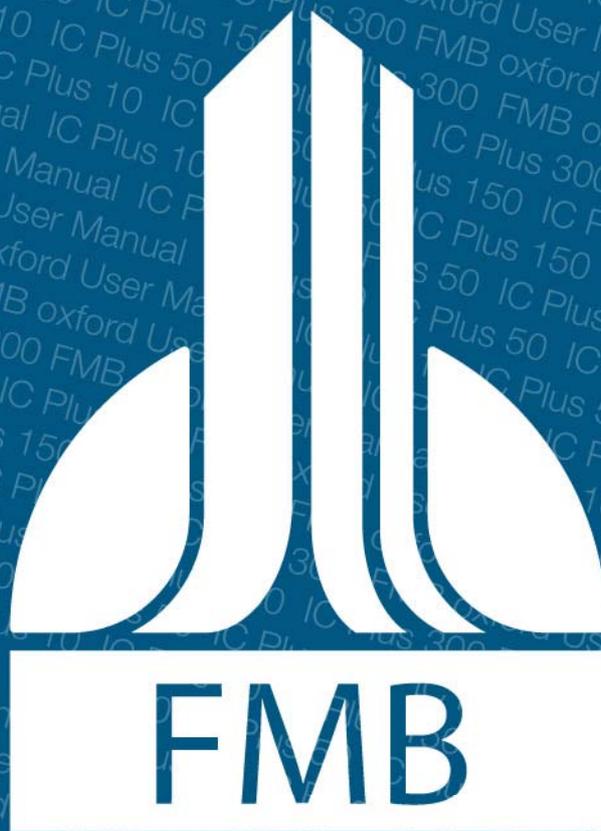




FMB Oxford

IC Plus 10, 50, 150 & 300 Ionisation Chamber User Manual



February 2010

Version 2.0



Important Information

This technical manual is intended to help the user operate the IC Plus 10, 50, 150 & 300 Ionisation Chambers manufactured by FMB Oxford.

Before attempting to operate the system **PLEASE READ THE INSTRUCTIONS**

This product should only be used by persons legally permitted to do so.

Warranty

Products of FMB Oxford are warranted to be free from all defects in materials and workmanship. The liability of FMB Oxford under this guarantee is limited to servicing, adjusting or replacing defective parts. The guarantee is effective for one year from the date of dispatch to the original purchaser, provided:

1. The product is returned to the factory, undamaged by failure to provide sufficient packaging.
2. The product appears to FMB Oxford's satisfaction to be defective through no fault of the user.
3. The equipment has been handled and operated in accordance with the instructions and advice given in this manual or any other instructions which may be provided by FMB Oxford.
4. Customer Returns Authorisation is obtained from FMB Oxford before returning any item for service or repair.

Important Health and Safety Notice

When returning components for service or repair, it is essential that the item is shipped together with a signed declaration that the product has not been exposed to any hazardous contamination, or that appropriate decontamination procedures have been carried out so that the product is safe to handle.

Feedback

Care has been taken to ensure the information in this manual is accurate and at an appropriate level. Please inform FMB Oxford if you have any suggestions for corrections or improvements to this manual.

Trademarks

FMB Oxford acknowledges all trademarks and registrations.

Copyright

Copyright © 2010 FMB Oxford Limited. All rights reserved. No part of this document may be reproduced or distributed in any form, or by any means, or stored in a database or retrieval system, without prior written permission of FMB Oxford.



Contents

Important Information.....	2
Important Health and Safety Notice.....	2
Feedback.....	2
Trademarks	2
Copyright	2
Contents	3
1 Health and Safety Information	4
General.....	4
Electrical Safety.....	4
Potential Electrical Hazards.....	4
Recommended Precautions	5
Safe Mechanical Practice	5
X-rays	5
Gas Pressure.....	5
Modifications and service	5
2 Introduction.....	6
2.1 Scope of Supply.....	6
2.2 How To Use This Manual.....	7
2.3 System Description.....	7
3 Specifications-common to all IC Plus.....	8
3.1 Environment.....	8
3.2 Details.....	8
3.3 Connectors.....	8
4 Installation.....	9
4.1 Dimensional Information	9
4.2 Optional Adaptor Information.....	11
4.3 Optional Electronics and Cable Information.....	11
4.4 Adjustment of the electrode plates.....	12
4.4.1 IC Plus 10 Electrode adjustment.....	12
4.4.2 IC Plus 50, 150 & 300 Electrode adjustment.....	13
4.4.2.1 To achieve the 18 mm separation (assumes separation is 14 mm):-.....	14
4.4.2.2 To achieve the 10 mm separation (assumes separation is 14 mm):-.....	14
4.5 Changing or replacing the window material.....	15
5 Operating Instructions	16
5.1 Safety.....	16
5.2 Operation	16
6 Maintenance Instructions.....	17
6.1 Bakeout Information.....	17
7 Spares.....	18

1 Health and Safety Information

General

In normal operation, the system is designed to operate safely. The user should, however, be aware of potential hazards which exist in and around equipment of this type and of the ways of avoiding possible injury and equipment damage which may result from inappropriate ways of working. A description of such potential hazards, and how to avoid them is given in this section.

If the equipment is used in a manner not specified in the User Manual, the protection provided by the equipment may be impaired.

This manual adopts the following convention:

**WARNING**

Indicates a potential hazard which may result in injury or death

**CAUTION**

Indicates a potential hazard which may result in damage to equipment

See original manufacturers' manuals for further safety data on third party equipment supplied with the system.

**WARNING**

Do not take risks. You have a responsibility to ensure the safe condition and safe operation of equipment.

Electrical Safety

In normal use the user is protected from the dangers associated with the voltage, current and power levels used by the equipment. Only personnel who are qualified to work with the voltages and currents used by this equipment should attempt to disconnect, dismantle or modify the equipment.

Potential Electrical Hazards

The following list is not intended as a complete guide to all the electrical hazards on the system, but illustrates the range of potential hazards that exist:

- electric shock
- electric burn
- fire of electrical origin
- electric arcing

Recommended Precautions



WARNINGS

1. All of the electrical equipment supplied as part of the system should be provided with a protective ground. Do not remove protective grounds as this may give rise to an electrical safety hazard. It is vitally important that the vacuum system is properly grounded at all times.
2. Do not defeat interlocks, remove connectors, disconnect equipment, open safety covers, dismantle or modify equipment unless you are qualified and authorised to do so and you are fully conversant with its operation and potential hazards or have total assurance through your local electrical permit to work system that the equipment has been made safe.

Safe Mechanical Practice

In normal use personnel are not required to undertake mechanical work. Servicing or repair may, however, necessitate access to any part of the system. Only suitably qualified personnel should attempt to dismantle, modify or repair equipment.

X-rays



WARNING

This equipment is intended for use on an X-ray beamline of a synchrotron. Ensure that safe working practices relating to radiation are employed. Follow any local, national or international rules and guidelines.

The manufacturer will not be held responsible for the safety of personnel injured by ionising radiation as a result of inadequacy of the customer's own radiation protection system.

Gas Pressure



WARNINGS

2. If the chamber is over pressurised, vacuum components such as windows may shatter and can cause injury.
3. Never exceed an overpressure of 1.5 bar absolute inside the Ion Chamber

Modifications and service

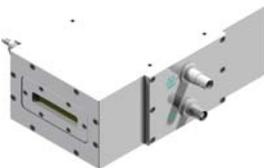
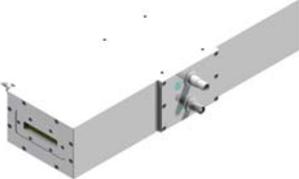
The safety, reliability or performance of the equipment may be impaired if assembly operations, extensions, re-adjustments, modifications or repairs are not carried out in accordance with the instructions provided in this manual and with any other instructions issued by the manufacturer. If you wish to modify the equipment please contact FMB Oxford for further advice.

It should be stressed that those parts of the equipment which are interchangeable, and which are subject to deterioration during operation, may significantly affect the safety of the equipment.

2 Introduction

2.1 Scope of Supply

This manual covers the four different types of IC Plus Ionisation Chambers available, the IC Plus 10, 50, 150 & 300. The number refers to the electrode length. The equipment is suitable for use in a number of Diffraction and Crystallography experiments.

Part Number	Description	Image
AHQ1800	IC Plus 10	
AHQ1810	IC Plus 50	
AHQ1815	IC Plus 150	
AHQ1820	IC Plus 300	



2.2 How To Use This Manual

This manual is intended to provide operators with a practical guide to the system and its operation. This is intended to familiarise the user with how the system works and to provide a better understanding of the system operation.

All personnel who are likely to operate the system or come into contact with any of the system components should read the SAFETY section of the manual. This provides basic information aimed at highlighting the safety hazards associated with the equipment.

The purpose of this manual is to:

- explain how to operate the equipment
- explain how to interface to the equipment
- list performance characteristics of the equipment
- describe how the equipment operates
- assist with simple maintenance

2.3 System Description

The IC Plus is an in-line device for accurately monitoring the intensity of a monochromatic X-ray beam at a synchrotron beamline. The detector head consists of a gas tight chamber containing two parallel plates, over which a high voltage is applied to produce a potential gradient. When X-rays pass through the chamber some are absorbed producing electron-ion pairs that are subsequently separated by the gradient and collected at the signal plate. The small current produced in the plate is then processed by the electronics module (not covered by this manual) to give a quantitative representation of the X-ray intensity.

3 Specifications-common to all IC Plus

3.1 Environment

Ambient temperature	0°C to 35°C
Storage temperature	0°C to 40°C
Relative humidity	10 – 95% non – condensing
Maximum bake out temperature	Not bakeable
Vacuum	Do not evacuate

3.2 Details

Window aperture	10 mm high x 50 mm wide
Windows	70 µm conducting Polymer
Body Material	Aluminum Alloy
Electrode gap	10, 14, 18 mm-user adjustable
Electrodes	Gold plated with guard rings
Working pressure	0.7-1.5 Bar absolute
Operating potential	Up to 1.7 kV
Maximum pressure drop	<0.0375 Bar/min

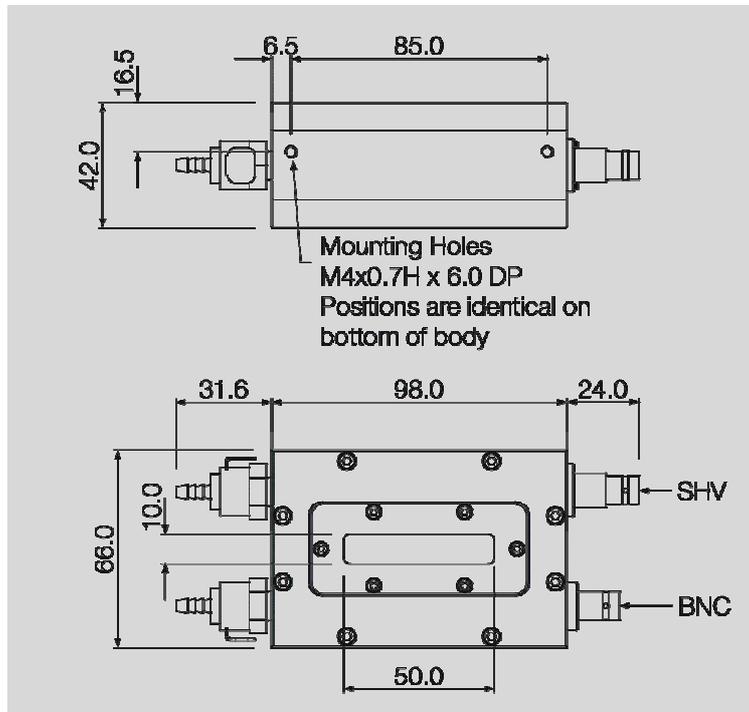
3.3 Connectors

High voltage	SHV
Signal	BNC
Gas	Quick release barb fitting for 5 mm flexible hose

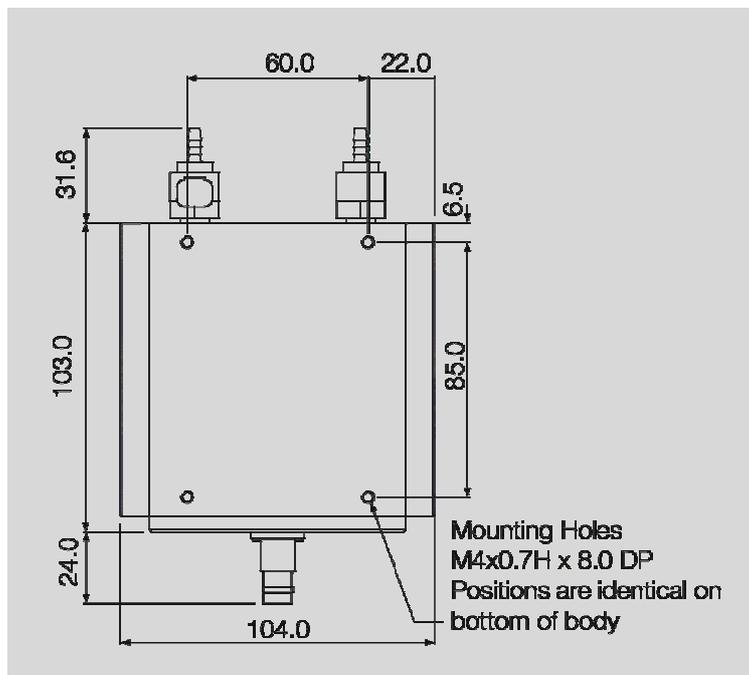
4 Installation

4.1 Dimensional Information

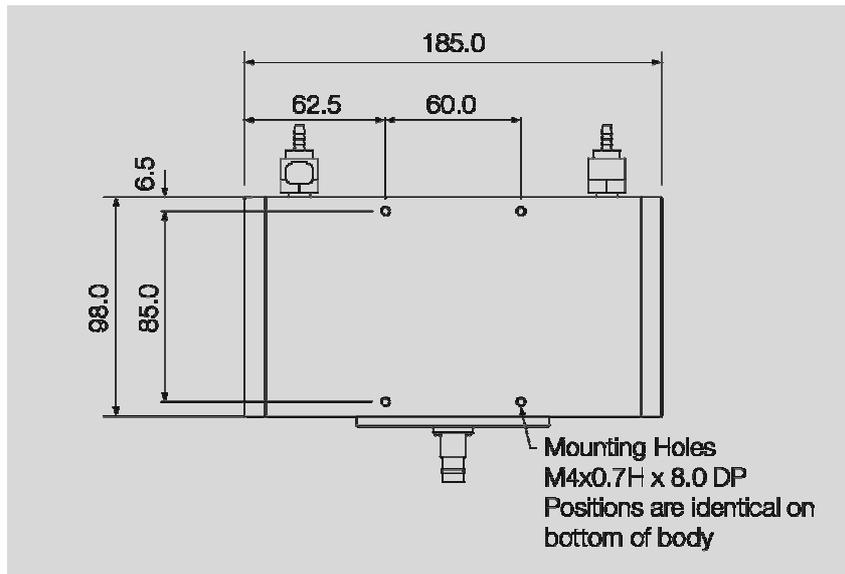
IC Plus 10



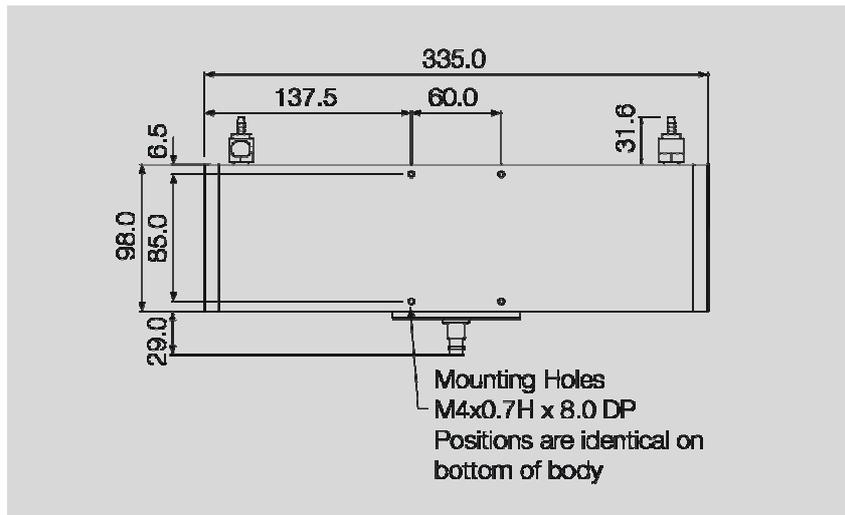
IC Plus 50



IC Plus 150



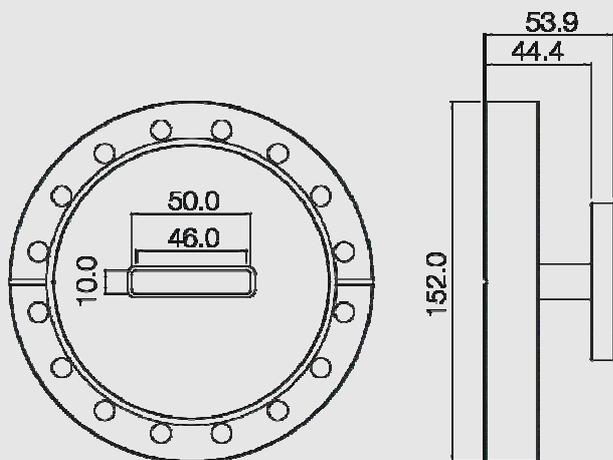
IC Plus 300



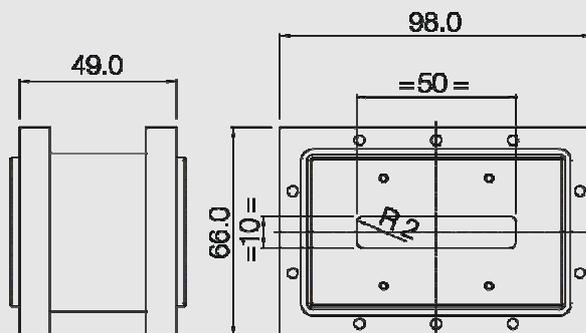
Installation is achieved by using the fixings holes as detailed in the dimensional data above.

4.2 Optional Adaptor Information

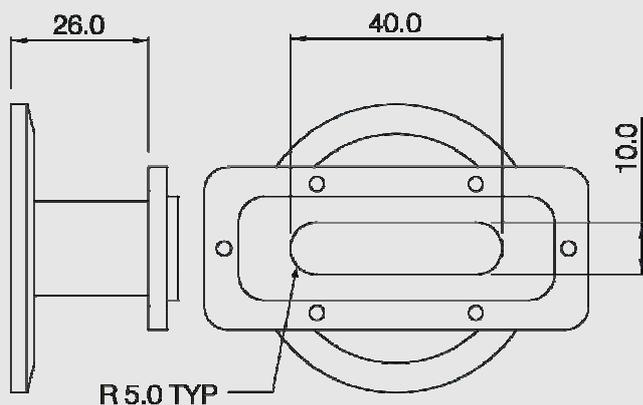
IC Plus to CF150 Adaptor
Part Number AHQ1880



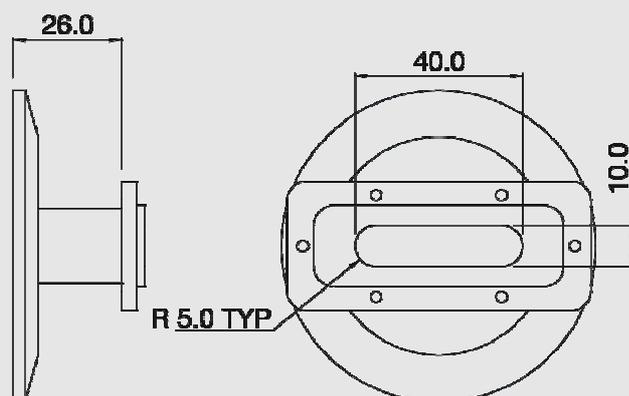
IC Plus to IC Plus Adaptor
Part Number ABY02595



IC Plus to KF40 Adaptor
Part Number AHQ2133



IC Plus to KF50 Adaptor
Part Number AHQ2132



4.3 Optional Electronics and Cable Information

Ordering Information

I404 four channel electrometer	I404
I404 four channel electrometer with 2 kV auxiliary High Voltage output	I404-XP20
I404 four channel electrometer with 3 kV auxiliary High Voltage output	I404-XP30
BNC Signal Cable, 250 mm	CBY1450
SHV High Voltage Cable, 250 mm	CBY1451

For alternative HV output please contact us.

Ordering Information

IC101 electrometer with user manuals, PSI Diagnostic host software for Windows PCs	IC101
IC101 with auxiliary HV supply positive 3000 V	IC101-XP30
IC101 with auxiliary HV supply negative 3000 V	IC101-XN30
BNC Signal Cable, 250 mm	CBY1450
SHV High Voltage Cable, 250 mm	CBY1451

4.4 Adjustment of the electrode plates

The IC plus range has the ability for its internal electrode plates to have 3 different separation distances depending on the intensity of the beam/signal strength. Reduce the separation for weak signals; increase the separation for strong signals. The separation distances are 10, 14 & 18 mm. The IC Plus 10 has hard wired electrodes, the IC Plus 50, 150 & 300 use an internal connector and require some internal dis-assembly to adjust them.

4.4.1 IC Plus 10 Electrode adjustment

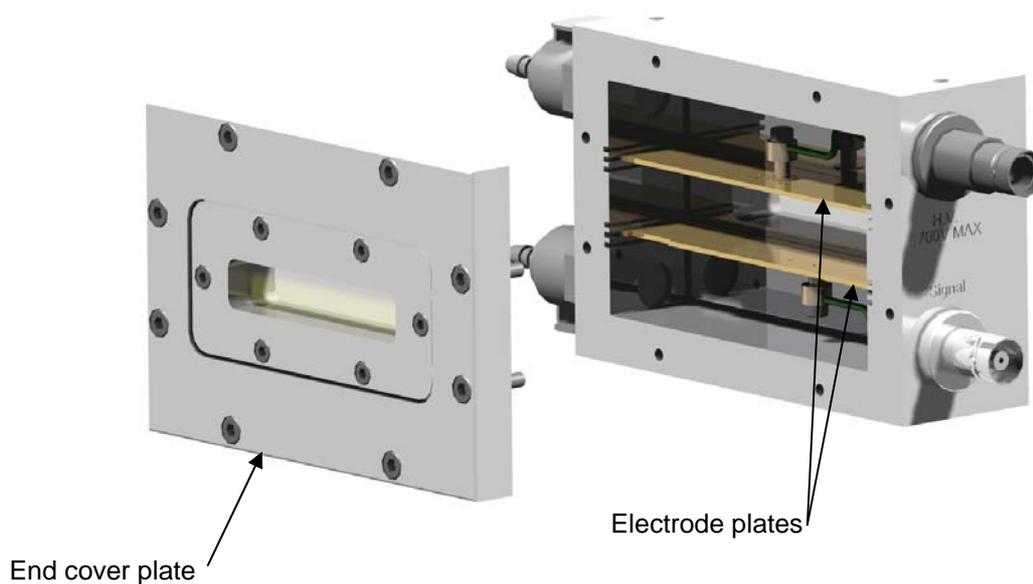
1. Wear suitable UHV compatible gloves
2. Remove end cover plate as shown
3. Carefully pull electrode plates until clear of slot and re-insert in the desired slot. Symmetry must be maintained.



CAUTION

Do not leave the electrode plate supported only by the internal wiring or damage may occur.

4. Re-fit end cover plate, ensuring the O-ring seal is correctly seated in the groove



4.4.2 IC Plus 50, 150 & 300 Electrode adjustment

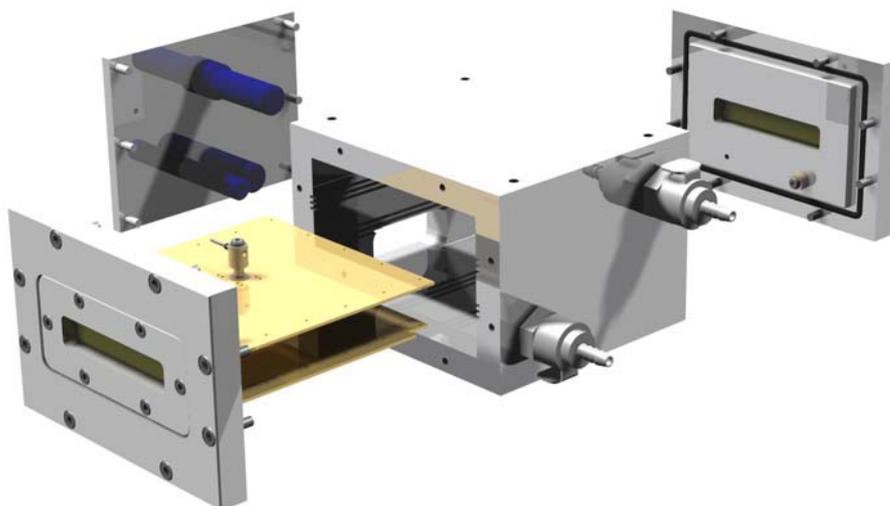
The system is built and shipped with the electrodes fitted to the central slot. This gives a 14 mm separation.

The centres of the electrical connectors are fixed. This requires that the spacers used to mount the electrical pin to the electrode plates will either require removing if 18 mm separation is required or adding to if 10 mm separation is required.

1. This process is the same for all 3 models
2. Wear suitable UHV compatible gloves and have a clean surface prepared
3. Carefully remove the electrical connector cover plate



4. Remove both end plates and carefully withdraw the electrode plates and place them on a suitable clean surface

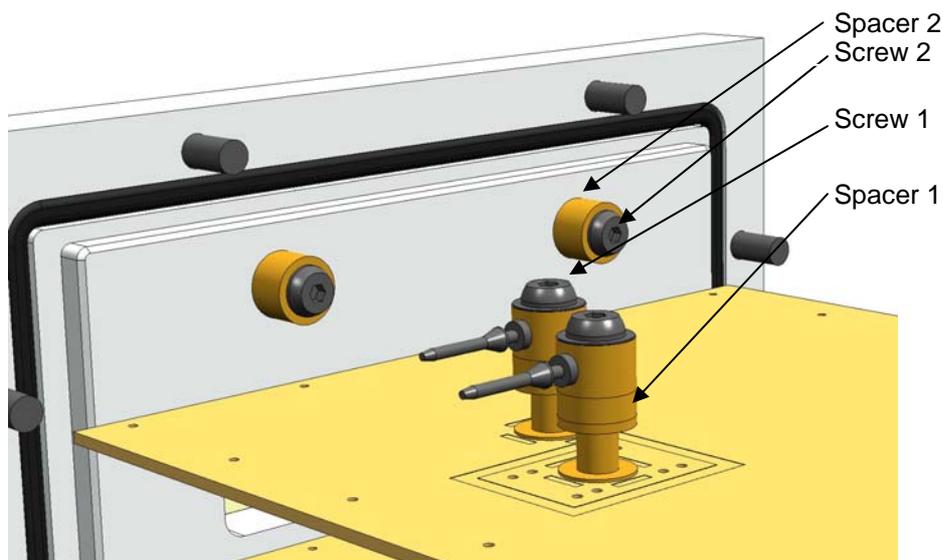


4.4.2.1 To achieve the 18 mm separation (assumes separation is 14 mm):-

1. Remove screw 1 (M2.5 X 10 long) and spacer 1 (AHQ1827-2 mm long) from 3 places. Using screw 2 (M2.5 X 8 long) re-fit the pin assemblies to the electrode plate without any spacers. Do not over tighten screws and ensure the pins are perpendicular to the beam position. The 2 mm long spacers and the 10 mm long screws should be re-fitted to the end plates for future use.

4.4.2.2 To achieve the 10 mm separation (assumes separation is 14 mm):-

1. Remove screw 1 (M2.5 X 10 long) from 3 places. Re-fit the pin assemblies to the electrode plate using both spacers (1 and 2). Do not over tighten screws and ensure the pins are perpendicular to the beam position. The 8 mm long screws should be re-fitted to the end plates for future use



2. Re-fit the electrodes into the desired slots maintaining symmetry. Carefully offer up the electrical connector cover paying close attention to the sockets as they engage with the pins. Force required to connect should be minimal.

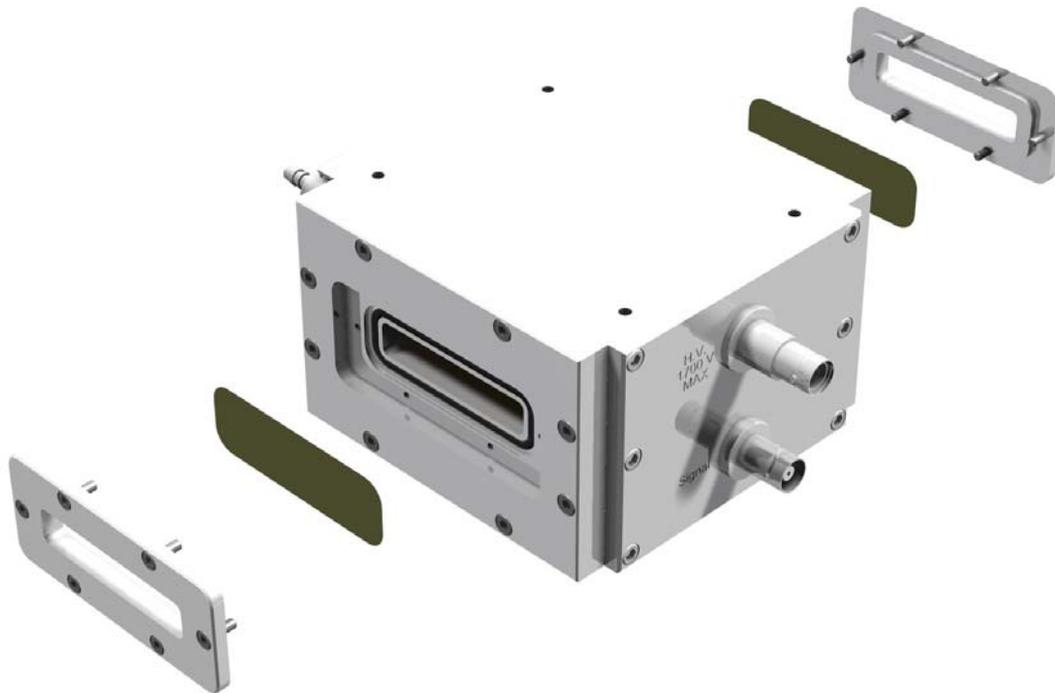
**CAUTION**

Forcing the electrical connectors onto the pins if mis-aligned may cause damage. If necessary remove the electrode plates and adjust the perpendicularity of the pins.

3. Re-fit both end cover plates, ensuring the O ring seal is correctly seated in the groove

4.5 Changing or replacing the window material

1. Remove window cover plates from both ends.



2. Prepare new windows to dimensions shown below



3. Re-fit both window cover plates, ensuring the O-ring seal is correctly seated in the groove

5 Operating Instructions

5.1 Safety

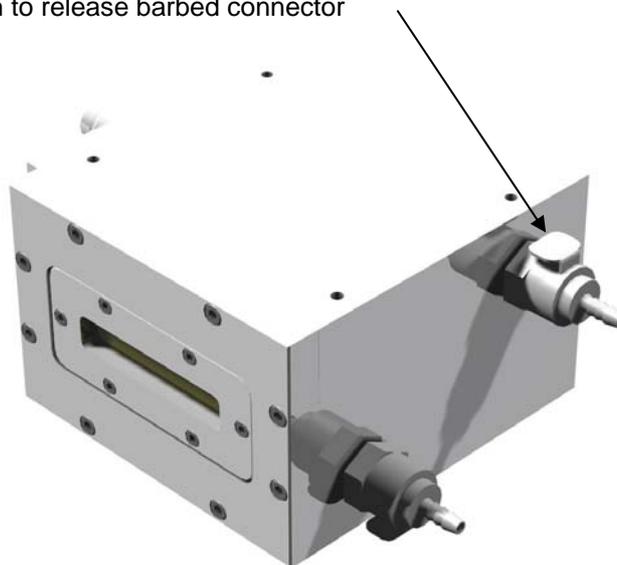
**WARNING**

This equipment uses X-rays. It is the responsibility of the user to ensure that when this equipment is in use, all personnel are adequately protected from X-ray radiation.

5.2 Operation

The IC plus range is capable of having numerous gas environments internally, either static or dynamic. Connection is made using a suitable 5 mm inside diameter plastic or rubber tube (not supplied). The barbed gas connectors are quick release. To remove them press the catch around the periphery.

Push to release barbed connector



It should be noted that once the tube connector is removed the fitting will self seal. This allows the chamber to be “charged” with gas and the gas supply removed.

**WARNING**

Do not use flammable or corrosive gases or liquids internally

**CAUTION**

Do not overpressurise the chamber or damage will occur. If the chamber is heated then the internal gas will expand and may cause damage.



6 Maintenance Instructions

The IC Plus range is normally maintenance free. If a static gaseous environment apart from air is used then this should be periodically re-charged.

6.1 Bakeout Information

The IC Plus range is not bakeable



7 Spares

Description	Type	FMB Oxford Part No.
Gas connector	Barbed quick release	VHQB0019
End cover plate O ring	83 mm ID X 2 mm section	LOEV0178
Electrical connector plate O ring	55 mm ID X 2 mm section	LOEV0177
Window cover plate O ring	41 mm ID X 2 mm section	LOEV0176



UK

FMB Oxford
Unit 1 Ferry Mills
Osney Mead
Oxford OX2 0ES
United Kingdom

Tel +44 (0)1865 320300
Fax +44 (0)1865 320301
sales@fmb-oxford.com

Germany

FMB Feinwerk-und Meßtechnik GmbH
Friedrich Wöhler Strasse 2
D - 12489 Berlin

Tel +49 (030) 67 77 30 - 0
Fax +49 (030) 67 77 30 - 40
info@fmb-berlin.de

USA/Canada

Toll Free (US) 1 800 673 7914
Fax 011 44 1865 320301
sales@fmb-oxford.com

Japan

Hakuto Co., Ltd.
1-13, Shinjuku 1-Chome
Shinjuku-Ku
Tokyo, 160-8910

Tel +81-3-3225-8938
Fax +81-3-3225-9011
fmb-oxford@hakuto.co.jp

Korea

Semivac Inc.
Doosan Venture Digm Rm 204
#126-1, Pyoungcheon-Dong
Dongan-Gu, Anyang Si
Gyeonggi-Do

Tel +82 (0)31 478 0740-0742
Fax +82 (0)31 478 0743
semivac@semivacinc.com

India

Transact India Corporation
5/1A, Grants Building
Arthur Bunder Road
Colaba
Mumbai 400 005

Tel +91 22 2285 5261
Fax +91 22 2285 2326
sales@transact.co.in

China

Clover Technology Group Inc.
No. 56A South Street Zhong Guan Cun
Fang Yuan Mansion
Suite B0201
Beijing 100044

Tel +86 10 8802 6700
Fax +86 10 8802 6856
zhy@nuclover.com

www.fmb-oxford.com

Your local agent is:



FMB Oxford



Certificate Number FM27988

FMB Oxford operate a Quality Management System which complies with the requirements of **BS EN ISO 9001:2008**. FMB Oxford reserves the right to change product specifications without notice, in line with our policy of constant product improvement.

© FMB Oxford Ltd 2009. All rights reserved. All trademarks, copyrights and registrations acknowledged.