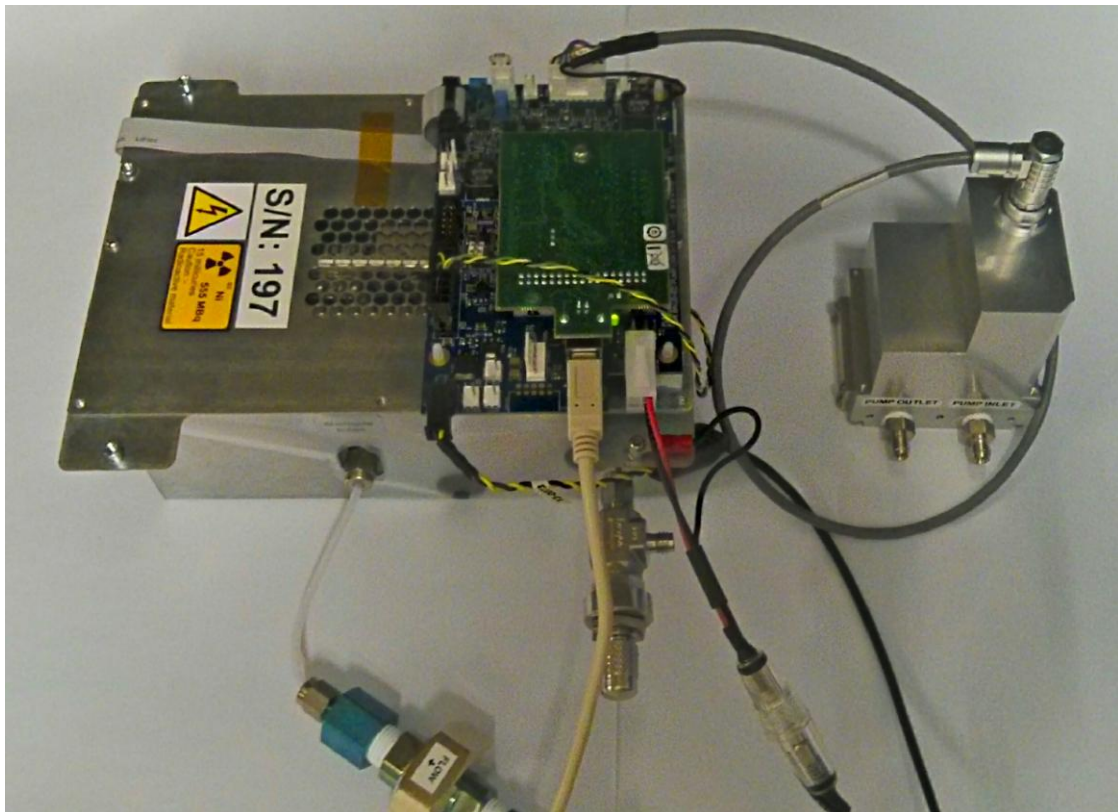




FAIMS CORE OEM Development Platform: Supplemental Manual

Issue/Version	Date	Author	Details
AAA	30/7/2010	Alastair Taylor	First Release
001	18/4/2013	Andrew Pauza	Renamed doc for consistency. Aligned with Lonestar Safety Notice documentation. Updated address and contact info. Reformatted, and improved nomenclature for clarity. Inline-> Inlet, FAIMS Core -> FAIMS PAD Development Kit. Into Change Control.
002	28/11/2014	Andrew Pauza	Update for Rev3.0 (Interface & Power Supply PCB Rev6, Sensor Head Rev 9). Rename PAD to CORE where appropriate. Rename "Kit" to "Platform"



The FAIMS (Field Asymmetric Ion Mobility Spectrometry) CORE Development Kit is an engineering prototype produced to meet the developmental needs of OEM suppliers. The unit is based around the FAIMS functional block used in the Lonestar® system. The majority of the ancillary functional blocks present in the Lonestar® have been removed to leave this CORE part.

About this Manual

This supplemental manual contains all the information needed to set up to run the FAIMS CORE OEM Development Platform. Additional information can be found in various Lonestar® manuals, although not all aspects will be relevant to this unit.



It is essential that this user manual be read and understood before commencing any work with the system. Read and understand the various precautionary notes, signs, and symbols contained inside this manual pertaining to the safe use and operation of this product before using the device. Using the FAIMS CORE OEM Development Platform in a way that is not specified in this manual could be harmful to health of the operator and co-workers.

This symbol is used to highlight a section explaining particularly important safety considerations

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Notices

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Proper Use of Owlstone Instruments

The supplied system is in compliance with international regulations. If this system is used in a manner not specified by Owlstone Ltd, the protection provided by the system could be impaired

Contacting Owlstone

Visit the Owlstone® website (www.owlstonenanotech.com) for up-to-date contact details.

For general inquires please email info@owlstonenanotech.com

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Owlstone Support

The Lonestar® User Manual, as well as other information and resources for Owlstone customers, are available at our support website:

<http://owlstone.zendesk.com/home>

For help with any further questions or problems, please contact Owlstone directly on our support address:

support@owlstone.zendesk.com

Warranty

Owlstone Ltd warrants that equipment supplied will perform to the advertised specifications for a period of 12 months. Should any material failure of the product occur within 12 calendar months of delivery Owlstone Ltd will repair or replace the equipment free of charge given our satisfaction that sub-standard performance is genuinely the result of defective material or workmanship and not caused by fair wear and tear.

If required, please contact Owlstone Ltd for further detail regarding exact terms of the warranty.

Returns

Chemical Safety

Owlstone takes chemical safety seriously. Customers are **NOT** permitted to return hardware to Owlstone without prior authorisation. Please consult your Owlstone representative regarding the returns procedure.

Before equipment can be returned, customers are required to fill out a Decontamination Certificate and submit to Owlstone for review. After H&S review, Owlstone will issue a returns number (RMA#).

The Decontamination Certificate, p/n 90-0027, is provided in your document pack (supplied with the Lonestar®) and can also be downloaded from our support website.

Under no circumstances should equipment be returned to Owlstone without an RMA#.

Packaging

Customers are encouraged to retain the original equipment packaging in case a future need arises for equipment return. Owlstone cannot take responsibility for transit damage due to poorly packed equipment.

For further advice regarding correct packaging of Owlstone equipment please contact Owlstone.

Recycling and Disposal



This Product has been designed and manufactured with high quality materials and components, which can be recycled and reused.

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC so should not be disposed of in normal waste. In some locations the radioactive source has additional disposal requirements; please consult Owlstone Ltd for details of our recycling and disposal program for this product.

For users outside the European Union consult local authorities for correct disposal or contact Owlstone Ltd.

Warning Labels



Caution: **The FAIMS CORE OEM Development Platform contains a radioactive source.** Please pay particular attention to sections containing this symbol and refer to the radiation source materials safety data sheet for more details on safe handling

Please consult local regulations about your responsibility in regards to the source. For instance; in England and Wales this will be compliance with "The Radioactive Substance (testing instruments) (England and Wales) Exemption Order 2006" and "The Ionising Radiation Regulations 1999".

For the US the FAIMS CORE OEM Development Platform is manufactured in compliance with U.S. NRC safety criteria in 10 CFR 32.27 so the purchaser is exempt from any regulatory requirements.

For transport purposes the FAIMS CORE OEM Development Platform complies to UN2911 standards for radioactive sources, and is provided with an identification certificate.



High humidity and acidic conditions can potentially damage the Nickel 63 source. If used in this manner, or if these conditions could potentially occur, please consult an Owlstone service engineer about the use of a secondary external downstream filter to prevent spread of contaminated material



No person shall intentionally or recklessly misuse or without reasonable excuse interfere with the radioactive substance contained within the FAIMS CORE Development Kit. The source is enclosed in a non-user serviceable housing with tamper seals.



This warning label indicates parts of the product that will become hot during use. Please take care.



This warning label indicates danger of electrical shock hazard

Safety Notice



Caution: Read these operating instructions fully before use and pay particular attention to sections containing this symbol

Always observe the following safety precautions:

- Only connect to an earthed supply socket. THE MAINS ADAPTOR IS CLASS 1 CONSTRUCTION AND MUST BE EARTHED (GROUNDED)!
- Ensure the mains outlet is easily reached to disconnect the unit
- Use only the supplied mains adaptor and leads supplied
- Always disconnect the equipment from the mains supply before moving
- This equipment is for use in moderate climates only. NEVER use the equipment in damp or wet conditions
- Avoid excessive heat, humidity, dust & vibration
- Do not use where the equipment may be subjected to dripping or splashing liquids

Harmful substances



The FAIMS CORE OEM Development Platform can be used with a wide range of samples some of which could be toxic or harmful. The FAIMS CORE OEM Development Platform is not a fully sealed unit, therefore for this reason it is essential that the user conduct a risk assessment for the substances to be used and establish safety protocols to cope with the release of such materials under the normal operation of the unit. These protocols must include suitable installation (e.g. in a fume cupboard, provision of extraction, etc.) and operational procedures to protect the operator.

Chemical compatibility

Materials in the flow path include

- PTFE
- stainless steel
- aluminium
- silicon
- graphite
- gold
- glass coated stainless steel
- FR4 or similar circuit board and
- Viton®

Ensure test atmospheres are neither corrosive nor reactive with materials in the flow path and can be safely operated at 60°C. If in doubt please contact an Owlstone representative using the contact details provided.

Note that the relative humidity sensors are for indication only. Typically the humidity sensors are accurate to +/-5%, but they can be affected by the exact makeup of the process sample and can be easily altered or damaged by certain chemicals.

Setup Guide

System Contents

The FAIMS CORE OEM Development Platform will usually be shipped with the following:

- FAIMS CORE Assembly (01-0540)
- Power Supply (13-0080)
- Inlet Filter (01-0195)
- Scrubber (01-0359)
- Peripheral board assembly (01-0042)
- 2 x USB Communication Cables
- Laptop, with Lonestar software pre-installed (50-1022)
- Laptop Power Supply
- Pump and solenoid assembly

A detailed packing list will be provided with your instrument.

If any of these items are missing or damaged then contact Owlstone Ltd immediately.

Please retain all items and packaging (especially the Peli Case) for return to Owlstone for annual service. No responsibility for damage arising from shipping using non-approved packaging will be accepted.

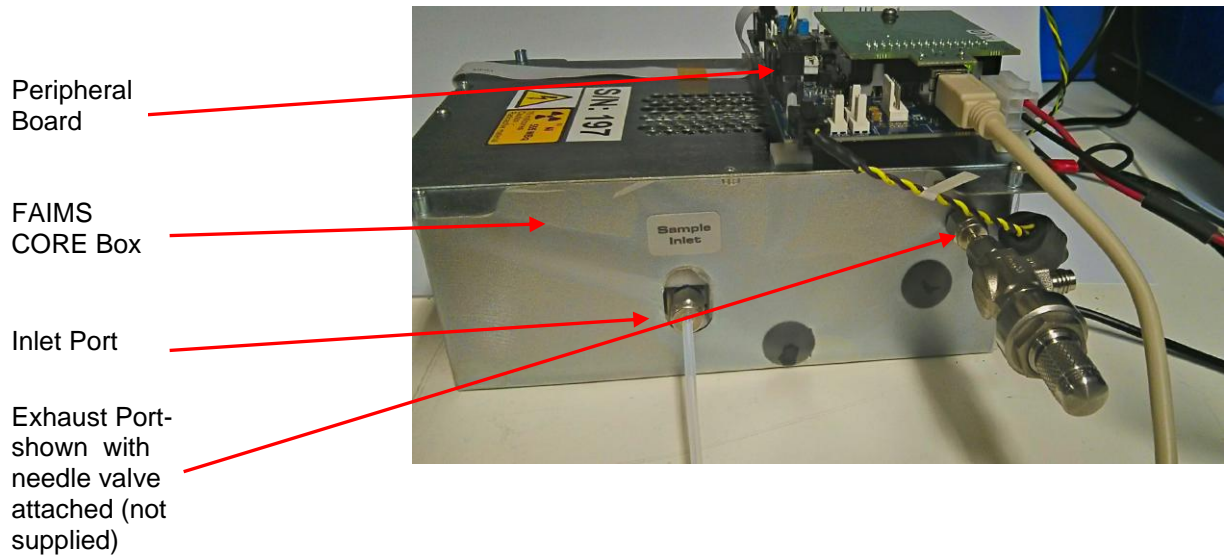


Figure 1. FAIMS CORE OEM Development Platform with inlet filter, power and communication cables shown.

Pre Installation

Please see the Lonestar Documentation, Pre Installation section in the Support area on the Owlstone website.

This gives guidance on air compressors, driers, zero air generators and other equipment that may be needed to generate air of sufficient quality to be used with the FAIMS CORE OEM Development Platform.

Before Starting

- Ensure that the system is placed on a solid, level surface, which is able to support its weight
- Only use the Owlstone supplied power supply
- Ensure cabling is routed behind the system, at bench level, posing no risk of tripping. Ensure that all cables are detached before attempting to move the unit.
- Do not block ventilation holes
- Do not place in space that is poorly ventilated or confined. Allow at least 50cm clearance from walls and free flow of air around the system
- Do not place near flammable materials
- During operation always apply the following precautions
- Before using the system, ensure that all power cables are intact with no damaged insulation or frays.
- Ensure the exhaust end cap is removed before applying flows otherwise the system may be damaged.



The pressure in any gas line connected to the system must not exceed 20psi

- Take care in removing and attaching Swagelok fittings to ensure fingers are not trapped or the instrument isn't damaged by over tightening.

- Do not open the FAIMS CORE unit – there is a risk of electric shock if covers are removed



A separate exhaust line should be made ready to connect to the exhaust outlet of the unit. This line should be checked for chemical compatibility and it is recommended that it is exhausted to a hydrocarbon trap or to a fume hood, depending on the findings of the risk assessment.

System Setup

The following steps describe how to connect up the FAIMS CORE OEM Development Platform, with reference to Figure 1 and Figure 2 and the cable connection schematic in Figure 3.

- Unpack the laptop and connect to the laptop power supply
- Unpack the FAIMS CORE OEM Development Platform and connect the power supply to the Peripheral Board.
- Unpack the USB cables and plug the two USB ends into the ports on the CORE box (Type mini B), NI Card (Type B) and the laptop (Type A).
- Check that all other cables are seated correctly, as shown in Figure 4.
- Connect the gas flow cables (inlet and outlet) and pump as required to be able to get the desired gas flow rate and pressure inside the instrument. A basic schematic for the ideal gas supply setup for the FAIMS Core unit is given in Figure 5.
 - The FAIMS CORE unit will accept a 1/8" (0.125 inch, 3.175 mm) Swagelok fitting on both the inlet and exhaust.
- Power up the laptop.
- Start the Lonestar software from the windows start bar or the desktop shortcut.

Brushless Pump
(optional)

USB Cable A - B

Peripheral
board power
connector

USB Cable
A - mini-B

Mains power
connector

Inlet Filter

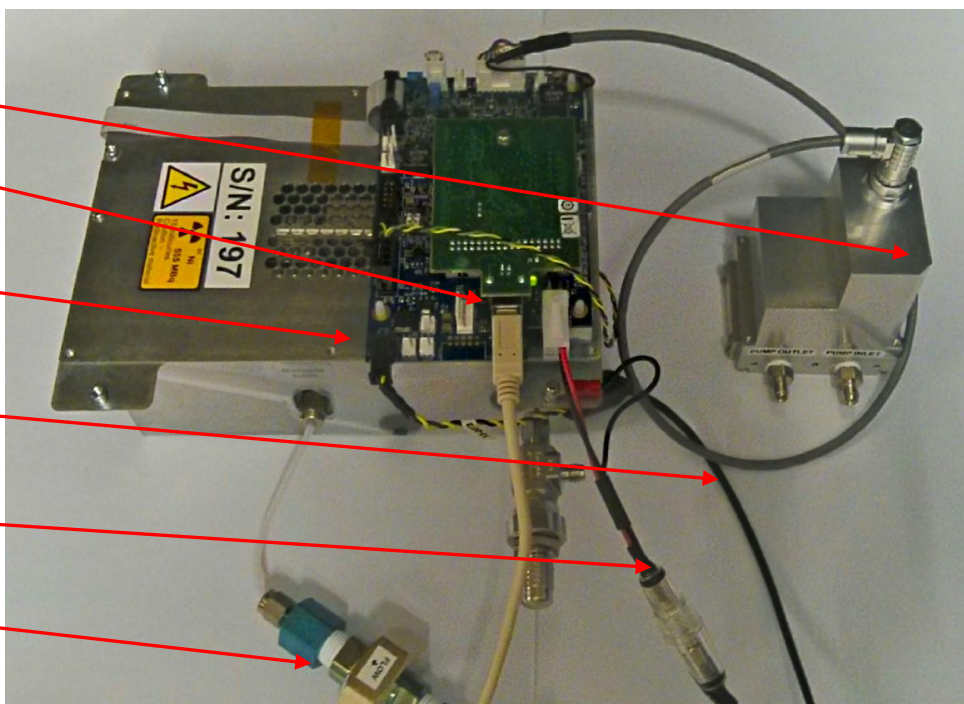


Figure 2. Power Supply and USB cable connections

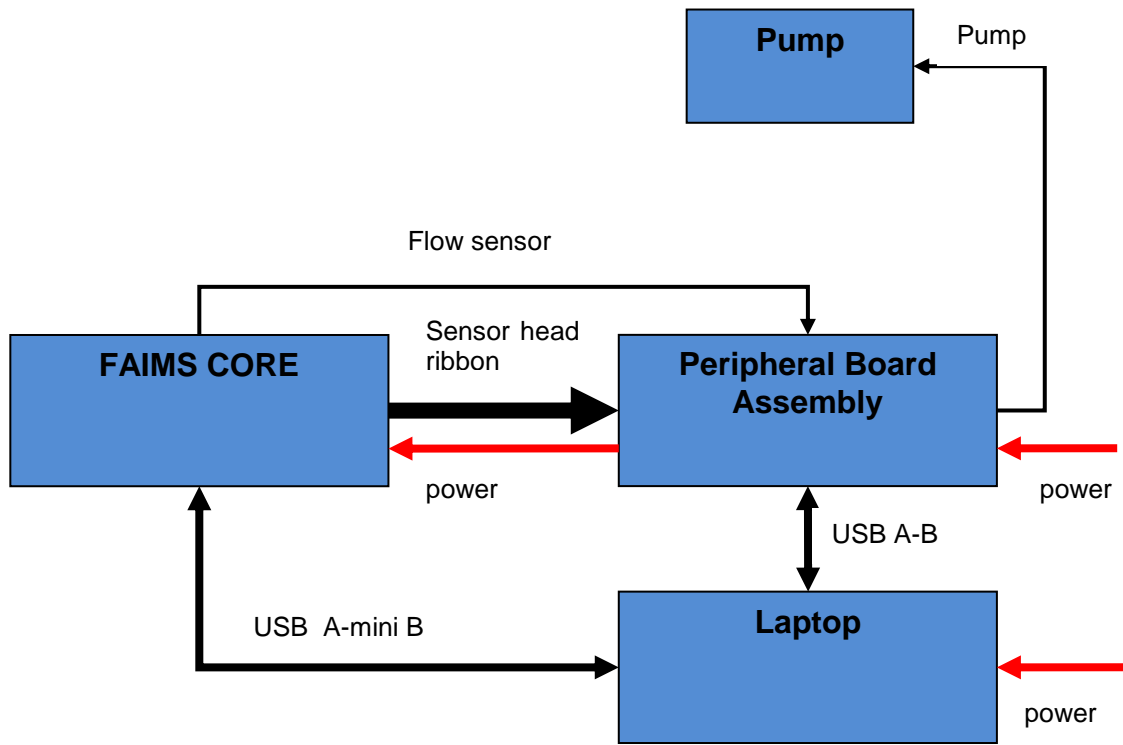


Figure 3. Schematic of the electrical connections on a FAIMS CORE system.

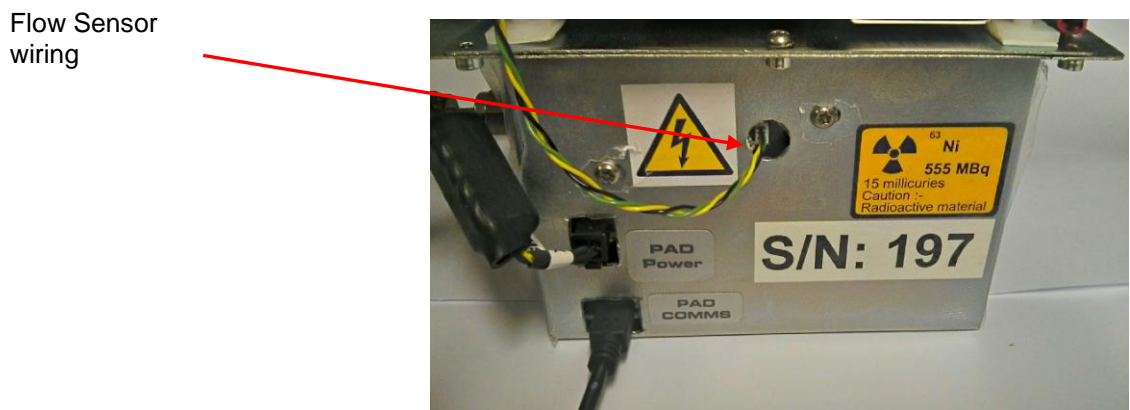
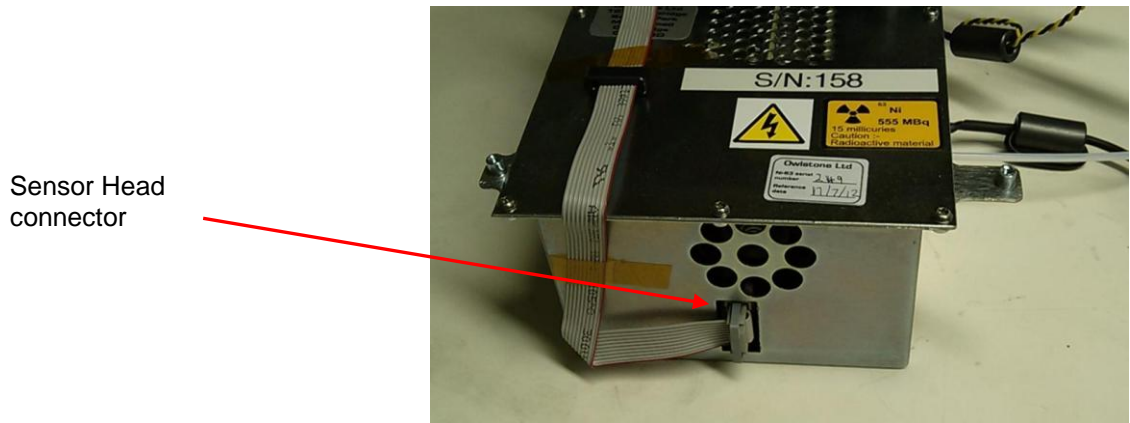


Figure 4. Detail of sensor head, flow sensor connectors

It is important to note that the optimal total flow through the FAIMS Core unit is 1 - 2.5 SLPM and that the maximum flow is 5 SLPM. **Please Note: Applying a total flow greater than 5 SLPM may cause damage to the FAIMS Core unit. The flow sensor is only calibrated up to 3.5SLPM**

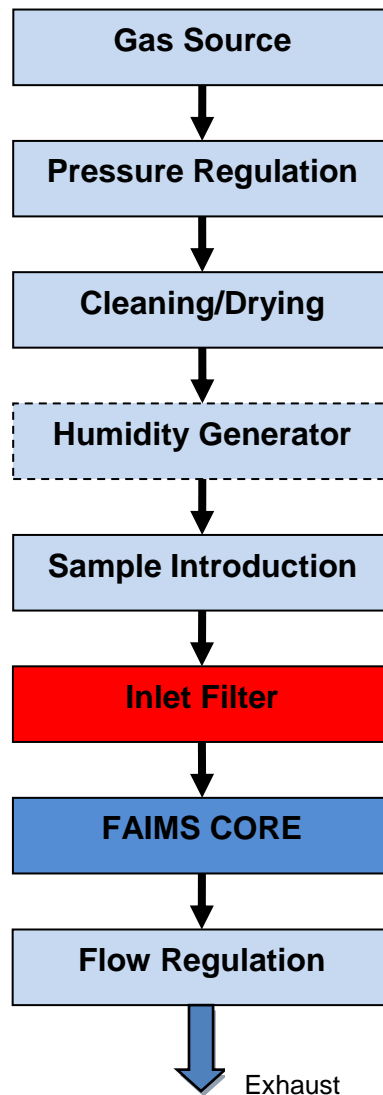


Figure 5. The gas flow path setup required for a FAIMS CORE system

Gas Source – This should be air or an air equivalent (pure nitrogen) capable of producing sufficient flow with a pressure of 40 psi. This can be from a compressed air generator, nitrogen generator or a bottled gas supply. If a pressurised supply is not available then a pump must be used on the output of the system.

Pressure Regulation – To set the pressures in the system, a regulator must be fitted. This should be set to no more than 30 psi.

Cleaning/Drying – The gas supplied to the unit should be very dry and free of hydrocarbons. The detailed specifications for these are given in the Lonestar Technical Specifications document, available on the Owlstone website in the Support section.

We strongly recommend the use of a molecular sieve and activated charcoal in the gas supply line, or the use of the Owlstone scrubber cartridge. **Please note that molecular sieves may need replacement or regeneration to maintain their absorbent properties.**

Humidity Generator – This is not necessary, but can increase the scope of experimentation by introducing different humidity levels above the baseline concentration. There are many types available but they must be fit in accordance with the rest of the gas line with respect to pressure and flow rates, Owlstone personnel can advise further on this matter.

Sample Introduction – This is the analyte to be studied and could be introduced directly as a gas or for non-gaseous analytes via a Vapour Generator (OVG), Duran bottle etc. –Owlstone personnel can advise on further this matter.

Inlet Filter – The system comes supplied with a 1 micron Inlet Filter. **THIS MUST BE USED IN ALL CIRCUMSTANCES.** The filter ensures that the FAIMS chip is not exposed to particulates that may damage it.

FAIMS CORE – The gas detection system.

Flow Regulation – The flow rate through the unit should be regulated with a flow meter or valve constriction down-stream of the FAIMS CORE to avoid any potential areas of contamination. The FAIMS CORE will report the gas flow rate which can be used to control the flow rate. A calibrated external flow meter can also be used. The flow regulation will also affect the pressure and may need to be balanced against the incoming pressure setting. The flow may also be regulated by the use of a pump, where the flow rate is controlled by the pump speed.

Exhaust –We advise the use of a wide-bore tube (PTFE, Tygon or silicone based) to avoid any effects on the pressure and flow regulation. This material must compatible with any hazardous chemicals used in the analysis; refer to your COSHH assessment for further advice.

Note: the exhaust end-cap **MUST** be removed before any gas or gas mixture is passed through the unit. It is also very important to **replace the end caps** at the inlet and outlet of the FAIMS CORE unit when the gas lines are disconnected to avoid contamination of the unit.

System Functionality

The parts in the FAIMS CORE OEM Development Platform are the basic functional blocks of a Lonestar unit, however a number of functional blocks are not *always* included which may limit the system functionality. The following items are referred to in the main Lonestar user manual but are not always present on the FAIMS CORE system:

Scrubber Cartridge – This produces a clean dry gas stream for the system. Without this, careful external conditioning of the gas flow is needed.

Changeable Filter – User changeable filter membrane contained within the inlet filter assembly.

Inlet Filter Heater – Reduces chemical “hang up” in the filter unit. The unheated filter supplied with the FAIMS CORE may be a source of chemical “hang up”. It is recommended that this section is heated if possible

The FAIMS CORE OEM Development Platform has additional connectors on the Control Board to allow control over certain 3rd party electronic. For details contact your Owlstone Representative.

Service and Maintenance

This equipment contains no user serviceable parts. Disassembly by users is NOT permitted as the unit contains a radioactive Ni-63 ionisation source. If your equipment requires maintenance or service, please contact your Owlstone® representative. Return and repair details are provided below

About Owlstone

Owlstone develops and commercializes innovative new technologies to address the critical need for compact, dependable and cost-effective chemical and biological detection solutions for a wide range of markets.

Owlstone was formed through the recognition of the opportunities created by the application of micro- and nano- technology to develop improved sensing solutions.

Owlstone is focused on the innovation of detection technologies to address unmet needs, developing solutions that are flexible enough to target a range of markets with the potential for growth by enabling new application opportunities.

From homeland security to home safety, Owlstone is working with leading manufacturers and integrators across a range of markets to develop products incorporating our microchip chemical sensing solution.

Owlstone is headquartered in the United States and has laboratory facilities in the United Kingdom. Owlstone Ltd was founded in 2003 with a seed investment of two million dollars from Advance Nanotech, Inc., a New York based company specializing in the investment in and commercialization of nanotechnologies.