature compensation. The temperature is displayed in 0.1 degree Celsius over a 0.0 to 50.0 degree Celsius range or 1 degree Fahrenheit increments over a 32 to 122 degree Fahrenheit range.

ORP

The PEH52 sensor is a microprocessor based preamp holder with a replaceable ORP electrode cartridge. The IPM will display the ORP value in 1 mV resolution over a range of -2000 to +2000 mV. Water temperature is also measured and displayed in 0.1 degree Celsius over a 0.0 to 50.0 degree Celsius range or 1 degree Fahrenheit increments over a 32 to 122 degree Fahrenheit range.

Packaging

The IPM is housed in a watertight (not submersible) handheld enclosure and is designed for harsh environments.

PortaCaddie

The PortaCaddie is an organizational tool that captures the IPM along with the sensor and cable. The PortaCaddie is designed to manage the cable to eliminate tangles while using the system in the field. The meter, sensor, and cable are retained securely during transport and are easily deployed at the desired test location. The rugged design was built specifically for the rigors encountered by field instrumentation. The PortaCaddie was designed to offer a level of protection to the meter, sensor, and cable.

The IPM may be moved from one PortaCaddie to another to provide quick and easy sensor exchange (see drawing IIG05N510 at the end of this manual).

The PortaCaddie is normally purchased with a sensor, or it is available separately.

Batteries and Charging

The IPM is powered by a rechargeable NIMH battery pack. A battery charger is included with the IPM. 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 IPM may be connected to the charger for extended periods of time without damage.

A fully charged battery can provide approximately 10 to 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 IPM will automatically shut off after 15 minutes.
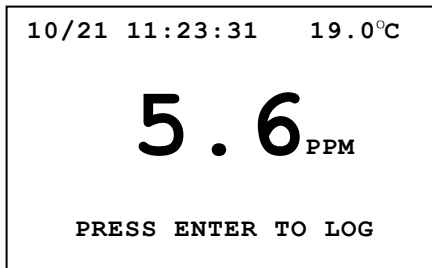
Display Backlighting

The IPM has a backlit display, but this backlighting is the main power consumer of the meter. 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 meter by pressing the ON key.

Run Mode

The RUN mode is the normal operating mode of the IPM and begins automatically at power-up. In Run mode, the display is continuously updated with the current date, time and measurement value(s). After power-up, the measurement can take up to 30 seconds to stabilize. In the event of an error or alarm condition the display will indicate the problem in plain English text.
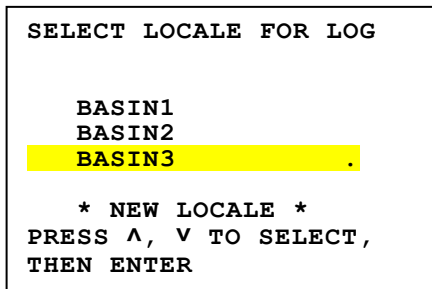
A typical RUN screen for an IPM with PDO sensor is:

```
10/21 11:23:31   19.0°C



   5.6 PPM


   PRESS ENTER TO LOG
```

Logging the Current Reading

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

```
SELECT LOCALE FOR LOG


   BASIN1
   BASIN2
   BASIN3           .

   * NEW LOCALE *
PRESS ∧, ∨ 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 select the highlighted location and display a Log confirmation screen.

```
LOG  5.6  TO BASIN3


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

Pressing the ENTER key a second time will create a log entry that contains the locale, the time, the primary measured value (with units), and the temperature (when available - PSS and PSSL sensors do not measure temperature). The IPM can store up 250 log entries in its nonvolatile memory. If 250 entries have been logged and a new value is selected to be logged, a LOG FULL message will be displayed. The operator will then be given the option of overwriting the oldest log entry or canceling the log operation.

New location names can be created by selecting the NEW LOCALE option and pressing 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 ∧, ∨ 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 in the menu list, and one of these options will be highlighted. Use the arrow keys to switch the highlight between RUN, VIEW LOG, PC EXTRACT, SETUP, & TEST, and then press the "ENTER" key to select that option.

```
      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 any of the previously stored data points on the IPM display. The first screen asks which type of logged values to view:

```
         VIEW LOG
DO LOG
SS LOG
SS-L LOG
PH LOG                  V

PRESS ∧, ∨ TO SELECT,
THEN ENTER.
```

Pressing ENTER will display any stored data for the selected (highlighted) sensor type:

```
       LOGGED DATA
LOCALE   PPM  DAY TIME
BASIN1  2.48 05 08:38
BASIN2  3.26 05 08:02
BASIN3  5.6  05 07:32
BASIN4  4.8  05 06:29
PRESS ∧, ∨ TO SELECT,
THEN ENTER TO REMOVE.
```

The operator may scroll through the logged values by using the UP and DOWN arrow keys.

Deleting Logged Entries

From the VIEW LOG mode, any individual logged entry may be removed by first highlighting the value, and then pressing the ENTER key. Pressing the ENTER key a second time will then remove the selected entry (or pressing the MENU key will cancel the removal).

PC Extract

When the IPM is in the "PC Extract" mode, the logged data within the IPM 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, 8, or 10 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 PortaLog software may also be downloaded from our InsiteIG.com web site.

The PC must be connected to the IPM through a standard serial (COM) port. Since most 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 IPM 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 most versions of Windows 7, 8 or 10, these drivers will already be resident on your computer, and Windows will complete their installation automatically. On some 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 IPM 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 IPM, do not use a Location Name that is completely blank. While data saved in this way may be viewed on the IPM itself, those logs cannot be copied to the computer with PortaLog.

Setup Mode

This mode of operation allows the user to customize various operational parameters of the IPM and to access the calibration procedures for the connected sensor. The SETUP mode is accessed through the MAIN MENU. From the RUN mode, press the MENU key to switch to the MAIN MENU. Then, use the "ARROW" keys to highlight the SETUP option, then press "ENTER" to display the SETUP menu. The SETUP menu list of options will vary slightly for each type of connected sensor, but the basic user interface remains the same.

The example below depicts the display screen for the SETUP menu as it would appear with a PDO sensor connected. Within this screen, the "UP" and "DOWN" arrow keys are used to move the highlight to the desired SETUP option. Then, pressing the "ENTER" key will select and begin that highlighted option. Note that only the first four SETUP options fit on the display screen, but repeated pressing of the "DOWN" key will scroll and reveal more options into view for selection.

```
        SETUP
 CALIBRATION
 CLEAR ALL LOGS
 REMOVE LOCALE
 REMOVE ALL LOCALES   ∨

PRESS ∧, ∨ TO SELECT,
THEN ENTER.
```

The following pages list the SETUP options available for each of the sensor types individually.

SETUP Menu for IPM with PDO (Dissolved Oxygen)

The SETUP options for the IPM with a PDO are:

> CALIBRATION
> CLEAR ALL LOGS
> REMOVE LOCALE
> REMOVE ALL LOCALES
> SET LOG MODE
> TEMP. UNITS
> SET SALINITY
> SET DISPLAY MODE
> SET POWER FILTER
> SET CLOCK

Use the "ARROW" keys to move the highlight to the desired setup option, then press the "ENTER" key to begin the selected operation.

At any point, pressing the "MENU" key will return the display to the previous page. To return to the RUN MODE, press the "MENU" key repeatedly as needed until the MAIN MENU is displayed, then use the "ARROW" keys to move the cursor to the RUN option, then press the "ENTER" key.

Calibration
This option will display the sensor calibration option menu. (see "PDO Sensor Calibration")

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 name 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 locale names and all logged data points from the log memory.

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

Temp. Units
This option allows the choice of either Celsius and Fahrenheit temperature units.

Set Salinity
When measuring dissolved oxygen in mg/l (or PPM), the presence of high concentrations of salt will affect the accuracy of the reading. This option allows the user to enter the salinity of the water so that the IPM can automatically generate a correction factor and apply it to the reading.. The salinity may be entered over a range of 0 to 45 ppt with a resolution of 1 ppt. Typical wastewater plants will enter a value of 0 for salinity. If measuring in %SAT units, sensing accuracy is unaffected by salts, and this entry has no effect.

Set Display Mode
This option allows the dissolved oxygen to be displayed in PPM, MG/L, or %SAT units.

Set Power Filter
This option allows the power line noise rejection filter to be set to either 50 Hz or 60 Hz.

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

SETUP Menu for IPM with PSS or PSSL (Suspended Solids)

The SETUP options for the IPM with PSS or PSSL are:

    MEASURE MODE
    CALIBRATION
    CLEAR ALL LOGS
    REMOVE LOCALE
    REMOVE ALL LOCALES
    SET LOG MODE
    SET CLOCK

Use the "ARROW" keys to move the highlight to the desired setup option, then press the "ENTER" key to begin the selected operation.

At any point, pressing the "MENU" key will return the display to the previous page. To return to the RUN MODE, press the "MENU" key repeatedly as needed until the MAIN MENU is displayed, then use the "ARROW" keys to move the cursor to the RUN option, then press the "ENTER" key.

Measure Mode
When measuring suspended solids, the IPM 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 scaling using the CAL1 calibration factor.
CAL2 – normal 15 second data filtering and scaling using the CAL2 calibration factor.

Calibration
This option will display the sensor calibration option menu. (see "PSS/PSSL Sensor Calibration")

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 name 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 locale names and all logged data points 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.

SETUP Menu for IPM with PEH51 (pH)

The SETUP options for the IPM with PEH51 are:

      SENSOR MODE
      CALIBRATION
      CLEAR ALL LOGS
      REMOVE LOCALE
      REMOVE ALL LOCALES
      SET LOG MODE
      TEMP. UNITS
      SET CLOCK

Use the "ARROW" keys to move the highlight to the desired setup option, then press the "ENTER" key to begin the selected operation.

At any point, pressing the "MENU" key will return the display to the previous page. To return to the RUN MODE, press the "MENU" key repeatedly as needed until the MAIN MENU is displayed, then use the "ARROW" keys to move the cursor to the RUN option, then press the "ENTER" key.

Sensor Mode
The IPM can operate in one of three sensor modes:
pH – the electrode holder is set for pH electrodes.
ORP US – the electrode holder is set for ORP electrodes and uses US polarity.
ORP EUR – the electrode holder is set for ORP electrodes and uses European polarity.

Calibration
This option will display the sensor calibration option menu. (see "PEH51 pH Sensor Calibration")

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 name 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 locale names and all logged data points from the log memory.

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

Temp. Units
This option will toggle between Celsius and Fahrenheit by pressing the arrow keys.

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

SETUP Menu for IPM with PEH52 (ORP)

The SETUP options for the IPM with PEH52 are:

     SENSOR MODE
     CALIBRATION
     CLEAR ALL LOGS
     REMOVE LOCALE
     REMOVE ALL LOCALES
     SET LOG MODE
     TEMP. UNITS
     SET CLOCK

Use the "ARROW" keys to move the highlight to the desired setup option, then press the "ENTER" key to begin the selected operation.

At any point, pressing the "MENU" key will return the display to the previous page. To return to the RUN MODE, press the "MENU" key repeatedly as needed until the MAIN MENU is displayed, then use the "ARROW" keys to move the cursor to the RUN option, then press the "ENTER" key.

Sensor Mode
The IPM can operate in one of three sensor modes:
pH – the electrode holder is set for pH electrodes.
ORP US – the electrode holder is set for ORP electrodes and uses US polarity.
ORP EUR – the electrode holder is set for ORP electrodes and uses European polarity.

Calibration
This option will display the sensor calibration option menu. (see "PEH52 ORP Sensor Calibration")

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 name 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 locale names and all logged data points from the log memory.

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

Temp. Units
This option will toggle between Celsius and Fahrenheit by pressing the arrow keys.

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

PDO Sensor Calibration

The three calibration menu options for dissolved oxygen sensor calibration are Sensor Calibration to a Reference, "SENSOR REF CAL", Sensor Slope Adjustment, "SENSOR SLOPE", and Restore Factory Defaults, "DEFAULT SPAN".

Note: The PDO sensor undergoes a thorough and accurate test and calibration procedure before shipment from the factory. Calibration of the system at startup is not necessary and is not recommended.

Use a QR reader app to scan with your mobile device for the Portable Dissolved Oxygen Calibration Video OR CLICK HERE

The PDO sensor has been designed to require very infrequent calibration. Unlike polaragraphic systems, light fouling of the sensing element should not affect the accuracy of the reading, but should only slow the response time of the system. (However, heavy biological fouling that prevents reasonable sensor contact with the water will cause erroneous readings.) With the sensor kept reasonably clean, the calibration should hold for 6 months to 2 years, depending upon conditions.

All calibration factors are stored in the nonvolatile memory of the sensor itself, so the sensor can be moved to a different IPM unit and retain both its "factory" and "field" calibration.

The IPM allows the user to perform two types of calibration. The normal preferred calibration is a single-point calibration (SENSOR REF CAL) procedure.   However, a more thorough 2-point calibration (adding the SENSOR SLOPE) option is available, but generally unnecessary and should only be used if it is apparent that the sensor output has been significantly altered.

All calibration procedures begin by selecting CALIBRATION from the SETUP menu.

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 Dissolved Oxygen Calibration MODE proceeds as follows:

```
    CALIBRATION
 DEFAULT SPAN
 SENSOR REF CAL
 SENSOR SLOPE
 PASSCODE


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 the four options will be displayed. The options are;
DEFAULT SPAN
SENSOR REF CAL
SENSOR SLOPE
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

Selecting the DEFAULT SPAN option allows the user to return all calibration factors to the original "Factory" calibration values. This is useful to return the sensor to a normal range of operation after an accidental miscalibration.

Sensor Calibration to a Reference

Calibration to a known reference is the preferred method of calibration when calibration is required. This method allows the operator to make adjustments to the D.O. reading to agree with any other source of D.O. information. Although any known D.O. level may be used, Insite IG strongly urges its customers to use a zero dissolved oxygen solution as a reference for this calibration because it is easy to prepare a very accurate solution. Sodium Sulfite powder can be dissolved in clean water at about 2% concentration by weight to create a solution that will remain at zero dissolved oxygen level for several days. Practically speaking, this amounts to about 1 tablespoon of this powder dissolved in 1 quart of clean water. For best accuracy, use water that is already at the ambient temperature level.

THIS CALIBRATION PROCEDURE MUST ONLY BE USED ON A CLEAN SENSOR. IF THE SENSOR IS READING ERRONEOUSLY DUE TO HEAVY BIOLOGICAL FOULING, USE OF THIS CALIBRATION METHOD WILL RESULT IN UNRELIABLE RESULTS.

The sensor must be stable in the water to be used as a reference before beginning this procedure. From the CALIBRATION menu, choose the "SENSOR REF CAL" option, and press ENTER. The IPM will now read the sensor and display the result. If this result matches the reference value, simply press ENTER to exit. Otherwise, use the arrow keys to adjust the reading to match the reference value, and then press ENTER to store this new value. This procedure is primarily an adjustment to the offset value of the sensor, but an adjustment in slope will also be made when this procedure is performed. If a sodium sulfite solution is being used as a reference, Insite IG recommends entering a value of 0.02 mg/l (PPM) or 0.2%SAT.

Sensor Slope Adjustment (NOT RECOMMENDED)

If performed correctly, the previously described "Sensor Ref Cal" should be all that is required by the user. "Sensor Slope" adjustment should only be attempted if it is apparent that a major shift in calibration has occurred.

A "Sensor Slope" adjustment procedure REQUIRES 3 steps that MUST be performed in the following order:
1. Erase all previous field calibration data by restoring factory defaults using DEFAULT SPAN.
2. Calibrate the first point, which MUST be a zero oxygen solution using SENSOR REF CAL.
3. Calibrate the second point, which should be near saturation levels using SENSOR SLOPE.

As with SENSOR REF CAL, the sensor must be clean in order for this procedure to be successful. The first calibration point will use the same sodium sulfite zero oxygen solution described in the previous section (1 tablespoon of sodium sulfite dissolved in 1 quart of water at ambient temperature). Allow the sensor to soak in this solution for at least 10 minutes before proceeding. Make sure that no air bubbles are trapped on the face of the sensing element during the soak. Once the sensor is stable, use the SENSOR REF CAL procedure described previously to set the D.O. reading to 0.02 PPM. YOU MUST ACTUALLY PERFORM THIS CAL TO REFERENCE PROCEDURE IN ZERO WATER EVEN IF THE SENSOR READS ZERO FROM THE RUN MODE. [NOTE: If the user's application requires a zero that is absolutely accurate (frequent readings below 0.5 PPM), then the zero solution needed for this procedure should be mixed 12 to 24 hours before use, and distilled water should be used in place of tap water. Freshly mixed solution actually has a value of about 0.04 PPM, but a calm solution at rest for 12 hours will drop down very close to absolute zero.

Once a sensor has been properly zeroed, a slope adjustment may be made. Although water of any known D.O. concentration may be used, Insite IG strongly encourages the user to create an air saturated solution of clean water. A bucket of very clean water, heavily aerated for at least 20 minutes with a normal aquarium style aeration stone, will make a good 100% saturation reference. Otherwise, if another known oxygen level is used, this level should be near or above the maximum reading expected of the sensor in normal operation. The sensor should be rinsed to remove all zero solution before placing it in an aerated container. The sensor should be allowed to stabilize for at least 10 minutes before proceeding.

Choose the SENSOR SLOPE adjustment from the CALIBRATION menu, and press ENTER. Press ENTER again to bypass the "!Warning! Proper Zero Required" message. The analyzer will now read the sensor and display a D.O. value. If this result matches the reference, simply press ENTER to exit. Otherwise, use the arrow keys to adjust the reading to match the reference value, and then press ENTER to store this new value.

Passcode

The passcode is a three digit security number which will disallow unauthorized access to the calibration 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.

PSS/PSSL Sensor Calibration

To do a complete suspended solids sensor calibration, three steps are required. First, the IPM with a thoroughly cleaned PSS or PSSL must be "zeroed" in clean water. Secondly, a sample or "snapshot" reading should be taken with the sensor submerged in the process during any normal representative condition. Finally, a physical sample of the water sampled can be taken and given a laboratory analysis, and the span of the IPM with PSS/PSSL 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 IPM stores calibration factors in the nonvolatile memory of the sensor itself, so the sensors can be moved to a different IPM and retain their last calibration factors. Each PSS or PSSL sensor stores a "zero" factor, and a choice of 2 span factors, referenced as "CAL1" and "CAL2". These 2 span factors allow calibrating the sensor to 2 different areas of a plant process with significantly different optical characteristics. For example, in a wastewater plant, a PSS sensor could use CAL1 for aeration basin mixed liquor measurements, and use CAL2 for measurements taken in RAS. The IPM will use the CAL1 or CAL2 span calibrations as selected from the MEASURE MODE in the SETUP menu.

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 IPM 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 IPM 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 PSS 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 PSSL 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 procedures begin by selecting CALIBRATION from the SETUP menu. The calibration options are passcode protected to disallow unauthorized access. Note: Setting the passcode to 000 will disable the passcode function and skip the passcode screen.

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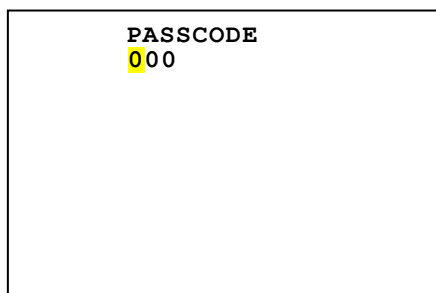
Use the "ARROW" keys to enter the first digit of the passcode, then press the "ENTER" key to proceed to the next digit. Repeat until all three passcode digits are entered.

Operation of the CALIBRATION mode then proceeds as follows:

```
      CALIBRATION
   DEFAULT SPAN
   SENSOR ZERO
   SPANSHOT
   SENSOR SPAN

   PRESS ^, v TO SELECT,
   THEN ENTER.
```
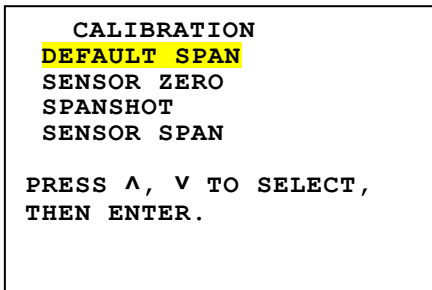
Use the "ARROW" keys to move the highlight to the desired calibration option, and then press the "ENTER" key to select the option.   There are six menu options, but only the first four appear initially. Scroll downward with the arrow keys to reveal the hidden options. The options are;

>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.

Use a QR reader app to scan with your mobile device for the Portable Suspended Solids Calibration Video OR CLICK HERE

Default Span

This calibration mode will replace the current span calibration value (CAL1 or CAL2) 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 IPM 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 IPM 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 PSS/PSSL sensor will have a unique zero reference. This calibration mode will calculate and store the zero reference for the current sensor.

Establishing the zero point for a PSS or PSSL sensor is simply a matter of submerging the clean sensor in a container of clean water. Potable water is generally OK for this use, but distilled water is ideal. Never use plant process water as a zero reference. First, clean the sensor with a clean damp cloth. Next, let the sensor soak in this water for about 10 minutes before beginning the ZERO procedure to allow time for temperature stabilization and complete wetting of the sensor surfaces. Just before beginning the procedure, check to see if air bubbles have formed on the interior sensor faces, and dislodge any that may have appeared. Select the "Sensor Zero" option from the calibrate menu using the up and down arrow keys. Press the "ENTER" key as needed to start the zero process. The IPM 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 IPM. 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 IPM.

With the PSS/PSSL 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 IPM to take a snapshot of the conditions. The IPM 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 IPM 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 IPM 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 SS curve or a special SS curve. The standard curve was modeled after typical waste treatment plants and should be used for most applications. In applications that have a very dark sludge or nonstandard characteristics, the special SS curve may be used. When the special SS 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.

The PEH51 sensor consists of two parts; the PEH (Holder/Preamplifier/Converter) and the M51 (pH electrode cartridge). They are shipped separately and must be assembled prior to using the sensor. See "pH and ORP Electrode Handling"
NOTE: Submerging a PEH Holder without an electrode properly seated will void the warranty.

pH buffers are special solutions which are used in the standardization or calibration of pH measuring electrode systems. They are special because they have the ability to resist changing pH due to contamination or dilution. The most common buffer solutions are 4, 7 and 10 pH values. Other special values can be purchased, and buffers for special biological and chemical applications are common. pH buffers are supplied in either a powdered form to be mixed with distilled water or a premixed liquid form. For pH buffers greater than 7, it is recommended that liquid buffer solutions be used because they tend to be more accurate. However, liquid buffer solutions have a short shelf life (typically 3 months) which must be considered when ordering.

For pH sensors, either a ONE POINT or a TWO POINT calibration mode is available.

ONE POINT CAL

For this method, a buffer is generally selected that is close to the expected measurement range of the process. First, submerge the PEH51 sensor in the buffer solution and allow a few minutes to stabilize. Select ONE POINT CAL from the CALIBRATION menu. Press the ENTER key. After the IPM has acquired data, the pH value will be displayed. Use the UP and DOWN arrow keys to change to the correct pH value and then press the ENTER key. The calibration is stored in the non-volatile memory of the PEH51 sensor.

> **Note: This method of calibration only adjusts for asymmetry in the electrode and thus should only be used in applications where the process has a small range of pH values.**

TWO POINT CAL

For this method, select 2 buffer solutions that nearly bracket the expected measurement range of the process. Submerge the PEH51 sensor in the first buffer solution and allow time to stabilize. Select TWO POINT CAL from the CALIBRATION menu. Press the ENTER key. After the IPM has acquired data, the pH value will be displayed. Use the UP and DOWN arrow keys to change to the correct pH value and then press the ENTER key. Submerge the PEH51 sensor in the second buffer solution and allow time to stabilize. Press the ENTER key. After the IPM has acquired data, the pH value will be displayed. Use the UP and DOWN arrow keys to change to the correct pH value and then press the ENTER key. The calibration is stored in the non-volatile memory of the PEH51 sensor.

FACTORY DEFAULT

The Factory Default parameter allows the user to restore the PEH51 sensor characteristic values of zero and slope to the original factory settings.

PASSCODE

The passcode parameter will allow the operator to limit access to the sensor setup parameters. The passcode may be set to any three-digit number.

The PEH52 sensors consist of two parts; the PEH (Holder/Preamplifier/Converter) and the M52 (ORP Electrode). They are shipped separately and must be assembled prior to using the sensor. See "pH and ORP Electrode Handling"

NOTE: Submerging a PEH Holder without an electrode properly seated will void the warranty.

SENSOR MODE

Displays are normally in the American convention which produces a negative voltage during a reduction of the platinum and a positive reading during the oxidation of the platinum. The European convention reverses the polarities.

ORP OFFSET

Calibration of a PEH52 is normally accomplished by equating millivolt levels to concentration. This may be accomplished by noting the reading of the ORP electrode and relating the reading to a laboratory analysis. Calibration standards may be generated by dissolving quinhydrone to saturation in a pH 4 Buffer at 25 degrees Celsius, which should produce a millivolt reading of approximately 250. By utilizing a pH 7 Buffer solution with quinhydrone, the generation should be approximately 90 millivolts.

Select ORP OFFSET from the setup menu. Submerge the PEH52 sensor in the standard solution. Press the ENTER key. After the IPM has acquired data, the ORP value will be displayed. Use the UP and DWON arrow keys to change to the correct ORP value and then press the ENTER key. The calibration is stored in the non-volatile memory of the PEH52 sensor.

FACTORY DEFAULT

The Factory Default parameter allows the user to restore the PEH52 sensor offset values to the original factory settings.

PASSCODE

The passcode parameter will allow the operator to limit access to the sensor setup parameters.   The passcode may be set to any three-digit number.

Inserting Electrode Cartridge into Holder

The replaceable pH and ORP electrode cartridges are supplied separately from the PEH holder unit and MUST be assembled properly prior to use. The electrode must be properly seated in the PEH holder to ensure a proper seal against water intrusion into the electrical contacts in the holder.
NOTE: Submerging a PEH Holder without an electrode properly seated will void the warranty.

Assembly begins by ensuring that there is silicone lubricant on the electrode cartridge O-rings.   Insert the cartridge into the holder and screw it down into place using ONLY the plastic insertion/removal tool that is supplied with every cartridge (see Figure 3). Tighten only until just snugly seated. DO NOT OVERTIGHTEN. FURTHER TIGHTENING WILL NOT IMPROVE THE SEAL OF THE SIDEWALL O-RINGS AND MAY DAMAGE THE CARTRIDGE OR MAKE IT DIFFICULT TO REMOVE. DO NOT USE PLIERS OR ANY OTHER COMMON HAND TOOL FOR THIS OPERATION.

Distinguishing Between an ORP and a pH Electrode Cartridge

Although our pH and ORP cartridges are very similar in appearance, they are definitely different and must not be confused. If making use of both types, make note of Figures 1 and 2 to see the distinguishing features. Before the electrode is installed, check for a faintly embossed "PH" or "ORP" label at the connector end of the cartridge. It is also notable that the center sensing area of the pH cartridge is larger than that of the ORP cartridge.

Cleaning

PEH51/PEH52 sensors should be cleaned and rinsed after use. If the sensor becomes sluggish or unresponsive, the cause may be the accumulation of deposits on the sensing surfaces of the electrode. Assuming there are no breaks or cracks in the sensing surface, the electrode may often be restored to full response by one of the following methods:
- **Inorganic Scale Deposits –** Dissolve the deposit by immersing the electrode first in 0.1M HCl, then in 0.1 M NaOH, and again in 0.1 M HCl. Each immersion should be for a 5 minute period.
- **Organic Oil or Grease Films –** Wash electrode tip in a liquid detergent and water. If film is known to be soluble in a particular organic solvent, wash with this solvent. Rinse electrode tip in tap water.

Keep Electrodes Wet!

The sensing end of pH and ORP electrode cartridges need to stay moist to maximize the useable life of the cartridge. Allowing the end of the cartridge to dry out completely may shorten its useful life dramatically or even ruin the cartridge completely. A rubber soaking cap that slides over the end of the cartridge is supplied with each cartridge. Keep this cap filled with liquid and return it to the end of the cartridge after each use. The ideal soaking solution to promote maximum cartridge life is a pH 4 buffer solution that has been saturated with KCl. Tap water is not as desirable, but is acceptable if it is the only available option. Distilled water should NOT be used.
If a pH or ORP Electrode has been allowed to dry completely, try soaking the sensor for at least 30 minutes before use to rehydrate the sensing element and reference junction.

Figure 1 pH Sensor Identification

Figure 2 ORP Sensor Identification

Figure 3   Insertion/Removal Tool

Autolog Mode

The Autolog Mode will cause the IPM to automatically log up to 250 entries at the selected interval. After 250 entries are logged the IPM will turn off.

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

To select the AUTOLOG mode, select SET 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 IPM 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 IPM will return to the main menu.

```
    MAIN MENU
      AUTOLOG START
      VIEW LOG
      PC EXTRACT
      SETUP
      TEST
PRESS ∧, ∨ TO SELECT,
THEN ENTER.
```

The RUN selection is replaced by the AUTOLOG START selection. When AUTOLOG START is selected, the IPM will log the current measurement readings and 249 additional readings at the selected interval. After 250 entries have been logged, the IPM 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 AUTOLOG RESUME is selected.

This mode of operation allows the user to perform basic test functions to aid in troubleshooting.

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 Insite IG technical support engineers in troubleshooting. Press the MENU key to exit.

View Sensor Char. (PDO sensors only)

This test displays the PDO sensor characteristics. This is primarily to aid the Insite IG technical support engineers in troubleshooting. Press the MENU key to exit.

View Sensor Cal. (PDO sensors only)

This test displays the PDO sensor calibration factors, "R" & "G". This is primarily to aid the Insite IG technical support engineers in troubleshooting. 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 IPM may determine that an error condition exists. If this happens, the display will contain an error message.

IPM with PDO error messages:

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

Sensor Error
The IPM is indicating that the PDO sensor is unable to report valid data. Call the factory for further information.

IPM with PSS/PSSL error messages:

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

Zero Sensor
The IPM is indicating that a zero cal operation is required for proper operation. This can occur if the PSS/PSSL 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 PSS/PSSL sensor is exposed to too much ambient light (exposed to direct sunlight). Or the PSS/PSSL sensor LED is faulty.

IPM with PEH51/PEH52 error messages:

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

Reading out of range
The IPM is indicating that the PEH51/PEH52 is reporting a value out of range. This can occur if the M51/M52 electrode is not seated properly in the PEH (holder).

Temperature out of range
This error message will be displayed if the themister in the PEH51/PEH52 sensor is faulty.

MAINTENANCE

The IPM does not require any periodic maintenance other than recharging the batteries after 4-8 hours of use.

PDO Sensor: The PDO sensor should be cleaned and rinsed after use. When necessary, the sensing element itself should only be wiped with a wet cloth - never a brush or hard tool. The sensor should never be stored dirty as a film can dry on the sensing element causing slow response times or, in extreme cases, inaccurate readings.

PSS/PSSL Sensor: The PSS/PSSL sensor should be cleaned and rinsed after use. The sensor should never be stored dirty as a film can dry on the lenses causing inaccurate readings.

PEH51/PEH52 Sensor: See the special section "pH and ORP Electrode Handling".

GUARANTEE AND REPAIR POLICY

The IPM is guaranteed for two years against defective materials and workmanship. PDO, PSS, PSSL, and PEH (holder only) sensors 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.

Sensor Cable Clips

Sensor Cable Wrapping Grooves

(5.3)

(11.2)

Sensor Clip Mounting Hole for Low Range SS, pH, and ORP

Sensor Clip Mounting Hole for DO and Standard Range SS

(7.6)

Sensor Clip (reversable for right or left hand use)

(6.5)

InsiteIG Portable Meter (IPM) Quick Release Latch

Sensor Cable Wrapping Grooves

Sensor Cable Clips

REVISIONS

ZONE	REV.	DESCRIPTION	DATE	APPROVED

UNLESS OTHERWISE SPECIFIED:		DATE	NAME
DIMENSIONS ARE IN INCHES	DRAWN		
TOLERANCES: ±.01 for .XX ±.005 for .XXX	CHECKED		
	ENG APPR.	2/21/18	
FRACTIONAL: ±1/16 ANGULAR: MACHINED ± 1°	MFG APPR.		
INTERPRET GEOMETRIC TOLERANCING PER:	Q.A.		
	COMMENTS:		
MATERIAL --			
FINISH --			

NEXT ASSY | USED ON
APPLICATION

PortaCaddie Outline

SIZE: B | DWG. NO. IIG05N510 | REV -

SCALE: | WEIGHT: | SHEET 1 OF 1