Installation and Instructions Manual

Model 4-20IQ

Sensor Transmitters

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IMPORTANT — READ FIRST!

This manual contains operating instructions for stationary gas monitoring instruments designed for area air quality and safety applications, and should be STUDIED CAREFULLY by all persons responsible for the operation and maintenance of the instruments. All International Sensor Technology (I.S.T.) equipment described herein is designed or manufactured for use only as set forth herein and by the labels affixed, or other literature accompanying the product.

Where WARNINGS or CAUTIONS are herein set forth, they must be followed. If I.S.T. equipment is used in a manner or under conditions not specifically authorized or prescribed by this manual, or by other materials or written instructions either accompanying the product or authorized by I.S.T. in writing, or if it is used or maintained by unqualified or improperly trained personnel, International Sensor Technology disclaims all responsibility of every kind for said equipment.

While basic connection installation instructions are included, all equipment must be installed by qualified electricians FOLLOWING ALL ASPECTS OF THE LOCAL CODE REQUIREMENTS. Also, the instruments must be calibrated and alarms tested periodically by trained personnel for proper functioning of the instruments.

CAUTION: The overall system, especially where gas monitoring sensors are used, must be CALIBRATED BY QUALIFIED PERSONNEL. Initial calibration should be performed after installation, then weekly for at least the first month of operation. Thereafter, a monthly calibration check is recommended to assure reliability and accuracy.

Please call the factory if any problems are encountered.

WARRANTY

IST sensors and instruments are designed for area air quality and safety applications. IST gas monitoring instruments are provided with a one year warranty (commencing on the shipment date from the factory). This warranty covers only defective parts or workmanship in normal use and service. Instruments which fail to function due to factory defect within one year of date of shipment are to be returned to International Sensor Technology for warranty repair.

IST will determine the nature and responsibility for the defect. In all cases the warranty is limited to the original cost of the equipment. Any misuse of equipment is the customers responsibility. IST will either repair or replace (at IST's option) returned instruments subject to the warranty, at no charge. No field service is included in this warranty. For field service requirements please contact IST.

In addition to the one year warranty on instruments, IST warrants the SENSOR ELEMENT itself against failure due to deterioration or defect, as follows:

1. Solid State Sensors — 3 years
2. Catalytic Sensors — 1 year
3. Electrochemical Sensors (including O2) — 1 year
4. Infrared (IR) — 1 year

This warranty is voided by:

1. Improper application of instrument.
2. Misuse of instrument.
3. Intentional or accidental damaging of instrument.
4. Not returning the sensor to factory for warranty validation.

For any queries regarding warranty repair or replacements, please include the instrument model and serial number in any transmittals to IST. All equipment returned to IST (including warranty repairs) must be accompanied by an RMA number.

IST instruments are supplied with operating and installation manuals and other literature. These are the only source of specific details regarding proper operation and maintenance of the equipment. These instructions must be carefully read and the precautions followed in detail. Instruments must be calibrated and alarms checked periodically to assure proper equipment operation. Please refer to the manual for details.

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4-20IQ Sensor Transmitters

1. INTRODUCTION

This manual describes the installation and operating instructions for International Sensor Technology's (IST) 4-20IQ sensor transmitter. The Model 4-20IQ is a completely self-contained, intelligent transmitter module, housed in a Class 1, Division 1, Group B, C & D explosion proof housing. Interfacing with the 4-20IQ for Span and Zero adjustment is done via magnetic sensors located on the 4-20IQ's front panel that are activated using a magnetic-tipped wand. It does not require the removal of the housing cover for calibration and other functions needed for transmitter to operate properly. This is especially important in hazardous or explosive locations where exposure of the sensor's electronics to the ambient environment is not acceptable.

This instruction manual covers the family of transmitters using Solid State, Catalytic Bead, Electrochemical and Oxygen sensors. This transmitter can operate as a"stand alone" unit or can be used in conjunction with a variety of controllers available from IST. They operate on 14-24 VDC and produce a 4-20 mA linear output proportional to the gas concentration. The wide power supply variation allows placing the transmitters away from the power supply due to attenuation of the signal (voltage drop) over distance. Minimum voltage AT THE TRANSMITTER is 14 VDC.

The transmitter has been calibrated at the factory and is ready to be used.

2. WIRING

Three conductor cable is required for 24 VDC and 4-20 mA. output. These connections are made to TB2 on the circuit board inside of the sensor transmitter for solid state, catalytic, and oxygen sensor transmitters. For IR and Electrochemical sensors, the connections are made on TB1. The upper deck of circuit cards needs to be removed to connect the wiring as shown in Figure 1 at right. The socket for this connection is included with the transmitter.

The three terminal connections are as follows:

1) Supply: +14 to +24 VDC input
2) Out: Linear 4-20 mA output
3) SYS GND: Ground

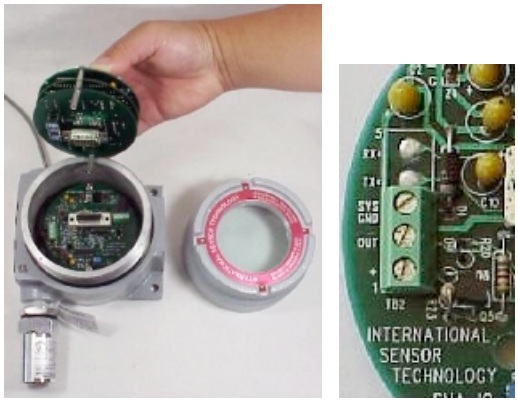

Figure 1 – Remove transmitter cover and pull upper circuit cards straight upward. TB2 is on the left side.

3. WIRE DISTANCES

The maximum distance which wires can be run for the 4-20IQ sensor transmitter is dependent on both the wire size used as well as the power supply voltage. The 4-20IQ can operate on any voltage between 14 and 24 VDC. When used in conjunction with IST's MP SERIES of controllers, these controllers provide 24 VDC to the sensor transmitter. Following are maximum wire distances vs. wire gauge for a 24 VDC power supply.

AWG	One Way Distance (Feet)	One Way Distance (Meters)
#18	2300	710
#16	3700	1100
#14	5900	1800
#12	9400	2800

Using an 18 VDC supply, the maximum one way distances are approximately HALF of the above values. IST does not recommend using 14 VDC supplies unless the wiring distances are very short.

NOTE: If the installation is in an exceptionally noisy area with regard to electrical interference, the maximum practical line length may be less than that indicated.

4. 4-20IQ CALIBRATION PROCEDURES

CAUTION!

IST SOLID STATE SENSORS TYPICALLY GET BETTER WITH AGE AND SHOULD NOT BE REPLACED AS PART OF THE ROUTINE MAINTENANCE PRACTICE.

DO NOT USE NITROGEN OR ANY OTHER GAS AS A SUBSTITUTE FOR AIR TO ZERO OR CALIBRATE THE INSTRU-

MENT, OR TO CHECK CALIBRATION, UNLESS THE INSTRUMENT WAS ORIGINALLY SUPPLIED FOR USE IN A NON-AIR BACKGROUND.

Do not run an accuracy test after an overdose exposure of the sensor to gases. Overdose exposures often change the sensor characteristics temporarily. The accuracy test should not be performed until three hours to two days after exposure, depending on the length of exposure and the chemicals the sensor has been exposed to.

To ensure reliability of the instrument, it is necessary to calibrate periodically. It is recommended that calibration be performed every two weeks during the first month or two. Thereafter, set your own calibration procedure and frequency. If a sensor has a defect, chances are that it will show up during the first month of operation. If a sensor is working properly after the first month, chances are excellent that it will last for many years. IST does not recommend a policy of automatically replacing sensors at fixed time intervals (such as one year) because, unlike virtually all competitive sensors, older IST sensors can generally be considered the equal of newer ones, or even better.

Calibration should be carried out away from interfering gases, and when using toxic gases, should be carried out in a fume hood or a well ventilated area.

NOTE: In the following instructions, to 'Tap' a 'Button' means to bring the magnetic wand near one of the five magnetic sensor locations marked on the front plate of the sensor housing.

Whenever the "UP" or "DOWN" buttons are used, the magnetic wand can be held continuously over the button to repeatedly increment or decrement the value to be set.

4.1 ZERO CALIBRATION

Following is a step-by-step procedure for performing a Zero Calibration using the 4-20IQ sensor module:

a) Tap the "ZERO" button for at least half a second. The "Active" LED will go off and the "Apply Gas" LED will turn on. The Set Zero function may be aborted at any time by tapping the "SPAN" button.
b) Expose the sensor to zero gas for a minimum of one minute. This may be difficult in areas where gas exists all the time. In such cases, a can of clean air (Use P/N 9905 canister) can be collected outside the plant area and sealed to prevent any exchange of air with the environment. NOTE: If the Set Zero function should time-out (i.e., the "Active" LED goes on) before the zero is actually set, you can restart the Set Zero function by repeating step 1) while leaving the zero gas on the sensor.
c) Once the sensor reaches a stable reading, tap the "ZERO" button. The "Apply Gas" LED will blink for approximately 2 seconds.
d) If the zero adjustment was successful, the display should read zero and the "Active" LED should re-illuminate.
e) If the zero adjustment was not successful, the three red LED's ("Span Conc.", "Apply Gas", and "Done") will blink on and off continuously. Also, the 4-20IQ output will be the span calibration fixed value (usually 4 mA or 100 mA) if configuration jumper 1 is not present on the 4-20IQ circuit board, or it will be the actual sensor reading if configuration jumper 1 is present. The error can be cleared by tapping the "SPAN" button. Ensure that the sensor is being exposed to clean air and attempt to re-zero the sensor.

In some areas where background gas is always present, it may be that the true 'Zero' for the gas to be monitored is actually an upscale reading of a few ppm.

ZERO GASES. There is no general consensus as to what is "clean" air to ZERO a sensor. For solid state sensors, it is important to use air compatible in humidity, oxygen content, and environmental conditions in which the sensor is in operation. Therefore, use of any highly pressurized air bottles or inert gases (such as Nitrogen) will offset the zero point and create an unstable zero reading for solid state sensors. If the environment the sensor is in is not free of background gas, it may be necessary to collect a canister or bag containing clean air. Place this clean air over the sensor head and let the sensor stabilize a few minutes in the clean air before setting the zero point. For oxygen and electrochemical sensors, the use of dry air or nitrogen will zero the sensor properly.

4.2 SPAN GAS CALIBRATION

Following is a step-by-step procedure for performing a Span Calibration using the 4-20IQ sensor module:

a) Tap the “SPAN” button for at least half a second. The “Active” LED goes off and “Span Conc.” LED will come on. The 4-20 mA output will go to a fixed value (usually 4 mA or 100 mA) if configuration jumper 1 is not present on the 4-20IQ circuit board. If configuration jumper 1 is present, the 4-20 mA output will reflect the actual sensor reading, SO MAKE SURE ALL ALARMS ARE DISABLED BEFORE PERFORMING THE ACTUAL SPAN CALIBRATION. The Set Span function can be aborted at any time by tapping the “ZERO” button.
b) The display will show the current value of the calibration span gas concentration. Adjust the span gas concentration using the “UP” and “DOWN” buttons so that the display corresponds to the concentration of the actual gas intended to be used for the calibration.
c) Tap the “SPAN” button again. The “Span Conc.” LED will go out and the “Apply Gas” LED will come on.
d) Apply calibration gas to the sensor. The gas can be applied by placing the sensor inside a 1000 cc closed container with an access hole for the sensor, such as the IST p/n 9905 canister, and injecting the appropriate amount of gas using a laboratory syringe.
e) The “Apply Gas” LED will change from a steady glow to blinking. The “Apply Gas” LED will continue to blink until the sensor reading stabilizes. When the reading stabilizes, the “Apply Gas” LED will stop blinking and the sensor’s span will be automatically adjusted. The sensor’s reading should now be the same as the calibration gas concentration.

NOTE: During the calibration process, you may notice the reading reaching full scale and then dropping slightly. DO NOT BE ALARMED. THIS IS NORMAL. The microprocessor automatically adjusts the span gain down slightly whenever full scale is reached. This is to allow the microprocessor to continue monitoring for the point when the sensor reading becomes stable.

f) The “Apply Gas” LED goes out and the “Done” LED turns on. At this time, remove the calibration gas. The 4-20IQ will allow the sensor to recover for two minutes, then the “Done” LED will turn off and the “Active” LED will turn on. The sensor is now in normal operating mode. Alternately, you may manually place the sensor back into normal operating mode by tapping the “SPAN” button. This should be done, however, only after the displayed gas level has dropped below the WARN or ALARM level for the sensor.
g) If an error occurs during calibration (i.e. the calibration gas concentration is out of the range of the sensor), the two outer red LEDs (“Span Conc.” and “Done”) will alternately flash on and off with the middle red LED (“Apply Gas”). To clear the error, remove the calibration gas and allow the sensor reading to fall below all WARN and ALARM levels. Then tap the “SPAN” button. The sensor will return to normal operating mode. Check to make sure that the “Span Conc.” setting corresponds to the concentration of gas you are calibrating with and attempt to re-calibrate the sensor.

NOTE: The operator will have five minutes to select the appropriate calibration concentration and apply calibration gas to the sensor; otherwise, the calibration function will abort and the sensor will return to normal active mode. After calibration gas is applied, the sensor will be given up to five minutes to reach a stable span gas reading. If the sensor does not stabilize within five minutes (which should never happen), the span calibration function will abort. The sensor will have to be re-calibrated at this point from the very beginning, following steps A through G above. This is a safety feature to prevent the 4-20IQ from being left in calibration mode indefinitely.

SPAN GASES. For solid state sensors, the calibration gas mixture needs to have a minimum of 12% oxygen. Calibration gas in inert gas backgrounds, such as Nitrogen, cannot be used directly to calibrate solid state sensors. Adding 50% of environmental air to the calibration mixture in the nitrogen background is needed to ensure a good calibration which will read as half of the actual concentration.

To ensure the reliability of the instrument, it is necessary to calibrate periodically. Calibration should be performed every two weeks during the first month or two. Thereafter, set your own calibration procedure and frequency. For more information visit IST’s website at: http://www.intlsensor.com. On the website there is a calibration chapter and gas data excerpts from the book; “ Hazardous Gas Monitors”, which offers many useful calibration tips.

5. HEATER CURRENT ADJUSTMENT

CAUTION!

THIS ADJUSTMENT IS VERY CRITICAL FOR THE CORRECT OPERATION OF THE SENSOR AND SHOULD ONLY BE MADE BY KNOWLEDGEABLE PERSONNEL. INCORRECT HEATER CURRENT ADJUSTMENT COULD CAUSE MALFUNCTION, AS WELL AS PHYSICAL DAMAGE TO THE SENSOR. IF UNSURE, CONSULT IST FOR INFORMATION ON PROPER HEATER CURRENT SETTINGS FOR YOUR TYPE OF SENSOR.

There is a regulated current source which supplies the current to the sensor heater. This is the most critical adjustment and is

factory set. It controls the sensor's operating temperature and will vary from one instrument to another, depending on the gas being monitored and its full scale range. A sensor's response and sensitivity will be affected if the heater current is improperly set. Unless it is absolutely necessary, do not attempt to adjust it. The heater current may have to be adjusted if an old sensor is being replaced. Following are the steps used to adjust the heater current:

a) Tap the "HEATER" button, leaving the magnetic wand in place for one second. The "Active" LED will go out. Remove wand from "HEATER" button as soon as the "Active" LED goes out. The wand must be removed within one second after the "Active" LED goes out.
b) If the timing in step A is correct, the "Span Conc.", "Apply Gas", and "Done" LED's will all come on to show that the heater adjust state has been entered. The display will show the heater current setting in mA.
c) Adjust the heater current using the "UP" and "DOWN" buttons.
d) Tap the "HEATER" button to exit the heater current adjust mode and return the sensor to normal operating mode.

6. 4-20IQ ERROR/FAULT INDICATIONS

The 4-20IQ module can detect various error/fault conditions that may arise during normal operation. The following subsections describe these error/fault conditions.

A) **UNABLE TO SET ZERO**

This condition will occur if the 4-20IQ sensor module is unable to reach a zero condition when a zero calibration is performed by the operator. In other words, the zero is 'out of range' of the zero potentiometer's adjustment capabilities. This condition will be indicated by the simultaneous flashing of the three red LEDs ("Span Conc", "Apply Gas", and "Done"). During this condition, the output will be held at a preset value (usually zero), or, if configuration jumper 1 is present on the 4-20IQ circuit card, the output will be the continual sensor reading. To clear the error, tap the "SPAN" button. This will release the error condition and return the sensor module to the normal active state. When a set zero error condition occurs, ensure that the sensor is being exposed to clean air and attempt to re-zero the sensor. It should be noted that the sensors for some gases (for instance hydrogen sulfide) do not have a zero adjustment and in fact will always give this error condition when a zero calibration is performed. This is the normal operation of the sensor. Simply tap the "SPAN" button to release the error condition.

B) **UNABLE TO SET SPAN**

This condition will occur when the 4-20IQ sensor module is unable to adjust the sensor reading to the 'Span Conc' value set by the operator during a span calibration. In other words, the span is 'out of range'. This error will be indicated by the alternate flashing of the three red LEDs. The LEDs will alternate between two 'ON' and one 'OFF', and vice versa. During this condition, the output will be held at a preset value (usually 4 mA), or, if configuration jumper 1 is present on the 4-20IQ circuit card, the output will be the continual sensor reading. To clear the error, tap the "SPAN" button. This will release the error condition and return the sensor module to the normal active state. When a set span error condition occurs, ensure that the 'Span Conc' setting corresponds to the actual concentration of calibration gas being used, then attempt to re-calibrate the sensor. If you cannot re-calibrate the sensor, please contact IST for further assistance.

C) **SENSOR FAULT**

This condition will occur if there is no sensor plugged into the 4-20IQ sensor module or if the sensor is physically damaged in some way. This condition is indicated on the front panel by the three red LEDs and the digital display. During this condition, the middle red LED will stay on and the two red LEDs on either side will alternately blink on and off. In addition, the digital display will blink on and off with the display indicating all "***8***"s (eights). If a sensor fault condition is detected, ensure that a sensor is present in the 4-20IQ module. If so, check to make sure that the sensor is not physically damaged (for instance, a broken wire), as this may also result in a sensor fault indication.

IMPORTANT NOTE

For a solid state or catalytic sensor, the 4-20 mA output will go to 0 mA if the sensor is missing or is not connected. For an electrochemical or oxygen sensor, the 4-20 mA output will go to 4 mA if the sensor is missing or not connected.

7. CALIBRATION GAS MIXTURES

Depending on type of gas and concentration, obtaining proper calibration gas mixtures to calibrate the sensors can be a very difficult task. The following are two of the easier ways to accomplish calibration (please see note below):

a) Calibration span gas can be applied using a premixed gas cylinder (available for certain gases, IST's p/n 8000). This is the easiest and most efficient way to calibrate if available.

b) You can also mix your own calibration samples using a container of known volume, pure gas, and a syringe: Using a canister of known volume with an access hole for the sensor (such as IST's p/n 9905, a 1 liter (1000 cc) canister), place the canister over the sensor. Then, using a syringe, measure an appropriate amount of pure gas to make the concentration you desire and inject this gas into the canister. For example, 1 cc of pure gas injected into a 1000 cc canister will produce a sample gas concentration of 1000 parts per million.

8. CALIBRATION OF OXYGEN SENSORS

A) **ADJUSTING THE 'ZERO' POINT (0% O_2) ENRICHMENT MODE**
To zero the oxygen sensor, apply a pure nitrogen gas to the sensor as the ZERO gas while following the directions in Section 4.1 (ZERO CALIBRATION)

B) **ADJUSTING THE 'SPAN' POINT (20.9% O_2) ENRICHMENT MODE**
The 4-20IQ-O uses normal ambient air as its calibration standard (normal ambient air is 20.9% at sea level). Therefore, follow Section 4.2 (SPAN GAS CALIBRATION) to span calibrate the 4-20IQ-O using ambient air as your span calibration gas. You will not have to apply any span calibration gas in most cases, since the unit should be constantly exposed to the span gas (ambient air).

9. OUTPUT VOLTAGE

Please note that the maximum load for the 4-20 mA output is 850 ohms.

10. REPLACING A SENSOR

To replace a sensor, use the following steps:

1. Power off the instrument.
2. Loosen the set screw, unscrew the sensor rainshield to expose the sensor.
3. Hold the sensor by the base and very carefully pull it out. On Solid State and Catalytic Bead Sensors, be careful not to damage the delicate part of the sensor that is suspended by the thin wires.
4. To install the new sensor, insert the sensor into the sensor socket by aligning the red line along the side of the sensor or ring-mark with Pin 'D' of the sensor socket. This is true for Solid State and Catalytic Bead Sensors. Electrochemical and oxygen sensors are keyed and do not have a red line on them.

11. INSTALLATION/LOCATION OF SENSOR TRANSMITTER

There are no set rules regarding where sensors must be located. However, the judgment of trained personnel and good common sense should always be used. Sensors which are properly installed can save hours of maintenance and provide trouble free operation. Following are some general guidelines to help you select the proper location:

a) Common sense is the key. What is appropriate for one installation may not be appropriate for another. As a general rule, sensors should be installed at the point(s) from which the gas is most likely to leak from and/or accumulate at. Generally, sensors should be located where they will indicate an average reading of the area that the sensor is to cover.
b) The number of sensors required for an application depends on a number of factors, including the plant layout, airflow pattern, type of gas to be monitored, and the degree of protection required. Choosing the proper number of sensors is a matter of common sense. Gas sensors are similar to smoke detectors, meaning they will only detect gas that directly comes in contact with the sensor. Thus, the sensor relies on the dispersion of the gas in order to detect it.
c) Sensor transmitters should be pointed downward, not up at the sky or ceiling.
d) The sensor must not be exposed directly to water or steam. Any sensors located close to the floor should be high enough so that they will not be immersed if someone decides to hose down the area. The sensor should be removed or else a sensor plug (IST P/N F44-P) should be temporarily installed if you intend to hose down the area. Whenever possible, sensors should be installed at approximately chest level. This makes calibration convenient and also generally assures that sensors don't get flooded by liquids. When there is a possibility of snow accumulating to the height that the sensor is installed, precautions must be taken to prevent the snow from reaching the sensor.
e) Gases have different densities, and some are lighter than air while others are heavier. However, this does not mean that sensors should be installed on the floor or ceiling to monitor these gases. Gases disperse easily and develop a concen-

tration gradient, which means, for example, that a gas that is heavier than air will still be detected several feet off the ground. An important point to remember is that sensors must be accessible for calibration and maintenance, so they should be located where they can be easily reached. Thus, installing them on the floor or ceiling is normally not a good idea.

f) A sensor plug (such as IST P/N F44-P) should be temporarily installed if painting or welding is going to be done in the immediate vicinity of the sensor, to protect it from excessive gas fumes.

g) Sensor transmitters should not be installed too close to a wall or other surface. Space is needed to fit calibration canisters or adapters over the sensor's rainshield. Also, toxic gases tend to adsorb into walls. Then, a change in temperature or humidity can cause the wall to off-gas, causing the sensor to produce a reading. This reading may inadvertently be interpreted as "drifting" or a false reading when, in fact, the sensor is operating properly and just doing it's job of detecting gas.

12. Frequently Asked Questions

1) ***What is Heater Current?***

Answer: Solid state and Catalytic sensors need to heated to operational temperatures. This heater current defines the output characteristic of the sensor. The heater current setting is factory set and will last for the lifetime of the sensor and should never be adjusted, unless you are explicitly instructed to do so by IST personnel or if you are replacing a sensor. The heater current for each replacement sensor will come with the sensor. See Section 5 for detailed instructions on how to adjust the Heater Current on the 4-20IQ.

2) ***How do I verify if an alarm condition exists? Or, you believe your sensor is malfunctioning or "drifting", because it will detect gas when you believe no gas is present.***

Answer: If a sensor is in alarm or is detecting gas when you believe none to be present, there is a simple and effective way to verify the presence of gas. Simply capture some air sample from area that is considered "clean" (such as an office) with a plastic bag (such as a garbage bag) and insert and seal the sensor head into the bag for a few minutes. If the reading comes down, this means that there is the presence of some gas, although not necessarily the target. Most sensors will not selectively read only one gas and will respond to other gases besides the target gas. If you are certain none of the target gas is in the area, you should try to eliminate any chemicals or gases from the area which might make the sensor respond. You can contact IST for a list of gases that might make your particular sensor read. If the reading does not change upon covering the sensor with clean air, recalibrate the sensor.

3) ***Sensor produces low or no reading during calibration.***

Answer: Calibrating sensors with very reactive gases in low concentration mixtures; such as with Chlorine and Ammonia, can sometimes produce low readings. This is because the gas molecules react with the dirt in and around the protective sinter that covers the sensor. This effectively clogs the pores of the sensor sinter, inhibiting the diffusion of gas to the sensor. To remedy this, turn off the power to the sensor and remove the protective housing for the sensor (make sure to loosen the set screw before doing this). Thoroughly wash the rain shield in acetone and air dry completely, making sure the rain shield is completely dried before reinstalling. Failure to dry completely will result in the sensor reading upscale.

4) ***Sensor reads at or near full scale when I first power the unit on. Is this normal?***

Answer: Yes, this is normal for a solid state sensor. Solid state sensors operate at a elevated temperature and require a heating up period. This period is typically from few minutes to few hours, but we advise that you leave the sensor plugged in overnight before testing it. This is true for any unit that has been powered off for any significant period of time.

13. Spare Parts

Replacement Sensors

Part #	Description
9910-S1	Category 1, ppm range solid state sensor
9910-S2	Category 2, ppm range solid state sensor
9910-SL	%LEL or % b/v solid state sensor
9909C	Catalytic Sensor

Replacement Sensors (continued)

Part #	Description
9910E	Type 1 electrochemical sensor
9922E	Type 2 electrochemical sensor
9920	Oxygen Sensor

Circuit Boards

Part #	Description
420IQ-PCB-ALL	Set of PCB's for 4-20IQ (all sensors except IR)
4-20IQ-PCB-ALL-IR	Set of PCB's for 4-20IQ-IR

Sensor Sockets

Part #	Description
9744	For solid state or catalytic sensor socket
9754-EI-C	Type 1 EI sensor socket
9754-EI-S	Type 2 EI sensor socket
9754-O2	Oxygen Sensor socket

Sensor Protective Housings and Sample Connections

Note: Parts with the F44 designation are for solid state, and catalytic sensors only.
Others are as specified.

Part #	Description
F44T	Rain shield with sinter for SS and Catalytic Sensors
F44P	Plug to seal and protect sensor
F44PF	F44P with _" OD fitting for tube connection
F44TEF	Teflon housing for special non-hazardous areas
F44CO	Housing with charcoal filter for CO or H_2 gas
F44RCO	Replacement charcoal pack for F44CO
F44C	F44T with inlet fitting for calibration gas
F44CS	Inlet and outlet port for sample to flow through
F44AVS	Sampling system with compressed air vacuum system
F44-WG	Water Guard to protect sensor from hose down
9930SS	Inlet/outlet port for Type 1 EL and O_2 sensors
9930AV	Same as 9930SS with compressed air pump

F44T F44P F44TEF F44CO F44C F44CS F44AVS F44WG

Duct Mounting Kits

Part #	Description
F44DM	F44 with 1" NPT external thread for duct mounting
F44DMK	F44 duct mounting kits

Duct Mounting Kits

Part #	Description
9945DMK	Duct mounting kit for Type 1 EL and O_2 sensors
9945DM-1	1" NPT Duct Mount Kit for Type 1 EL and O_2 sensors

F44DM

F44DMK

9945DMK

9945DM-1s

Part #	Description
S2K	Sampling system with periodic and diluting sampling
TR98M	Relay contact for transmitters with 4-20 mA signal
TR98S	Slave-additional relay contact for TR98M
420 I	4-20 mA. isolated output module for SM95 & 4-20IQ

SM 95 Transmitter with TR98M Relay Contact

SM95-420 I, isolate 4-20mA output for SM 95

Visit our website at www.intlsensor.com for more details.

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