Cirrus 3-XD
User Manual

Cirrus 3-XD Hardware Manual – SP101021.102
February 2016

As part of our continuous product improvement policy, we are always pleased to receive your comments and suggestions about how we should develop our product range. We believe that the manual is an important part of the product and would welcome your feedback, particularly relating to any omissions or inaccuracies you may discover. You can send your comments to:-

Mass Spectrometry Solutions
MKS Instruments UK Ltd.
Cowley Way
Weston Road
Crewe
Cheshire
CW1 6AG
U.K.
+44 (0)1270 250150 Tel. International
+44 (0)1270 251939 Fax. International

Email: manual_info@mksinst.com

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Table of Contents

1.0 Overview

1.1 Declaration of Conformity

MKS Instruments UK Ltd.
2-4 Cowley Way
Crewe, Cheshire
CW1 6AG United Kingdom

mks
Technology for Productivity
Spectra™ Products

Declaration of Conformity
CIRRUS 3-XD (LM125)

Declaration:

MKS Instruments UK Ltd. hereby declares that the CIRRUS 3-XD (LM125) product complies with the EMC and LVD directives and the following standards:

2004/108/EEC ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

The item detailed above has been tested in accordance with:

CENELEC EN 55011:2009+A1:2010 Group 1 Class A
EN 61326-1:2006 and **EN61326-1:2013** Electrical equipment for measurement, control and laboratory use — EMC requirements — **Part 1**: General requirements
Conducted RF immunity as specified in **EN 61326-1 Table 1**: AC Power and I/O signal/control **EN 61000-4-6**
Report No: ECR/15/151 – Issue 1

2006/95/EC LOW VOLTAGE DIRECTIVE

The item detailed above has been tested in accordance with:

EN61010-1:2010 - Safety requirements for electrical equipment for measurement, control & laboratory use
Report number SAR/15/105 Issue 1

The technical documentation required to demonstrate the product meets with the requirements of the directives is available for inspection by the relevant authorities.

I hereby declare that the CIRRUS 3-XD (LM125) product meets with the requirements of the above referenced European Standards and complies with the referenced European Directives.

Signed:

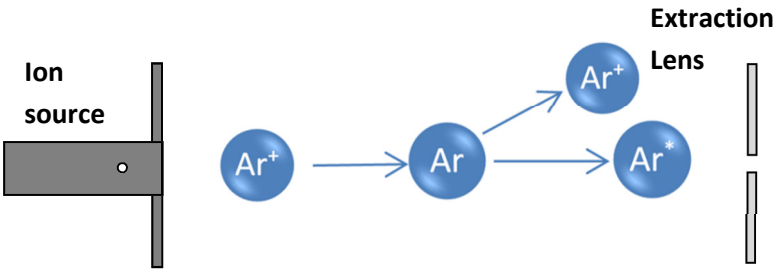
Alistair Wallace
Assistant General Manager
Mass Spectrometry Solutions
18 February, 2016

CE 16

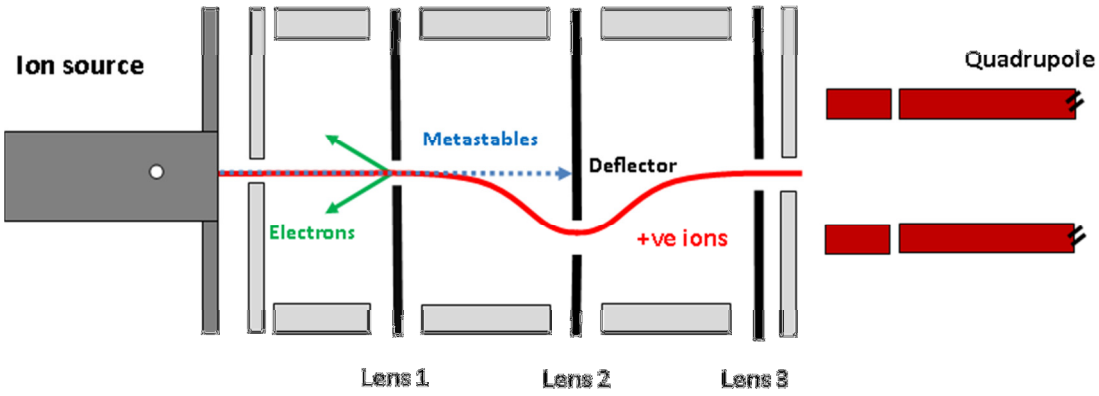
1.2 V-lens Technology

The Cirrus 3-XD is a purpose built quadrupole mass spec for gas monitoring at atmospheric pressure. It is available in either bench top or rack mounted configurations.
Incorporating the latest V-lens technology, the Cirrus 3-XD has been designed to meet all the traditional requirements for an RGA sensor, but offers data collection speeds in the milliseconds, even over the full dynamic range - unachievable with previous technologies.

- Higher sensitivity and lower background noise
- Reduced baseline noise
- Consistent baseline for all gases
- Lower limits of detection
- Improved ion transmission



Electron Ionization source produces “metastable neutrals” in addition to positive ions. All current RGAs use line-of-sight ion sources that allow neutral species through the mass filter to the detector. This causes higher noise levels in the instruments. Noise levels determine the detection limits of the RGA. This effect is strongest at low masses.
The Cirrus 3-XD incorporates V-lens Technology which prevents high energy neutrals generated within the source from having line of sight of the quadrupole region. In addition any stray electrons are repelled and a well collimated beam is presented to the entrance of the quadrupole.



Analog and digital interfaces are provided for integrated systems and future technologies.

The Cirrus 3-XD is designed to be operated in several ways:
From a host computer – an IBM® compatible PC running the MKS Process Eye™ Professional or EasyView software package.
PC using a web browser such as Internet Explorer or Integration into existing systems controlling through the use of the ASCII protocol command set.

This manual focuses on the Cirrus 3-XD hardware and should be used in conjunction with the relevant user interface manual during installation.
Any required network communications cards should be installed and configured prior to installing the Cirrus 3-XD, or RGA software if supplied.

2.0 Specifications

2.1 Mechanical

2.1.1 Cirrus 3-XD Bench Top

Dimensions: 285 mm wide x 595 mm deep x 468 mm tall
Weight: 38 kg

2.1.2 Cirrus 3-XD Rack Mounted

Dimensions: Front plate 482 mm, body 455 mm wide x 577 mm deep x 266 mm tall
Should fit in a standard 600 mm deep 19”Rack, no more than 6U high.
The Cirrus 3-XD must be supported on a rack shelf of adequate strength to support 33 kg.
Weight: 33 kg

2.1.3 Analyser

Triple mass filter, 1-100 amu, 1-200 amu, 1-300 amu or 1-100 amu HP, Faraday and MCP detector

2.2 Electrical

2.2.1 Power Inlet

100 – 240 VAC, 50-60 Hz @ 5.0 A rms, 500 W
Installation category (over voltage category) II to IEC664
Insulation Class I to IEC536

2.2.2 Fuses

Located on rear panel
All fuses are 20 mm x 5 mm H.R.C ceramic, 250 VAC, characteristic (T) and compliant with IEC127

2.3 Environmental

2.3.1 Temperature range

0 to 35^0C, 80%RH non-condensing, operating and storage
Pollution degree 2 to EN61010
Enclosure IP20 to EN60529

2.4 Safety

IP20 to EN60529
The protective earth conductor of the power cord must be connected to the power source protective earth terminal.
Prior to removal of covers for replacement of any user serviceable parts, the Cirrus 3-XD should be isolated from the mains and allowed to cool.
The Cirrus 3-XD must be used only in the manner specified in this document.

2.5 Connectors

The connectors for external circuits are for use only with MKS equipment, or equipment which has no accessible hazardous live parts.

The external circuits must comply with the requirements of EN61010-1 section 6.6.1.
Ports for connection of accessories do not carry hazardous potentials.

Installation Category II comprises mains powered, local level appliances.
Use only an approved and correctly rated replacement mains cable.

2.6 Warning labels

Risk of electric shock


Affixed to the rear panel refer to:
Hazardous internal voltages that are exposed when the cover is removed

Risk of danger or malfunction

Read all instructions carefully before use
The control unit and signal ports are designed for connection to MKS accessories via MKS supplied cables

There are no accessible hazardous voltages or currents on these ports, MKS must be consulted before any non-MKS supplied cables or accessories are connected to these ports

Hot surface

Affixed internally refers to hot surfaces around the oven

Heavy object

This equipment weighs in excess of 18 kg and should be lifted by at least two people.
To avoid muscle strain and or back injury, movers should employ lifting aids and the correct lifting techniques

2.7 Ventilation

Do not obstruct any of the outer cover ventilation openings.
Allow a minimum clearance of 50 mm at rear of instrument.

Do not exceed the maximum operating ambient temperature.

3.0 Additional Installation Maintenance and Operating Instructions

In order to comply with European regulations, the following procedures must be followed:

3.1 Installation

1. The installation procedures given in the operating and technical manuals must be followed in addition to these instructions.
2. The mains power cable must conform to local regulations and must have a protective earth (PE) conductor securely connected to the power plug protective earth contact.
3. Cables attached to all other ancillary signal and control ports must have a length of less than 3 meters. If greater length is required, MKS Instruments Ltd. must be contacted for technical guidance on possible EMC and safety issues.

3.2 Operation

1. The equipment is not authorised for use as a critical component in a life support or safety critical system without the express written approval of MKS Instruments Ltd.
2. All instructions given in the operating manual must be followed.
3. Adjustments are strictly limited to those accessible from the control panel and computer keyboard and only when running software supplied by MKS Instruments Ltd.

3.3 Maintenance

WARNING-DANGEROUS VOLTAGES EXIST INSIDE THE EQUIPMENT

1. Maintenance functions must only be carried out by competent persons.
2. During the warranty period, faulty equipment must be returned to MKS Instruments, Mass Spectrometry Solutions, unless special arrangements are made.
3. There are no user serviceable parts in the electronic equipment. Certain components are EMC and safety critical and must not be substituted. Replacement parts are available from MKS Instruments UK Ltd.
4. Equipment enclosures embody certain special fastenings and bonding devices that affect EMC and safety performance. These must be correctly re-fitted after servicing.

4.0 Connections and Indicators

4.1 Front Panel

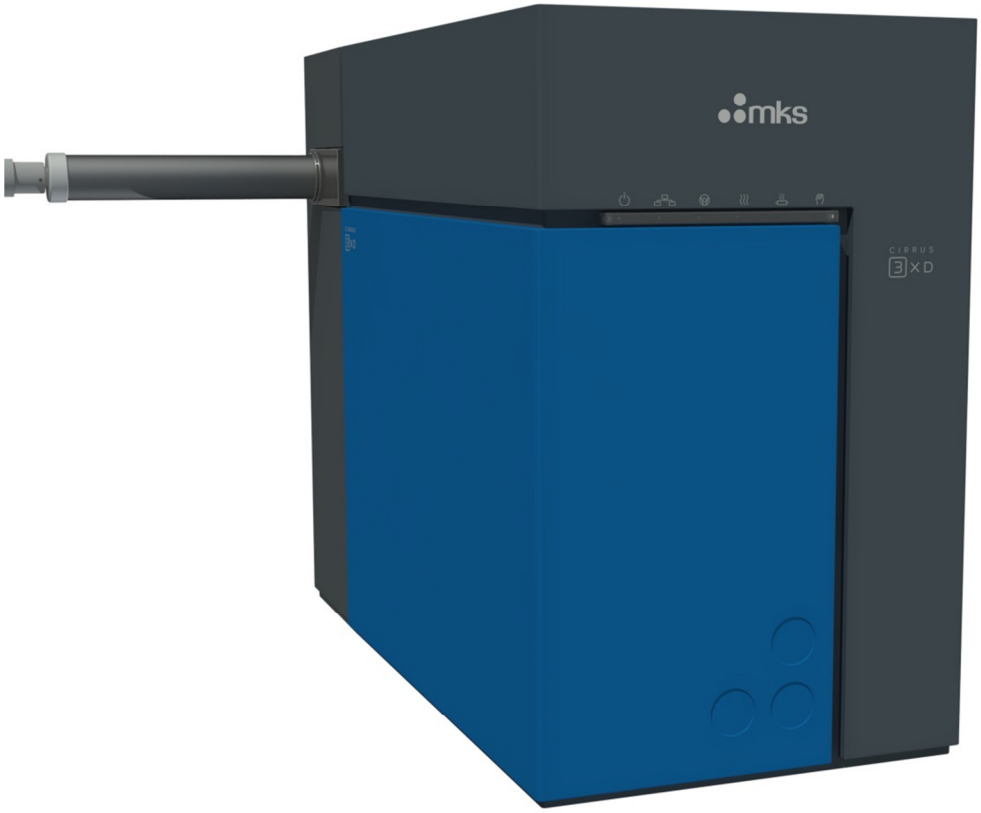
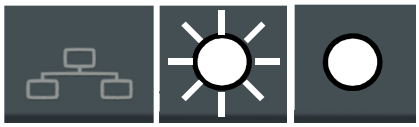


Illustration 1. The front panel incorporates six status indicators to assist in the operation of the Cirrus 3-XD.

Power

The indicator is white when power is supplied to the Cirrus 3–XD unit.

Network Comms



This indicator blinks white while the comms are establishing, then it continuously lights when the comms are operating correctly.

Turbo Pump at Speed

The indicator blinks white while the turbo molecular pump accelerates, changing to continuous white when it has reached normal operating speed.
The filament protect trip is interlocked to this signal to prevent operation of the filament before a suitable chamber pressure has been obtained.

System Heater

The Indicator blinks white when the heater is turned on but has not yet reached the set temperature, changing to continuous white when set point is reached.

CAUTION: The oven will remain hot for a long time after the heater is turned off

Capillary Heater

The Indicator blinks white when the heater is turned on but has not yet reached the set temperature, changing to continuous white when set point is reached.

Emission

The indicator is white when a filament is active and operating correctly.

4.2 Rear Panel

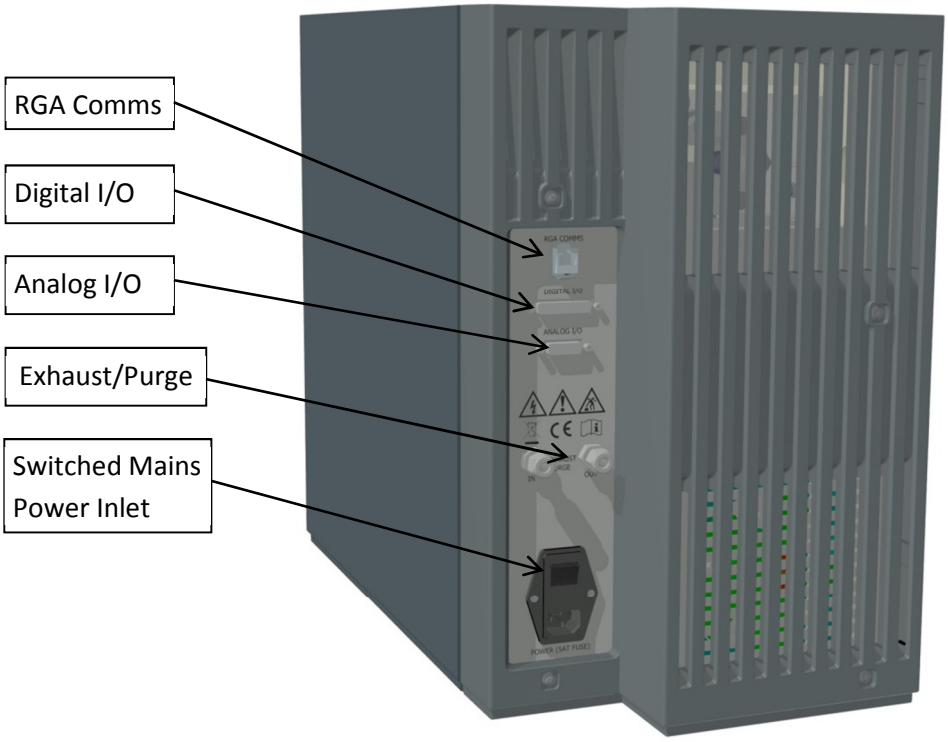


Illustration 2. The rear panel incorporates all of the external connections required by the Cirrus 3-XD, as well as exhaust / purge connections.

A description of each of the connectors can be found below.

The signal and data ports must not be connected to ports that could become hazardous live.

RGA Comms

A standard RJ45 type 10/100 Base-T Ethernet connector used to connect the Cirrus 3-XD to a host PC, hub, switch or network.

Ensure you read through the network scenarios starting on Page 17 before connecting the unit to your network

Power

The mains power switch and fused IEC socket for connection to the local mains supply.

Analog I/O Connector

A standard 15-way D-type socket used for interfacing with external equipment.
This may be already in use depending on the type of RGA system purchased.

This interface offers the following functionality:

Two analog outputs 0 to +10 V, 12 bit
Four, quasi-differential analog inputs, -11 to +1 1V, with a maximum voltage on the return of ±0.5 V, 22 bit
±15 V power outputs both fused at 120 mA, fuses are self resetting.

Pin	Function	Description
1	-15 V	-15 V supply output, fused at 120 mA
2	Analog Input 4 Return	
3	Analog Input 3 Return	
4	Analog Input 2 Return	
5	Analog Input 1	±11V
6	Composite Return	Differential Output Return
7	Electrometer Differential Output	Direct Electrometer output from 50 MΩ feedback resistor
8	0 V	
9	+15 V	+15 V supply output, fused at 120 mA
10	Analog Input 4	±11 V
11	Analog Input 3	±11 V
12	Analog Input 2	±11 V
13	Analog Input 1 Return	
14	Analog Output 2	0 – 10 V
15	Analog Output 1	0 – 10 V

NOTE:

The 120 mA maximum load for the power supply outputs is shared between the Digital and Analog connectors.

Digital I/O Connector

See Interfacing Notes on Page 14 before making connections to this interface.

A standard 25-way D-type socket used for interfacing with external equipment.

The Digital I/O connector can also be used to provide alarm output signals and process trip signals.
This interface offers the following functionality:

16 configurable I/O lines
+3.3V power output fused at 120mA, fuses are self resetting
±15V power output fused at 120mA, fuses are self resetting
+24V power output fused at 120mA, fuses are self resetting

Pin	Function	Description
1	Multiplier Trip	Dedicated to Multiplier Trip
2	PA1	
3	PA3	
4	PA5	
5	PA7	
6	PB1	
7	PB3	
8	PB5	
9	PB7	
10	0V Digital	
11	0V Analog	
12	-15V	-15V supply output, fused at 120mA
13	+15V	+15V supply output, fused at 120mA
14	PA0	
15	PA2	
16	PA4	
17	PA6	
18	PB0	
19	PB2	
20	PB4	
21	PB6	
22	+3.3V fused	+3.3V supply output, fused at 120mA
23	Not Connected	
24	GND	
25	+24V	+24V supply output, fused at 120mA

Note: The total power consumption on each rail (+3.3V, ±15V & +24V) for both the Analog and Digital I/O ports must not exceed 120 mA.

Important Interfacing Notes

The Cirrus 3-XD digital I/O is based on 3.3 V logic. Interfacing to other voltages such as 5 V should be done with careful consideration:

Logic High Output
There is a pull up / current source on all inputs/outputs to the local +3.3 V supply rail. This current source is rated at 30 µA minimum (300 µA maximum). Therefore it will need to be buffered if an output capable of sourcing more current than 30 µA is required.

Logic Low Output
In the logic low state the output will sink up to 10 mA. Exceeding this value may cause damage to the instrument.

Inputs
The 30-300 µA pull up / current source is always active regardless of whether the port is an input or output. As such it may be driven by an open drain / collector / contact closure output. This is the recommended way to use the inputs. However the inputs may also be driven by 3.3 V logic. A voltage < 0.99 V will be interpreted as a logical low. A voltage > 2.31 V will be interpreted as a logical high.

Notes
a) Where appropriate, arrange the hardware/software configuration so that an input HIGH state is a safe condition. This ensures that if a connection should be unplugged the system will go into a fail-safe state.
b) In cases where the external equipment is a distance away or is likely to have a different ground potential, the fitting of opt couplers on the interface should be implemented.

WARNING
DO NOT DRIVE THE INPUTS ABOVE +3.8 V OR BELOW -0.5 V OR DAMAGE TO THE INSTRUMENT WILL OCCUR.

Exhaust Purge IN/OUT

You may want to connect the Cirrus 3-XD to a nitrogen purge system, or vent the exhaust gas to an extractor system. You may have been advised whether we feel for your particular application nitrogen purging is necessary, desirable or absolutely vital.

Optional: The Cirrus 3-XD includes the facility to purge the turbo pump bearings and vent the vacuum chamber with nitrogen. This feature is usually used when the unit is likely to be exposed to corrosive and/or toxic gases.

Flushing the pump exhaust

Connect a dry nitrogen supply at a pressure of 1 - 2 psi above atmospheric pressure to the IN port to improve detection levels.
Connect a second pipe to the port labeled OUT to exhaust the dry nitrogen safely. The exhaust nitrogen may now contain corrosive/toxic gases.

Exhaust the pump only

Even if you are not using nitrogen purge you MUST connect the Cirrus 3-XD to an exhaust system.
Blank off the port marked IN and use only the OUT to exhaust the pump.

The standard configuration of Cirrus 3-XD does not use rotary pumps, so there will be no hydrocarbon vapors emitted by the vacuum pumping.

Never block, or obstruct any pump exhaust, as this may cause dangerous internal pressure buildup.

5.0 Installation

Benchtop Variant

The Cirrus 3-XD should be installed on a flat, level bench top with adequate ventilation as specified in Specifications section of this manual.

Rack Mount Variant

The 'Rack Mount' configuration the Cirrus 3-XD is suitable for mounting in a 19" EIA rack.
The Cirrus 3-XD must be supported on a rack shelf of adequate strength to support 33 kg.

Periodic maintenance will be required during the lifetime of the unit, with this in mind some thought should be given to the location. All connections should be easily accessible, with the Cirrus 3-XD positioned so that strain is not placed on any of the cables or connectors.

5.1 Connecting to the Ethernet Port

Overview

Before connecting a cat5 patch lead to the socket marked “ETHERNET” please take the time to read through the following sections.
If the Cirrus 3-XD is to be installed on your company network, then there are a number of different network configurations that must be considered before you continue.
There are four main network technologies employed in the distribution of network addresses (IP addresses) to network devices, the Cirrus 3-XD can be configured to use any of the following:

Auto-IP
A mechanism where in the absence of a DHCP or BOOTP server on the network, network entities can obtain their unique IP addresses by a process of arbitration between devices. If a DHCP or BOOTP server is present on the network, Auto-IP will obtain an IP address from the server.

DHCP
Short for Dynamic Host Configuration Protocol, a server running on the network is responsible for assigning dynamic IP addresses to devices on a network.

BOOTP
Short for Bootstrap Protocol, an Internet protocol that enables a diskless workstation to discover its own IP address and the IP address of a BOOTP server on the network.

Static
Each address is issued manually to each device by the network administrator.

By default the Cirrus 3-XD is configured for Auto-IP which is by far the simplest method if you are new to networking, or are installing the Cirrus3-XD into an existing Auto-IP or DHCP network.

If you intend to connect a Cirrus 3-XD to an existing network, then you must consult your IT Specialist for advice on how the network assigns IP addresses.

Do not continue until you are certain of your network configuration

The following sections describe the different network connection options available to the user when installing the Cirrus 3-XD.

The Cirrus 3-XD is to be connected to a network running **Auto-IP** or **DHCP**
Option - Use Auto-IP

If the Cirrus 3-XD is to be connected to a network where existing devices obtain their IP address automatically, then no further configuration is required.
You can safely connect the Cirrus3-XD to your network.

The Cirrus 3-XD is to be connected to a network running **BOOTP**
Option - Use Auto-IP

If the Cirrus 3-XD is to be connected to a network running BOOTP, then your IT Specialist will need to perform certain tasks on the BOOTP Server to complete the installation.

Do not connect the Cirrus3-XD to your network without involving your IT specialist.

The Cirrus 3-XD is to be connected to a network using **Static IP** addressing
See the Static IP Addressing section

For details on how to assign a static IP address to the Cirrus 3-XD, please see the guide on Page 19.
You will need to be allocated an IP address for use by your IT Specialist, or have them perform the installation for you.

5.2 Directly connecting to the Cirrus 3-XD

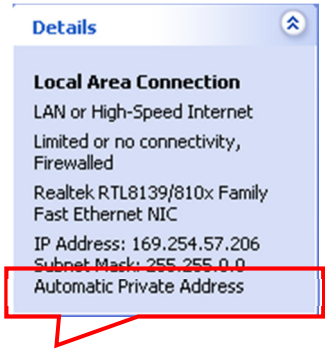
If your PC is not part of a network, you may choose to connect the Cirrus 3-XD directly to the Ethernet port or a local hub. The following section describes what is required to get your unit up and running.

As stated earlier, the Cirrus 3-XD is configured to use Auto-IP by default, all that is left to do is to ensure your PC is configured the same way.

Connect the Cirrus 3-XD to your PC or hub with a standard Cat5 STP cable (there is no need to use a dedicated cross-over cable) and power on the Cirrus 3-XD

Next you need to check if your PC is configured for Auto-IP; most are by default.

Windows PC
Start / Connect To / Show All Connections
Click once on the connection hosting the Cirrus 3-XD
Note the information displayed in the Task Pane



If the text **"Automatic Private Address"** is displayed, then the PC is ready to begin communications with the Cirrus 3-XD unit.

If the text **"Obtaining an IP address"** is displayed, then please wait a few moments for the sequence to complete.

If any other text is displayed, then you will need to make changes to the way your PC obtains IP addresses.

If your PC is not configured for Auto-IP, you can make the following changes to enable the function. You will need to have Administrative privileges.

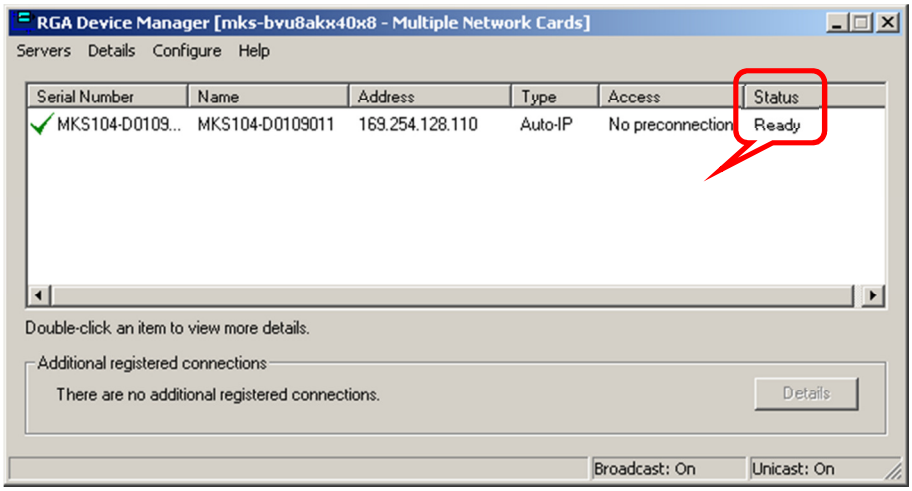
Windows PC
Control Panel / Network Connections
Double-click the **Local Area Connection** used to host the RGA
Properties
Double-click **Internet Protocol (TCP/IP)** from the list.

Choose the following options:
Obtain an IP address automatically
Obtain DNS server address automatically
Click **OK**

While the PC is generating its automatic IP address, the Cirrus 3-XD will be attempting to generate a compatible address.

You may need to wait about 120 seconds after the PC has an IP address before the Cirrus 3-XD is ready.

If you have already installed Process Eye Professional you can check the status of the Cirrus 3-XD by launching the "RGA Device Manager" (see your Process Eye Professional user manual)
Double-click the RGA Device Manager icon to start the application. After a few moments the following dialog appears displaying a list of all discovered MKS RGA's.



You can see that there is only one RGA displayed in the example, if you have more than one RGA on your network, this view may contain many entries.

Ensure you choose the correct instrument from the list.

The status, current IP address and type of IP addressing can be checked in this dialog. Once "Ready" is displayed you can close RGA Device Manager and begin using the RGA.

5.3 Assigning a static IP Address

If you are connecting to a network where static IP addresses are used, or connecting directly to your PC and wish to use fixed addressing, you will need to assign an address to the Cirrus 3-XD
To help you understand this scenario, the following explanation may be of use:

You have your standalone or networked PC configured to use a fixed IP address, for example 192.168.0.1. When the Cirrus3-XD is connected to the network, it will “ask” to be assigned an IP address from a DHCP server, as one will not be present in this type of network, the Cirrus 3-XD will use a default address in the range 169.254.xxx.xxx. As the host PC and Cirrus3-XD are on entirely different IP ranges, communication between the two is impossible. We must issue the Cirrus 3-XD with an IP address in the same range as the host PC.

You will need to ask for an IP address and Subnet from your IT Specialist if you are installing on a network.

This is done using the RGA Device Manager Application found on the supplied MKS Utilities CD. This application does not require installation, but you will require administrative privileges to make changes to the Windows Firewall exceptions for the application to function correctly.

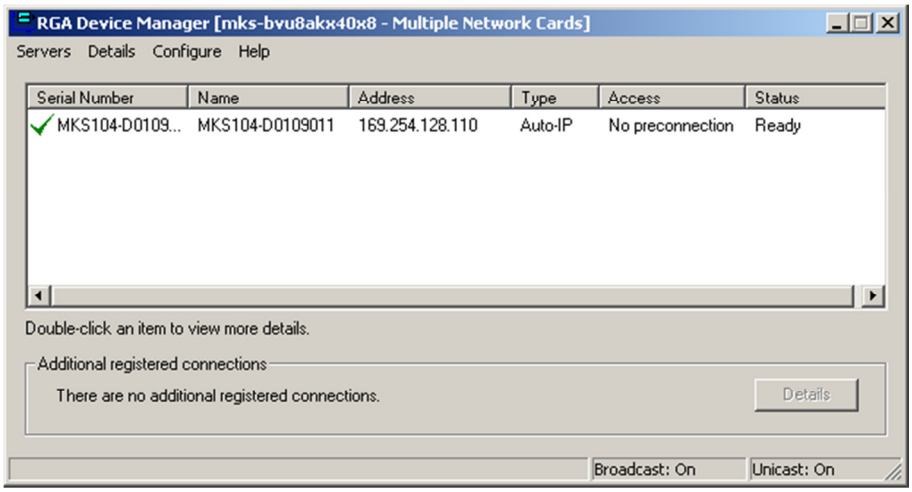
The RGA Device Manager application is designed to locate and retrieve information from any MKS RGA instrument, networked or otherwise. It does this by sending out a network broadcast, asking for information from any MKS Mass Spectrometry Solutions products discovered. It does not matter that the host PC may be on an entirely different IP range than the Cirrus 3-XD . Once connected by RGA Device Manager we can assign a new IP address to the Cirrus 3-XD .

Double-click the RGA Device Manager icon to start the application. After a few moments the following dialog appears displaying a list of all discovered MKS RGA’s.
You will need to ask for an IP address and Subnet from your IT Specialist if you are installing on a network.

This is done using the RGA Device Manager Application found on the supplied MKS Utilities CD. This application does not require installation, but you will require administrative privileges to make changes to the Windows Firewall exceptions for the application to function correctly.

The RGA Device Manager application is designed to locate and retrieve information from any MKS RGA instrument, networked or otherwise. It does this by sending out a network broadcast, asking for information from any MKS RGAs discovered. It matters not that the host PC may be on an entirely different IP range than the Cirrus 3-XD . Once connected by RGA Device Manager we can assign a new IP address to the Cirrus3-XD.

Double-click the RGA Device Manager icon to start the application. After a few moments the following dialog appears displaying a list of all discovered MKS RGA's.



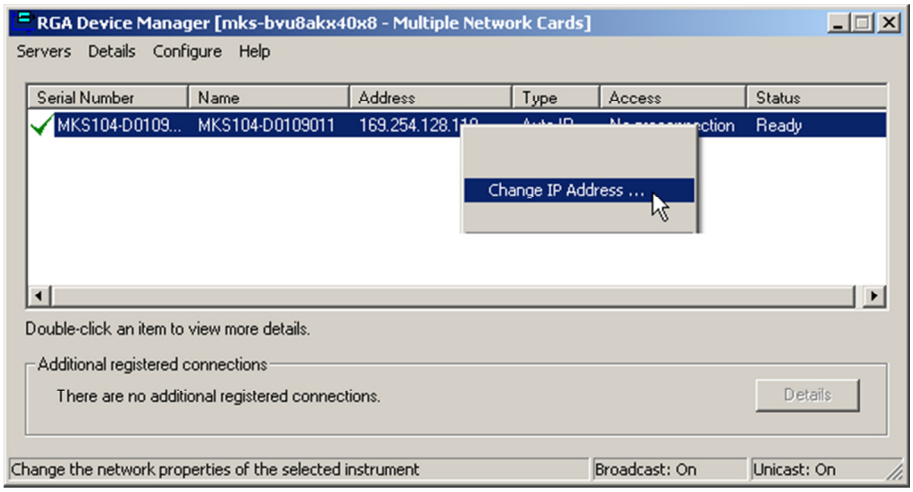
You can see that there is only one RGA displayed in the example, if you have more than one RGA on your network, this view may contain many entries.

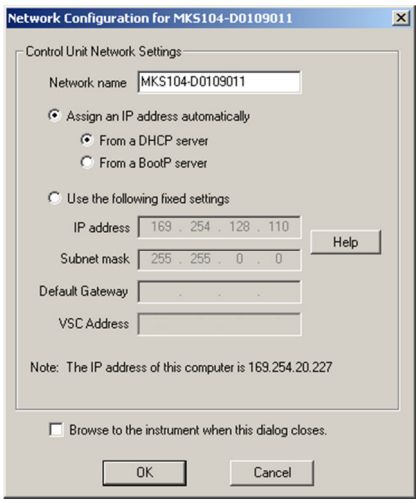
Ensure you choose the correct instrument from the list.

You can see that Device Manager displays all the pertinent information on the RGA, of particular interest are the "Address" and "Type" fields:

The "Address" field is the currently assigned IP address of the Cirrus 3-XD
The "Type" field describes the scheme the Cirrus 3-XD is currently using to obtain an address.

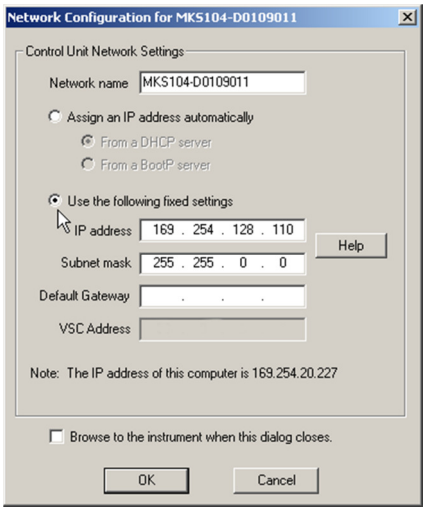
Right-click the instrument and select "Change IP Address".





You can see that the Cirrus 3-XD is configured to receive an IP address.

We must change this option to continue.



Select the “Use the following fixed settings” option.

Enter the IP address and the Subnet issued to you by your IT Specialist.

The “Default Gateway” is used in situations where multiple networks exist, or for connection to the Cirrus 3-XD from outside its local network. Your IT Specialist will instruct you on what to enter here, otherwise leave it blank.

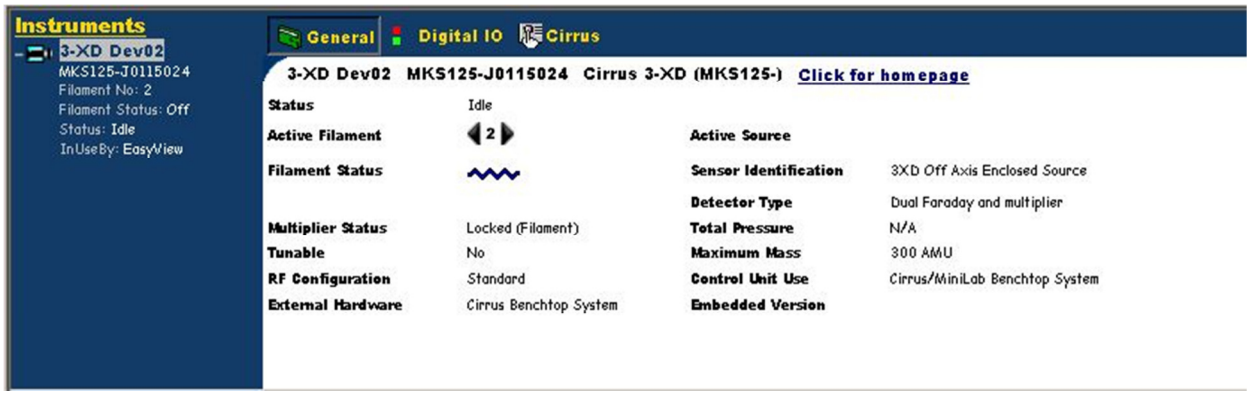
Once the relevant information has been entered, click OK to store and commit the changes to the Cirrus 3-XD .

6.0 Operation

6.1 Powering up

Switch on the Cirrus 3-XD.
The internal cooling fans will start, but none of the pumps should be running, the only indicators lit on the front panel should be the “Power” and “Comms” LEDs.

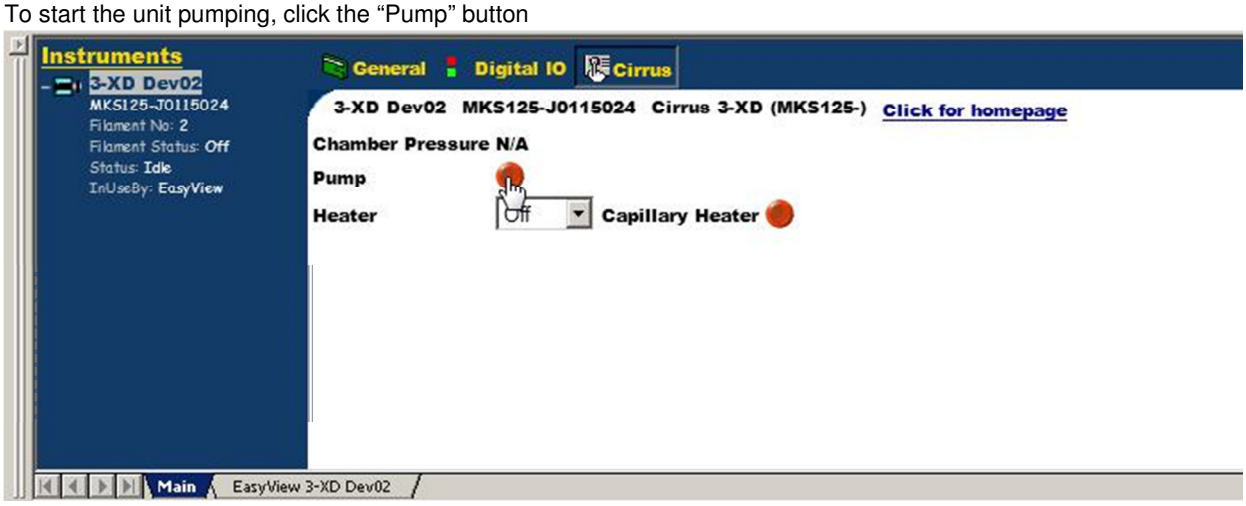
Use the RGA Device Manager to locate and install your unit ready for use. This is explained in the Process Eye Professional User Manual.



Once the unit has been installed, start the Process Eye software, once loaded you will see the unit information is displayed.

Clicking on the Cirrus tab allows control of the unit

To start the unit pumping, click the “Pump” button



The indicator will turn yellow while the turbo is getting up to full speed. Once the turbo pump is up to speed, the indicator will change to green in the software interface and continuous white on the front panel of the Cirrus 3-XD. The Ion Gauge will turn on and the Chamber Pressure will be displayed.

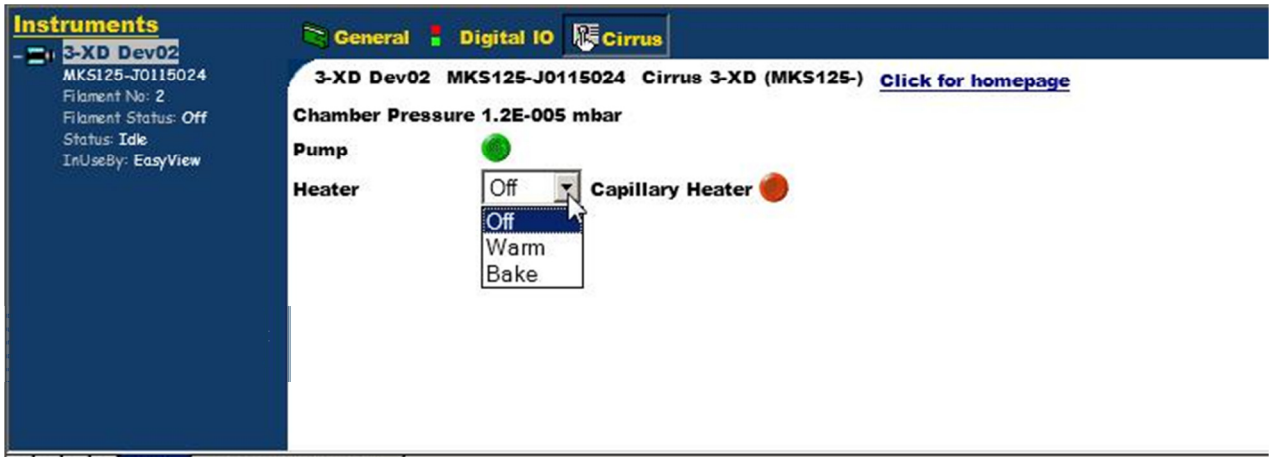
6.2 Starting Analysis

The quadrupole's filaments are interlocked with the internal pressure gauge, you will only be able to start the filament once the chamber has reached its operating pressure.

6.3 Baking

Before you can start to use the system properly, it will need to be run for sufficient time to allow the background peaks to drop. This amount of time can be significantly reduced by baking the system.

From the Warm/Bake pull-down list, choose the Bake option. A dry, inert gas should be flushed continuously through the capillary inlet during bake out. The quadrupole should be running with the filament on but only using the faraday detector.



The multiplier detector will be unavailable during baking and for a period afterwards while the system cools down.

The total pressure may gradually start to rise slightly as the system outgases and you should bake the system at least until the pressure starts to fall. In normal operation an initial bake of at least 24 hours is required, although in general the longer the system is baked the better.

To improve the background further, it is recommended that you run both filaments. The amount of time spent in reducing the background peaks depends entirely on the application and is left to the discretion of the customer. When the Cirrus 3-XD is switched off, it will vent to atmosphere introducing water vapour and should be baked again.

6.4 Temperature Settings

The Heat/Bake option should be set to Bake for the initial bake out to reduce the water background. After this period, running at the lower temperature of Heat is adequate in preventing the condensation of vapours in the vacuum chamber which could lead to memory effects.

Often it is not necessary to have the system heater on at all, but this will depend on the application.
The Cirrus is designed to allow continuous operation using the Faraday detector, with the system heater on Bake or Warm. The Multiplier will be locked and unuseable when the temperature is above 90°C because the high temperature will damage the multiplier if it is in use.

The standard temperature settings are 80°C for Warm and 150°C for Bake.

6.5 Capillary Heater

Use the Capillary Heater to lessen the chance of vapour condensing in the capillary leading to memory effects, or even blockage. Whether you need to heat the capillary or not depends on the application and the nature of the gases being sampled.
The Cirrus 3-XD is designed to allow the capillary heater to be run continuously.

6.6 Shutting Down

The Cirrus 3-XD should be left to run continuously unless it is not to be used for an extended period of time, or it needs to be shut down for maintenance.

6.6.1 Scheduled Shut Down

To shut down the Cirrus 3-XD:

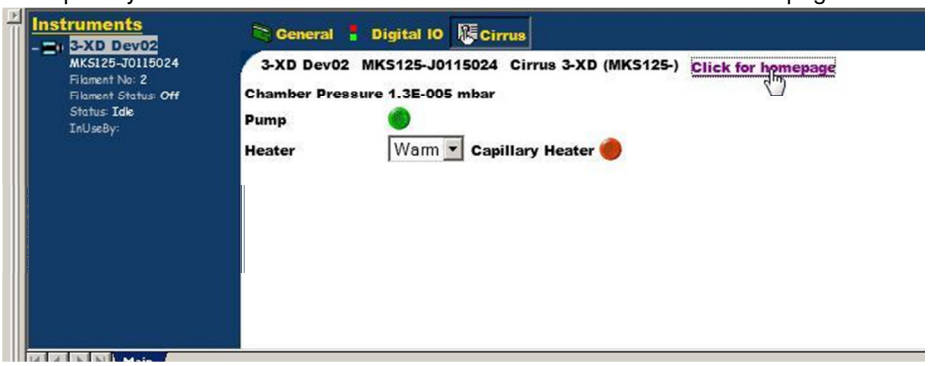
1. Switch off the Capillary and System heaters.
2. Switch off the quadrupole filaments.
3. Wait 10 minutes to allow the filaments and source to cool.
4. Stop the turbo and backing pump by clicking the “Pump” button.
5. Wait for the system to cool further and come to a full stop, if the system is very hot this may take several hours.

6.6.2 Unscheduled Shut Down

If the power is suddenly lost to the instrument, the system will shut down safely, although the source and filaments will be hot when this happens.
The pressure increases relatively slowly and it is unlikely that any serious loss of performance will result.

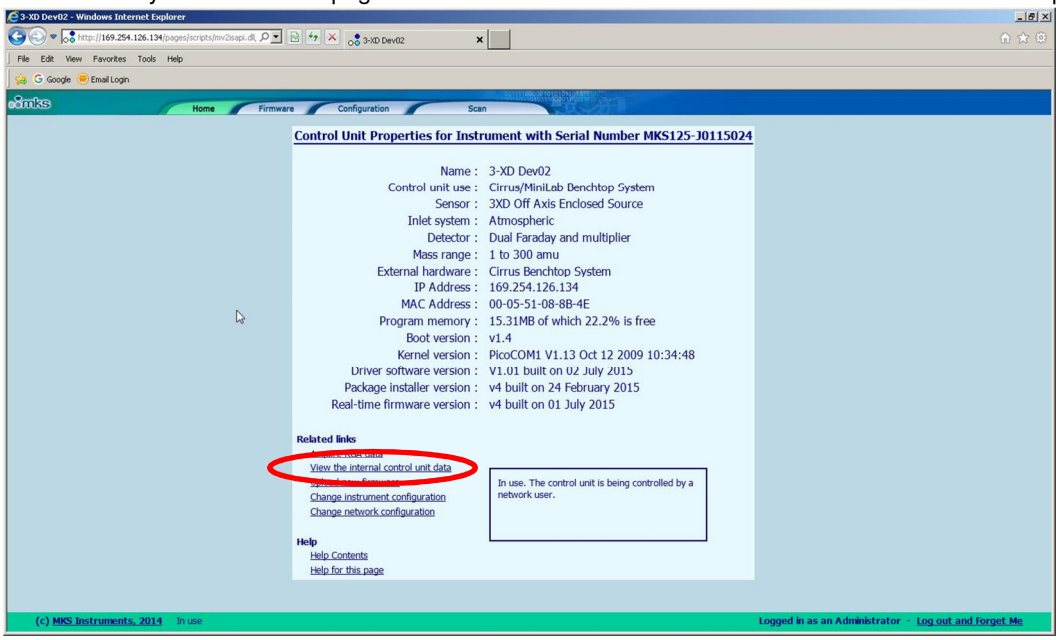
6.7 Heater Temperature Set and Read back

The temperature of the heaters and the oven heater setting can be found in the Web Interface, details of this interface can be found in the Process Eye User Manual.
A simpleway to access the Web Interface is to click on the Click for homepage link

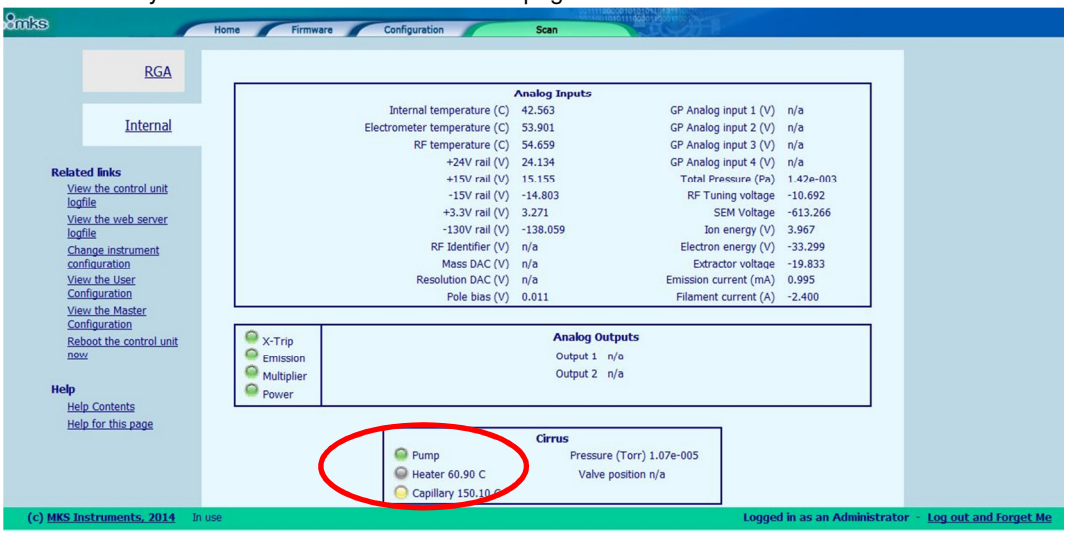


This will take you to the log on page, to veiw the temperatures or configuration without being able to change the settings leave the password box blank and log on. To make changes enter password - profproc

This will take you to the Home page. Click View the internal control unit data to see the heater temperatures



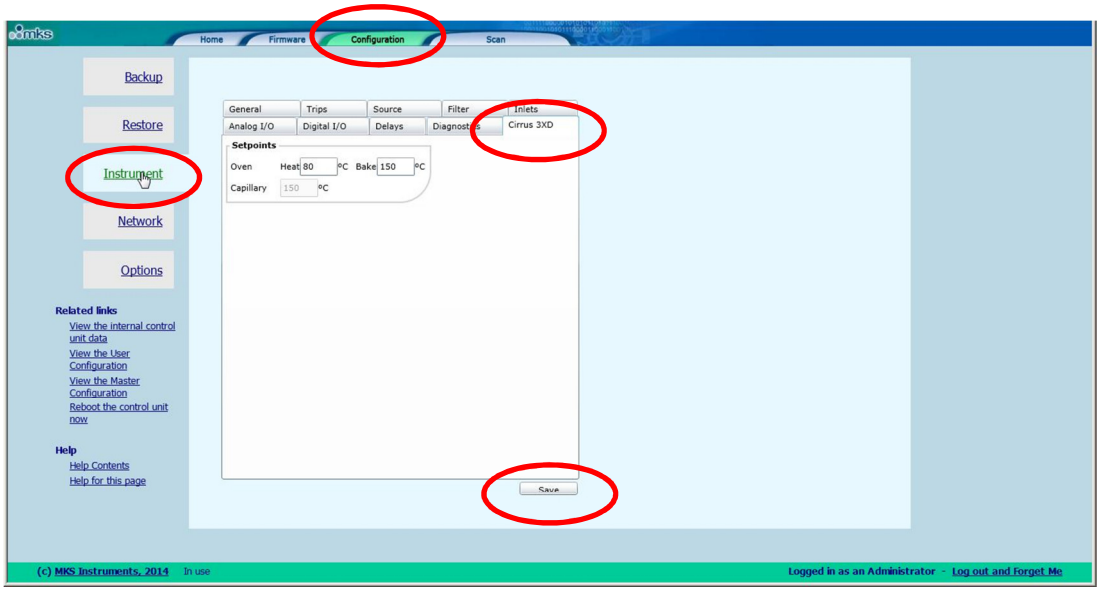
This will take you to the internal control unit data page



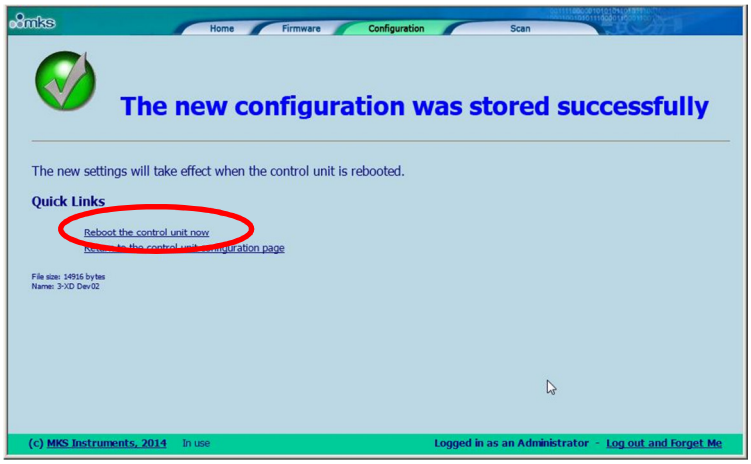
The heaters are grey if they are off, yellow for capillary on and oven at warm, red for oven at bake.

To view the heater setting, click Configuration, then Instrument then Cirrus 3XD.

If you have entered the password which allows changes to be made, once you have made temperature changes, press Save.



You will be taken to this window, click Reboot the control unit now. You will be able to reconnect to the instrument in a few minutes.



7. Maintenance

7.1 Overview

Periodic maintenance of your Cirrus 3-XD will be required to ensure optimal performance. The following sections provide detailed information on filament replacement, ion-source cleaning or replacement and capillary maintenance. If you feel uneasy about tackling any of the following maintenance topics, please contact us for advice or to arrange an on-site service visit where we will carry out the work.

7.1.1 Quadrupole Ion Source

The ion source contains two filaments, only one of which will be in use at any one time. The filament is heated to approximately 2000 degK at which temperature it emits electrons, which are used to produce the ions required by the quadrupole filter. At this high temperature, there are two deleterious effects;
The filament material slowly evaporates and condenses upon the surrounding surfaces. This effect is extremely slow but would require, from time to time, the cleaning of the surrounding source plates and ceramics and the replacement of the filaments.
The second effect is similar to the first except that the vacuum, under which the source is operating, has either a high oxygen or water content. Then instead of metal being deposited upon the surrounding source plates, layers of metal oxides are deposited. Being insulators, these have a far more noticeable effect upon the performance of the source and therefore a more frequent cleaning program should be adopted.

7.1.2 Capillary Inlet

The Cirrus system uses a capillary inlet to admit sample gas into the chamber for analysis. MKS Mass Spectrometry Solutions produce a variety of capillary inlets but the Fused Silica capillary is dealt with in this manual.
The Fused Silica capillary inlet assembly consists of a heated tube containing a fine bore stainless steel tube, down the centre of which is threaded a 0.32mm I.D. fused silica tube.
A low voltage heater runs along the length of the stainless steel tube to provide heating of the fused silica tube.
You may need to replace the fused silica capillary tube which forms part of the capillary inlet assembly, if it has been damaged or becomes blocked.
Frequent baking can cause the Fused Silica liner to become brittle and break at even less than acute angles and over time, a build-up of particulates can lead to a blockage.

7.1.3 Orifice Disk

A pressure reducing orifice disk is fitted to the inlet flange of the RGA chamber, a build-up of particulates can block the holes in this disk.

7.1.4 Pumping System

The turbo pump utilizes a “wet bearing”, the pump manufacturer recommends this is changed every 4 years. The internal diaphragm pump must also be included in your service plan.
Details of servicing are provided in the relevant pump user manuals supplied with your Cirrus 3-XD.

7.2 Removing the covers

These are not operator functions, only competent persons may carry out these operations

Before removing any of the Cirrus3-XD covers, ensure the unit is disconnected from the mains supply and has had adequate time to cool.

When removing parts from the system, ensure all fixings such as screws and washers are accounted for, any lost fixings could cause sevre damage when power is turned back on by shorting across electrical components

7.2.1 Removing Panels, Desktop

Illustration 3. To access the rear of the instrument, required for changing the capillary and orifice disk, the rear panel must be removed. This is done by removing the four screws and pulling the panel backwards until clear of the instrument.

Illustrations 4a & b. Removal of the front panel is required to access the mass filter for source maintenance.

When the rear panel has been removed the front cover can be removed by unscrewing the two screws on each side of the instrument, shown above. The cover is then pulled forwards.

7.2.2 Removing Panels, Rack mounted

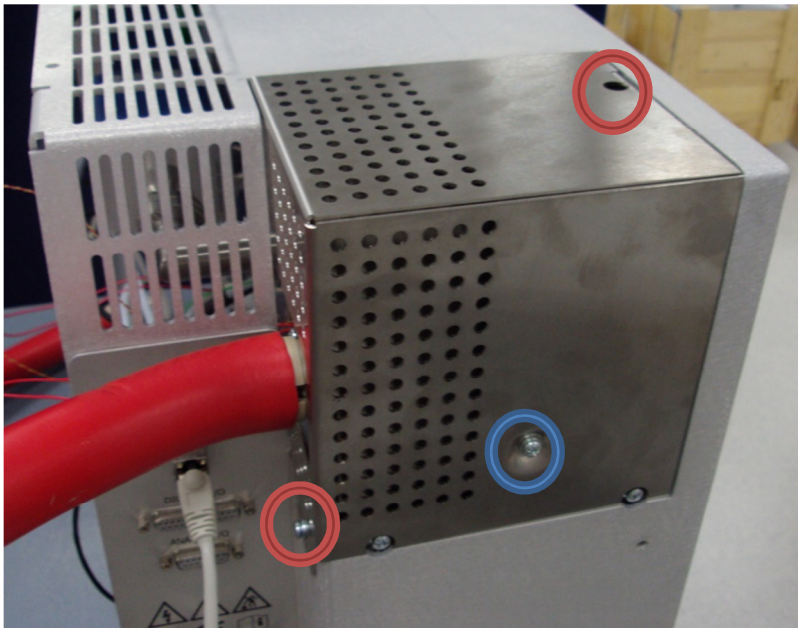


Illustration 5. To access the rear of the instrument, required for changing the capillary and orifice disk, a small rear cover must be removed.

This is done by removing the screw in the blue circle and loosening the screws in the red circles,then pulling the panel backwards until clear of the instrument.

To remove the outer cover, Loosen the three cross head screws near the front of the instrument.

Pull the cover back and lift off.

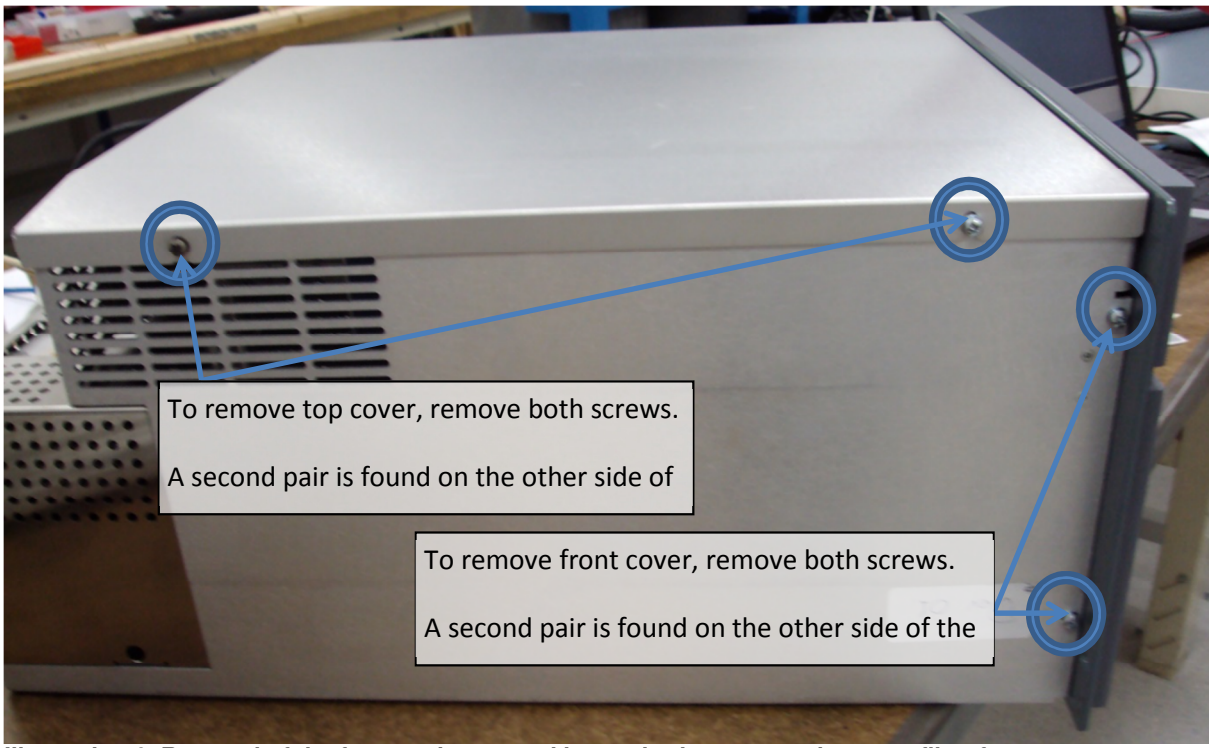


Illustration 6. Removal of the front and top panel is required to access the mass filter for source maintenance.

7.3 Internal Components

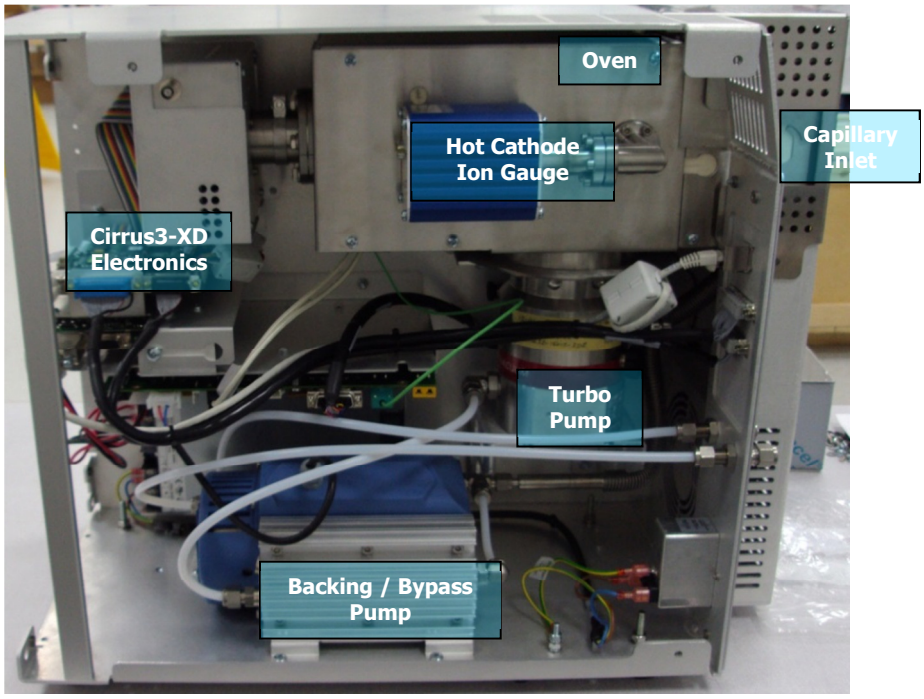


Illustration 7. Side view of the Cirrus 3-XD

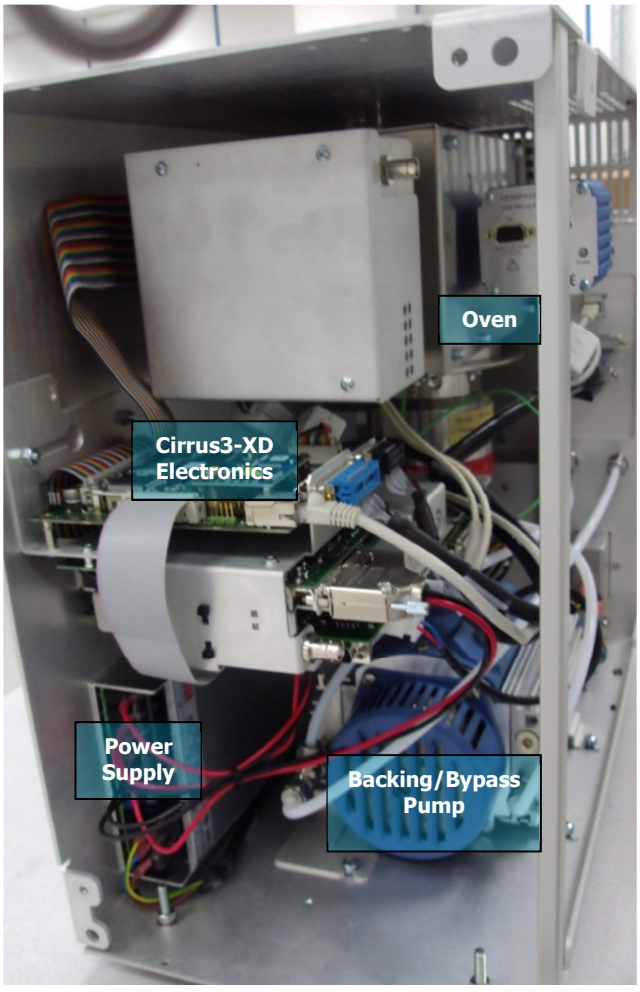


Illustration 8. Front view of the Cirrus 3-XD

7.3 Access to Oven and Capillary

Before removing the oven top plate, ensure the oven has had adequate time to cool after baking.

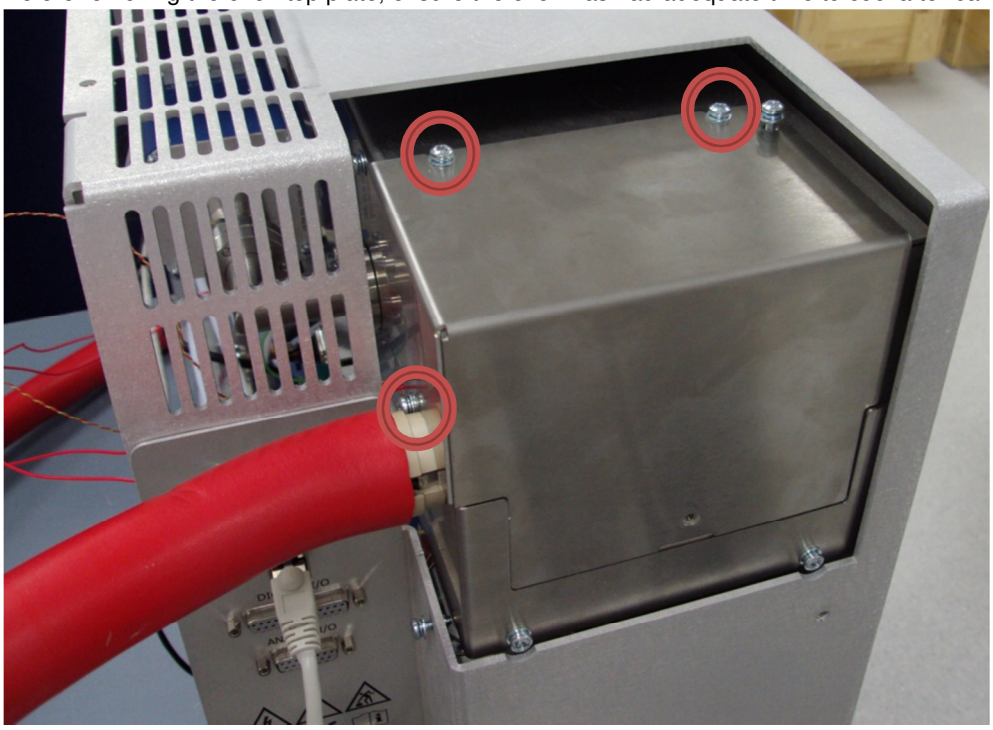


Illustration 9. To remove oven entrance hatch, loosen or remove three screws and lift off cover, to gain access to change the fused silica and VCR orifice

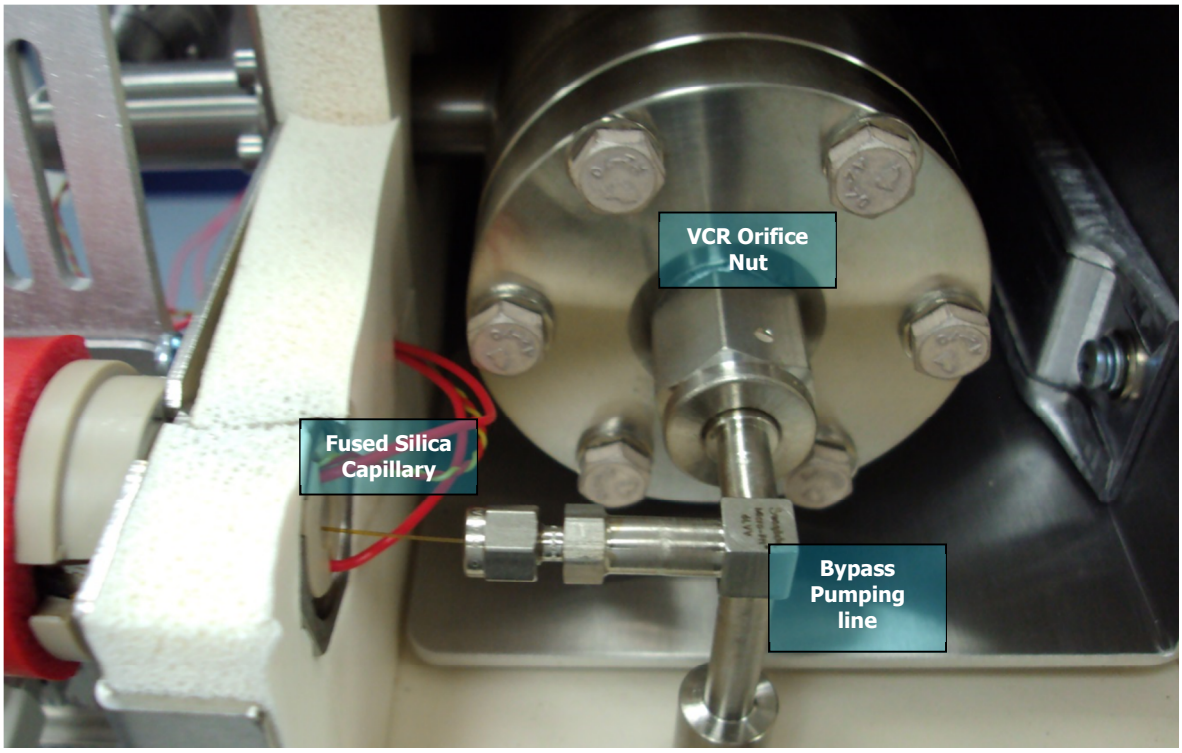


Illustration 10. Top Rear View of Cirrus 3-XD, with fused silica capillary and VCR Orifice connection. The example shown is for the rack mounted Cirrus 3-XD, the desktop version has the capillary entering from the other side.

7.4 Capillary Inlet

Before carrying out ANY operations that involve the capillary system, take precautions to prevent contact with any hazardous substances that may have been sampled. Allow all parts of the inlet and oven to cool before commencing. Wearing suitable protective eyewear is recommended.

The Cirrus 3-XD system uses a capillary inlet to admit sample gas into the chamber for analysis. MKS Mass Spectrometry Solutions produce a variety of capillary inlets, the fused silica option is shown in this manual.

The default fused silica capillary inlet assembly consists of a heated liner tube containing a fine bore stainless steel tube, down the centre of which is threaded a 0.32mm I.D. fused silica tube. Narrower bore fused silica and stanless steel capillaries are also available. The preceedure is simillar for all types of capillary.

You may need to replace the capillary tube which forms part of the capillary inlet assembly, if it has been damaged or becomes blocked.

7.4.1 Removing the liner

1. Shut down the Cirrus by following the instructions in Shutting Down then disconnect from the mains supply. Remove the outer cover.

2. Disconnect the high pressure end of the capillary from the gas source. If there is a shut off valve, remember to close it.

3. Begin with the sample end of the capillary. Loosen the M4 cap-head bolt (1) on the Inlet Connector Clamp until you can rotate the stub-tube (2) by undoing inlet connector clamp from heated capillary end body(3). Completeley remove the stub-tube(2) and the graphite vespel ferrule(4).

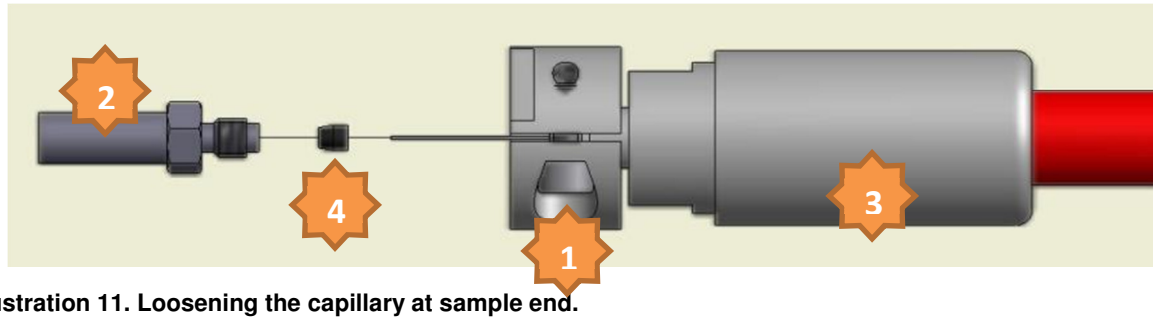


Illustration 11. Loosening the capillary at sample end.

4. Remove the covers as described above.

5. In the oven compartment, use a 5/16“ spanner to undo the nut on the bypass pumping line and slide it, and the ferrule, along the Capillary towards the side of the oven.

6. Carefully slide the capillary down the heated capillary assembly away from the bypass pumping line and remove the nut and ferrule.

7. Once the capillary appears at the high pressure end you can pull it out of the assembly.

7.4.2 Fitting a new liner

1. Take the cassette of fused silica tubing and carefully feed one end down the capillary assembly from the high pressure end. The fused silica tubing is quite fragile but should slide freely down the inner bore of the capillary assembly. Continue to feed the tube down the capillary until it emerges inside the oven.

2. Thread the Swagelok nut and then a new ferrule onto the silica tubing as shown below, cut the end off the fused silica with an appropreate tool, e.g. a ceramic scoring wafer.

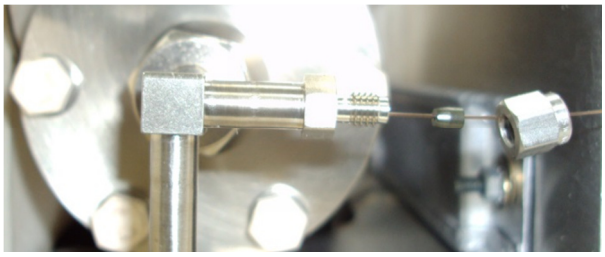


Illustration 12. Note the orientation of the ferrule

3. Thread the fused silica tube into the Swagelok reducer and continue until you feel it butt up against far side inlet, then withdraw the fused silica tube by 2-3 mm.
Slide the ferrule into place then tighten the nut FINGER TIGHT. With a 5/16" spanner tighten the nut a further ½ to 3/4 TURN only.

4. At the high pressure end of the capillary, leave ½" of liner beyond the fitting and carefully cut.

5. Fit a new ferrule (note orientation Illustration 12) and slide the stub-tube onto the liner.

6. Tighten the stub-tube and retighten the Inlet Connector Clamp, finger tight should be sufficent.

7. Perform a Leack Check of the system before fitting the oven lid or covers. See your RGA Software User Guide for details on the Leak Check function.

7.4.3 Replacing the VCR Orifice Disk

The Cirrus 3-XD utilise a VCR orifice disk which allows simple replacement in case of blockage.

Disk part number – 800010097

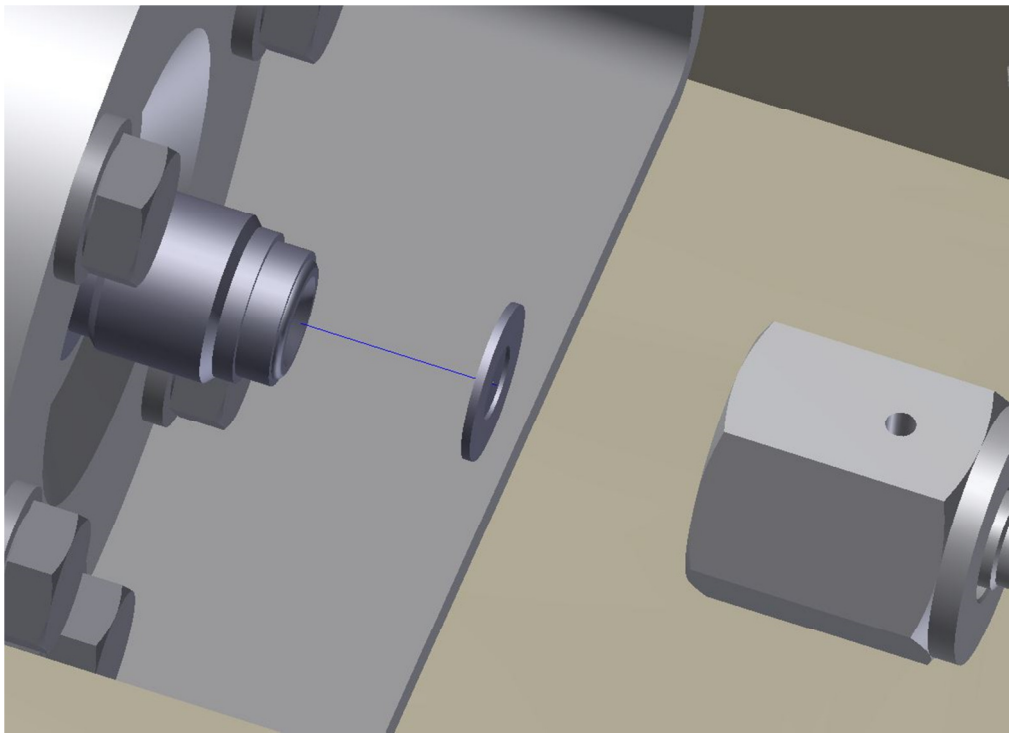


Illustration 13. To replace the disk, follow the steps on removing the outer cover detailed in the preceeding section to allow access to the inlet flange.

Loosen nut holding fused silica capillary first (if fitted) or the fused silica capillary may break.

Loosen the VCR fitting using a ¾" spanner, the disk is fitted into a formed holder which is clipped onto the machined face of the inlet flange. Remove the old disk and replace with the new part, refit the holder to the inlet flange and hand tighten the VCR fitting, then using spanner tighten by an 1/8 turn.

7.5 Analyser Maintenance

CAUTION

THE QUADRUPOLE FILTER IS ACCURATELY ALIGNED BY SKILLED PERSONNEL USING SPECIALIST TOOLS AND JIGS. UNDER NO CIRCUMSTANCE SHOULD THE FILTER ASSEMBLY BE DISMANTLED

You should not attempt repair other than replacing the filaments or cleaning / replacing the ion-source.

Further servicing may be carried out on-site, or on a “Return to Base” basis.
Please contact your local MKS representative for further information.

7.5.1 Access the Analyser feed through

Illustration 14. Desktop Version

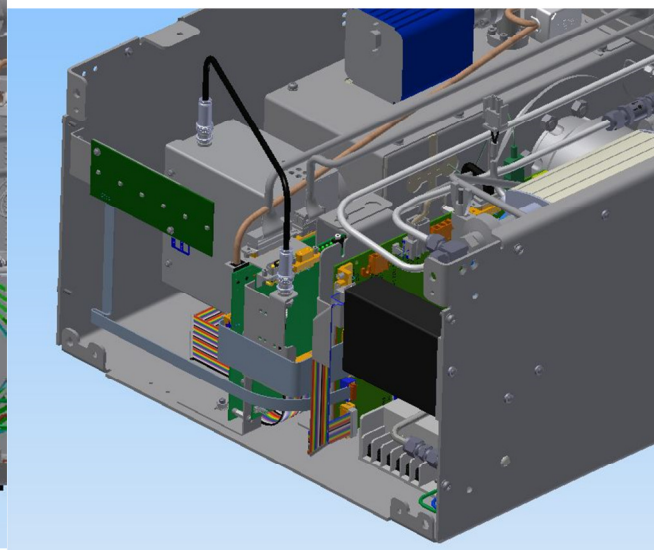


Illustration 15. Rack-mounted Version

Note, the LED pcb has two different mounting positions depending on the instrument type, the desktop version has an additional support strut not fitted to the rackmounted version.

Without unplugging, unscrew the LED pcb and place safely out of the way.

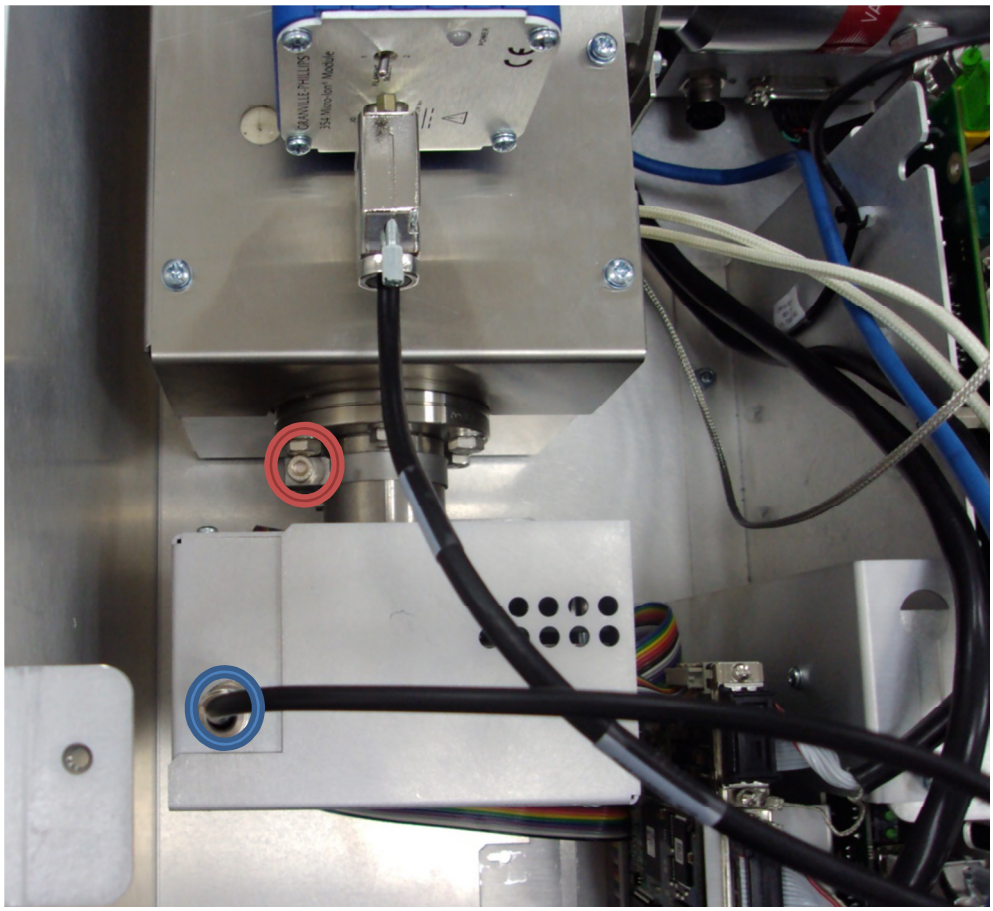


Illustration 16. Unplug the coaxial cable indicated with the blue circle and loosen the bolt in the red circle with a 4mm allen key untill the collar moves freely. Pull the box connected to the analyser away towards the front of the instrument, place it clear as shown below.

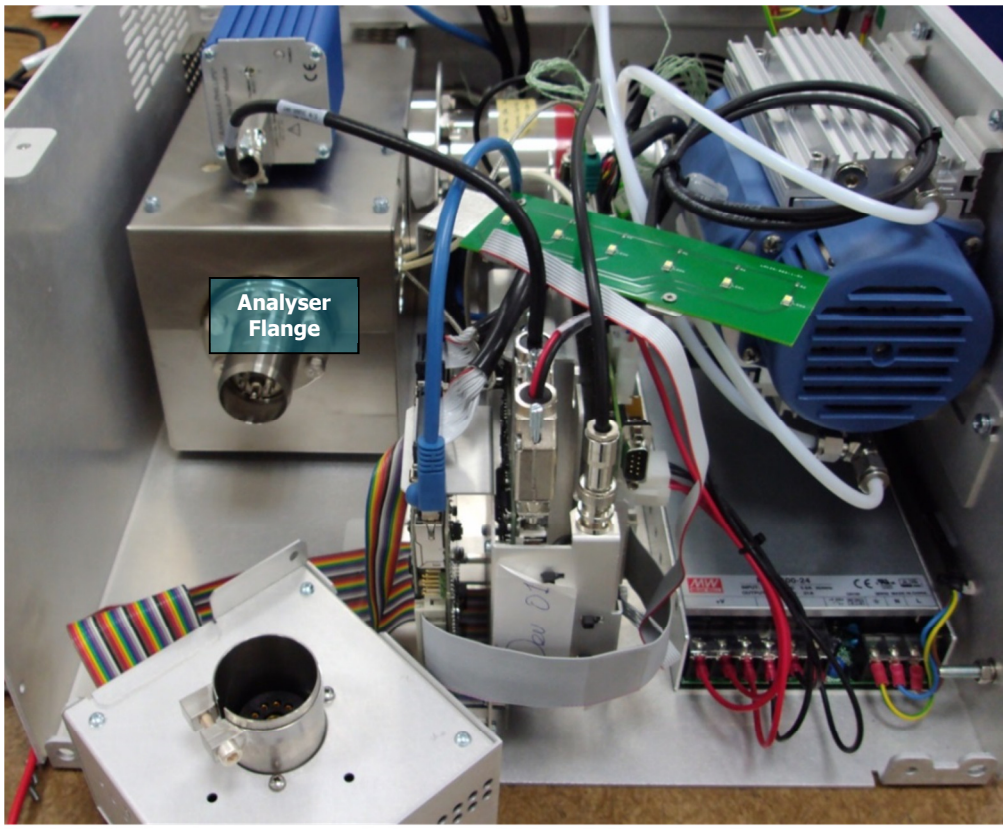


Illustration 17. Cirrus 3-XD with LED pcb and RF/electrometer unit de-mounted.

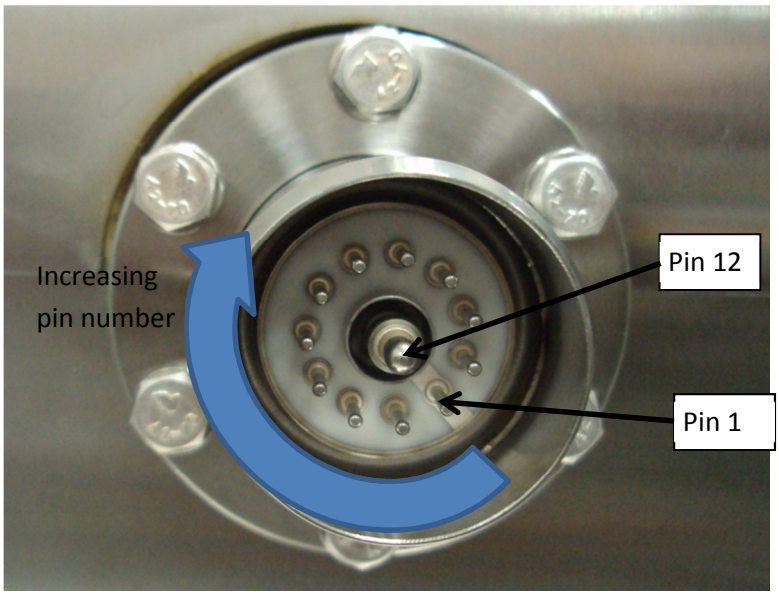


Illustration 18. Pin 1 is recognised by the track connecting it to earth, the pin number increases in the clockwise direction, pin 12 is the center pin.

7.5.2 Ohmmeter analyser checks

There are a number of circumstances when carrying out some simple checks with an ohmmeter can be worthwhile. If you suspect a failed filament, or want to check for shorts-circuits following maintenance, performing some simple checks can save a great deal of time.

In carrying out these checks, we can legitimately accept two ranges of meter readings as possibly acceptable and anything outside these ranges as being a definite fail. Any readings less than 1 ohm we can assume as a short-circuit and any reading above 5 Meg Ohm ($5x10^6$ ohms) as being open circuit. The following assumes that the analyser is still on the vacuum system and details all the possible tests.

Tools required: Ohmmeter with leads
Please refer to Page 47 for analyser pin numbers.

1. Attach a meter lead to pin 1 of the analyser feedthrough.

2. Connect the other lead to the analyser flange, you should read a short circuit. If not, you have either a serious problem, or more likely a faulty meter/meter leads. If after checking your meter, an open circuit still exists, contact your nearest MKS service center for advice.

3. Move the lead from the flange and connect to pins 2 through12 on the analyser feedthrough in turn. Each one should give an open circuit. If not, you have a short to earth.

There are two types of short to earth, an internal short between one part of the analyser and an earthed part of the analyser, or more commonly, a short between part of the analyser and the vacuum chamber.
In either case, remove the analyser from the vacuum chamber and repeat the test. If the result is the same, then you have an internal short and should contact your local MKS facility for advice.
Repeat the ohmmeter tests before pumping down the vacuum chamber. Remember that the ion source gets very hot during operation and the stainless steel components will expand slightly. Sometimes a short will only develop when the analyser has been run for a while and is up to temperature.

4. Move the meter lead from pin 1 and attach it to pin 2 of the analyser feedthrough. Connect the other lead to pins 3 through 12 on the analyser feedthrough in turn. Each one should give an open circuit.
Now move the meter lead from pin 2 to pin 3 and check to pins 4 to 12. Proceed around the feedthrough until all possible connections have been checked.
All the pins should show an open circuit to all other pins, EXCEPT pin 4 to 8,pin 4 to 10 and pin 8 to 10, which should show short-circuit as these are the filament connections.
If any of the pins read short-circuit to another pin, contact your local MKS service center with the results of your tests and they will advise you how to proceed.

7.5.3 Checking filaments

The status of the filaments is constantly monitored by the Cirrus 3-XD and the operating software. This is achieved by measuring the flow of electrons emitted by the hot filament, referred to as the emission current, flowing to the ion source.

This is normally maintained at a fixed value of 1mA. The current flow through the filament is increased until the value of emission current is reached. If, however, the control electronics reaches the limit of its filament current supply capability and the emission current has still not reached 1mA, a filament fail condition will exist.

In the vast majority of cases this will be due to a blown filament, more correctly described as an open circuit filament. There are other conditions, such as a heavily contaminated ion source, which will result in a filament fail condition when the filament is not open circuit.
If you suspect a blown filament, carry out the following test before removing the analyser from the vacuum system.

Connect meter lead one to analyser feedthrough pin 8, which is the common connection to both the filaments.
Connect the second meter lead to pin 4 (Filament 1). You should read short-circuit.
Next connect the second meter lead to pin 10 (Filament 2), again your meter should indicate short-circuit.
If either or both filaments are blown, the meter will indicate an open-circuit and the filaments will need to be replaced.
If the meter reading suggests that the filament is good but the control unit shows a filament fail, the most likely cause would be a break down in electrical continuity or contamination of the ion source.

7.5.4 Changing filaments

Changing filaments is the most common maintenance event with quadrupole analysers. For this reason the MKS analyser has been designed to make this task as quick and easy as possible.
Below is a list of the tools and equipment you will require. We recommend that you assemble the following items before you start. Remember that the instrument is supplied with a tool kit that contains some of the things you will need;

- small jewelers screwdriver (2mm)
- pair of tweezers
- small pair of smooth jawed needle nosed pliers
- pair of clean cotton gloves
- clean bench on which to work
- Ohmmeter
- clean container in which to put small parts
- replacement filament
- a method of holding the analyser securely in an upright position, (a small bench vice is ideal).
- pen and paper on which to make notes and sketches

You are now ready to pump down and continue the operation of your quadrupole.

7.5.5 Removing the filaments

1. Remove the analyser from the vacuum system making sure that you do not touch the exposed internal surfaces and place it on the bench in an upright position.

2. The filaments are located on the very top of the analyser, retained by four M2 x4 pan head screws. The electrical connections are made via two barrel connectors, one to each filament.

3. Hold the barrel connectors firmly with your pliers and slacken the screws shown until the barrel connector can be removed from the filament plate and the connecting lead, the screws do not have to be removed, see Illustration 19 & 20.

4. Remove the four M2 x4 pan head screws holding the filament plate in place, see Illustration 21.

5. Remove the two filament plates. Carry out this step carefully so as not to damage the filaments, see Illustration 22.

Refer to the views on the following page

Cirrus 3-XD ion source views

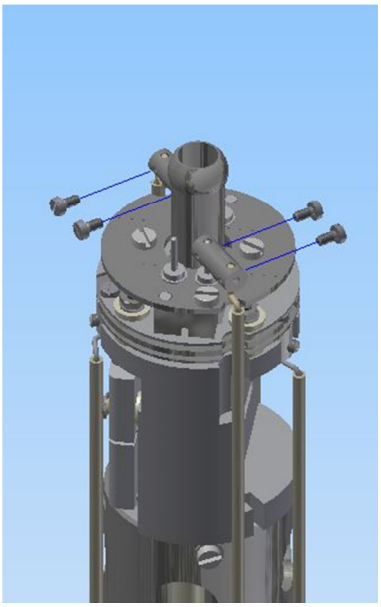


Illustration 19. Loosen screws indicated

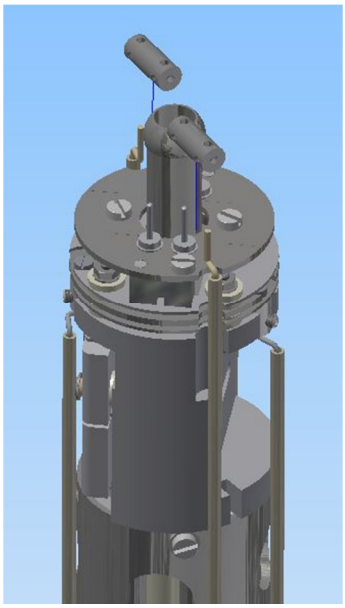


Illustration 20. Remove barrel connectors

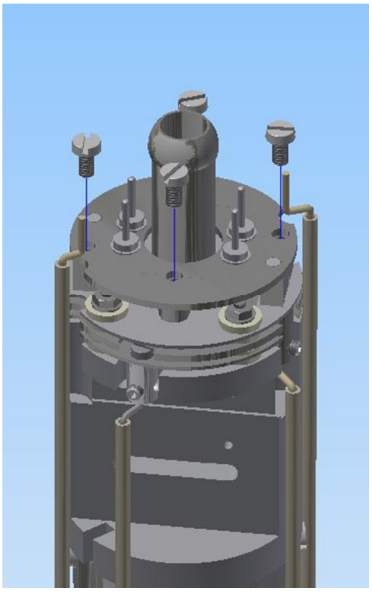


Illustration 21. Remove M2 screws

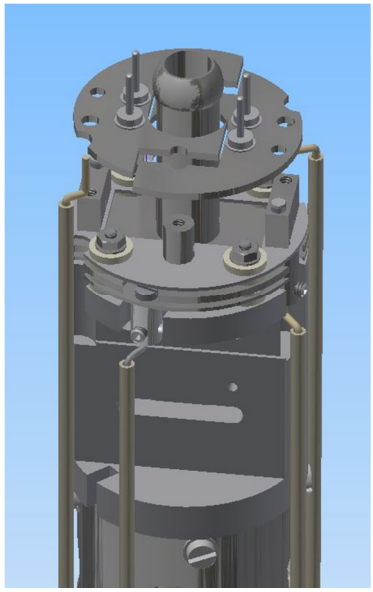


Illustration 22. Carefully remove filament plates

At this stage it is worthwhile looking to see if the source requires any attention, especially if the filament(s) have broken because of an over pressure situation in your vacuum system.

With the filaments removed, you have a clear view of the source. The signs to look for are powdery deposits, which will vary in colour but may be brown, blue, canary yellow or white depending upon the precise circumstances which led to their formation.
If these oxides are present, it is recommended that you refer to the section on ion source cleaning on page 43 before proceeding.

7.5.6 Fitting filaments

The fitting of filaments is simply the reversal of the procedure for removing them. Care should be taken at all stages to ensure that no shorts are introduced and that the analyser is kept clean.

1. Using tweezers carefully place each filament plate onto the mounting posts. Each filament plate has a locating hole which fits over a locating stud.

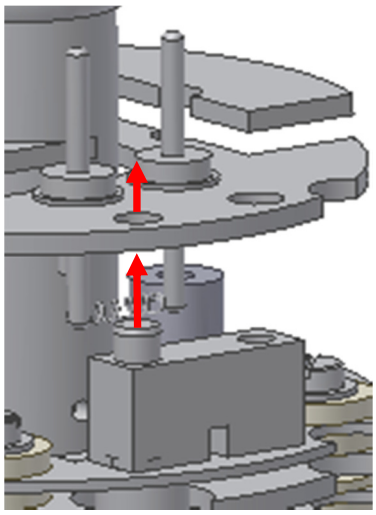


Illustration 23. Refitting the filaments

2. Loosely re-fit the four M2 x4 pan head screws through the filament plates.

3. Once all four screws have been loosely fitted, check the alignment of both filament plates before tightening securely.

4. Re-fit each barrel connector in the same orientation as removed, sliding each barrel connector over the connecting lead and filament post and while holding the barrel connector firmly with pliers, tighten all screws.

Do not slide the barrel connector all the way down the filament post as you may short-circuit the insulating feedthrough. Leave 1- 2mm of clearance

5. Before re-fitting the analyser to your vacuum chamber, refer to page 38 for details on how to check for any short circuits.

6. Replace the analyser into your vacuum housing and again check for shorts or grounding to the outer vacuum housing.

You are now ready to pump down and continue the operation of your quadrupole.

7.6 Ion Source cleaning

7.6.1 Cleaning while fitted to the analyser

Sometimes it is possible to clean the ion source without removing it from the analyser. For the user who has the necessary equipment available including a means to suitably dry the analyser, it is usually worth trying this method before removing or replacing the ion source. However, it is likely only to be successful where the source is contaminated with loose or alcohol soluble deposits.

Remove the analyser from the vacuum chamber and place it on the bench in an upright position (the use of a small bench vice is recommended), remove the filaments by following the guide starting on Page 40.

Insert the analyser into the measuring cylinder so that the knife edge side of the flange rests on the lip of the cylinder. Note the level which the ion source comes to on the measuring cylinder before removing the analyser and filling the measuring cylinder with sufficient iso-propyl-alcohol to cover the ion source only.

Note: the measuring cylinder should be of a diameter and length to accommodate the analyser.
Put the measuring cylinder into the ultra-sonic bath for 10 to 15 minutes.
Remove the analyser and allow any excess alcohol to drain off. Keep the analyser inverted (feedthrough upper most) until it is dry.
Do not let any alcohol run down the analyser into the flange assembly as this will seriously damage the multiplier.
Check the condition of the ion source. A second or third wash may be required.

The ultra sonic bath may loosen some of the screws in the ion source. Take care not to throw these away when discarding the alcohol

The analyser must be dried of cleaning solution before it can be used. We recommend the use of a clean oven for this purpose. The oven should be set at 80^0C and the analyser baked for at least two hours.

Check the documentation on your cleaning solution for guidelines on handling the substance and any fire or explosion risks involved

After the bake period, check all the screws in the ion source are tight and re-fit the analyser to the vacuum chamber. A further bake under vacuum will be required to drive off any remaining residue.

7.6.2 Remove for cleaning

The analyser design permits the removal of the ion source as one complete assembly for cleaning or replacement. The ion source is easily aligned to the main analyser assembly, allowing easy replacement without the need for special jigs.

Below is a list of the tools and equipment you will require. We recommend that you assemble the following items before you start. Remember that the instrument is supplied with a tool kit that contains some of the things you will need.

- Small jeweler's screwdriver (2mm)
- Pair of tweezers
- Small pair of smooth jawed needle nosed pliers
- Pair of clean cotton gloves
- Clean bench on which to work
- Ohmmeter
- Clean container in which to put small parts
- Pen and paper on which to make notes and sketches

1. Remove the analyser from the vacuum system, place it on the bench in an upright position (holding the analyser in a small bench vice or analyser support stand is recommended).

2. If you are cleaning the ion-source, then you should remove the filaments by following the guide starting on Page 40.

3. Loosen the three M2 x3 grub screws shown as exploded in Illustration 24 & 25, these secure the three insulated wires that run from the analyser flange assembly to the source, repeller and extractor plates and move the wires out of the way.

4. Remove the screw that holds the insulated wire to the V-lens, Illustration 26.

5. Remove the three M2 x4 screws and shakeproof washers shown as exploded that hold the source assembly to the filter assembly, see Illustration 27.
6. Carefully withdraw the source assembly from the filter, Illustration 28.

Refer to the views on the following pages.

PVD Ion source views

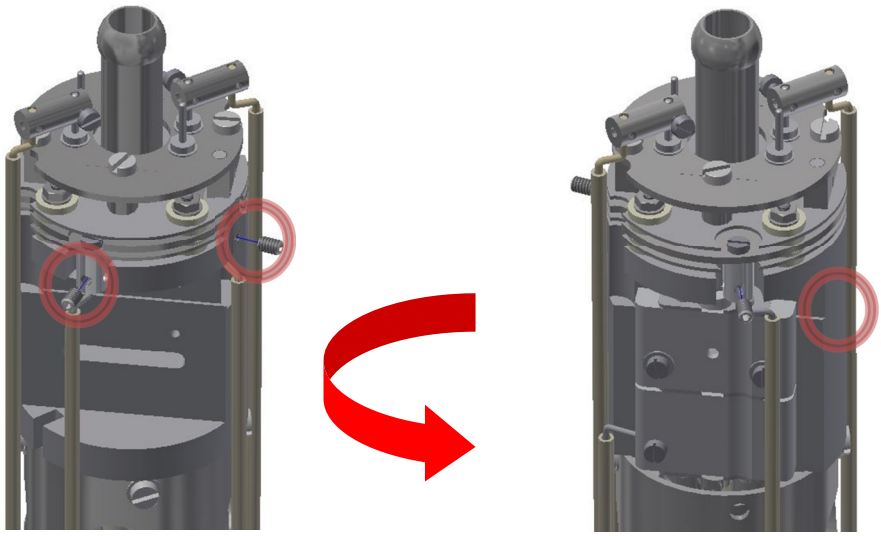


Illustration 24&25.Remove grub screws and withdraw wires

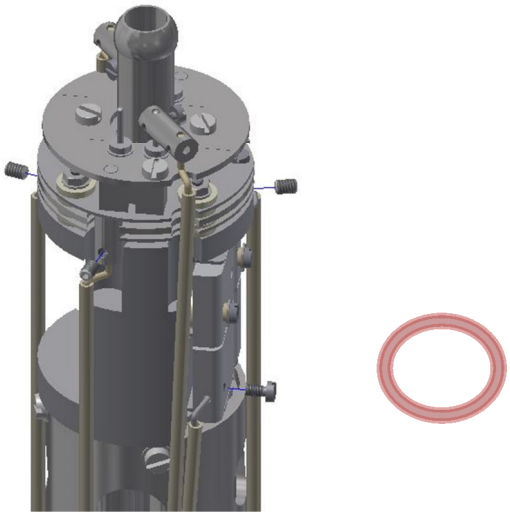


Illustration 26. Remove screw and withdraw wire

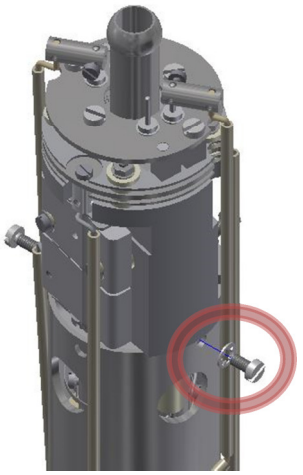


Illustration 27. Remove screw shown

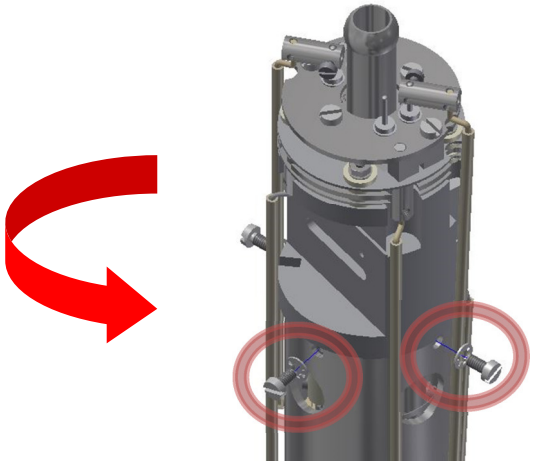


Illustration 28. Remove screws shown

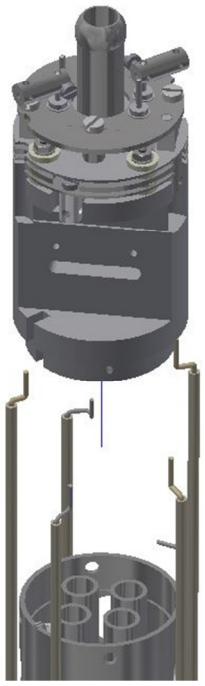


Illustration 29. Carefully remove source, the filaments should have been removed.

7.6.3 Refitting the ion source

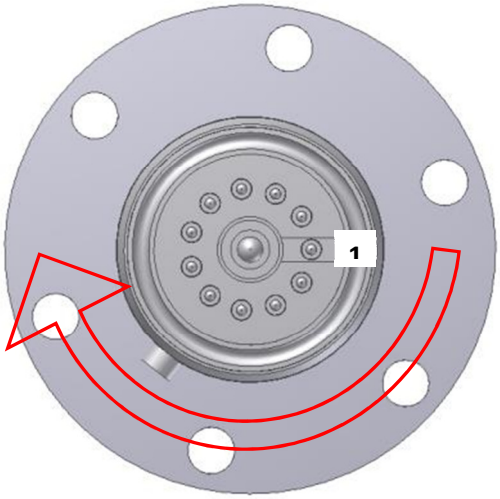
Refitting the ion-source is simply the reversal of the procedure for removing it. Care should be taken at all stages to ensure that no shorts are introduced and that the analyser is kept clean.

The orientation of the ion-source is by the small notch on the mounting base. This notch is positioned so that it sits over the gold leads visible on the filter assembly as indicated below.
Once positioned, slide home the ion-source assembly so that it sits flush on top of the filter, refit the three M2x4 screws and shakeproof washers and tighten securely.

8. Exploded Views

8.1 Analyser pin-outs

Pin 1 is easily identified as it is the only pin with a metalized contact running through it. The pins are numbered clockwise from this pin. The large central pin is pin 12



Pin Descriptions	
Pin	Connection
1	Earth
2	Source plate
3	Electron Multiplier
4	Filament 1
5	Extraction plate
6	Suppressor plate
7	RF.1
8	Filament common
9	V-Lens
10	Filament 2
11	RF.2
12	Detector Output

9. Spare Parts

Spare parts for your quadrupole analyser are available from your local MKS Instruments sales office under the part numbers detailed below.
Filaments are supplied in pairs, either on a single plate or on two plates depending on the analyser.
Replacement ion sources are supplied complete with filaments.

Filaments

Ion Source	Tungsten	Thoriated Iridium
V-lens PVD	842-060	842-002

Ion source

Ion Source	With Tungsten Filaments	With Thoriated Iridium Filaments
V-lens PVD	LM511-100-1	LM511-101-1

If you require a spare part not mentioned above, please contact your local MKS Instruments office for help on obtaining a part number.

10. Returning Your Unit for Service

If you wish to return an MKS Mass Spectrometry Solutions product for maintenance / repair / upgrade, please follow these simple guidelines. Because of the returned product will be dismantled and possibly cleaned by an MKS technician we therefore require a Declaration of Contamination report (CSG-001-F001) to be completed to preclude the potential health risk to our service personnel.

Declaration of Contamination report can only be completed and signed by an authorised and qualified person!

Please fill in the declaration, sign it and send by email to your local Service Coordinator.

MKS Mass Spectrometry Solutions Service Centres:
Europe 00 44 1270 250 150
USA 00 1 408 750 0347

The Service Coordinator will review the declaration and authorise the return with and RMA number.

Securely package all items to be returned, using the original packaging where possible and send to the address provided by the Service Coordinator. Also please attach a copy of the declaration to the product with the RMA number before shipping to the Service Centre.

Maintenance / repairs / upgrades will only be carried out on products accompanied by a fully completed and correct Declaration of Contamination report and have RMA number. If this is not the case, the corresponding repair will be delayed or refused. A separate declaration must be submitted for each device and each product. Every product returned without a completed declaration secured to the outside of the package, will be returned to the customer unprocessed, at their cost. If following inspection and quotation you decline the repair you may be subject to a service fee to cover the cost of product disassemble, cleaning, testing and evaluation.

Please also be advised that by sending your equipment to us, you have authorized us to disassemble the product for inspection or failure analysis. The act of disassembling may permanently damage old components. If the product is subsequently deemed un-repairable or you decline the repair and request the item to be returned, we cannot ensure that it will be reassembled to working condition upon return.

We wish to draw your attention to the following points:
The product being returned must be fully decontaminated, securely packed and shipped prepaid.
Please list all adapters, fittings and valves that are not an integral part of the instrument on the Declaration of Contramination report. MKS Mass Spectrometry Solutions will not be responsible for unlisted items loss or damage.
A product returned from a restricted country or a denied end user will not be accepted!

The environment and the health & safety risks may be of the following nature:
Chemical: Danger to health, risk of explosion, fire, risks to the environment. Please indicate the chemical formula and name of all gases or substances that have been in contact with the product.
Biological, explosive, radioactive: In case of biological, explosive, radioactive contamination our Service Centre is currently unable to decontaminate and recycle such materials without risk to the safety of our staff. Please contact us before sending the product to the Service Centre.

In the event of chemical contamination, please indicate the following gases or substances:
Gases (or substances) introduced into the reactor and which may be found at the exhaust.
Gases (or substances) resulting from the reaction or process.
Gases (or substances) that may possibly be formed inside the returned product (due to a chemical or thermodynamic reaction, condensation, deposition, precipitation etc.)

We are sure that you share our concern for the safety of our personnel and we request your full cooperation in carrying out these few extra steps prior to returning any and all products to MKS Mass Spectrometry Solutions.

mks
Technology for Productivity

DECLARATION OF CONTAMINATION

RMA

THIS FORM MUST BE COMPLETED AND RETURNED WITH EQUIPMENT OR SERVICE WILL NOT BE PERFORMED!

1. CONTACT INFORMATION

Reported by:		Company:	
Position:		Site:	
Email:		Phone:	

Customer data:

Customer:	
Site:	

End User data *(if different from customer)*

End user:	
End user:	

Invoice Address

FAO:		Company:	
Email:		Phone:	
Address:			

Return Address *(if different from above)*

FAO:		Company:	
Email:		Phone:	
Address:			

2. INSTALLATION DETAILS

MKS Part Number:		(1) MKS Serial Number:	
Description:		Date of installation:	
Customer PO #:		MKS SO #:	
(2,3) RGA Orientation:		(2) Vacuum pressure:	

1 - In case of a complete RGA system failure please add the system serial number here. 2 - When the fault experienced. 3 - horizontal / vertical / other

Has this equipment been used? *(Please check appropriate boxes)*

☐ No – Still in MKS packaging.

☐ No – Unit unpacked, but never installed in a system.

☐ Yes – Used only with clean, dry inert gas (i.e. Air, N2, Ar, He).

☐ Yes – Used with chemicals. Please indicate if the product has been subjected to any compound of the following contaminants:

Toxic	☐ Yes	☐ No	Radioactive	☐ Yes	☐ No	Sulphur (S)	☐ Yes	☐ No
Carcinogenic	☐ Yes	☐ No	(4) Copper (Cu)	☐ Yes	☐ No	Silicone oils / greases	☐ Yes	☐ No
Combustible	☐ Yes	☐ No	Lead (Pb)	☐ Yes	☐ No	Alkali Metals (Li, Na, K etc.)	☐ Yes	☐ No
Corrosive	☐ Yes	☐ No	Cadmium (Cd)	☐ Yes	☐ No			
Explosive	☐ Yes	☐ No	Antimony (Sb)	☐ Yes	☐ No	Other harmful substances	☐ Yes	☐ No
Biological	☐ Yes	☐ No	Zinc (Zn)	☐ Yes	☐ No			

4 - Equipment must be double bagged. Label outside bag and packing slip: "Copper Part". Label final shipping container: "Copper Part" and place a strip of orange tape on the container.

Chemical formula	CLP classes of dangerous goods	Risks and precautions associated with	Process description	Decontamination description
1.				
2.				
3.				
4.				
5.				
6.				
7.				

Other substances and by-products which may have come into contact with the product:

CSG-110-F001 – May, 2014.
Superseding: WD-009-F001_v3 – Oct, 2013.

Page 1 of 2

Tel: +44 1270 250 150 Ext. 129.

DECLARATION OF CONTAMINATION

RMA

THIS FORM MUST BE COMPLETED AND RETURNED WITH EQUIPMENT OR SERVICE WILL NOT BE PERFORMED!

1. CONTACT INFORMATION

Reported by:		Company:	
Position:		Site:	
Email:		Phone:	

Customer data:

Customer:	
Site:	

End User data *(if different from customer)*

End user:	
End user:	

Invoice Address

FAO:		Company:	
Email:		Phone:	
Address:			

Return Address *(if different from above)*

FAO:		Company:	
Email:		Phone:	
Address:			

2. INSTALLATION DETAILS

MKS Part Number:		(1) MKS Serial Number:	
Description:		Date of installation:	
Customer PO #:		MKS SO #:	
(2,3) RGA Orientation:		(2) Vacuum pressure:	

1 - In case of a complete RGA system failure please add the system serial number here. 2 - When the fault experienced. 3 - horizontal / vertical / other

Has this equipment been used? *(Please check appropriate boxes)*

- ☐ No – Still in MKS packaging.
- ☐ No – Unit unpacked, but never installed in a system.
- ☐ Yes – Used only with clean, dry inert gas (i.e. Air, N2, Ar, He).
- ☐ Yes – Used with chemicals. Please indicate if the product has been subjected to any compound of the following contaminants:

Toxic	☐ Yes	☐ No	Radioactive	☐ Yes	☐ No	Sulphur (S)	☐ Yes	☐ No
Carcinogenic	☐ Yes	☐ No	(4) Copper (Cu)	☐ Yes	☐ No	Silicone oils / greases	☐ Yes	☐ No
Combustible	☐ Yes	☐ No	Lead (Pb)	☐ Yes	☐ No	Alkali Metals (Li, Na, K etc.)	☐ Yes	☐ No
Corrosive	☐ Yes	☐ No	Cadmium (Cd)	☐ Yes	☐ No			
Explosive	☐ Yes	☐ No	Antimony (Sb)	☐ Yes	☐ No	Other harmful substances	☐ Yes	☐ No
Biological	☐ Yes	☐ No	Zinc (Zn)	☐ Yes	☐ No			

4 - Equipment must be double bagged. Label outside bag and packing slip: "Copper Part". Label final shipping container: "Copper Part" and place a strip of orange tape on the container.

Chemical formula	CLP classes of dangerous goods	Risks and precautions associated with	Process description	Decontamination description
1.				
2.				
3.				
4.				
5.				
6.				
7.				

Other substances and by-products which may have come into contact with the product:

DECLARATION OF CONTAMINATION

THIS FORM MUST BE COMPLETED AND RETURNED WITH EQUIPMENT OR SERVICE WILL NOT BE PERFORMED!

Has this equipment been cleaned? *(Please check appropriate boxes)*

Has equipment been purged?	☐ No.	☐ Yes.	Purged with what?	
Has equipment been flushed?	☐ No.	☐ Yes.	Flushed with what?	
Has equipment been decontaminated?	☐ No.	☐ Yes.		

Explain decontamination process:

Operation time

How many months has this equipment been in use?	

MKS will not accept delivery of equipment that has been chemically, radioactively or biologically contaminated, without written evidence of decontamination or laboratory analysis. Alternately, we will require evidence that the biological process is not harmful.

3. DETAILED FAILURE INFORMATION OR DESCRIPTION OF REQUIRED SERVICE OR REASON FOR RETURN

If an installed unit fails please attach a data file or a screen shot of the fault to support the investigation!
Permanent or intermittent failure? Continuous or delayed/time dependant failure?
Has the unit been exposed to any unusual environmental conditions (magnetic or electrical field, radiation, humidity etc.)?

4. LIST OF PART AND ACCESSORIES FOR RETURN

Please list here all components, accessories which you are returning to MKS UK Service Centre. If you fail to mention any components, accessories MKS UK Service Centre will not accept responsibility for their return.

5. IMMEDIATE ACTIONS TAKEN TO RESOLVE THE FAULT AT CUSTOMER LOCATION

Task	By whom?	Status
1.		
2.		
3.		

6. DECLARATION

I hereby guarantee that the information in this Declaration of Contamination report is correct and complete. I guarantee that the device has been fully decontaminated before being packed. If I haven't had MKS UK Service Centre written approval, I also guarantee that the device hasn't been in contact with biological hazardous, explosive or radioactive gases or substances. I, the undersigned, am able to produce a true assessment. I am aware of the customer liability towards the MKS UK Service Centre for damage resulting from incomplete or inaccurate details; customer undertake to be responsible for any third-party claims based upon claims of contamination or other non-conformity with the statements herein. I guarantee that the country where the product has been returned from is not restricted and the end user is not denied.

Date: **Printed Name:** **Signature and company seal:**