

Instruction Manual
SM5000 Sampling Module, DC Pump Model



Order No.: 10103804/02
Print spec.: 10000005389(A)



WARNING!

This manual must be carefully read by all individuals who have or will have the responsibility for using or servicing the product. Like any piece of complex equipment, this device will perform as designed only if it is used and serviced in accordance with the manufacturer's instructions. Otherwise, it could fail to perform as designed and persons who rely on this product for their safety could sustain severe personal injury or death.

The warranties made by MSA with respect to the product are voided if the product is not used and serviced in accordance with the instructions in this manual. Please protect yourself and others by following them. We encourage our customers to write or call regarding this equipment prior to use or for any additional information relative to use or service.

In the U.S., to contact your nearest stocking location, dial toll-free 1-800-MSA-INST.

To contact MSA International, dial 1-412-967-3228.

This manual is available on the Internet at www.MSAsafety.com.



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MSA Permanent Instrument Warranty

1. **Warranty** - Seller warrants that this product will be free from mechanical defect or faulty workmanship for a period of eighteen (18) months from date of shipment or one (1) year from installation, whichever occurs first, provided it is maintained and used in accordance with Seller's instructions and/or recommendations. This warranty does not apply to expendable or consumable parts whose normal life expectancy is less than one (1) year such as, but not limited to, non-rechargeable batteries, sensor elements, filter, lamps, fuses etc. The Seller shall be released from all obligations under this warranty in the event repairs or modifications are made by persons other than its own or authorized service personnel or if the warranty claim results from physical abuse or misuse of the product. No agent, employee or representative of the Seller has any authority to bind the Seller to any affirmation, representation or warranty concerning the goods sold under this contract. Seller makes no warranty concerning components or accessories not manufactured by the Seller, but will pass onto the Purchaser all warranties of manufacturers of such components.
This warranty is in lieu of all other warranties, expressed, implied or statutory, and is strictly limited to the terms hereof. Seller specifically disclaims any warranty of merchantability or of fitness for a particular purpose.
2. **Exclusive remedy** - It is expressly agreed that Purchaser's sole and exclusive remedy for breach of the above warranty, for any tortious conduct of Seller, or for any other cause of action, shall be the repair and/or replacement at Seller's option, of any equipment or parts thereof, which after examination by Seller is proven to be defective. Replacement equipment and/or parts will be provided at no cost to Purchaser, F.O.B. Seller's Plant. Failure of Seller to successfully repair any nonconforming product shall not cause the remedy established hereby to fail of its essential purpose.
3. **Exclusion of consequential damage** - Purchaser specifically understands and agrees that under no circumstances will seller be liable to purchaser for economic, special, incidental or consequential damages or losses of any kind whatsoever, including but not limited to, loss of anticipated profits and any other loss caused by reason of non-operation of the goods. This exclusion is applicable to claims for breach of warranty, tortious conduct or any other cause of action against seller.

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General Warnings and Cautions



WARNING!

1. The SM5000 Sampling Module - DC Pump Model described in this manual must be installed, operated, and maintained in strict accordance with the labels, cautions, warnings, instructions, and within the limitations stated.
2. An SM5000 Sampling Module - DC Pump Model is designed to sample gases or vapors in air. It cannot sample the concentration of gases or vapors in steam or condensing streams or inert or oxygen deficient atmospheres.
3. The unit must not be painted. If painting in an area where this unit is located, ensure that paint is not deposited on the module inlet fitting. Such paint deposits interfere with the sampling process and can result in improper readings.
4. Sensors are sealed units containing a corrosive electrolyte. Should a sensor develop leakage, immediately remove it from service; then, remove it from its housing assembly and discard it properly. Ensure that the electrolyte does not contact skin, eyes, clothing or circuitry; otherwise, personal injury (burns) and/or equipment damage may result.
5. Use only genuine MSA replacement parts when performing any maintenance procedures provided in this manual. Failure to do so may seriously impair instrument performance. Repair or alteration of the SM5000 Sampling Module - DC Pump Model, beyond the scope of these maintenance instructions or by anyone other than an authorized MSA service person, could cause the product to fail to perform as designed, and persons who rely on this product for their safety could sustain severe personal injury or death.
6. Properly vent the exhaust of this unit to a safe area. Improper venting of the exhaust can cause personal injury or death.
7. Extremely high concentrations of combustible gas or vapor between the lower explosive limit (LEL) and the upper explosive limit (UEL) will cause the indication on the SM5000 Gas Monitor to indicate full scale or above full scale. If the concentration level is further increased and exceeds the UEL, the display will continue to show an above scale indication. Gas or vapor concentrations above the UEL are extremely dangerous since the instrument cannot measure them accurately, and when reduced by the addition of air to a level below the UEL, they again constitute a violently explosive mixture. Therefore, every alarm causing condition or situation must be investigated to determine that the area being monitored does not contain a gas or vapor in air mixture that exceeds the LEL or UEL.

Failure to follow the above warning can result in serious personal injury or death.



CAUTION!

1. Perform periodic leak check on all of this unit's flow system components and fittings. Ensure the flow is within specifications.
2. As with all sensors, high levels of, or long exposure to, certain compounds in the tested atmosphere contaminate the sensors. In atmospheres where an SM5000 Sampling Module - DC Pump Model may be exposed to such materials, calibration should be performed frequently to ensure that channel operation is dependable and display indications are accurate. Ensure the flow is checked to be within specifications.
3. The only absolute method to ensure the proper overall operation of this unit is to check the associated sensor(s) with a known concentration of the gas for which it has been calibrated. Consequently, calibration checks must be included as part of the routine inspection of the system along with ensuring flow to be within specifications.

Failure to follow the above caution can result in injury, product damage, and/or an unsafe condition.

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1 General Information

1.1 Introduction

1.1.1 The SM5000 Sampling Module - DC Pump Model:

- must be used with an Ultima X, Ultima X5000, or an S5000 Gas Monitor with a digital sensor (available separately).

NOTE: Does not work with S5000 IR400, passive catalytic bead or metal oxide semiconductor (MOS) sensors.

- draws a gas sample from the monitored area, through a sample line (sold separately, see Tab. 3 for details) to the sensor.
- samples areas that are remote, inaccessible, too hot or too cold for direct sensor monitoring, such as:
 - ducts carrying combustible or toxic gas
 - wet wells, water vapor in the sampling must not condense (RH must be less than 95%)
 - printing drying ovens
 - blanking or inerting operations
- must be used with a special flow cap to ensure proper sensor sampling (sold separately, see Tab. 3).

A properly-installed unit for a single Ultima X5000 Gas Monitor is shown in Fig. 1. It is also possible for one Pump Sampling Module to supply sample gas for up to three Ultima X, Ultima X5000, or S5000 Gas Monitors. This procedure:

- is useful when monitoring up to three different gases.
- requires additional Ultima X, Ultima X5000, or S5000 Gas Monitors with individual flow caps.
- is further detailed in chapter 2 "Installation".

When using Ultima XIR or XIR PLUS sensor(s), locate the sensor on the exhaust side of the Pump Sampling Module (see Fig. 2) to ensure the most accurate readings (the three-way valve from the XIR flow cap must be installed on the inlet side of the pump). The Pump Sampling Module is not compatible with the S5000 IR400 sensor.

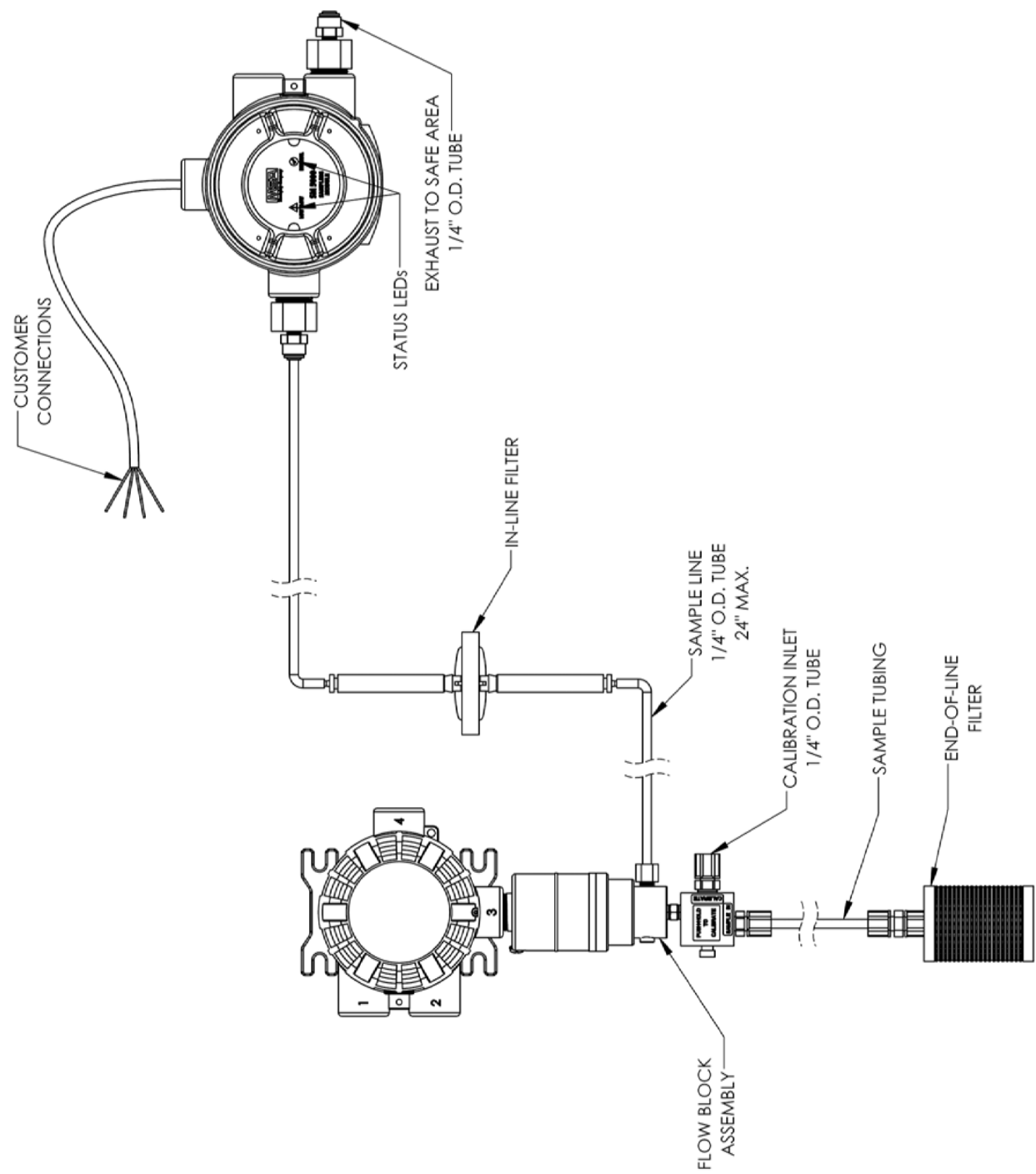


Fig. 1 Sampling module installation with Ultima X5000 oxygen, toxic, and catalytic combustible sensors

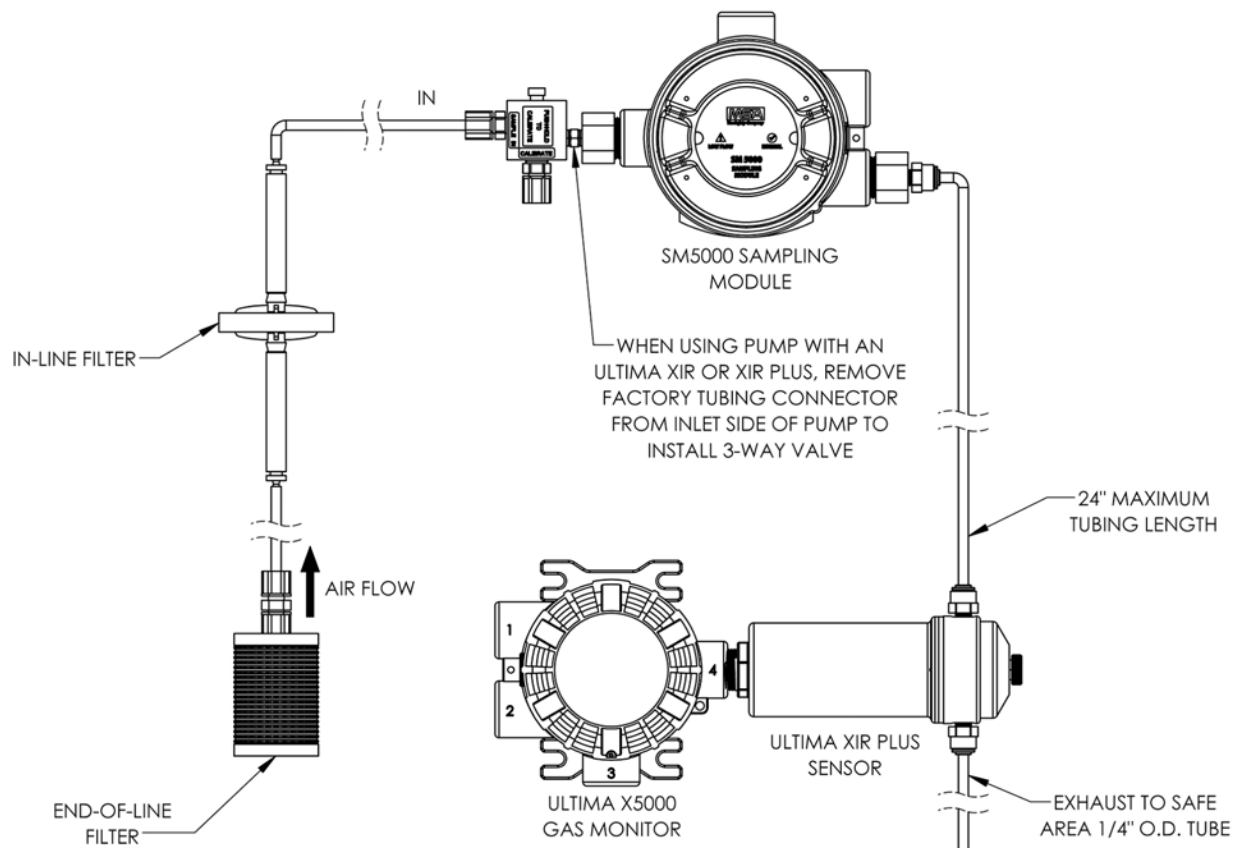


Fig. 2 Sampling module installation with Ultima XIR PLUS sensor

1.1.2 Unpacking Unit

Carefully unpack your Pump Sampling Module from shipping carton(s). Compare enclosed items with the packing list to ensure all parts ordered were received; contact shipper or carrier if discrepancies exist.

Each Pump Sampling Module package contains:

- Pump Sampling Module
- Tubing and in-line filter
- End-of-line filter
- Instruction manual

1.1.3 Unit Identification

There is one possible Pump Sampling Module configuration:

- Explosion-proof (P/N 10043264) unit

Reference the identification label located on the side of the unit (see Fig. 3). See Tab. 1 for unit specifications.

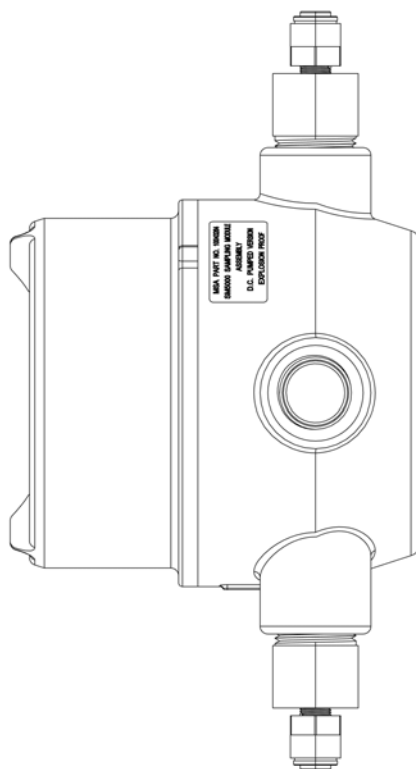


Fig. 3 Identification label

Maximum power consumption	8.5 watts at 9 to 30 VDC
Cable requirements	Four-conductor, shielded, 18 AWG (typical)
Sample transport time	30 seconds at 0.5 LPM with 50 feet (15.25 meters) of .180 (4.57 mm) ID sample tubing
Nominal sample flow rate	2 CFH (1 LPM)
Minimum sample flow rate	1 CFH (.500 LPM)
Maximum sample tubing length	100 feet (30 meters)
Maximum exhaust tubing length	20 feet (6 meters)
Inlet fitting	1/4" (6.35 mm) OD tube fitting
Exhaust fitting	1/4" (6.35 mm) OD tube fitting
Calibration fitting	1/4" (6.35 mm) OD barbed fitting
Overall dimensions	9" x 6" x 5" (228.5 cm x 152.4 cm x 127 cm)
Weight	4.5 lbs. (2 kg)
Rating	Explosion-proof enclosure, Class I, Groups A, B, C and D, Division 1, Hazardous Locations
Electrical entry	3/4-14 NPT
Flow failure relay	SPDT at 0.6 Amps, 125 Volts AC or 110 Volts DC at 2.0 Amps, 30 Volts DC
Temperature range	-20°C to 55°C (-4 to 122°F)
Humidity	15 to 95% RH, non-condensing

Tab. 1 Performance specifications for SM5000 Sampling Module - DC Pump Model

1.1.4 Terminology

Electrochemical sensor	Sensor employing the reactions of chemicals generating electric currents to detect certain gases.
Exhaust gas	Gas after it has passed through the sensor.
Flow rate	The volume-per-minute of gas in the sample line.
Span gas value	The gas concentration in % LEL that is used to set the calibration value during spanning. This value is usually printed on the gas cylinder containing the gas.
Spanning	Process of placing a full scale or up scale meter reading on the display by using calibration span gas cylinders.
Zero	A zero (0) indication on the meter display usually indicates ambient air present or no hazardous gases present.
Zeroing	Processes for placing a zero indication on meter display.

Tab. 2 Terminology

2 Installation

2.1 General

Install the Pump Sampling Module in the correct area classified in your facility.

NOTE: The explosion-proof model hazardous area classification is Class I, Division 1, Groups A, B, C and D. It is important that all local and national codes be followed when installing this model in a classified area.

Double check the area classification of the Pump Sampling Module.

Refer to Fig. 3 to find the area classification label on your unit. Ensure that the gas monitor being used with the sample pump is rated properly by referring to the gas monitor instruction manual for more details.



WARNING!

Do not mix units with different area classifications. All units used in a classified area must have the proper area classification. Otherwise, an explosion hazard will exist, resulting in a possible explosion, injury or death.

The Pump Sampling Module for a general-purpose (GP) monitor can be a source of ignition. Install, locate and operate only in a non-hazardous area and in accordance with applicable codes.

If sampling from or exhausting into a separate location, the installation requires flashback arrestors at the inlet from a hazardous location and at the outlet to a hazardous location, to prevent the propagation of ignition of hazardous gases. Routinely check for pump system leaks that could create an explosive environment inside the enclosure.

Read and follow all instructions, warnings and cautions pertaining to this gas monitor.

Failure to follow this warning can cause ignition of explosive environments resulting in serious personal injury or death.

2.2 Mounting the Pump Sampling Module Unit (All Models)

- (1) Locate the Pump Sampling Module and the gas monitor(s) in a clean, accessible location.

NOTE: Since the unit enclosure is non-corrosive, it can be mounted to the outside of a building or in other wet environments. Note the temperature and RH requirements.

NOTE: Use of Teflon tape or non-hardening thread sealant for environmental reasons is acceptable.

NOTE: When installing multiple gas monitors, ensure all monitors have conduit seals placed within the requisite distances as outlined in their respective user manuals.



CAUTION!

Ensure that Pump Sampling Module or the gas monitor(s) display(s) are not blocked or obscured. A blocked display will obscure the gas reading indication and sampling module indications. The unit must be mounted with the electrical input facing down and the label clearly readable.

- (2) Mount the Pump Sampling Module and gas monitor(s):
 - From the electrical conduit or
 - By using optional mounting bracket (P/N 10047561) and the four holes in the rear of the Pump Sampling Module.
 - By using the optional mounting bracket (P/N 10179361) for the Ultima X5000 Gas Monitor.
 - Assemblies are also available that will allow monitoring in vent pipe lines 4-6" in diameter. Use PN 10147544 for digital sensors and PN 10126895 for XIR/XIR PLUS sensors.

Installation

- (3) Mount gas monitor such that the digital sensor inlet is facing downward. If installing with an Ultima XIR or XIR PLUS, mount such that the sensor inlet is horizontal.
- (4) Mount Pump Sampling Module exhaust tubing so that the end of the tubing is facing downward and is the lowest point of the tubing (see Fig. 1).



CAUTION!

The gas monitor must be mounted with its sensor at the bottom of the case and the digital sensor inlet fitting pointed downward or XIR/XIR PLUS sensor pointed horizontal; otherwise, the unit may become inoperative.

2.3 Sample Line Placement between Pump Sampling Module and Ultima X, Ultima X5000, or S5000 Gas Monitor

- (1) Remove all protective packaging plugs and/or caps from Pump Sampling Module gas inlet and exhaust ports.
- (2) On new installations, skip to Step 4.
On existing installations of the Ultima X, Ultima X5000, or S5000 gas monitors: Remove the red or black sensor guard and any gaskets remaining on the sensor. Do not remove the sensor element.
- (3) Install the flow block(s) on the gas monitor(s) where the red or black sensor guard was removed in the previous step (see Fig. 1 and Fig. 4).

NOTE: Flow caps are purchased separately. See Tab. 3 for part numbers.

- (4) Attach the supplied tubing to the Pump Sampling Module port labeled "TO ULTIMA".
- (5) Attach the other end of the supplied tubing to the side of the flow block (see Fig. 1).

NOTE: Tubing can be trimmed to ensure that there are no kinks.

NOTE: In-line filter (P/N 10051406) must be used somewhere along the tubing length. Ensure that the arrow on the in-line filter is pointing towards the Pump Sampling Module.

Item	Part no.
End-of-line filter for wet area sampling	10015787
End-of-line filter for humid area sampling	637921
4-6" vent pipe mount for mounting with digital sensor	10147544
4-6" vent pipe mount for mounting with XIR/XIR PLUS sensor	10126895
Sample line water deflector (for hosed-down areas)	10087383
Ultima X, Ultima X5000 and S5000 Digital Sensor Flow Block	10041866
Ultima XIR/XIR PLUS Flow Block	10042600

Tab. 3 Parts purchased separately



CAUTION!

The in-line filter must be used before the Pump Sampling Module to prevent water entry from damaging unit. If installing additional gas monitors, install tubing between units as shown in Fig. 4. Use tubing compatible with the gas being sampled.

MSA tubing is available (P/N 600771).

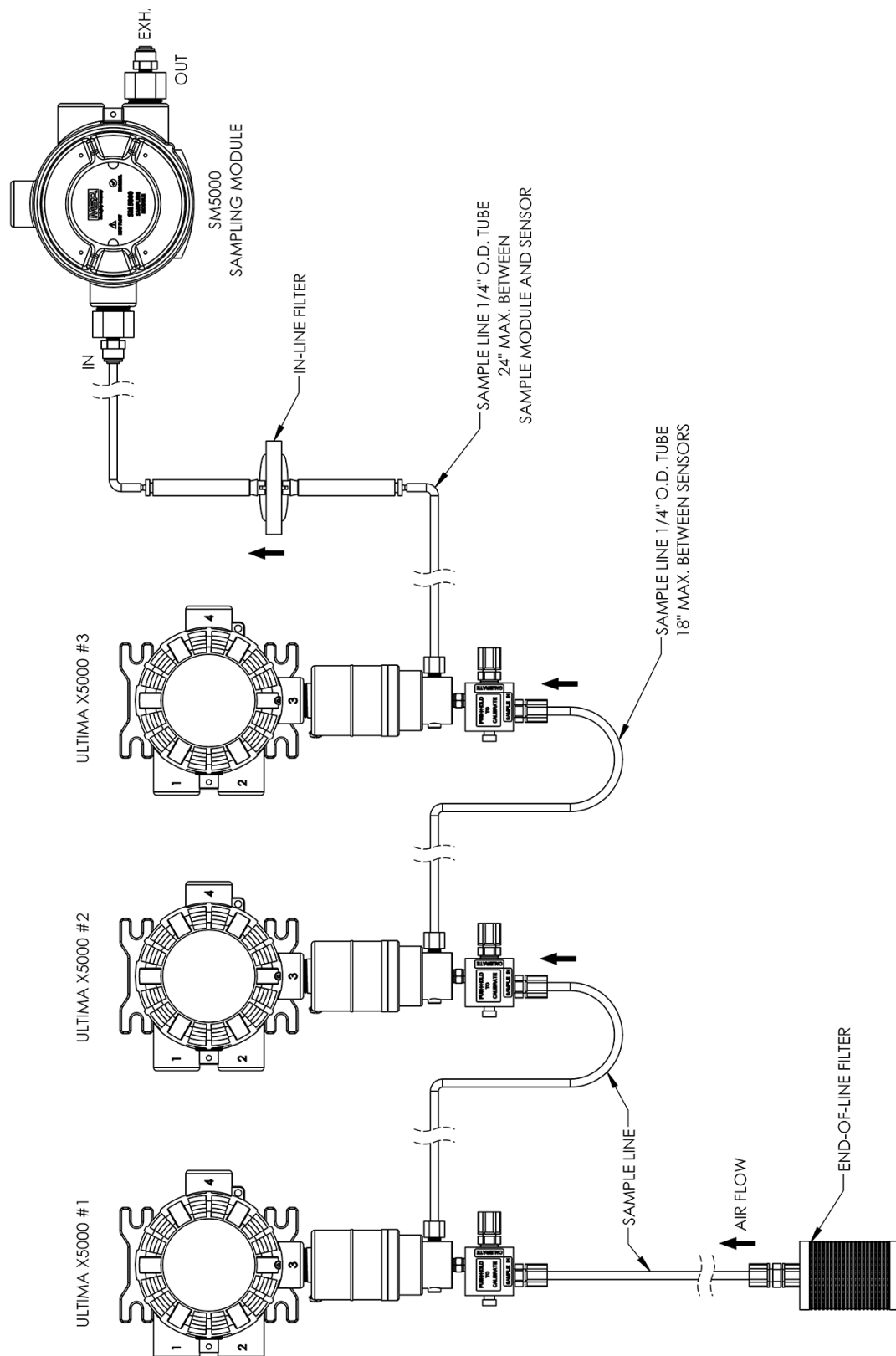


Fig. 4 Three Ultima X5000 Gas Monitors and a Sampling Module

2.4 Sample Line Placement

The Pump Sampling Module draws a gas sample to the internally mounted Ultima X, Ultima X5000, or S5000 Gas Monitor sensor.

- The Pump Sampling Module can be mounted up to 100 feet (30 meters) away from the monitored area.
- It uses 1/4-inch (6.35 mm) OD tubing to connect the Pump Sampling Module sample inlet to the end of the sample line in the monitored area.
- Tubing must be compatible with the sampled gas.
- It takes a maximum of 30 seconds for the sample gas to reach the Pump Sampling Module when 50 feet (15.25 meters) of tubing is used:
 - To decrease this time, shorten the sample line length.
 - It is generally good practice to make the sample line as short as possible.
- Depending on the gas characteristics, the end of the sampling tubing and the sample inlet should be mounted to best optimize sampling of that particular gas. Consult your architect, facility manager or safety engineer for guidance in proper placement of the sampling tube inlet.
- Testing for ventilation patterns is useful in establishing sample inlet location. Smoke tubes (P/N 458481) are useful in measuring the direction and rate of air flow to determine which areas to monitor.
- The particulate filter provided should be used at the sample end of the sample line to help prevent dirt and dust from clogging the sample line. This filter must be compatible with the gas being sampled.
- Alternative end of line filters are available if sampling from wet areas. If sampling from a hot and moist area, use in line filter PN 637921. If sampling from an outdoor area where the sample line end is at risk for submerging under water, use in line filter PN 10015787. Both filters are purchased separately.
- If installing in an area that is hosed-down or sanitized, use the water deflector accessory PN 10087383 for end of line sample, available for purchase separately.
- It is recommended that a stainless steel or Teflon (Trademark of the DuPont Company) sample line be used for monitoring gases that are highly reactive such as:
 - Nitrogen dioxide
 - Sulfur dioxide
 - Chlorine
 - Chlorine dioxide
 - Hydrogen chloride
 - Ammonia
 - Fluorine
 - Bromine.
- With the above gases, use filter (P/N 637921). The filter and sample line should be inspected periodically and replaced if dirty.



CAUTION!

Do not attempt to clean the sample line by applying compressed air.

All gas monitors must be mounted in ambient, interference-free air; otherwise, erroneous readings may result.

- (1) Remove all protective packaging plugs and/or caps from the Pump Sampling Module:
 - gas inlet
 - exhaust ports.
- (2) Attach a 1/4-inch (6.35 mm) OD sample tubing to the flow block sample inlet fitting on the gas monitor (see Fig. 1). Ensure tubing is compatible with the sampled gas.
- (3) Route the sample tubing to the area to be monitored.

NOTE: Do not run the sample tubing in water or across areas of vibration, doorways, man ways or access ways; otherwise, a sample tubing leak or tripping hazard may result.
- (4) Using suitable hardware (not supplied):
 - a) fasten the sample tubing to supports.
 - b) fasten the end of the sample tubing and sample inlet in the monitoring area.

NOTE: The sample inlet should be pointed downward to prevent dirt and water from entering the sample tubing line.
- (5) Install the provided end-of-line filter at the end of the sample tubing, if applicable.
- (6) Check for leaks along the entire length of the sample tubing line. Any leak will dilute the gas sample from the area of interest and give a lower than actual gas reading.
- (7) The in-line filter will trap water and block the flow.

2.5 Exhaust Line Placement

- (1) Attach a 1/4-inch (6.35 mm) OD sample tubing to the exhaust outlet fitting on the Pump Sampling Module unit.
- (2) Route the exhaust tubing into a safe area where the gas sample can be vented. Avoid any sharp bends or elbows. Route the tubing to allow any collected water to drain.

NOTE: The maximum exhaust tubing length is 20 feet (6 meters).

NOTE: Do not run the exhaust tubing in water or across areas of vibration or across doorways, man ways or access ways; otherwise, a leak in the exhaust tubing or a tripping hazard may result.
- (3) Fasten the exhaust tubing to supports using suitable hardware (not supplied).
- (4) Fasten the end of the exhaust tubing in the area of interest by using suitable hardware (not supplied).

NOTE: Exhaust inlet should be pointed downward to prevent dirt and water from entering the exhaust tubing line.
- (5) Check for leaks along entire length of the exhaust tubing line.

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2.6 Electrical Connection

A flow detector within the Pump Sampling Module activates a relay when sufficient flow exists for proper gas detection. Generally, the Ultima X5000 transmitter analog output signal can be routed through the sampling module relay. When the flow is insufficient, the relay opens and the (AO) analog output signal is interrupted. Equipment monitoring the AO can be configured to sound an alarm when the signal is interrupted. See Fig. 5, Fig. 6 and Fig. 7 for a typical wiring schematic of the Sampling Module and Ultima X5000 Gas Monitor.

Other devices that alert when the flow loss relay activates can be connected to relay contact with the Pump Sampling Module.

NOTE: The Pump Sampling Module utilizes a shielded four-conductor wiring harness. It is recommended to use the shielded wire harness if installing the system where portable two-way radio, welding or large machinery are located.

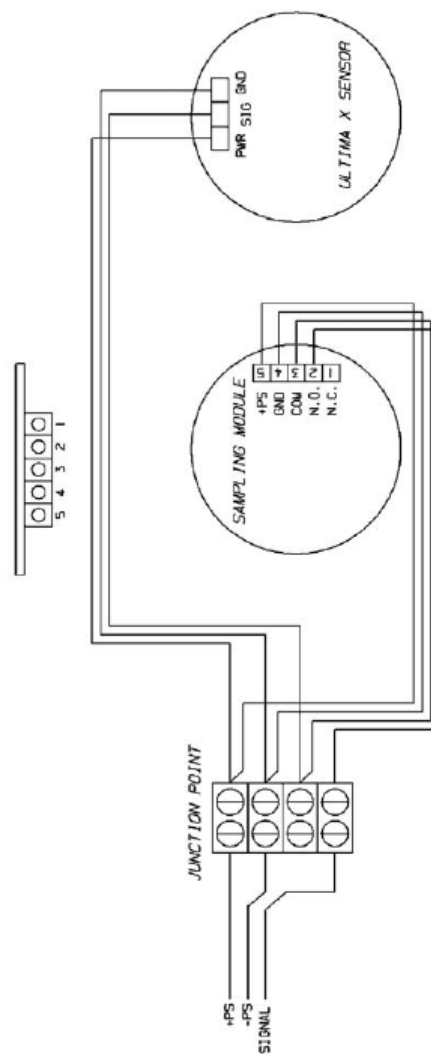


Fig. 5 Typical wiring - Ultima X

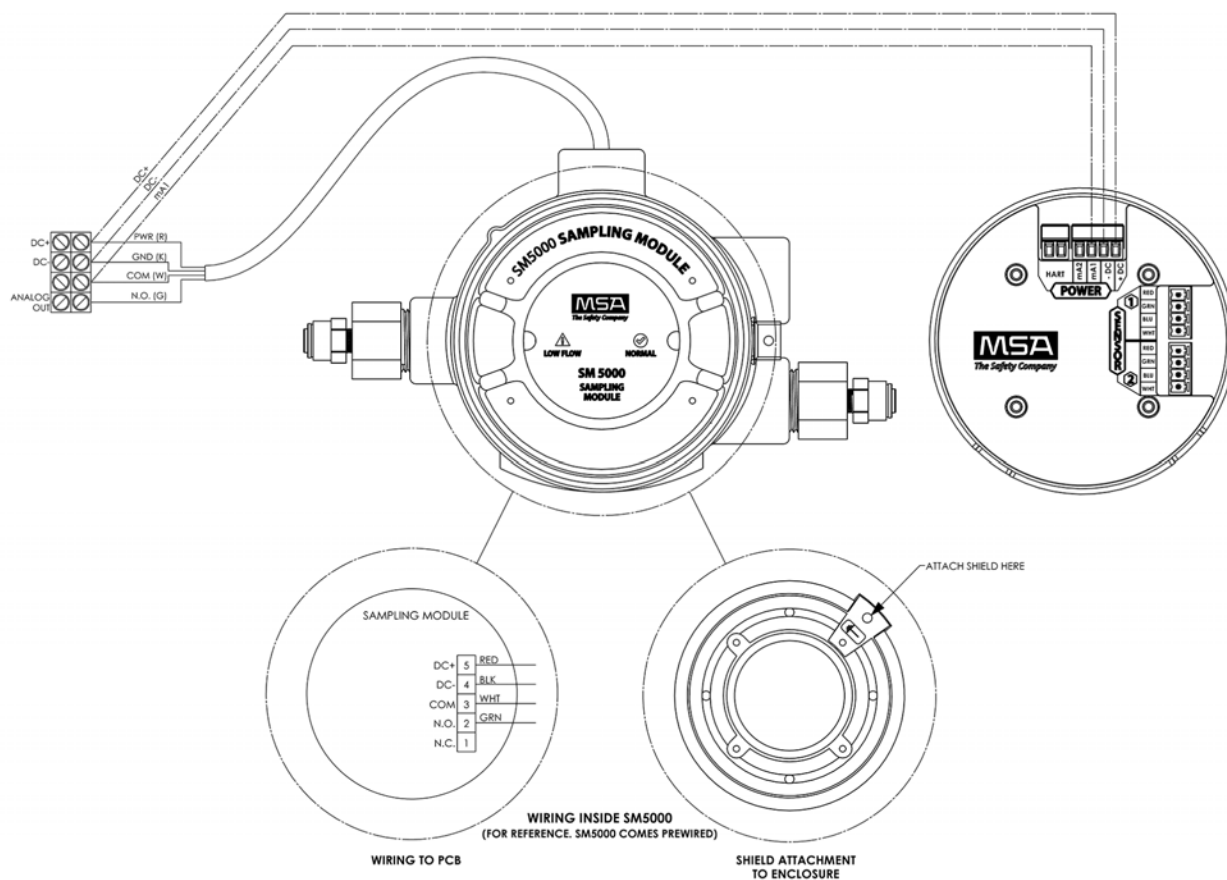


Fig. 6 Typical wiring - SM5000 and X5000

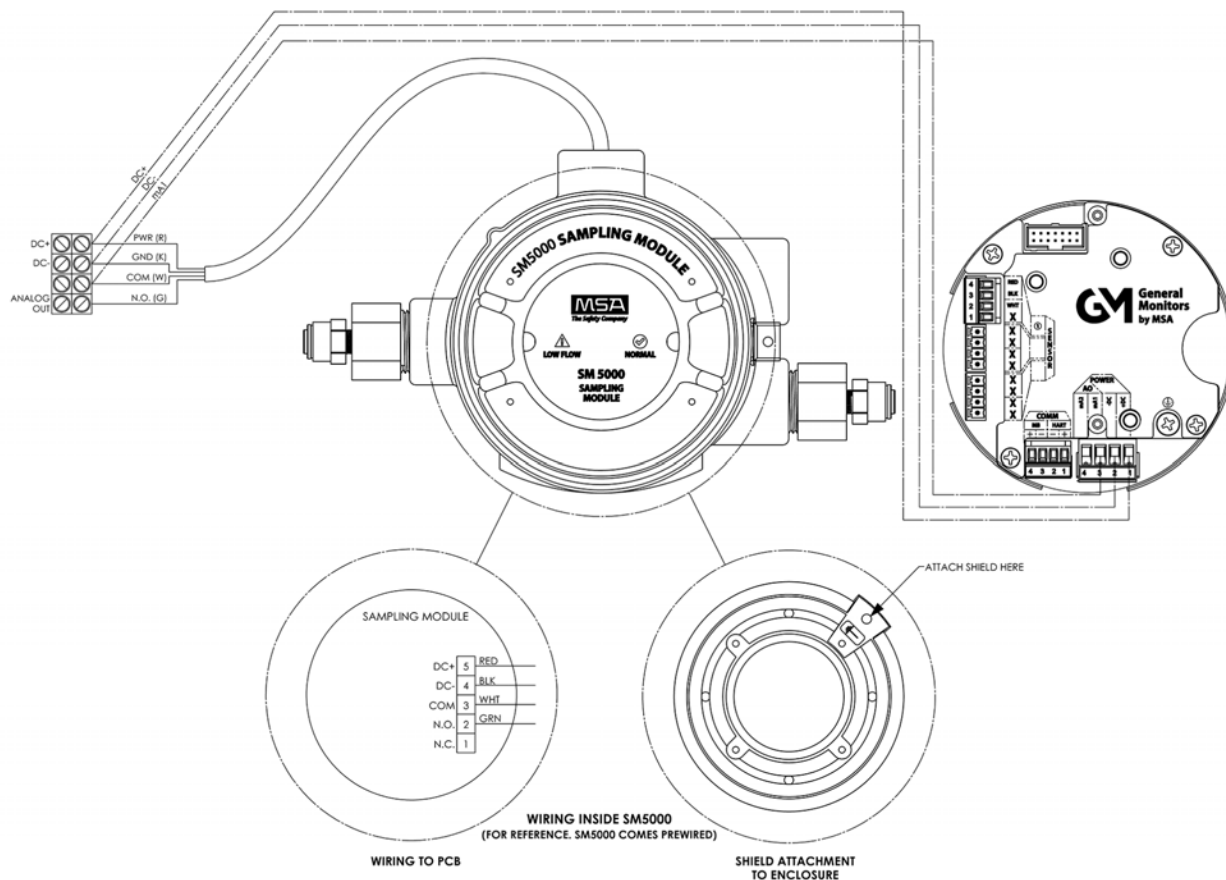


Fig. 7 Typical wiring - SM5000 and S5000

2.6.1 Electrical Connection Procedure

- (1) Turn power OFF from the receiving instrument or power supply for the system.



WARNING!

Failure to remove power from instrument may damage the Pump Sampling Module and/or Ultima X5000 Gas Monitor during wiring.

- (2) If connecting the field wires to the wiring harness, observe the identity of the conductors within the wiring harness. Connect field wires to the appropriate harness conductors.
- (3) If not using the attached wiring harness:
 - a) Remove the top cover of the Pump Sampling Module by rotating the cover counter-clockwise.
 - b) Unscrew and remove the two top-cover screws.
 - c) Lift top cover to expose the wiring terminal strip on the bottom side of the cover.
 - d) Loosen terminal strip screws and remove the wiring harness.

If not using the attached wire harness:

- Remove and discard the wiring harness.
- Install a conduit seal into the enclosure.
- Use of Teflon tape or non-hardening thread sealant for environmental reasons is acceptable.

- e) Route a cable (not supplied) through the electrical entry of the Pump Sampling Module.
- f) Connect the conductors to the wiring terminal strip noting the identity of the wires (see Fig. 4 and Tab. 4).
- g) Replace the top cover and tighten with the two screws.
- h) Replace lid and tighten in place.

WARNING!

Do not allow lid to remain off of the explosion-proof Pump Sampling Module. Flammable or combustible gas in the atmosphere may ignite a spark; that, in turn, may cause an explosion and result in injury or death.

- (4) Wire the other end of the wiring cable to your read-out instrument and power supply, ensuring the cable from the Pump Sampling Module is wired to the proper connections on the instrument. Consult the instrument instruction manual for more wiring details.

Position	Description
1	Normally closed contact of the flow loss relay
2	Normally open contact of the flow loss relay
3	Common position of the flow loss relay
4	Ground or negative of the power supply
5	Positive or supply position of the power supply

Tab. 4 Wiring identification

2.7 Initial Start-Up

Before starting up the Pump Sampling Module:

- (1) Check wiring connections (see Fig. 5 and Tab. 4).
- (2) Ensure that power supplied to the controlling instrument is the proper voltage with sufficient current capacity to operate the instrument. Refer to the gas monitor instruction manual for proper power set-up.
- (3) Apply power to the instrument through a remote circuit breaker.

CAUTION!

If relays in the controlling instrument are wired to external devices (e.g. horns, exhaust fans, and fire suppression systems), these devices may activate while adjustments are performed during the following procedures. Consult equipment instruction manual for further details. All instruments must be returned to normal operation when Pump Sampling Module and gas monitor adjustments are completed.

- (4) Ensure the exhaust is not restricted.
- (5) The front panel low flow indication, red LED, should NOT be ON.

NOTE: If front panel low flow indication is ON, see chapter 4.3 "Troubleshooting Guidelines".

3 Calibration and Operation

3.1 Introduction

Calibration of the sensor when used with the Pump Sampling Module should follow the operating instructions for the gas monitor used.

If this calibration procedure cannot be performed at any step, consult chapter 4.3 "Troubleshooting Guidelines", localize the problem and replace the inoperative component.

MSA offers periodic service that is available on a contract basis; for more information, please call MSA at 1-800-MSA-INST.

3.2 Calibration Procedures

Place the instrument receiving the signal from the gas monitor into calibration mode, if applicable.



WARNING!

It is necessary to put the receiving instrument in calibration mode. If the instrument is not in calibration mode, any alarm relays may energize and activate any safety devices which are connected to the alarm relays of the instrument.

Equipment needed:

- Ultima X (calibration kit #42)
X5000/S5000 (CALKIT2)
- Appropriate zero and span gas cylinders (see gas monitor instruction manual).
- If using an Ultima X, Controller (P/N 809086) or an Ultima X Calibrator (P/N 809997).

NOTE: If unsure of which span gas to use or of the span gas value, consult your safety engineer or officer or facility manager.

- (1) Locate the zero gas cylinder and the appropriate regulator and tubing. Screw the regulator into the cylinder and connect the tubing to the regulator outlet. Ensure that tubing is compatible with the gas within the cylinder.
- (2) Before initiating the calibration procedures on the gas monitor, connect the tubing from the zero gas cylinder to the calibration inlet (see Fig. 1).

3.2.1 Zeroing with the Pump Sampling Module

- (3) Initiate the calibration procedure on the gas monitor (see gas monitor instruction manual).
- (4) When the gas monitor indicates "APPLY ZERO GAS", press and hold the button by the calibration inlet. Turn the knob on the regulator to permit the zero gas to flow. Simultaneously, the gas monitor will make all corrections to the zero signal; there are no adjustments necessary.
- (5) When the gas monitor is done zeroing, close the cylinder valve, release the button by the calibration inlet, and quickly rotate the zero gas cylinder to remove the zero gas cylinder. Do not remove the tubing from the flow controller.
- (6) Locate and screw regulator into the cylinder.

NOTE: If unsure of which span gas to use or of the span gas value, consult your safety engineer or officer or facility manager.

3.2.2 Spanning with the Pump Sampling Module

- (7) When calibrating, the span immediately follows the zero (see gas monitor instruction manual).
- (8) When the gas monitor displays "APPLY SPAN GAS", press and hold the button by the calibration inlet. Turn the regulator knob to permit the span gas to flow. The gas monitor will make all corrections to its calibration; there are no adjustments necessary.
- (9) When the gas monitor calibration is complete, release the button by the calibration inlet, close the cylinder valve and remove the span gas cylinder.
- (10) Unscrew the regulator from the gas cylinder and replace all calibration components in the kit.
- (11) Return instrument receiving the signal from the gas monitor to normal run mode operation.

3.3 Operation

There are only two indicators on the front cover of the Pump Sampling Module which affect the operation of the unit.

- The NORMAL indicator, the green LED, shows that there is power to the unit and the flow is greater than .5 LPM.
- The LOW FLOW indicator, the red LED, indicates that the flow detector has insufficient gas flow for proper monitoring. See chapter 4.3 "Troubleshooting Guidelines" for corrective action.



WARNING!

The pressure switch can fail and the orifice can clog if water enters the system. Always use the proper in-line filter (P/N 10051406).

4 Maintenance and Troubleshooting Guidelines

4.1 Maintenance

The Pump Sampling Module requires minimal maintenance. However, the filters need routine inspection and possible replacement. It is good practice to have on hand replacement filters to minimize any down time of your unit (see Tab. 6).

4.2 Filter Maintenance

Filter maintenance consists of visual inspection of the two filters, end-of-line filter and in-line filter. When new, filters are white or slightly yellowed; when loaded with dust or dirt, they normally turn dark in color. Visually inspect the two filters periodically. The frequency of this inspection depends on the environment; if your environment is extremely dirty or dusty, this inspection should be done often. The in-line filter is hydrophobic and will not pass liquids.

End-of-line filters must be located so that they are not exposed to liquids or steam. If liquids become entrapped within a filter, replace the filter as it will interfere with proper operation of the unit.

4.3 Troubleshooting Guidelines

Symptom	Possible cause	Probable solution
Low flow indicator is ON	Sample line clogged	Check and replace or clean sample line
	A leak internal to the Pump Sampling Module	Check tubing inside the Pump Sampling Module, especially the fittings
	Inoperative flow switch	Replace flow switch
	The sample line is under a vacuum	Remove vacuum from sample line inlet
	Dirty end-of-line or in-line filter	Replace dirty end-of-line or in-line filter
	Exhaust clogged	Clean or replace exhaust tubing
No sensor output or low output	Sensor is approaching its end-of-life	Replace sensor
	The ambient is too cold or too hot for the sensor	Place Pump Sampling Module in a warmer or cooler ambient environment
	A leak in the sample line	Check/repair any leaks in the sample line
	Inoperative sensor pre-amp electronics	Replace sensor printed circuit board
	Exhaust clogged or restricted	Unclog or remove the restriction on the exhaust
	Dirty or wet sample filter	Replace sample filter
	Inoperative flow switch	Replace flow switch
	Sensor wiring plug loose	Reconnect sensor wiring plug
	Bad wiring connection between instrument and Pump Sampling Module	Check wiring and replace or repair any inoperative wiring or connections
	No power to the unit	Turn control instrument ON
	Improper voltage selection at the control instrument	Select proper voltage at the control instrument
	Inoperative relay	Replace printed circuit board assembly

Tab. 5 Troubleshooting guidelines

4.4 Replacement Parts

Description	Part no.
PC board assembly (requires new label - listed below)	10052349
Pressure switch	10050076
Pump and drive	815395
Pump bracket	10047561
End-of-line filter (wet)	10015787
Filter, in-line	10051406
Filter, end-of-line, includes cartridge (standard)	637920
Filter, end-of-line (humid or reactive samples)	637921
Filter cartridge for end-of-line filter (general purpose)	95302
Flashback arrestor for explosion-proof models only	813159
Flow cap - digital sensor	10041866
Flow cap - XIR/XIR PLUS sensor	10042600
Valve, push-button	635729
Gasket, flow block, explosion-proof	10051112
Sample line tubing 1/4"	600771
O-ring, Ultima XIR flow block	10042428
4-6" vent pipe mount - digital sensor	10147544
4-6" vent pipe mount - XIR/XIR PLUS sensor	10126895
Water deflector	10087383

Tab. 6 Parts list

NOTE: It is the user's responsibility to follow all applicable regulations and to ensure continued compliance with the certification, as marked on the label.

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