DUAL CHANNEL ANALYZER

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Product Description

InsiteIG's Dual Channel Analyzer (DCA) is a two channel analyzer designed for the continuous measurement of dissolved oxygen, suspended solids, pH and ORP in an aqueous solution. The microprocessor-based electronics of the DCA provides a high degree of flexibility and ease of use. The DCA has two isolated analog outputs and a Modbus interface. Also included are two programmable set-point relays and two relays to control self-cleaning.

The DCA is designed for continuous operation, fixed equipment for outdoor operation in rain and direct water spray (do not pressure wash). The Installation Overvoltage Category is III and the Pollution Degree is II. If mounted in direct or intense sunlight the optional Sun Shade mounting is recommended, InsiteIG Model SS1.The DCA is housed in a NEMA 4X enclosure (see Drawing IIG01N111 for Outline and Mounting) and is designed for outdoor mounting. For areas where the environmental temperature is expected to drop below 14 degrees Fahrenheit (-10 degrees Celsius) for extended periods of time, the optional automatic heater assembly, InsiteIG Model IH-2, is recommended. All run, programming, and calibration functions are accessible without having to open the enclosure.

WARNING! – Hazardous if moisture or water collects inside the enclosure. Cover is to remain closed and circuit board must remain dry during normal operations.

WARNING! – Before opening, switch off the analyzer line power at the circuit breaker to avoid risk of shock. Line power is present on terminals even when the analyzer is switched off.

WARNING! – Circuit breaker meeting IEC-947-3 must be on line supply, in close proximity to equipment and shall be marked as the disconnecting device for the equipment.

The DCA is designed to operate with a combination of any one or two of the following InsiteIG sensors in a variety of applications.

The M10 Dissolved Oxygen sensor is designed for the continuous monitoring of dissolved oxygen in water and wastewater where parts per million accuracy is required. The M10 sensor is an optical type sensor that measures the fluorescence and quenching reactions of a ruthenium complex that is immobilized in a sol-gel matrix. The DCA will display dissolved oxygen content in PPM, mg/l or %SAT. The resolution in PPM and mg/l mode is 0.01 over a range of 0.00 to 3.99 and 0.1 over a range of 4.0 to 60.0. The resolution in %SAT mode is 0.1%SAT over a range of 0.0 to 99.9%SAT and 1%SAT over a range of 100 to 600%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. The sensor incorporates self-cleaning optics via air or water jet.

The M15 TSS sensor has been designed for medium ranges (0 to 60,000 mg/l) as commonly found in aeration basins of wastewater treatment plants. **The M15L** sensor has been designed for low ranges (0 to 1500 mg/l) as commonly found in effluent streams. Both SS sensors operate on the principle of single gap light absorption as a means of detecting the presence of suspended solids. Both sensors utilize an infrared emitter to minimize color effects and compensate for emitter variations due to temperature by measuring source brightness. They incorporate self-cleaning optics via air or water jet.

The M50 is a microprocessor based preamp interface for use with the **M51** pH or **M52** ORP electrodes. (Please specify pH or ORP when ordering the **M50**.) The pH and ORP sensors are flat glass electrodes designed for maximum durability in waste water environments. The DCA can display the pH value in 0.01 pH resolution over a range of zero to 14.00 pH. However, the standard M51 pH electrode is only rated for a pH range of 2 to 12. Water temperature is also measured for automatic temperature compensation. The temperature is displayed in 0.1 degree Celsius increments or 1 degree Fahrenheit increments. The SCA can display the ORP value in 1 mV resolution over a range of -2000 to 2000 mV. The M50 incorporates self-cleaning via air or water jet.

INSTALLATION

1. The DCA should be located convenient for an operator to read and technician to install and maintain. A handrail mounting kit is available for the standard enclosure (see Drawing IIG01N110). This mounting kit is designed for a standard 2" handrail but can be adapted to square or angle handrails as well.

Use a QR reader app on a mobile device to scan for the Analyzer Mounting video or CLICK HERE

DO NOT! Locate the analyzer where it is likely to be damaged during unrelated or other periodic maintenance such as pressure washing catwalks.

2. Consult the following drawings for sensor mounting options and location guidelines:
   - IIG01N005 – Sensor Handrail Mounting for Open Basin or Channel Applications
   - IIG02N004 – M10 D.O. Sensor Outline
   - IIG03N004 – M15 TSS Sensor Outline
   - IIG03N010 – M15L Low Range SS Sensor Outline
   - IIG07N201 – M50 pH/ORP Electrode Interface Outline
   - IIG03N006 – TSS sensors for pipe "T" mounting: M15T (PVC) or M15PI (SS)
   - IIG03N007 – Installation Diagram for a M15T By-Pass Line

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NOTE: DO NOT install a pH/ORP holder (M50) without a pH cartridge (M51) or an ORP cartridge (M52) installed and properly seated in the pH/ORP holder. Installing a M50, pH/ORP holder, without a pH or an ORP cartridge will void the warranty.

3. Open the enclosure of the DCA. Pass all connection cables through water tight glands or ½" conduit in the bottom of the enclosure (gland and conduit are not supplied). The sensor input connections are made to terminal blocks TB5 (labeled SENSOR 1) and TB7 (labeled SENSOR 2) (see drawing IIG04R111). The four wires are color coded and there is a cable shield. Connect the RED wire to the terminal labeled "RED". Connect the GREEN wire to the terminal labeled "GRN". Connect the WHITE wire to the terminal labeled "WHT". Connect the BLACK wire to the terminal labeled "BLK". Connect the cable SHIELD to the terminal labeled "SHLD". The analog outputs are available on the terminal block labeled TB1 and the relay outputs are available on the terminal block labeled TB6.

DO NOT! Add conduit entries in areas that may cause moisture intrusion or electrical hazards.

DO NOT! Use entry hole #4 for conduit hub. Damage may occur to fuse holder. Cord Grip Bushing is recommended in this location. See drawing IIG04N111.

4. Power Selector Switch: Check switch S4 on the circuit board to be sure that it is set for the type of power being used (115 volts or 230 volts). Power connections should now be made to the terminal block labeled TB3. Turn power "on" by using switch S3. Close and secure the enclosure.

Note: Failure to select correct voltage could result in damage to PC Board.

5. Switch the circuit breaker on and the unit will now power up.

6. Once the DCA is turned on, the unit will initialize and then jump into the "RUN" mode and begin displaying Channel 1 "CH 1" content on the upper portion of the display and Channel 2 "CH 2" content on the lower portion of the display.

Note: In order for the sensors to operate properly, the frequency select parameter must be set to the power line frequency (50/60 Hz). See sensor setup section for details.

7. The first time the unit is powered up with the sensor in the process, 15 minutes are required for the sensor to stabilize. The reading will drift slightly during this period. After approximately 15 minutes the sensor will respond correctly. In the event the sensor is removed from the process for a short period of time, the sensor should be allowed to stabilize for approximately 10 minutes after it is put back in the process.

Analog Outputs

Two isolated 4-20 or 0-20 milliamp signals capable of driving 600 ohms are available from the terminal block labeled TB1. (See drawing IIG04R111 for details). The analog #1 output, for channel #1, is labeled "I 1" and the analog #2 output, for channel #2, is labeled "I 2". The common or ground for these signals are labeled "ICOM".

Digital Output

A Modbus communications (RS-485) output is available from TB2, (See Appendix A). This is a three wire signal with a transmit/receive plus (labeled X+), a transmit/receive minus (labeled X-), and a signal ground or common (labeled X COM). The Modbus interface uses 8 bits, no parity, 1 stop bit. See drawing IIG04R111 for details. The RS-485 interface is electrically isolated from the measurement and microprocessor circuitry of the DCA. The communications protocol for the Digital Output is fully described in Appendix A.

Relay Outputs

There is one independent programmable set point control relay for each channel. These relays are Form-C with contacts rated 10/6 amps resistive load at 125/250 VAC. Two Form-A relays with contacts rated 10/6 amps resistive load at 125/250 VAC are used for the jet clean function. The connections for the relay outputs are available from TB6. See drawing IIG04R111 for connection details.

Note! – In "Normal Operation" the hinge cover is to remain tightly screwed closed. Under no circumstance is it necessary for the operator to open the enclosure during normal operation.

Run Mode

The RUN mode is the normal operating mode of the DCA and begins automatically at power-up. When the Run mode has begun, the DCA will determine what type(s) of sensors are attached to each channel. These supplied sensors have been calibrated at the factory and a label is provided as to which channel the sensor is calibrated to. The display is continuously updated with the current measurement values. Also, the analog output and the relays are updated according to the current conditions and their programmed functions. In the event of an error or alarm condition the display will indicate the problem in plain English text.

Sensor field calibration information is stored in nonvolatile memory of the DCA. If a M15/15L is connected to the DCA and the sensor has not been previously "Zeroed" on that DCA, the DCA will display a configuration message. The configuration message for the M15/15L TSS sensor is "**Zero sensor**". These messages will appear whenever a different M15/M15L is connected to the DCA, See the SS sensor section.

While in the RUN Mode, the time to next scheduled clean cycle can be viewed by pressing and holding either arrow key. A clean cycle can be demanded by pressing the ENTER key while in the RUN Mode, see the section on Demand Clean.

Main Menu

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

Setup Mode

This mode of operation allows the user to customize the unit to the specific operation and needs of the facility.

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 six options will be displayed. The options are;

RELAYS
ANALOG OUTPUT
MODBUS
SENSOR 1 SETUP
SENSOR 2 SETUP
CH 2 MODE

Second, use the "ARROW" keys to move the cursor to the desired setup option, then press the "ENTER" key. The sub-menu for that option will be displayed. Use the "ARROW" keys again to move the cursor to the specific item to be changed, then press the "ENTER" key. When the user is finished making the adjustment, pressing the "MENU" key to will 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, then press the “ENTER” key.

Relay

From the setup menu, use the “ARROW” keys to move the cursor to the “Relays” option, and then press the “ENTER” key. There are 13 menu options for configuring the relays.

RELAY 1 OP MODE –	defines operational mode of relay 1
RELAY 1 ON SETPOINT –	defines when relay 1 will energize
RELAY 1 OFF SETPOINT –	defines when relay 1 will de-energize
RELAY 1 FAIL MODE –	defines the relay 1 state during an alarm condition
RELAY 2 OP MODE –	defines operational mode of relay 2
RELAY 2 ON SETPOINT –	defines when relay 2 will energize
RELAY 2 OFF SETPOINT –	defines when relay 2 will de-energize
RELAY 2 FAIL MODE –	defines the relay 2 state during an alarm condition
RELAY 3 OP MODE –	defines operational mode of relay 3.
CLEAN SCHEDULE –	defines how often relay four will energize cleaning
CLEAN JET TIME –	defines duration of time the clean relays will be energized
CLEAN RECOVERY TIME –	defines how long the reading holds after cleaning.
CLEAN TSS THRESHOLD –	defines a TSS value that will trigger an immediate cleaning

Note: Do not attempt to adjust relay set point values until a working sensor has been connected to the channel. Otherwise, the DCA may not display the correct measurement units for the channel.

Relays #1 and #2 have 3 OP MODES: Low Setpoint, High Setpoint, Alarm.

Low Setpoint

If a relay “OP MODE” has been set as a LOW setpoint, then the corresponding relay will energize if the reading falls below the value set in the “ON SETPOINT” parameter. Once the relay has been energized by a low reading, it will not be de-energized until the reading rises above the value set in the “OFF SETPOINT” parameter. The relay “OFF SETPOINT” value MUST be greater than or equal to the “ON SETPOINT” value in this mode.

High Setpoint

If a relay “OP MODE” has been set as a HIGH setpoint, then the corresponding relay will energize if the reading rises above the value set in the “ON SETPOINT” parameter. Once the relay has been energized by a high reading, it will not be de-energized until the reading falls below the value set in the “OFF SETPOINT” parameter. The relay “OFF SETPOINT” value MUST be less than or equal to the “ON SETPOINT” value in this mode.

Alarm

If a relay “Op Mode” has been set as an Alarm, then the corresponding relay will indicate alarm or error conditions. In this mode, the relay is energized during normal operation and will become de-energized if an error condition occurs on either channel. Consequently, loss of power can be sensed remotely as an alarm condition. In this mode the ON SETPOINT and the OFF SETPOINT parameters are ignored.

Relay #3:

Relay 3 has three OP Modes: ALARM, CA2 CLEAN, and SPECIAL.

ALARM MODE: In this mode, the relay is energized for normal operation and will become de-energized if an error condition occurs. Consequently, loss of power can be sensed remotely as an alarm condition.

CA2 CLEAN: This mode must be chosen if an InsiteIG Model CA2 compressor cleaning assembly is used. Both relays 3 and 4 are needed to operate this compressor.

SPECIAL: This mode is set if customer supplied air or water is being used with one or two solenoid valves (see drawing IIG04R113). Or, if a CA1 compressor is being used to clean both sensors. In this mode the DCA will energize relay #4 for a clean duration and then de-energize #4 and energize relay #3 for a clean duration.

Cleaning Setup

The jet clean system is intended to be controlled by the DCA through relays 4 and/or 3. The relays are connected to the InsiteIG compressor (CA-2) or a customer supplied air or water source and a shut-off valve. See drawing IIG04R113 and IIG04R112 for details.

Use a QR reader app on a mobile device to scan for the Sensor Self-Cleaning video or CLICK HERE

The **CLEAN SCHEDULE** program parameter determines how often the jet clean cycle will occur. This parameter can be set to “OFF”, “DEMAND ONLY” or values of 10 minutes to 24 hrs. Typically, a clean interval of 2 hrs works well for aeration basins. In colder climates, condensation may form then freeze in the jet-clean tubing. To prevent this, set the clean interval to 10 or 20 minutes. If this is set to “OFF” then cleaning is turned off even for “DEMAND ONLY”.

The **CLEAN JET TIME** program parameter determines how long the jet clean cycle will last. The CLEAN PULSE can be set to values of 5-seconds to 90-seconds with a 1-second resolution. Typically, a clean pulse of 30-seconds works well for aeration basins. A clean cycle will consist of the channel 1 sensor being cleaned for the programmed clean jet time immediately followed by the channel 2 sensor being cleaned for the programmed clean jet time. The analyzer will hold the measurement reading during the clean cycle and the CLEAN RECOVERY time period.

The **CLEAN RECOVERY** parameter determines how long the DCA will hold the DO reading after the cleaning jet time has expired. The default setting is 1 minute which is adequate in most applications. However, increased recovery time may be required for applications where the sensor is in stagnant water or dead zones.

For Example: “CLEAN SCHEDULE” set to 2 hours, “CLEAN JET TIME” set to 20 seconds and CLEAN RECOVERY set to 1 - Will clean each channel for 20 seconds every 2 hours and the readings will not update, but remain frozen, for a total 1:40.

Demand Clean

When the DCA is in the RUN mode and the CLEAN SCHEDULE parameter is set to something other than “OFF”, pressing the "ENTER" button will cause a cleaning cycle to begin immediately. Demanding a clean cycle in this manner doesn’t affect the normal cleaning schedule.

Analog Output

Note: Do not attempt to adjust analog FULL and MIN values until a working sensor has been connected to the channel. Otherwise, the DCA may not display the correct measurement units for the channel.

From the SETUP menu, use the ARROW keys to select the “ANALOG OUTPUT” option, then press the ENTER key. The ANALOG OUTPUT SETUP menu has 8 parameters for configuring these outputs:

ANALOG 1 TYPE – Select either 4-20mA or 0-20mA operation for the Analog 1 output.
ANALOG 1 FULL SCALE – Defines the ch 1 reading that will result in an Analog 1 output of 20mA.
ANALOG 1 MIN SCALE – Defines the ch 1 reading that will result in an Analog 1 output of 0/4mA.
ANALOG 1 FAIL MODE – Defines the behavior of the Analog 1 output during an alarm or error condition; choose between holding the last good reading, 0/4mA, or 20mA.

ANALOG 2 TYPE – Select 4-20mA operation or 0-20mA operation for ch 2, or 4-20mA output of channel 1’s temperature (only available if channel 1 is a DO or pH sensor) for the Analog 2 output. If ch 1 temperature is selected, the scaling will be fixed at 0 to 50 degrees C.
ANALOG 2 FULL SCALE – Defines the ch 2 reading that will result in an Analog 2 output of 20mA.
ANALOG 2 MIN SCALE – Defines the ch 2 reading that will result in an Analog 2 output of 0/4mA.
ANALOG 2 FAIL MODE – Defines the behavior of the Analog 2 output during an alarm or error condition; choose between holding the last good reading, 0/4mA, or 20mA.

Modbus Setup Mode

From the setup menu, use the “ARROW” keys to select the “MODBUS” option, then press the “ENTER” key. There are three menu options for configuring the serial digital output.
Comm Address – Defines the Modbus address (1 to 247) for the DCA
Comm Baud Rate – Defines the baud rate of the Modbus port
Comm Mode - Defines the communications mode as RTU or TCP.

Appendix A describes the Modbus protocol implementation in the DCA.

SENSOR SETUP

Each channel has its own sensor setup menu. The DCA will select the appropriate menu for the type of sensor that is currently connected to each channel.

DO Sensor

GENERAL

The M10 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.

Note: The M10 D.O. sensor undergoes a thorough and accurate test and calibration procedure before shipment from the factory. Calibration of the D.O. reading at startup is not necessary and is not recommended.

The DCA 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 (SENSOR SLOPE ADJ.) option is available, but generally unnecessary and should only be used if it is apparent that the sensor output has been significantly altered.

Factory calibration values are stored in the nonvolatile memory of the M10 sensor itself, so if a sensor is moved to a different DCA unit, the DCA will report values based on the original factory calibration. "Field" calibration values are stored in the DCA, and will not automatically travel with the sensor. The original factory calibration values for the sensor are never erased from the sensor memory, so a sensor may be restored to its original factory calibration condition if it is believed that the current calibration condition is erroneous.

SENSOR REF CAL

Use a QR reader app on a mobile device to scan for the DO Sensor Calibration video or CLICK HERE

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 know 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 SENSOR SETUP menu, choose the “Sensor Ref Cal” option, and press ENTER. The analyzer will now read the sensor for the period of time indicated by the “dampening” parameter, and display the result as D.O. in PPM. 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. 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 PPM.

SENSOR SLOPE ADJ (NOT RECOMMENDED)

If performed correctly, the previously described “SENSOR REF CAL” should be all that is required by the user. “SENSOR SLOPE ADJ.” should only be attempted if it is apparent that a major shift in calibration has occurred.

“SENSOR SLOPE ADJ.” procedure requires 3 steps that MUST be performed in the following order:

1. Erase all previous field calibration data by restoring factory defaults.
2. Calibrate the first point, which MUST be a zero oxygen solution.
3. Calibrate the second point, which should be near saturation levels.

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 THE 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 ADJ. calibration procedure from the SENSOR SETUP menu, and press ENTER. Press ENTER again to bypass the “!Warning! Proper Zero Required” message. The analyzer will now read the sensor for the period of time indicated by the “dampening” parameter, and display the result as D.O. in PPM. 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. Press the "MENU" button to exit or use the up and down arrow buttons to select another calibration mode.

FACTORY DEFAULT

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

TEMP. UNITS

The temperature units parameter allows the user to specify Celsius or Fahrenheit for the displayed temperature units.

DAMPENING

The dampening parameter will allow the adjustment of the amount of averaging taking place. This is entered in the amount of time it will take to achieve a stabilized reading, in seconds. This may be useful when using the system in a new application or trouble shooting.

SALINITY

This option allows for the correction of salts in the water. The salinity correction range is 0 to 45 ppt with a resolution of 1 ppt. Average sea water is about 34 ppt.

DISPLAY MODE

This option allows the dissolved oxygen to be displayed in either PPM or %SAT.

FREQ. SELECT

This option allows the power line notch filter to be set for 50Hz or 60 Hz.

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.

SS SENSOR

GENERAL

To do a complete calibration, three steps are required. The analyzer must first be zeroed, and then a sample/snapshot is taken. After the sample has been analyzed, the span of the analyzer can be adjusted to the sample. 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.

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 DCA 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 SAMPLE 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 M15 sensors is 0-60,000 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 M15L 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.

SENSOR ZERO

Establishing the zero point for a M15/M15L 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.

Use a QR reader app on a mobile device to scan for the SS Sensor Zero Calibration video or CLICK HERE

Select the "SENSOR ZERO" option from the SENSOR CAL menu using the up and down arrow buttons. Press the "ENTER" button. With the sensor submerged in clean water, wait about 10 minutes and then press "ENTER". The analyzer will take about sixty seconds to zero. The display will return to the calibrate menu automatically when it is finished. Press the "MENU" button to exit or use the up and down arrow buttons to select another calibration mode.

SNAPSHOT

For a truly meaningful calibration of the span of the sensor, the sensor should be calibrated in the process water itself against a value derived from laboratory analysis of that water. Since the laboratory analysis takes considerable time, the “SNAPSHOT” procedure causes the DCA to store the optical conditions seen by the sensor at the time the physical sample is taken. The SNAPSHOT procedure does not alter the calibration, but merely stores information for later use. With the sensor submerged in the process to be measured and stable, select the "SNAPSHOT" option from the SENSOR SETUP menu

using the up and down arrow buttons and pressing the "ENTER" button. Pressing the "ENTER" button again will cause the DCA to take a snapshot of the conditions. The DCA will take about sixty seconds to obtain a sample value. The display will return to the calibrate menu automatically when it is finished. At this point, you have NOT altered the calibration of the analyzer at all; you have only stored the conditions of the process water in memory for future use. Press the "MENU" button to exit or use the up and down arrow buttons to select another calibration function.

Use a QR reader app on a mobile device to scan for the SS Sensor Span Calibration video or CLICK HERE

At this time, 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. This value will be used during the span calibration.

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 SENSOR SETUP menu using the up and down arrow buttons and pressing the "ENTER" button. The value that was previously saved during snapshot will be displayed. Use the up and down arrow buttons to adjust the DCA's reading to agree with the value from the laboratory analysis. Press the "Enter" button when done. The system is now calibrated and ready for normal operation. Press the "MENU" button to exit or use the up and down arrow buttons to select another calibration mode.

DEFAULT SPAN

This calibration mode will replace the current span calibration value with the factory default value. This may be useful when using the system in a new application. If the sensor has been properly zeroed in clean water, the DCA 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.

RESPONSE TIME

The response time parameter will allow the adjustment of the amount of averaging taking place. This is entered in the amount of time it will take to achieve a stabilized reading, in seconds. This may be useful when using the system in a new application or trouble shooting.

SENSOR CURVE

The sensor curve parameter will allow the selection of a standard TSS sensor curve which should be used for most applications or a special TSS sensor curve which can be used for applications when the standard curve does not apply. Contact the factory for details on using the special curve setting.

FREQ. SELECT

This option allows the power line notch filter to be set for 50Hz or 60 Hz.

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.

pH SENSOR

The pH sensors consist of two parts; the M50 Holder and the Electrode (M51). They are shipped separately and must be assembled prior to installing the sensor into the process. The pH electrodes must be properly seated in the pH holder to ensure reliable operation and proper cleaning. This is achieved by first ensuring that there is silicone lubricant on the O-rings and seat and then by screwing the electrode into the holder, using the Electrode Installation Tool provided, until the top of the electrode is even with the line etched onto the jet clean boss.

NOTE: Installing a pH/ORP holder without a pH or an ORP electrode properly seated will void the warranty.

Calibration of pH electrodes have been greatly simplified, with ONE POINT or TWO POINT calibration modes available.

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 dilutions 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.

ONE POINT CAL

Select ONE POINT CAL from the setup menu. Submerge the sensor in the buffer solution. Press the ENTER key. After the DCA 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 nonvolatile memory of the DCA.

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

Select TWO POINT CAL from the setup menu. Submerge the sensor in the first buffer solution. Press the ENTER key. After the DCA 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 sensor in the second buffer solution. Press the ENTER key. After the DCA 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 nonvolatile memory of the DCA.

FACTORY DEFAULT

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

TEMP. UNITS

The temperature units parameter allows the user to specify Celsius or Fahrenheit for the displayed temperature units.

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.

ORP SENSOR

The ORP sensors consist of two parts; the M50 Holder and the Electrode M52. They are shipped separately and must be assembled prior to installing the sensor into the process. The ORP electrodes must be properly seated in the ORP holder to ensure reliable operation and proper cleaning. This is achieved by first ensuring that there is silicone lubricant on the O-rings and seat and then by screwing the electrode into the holder, using the Electrode Installation Tool provided, until the top of the electrode is even with the line etched onto the jet clean boss.

NOTE: Installing a pH/ORP holder without a pH or an ORP electrode properly seated will void the warranty.

SENSOR TYPE

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 an ORP electrode 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 sensor in the buffer solution. Press the ENTER key. After the DCA has acquired data, the ORP value will be displayed. Use the UP and DOWN arrow keys to change to the correct ORP value and then press the ENTER key. The calibration is stored in the nonvolatile memory of the DCA.

FACTORY DEFAULT

The Factory Default parameter allows the user to restore the sensor zero offset 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.

CH 2 MODE

If the DCA has only one sensor connected, you may use this setup option to disable channel 2 completely. This eliminates all channel 2 information from the normal RUN mode display. The options are ENABLED and DISABLED

Test Mode

This mode of operation allows the user to perform basic test functions to aid in troubleshooting. There are a total of 13 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 1 Data

This test is intended primarily to aid the InsiteIG technical support engineers in troubleshooting. The following channel 1 sensor data is displayed: sensor type, sensor serial number, sensor reporting mode, and sensor raw data. Press the MENU key to exit.

View Sensor 2 Data

This test is intended primarily to aid the InsiteIG technical support engineers in troubleshooting. The following channel 2 sensor data is displayed: sensor type, sensor serial number, sensor reporting mode, and sensor raw data. Press the MENU key to exit.

View Sensor Clk

View Sensor Clk displays the power line frequency which is used to filter the sensor data. Press the MENU key to exit.

Cal Analog 1

Cal analog 1 will cause the DCA to generate full scale output of 20mA on analog output 1. Use the UP and DOWN arrows keys to adjust the output, then press the ENTER key to save.

Cal Analog 2

Cal analog 2 will cause the DCA to generate full scale output of 20mA on analog output 2. Use the UP and DOWN arrows keys to adjust the output, then press the ENTER key to save.

Test Relay 1

Test Relay 1 displays the current status of relay 1. To toggle relay 1, press the "ENTER" button. The new status of relay 1 will be displayed. To exit, press the "MENU" key.

Test Relay 2

Test Relay 2 displays the current status of relay 2. To toggle relay 2, press the "ENTER" button. The new status of relay 2 will be displayed. To exit, press the "MENU" key.

Test Relay 3

Test Relay 3 displays the current status of relay 3. To toggle relay 3, press the "ENTER" button. The new status of relay 3 will be displayed. To exit, press the "MENU" button.

Clean Relay (Relay #4)

Test Clean Relay displays the current status of relay 4. To toggle relay 4, press the "ENTER" button. The new status of relay 4 will be displayed. To exit, press the "MENU" button.

Test Modbus

Test Modbus will test the RS-485 communication port.

Software Version

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

View Sensor 1 Char

This test is intended primarily to aid the InsiteIG technical support engineers in troubleshooting. The characteristics for the channel 1 sensor are displayed.

View Sensor 2 Char

This test is intended primarily to aid the InsiteIG technical support engineers in troubleshooting. The characteristics for the channel 2 sensor are displayed.

Error Messages

During operation, the DCA may determine that an error condition exists. If this happens, the display will contain an error message. The 4 possible error messages are as follows:

****SENSOR NOT RESPONDING****
This error message indicates that the DCA is not receiving any data from the sensor. Check to see that the sensor is properly connected, and there is no damage to the sensor cable. The error may also be caused by a faulty ground connection (check the power (chassis) ground and shield connections), severe electrical noise, or faulty electronics.

SENSOR ERROR
This error message indicates that the sensor is communicating with the DCA, but cannot produce a reasonable measurement. Loose connections, or connections that have been disconnected and reattached while power is turned on may cause these issues. These may be cleared by turning off power at the DCA for 30 seconds, then turning the unit back on again. This error may also be caused by a faulty ground connection (check the power (chassis) ground and shield connections), severe electrical noise, or faulty electronics.

****Zero Sensor** (M15/15L only)**
The DCA is indicating that a zero cal operation is required for proper operation. This error will appear if a new or different SS sensor has been connected to the DCA (the serial number of the sensor has changed). The error can also appear if the sensor is trying to produce a negative SS value, which should be impossible if a proper zeroing of the sensor had been performed.

***Ambient Error* (M15/15L only)**
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.

With any of these errors, you may call the factory for assistance.

MAINTENANCE

The DCA does not require any periodic maintenance. However, it may be necessary to periodically clean the exterior of the DCA. This may be done with a soft brush, broom or low pressure water rinse.

DO NOT! Use hi-pressure water or a pressure washer to clean the DCA. It is likely to be damaged during pressure washing.

The sensors must be kept clean for accurate readings. Normally, the jet clean system will adequately perform this function.

M10 D.O. Sensor: In normal wastewater aeration basins the M10 Sensor will not require a jet clean system; however it is important that the aqueous sample to be measured be allowed to come in contact with the measuring surface. The sensor should be visually inspected on a monthly basis to insure that rags and hair have not completely covered the measuring surface. During this time we recommend rinsing the sensor with a water hose.

In systems with high bio-slim and scaling, the integrated jet clean system is recommended to be used to prevent the slime and scale from attaching itself to the measuring surface. If wiping the sensing element is required, use a wet cloth, do not use a brush.

Fouling conditions at wastewater treatment facilities vary considerably from plant to plant. Experience gained during the first few months of sensor operation will allow the plant operators to determine their own reasonable schedule of sensor inspection. In no case should this inspection interval exceed one year.

M15/15L TSS Sensor: The sensor must be kept clean for accurate readings. Normally, the jet clean system will adequately perform this function. However, the sensor should be retrieved and cleaned manually on a periodic basis to remove the heaviest fouling that may impair the performance of the sensor. The frequency of this cleaning will vary depending on the application.

M51/52 pH/ORP Sensor: The electrodes are shipped with a protective boot over the pH glass. This boot should be used to keep the electrode glass wet while the electrode is out of service. If the electrode system has been unused for a long period of time, immerse the flat glass end of the electrode(s) in tap water for at least 30 minutes. This hydrates the pH flat glass and prepares the liquid junction of the reference electrode for contact with the test solution. To maintain response, the electrode system should always remain wet. The preferred storage solution is pH 4.0 buffer with saturated KCl added. Tap water will suffice for short term storage.

NOTE: <u>Do not</u> soak in distilled water. Utilize the pliable storage boot provided with the electrode(s) for storage.

Electrodes which are not broken or cracked can be restored, or rejuvenated, to full response by the following procedures:

- **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.

If these procedures fail to rejuvenate the electrode, the problem is probably a clogged reference junction in the reference electrode portion of the electrode system. Cleaning the reference junction involves heating a diluted KCl solution to 60 – 80 degrees Celsius. Place the electrode tip in the heated KCl solution for approximately ten minutes. Allow the electrode to cool naturally before re-testing. If these steps fail to improve the electrode response, replace the electrode.

Successful long term storage of an InsiteIG electrode depends entirely upon the care taken to assure that the glass and reference junction remain immersed in the recommended storage solution. Electrodes in storage with the protective rubber boot should be checked at least every 2 months to be sure that there is an adequate amount of storage liquid. Electrodes stored in this manner will normally last for 2 years. If a stored electrode is allowed to dry, the reference junction may become clogged with dried electrolyte. Should this occur, attempt to rejuvenate the reference junction using the "Cleaning Electrodes" procedure for reference junctions discussed earlier.

GUARANTEE AND REPAIR POLICY

The DCA, M15/15L sensors, M50 electrode holder and related items are guaranteed for two years against defective materials and workmanship. The M10 Dissolved Oxygen Sensor is guaranteed for five years against manufacturing defects. 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 RMA number and address it to the factory at:

Insite IG
RMA ### - ####
80 Whisperwood Blvd.,
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 immediately at 985-639-0006.

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

Appendix A - Modbus Protocol

Insite IG analyzers support communication with other devices via the Modbus protocol using RTU or TCP transmission mode. The Modbus protocol defines a message structure that controllers will recognize and use, regardless of the type of networks over which they communicate. It establishes a common format for the layout and contents of message fields. Transactions use a master-slave technique, in which only one device (the master) can initiate transactions (called queries). The other devices (the slaves) respond by supplying the requested data to the master and by taking the action requested in the query. Insite IG analyzers operate as slaves to other modbus devices. . When TCP mode is selected, all requests and responses are prefixed by a six byte header and the CRC field is not included.

The six byte header is as follows:

Byte 0: transaction identifier – copied by server – usually 0
Byte 1: transaction identifier – copied by server – usually 0
Byte 2: protocol identifier = 0
Byte 3: protocol identifier = 0
Byte 4: length field (upper byte) = 0 (since all messages are smaller than 256)
Byte 5: length field (lower byte) = number of bytes following

Message framing

Messages start with a silent interval of at least 3.5 character times followed by 4 fields and then followed by another silent interval of at least 3.5 character times. The first field contains the device address. The second field contains the function code. The third field contains the data. The fourth field contains the CRC value. Each byte has 1 start bit, 8 data bits, no parity, and 1 stop bit.

Address field

The address field contains one byte. Valid slave device addresses are in range 1 to 247 decimal.

Function code field

The function code field contains one byte. See the section titled Function codes supported by the DCA.

Data field

The data field contains one or more byte. This information is used by the analyzers to take the action defined by the function code.

CRC field

The CRC (cyclical redundancy check) field is two bytes, containing a 16-bit binary value. The CRC value is calculated by the transmitting device, which appends the CRC to the message. The receiving device recalculates a CRC during receipt of the message, and compares the calculated value to the actual value it received in the CRC field. If the two values are not equal, the message will be discarded.

The CRC is started by first preloading a 16-bit register to all 1's. Then a process begins of applying successive 8-bit bytes of the message to the current contents of the register. During the generation of the CRC, each 8-bit character is exclusive ORed with the register contents. Then the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB was a 1, the register is then exclusive ORed with a preset fixed value. If the LSB was a 0, no exclusive OR takes place.

The process is repeated until eight shifts have been performed. After the last (eight) shift, the next 8-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value.

When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

Function codes supported by the DCA

01 Read Coil Status

Description
Reads the ON/OFF status of the relays in the DCA.

Query
The query message specifies the starting relay and quantity of relays to be read. Relays are addressed starting at zero. Relays 1 – 4 are addressed as 0 – 3.

Below is an example of a request to read relays 1 – 4 from DCA with slave address 1.

Field Name	Example (hex)
Slave Address	01
Function	01
Starting Address Hi	00
Starting Address Lo	00
No. of Relays Hi	00
No. of Relays Lo	04
CRC	--

The coil status in the response message is packed as one relay per bit of the data field. Status is indicated as: 1 = ON; 0 = OFF. The LSB of the first data byte contains the relay addressed in the query. The other relays follow toward the high order end of this byte.

Below is an example of a response to the previous query.

Field Name	Example (hex)
Slave Address	01
Function	01
Byte Count	01
Data	05
CRC	--

The status of relays 1 and 3 is ON and the status of relays 2 and 4 is OFF.

04 Read Input Registers

Reads the binary contents of input registers in the DCA.

Query

The query message specifies the starting register address and the quantity of registers to be read. The DCA input registers are as follows:

Address (hex)	Register
0000	Channel 1 status
0001	Channel 1 primary measurement
0002	Channel 1 secondary measurement
0003	Channel 2 status
0004	Channel 2 primary measurement
0005	Channel 2 secondary measurement
000A	Last 4 digits of the channel 1 sensor serial number
000F	Last 4 digits of the channel 2 sensor serial number

The channel status is reported as follows:

Status (hex)	Description
0000	Normal
0001	Sensor not responding
0002	Sensor error
0003	Sensor requires a zero calibration (M15/15L only)

The M10 sensor will report D.O. as the primary measurement and temperature as the secondary measurement. The units for D.O. are hundredths of ppm and the units for temperature are tenths of °C.

The M15/15L sensor will report TSS as the primary measurement and the secondary measurement is undefined. The units for TSS are mg/l.

The M51 sensor will report pH as the primary measurement and temperature as the secondary measurement. The units for pH are hundredths of pH and the units for temperature are tenths of °C.

The M52 sensor will report ORP as the primary measurement and the secondary measurement is undefined. The units for ORP are mV with a 2000 mV bias to make all readings positive.

Input Registers 6, 7, 8, 9, B, C, D and E are internal calculation values used by the factory for testing.

Below is an example of a request to read the channel 2 status and channel 2 primary measurement registers from an analyzer with the slave address of 1.

Field Name	Example (hex)
Slave Address	01
Function	04
Starting Address Hi	00
Starting Address Lo	03
No. of Regs. Hi	00
No. of Regs. Lo	03
CRC	--

Below is an example of a response to the previous query where channel 2 is connected to a M10 D.O. sensor measuring 8.3 ppm at 25.0°C.

Field Name	Example (hex)
Slave Address	01
Function	04
Byte Count	06
Data Hi (Reg 3)	00
Data Lo (Reg 3)	00
Data Hi (Reg 4)	03
Data Lo (Reg 4)	3E
Data Hi (Reg 5)	00
Data Lo (Reg 5)	FA
CRC	--

06 Preset Single Register

Presets a value into a single register of the DCA.

Query

The query message specifies the register to be preset. The demand clean cycle register is the only register in the DCA which can be written to. When any value is written to this register, a clean cycle is initiated. The address of the demand clean cycle register is 238C (hex).

Below is an example of a request for a demand clean cycle on an analyzer with the slave address of 1.

Field Name	Example (hex)
Slave Address	01
Function	06
Reg. Address Hi	23
Reg. Address Lo	8C
Data Hi	00
Data Lo	00
CRC	--

The normal response is an echo of the query.

17 Report Slave ID

Returns a description of the type of device at the slave address.

Query
Below is an example of a request to report the ID and status of slave address 1.

Field Name	Example (hex)
Slave Address	01
Function	11
CRC	--

The normal response of the DCA is shown below.

Field Name	Example (hex)
Slave Address	01
Function	11
Byte Count	04
Slave ID	02
Run status	00=Off, FF = On
Ch 1 sensor type	00=M10 10=M15 20=M15L 30=M51 31=M52 63=Not used
Ch 2 sensor type	00=M10 10=M15 20=M15L 30=M51 31=M52 63=Not used
CRC	--

Exception Responses

If the DCA receives a query without a communication error, but cannot handle it, an exception response will be returned.

In a normal response, the DCA echoes the function code of the original query in the function code field of the response. In an exception response, the DCA sets the MSB of the function code to 1. This makes the function code value in an exception response exactly 80 hexadecimal higher than the value would be for a normal response.

The data field in an exception response contains an exception code. The exception codes supported by the DCA are:

Exception code	Description
01	Illegal function code
02	Illegal data address

Appendix B – Jet Clean System

The InsiteIG cleaning system uses a pressurized stream of air or water to remove bio growth or other debris from the optical surfaces of our sensors. The InsiteIG analyzers control the frequency and duration of the clean cycle through relays #3 and #4. (See drawing IIG04R112 & IIG04R113) These relays are programmable through the setup menu, see Relays section of this manual for more detail.

The **InsiteIG Model CA-2** Compressor consists of a compressor pump which delivers a sufficient blast of air to clean debris from the optics in most wastewater treatment plant basins and a directional solenoid valve to blast the sensors on channel 1 and channel 2 independently. (Relay #3 mode should be set to CA2 CLEAN.) It is housed in a UL, NEMA 4X, polycarbonate enclosure (see drawing IIG01N030) with quick disconnect ¼" tubing fittings provided on the bottom of the enclosure. The power requirements are 110/120 VAC @ 50/60 Hz and 1.8A. The unit is fused at 3 amps with a 1¼ x ¼" time delay fuse. The ambient operating conditions are a temperature of 0 degree Celsius to 55 degree Celsius and 0 to 100% humidity. A ¼" OD flexible tube with a 70 psi rating (customer supplied) connects the sensors to the compressor assembly. Quick disconnect fitting are supplied on both the sensor heads and compressor. The tubing length should be as short as possible. (If over 100' please consult the factory)

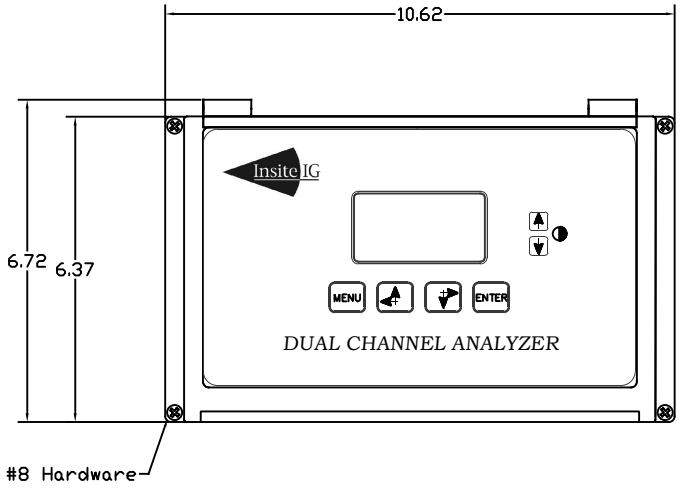
The compressor system should be mounted as close to the sensors as possible. The tubing connection, input power and relay connection to the analyzer are on the bottom of the enclosure. Handrail brackets are available for the compressor enclosure. See drawing IIG01N030 and IIG04R112.

If **Plant Water** is being used, or shop air, the customer must supply clean water at 35 to 50 psig or air at 40 to 60 psig. A 2-way solenoid valve (customer supplied) may be used to turn on and off the water to both sensor heads. A ¼" quick disconnect fitting is supplied with the sensor. See drawing IIG04R113 for wire details. There are no changes required in the sensor head for use with water or shop air. In this case Relay #3 mode should be set to ALARM.

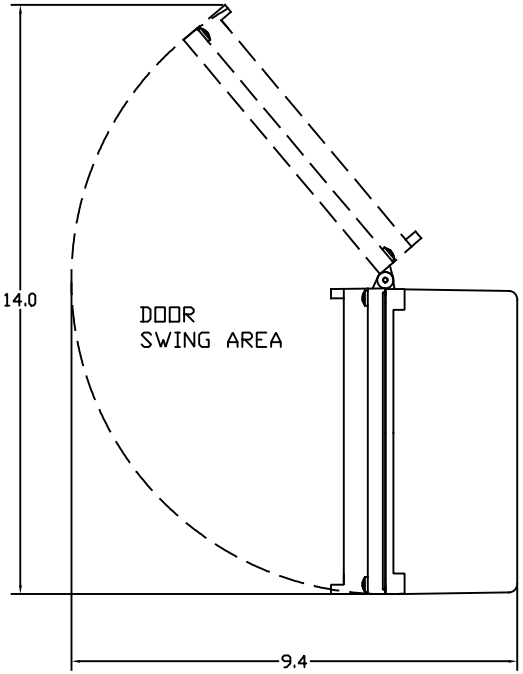
Two solenoid valves may be used (one for each sensor) so that the cleaning blast is not divided. In this case Relay #3 & Relay #4 are energized separately and Relay #3 mode should be set to SPECIAL.

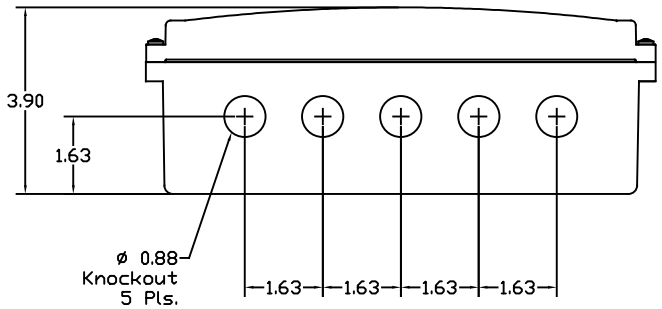
All of the InsiteIG sensors have the jet clean design built-into the sensor housing. The sensors are constructed of impact resistant epoxies and polyurethanes, suitable for most waste treatment. The nozzle aims the water, or air, stream across the measuring surface(s) of the sensor, removing any debris that may cause fouling.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Front View





Notes:

1. Construction: Polycarbonate + ABS (PC+ABS) with Flammability Classification V–0 or better; Enclosure Standard NEMA 4X, IP67, IP68
2. Approximate Weight: 4 LB.

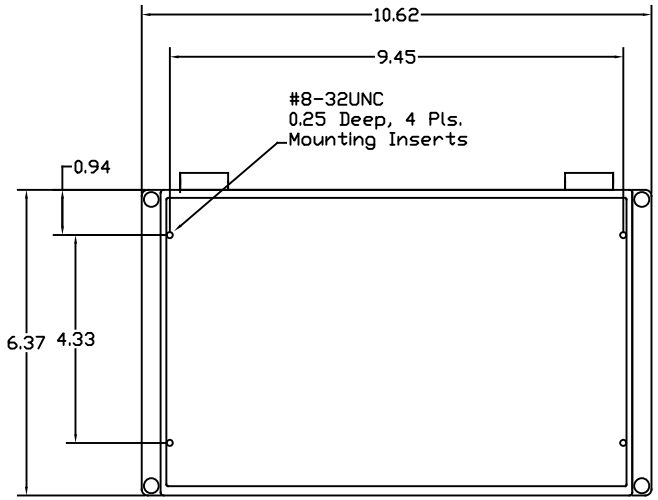
In "Normal Operation" the hinged cover is to remain tightly screwed closed. Under no circumstance is it necessary for the operator to open the enclosure.

Warning! – Before opening; switch off the analyzer power at the circuit breaker to avoid risk of shock.

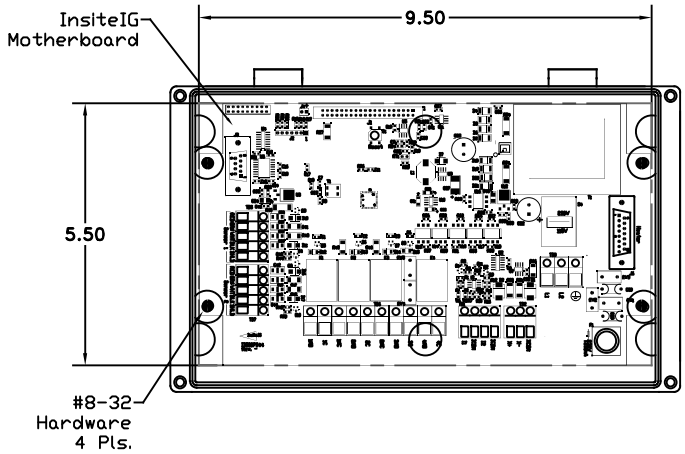
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.		InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	DRAWN	DATE	
	CHECK		TITLE InsiteIG Analyzer OUTLINE & MOUNTING
MATERIAL –	DESIGN		
FINISH –	APPROVED		SIZE C | DWG NO. IIG04N711 | REV –
SPEC.	CUSTOMER		SCALE NOTED | SHEET 1 OF 2

REV. –
DWG. No IIG04N711

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Rear View



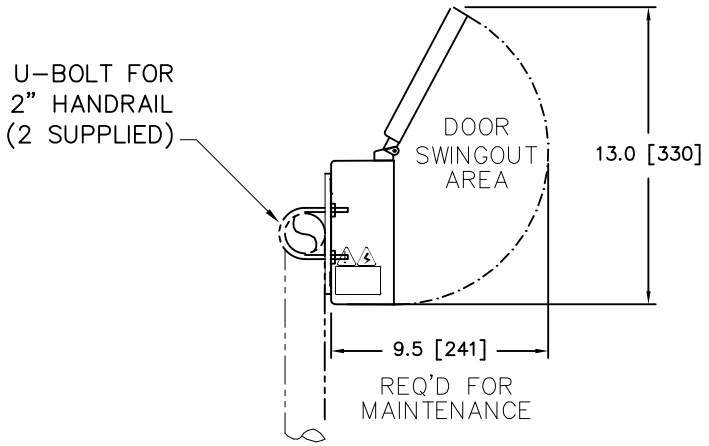
Front View

(Cover Removed)

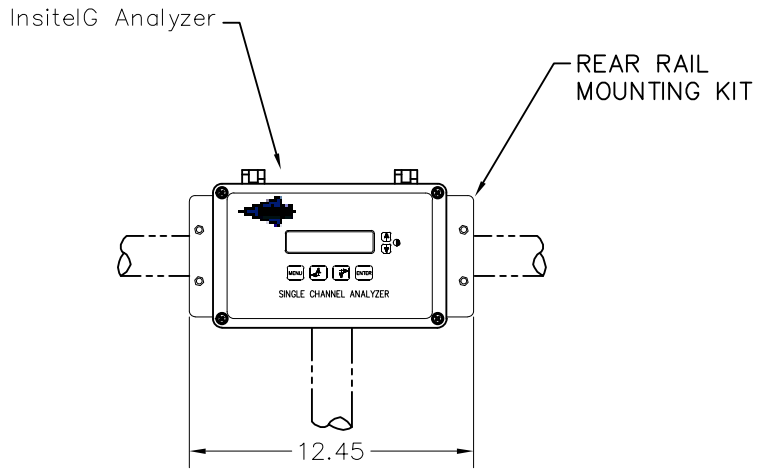
SIZE	DWG NO.	REV
C	IIG01N711	–
SCALE NTS		SHEET 2 OF 1

DWG. No IIG01N711 REV. –

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



SIDE VIEW



PLAN VIEW

NOTES:

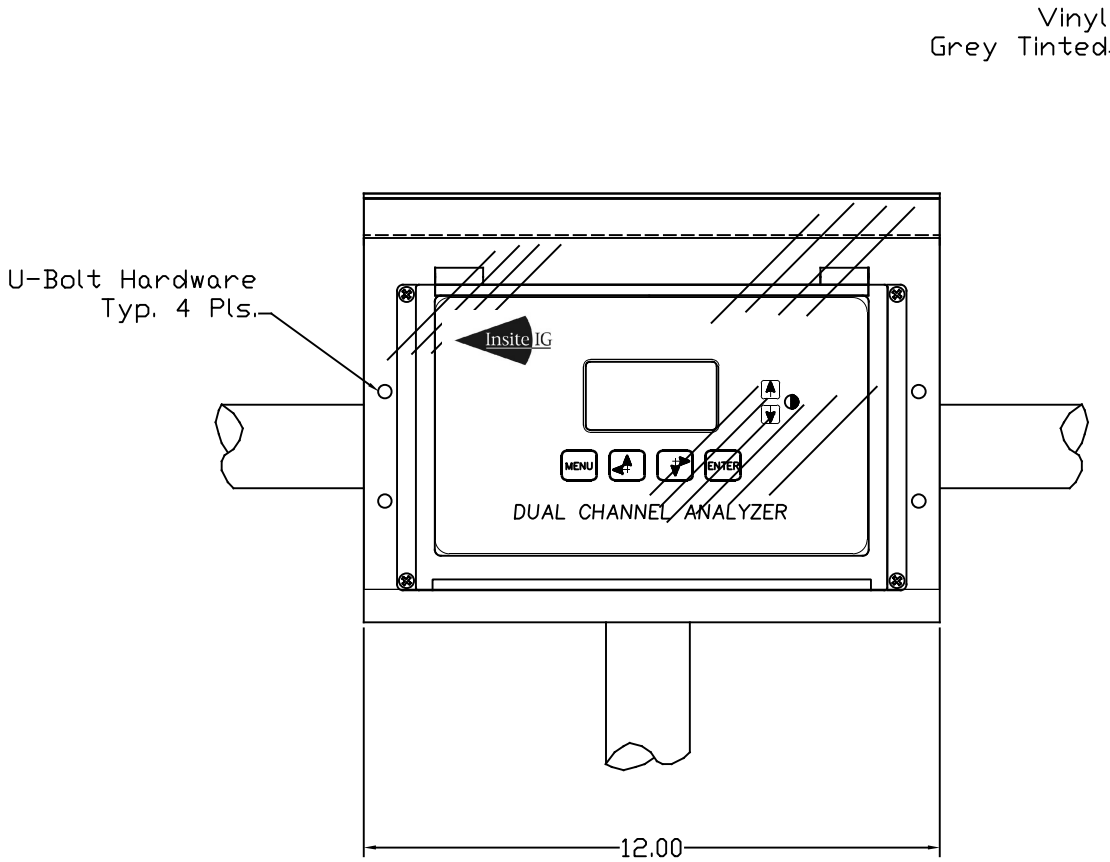
1. CONSTRUCTION: FIBERGLASS, NEMA 4X TYPE ENCLOSURE MOUNTED ON .125" PASSIVATED STAINLESS STEEL BRACKETS.

2. APPROXIMATE WEIGHT: 7 LBS.

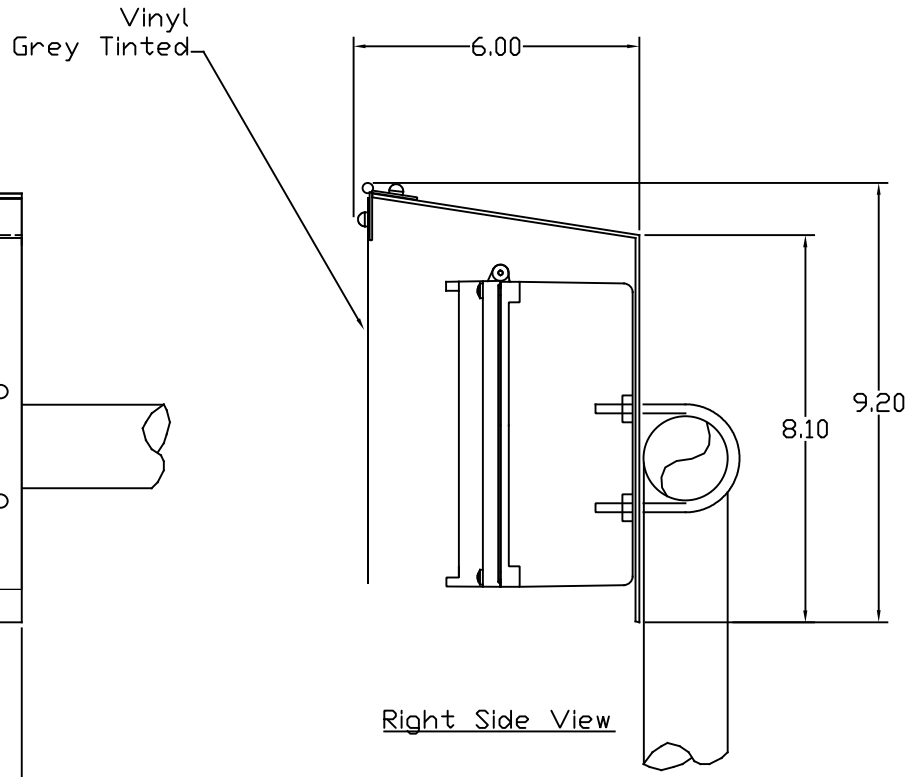
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS .XX ±.010 .XXX ±.005 ANGULAR X° ±1° DO NOT SCALE DRAWING	CONTRACT NO.		Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL —	DRAWN D. RADLE	DATE 1/29/02	TITLE HANDRAIL MOUNTING INSITE ANALYZER
FINISH —	CHECK		SIZE C DWG NO. IIG01N110 REV A
SPEC.	DESIGN D. RADLE	1/29/02	SCALE NTS SHEET 1 OF 1
	APPROVED		
	CUSTOMER		

DWG. No IIG01N110 REV. A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	CHANGE TITLE BLK		
	B	NEW ENCLOSURE	3/10/23	D.RADLE



Front View



Right Side View

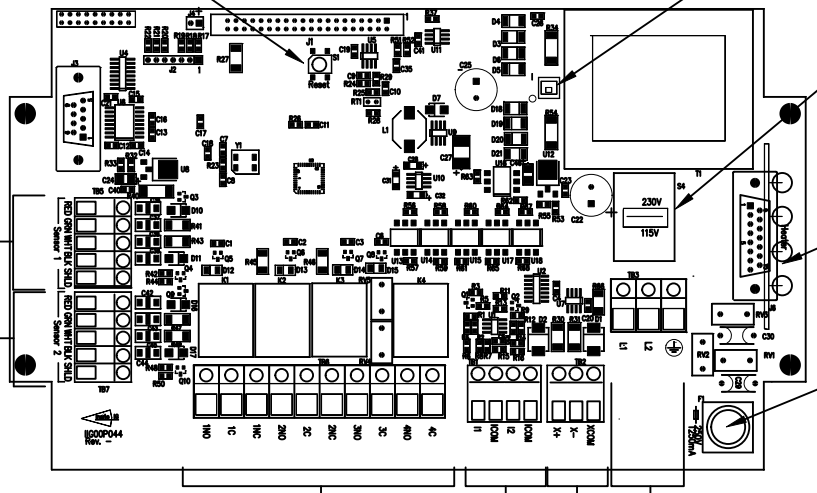
NOTES:

1. Weight Without Analyzer 4.0 lbs.
2. Material - 304 SS
3. Material Gauge - 14 Gauge
4. Finish - Passivated

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS .XX ±.010 .XXX ±.005 ANGULAR X° ±1° DO NOT SCALE DRAWING	CONTRACT NO.	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL –	DRAWN / DATE	TITLE: SUN SHADE O&M For SCA, DCA & MCR
FINISH –	CHECK	SIZE C / DWG NO. IIG01N022 / REV B
SPEC.	DESIGN	SCALE NTS / SHEET 1 OF 1
	APPROVED	
	CUSTOMER	

DWG. No IIG01N022 REV. B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	A	New Heater	1/2016	D.RADLE
	B	Change Power Switch	5/2020	D.RADLE



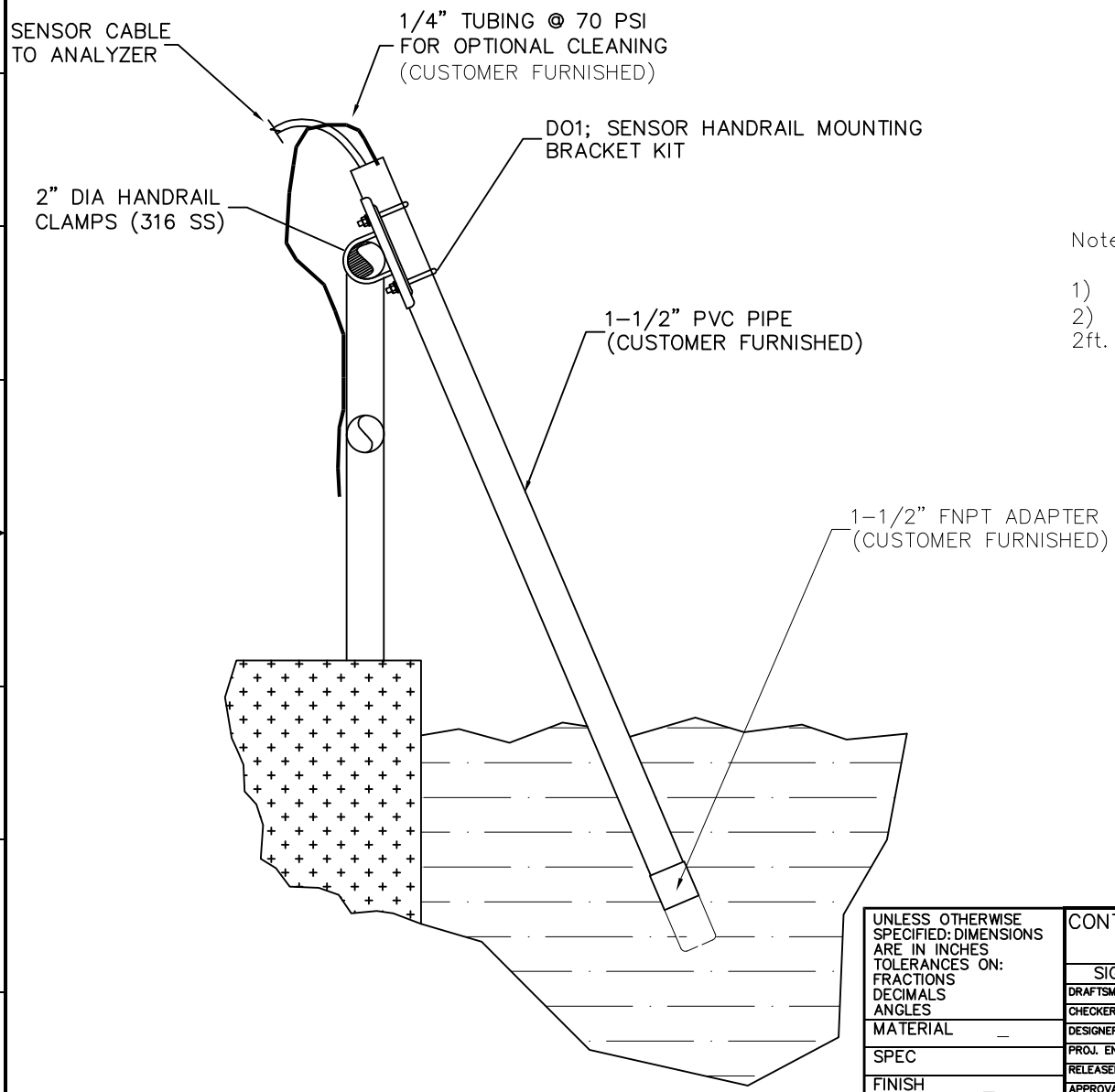
⚠ Circuit Breaker meeting IEC-947-3 must be on line supply, in close proximity to equipment and shall be marked as the disconnecting devise for the equipment.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL —	DRAWN / DATE	TITLE: CUSTOMER CONNECTION INSITE IG MODEL DCA
FINISH —	CHECK D. RADLE	SIZE C / DWG NO. IIG04R111 / REV B
SPEC.	DESIGN	SCALE NTS / SHEET 1 OF 1
	APPROVED D. RADLE	
	CUSTOMER	

DWG. No IIG04R111 REV. B

IIG01N005 —

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



Notes:

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

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACTIONS
DECIMALS
ANGLES
MATERIAL —
SPEC
FINISH —

CONTRACT NO.

SIGNATURES	DATES
DRAFTSMAN	
CHECKER	
DESIGNER	
PROJ. ENGR.	
RELEASED	
APPROVAL	

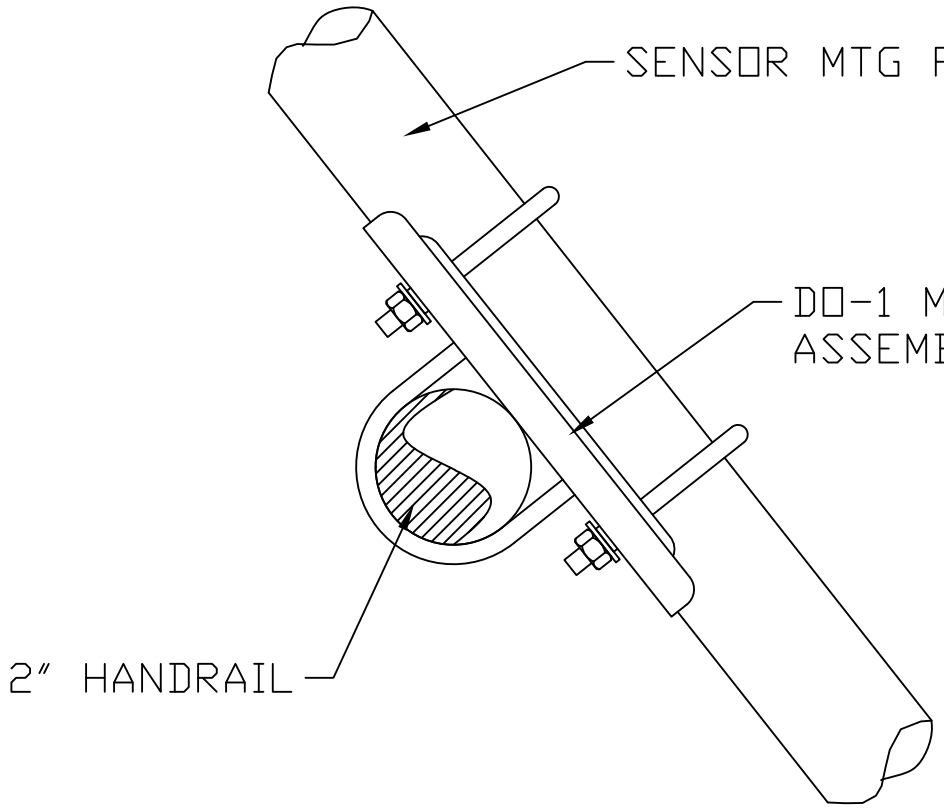
InsiteIG
80 Whisperwood Blvd.
Suite 107
Slidell, LA 70458

Insite IG, DO1
SENSOR HANDRAIL MOUNTING

SIZE	FSCM NO.	DRAWING NO.	REV
B		IIG01N005	—

SCALE NTS | SHEET 1 OF 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



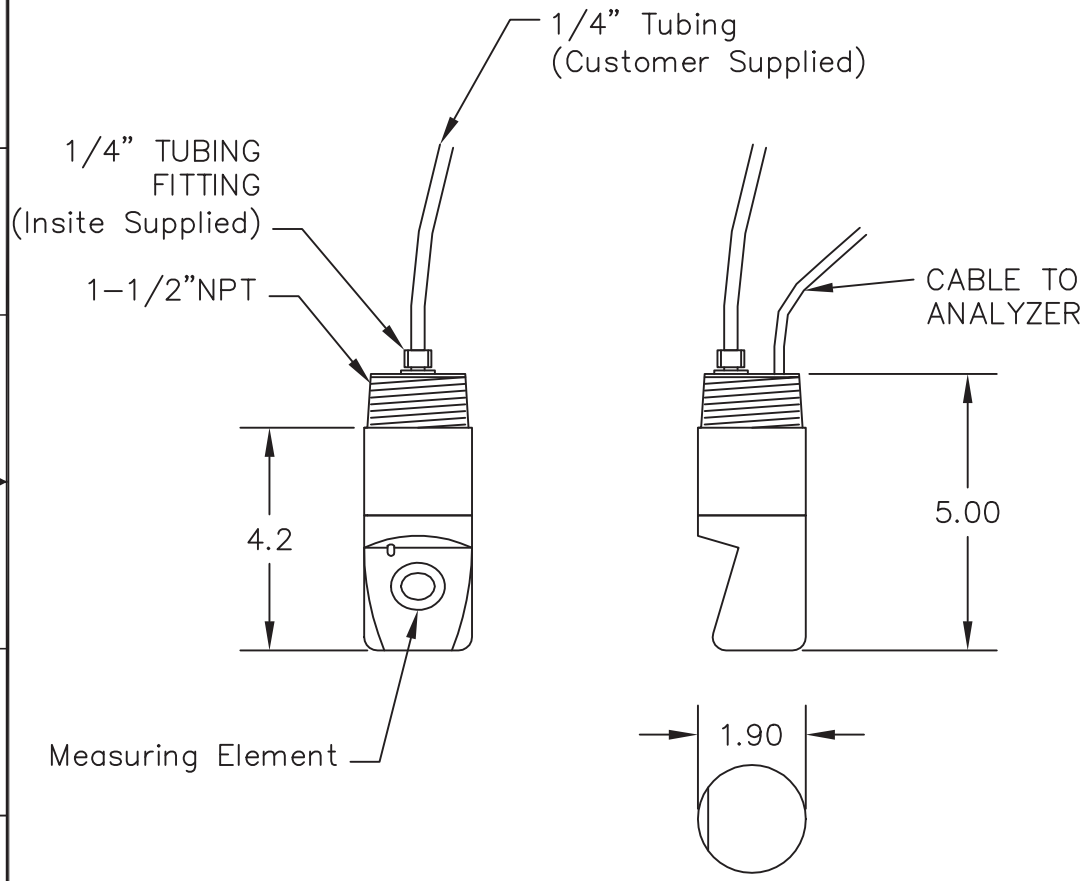
REV: –

DWG. No IIG01N005

SIZE	DWG NO.	REV
C	IIG01N005	–
SCALE NTS		SHEET 2 OF 2

IIG02N004 | C

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



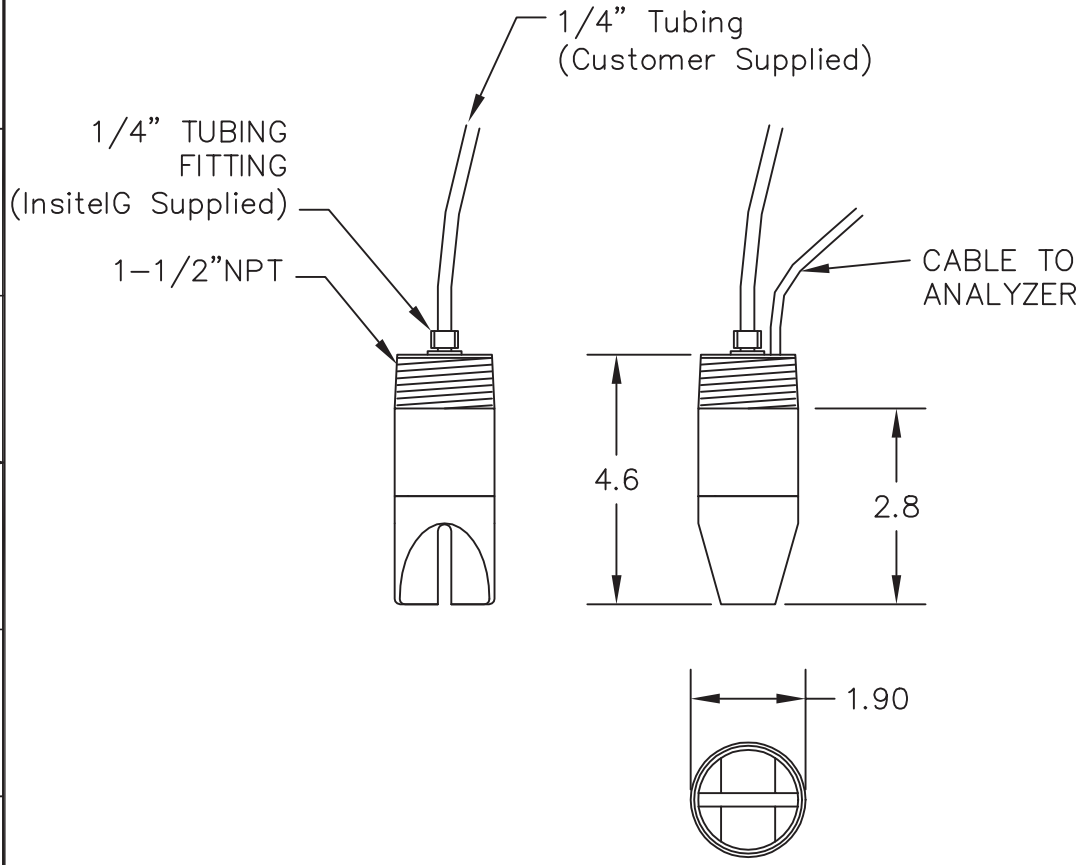
Notes:

1) Sensor Material: Epoxy, Polyurethane, PVC, 316 SS
2) Oxygen measurements should be take 2ft. below the surface and 3ft. from the wall.
3) Measurement element surface should not be facing downward in order to avoid collecting air bubbles.

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON: FRACTIONS DECIMALS ANGLES MATERIAL _ SPEC FINISH _	CONTRACT NO.	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	SIGNATURES / DATES DRAFTSMAN CHECKER DESIGNER PROJ. ENGR. RELEASED APPROVAL	DO SENSOR OUTLINE & MOUNTING
		SIZE B | FSCM NO. | DRAWING NO. IIG02N004 | REV C
		SCALE NTS | SHEET 1 OF 1

IIG03N004 | A

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



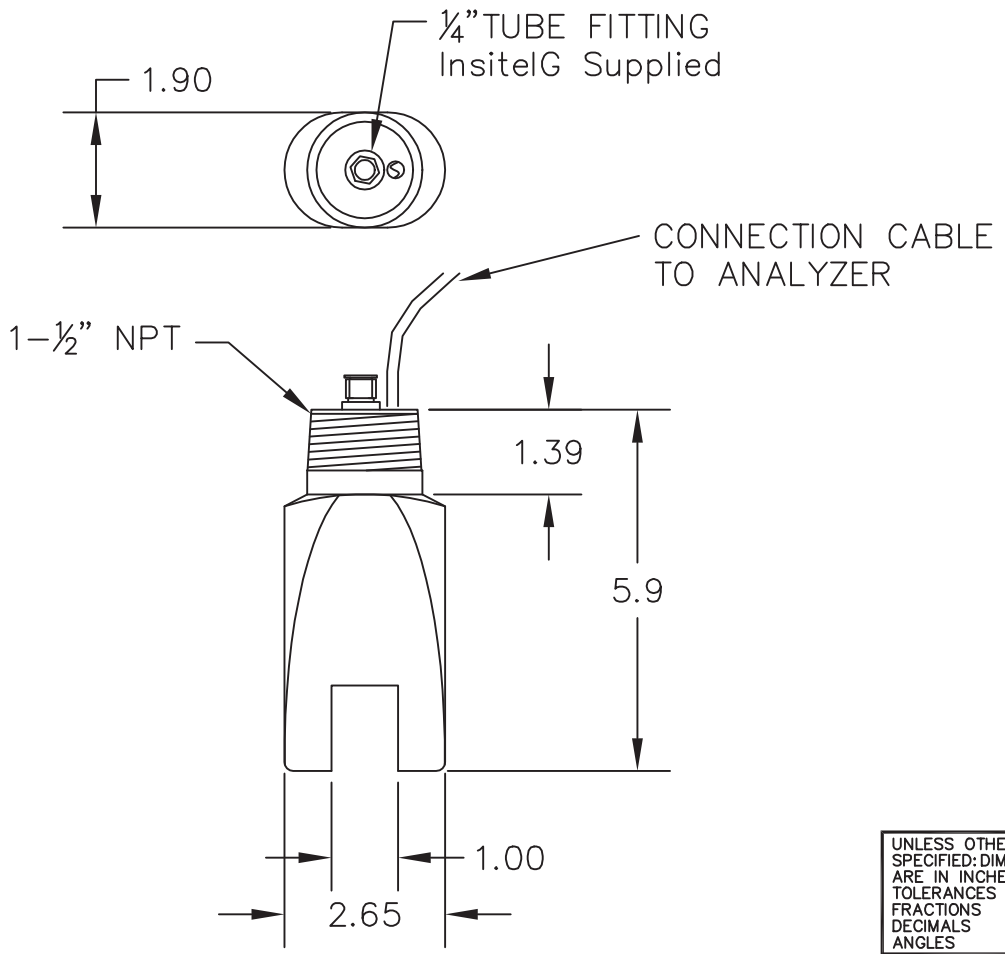
Notes:

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

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON: FRACTIONS DECIMALS ANGLES MATERIAL _ SPEC FINISH _	CONTRACT NO. SIGNATURES / DATES DRAFTSMAN CHECKER DESIGNER PROJ. ENGR. RELEASED APPROVAL	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458 TSS SENSOR OUTLINE & MOUNTING SIZE B | FSCM NO. | DRAWING NO. IIG03N004 | REV A SCALE NTS | SHEET 1 OF 1

IIG03N010 | –

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

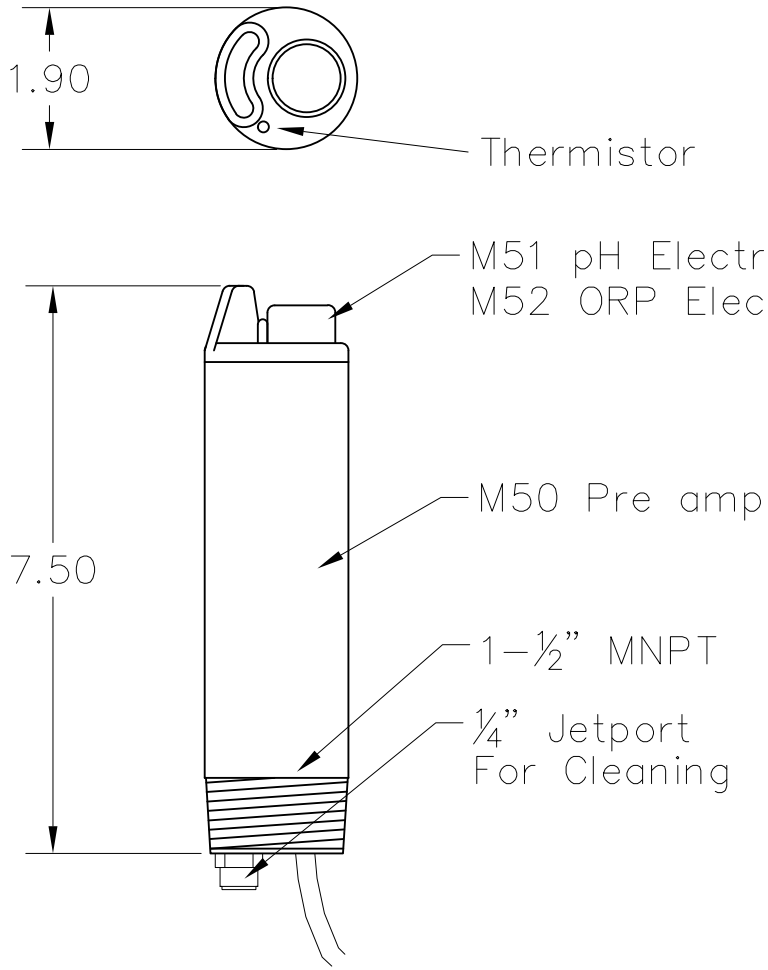


Notes:

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

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON: FRACTIONS DECIMALS ANGLES	CONTRACT NO.	InsitelG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL Listed	SIGNATURES / DATES	Outline & Mounting Low Range 15L/25L Sensor
SPEC	DRAFTSMAN	SIZE B | FSCM NO. | DRAWING NO. IIG03N010 | REV –
FINISH –	CHECKER	SCALE NTS | SHEET 1 OF 1
	DESIGNER	
	PROJ. ENGR.	
	RELEASED	
	APPROVAL	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



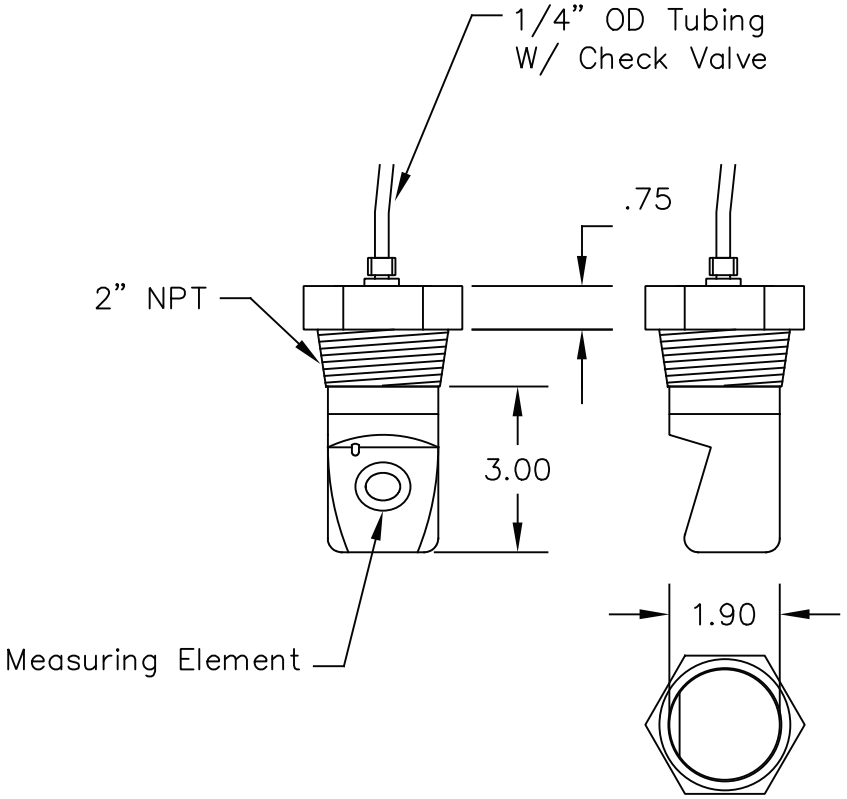
Notes:
1) Material:
   M50 – PVC, Polyurethane and Viton O–rings
   M51 – Flat Glass Double Junction w/Viton O–rings
   M52 – Flat Glass Double Junction w/Viton O–rings
2) Temperature Range: 10 to 60°C
3) Cable length 33'
4) Operating Range:
   M51 – 2 to 12pH
   M52 – ±2000mV

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL –	DRAWN / DATE	TITLE: OUTLINE & MOUNTING 28 & 50 SERIES pH/ORP
FINISH –	CHECK	SIZE C / DWG NO. IIG07N201 / REV B
SPEC.	DESIGN	SCALE NTS / SHEET 1 OF 1
	APPROVED	
	CUSTOMER	

DWG. No IIG07N201 REV. B

IIG02N006 B

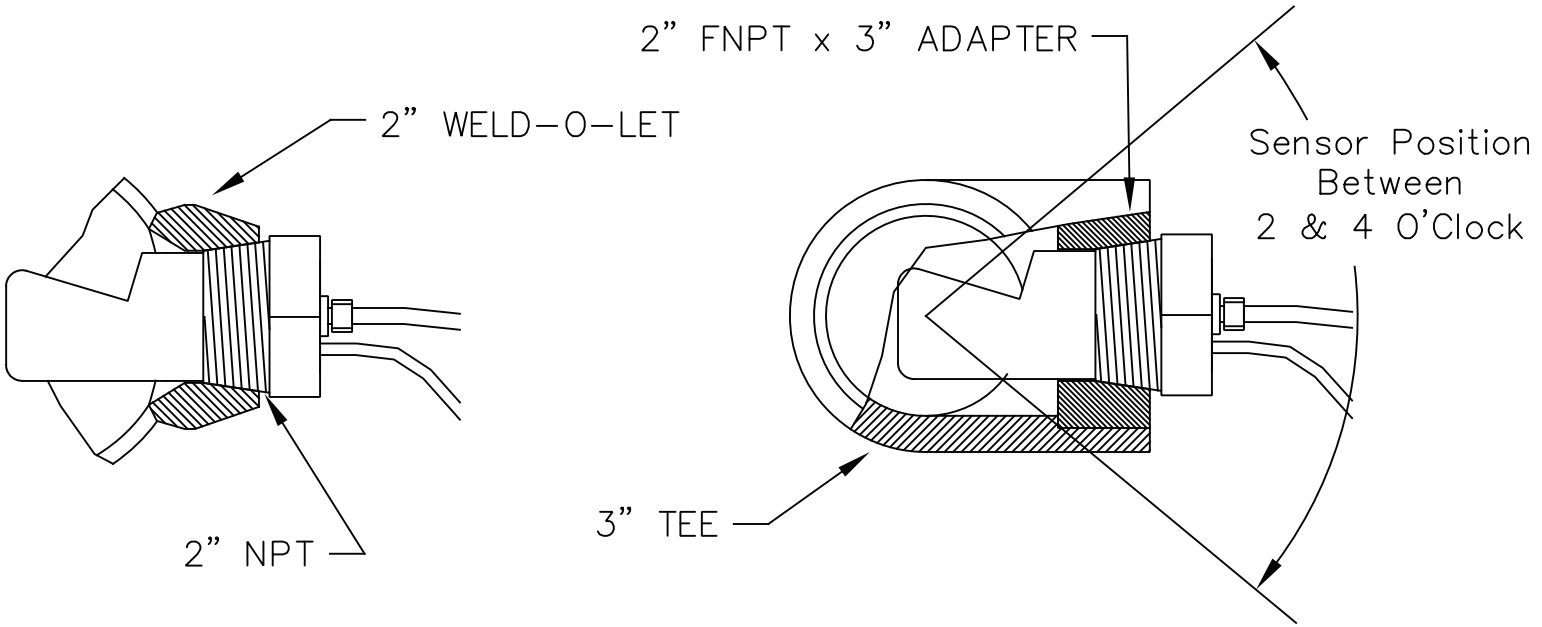
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	As Built		
	B	Change Max pressure to 50psi	11/2020	D.Radle



Notes:
1. Material: Sensor head – Epoxy and Polyurethane
   Back Coupling: 10PI is 316 S.S.
   10T is Gray PVC
2. Max in-line pressure is 50psi
3. Minimum pipe size is 3" nominal dia.
4. Be sure that Sensor measurement element surface is not facing into or against flow
5. Sensor must penetrate ID of the pipe by 1.5".

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES ON: FRACTIONS DECIMALS ANGLES MATERIAL _ SPEC FINISH _	CONTRACT NO.	Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	SIGNATURES / DATES DRAFTSMAN CHECKER DESIGNER PROJ. ENGR. RELEASED APPROVAL	INLINE DO SENSOR OUTLINE & MOUNTING
		SIZE B | FSCM NO. | DRAWING NO. IIG02N006 | REV B
		SCALE NTS | SHEET 1 OF 1

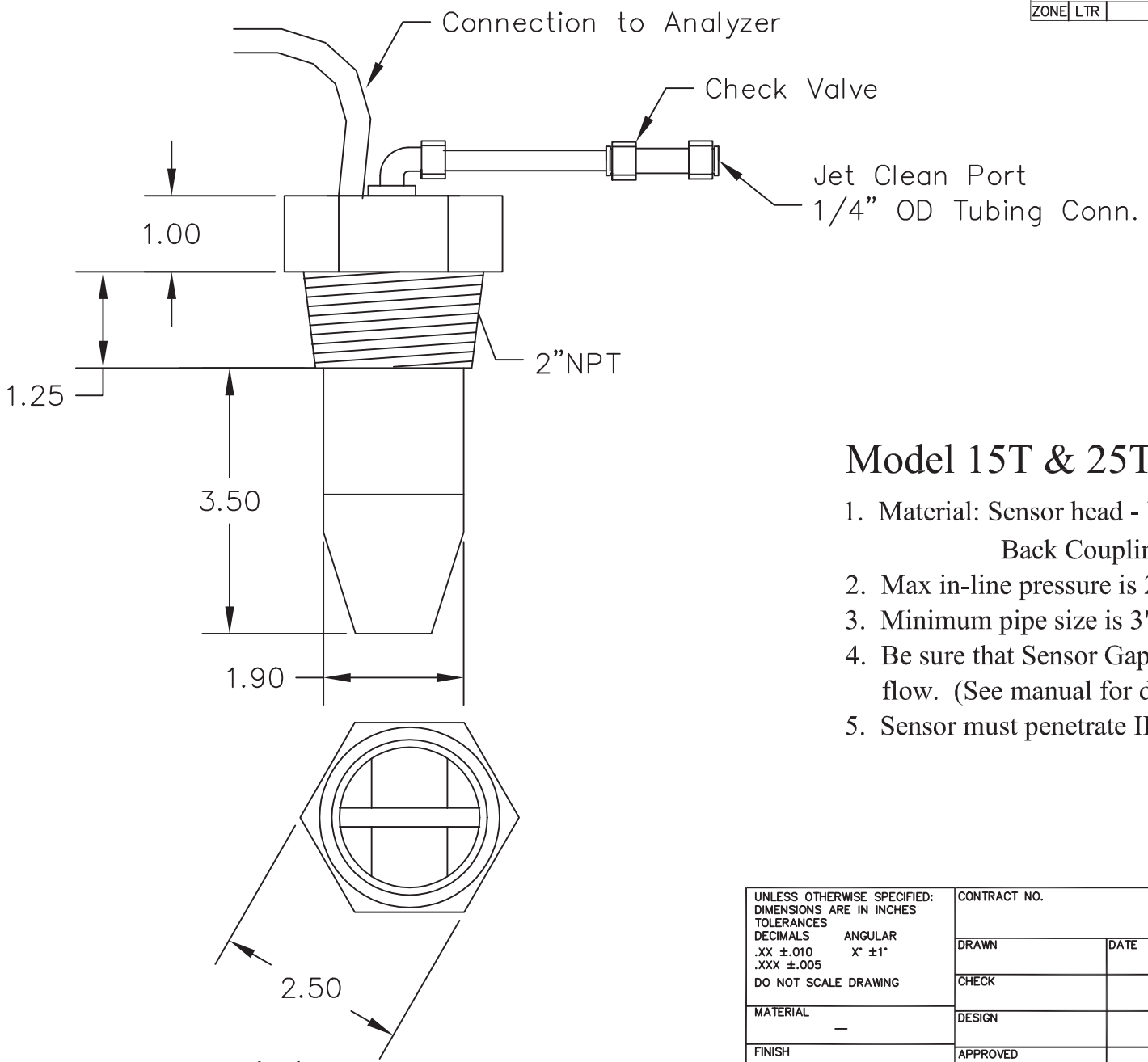
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



DWG. No IIG02N006 REV. B

SIZE	DWG NO.	REV
C	IIG02N006	B
SCALE NTS		SHEET 2 OF 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Model 15T & 25T

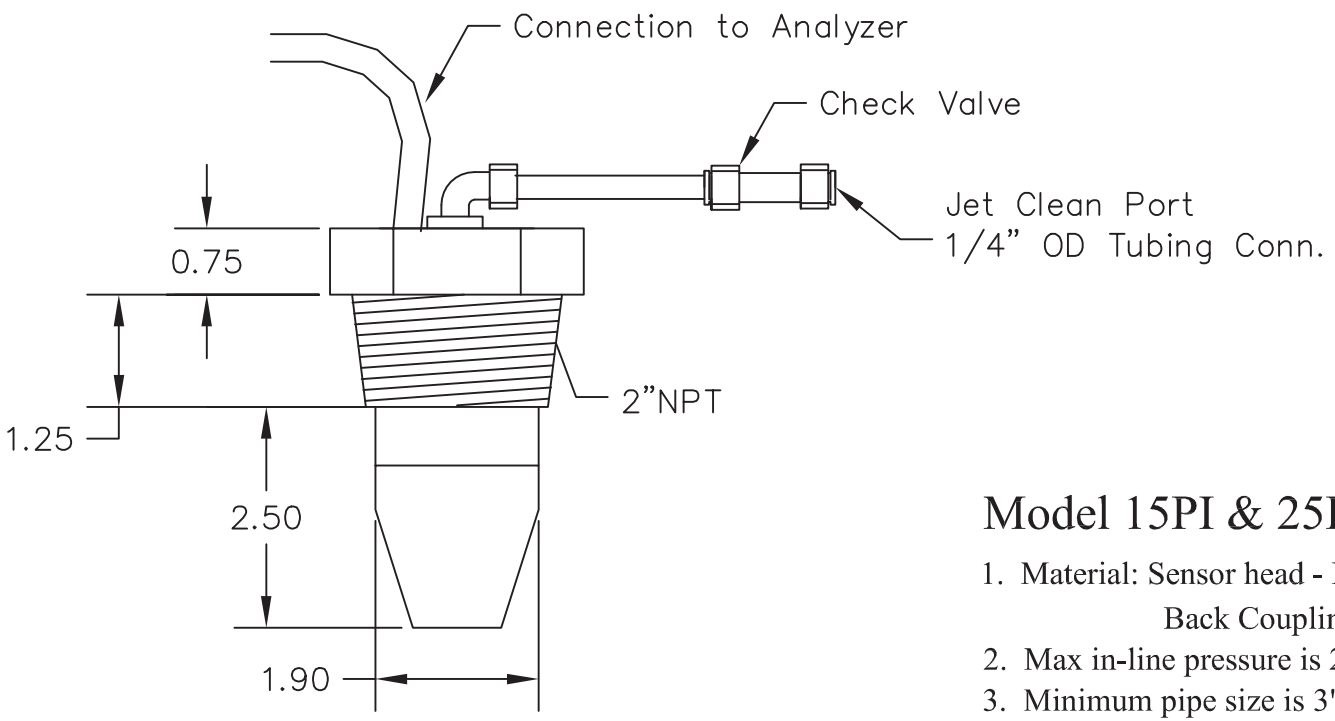
Model 15T & 25T Notes:

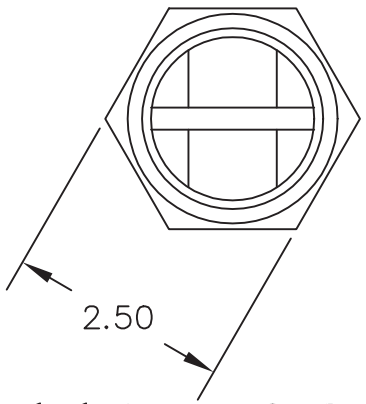
1. Material: Sensor head - Epoxy and Polyurethane
   Back Coupling - Gray PVC
2. Max in-line pressure is 20psi
3. Minimum pipe size is 3" nominal dia.
4. Be sure that Sensor Gap is in-line with sample flow. (See manual for details.)
5. Sensor must penetrate ID of the pipe by 1.5".

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL –	DRAWN / DATE	TITLE: OUTLINE & MOUNTING MODEL 15T/PI & 25T/PI
FINISH –	CHECK	SIZE C / DWG NO. IIG03N006 / REV B
SPEC.	DESIGN	SCALE NTS / SHEET 1 OF 3
	APPROVED	
	CUSTOMER	

DWG. No IIG03N006 REV. B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED





Model 15PI & 25PI

Model 15PI & 25PI Notes:

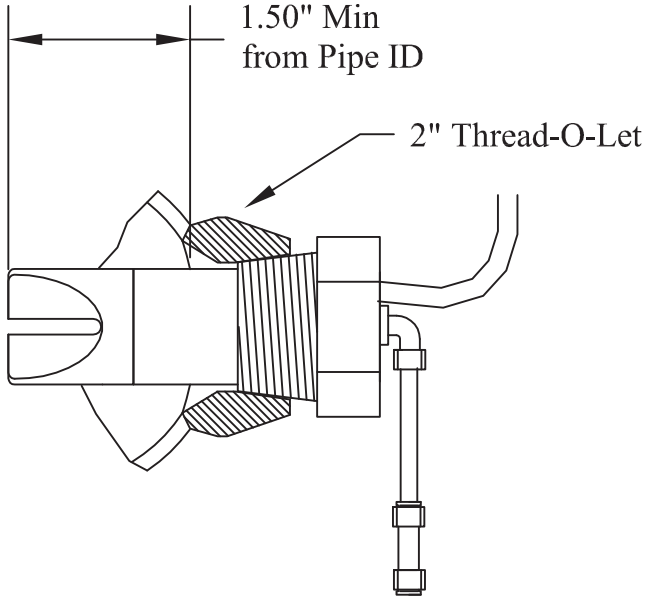
1. Material: Sensor head - Epoxy and Polyurethane
   Back Coupling - 316 Stainless Steel, Passivated
2. Max in-line pressure is 20psi
3. Minimum pipe size is 3" nominal dia.
4. Be sure that Sensor Gap is in-line with sample flow. (See manual for details.)
5. Sensor must penetrate ID of the pipe by 1.5".

SIZE	DWG NO.	REV
C	IIG03N006	B
SCALE NTS		SHEET 2 OF 3

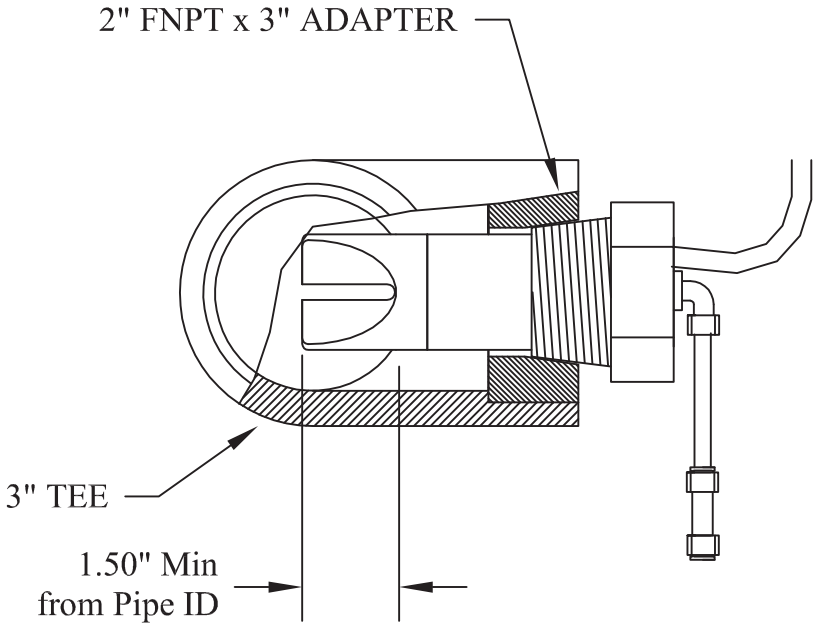
REV. D

DWG. No IIG03N006

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Thread–O–Let
Installation



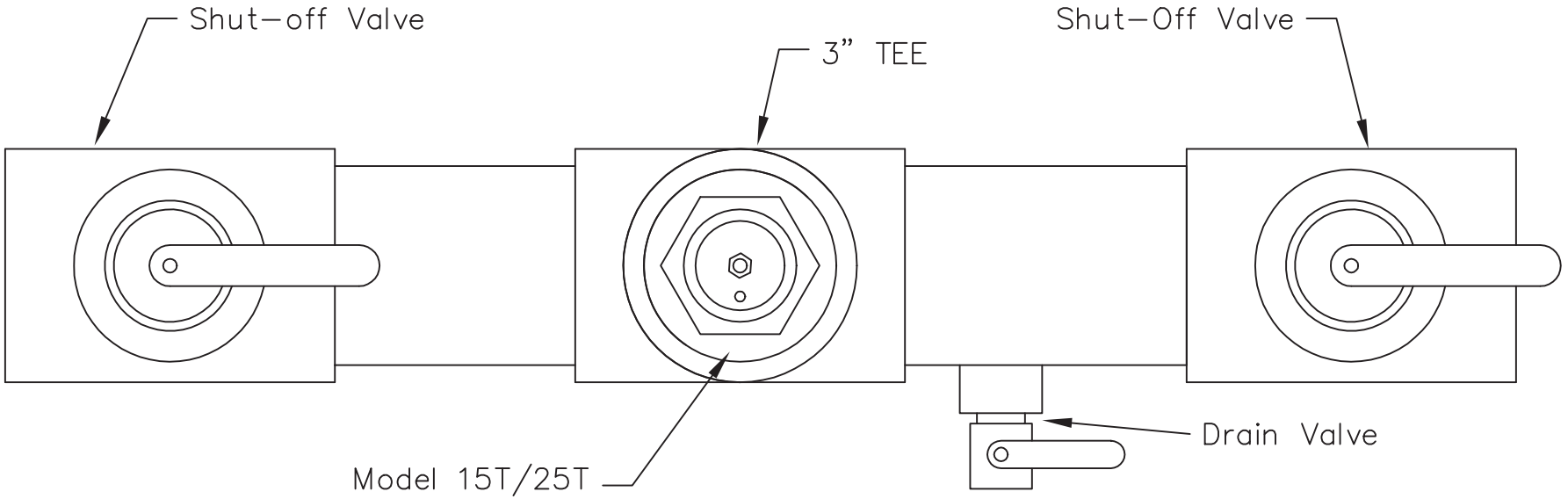
PVC TEE Installation

SIZE	DWG NO.	REV
C	IIG03N006	B
SCALE NTS		SHEET 3 OF 3

REV. D

DWG. No IIG03N006

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



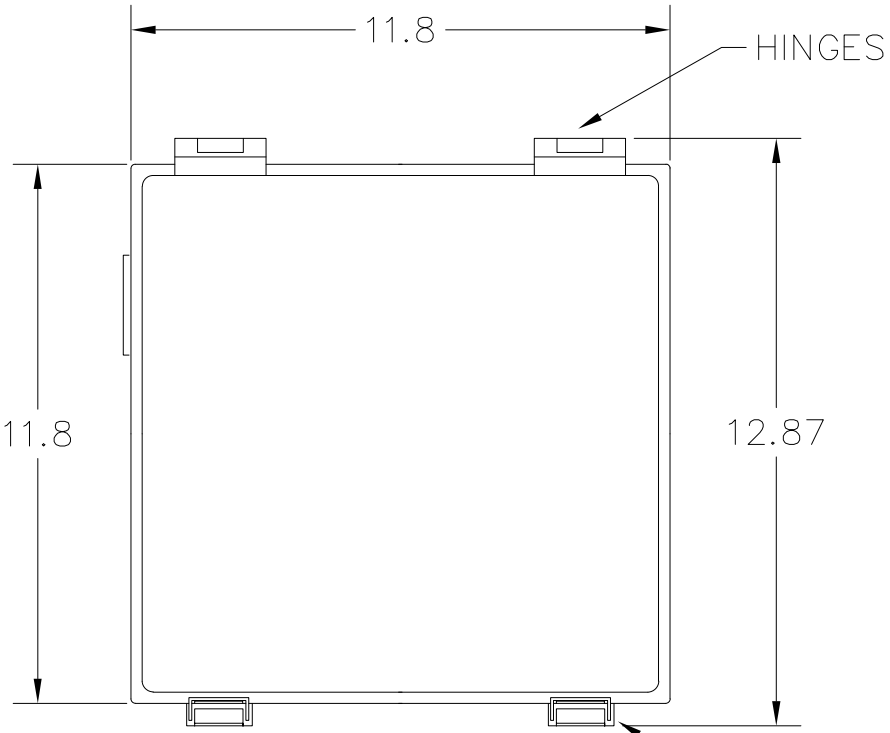
Sample By–Pass Line

REV. –

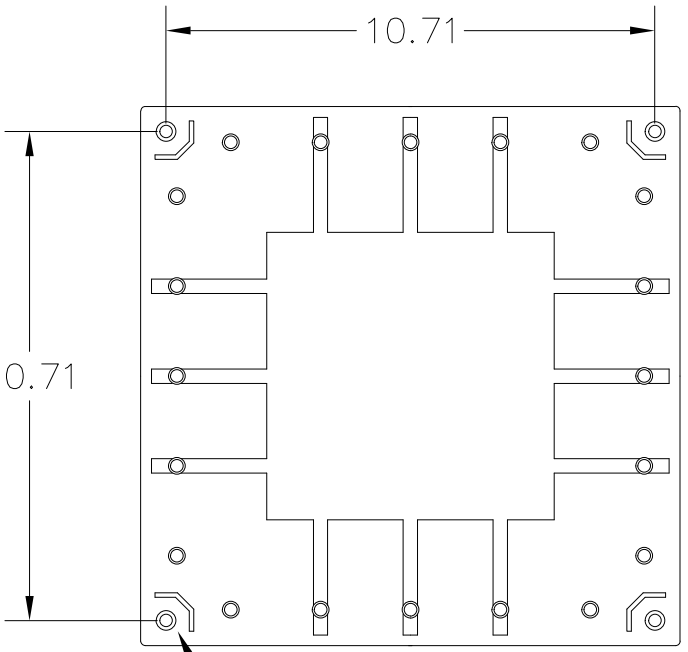
DWG. No IIG03N007

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL –	DRAWN / DATE	TITLE INSTALLATION DIAGRAM MODEL 15T/25T
FINISH –	CHECK	SIZE C / DWG NO. IIG03N007 / REV –
SPEC.	DESIGN	SCALE NTS / SHEET 1 OF 1
	APPROVED	
	CUSTOMER	

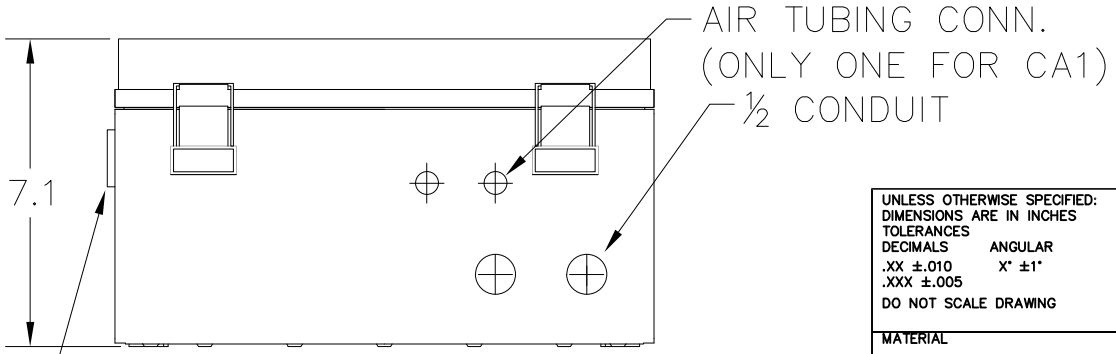
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



PLAN VIEW



BACK VIEW

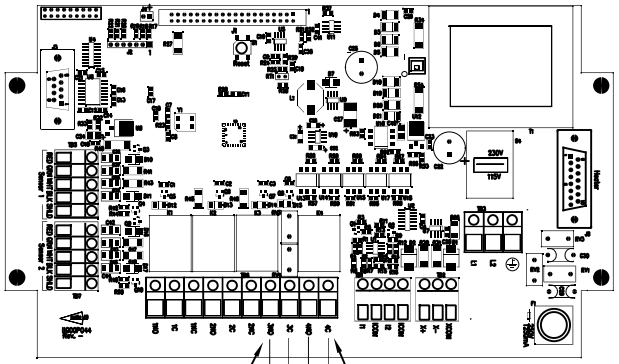


BOTTOM VIEW

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.		Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL —	DRAWN D. RADLE	DATE 1/29/02	TITLE OUTLINE & MOUNTING MODEL CA1 & CA2 COMPRESSOR
FINISH —	CHECK		SIZE C DWG NO. IIG01N030 REV A
SPEC.	DESIGN D. RADLE	1/29/02	SCALE NTS SHEET 1 OF 1
	APPROVED		
	CUSTOMER		

DWG. No IIG01N030 REV. A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

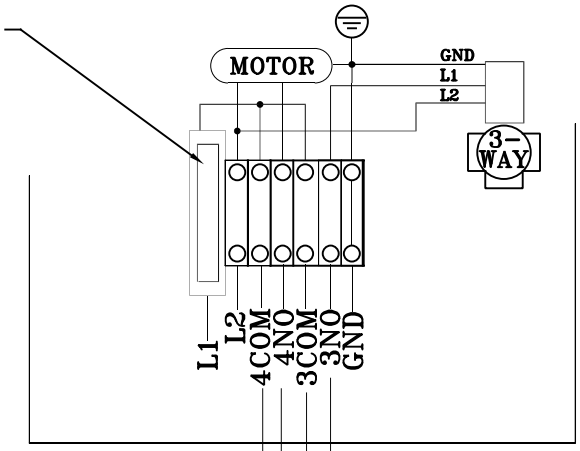


RELAY #3
SENSOR SELECTION
RELAY

RELAY #4
COMPRESSOR ON/OFF

CUSTOMER SUPPLIED
4 CONDUCTOR CONNECTION
18 AWG OR LARGER (2AMP)
RATED FOR 115/230 VAC

1-1/4" x 1/4"
3 AMP FUSE
MAX WITH
TIME DELAY
(GDC TYPE)



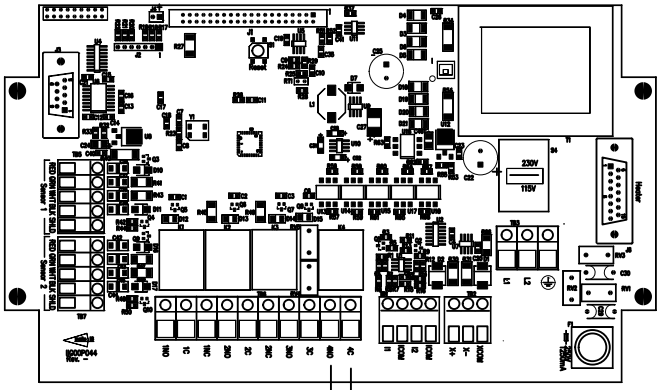
ANALYZER CONNECTIONS

COMPRESSOR CONNECTIONS
INSITE IG - MODEL CA2

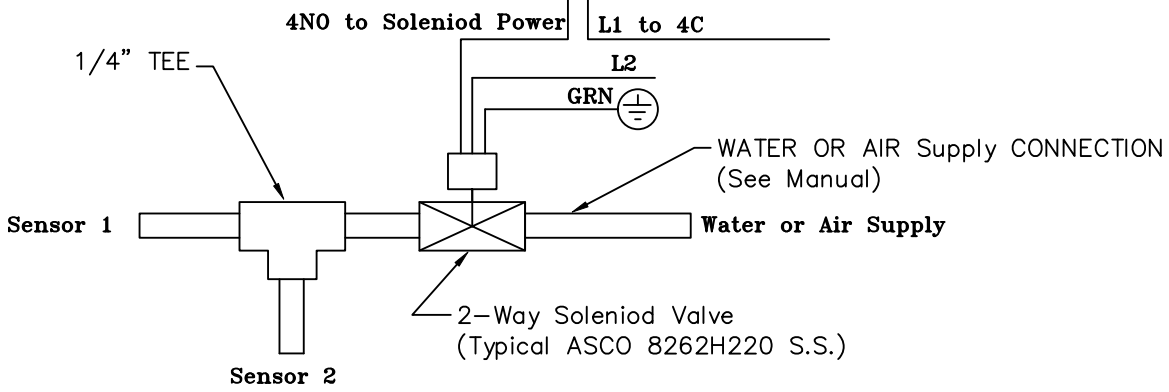
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	DRAWN / DATE	TITLE: MODEL CA2 CONNECTION INSITE IG - DCA
MATERIAL: -	CHECK: D. RADLE	
FINISH: -	DESIGN	SIZE: C DWG NO.: IIG04R112 REV: B
SPEC.	APPROVED: D. RADLE	SCALE NTS SHEET 1 OF 1
	CUSTOMER	

DWG. No IIG04R112 REV. B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



NOTES:
1. All solenoid wiring should be per National Electric Code.
2. Solenoids are general duty suitable for air and water to maximize flow at maximum pressure of 60 psi.

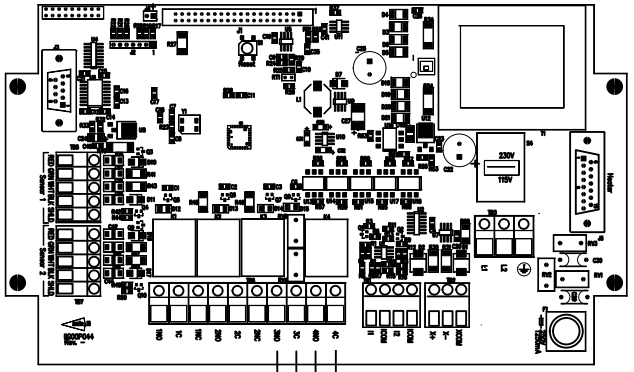


ANALYZER CONNECTIONS

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS .XX ±.010 .XXX ±.005 ANGULAR X° ±1° DO NOT SCALE DRAWING	CONTRACT NO.		Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	DRAWN	DATE	
	CHECK		TITLE SOLENOID JET CONNECTION INSITE IG DUAL ANALYZER
MATERIAL –	DESIGN D. RADLE		
FINISH –	APPROVED		SIZE C DWG NO. IIG04R113 REV B
SPEC.	CUSTOMER		SCALE NTS SHEET 1 OF 2

DWG. No IIG04R113 REV. B

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



3N0 to Soleniod #1 Power

L1 to 3C and 4C

4N0 to Soleniod #2 Power

L2

GRN

WATER OR AIR Supply CONNECTION
(See Manual)

Sensor 1

Water or Air Supply

2–Way Soleniod Valve
(Typical ASCO 8262H220 S.S.)

L2

GRN

WATER OR AIR Supply CONNECTION
(See Manual)

Sensor 2

Water or Air Supply

2–Way Soleniod Valve
(Typical ASCO 8262H220 S.S.)

ANALYZER CONNECTIONS for "SPECIAL MODE"

DWG. No IIG04R113 REV. B

SIZE	DWG NO.	REV
C	IIG04R113	B
SCALE NTS		SHEET 2 OF 2