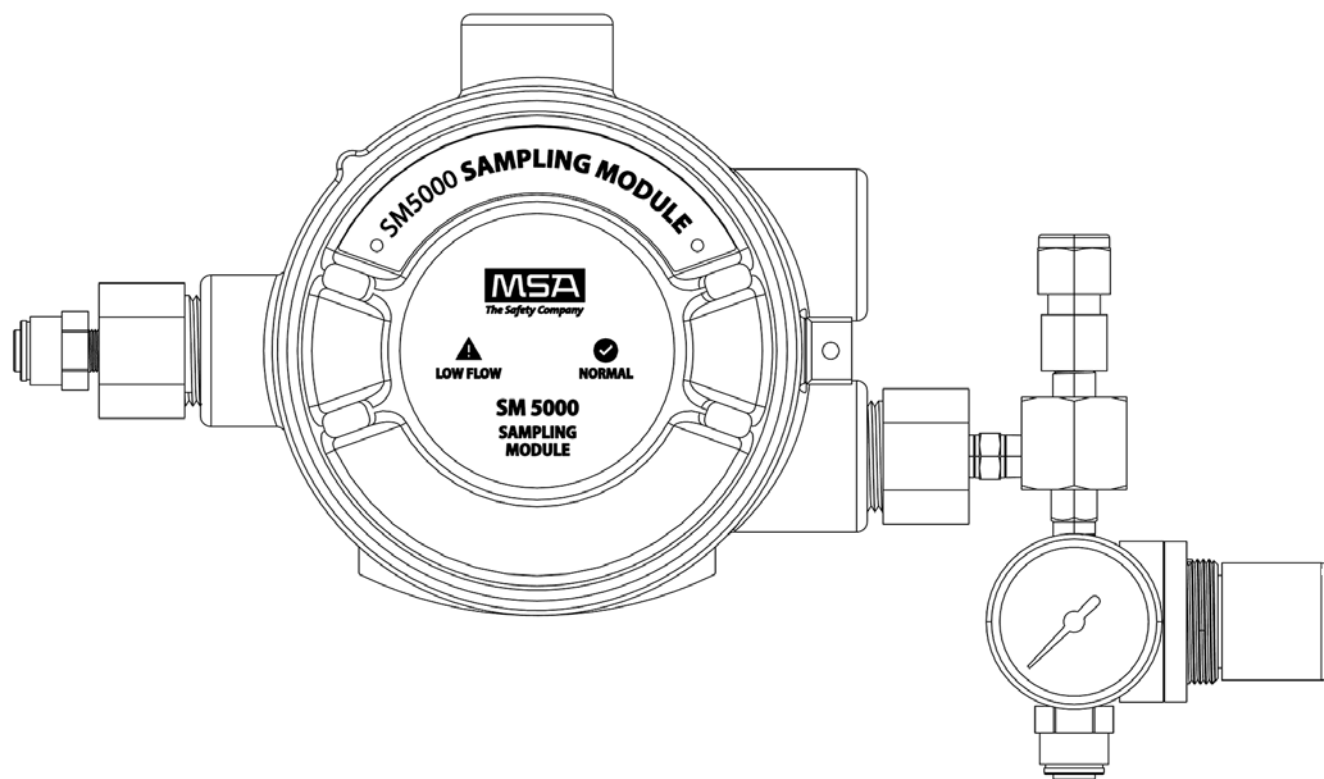




Instruction Manual

SM5000 Sampling Module, DC Aspirated Model



Order No.: 10103803/01
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.MSAafety.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.

General Warnings and Cautions



WARNING!

1. The SM5000 Sampling Module - Aspirated 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. The SM5000 Sampling Module - Aspirated 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 - Aspirated 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 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 - Aspirated Model may be exposed to such materials, calibration should be performed frequently to ensure that channel operation is dependable and display indications are accurate.
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.

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 - Aspirated Model:

- must be used with an Ultima X, Ultima X5000 or an S5000 Gas Monitor (available separately).
NOTE: Does not work with S5000 passive catalytic bead or metal oxide semiconductor (MOS) sensors.
- draws a gas sample from the monitored area, through a sample line (available separately) to the Gas Monitor 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
 - printing drying ovens
 - blanking or inerting operations
- comes equipped with:
 - necessary flow components (excluding gas sample line) to properly deliver gas samples to the Gas Monitor.

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

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

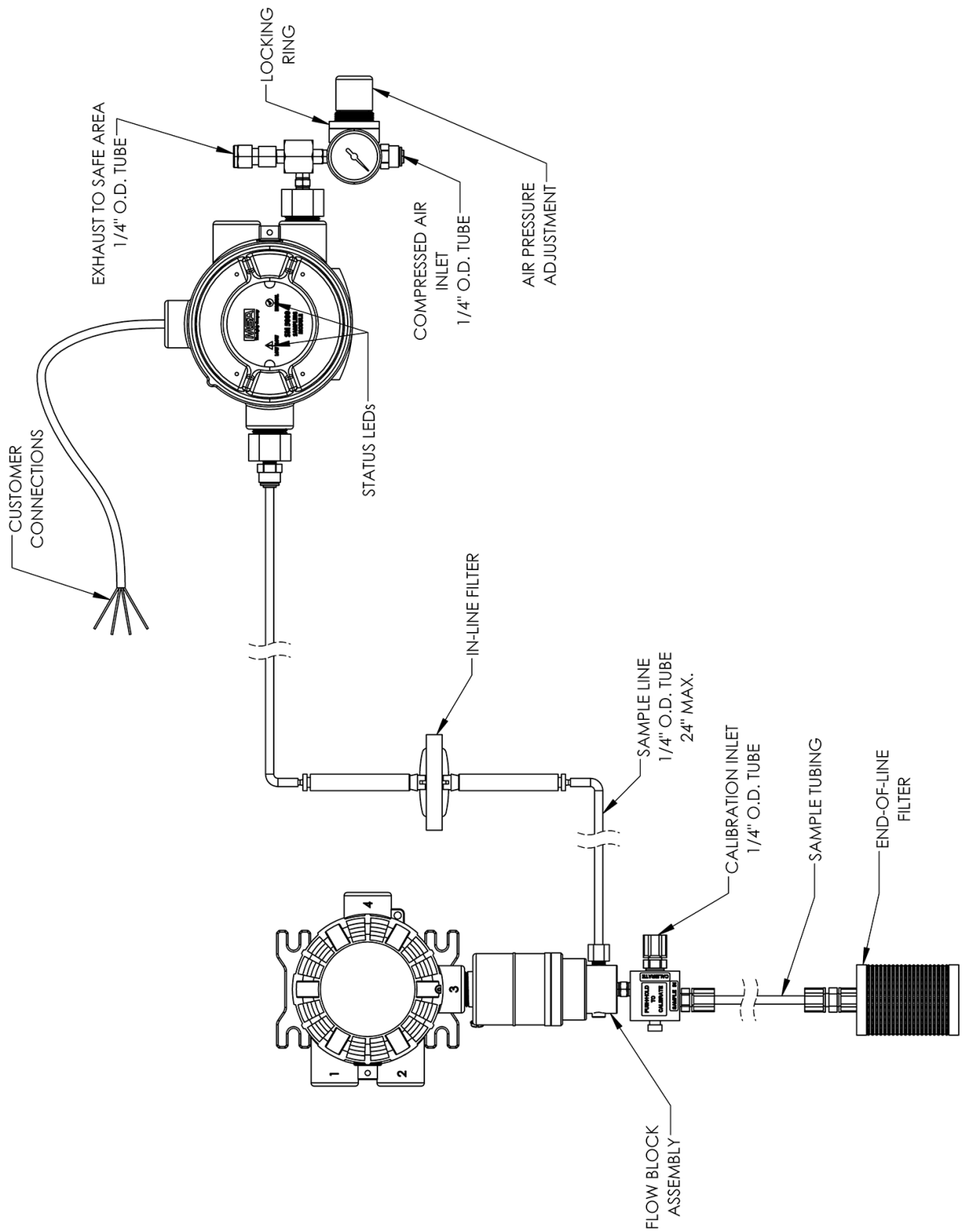


Fig. 1 Sampling module installation



1.1.2 Unpacking Unit

Carefully unpack your Aspirated Sampling Module (and Ultima X, Ultima X5000 or S5000 Gas Monitor, if also newly purchased) 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 Aspirated Sampling Module package contains:

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

1.1.3 Unit Identification

There is one possible Aspirated Sampling Module configuration:

- Explosion-proof (P/N 10058101) unit

Reference the identification label located on the side of the unit (see Fig. 2). See Tab. 1 for unit specifications.

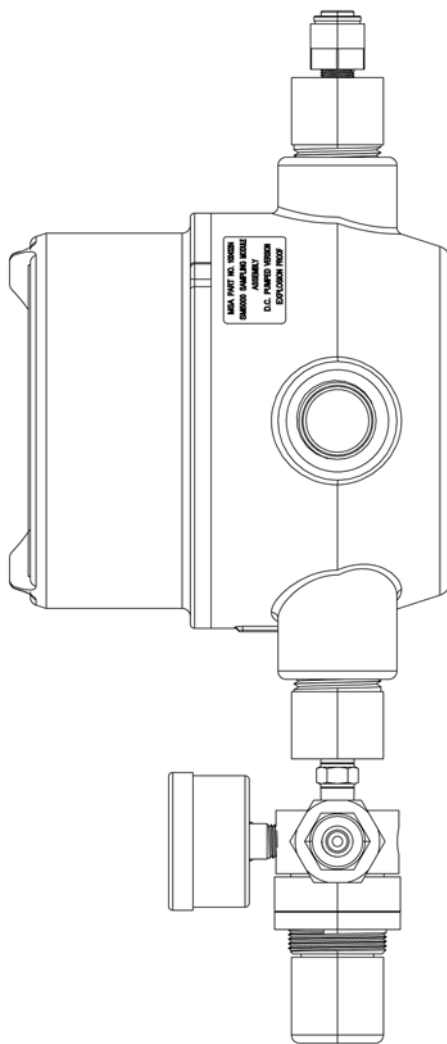


Fig. 2 Identification label

Aspirator air requirements	Instrument grade air
Maximum aspirator pressure	30 PSIG (206 kPa)
Minimum aspirator air consumption	.6 CFM at 20 PSIG (137 kPa)
Maximum aspirator air consumption	9 CFM at 30 PSIG (206 kPa)
Maximum power consumption	1.8 watts at 9 to 30 VDC
Cable requirements for all gases	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
Trouble relay rating	0.6 Amps at 125 VAC
	0.6 Amps at 110 VDC
	2 Amps at 30 VDC

Tab. 1 Performance specifications for SM5000 Sampling Module - Aspirated Model

1.1.4 Terminology

Electro-chemical 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	Full scale or up-scale reading on the meter display.
Span gas value	Gas concentration which gives the instrument an up scale or full scale value. 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 Aspirated Sampling Module in the correct area classified in your facility.

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 Aspirated Sampling Module. Refer to Fig. 2 to find the area classification label on your unit. Ensure that the Gas Monitor is rated properly by referring to 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 Aspirated 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 aspirated 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 Aspirated Sampling Module Unit (All Models)

- (1) Locate the Aspirated 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: Use of Teflon tape or non-hardening thread sealant for environmental reasons is acceptable.

NOTE: When installing multiple Gas Monitors, locate all monitors within 18 inches (45 cm) of each other.



CAUTION!

Ensure that Aspirated Sampling Module or the Gas Monitor unit front covers are not blocked or obscured. A blocked front cover 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 Aspirated Sampling Module and Gas Monitor to a wall:
 - From the electrical conduit or
 - By using optional mounting strap (P/N 10047561) and the four holes in the rear of the units.
- (3) Mount Gas Monitor sensor inlet facing downward.
- (4) Mount Aspirated 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 sensor inlet fitting pointed downward; otherwise, the unit may become inoperative.

2.3 Sample Line Placement between Aspirated Sampling Module and Gas Monitor

- (1) Remove all protective packaging plugs and/or caps from Aspirated 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 Monitor: Remove the Gas Monitor(s) red plastic sensor cap and any gaskets remaining on the sensor. Do not remove the sensor element.
- (3) Locate the Aspirated Sampling Module flow block. Install the flow block(s) on the Gas Monitor(s) where the red plastic sensor cap was removed in the previous step (see Fig. 1 and Fig. 3).

NOTE: Additional flow blocks are available for additional Gas Monitors.

NOTE: See Tab. 3 for a description and part number for additional flow blocks.

**WARNING!**

Install the proper flow block with the correct area classification for your additional Gas Monitors. Incorrect flow blocks will not enable the Gas Monitor to properly monitor gas. Incorrect area classification will present an ignition source, which may cause an explosion resulting in injury or death.

- (4) Attach the supplied tubing to the Aspirated 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.

Item	Part no.
Ultima X, Ultima X5000 and S5000 Digital Sensor Flow Cap	10041866
Ultima XIR/XIR Plus Flow Block	10042600

Tab. 3 Parts list

**CAUTION!**

The in-line filter must be used before the aspirated pump to prevent water entry from damaging unit.

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 Aspirated Sampling Module.

If installing additional Gas Monitors, install tubing between units as shown in Fig. 3.

Use tubing compatible with the gas being sampled.

MSA tubing is available (P/N 600771).

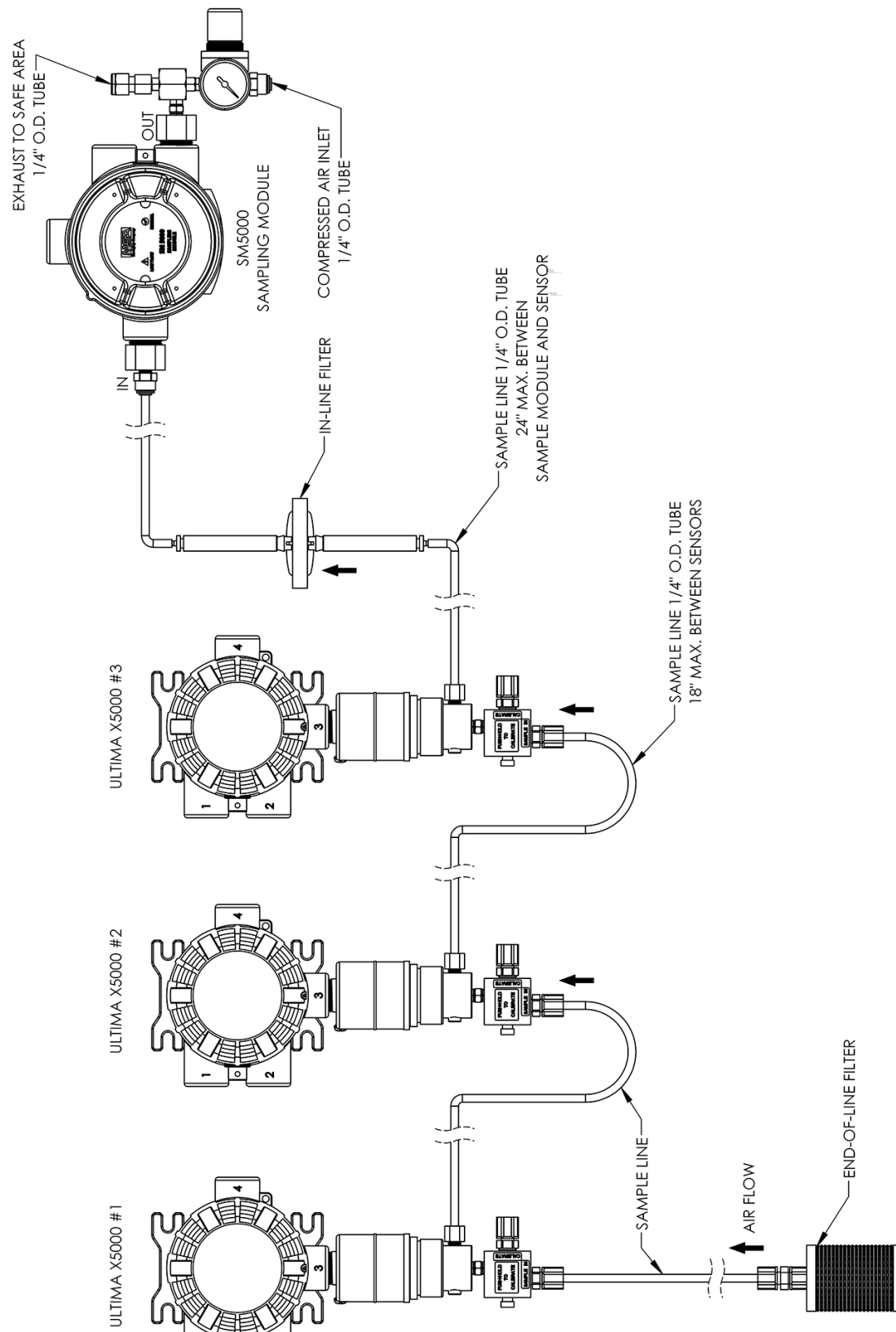


Fig. 3 Three Ultima X5000 Gas Monitors and a Sampling Module

2.4 Sample Line Placement

The Aspirated Sampling Module draws a gas sample to the internally mounted Gas Monitor sensor.

- The Aspirated Sampling Module can be mounted up to 100 feet (30 meters) away from the monitored area.
- It uses 3/8-inch OD tubing to connect the Aspirated 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 Aspirated 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.
- 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.
- Use an end-of-line filter (P/N 637921) with the above gases. The filter and sample line should be inspected periodically and replaced if dirty.



CAUTION!

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

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

- (1) Remove all protective packaging plugs and/or caps from the Aspirated 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.

Installation

- (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.

2.5 Exhaust Line Placement

- (1) Attach a 1/4-inch (6.35 mm) OD sample tubing to the exhaust outlet fitting on the Aspirated 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.

NOTE: Exhaust to a safe or non-hazardous area only.
- (5) Check for leaks along entire length of the exhaust tubing line.

2.6 Aspirator Connection

Connect the Aspirated Sampling Module to compressed air via the 1/4" OD tube fitting at the top of the unit. The compressed air must be instrument-grade quality. Maximum inlet air pressure must not exceed 25 psig (172 kPa).



WARNING!

Connecting the Aspirated Sampling Module to an inferior quality or an over-pressure air supply can cause incorrect gas readings or damage to the Aspirated Sampling Module.

2.7 Electrical Connection

A flow detector within the Aspirated Sampling Module activates a relay when sufficient flow exists for proper gas detection. Generally, the Gas Monitor output signal is routed through this relay. When the flow is insufficient, the relay opens and the gas signal is interrupted. Equipment monitoring this signal can be configured to sound an alarm when signal is interrupted. See Fig. 4, Fig. 5 and Fig. 6 for a typical wiring schematic of the Aspirated Sampling Module and Gas Monitor.

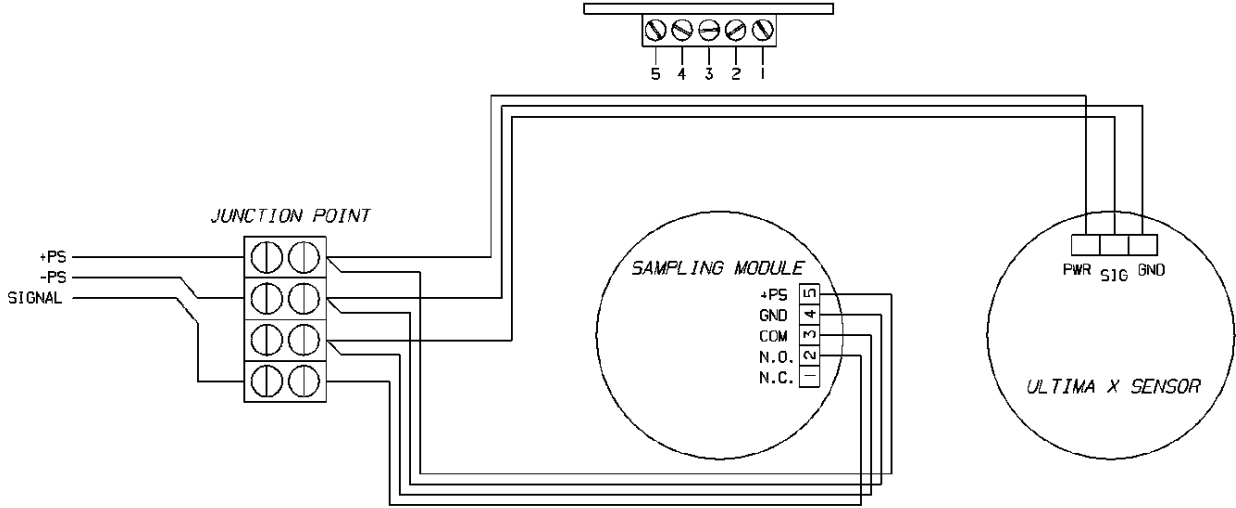


Fig. 4 Typical wiring - Ultima X

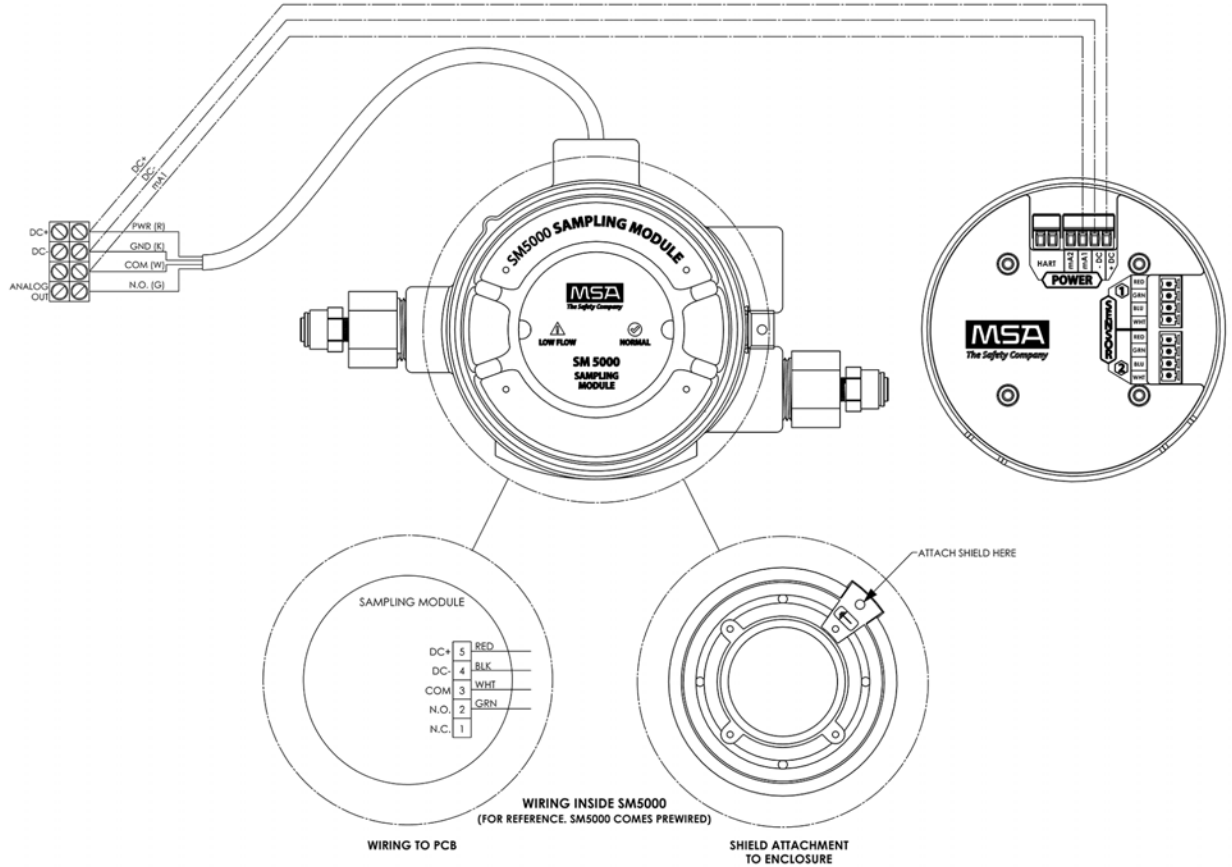


Fig. 5 Typical wiring - SM5000 and X5000

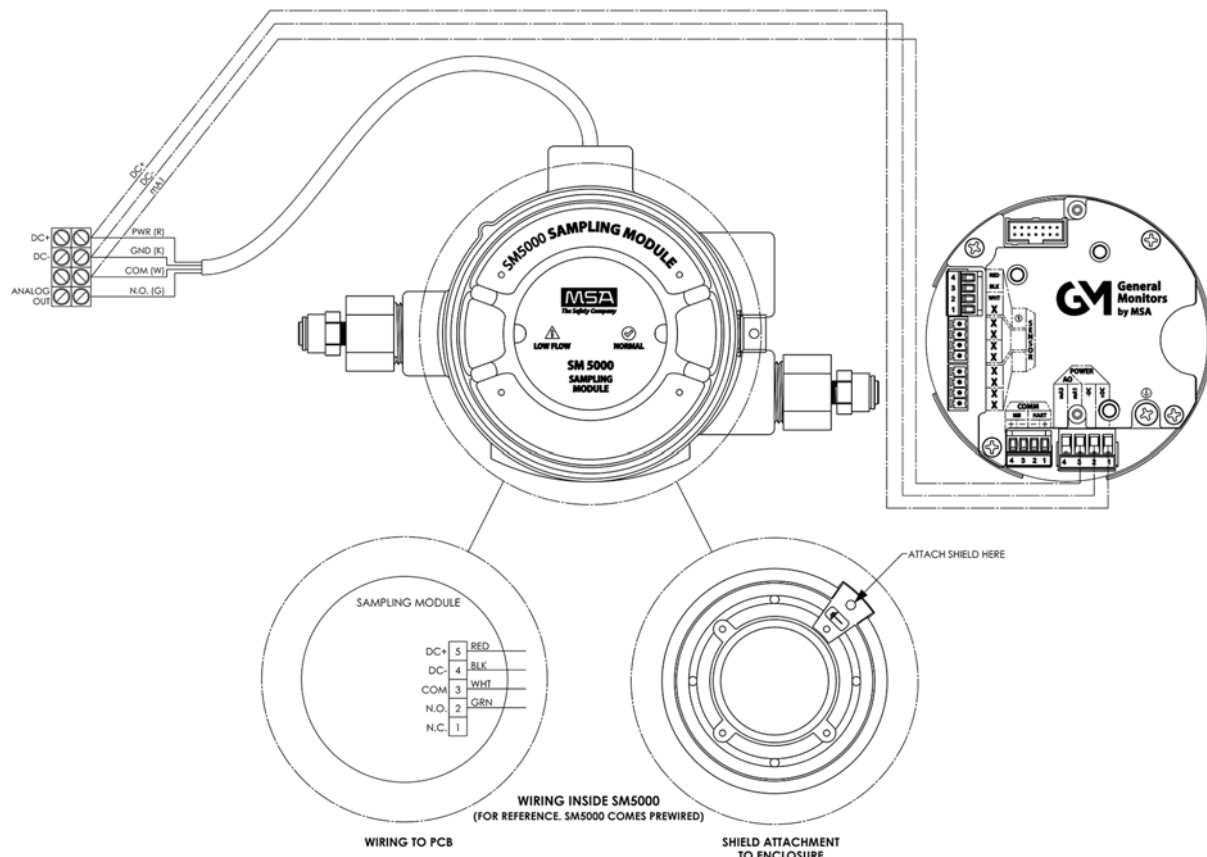


Fig. 6 Typical wiring - SM5000 and S5000

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

NOTE: The Aspirated Sampling Module requires a four-conductor wire. Use shielded wire if installing the system where portable two-way radio, welding or large machinery are located. The shield of any wire must not be grounded at the Aspirated Sampling Module or the Gas Monitor. The shield must be grounded at one point only, usually at the controlling instrument.

2.7.1 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 Aspirated Sampling Module and/or the 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.
If unit is an explosion-proof model:
 - a) Remove and discard the cable grip threaded into the enclosure.
 - b) Follow national electrical and local procedural codes.
- (3) If not using the attached wiring harness:
 - a) Remove the top cover of the Aspirated Sampling Module by rotating the cover counter-clockwise.

**WARNING!**

Ensure that no flammable or combustible gas exists in the atmosphere by checking with a portable instrument capable of detecting combustible gases; otherwise, a spark may generate and cause an explosion, which may result in injury or death.

Do not allow the lid to remain off of the explosion-proof Aspirated 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.

- 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 wiring harness.

If unit is an explosion-proof model:

- Remove and discard the wiring harness and cable grip threaded into the enclosure.
- Install a conduit seal into the enclosure.

- e) Route a cable (not supplied) through the electrical entry of the Aspirated Sampling Module.
- f) Connect the conductors to the wiring terminal strip noting the identity of the wires (see Fig. 3 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 Aspirated 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 Aspirated 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

2.8 Initial Start-Up

Before starting up the Aspirated Sampling Module:

- (1) Check wiring connections (see Fig. 3 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 instrument 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 Aspirated Sampling Module and Gas Monitor adjustments are completed.

- (4) Before applying compressed air to the Aspirated Sampling Module compressed air inlet:
 - a) Adjust the internal pressure regulator for 0 psig by pulling out the red locking ring on the regulator and adjusting the knob fully counter-clockwise (see Fig. 1).
 - b) Ensure the exhaust is not restricted.
- (5) Apply the compressed air to the compressed air inlet of the Aspirated Sampling Module at 20 to 25 psig (137 to 172 kPa).
- (6) Pull out the red locking ring and adjust the knob on the air regulator to obtain a reading of 10 psig (90 kPa).
- (7) Notice the low flow indication on the front panel:
 - a) If low flow indication is **not** ON, push in the air regulator red locking ring to lock the regulator at this pressure.
 - b) If the low flow indication is **still** ON, increase air pressure by turning the knob until the indication turns OFF [do not exceed 15 psig (100 kPa)]. When indication turns OFF, push in the red locking ring of the air regulator.
 - c) If the low flow indication is **still** ON at 15 psig (100 kPa), reduce the pressure below 10 psig (90 kPa) until the low flow indication turns OFF.

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3 Calibration and Operation

3.1 Introduction

Aspirated Sampling Module calibration uses the Ultima X, Ultima X5000 or S5000 Gas Monitor calibration procedure. Refer to the Gas Monitor instruction manual and follow the procedure below:

Perform the calibration procedure regularly and maintain a log of calibration adjustments. Increase the frequency of calibration when any calibration shows as much as 10% difference from the test gas concentration. More frequent calibrations may be required when the Aspirated Sampling Module is new or when the sensor is approaching its end of life. Also, perform the calibration procedure when installing or changing the power source, sensor, or control instrumentation.

The necessary frequency of calibration depends on the operating time and chemical exposures of the sensors. Newly installed units or new sensors should be calibrated more often until the calibration records prove sensor stability. The calibration frequency can then be reduced to the schedule set by the safety officer or facility manager.

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 the System with the Aspirated Sampling Module

- (3) Initiate the calibration procedure on the Gas Monitor (see Gas Monitor instruction manual).
- (4) When the Gas Monitor displays "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. 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 the span gas cylinder and screw the 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 Aspirated Sampling Module

- (7) When calibrating, the span immediately follows the zero (see Calibrator or Controller 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 the span signal; 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 the normal run mode operation.

3.3 Operation

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

- The normal (green LED) indicator, shows that there is sufficient sample flow (greater than .5 LPM).
- The low flow (red LED) indicator, when ON, indicates that the flow detector has found 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 Aspirated 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. 8).

4.2 Filter Maintenance

Filter maintenance consists of visual inspection of the two filters, end-of-line filter and the in-line filter which blocks water from entering the pump module. When new, filters are white; 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 the environment is extremely dirty or dusty, this inspection should be done often.

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 Aspirated Sampling Module	Check tubing inside the Aspirated Sampling Module, especially the fittings
	Inoperative flow switch	Replace flow switch (preset at factory)
	No or low air pressure to the aspirator	Supply compressed air to the air inlet of the Aspirated Sampling Module
	Air pressure regulator set too low	Re-adjust air pressure regulator
	The sample line is under a vacuum	Remove vacuum from sample line inlet
	Dirty/clogged aspirator	Clean or replace aspirator
	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 the Aspirated Sampling Module in warmer or cooler ambient environment
	A leak in the sample line	Check and repair any leaks in the sample line
	Inoperative sensor electronics	Replace sensor printed circuit board
	Exhaust clogged or restricted	Unclog or remove the restriction on the exhaust
	Dirty sample filter	Replace dirty sample filter
	Inoperative flow sensor	Replace inoperative flow sensor
	Sensor wiring plug loose	Reconnect sensor wiring plug
	Bad wiring connection between instrument and Aspirated 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. 7 Troubleshooting guidelines

4.4 Replacement Parts

Description	Part no.
PC board assembly (requires new label)	10052349
Filter, in-line	10051406
Filter, end-of-line, includes cartridge (high humidity)	637920
Filter, end-of-line (reactive gases)	637921
Filter cartridge for end-of-line filter (general purpose)	95302
Flashback arrestor for explosion-proof models only	813159
Gauge, pressure	638395
Regulator	636411
Pump, vacuum	631716
Valve, push-button	635729
Gasket, flow block, explosion-proof	10051112
Sample line tubing	600771
Pressure switch	10050076
O-ring, Ultima XIR flow block	10042428

Tab. 8 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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