MCA
MULTI-CHANNEL
ANALYZER

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Insite Instrumentation Group, Inc
80 Whisperwood Blvd.
Slidell, LA 70458
Phone: (985) 639-0006
Fax: (985) 639-0014
E-mail: info@insiteig.com
www.insiteig.com

Product Description

The MCA Multi-Channel Analyzer comes standard with 4 channels for the continuous measurement of dissolved oxygen, suspended solids, pH and/or ORP in an aqueous solution. It can be easily upgraded to handle up to 8 channels with the addition of a 4-channel expansion daughter board and sensors. The microprocessor-based electronics of the MCA analyzer provide a high degree of flexibility and ease of use.

The MCA 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 MCA is housed in a NEMA 4X enclosure (see Drawing IIG01N711 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-3, 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 MCA is designed to operate with any combination 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 unit 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 25.0. 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 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. The M10 incorporates self-cleaning optics via air or water jet.

The **M15 TSS sensor** has been designed for medium ranges (0 to 30,000 mg/l) as commonly found in aeration basins of wastewater treatment plants. It is available in configurations to facilitate either open basin/channel or pipe insertion applications. The **Model 15L sensor** has been designed for low ranges (0 to 1500 mg/l) as commonly found in effluent streams. Both sensors utilize an infrared emitter to minimize color effects, and they both 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 the M51 and M52, pH and ORP electrodes** (please specify pH or ORP when ordering the M50). The MCA will display pH values in 0.01 pH resolution, and can display a range of 0.00 to 14.00 pH. However, the M51 pH electrode is only rated for a pH range of 2 to 12. The MCA will display ORP values in 1 mV resolution over a range of -2000 to 2000 mV. Water temperature may also be measured for automatic temperature compensation. The temperature may be displayed in degrees Celsius or degrees Fahrenheit. 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. They incorporate self-cleaning via air or water jet.

INSTALLATION

1. The MCA analyzer should be located to allow convenient access for an operator to read and technician to install and maintain. A rear rail mounting kit is available for the standard enclosure (see Drawing IIG07N022). This mounting kit is design for a standard 2" handrail but can be adapted to square or angle handrails as well.

   DO NOT locate the analyzer where it is likely to be damaged during unrelated or 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

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

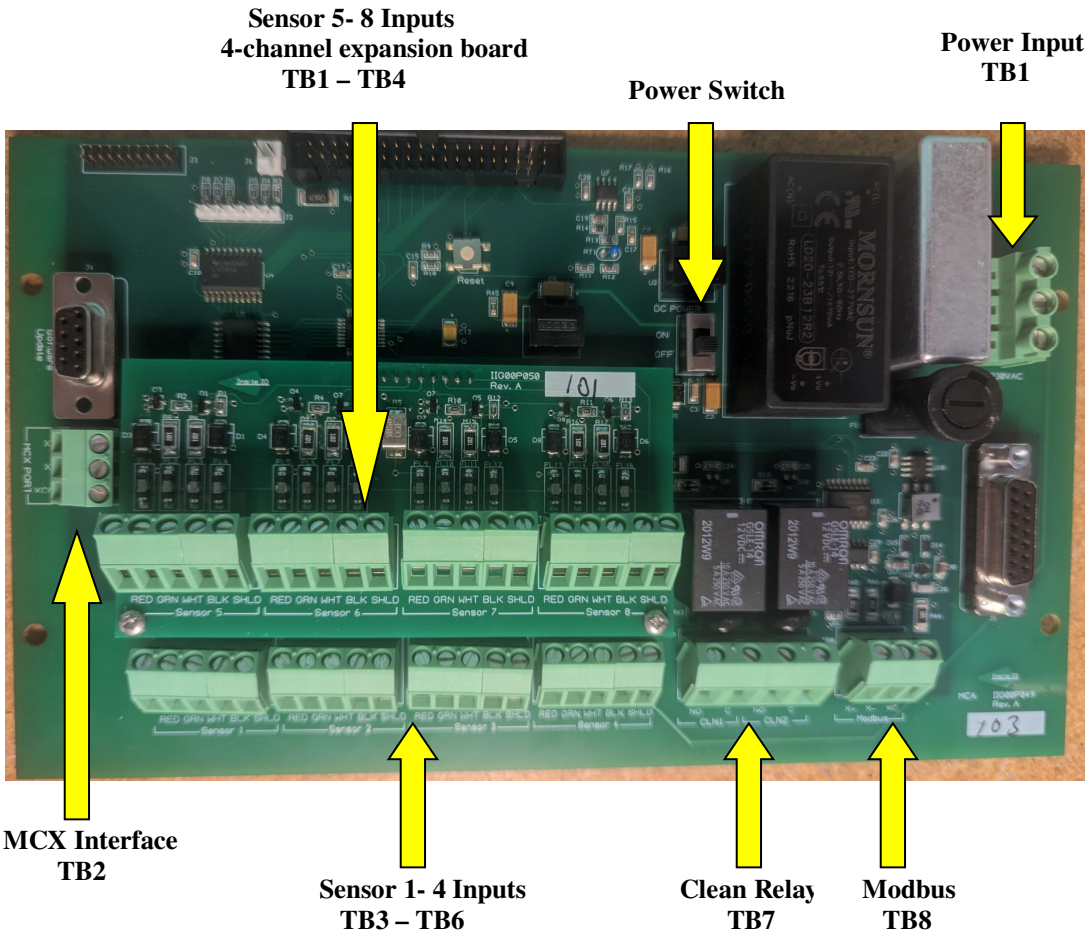
DO NOT install a pH/ORP holder (Model 50) without a pH cartridge (Model 51) or an ORP cartridge (Model 52) installed and properly seated in the pH/ORP holder. Installing a pH/ORP holder without a pH or an ORP cartridge will void the warranty.

WARNING! – Before opening the analyzer cover; 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! – A circuit breaker meeting IEC-947-3 must be on the line supply, in close proximity to the MCA, and shall be marked as the disconnecting device for this equipment.

3. Open the enclosure of the MCA. Pass all connection cables through 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 TB3 through TB6 (labeled SENSOR 1 through 4) on the standard unit (see drawing IIG07R711) and TB1 through TB4 of the 4-channel expansion daughter board for sensors 5 through 8. 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".

4. Power connections should now be made to the terminal block labeled TB1 (115 volts or 230 volts). Turn power "on" by placing switch S1 to the ON position. Close and secure the enclosure.



MCA Motherboard with Daughterboard

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

6. Once the MCA is turned on, the unit will initialize and then automatically enter the normal "RUN" mode. In this mode, Channel 1 (“CH 1”) content will be displayed on the upper left-hand portion of the display with the content of Channels 2 through 4 displayed below it. Channels 5 through 8 will appear in a right-hand column.

Note: The Model 10 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. Likewise, pH and ORP readings should be correct upon initial installation of equipment received from the factory. TSS sensors normally require zero and span procedures as described in detail later in this document.

Digital Output

A Modbus communications (RS-485) output is available from TB8 and is labeled “Modbus”. This is a three-wire signal with a transmit plus (labeled X+), a transmit minus (labeled X-), and a transmit ground or common (labeled X COM). The Modbus interface uses 8 bits, no parity, 1 stop bit. See drawing IIG07R711 for details. The RS-485 interface is electrically isolated from the measurement and microprocessor circuitry of the MCA. The communications protocol for the Digital Output is fully described in Appendix A.

Clean Relays

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 TB7. See drawing IIG07R711 for connection details.

Analog Outputs and Relay Outputs

The optional MCX box expands the system to provide eight isolated active 4-20 or 0-20 milliamp signals capable of driving 600 ohms. It also provides four form C set point control relays. The analog outputs and relays are independently programmable and may be assigned to any sensor channel.

MCX Installation

In most instances, the MCA and MCX units should be mounted in close proximity to each other for practical logistical reasons. The electrical interface between the MCA and MCX units is a 3 wire RS485 connection, and this interface will allow for long distances where necessary (1000 feet). The MCX box requires its own 115 or 230 VAC line power (see Drawing IIG07R721). The MCX box mounting details and considerations are identical to the MCA, as depicted in drawing IIG07N022.

Status LED

A GREEN status LED will blink at a one second rate during normal operation to indicate that the MCX is properly powered, and the internal microcontroller is functioning normally.

Tx LED

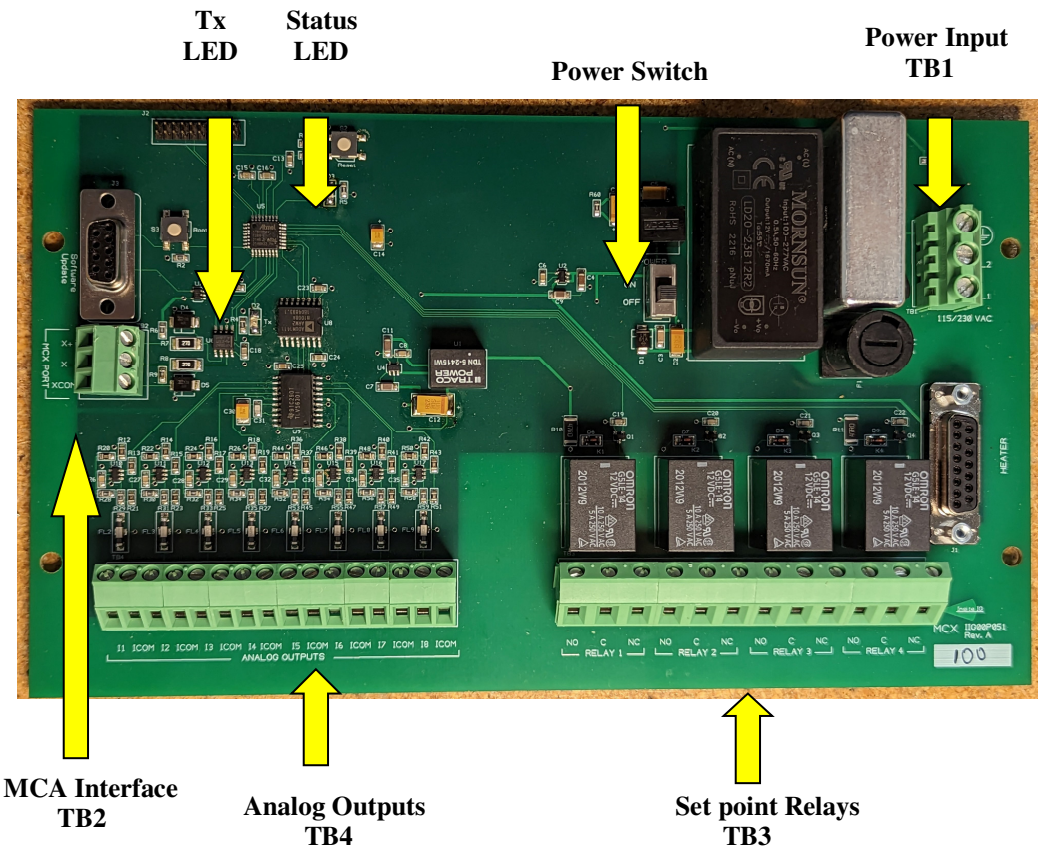
A YELLOW Tx LED will flash to indicate that the MCX is responding to a message that it has received from the MCA. If communications between these two units are working normally, this LED will flash about once per second.

Analog Outputs

Four isolated 4-20 or 0-20 milliamp signals capable of driving 600 ohms are available from the terminal block TB4 labeled “Analog Outputs”. See drawing IIG07R721 for details. The #1 analog output is labeled "I1 & ICOM”, and the #2 analog output is labeled “I2 & ICOM”, and so on. Each analog output may be assigned to any sensor channel.

Relay Outputs

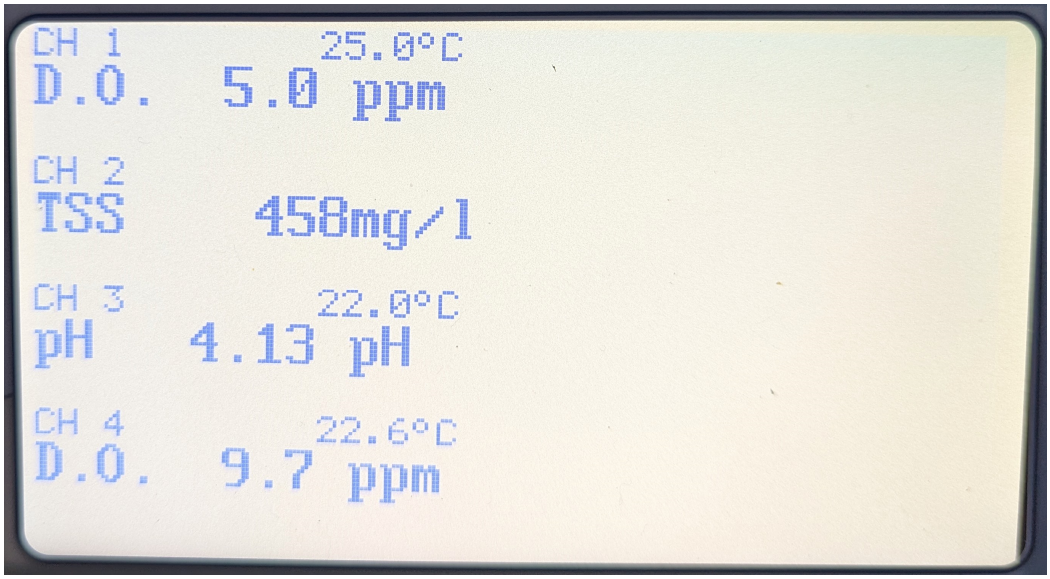
There are four independent programmable set point control relays that may be assigned to any sensor channel. These relays are Form-C with contacts rated 10/6 amps resistive load at 125/250 VAC. The connections for the relay outputs are available from TB3. See drawing IIG07R721 for connection details.



MCX Circuit Board

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

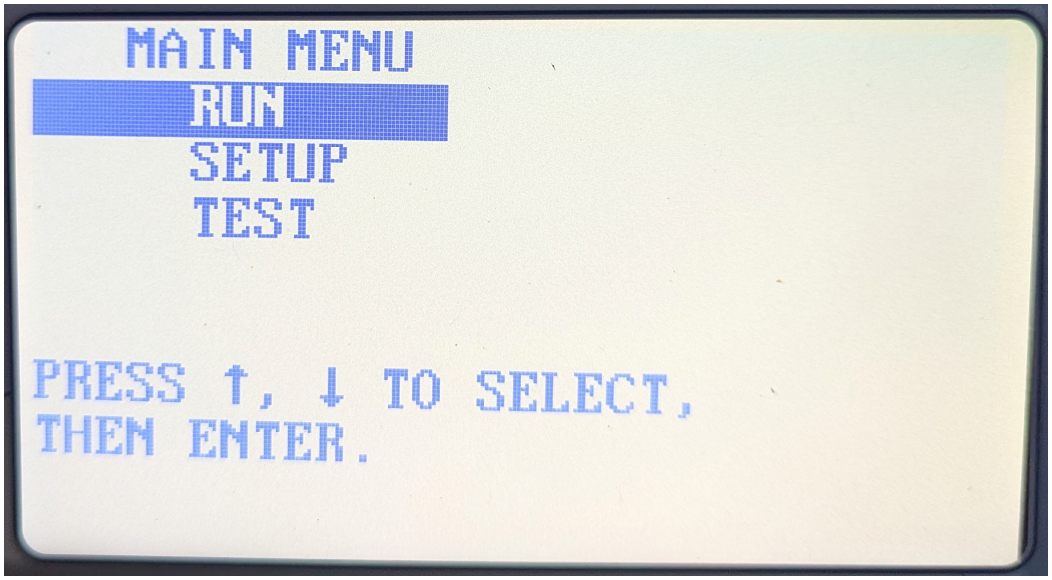


The RUN mode is the normal operating mode of the analyzer and is automatically engaged upon power-up. When the RUN mode begins, the MCA will automatically determine what type of sensor is attached to each of the channels. Afterwards, the display will be continuously updated with the current measurement values. If the system contains a MCX box, the analog outputs and the relays will be 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.

The supplied sensors have been calibrated at the factory. Sensor calibration details for Model 15/15L TSS sensors are stored in the non-volatile memory of the MCA by channel. If a Model 15/15L is connected to the MCA, and the sensor information does not match the information stored in the analyzer for that channel, the analyzer will display a configuration message. The configuration message for the Model 15/15L TSS sensor is "**Zero sensor**". These messages will appear whenever the sensor is changed.

While in the RUN Mode, the time to the next scheduled cleaning 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.

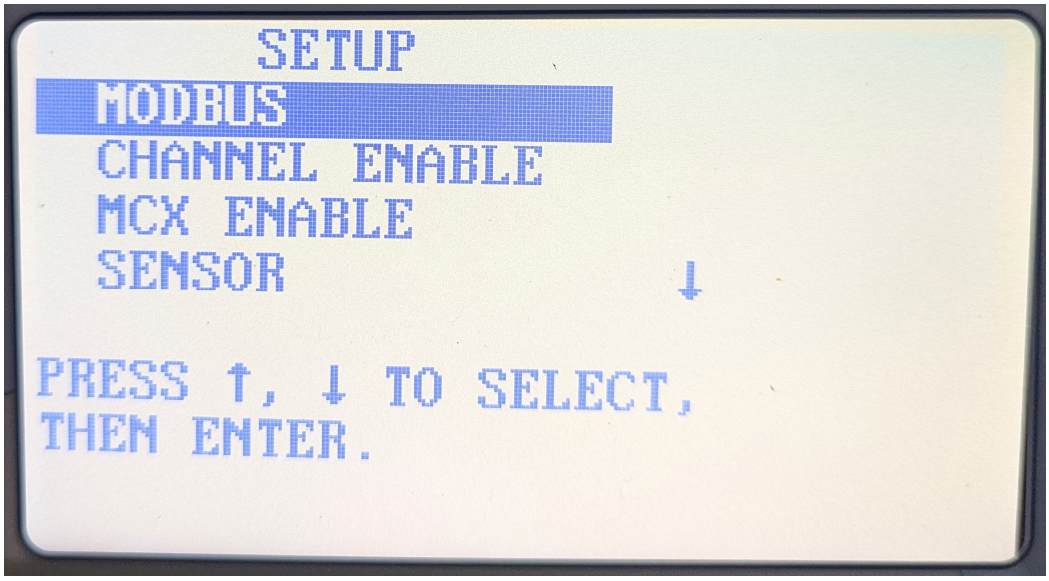
MAIN MENU



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, and 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. There are a total of five subcategories that may be adjusted.



Operation of the SETUP MODE proceeds as follows:

From the MAIN MENU, select SETUP and the six menu options will be displayed. Use the “ARROW” keys to move the cursor to the desired SETUP option, and then press the “ENTER” key. A menu with six options will be displayed. The options are:

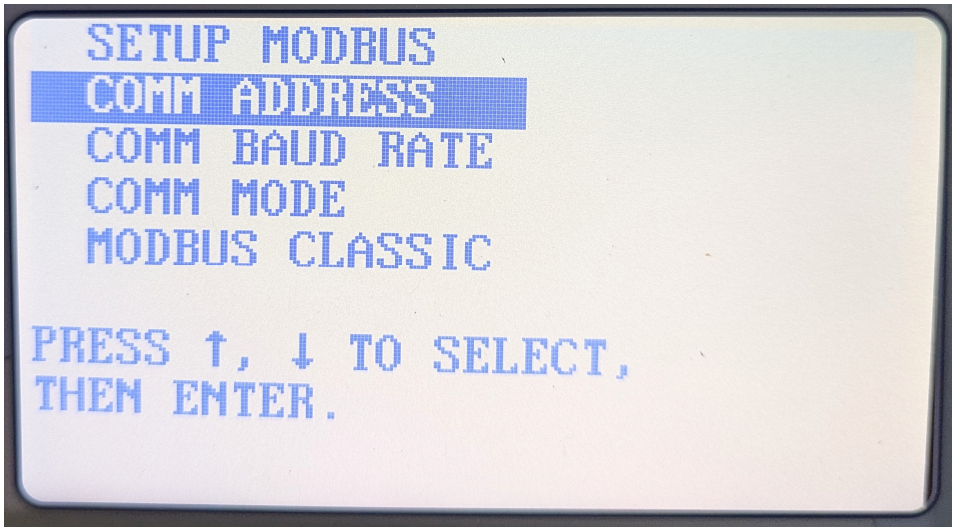
MODBUS
CHANNEL ENABLE
MCX ENABLE
SENSOR
POWER FREQ.
CLEAN RELAYS

If MCX is enabled, two additional menu options will be displayed:

RELAYS (MCX)
ANALOG OUT (MCX)

Pressing the “MENU” key will return to the previous page. To return to the RUN mode, press the “MENU” key until the MAIN MENU is displayed and then press the “ENTER” key with the RUN mode selected.

MODBUS



There are four menu options for configuring the serial digital output.

COMM ADDRESS – defines the MODBUS slave address for this MCA
COMM BAUD RATE – defines the baud rate of the digital interface
COMM MODE - defines the communications mode as RTU or TCP
MODBUS CLASSIC – if enabled, will generate a response to the Report Slave ID compatible with legacy MPA-48 units.

Appendix A describes the Modbus protocol implementation in the MCA.

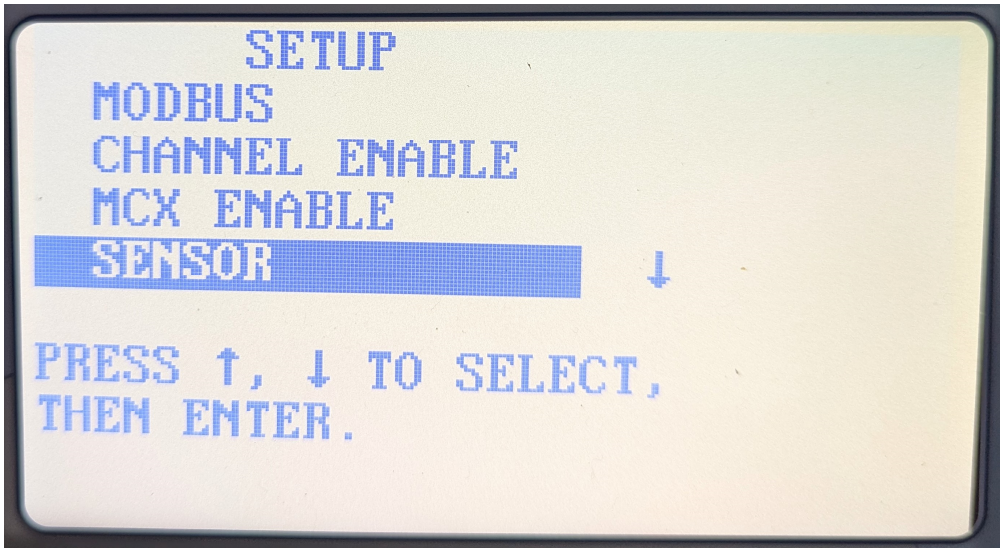
CHANNEL ENABLE

If any channel of the MCA will not be used, that channel may be completely disabled for display. When the CHANNEL ENABLE option is selected from the SETUP menu, the operator is prompted to select which sensor channel is to be configured. The selected channel may be ENABLED or DISABLED by pressing the “ARROW” keys and then pressing the “ENTER” key.

MCX ENABLE

The MCX ENABLE option is used to inform the MCA that a MCX box is connected. If the system contains a MCX box, ENABLED must be selected to activate communications between units. If the system does not contain a MCX box, select DISABLED. When the MCX ENABLE option is selected from the SETUP menu, the current MCX status is displayed. The MCX may be ENABLED or DISABLED by pressing the “ARROW” keys and then pressing the “ENTER” key.

SENSOR

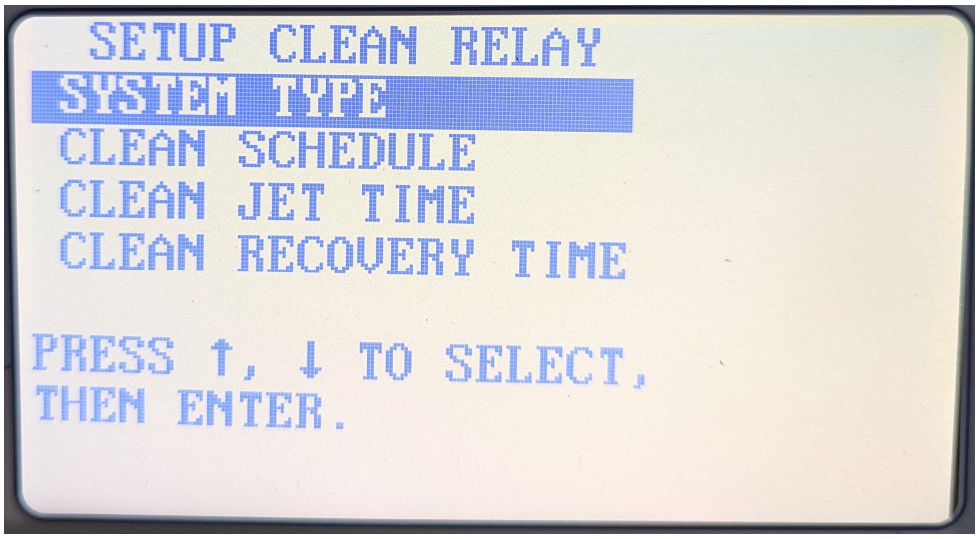


See the SENSOR SETUP section for each type of sensor for details.

POWER FREQ.

The POWER FREQ. option is used to select the proper power noise filter (50Hz or 60Hz). When the POWER FREQ. option is selected from the SETUP menu, the current power freq. status is displayed. The 50Hz or 60Hz filter may be selected by pressing the “ARROW” keys and then pressing the “ENTER” key.

CLEAN RELAYS



The jet clean system is intended to be controlled by relays “CLN 1” & “CLN 2”. The relays should be connected to an InsiteIG compressor (CA-2 or CA-4), or a customer supplied air or water source and a solenoid shut-off valve. See drawings IIG07R712, IIG07R713, IIG07R714 and IIG07R716 and Appendix B for more details.

The SYSTEM TYPE parameter defines which cleaning system has been implemented. Select “CA2

Clean" or "CA4 Clean" when one of those InsiteIG compressor units are connected. Select "House" when a solenoid valve is connected for controlling customer supplied air or water.

The CLEAN SCHEDULE parameter determines how often the jet clean cycle will occur. This parameter can be set to 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 and freeze in the jet-clean tubing. To decrease the likelihood of this occurrence, set the clean interval to 10 or 20 minutes. If this is set to "0", then cleaning is turned off.

The CLEAN JET TIME parameter determines how long the jet clean cycle will last. This 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. The analyzer will hold all the measurement readings during the cleaning pulse, and for the additional CLEAN RECOVERY TIME.

In CA2 CLEAN mode, a standard clean cycle will sequence between 2 compressed air outputs on an InsiteIG CA2 compressor. Each of the outputs will be activated for the entire programmed CLEAN JET TIME, one after the other. Additional CA2 compressors can be connected in parallel with the first so that each output can serve one sensor. See drawing IIG07R714 for details.

In CA4 CLEAN mode, a standard clean cycle will sequence between 4 compressed air outputs on an InsiteIG CA4 compressor. Each of the outputs will be activated for the entire programmed CLEAN JET TIME, one after the other. See drawing IIG07R716 for details.

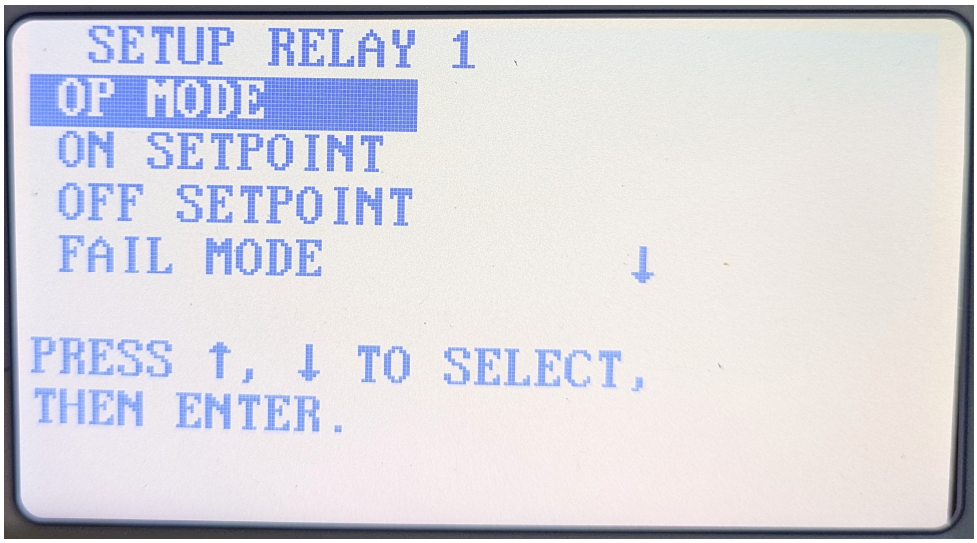
In HOUSE CLEAN mode, both clean relays are turned on simultaneously for the whole duration of the CLEAN JET TIME.

The CLEAN RECOVERY TIME parameter determines how long the analyzer will hold the sensor readings 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.

Demand Clean

When the analyzer is in the RUN mode, pressing the "ENTER" key will cause a clean cycle to begin immediately (if the CLEAN SCHEDULE is not set to OFF). Performing a "demand clean" cycle doesn't affect the normal clean schedule, and the next clean cycle will occur at its previously scheduled time.

RELAYS (MCX)



When the RELAYS (MCX) option is selected from the SETUP menu, the operator is prompted to select which relay is to be configured. There are five menu options for configuring each setpoint relay.

OP MODE - defines operation mode of relay as a high/low setpoint, or alarm.
ON SETPOINT - defines when the relay will energize.
OFF SETPOINT - defines when the relay will de-energize.
FAIL MODE - defines the relay state during an alarm condition (no change, ON, or OFF).
CH ASSIGN - defines to which sensor channel the relay is assigned. A sensor channel may be assigned to more than one relay.

Note: Do not attempt to adjust relay set points values until a working sensor has been connected to the channel. Otherwise, the analyzer may not display the correct units for setting the setpoints of the channel.

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.

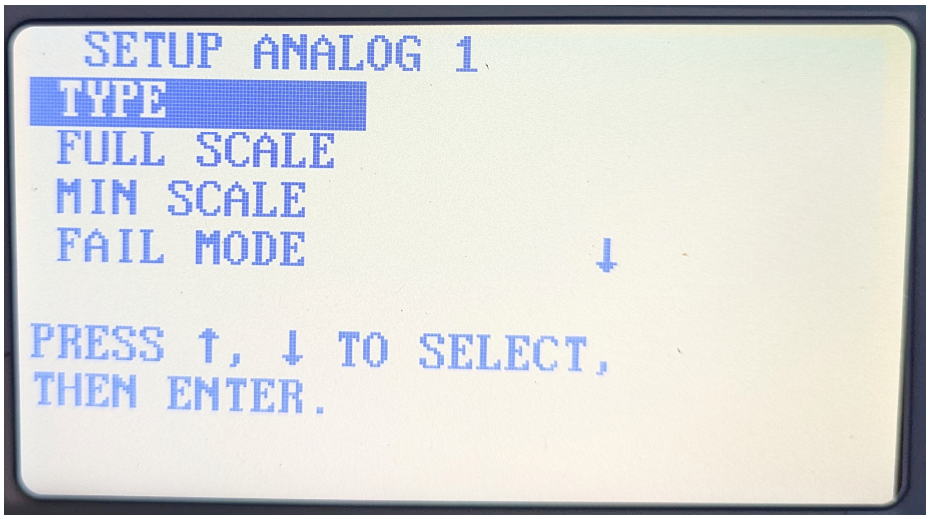
High Setpoint

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 be energized if all enabled sensor channels have no ERRORs. If any of the enabled sensor channels have an ERROR, the relay will de-energized.

ANALOG OUTPUT (MCX)



When the ANALOG OUTPUT (MCX) option is selected from the SETUP menu, the operator is prompted to select which analog output is to be configured. There are five menu options for configuring each of the 8 analog outputs.

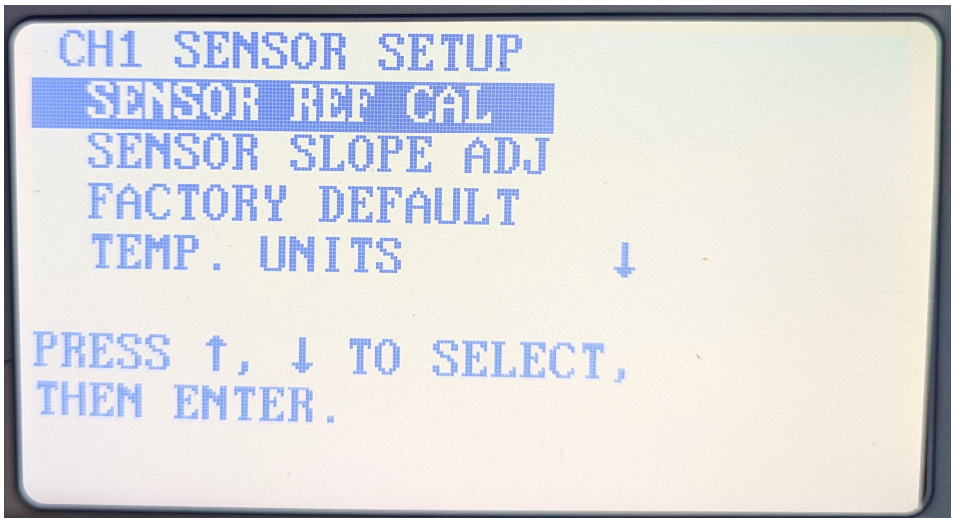
TYPE - selects either 4-20mA or 0-20mA operation for the analog output.
FULL SCALE - defines the sensor reading that will cause the analog output to go to 20mA.
MIN SCALE - defines the sensor reading that will cause the analog output to go to 0/4mA.
FAIL MODE - defines the value of the analog output during an alarm or error condition (no change, full scale, or min scale).
CH ASSIGN - defines to which sensor channel the analog output is assigned. A sensor channel may be assigned to more than one analog output.

Note: Do not attempt to adjust analog output values until a working sensor has been connected to the channel. Otherwise, the analyzer may not display the correct units for setting the scales of that channel.

SENSOR SETUP

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

DO Sensor



General

The Model 10 sensor has been designed to require very infrequent calibration. Unlike polarographic 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 3 months to a year, depending upon conditions.

Note: The Model 10 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 MCA analyzer allows the user to select from two different calibration procedures. The procedure can be selected by choosing SETUP from the main menu. Once the SETUP menu appears, use the arrow keys to choose the “SENSOR” option, and then select the desired sensor.

Sensor Calibration to a Reference

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 Adjustment (NOT RECOMMENDED)

If performed correctly, the previously described "Sensor Calibration to a Reference" should be all that is required by the user. "Sensor slope adjustment" should only be attempted upon recommendation from the factory.

Sensor calibration option 2 "SENSOR SLOPE ADJ" allows the user to adjust the span of the sensor, but this procedure must only be used immediately AFTER the sensor has been "zeroed" using calibration option 1 with the sensor submerged in a zero oxygen solution. This zero solution may be prepared by adding one tablespoon of sodium sulfite salt per liter of tap water in an open container (bucket). The sodium sulfite salt will remove all oxygen from the water as it dissolves. Stir the water for about one minute to dissolve the salt. Submerge the Model 10 sensor in this water and allow it to rest for at least 30 minutes. 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 Calibration to a Reference" procedure described previously to set the D.O. reading to 0.03 PPM. THE CAL TO REFERENCE PROCEDURE IN ZERO WATER MUST BE PERFORMED 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. Place the sensor in a solution of known D.O. concentration, and allow about 15 minutes to fully stabilize. Choose the sensor slope adjustment calibration procedure as option 2 "Sensor Slope Adj" 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.

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.

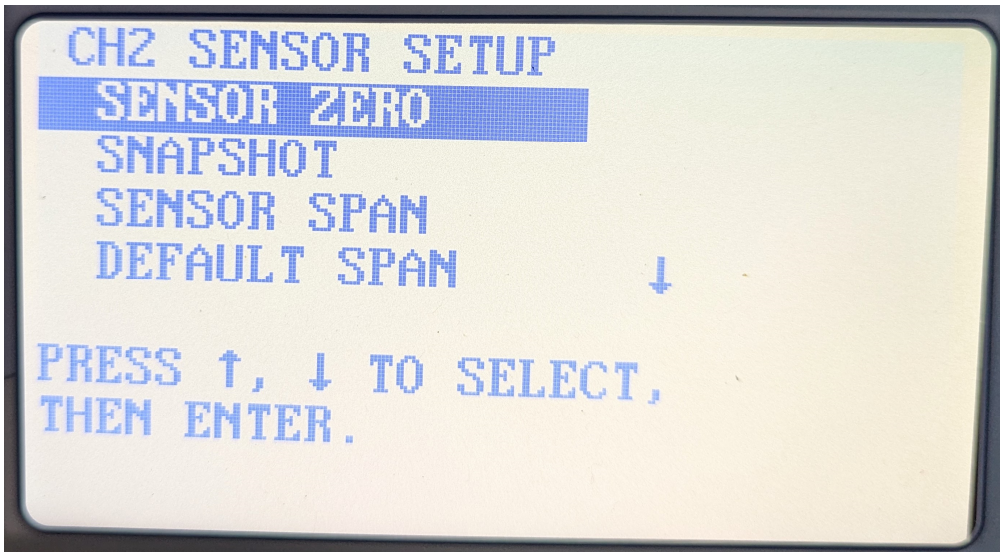
DISPLAY MODE

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

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



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 MCA 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 Model 15 sensors is 0-30,000 mg/l total suspended solids. Within this range, accuracy and repeatability are only specified over a range of +/- 50% of the user's point of calibration. Accuracy will be +/- 5% of the current reading or +/- 100 mg/l, whichever is greater. Repeatability will be +/- 1% of the current reading or +/- 20 mg/l, whichever is greater.

The range of operation of the Model 15L 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 SETUP 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 MCA 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 MCA to take a snapshot of the conditions. The MCA 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 press the "ENTER" button. The value that was previously saved snapshot will be displayed. Use the up and down arrow buttons to adjust the analyzer reading to the value of 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 sensor setup option.

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 analyzer has been properly zeroed in clean water, the analyzer will read values that are typical for an average waste treatment plant. No absolute accuracy is guaranteed after this procedure, but the numbers will, in the least, be useful for

observing trends in the suspended solids concentration over time.

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.

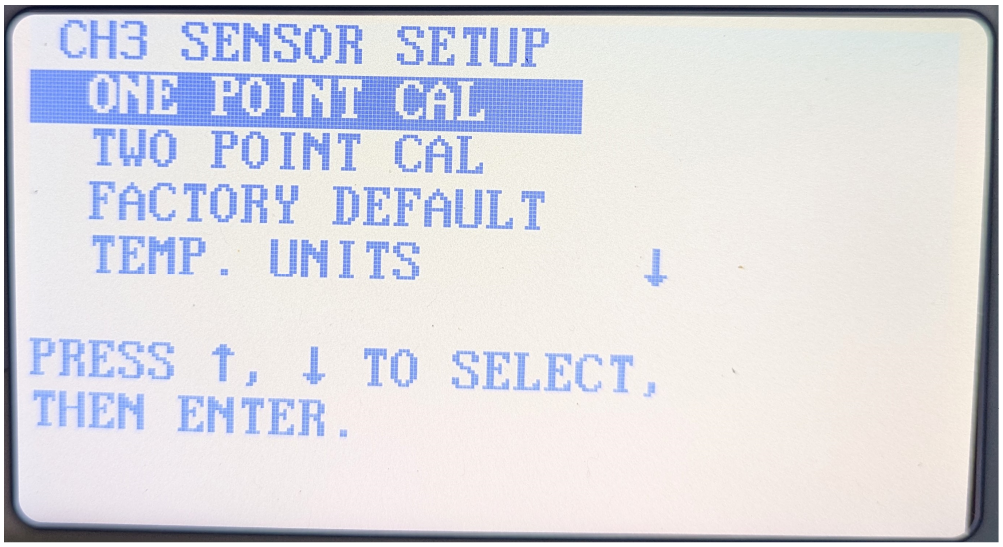
SENSOR CURVE

The sensor curve mode 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.

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 M51 Electrode. 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 until the top of the electrode is even with the line etched onto the jet clean boss. **NOTE: Installing a pH holder without a pH 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 Calibration Method

Select ONE POINT CAL from the setup menu. Submerge the sensor in the buffer solution. Press the ENTER key. After the analyzer 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 analyzer.

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 Calibration Method

Select TWO POINT CAL from the setup menu. Submerge the sensor in the first buffer solution. Press the ENTER key. After the analyzer 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 analyzer 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 analyzer.

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 sensor consists of two parts; the M50 Holder and the M52 Electrode. 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 until the top of the electrode is even with the line etched onto the jet clean boss. **NOTE: Installing a ORP holder without 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.

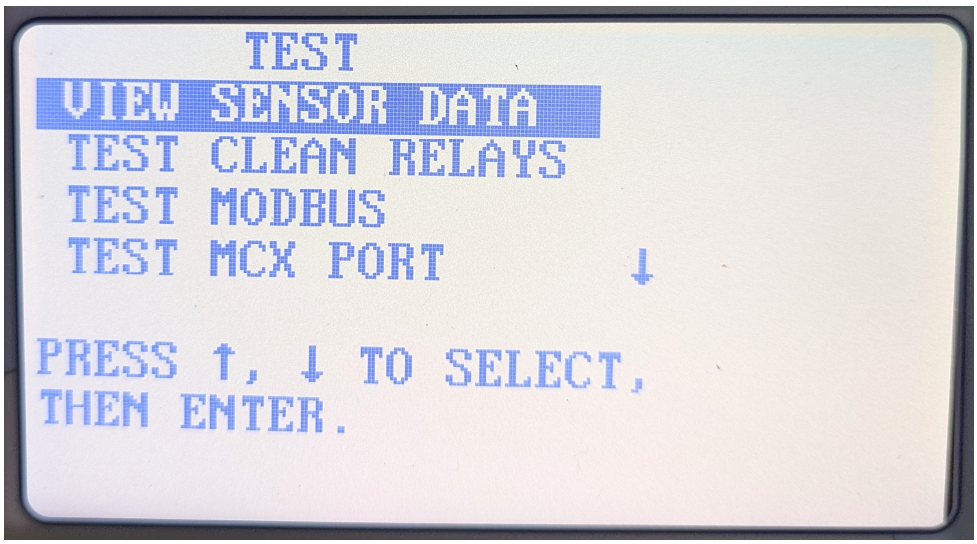
ORP OFFSET

Calibration of an ORP electrode is normally accomplished by equating millivolt levels to a known calibration standard. Any commercially available standard reference solution may be used.

Select ORP OFFSET from the setup menu. Submerge the sensor in the reference solution. Press the ENTER key. After the analyzer 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 non-volatile memory of the analyzer.

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.



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 one of the seven options, and then press the “ENTER” key.

VIEW SENSOR DATA

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

TEST CLEAN RELAYS

This option will display the current status of the clean relays. To toggle the state of the CLN1 relay, press the “UP” key. To toggle the state of the CLN2 relay, press the “DOWN” key. The new status of the clean relays will be displayed. To exit, press the “MENU” key.

TEST MODBUS

This option will test the RS-485 communication port.

TEST MCX PORT

This option will test the MCX communication port.

SOFTWARE VERSION

This option will display the current version of software in the analyzer. To exit, press the "MENU" key.

VIEW SENSOR CHAR

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

TEST ANALOGS (MCX)

This option will generate 20mA on the selected analog output. If a connected current meter indicates that this value is not accurate, the “UP” and “DOWN” arrows keys may be used to adjust the output until an acceptable 20mA meter reading is obtained. Pressing the “ENTER” key will save the new calibration. Please note that this function is intended to be used to fine tune the electrical accuracy of a current output, while the actual scaling of the output to match the sensor reading to the customer’s receiving device is accomplished through the SETUP – ANALOG OUTPUT (MCX) menu.

TEST RELAYS (MCX)

This option will test the set point relays. The current status of the selected relay is displayed. To toggle the state of the relay, press the "ENTER" key. The new status of the relay will be displayed. To exit, press the "MENU" key.

ERROR MESSAGES

During operation, the MCA analyzer 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 analyzer is not receiving any data from the sensor. This could be caused by a faulty sensor, an improper or faulty sensor connection, or faulty analyzer electronics.

***SENSOR ERROR* (Model 10 only)**

This error message will be displayed if the sensor's electronics become faulty, or the sensor has erroneously entered a factory test mode. Try cycling power to the MCA to clear this error, or call the factory for assistance.

****Zero Sensor** (Model 15/15L only)**

The analyzer is indicating that a "zero cal" operation is required for proper operation. This error is triggered when a new or different sensor is connected to this channel of the analyzer. This could also be caused by a negative reading, which clearly indicates that the stored zero reading was improperly determined.

***Ambient Error* (Model 15/15L 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. Call the factory for assistance.

****MCX NOT RESPONDING****

When the MCX is enabled, this error message indicates that the analyzer is not receiving any data from the MCX. If the system does not contain a MCX box, the MCX parameter should be set to disabled.

MAINTENANCE

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

DO NOT use high pressure water or a pressure washer to clean the analyzer. 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.

Model 10 D.O. Sensor: In normal wastewater aeration basins the Model 10 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 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.

Model 15/15L 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.

Model 51/52 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 0.1M NaOH, and again in 0.1M 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

MCA Analyzer, MCX box, Model 15/15L sensors, Model M50 electrode holder and related items are guaranteed for two years against defective materials and workmanship. The Model 10 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 R/A number and address it to the factory at 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 Instrument 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 MCA.

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 OR'ed 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 OR'ed 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 OR'ed 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 MCA

01 Read Coil Status

Description
Reads the ON/OFF status of the relays in the MCA analyzer.

Query
The query message specifies the starting relay and quantity of relays to be read. Relays are addressed starting at zero. Relays 1 – 8 are addressed as 0 – 7.

Below is an example of a request to read relays 1 – 8 from MCA 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	08
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, 4, 5, 6, 7 and 8 is OFF.

04 Read Input Registers

Reads the binary contents of input registers in the MCA analyzer.

Query
The query message specifies the starting register address and the quantity of registers to be read.

The MCA 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
0006	Channel 3 status
0007	Channel 3 primary measurement
0008	Channel 3 secondary measurement
0009	Channel 4 status
000A	Channel 4 primary measurement
000B	Channel 4 secondary measurement
000C	Channel 5 status
000D	Channel 5 primary measurement
000E	Channel 5 secondary measurement
000F	Channel 6 status
0010	Channel 6 primary measurement
0011	Channel 6 secondary measurement
0012	Channel 7 status
0013	Channel 7 primary measurement
0014	Channel 7 secondary measurement
0015	Channel 8 status
0016	Channel 8 primary measurement
0017	Channel 8 secondary measurement
0022	Last 4 digits of the channel 1 sensor serial number
0027	Last 4 digits of the channel 2 sensor serial number
002C	Last 4 digits of the channel 3 sensor serial number
0031	Last 4 digits of the channel 4 sensor serial number
0036	Last 4 digits of the channel 5 sensor serial number
003B	Last 4 digits of the channel 6 sensor serial number
0040	Last 4 digits of the channel 7 sensor serial number
0045	Last 4 digits of the channel 8 sensor serial number

The Model 10 sensor will report the channel status as follows:

Status (hex)	Description
0000	Normal
0001	Sensor not responding
0002	Sensor error
0003	New sensor codes needed

The Model 10 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 ℃.

The Model 15/15L sensor will report the channel status as follows:

Status (hex)	Description
0000	Normal
0001	Sensor not responding
0002	Sensor error
0003	Sensor requires a zero calibration

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

The Model 51/52 sensor will report the channel status as follows:

Status (hex)	Description
0000	Normal
0001	Sensor not responding
0002	Sensor error
0003	Sensor error

The Model 51 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 Model 52 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.

Below is an example of a request to read the channel 2 status and channel 2 primary and secondary 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 Model 10 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 MCA analyzer.

Query

The query message specifies the register to be preset. The demand clean cycle register is the only register in the MCA 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 MCA is shown below.

Field Name	Example (hex)
Slave Address	01
Function	11
Byte Count	0A
Slave ID	30
Run status	00=Off, FF = On
CRC	--

The response of the MCA if MODBUS CLASSIC is enabled is shown below.

Field Name	Example (hex)	
Slave Address	01	
Function	11	
Byte Count	0A	
Slave ID	30	
Run status	00=Off, FF = On	
Ch 1 sensor type	00	(Model 10)
Ch 2 sensor type	10	(Model 15)
Ch 3 sensor type	20	(Model 15L)
Ch 4 sensor type	30	(pH/Model 51)
Ch 5 sensor type	31	(ORP/Model 52)
Ch 6 sensor type	63	(Off/Not used)
Ch 7 sensor type	63	(Off/Not used)
Ch 8 sensor type	63	(Off/Not used)
CRC	--	

Exception Responses

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

In a normal response, the MCA echoes the function code of the original query in the function code field of the response. In an exception response, the MCA 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 MCA 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. All InsiteIG sensors have this jet clean port built into the sensor. The InsiteIG analyzers control the frequency and duration of the clean cycle through clean relays (see drawing IIG07R112, IIG07R113, IIG07R114 and IIG07R116). These relays are programmable through the setup menu, see Relays section of this manual for more detail.

InsiteIG Compressors

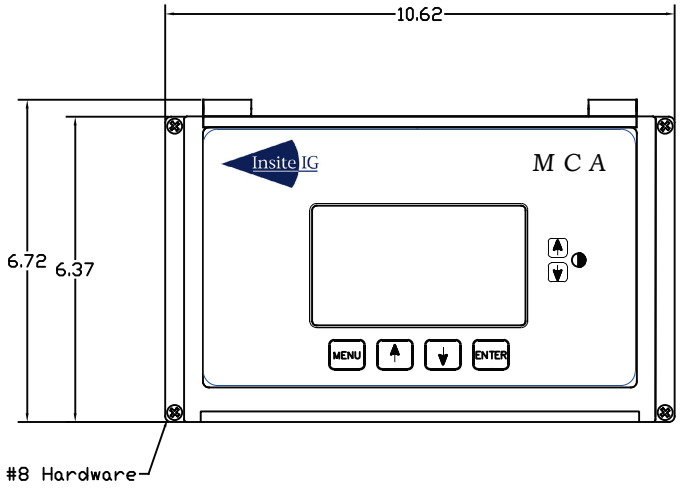
The InsiteIG Model CA Compressors include a compressor pump which delivers a sufficient blast of air to clean typical wastewater treatment plant debris from the sensor's optics. The CA units also contain solenoid valves to direct the cleaning blast independently to either two or four sensors. A CA-2 compressor services 2 sensors independently, while a CA-4 unit services 4 sensors. They are housed in a UL, NEMA 4X enclosure (see drawing IIG01N030 for CA-2 and IIG07N031 for CA-4) 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 units are 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 degrees Celsius and 0 to 100% humidity. A ¼" OD customer suppled flexible tube with a 70 psi rating connects the sensors to the compressor assembly. Quick disconnect fittings are also incorporated into InsiteIG sensors. The tubing length should be as short as possible. (If over 100 feet, 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 IIG07R712, IIG07R714, IIG07R716.

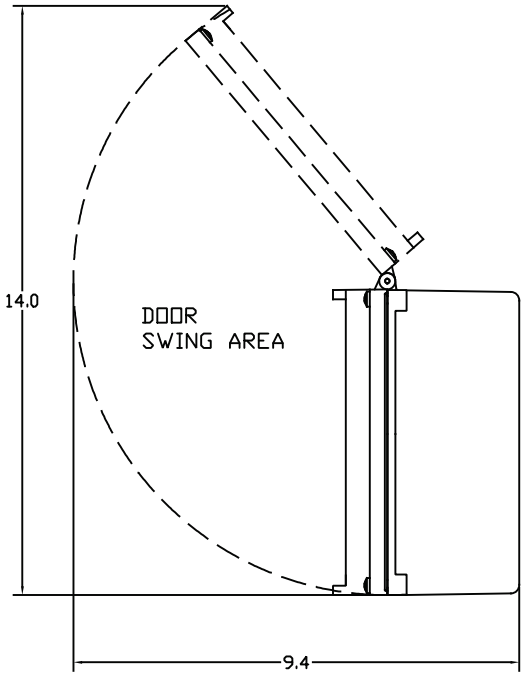
Customer Supplied Air or Water

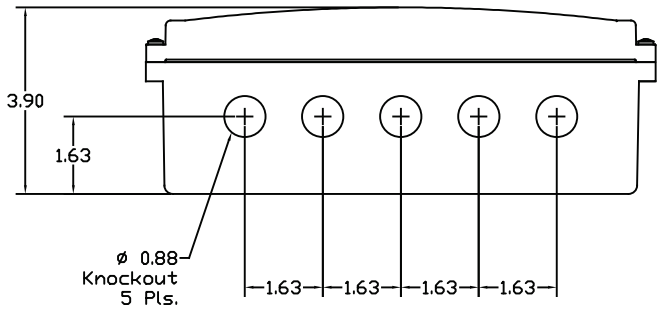
For cleaning configurations that use plant water or shop air, the customer must supply clean water at 35 to 50 psig or air at 40 to 60 psig. A customer supplied 2-way normally closed solenoid valve should be used to turn the cleaning blast on and off to one or more sensors. A ¼" quick disconnect fitting is incorporated into the sensor. See drawing IIG07R113 for wire details. There are no changes required to the sensor when selecting either water or shop air. Additional solenoid valves can be added in parallel for additional sensors. (Using additional solenoid valves can be advantageous to maintain pressure and flow in lieu of splitting the flow after the valve.)

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.

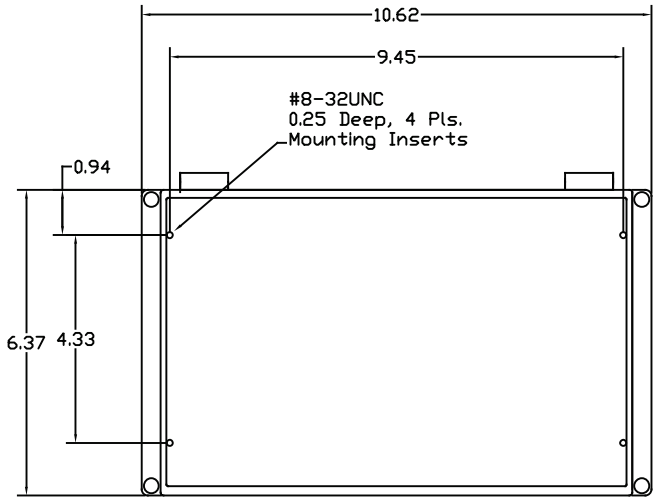
In "Normal Operation" the hinged cover is to remain tightly screwed closed. Under no circumstance is it necessary for the operator to open the enclosure.

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

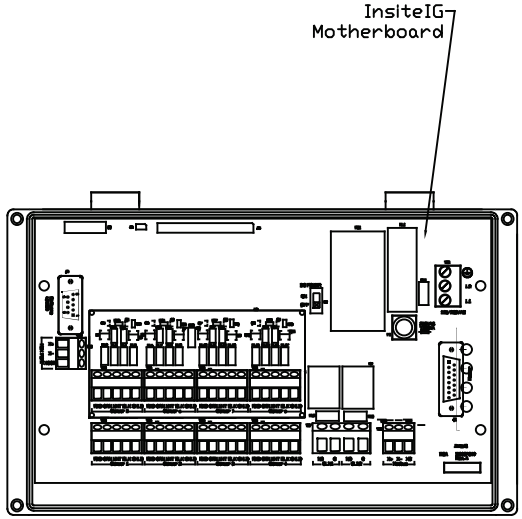
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	InsiteIG	80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	DRAWN / DATE	TITLE	InsiteIG MCA Analyzer OUTLINE & MOUNTING
MATERIAL –	CHECK	SIZE	DWG NO. / REV
FINISH –	DESIGN	C	IIG07N711 / –
SPEC.	APPROVED	SCALE NOTED	SHEET 1 OF 2
	CUSTOMER		

REV. –
DWG. No IIG07N711

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Rear View



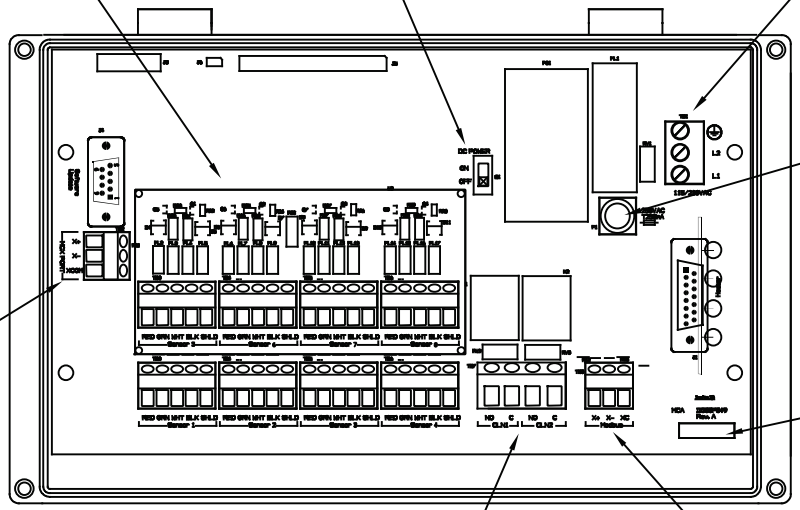
Front View

(Cover Removed)

SIZE	DWG NO.	REV
C	IIG07N711	–
SCALE NTS		SHEET 2 OF 2

DWG. No IIG07N711 REV. –

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

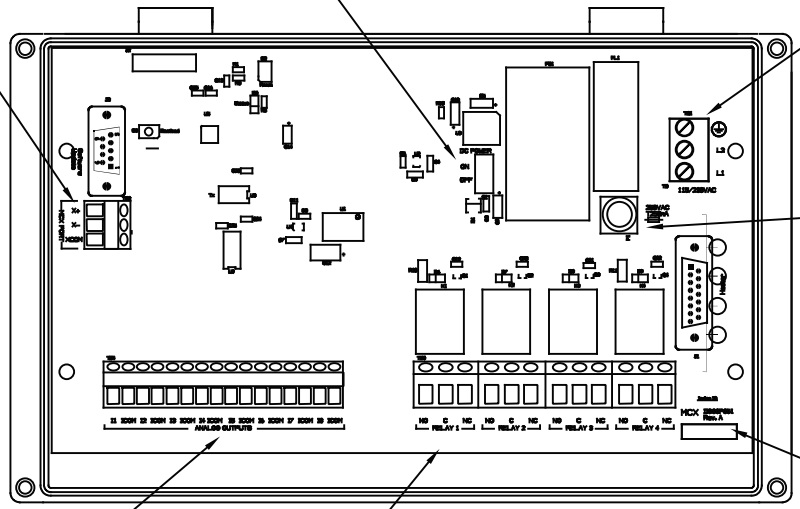


UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	DRAWN / DATE	
	CHECK	TITLE InsiteIG MCA CUSTOMER CONNECTION
MATERIAL –	DESIGN	
FINISH –	APPROVED	SIZE C / DWG NO. IIG07R711 / REV – SCALE NTS / SHEET 1 OF 1
SPEC.	CUSTOMER	

REV. –

DWG. No IIG07R711

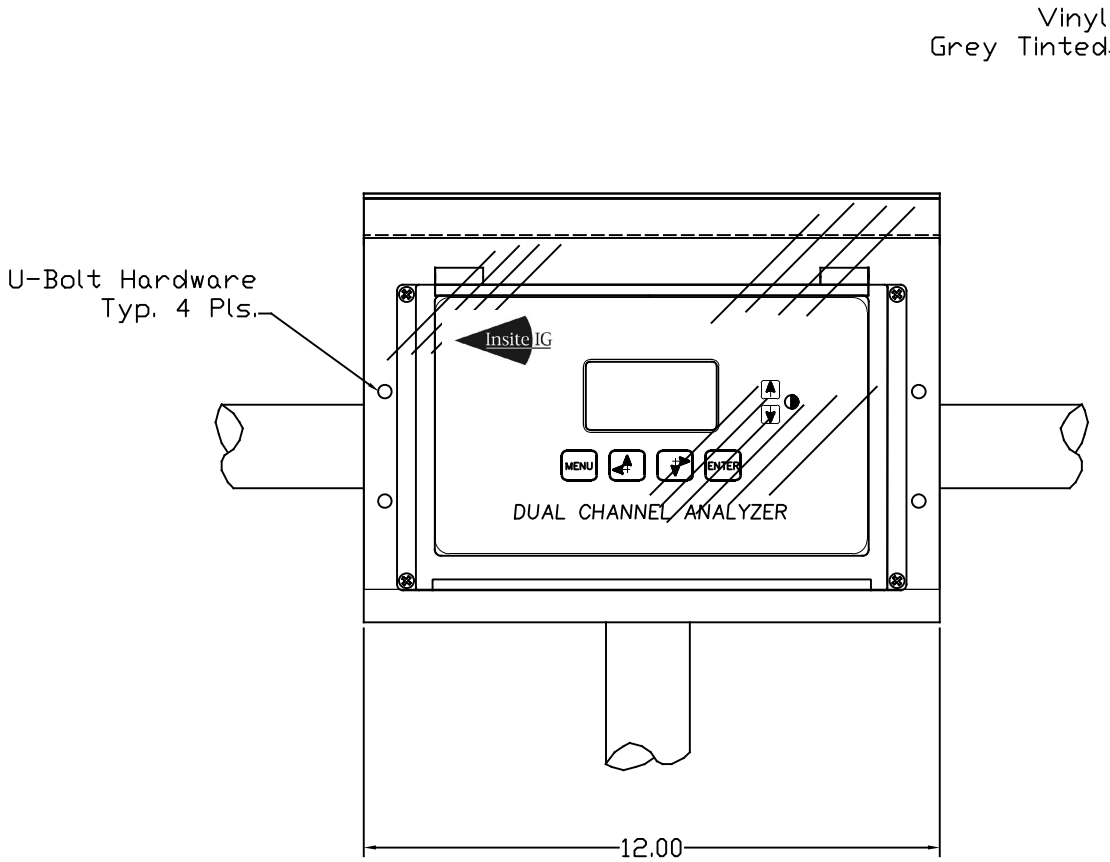
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



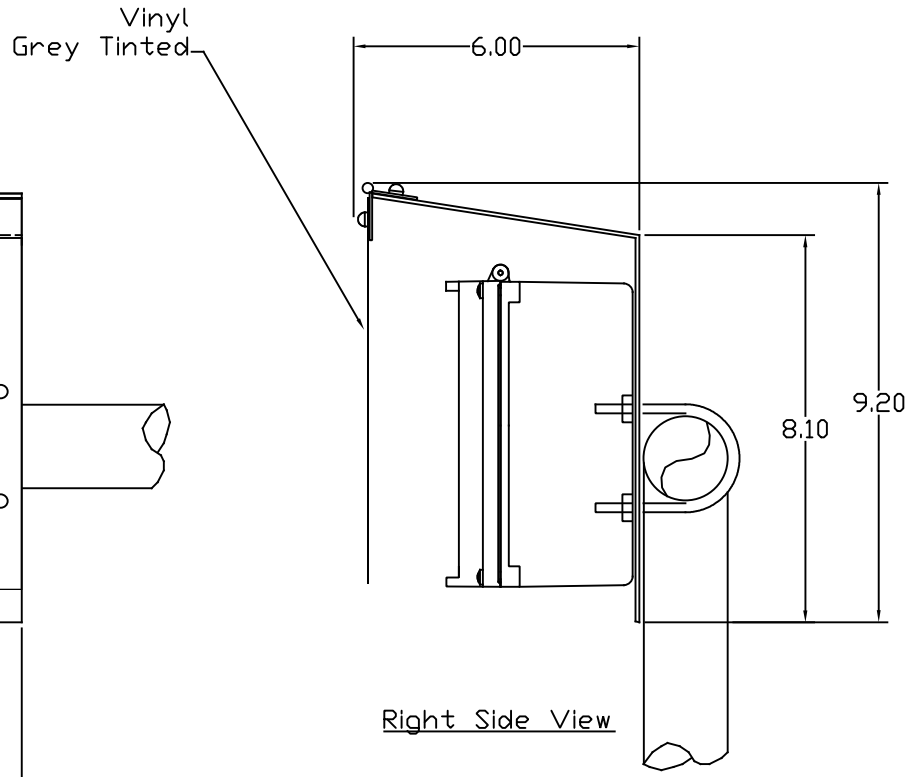
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	InsiteIG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
	DRAWN / DATE	
	CHECK	TITLE InsiteIG MCX CUSTOMER CONNECTION
MATERIAL –	DESIGN	
FINISH –	APPROVED	SIZE C / DWG NO. IIG07R721 / REV – SCALE NTS / SHEET 1 OF 1
SPEC.	CUSTOMER	

DWG. No IIG07R721 REV. –

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



Front View



Right Side View

NOTES:

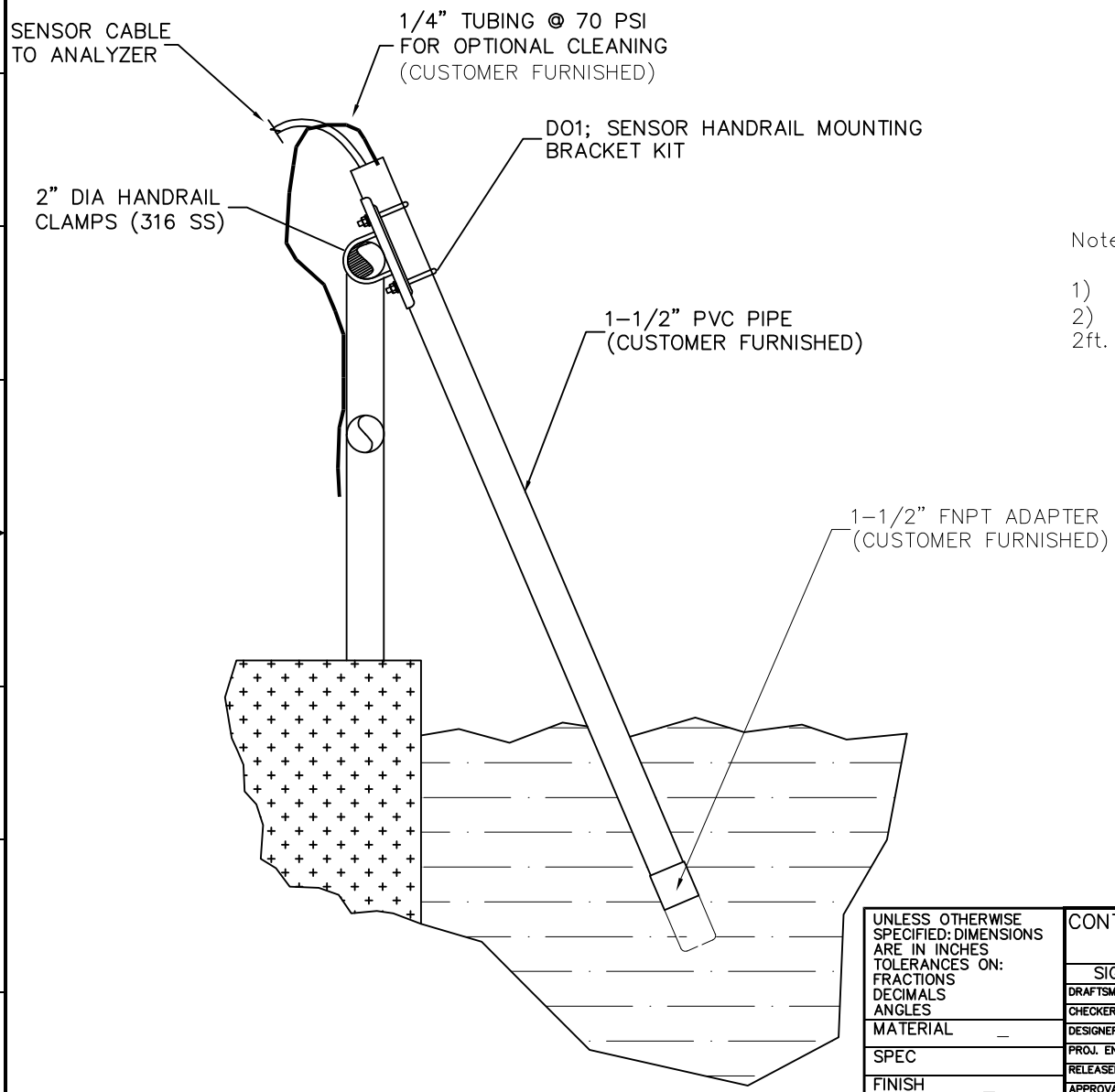
1. Weight Without Analyzer 4.0 lbs.
2. Material - 304 SS
3. Material Gauge - 14 Gauge
4. Finish - Passivated

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

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	

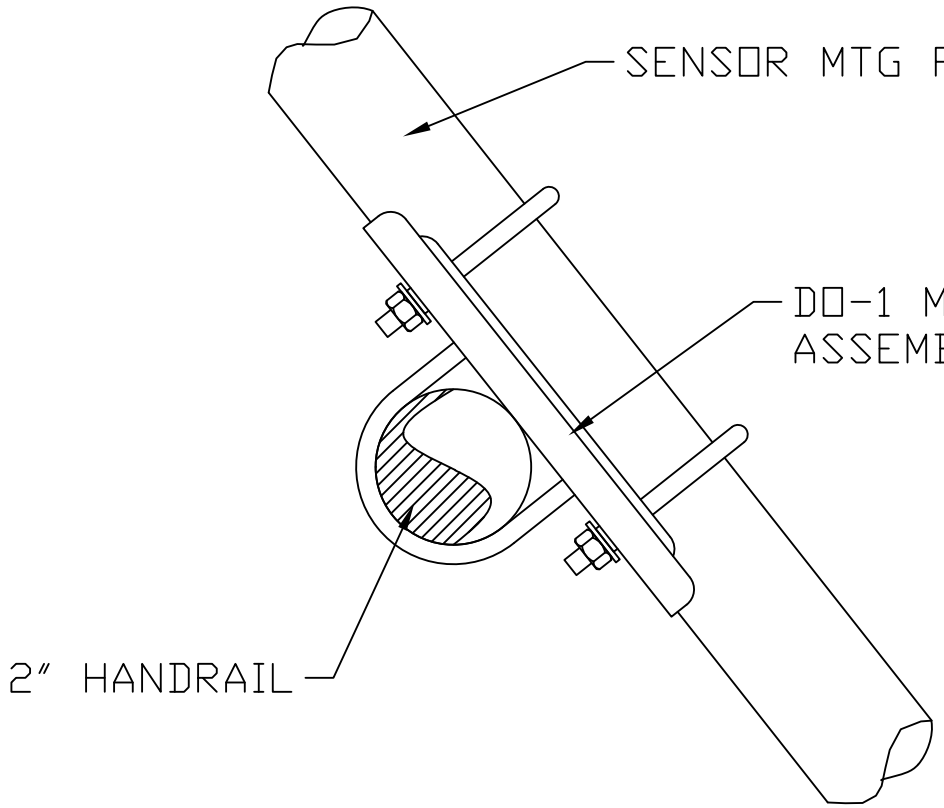
InsiteIG
80 Whisperwood Blvd.
Suite 107
Slidell, LA 70458

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



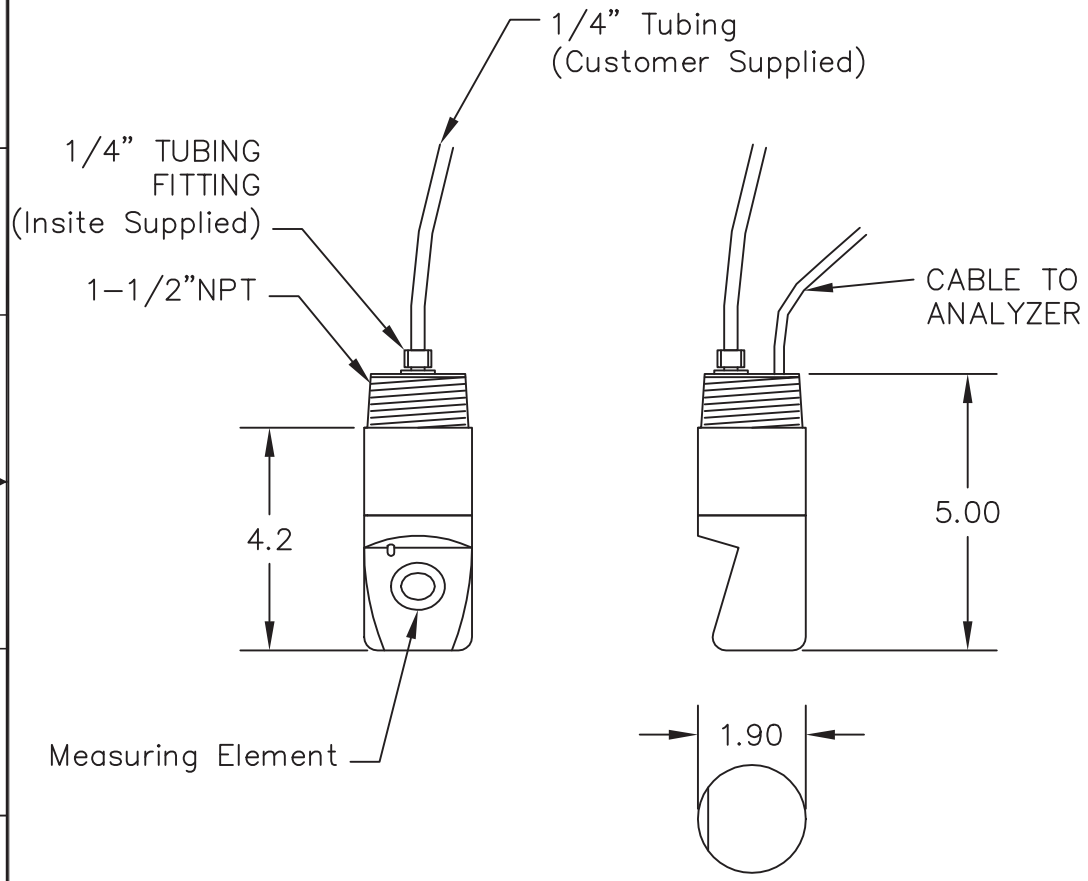
REV: –

DWG. No IIG01N005

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

IIG02N004 | C

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



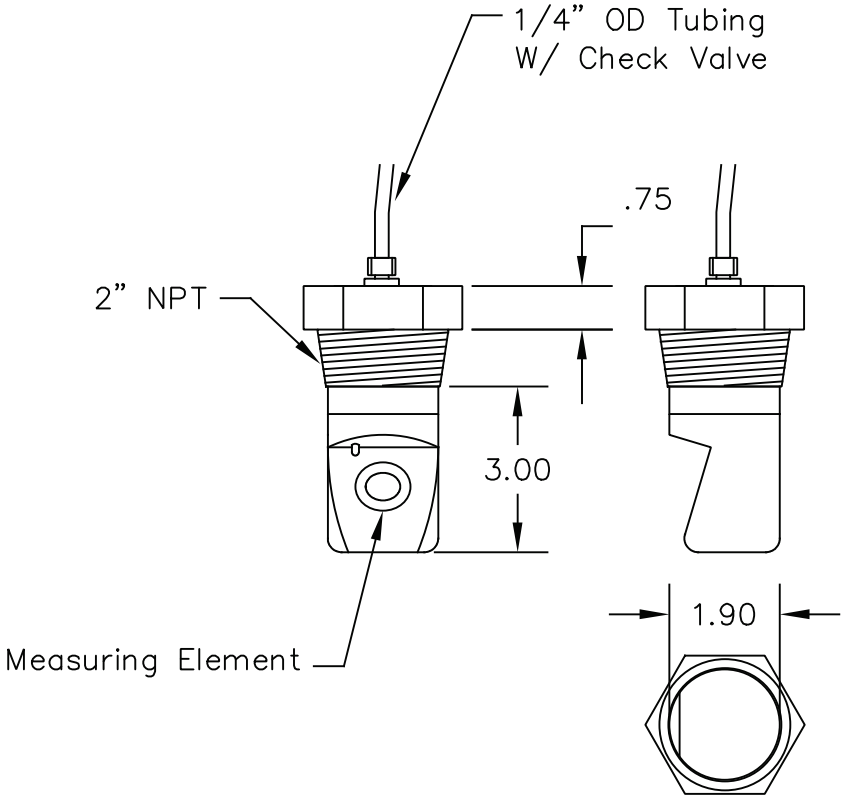
Notes:

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

IIG02N006 B

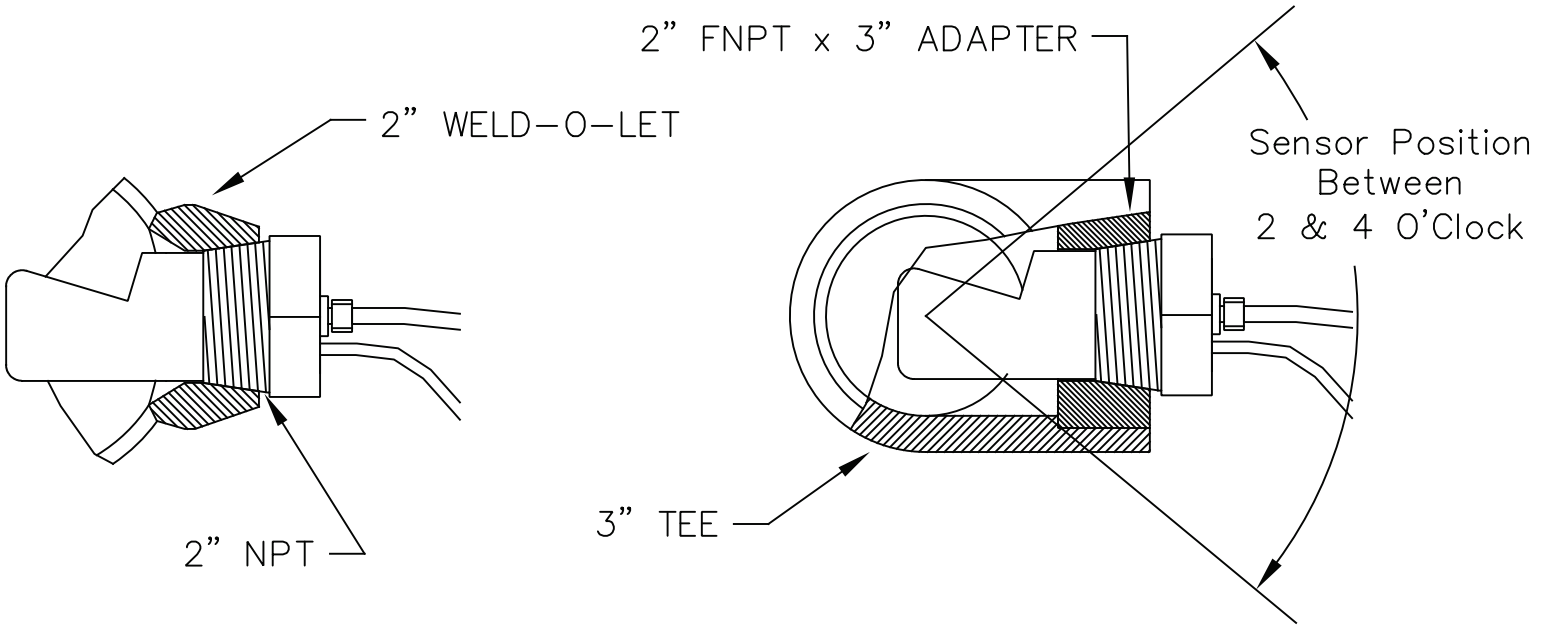
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	As Built		
	B	Change Max pressure to 50psi	11/2020	D.Radle



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

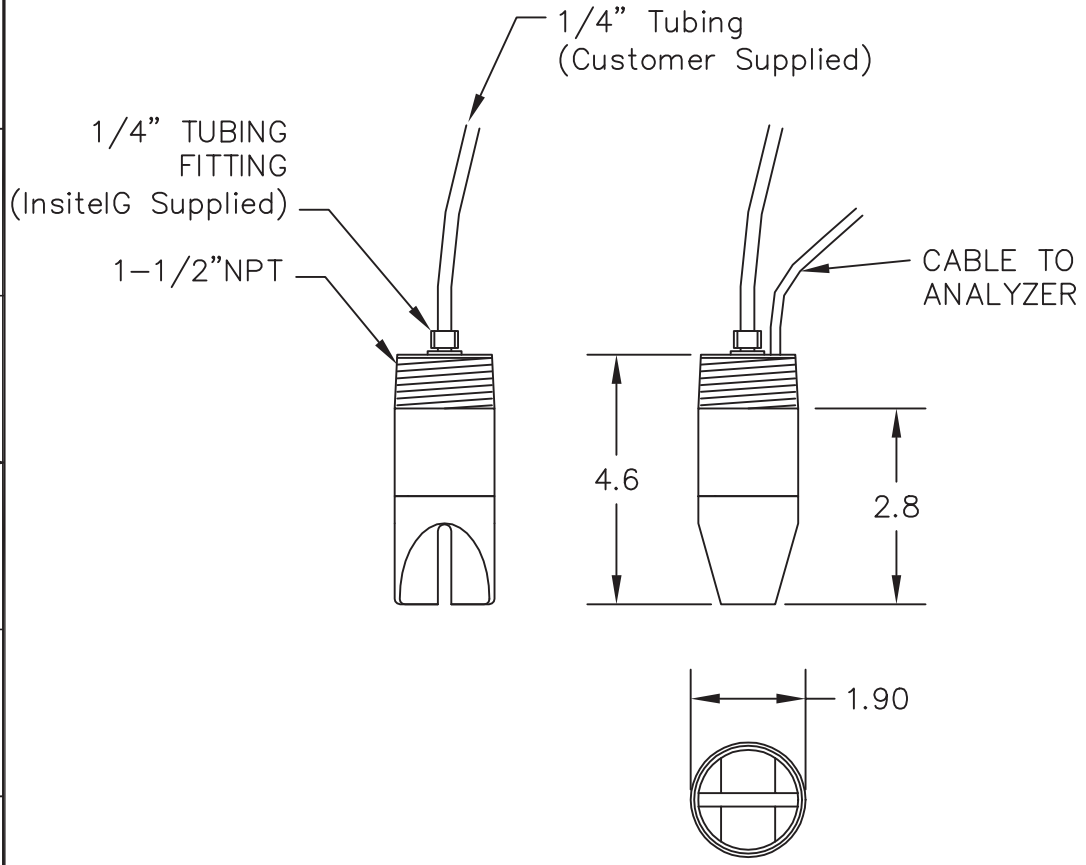


DWG. No IIG02N006 REV. B

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

IIG03N004 | A

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

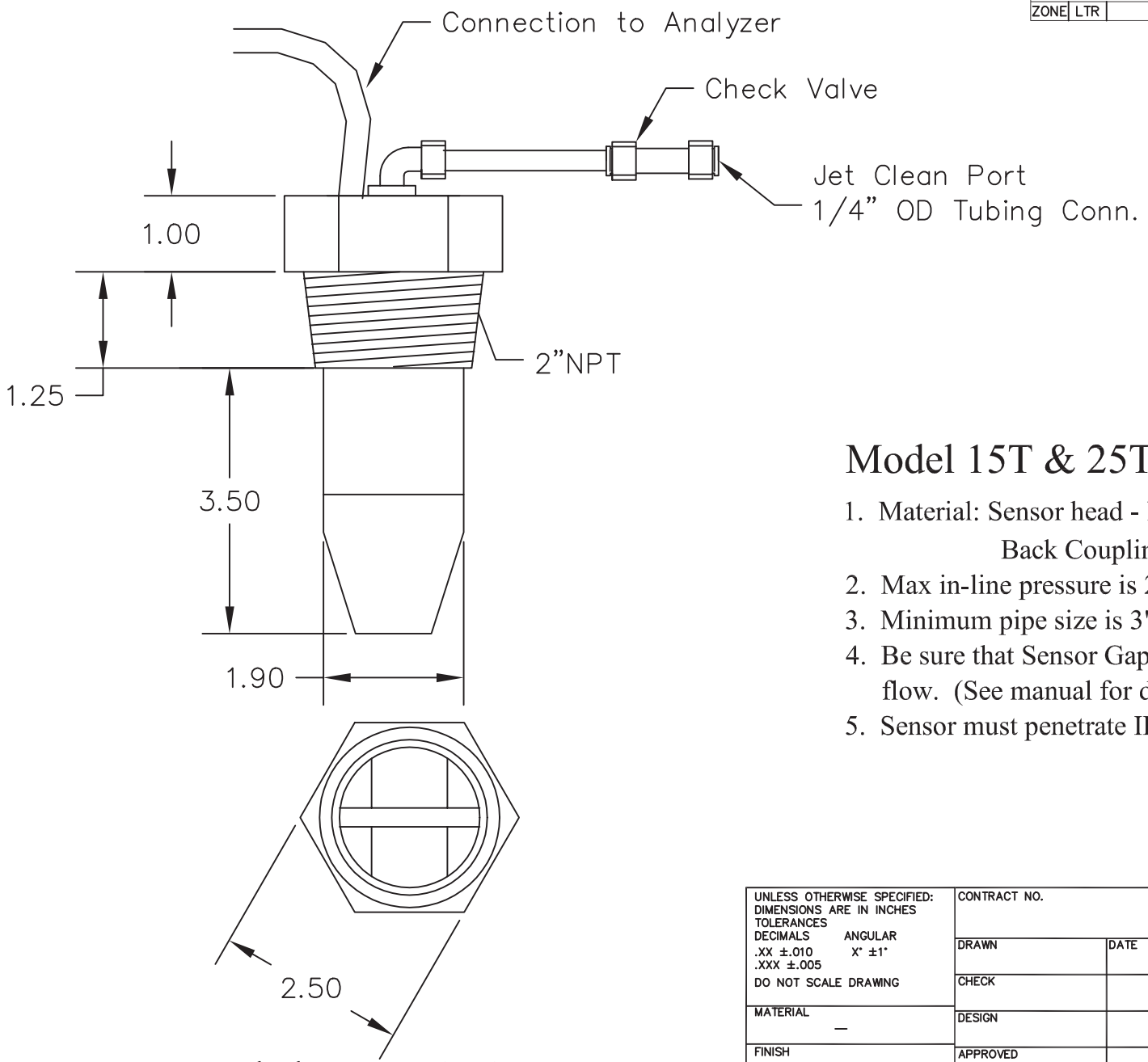


Notes:

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

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Model 15T & 25T

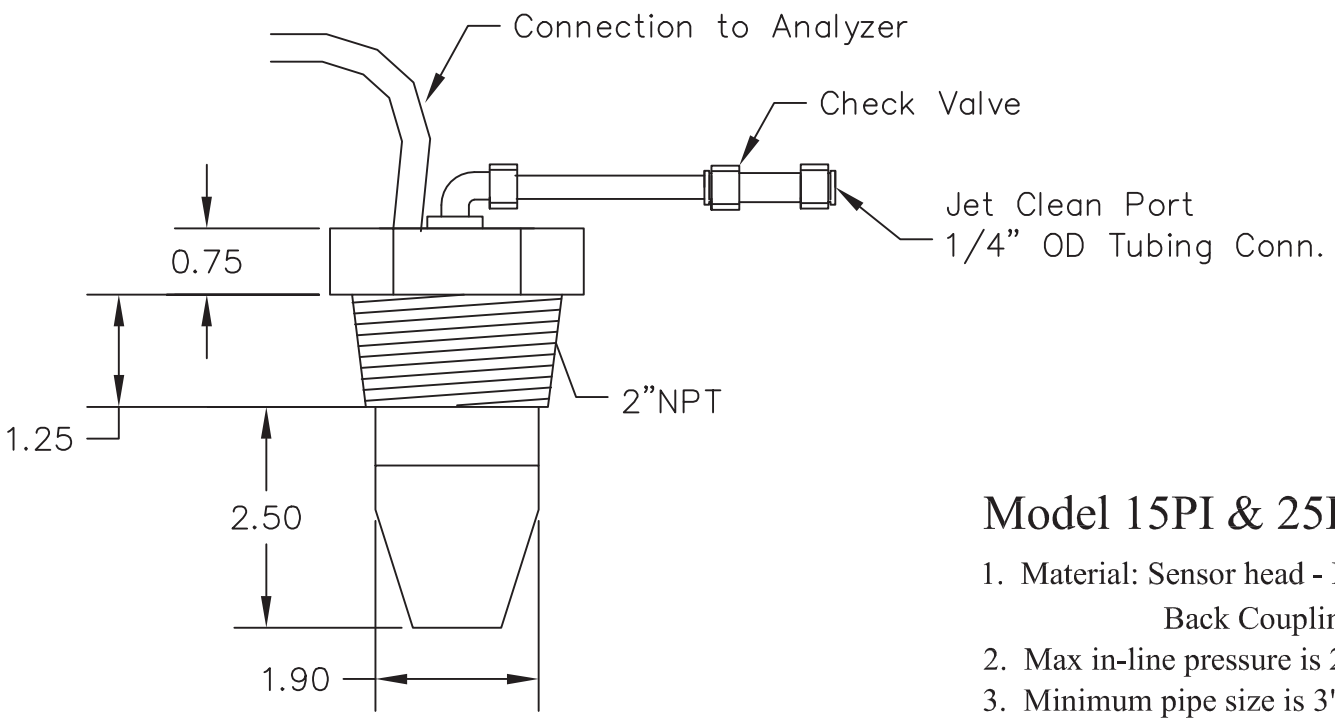
Model 15T & 25T Notes:

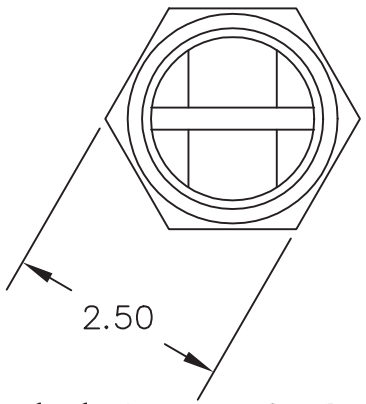
1. Material: Sensor head - Epoxy and Polyurethane
   Back Coupling - Gray PVC
2. Max in-line pressure is 20psi
3. Minimum pipe size is 3" nominal dia.
4. Be sure that Sensor Gap is in-line with sample flow. (See manual for details.)
5. Sensor must penetrate ID of the pipe by 1.5".

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:

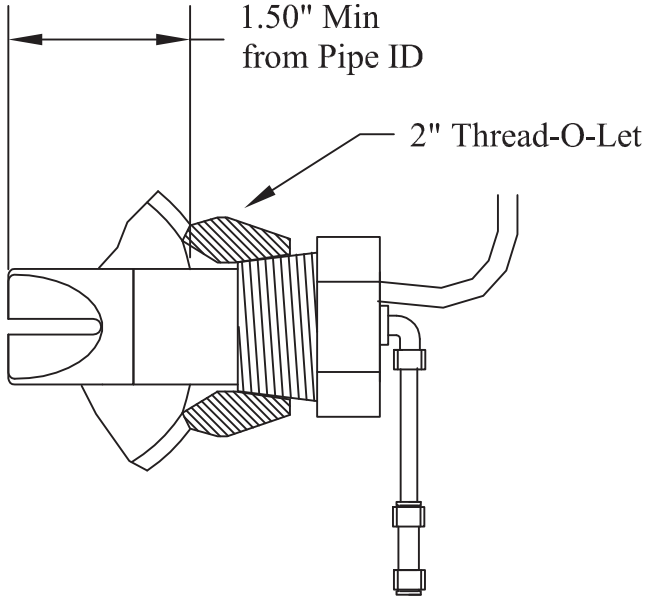
1. Material: Sensor head - Epoxy and Polyurethane
   Back Coupling - 316 Stainless Steel, Passivated
2. Max in-line pressure is 20psi
3. Minimum pipe size is 3" nominal dia.
4. Be sure that Sensor Gap is in-line with sample flow. (See manual for details.)
5. Sensor must penetrate ID of the pipe by 1.5".

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

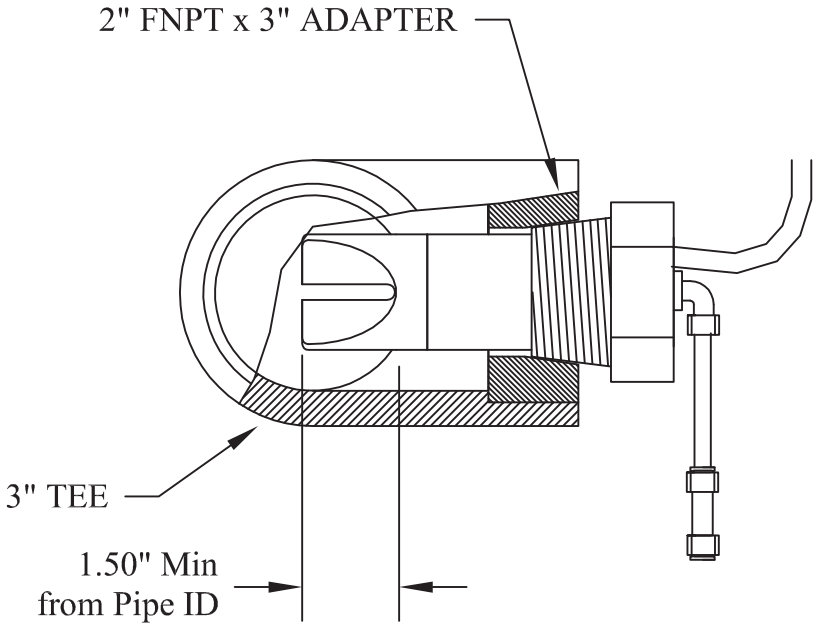
REV. D

DWG. No IIG03N006

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



Thread–O–Let
Installation



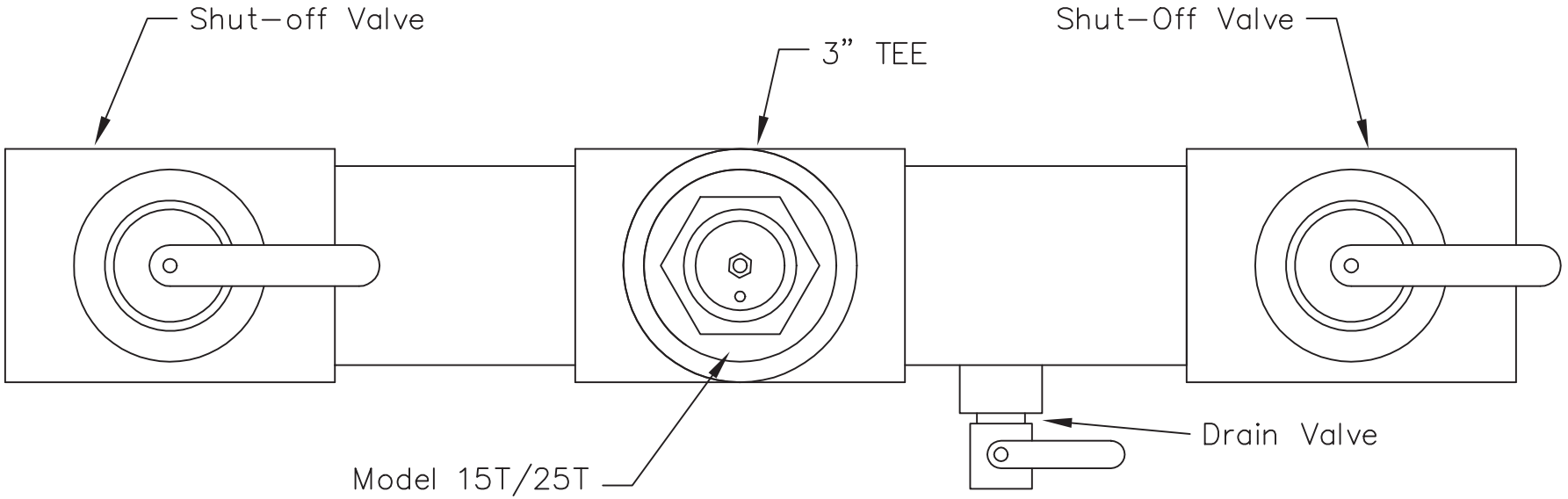
PVC TEE Installation

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

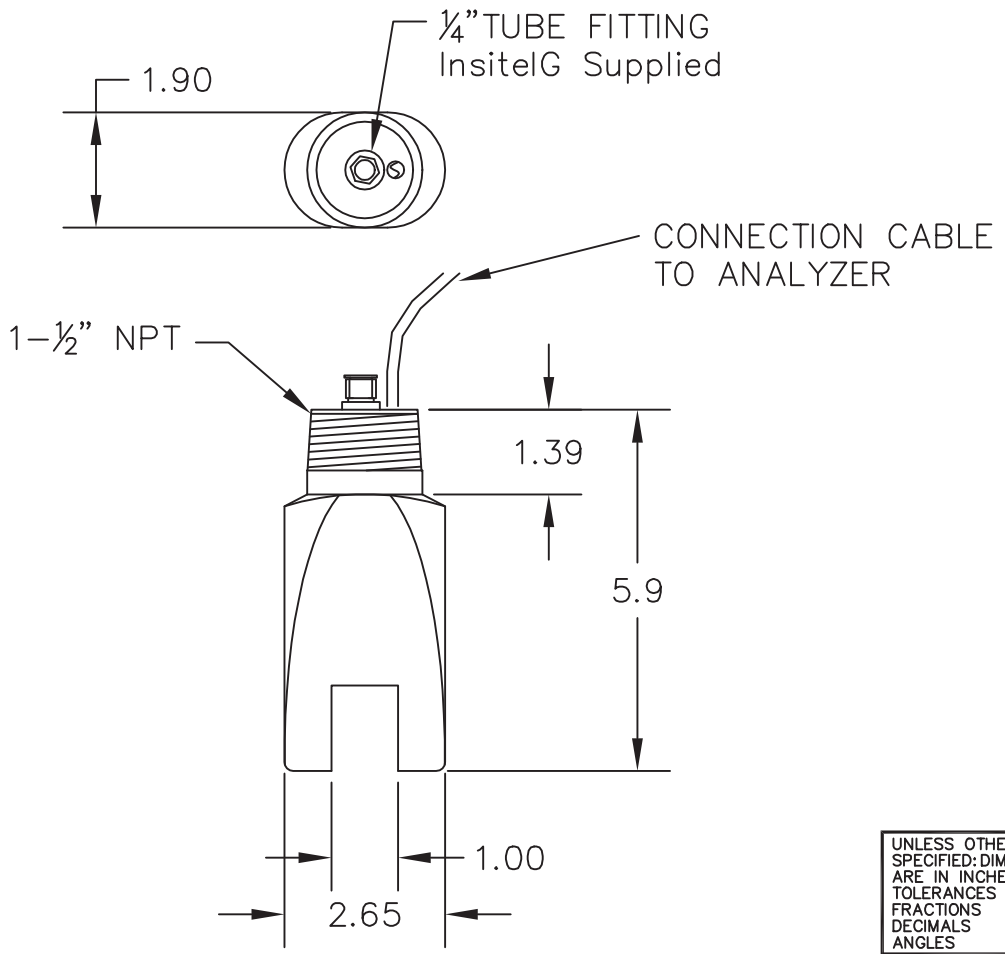
REV. –

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	

IIG03N010 | –

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

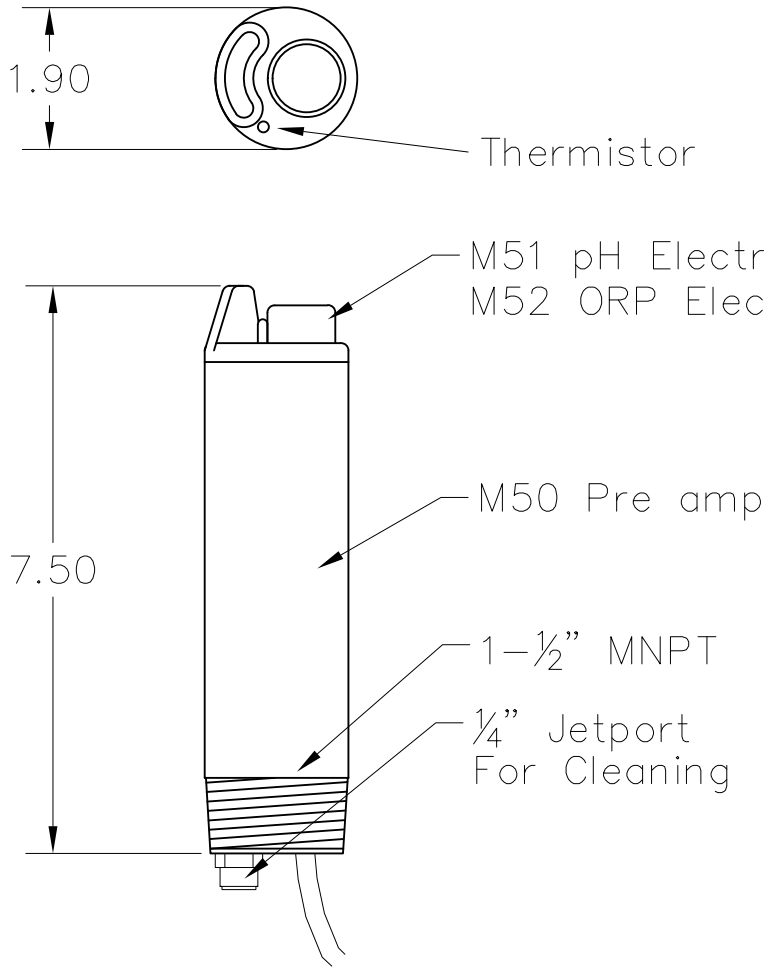


Notes:

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

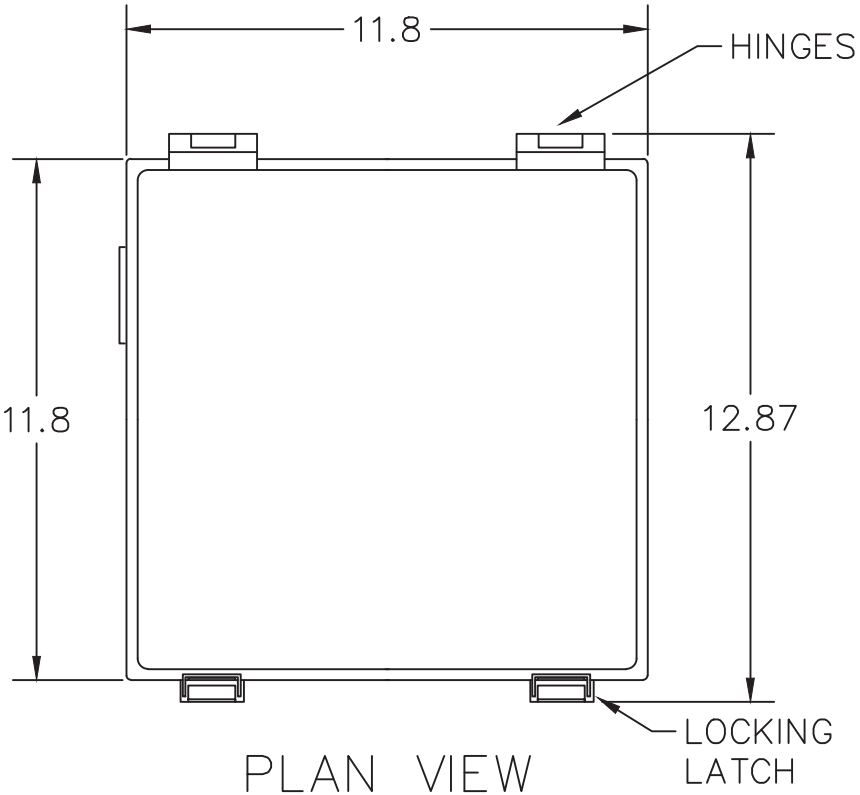


Notes:
1) Material:
   M50 – PVC, Polyurethane and Viton O–rings
   M51 – Flat Glass Double Junction w/Viton O–rings
   M52 – Flat Glass Double Junction w/Viton O–rings
2) Temperature Range: 10 to 60°C
3) Cable length 33'
4) Operating Range:
   M51 – 2 to 12pH
   M52 – ±2000mV

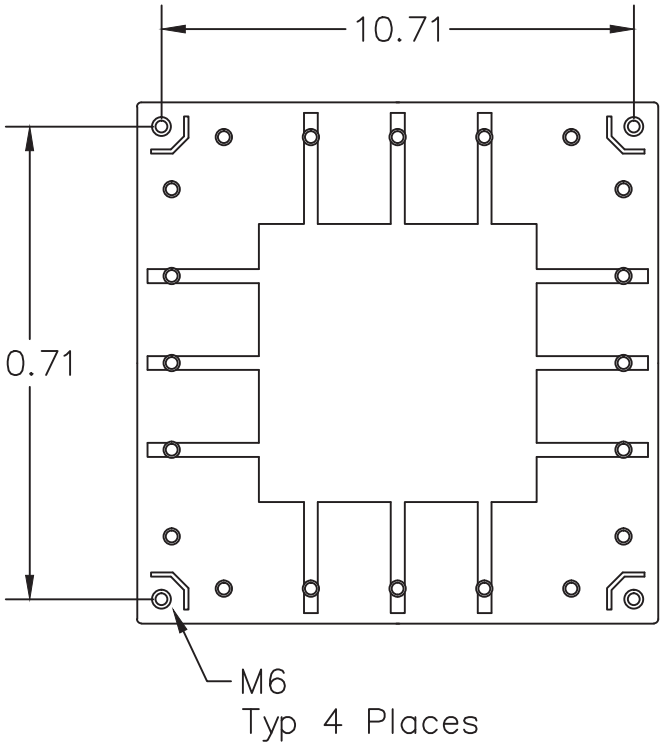
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS ANGULAR .XX ±.010 X° ±1° .XXX ±.005 DO NOT SCALE DRAWING	CONTRACT NO.	Insite IG 80 Whisperwood Blvd. Suite 107 Slidell, LA 70458
MATERIAL –	DRAWN / DATE	TITLE: OUTLINE & MOUNTING 28 & 50 SERIES pH/ORP
FINISH –	CHECK	SIZE C / DWG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

DWG. No IIG07N201 REV. B

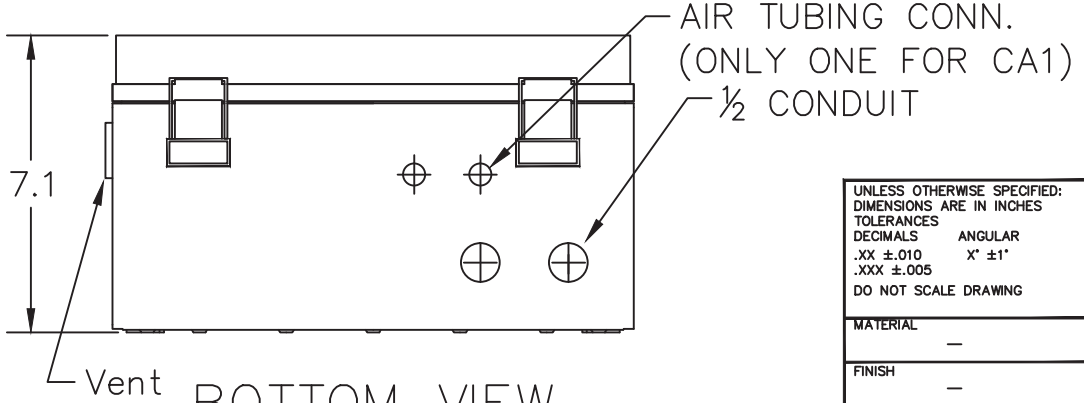
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



PLAN VIEW



BACK VIEW

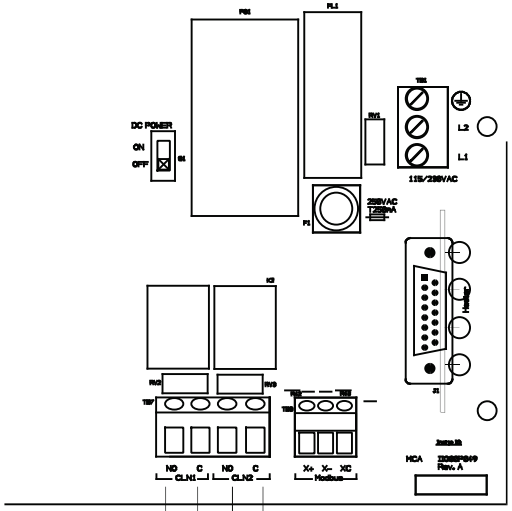


BOTTOM VIEW

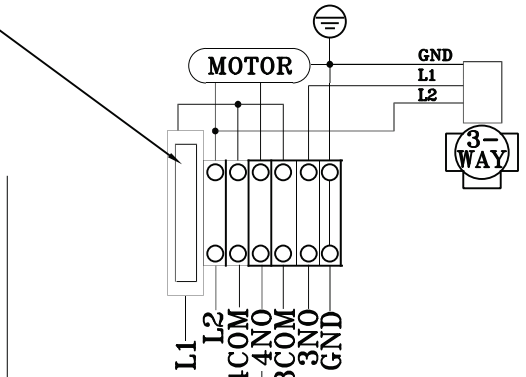
UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS .XX ±.010 .XXX ±.005 ANGULAR X° ±1° DO NOT SCALE DRAWING	CONTRACT NO.		Insite IG 1550 W. Lindburg Dr. Slidell, LA 70458
	DRAWN D. RADLE	DATE 1/29/02	TITLE OUTLINE & MOUNTING MODEL CA1 & CA2 COMPRESSOR
	CHECK		
MATERIAL –	DESIGN D. RADLE	1/29/02	
FINISH –	APPROVED		SIZE C DWG NO. IIG01N030 REV A
SPEC.	CUSTOMER		SCALE NTS SHEET 1 OF 1

DWG. No IIG01N030 REV. A

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



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



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

ANALYZER CONNECTIONS

COMPRESSOR CONNECTIONS
INSITE IG – MODEL CA2

MPA-48	CA-2 COMPRESSOR
CLN1 - NO	4-NO
CLN1 - C	4-COM
CLN2 - NO	3-NO
CLN2 - C	3-COM

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS ANGULAR
.XX ±.010 X° ±1°
.XXX ±.005
DO NOT SCALE DRAWING

MATERIAL —

FINISH —

SPEC.

CONTRACT NO.

DRAWN DATE

CHECK D. RADLE

DESIGN

APPROVED D. RADLE

CUSTOMER

Insite IG
80 Whisperwood Blvd.
Suite 107
Slidell, LA 70458

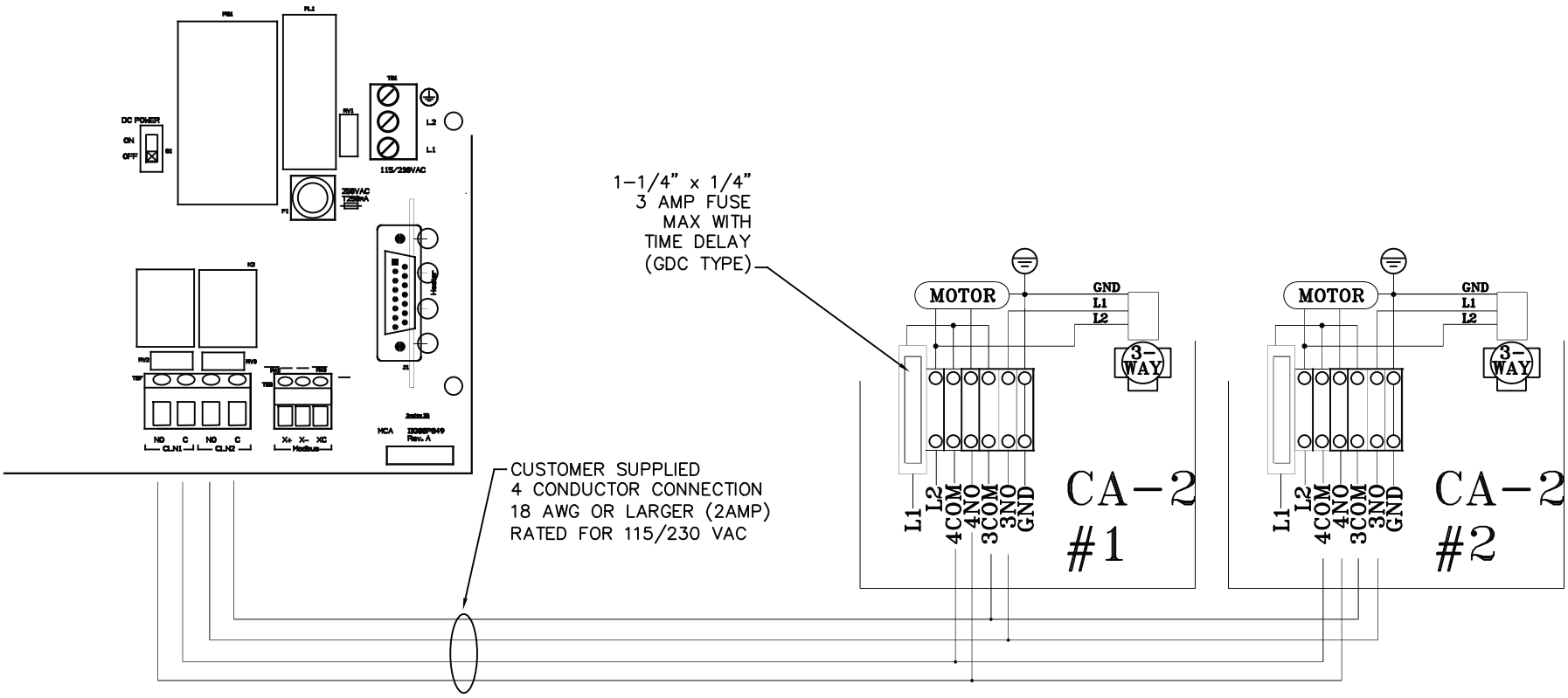
TITLE
MODEL CA2 CONNECTION
Insite IG MCA

SIZE	DWG NO.	REV
C	IIG07R712	—

SCALE NTS SHEET 1 OF 1

DWG. No IIG07R712 REV. —

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



MPA-48	CA-2 #1	CA-2 #2
CLN1 - NO	4-NO	4-NO
CLN1 - C	4-COM	4-COM
CLN2 - NO	3-NO	3-NO
CLN2 - C	3-COM	3-COM

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS ANGULAR
.XX ±.010 X° ±1°
.XXX ±.005
DO NOT SCALE DRAWING

MATERIAL — D. RADLE

FINISH — D. RADLE

SPEC.

CONTRACT NO.

DRAWN | DATE

CHECK

DESIGN

APPROVED

CUSTOMER

Insite IG
80 Whisperwood Blvd.
Suite 107
Slidell, LA 70458

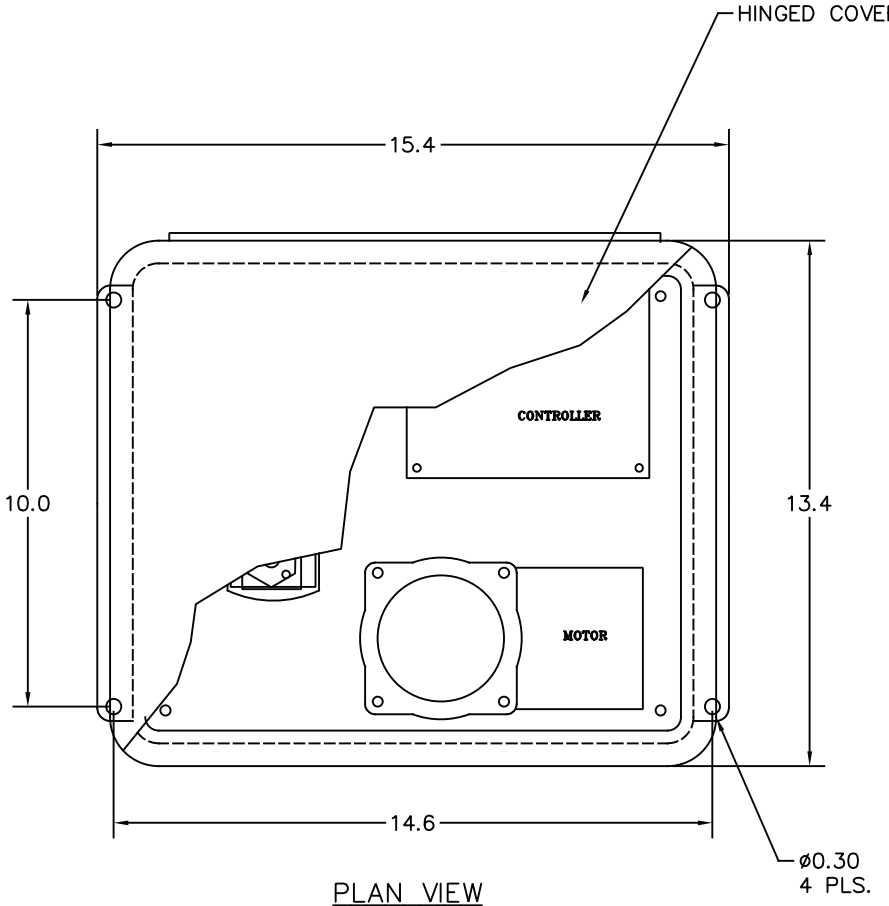
TITLE
MCA CONNECTION
to TWO CA-2 Compressors

SIZE	DWG NO.	REV
C	IIG07R714	—

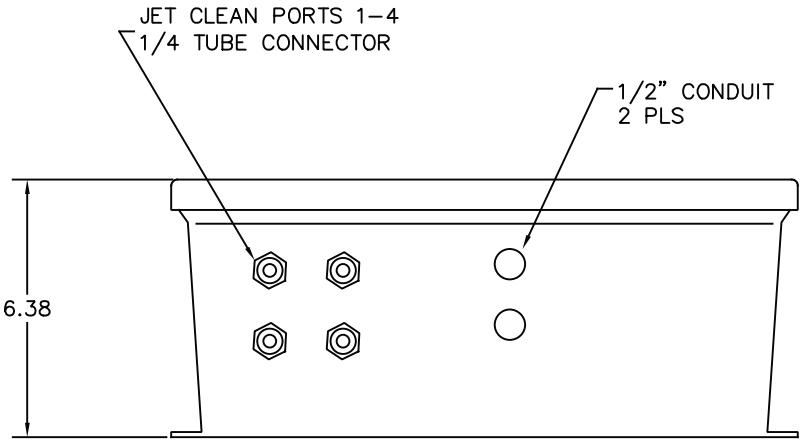
SCALE NTS | SHEET 1 OF 1

DWG. No IIG07R714 REV. —

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



PLAN VIEW



PLAN VIEW

NOTES:
1) Material: Stahlin Fiberglass Enclosure #J1412HW

REV. –

DWG. No IIG07N031

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES DECIMALS .XX ±.010 .XXX ±.005 ANGULAR X° ±1° DO NOT SCALE DRAWING D. RADLE 1/29/02	CONTRACT NO.	Insite IG 1550 W. Lindburg Dr. Slidell, LA 70458	
MATERIAL –	DRAWN	DATE	TITLE OUTLINE & MTG DETAIL CA4 COMPRESSOR
FINISH D. RADLE 1/29/02 –	CHECK		
SPEC.	DESIGN		SIZE C DWG NO. IIG07N031 REV –
	APPROVED		SCALE NTS SHEET 1 OF 1
	CUSTOMER		

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

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

ANALYZER CONNECTIONS

COMPRESSOR CONNECTIONS
INSITE IG – MODEL CA4

MPA-48	CA-4
CLN1 - NO	NO - TO CLN1
CLN1 - C	C - TO CLN1
CLN2 - NO	NO - TO CLN2
CLN2 - C	C - TO CLN2

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS ANGULAR
.XX ±.010 X° ±1°
.XXX ±.005
DO NOT SCALE DRAWING

MATERIAL — D. RADLE

FINISH — D. RADLE

SPEC.

CONTRACT NO.

	DATE
DRAWN	
CHECK	
DESIGN	
APPROVED	
CUSTOMER	

Insite IG
80 Whisperwood Blvd.
Suite 107
Slidell, LA 70458

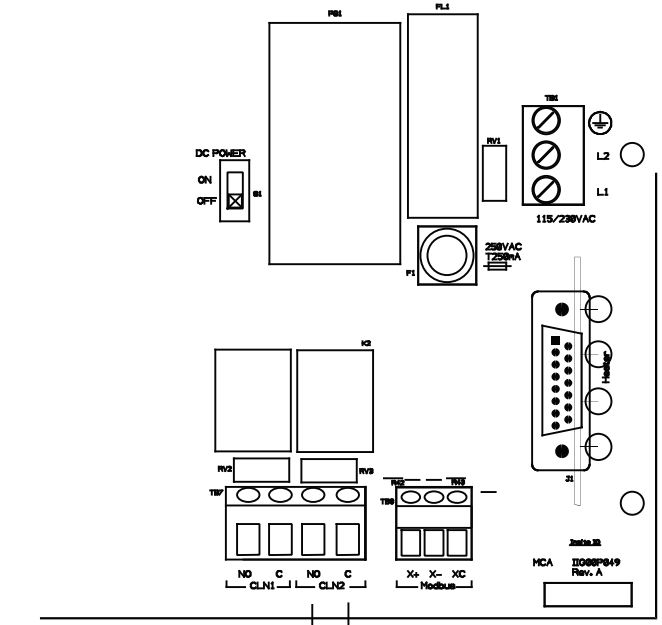
TITLE
MCA CONNECTION
to CA–4

SIZE	DWG NO.	REV
C	IIG07R716	—

SCALE NTS SHEET 1 OF 1

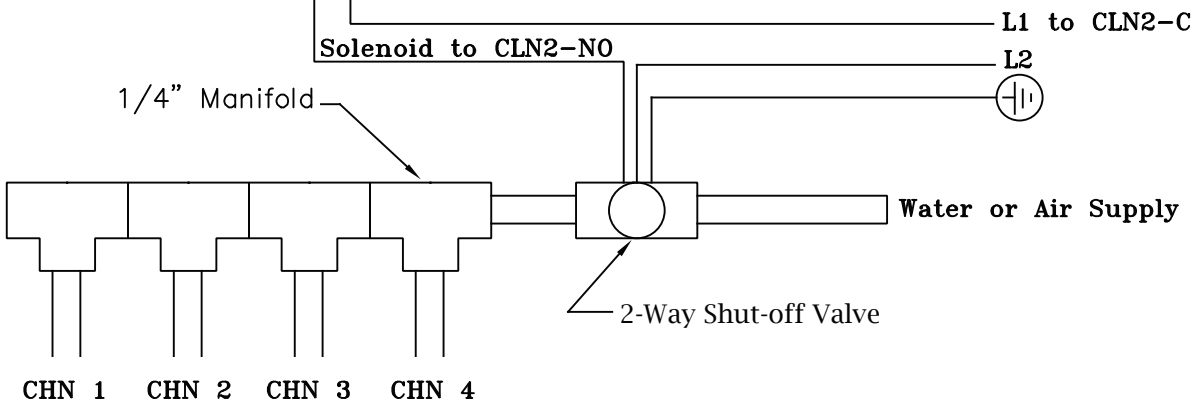
DWG. No IIG07R716 REV. —

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.



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	TITLE SOLENOID JET CONNECTION InsiteIG MCA
FINISH —	CHECK	SIZE C DWG NO. IIG07R713 REV —
SPEC.	DESIGN D. RADLE	SCALE NTS SHEET 1 OF 1
	APPROVED	
	CUSTOMER	

DWG. No IIG07R713 REV. —