Installation manual

CIA Advantage-xr
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1. Preface

This manual provides detailed instructions on the use of the CIA Advantage-xr. It details the software/hardware interface and procedure for the installation of this instrument.

1.1 Notices

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1.2 Warranty

CIA Advantage-xr is designed for laboratory use only. It is not intended for use in domestic establishments or establishments directly connected to a low-voltage power supply network that supplies buildings used for domestic purposes. Where equipment is used in a field placement environment, care must be taken to ensure that the instrument is not exposed to detrimental conditions, i.e. rain, wind, or sun. Exposure may diminish the performance, cause damage to the instrument and/or cause the equipment to become unsafe to the user.

If the equipment is not used in a way specified by Markes International, the safety protection provided by the equipment may be reduced. Furthermore, system failures arising from such use may not be covered in standard warranty and/or service contract agreements.

1.3 Regulatory compliance

The instrument is designed and manufactured under a quality system registered to ISO 9001.

The instrument complies with the essential requirements of the following applicable European Directives, and carries the CE mark accordingly:

- Low voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU
- ROHS Directive 2011/65/EU

The instrument conforms to the following product safety standards:

- IEC 61010-1/EN 61010-1
- Canada: CSA C22.2 No.61010-1
- USA: ANSI/UL 61010-1.

The instrument conforms to the following regulation on electromagnetic compatibility (EMC):

- IEC 61326-1/EN 61326-1.
1.4 Important Safety Warnings

Make sure you follow the precautionary notices presented in this manual. Safety and other special notices appear in boxes and include the following.

**WARNING**
This is the general warning safety symbol and safety alert word to prevent actions that could cause personal injury.

**CAUTION**
Highlights actions that may cause instrument damage. We use it to highlight information necessary to prevent damage to hardware, software, invalid test results, or to information that is critical for optimal system performance.

**NOTE**
Emphasizes important information about a specific task.

### 1.4.1 Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Markes International Ltd. assumes no liability for the failure to comply with these requirements.

- The **CAUTION – HIGH VOLTAGE** symbol indicates a mains voltage hazard.
- The **CAUTION – HOT SURFACE** symbol indicates a burn hazard.
- The **LIFTING HAZARD** symbol indicates that physical injury may occur if the correct lifting procedure for the instrument is not followed.

### 1.4.2 Mains Voltages

**WARNING**
Contact with mains voltages can cause serious injury and even death. It is advised that a Markes International trained service engineer carries out all servicing of this instrument to ensure no safety risks are created for the engineer and/or the user, especially after the servicing is complete.

Some internal parts of the CIA Advantage-xr carry dangerous mains voltages. If the TD100-xr is connected to a power source, even if the power switch is off, potentially dangerous voltages exist on:

- The wiring between the power cord and the mains inlet.
• The wiring between the mains inlet and the power supplies.
• The mains inlet and power supplies themselves.

All parts carrying high voltages are shielded by covers. If the covers are in place it should be difficult to make contact with dangerous voltages.

The unit covers should only be removed if specifically instructed to do so, and should never be removed when the power cable is connected, even if the power switch is off. The safe state of the equipment must be verified following any service or repair.

1.4.3 Power cord

The instrument must be suitably earthed via the power cord.

Any cord set used with this equipment shall be previously approved and adequately rated according to the country of use.

Ensure at all times that the plug (electrical isolator) can be easily and quickly accessed during equipment use.

1.4.4 High Temperatures

Some parts of CIA Advantage-xr can be hot enough to represent a burn hazard. These parts are contained within the heated valve enclosure.

These zones are labelled with ‘Burn hazard’ labels similar to that shown below. Whenever possible cool these areas of the system to room temperature before working on it and ALWAYS operate the instrument with the covers in place to avoid accidental contact with these zones.

Due to the high temperatures involved in the flow path, other zones of the instrument will be at higher temperatures during operation. There may not on visual inspection be obvious to the user. These zones are: the insulation of the GC transfer line and the top and side covers (especially directly above the heated valves).

1.4.5 Carrier Gas safety

Previously approved and correctly rated external gas regulator should be used with this unit. Maximum inlet pressure must not exceed 60 psi.

1.4.6 Cleaning and decontamination

Please consult your local agent or Markes International for information on decontamination or the use of cleaning agents.

NOTE Incorrect cleaning/decontamination could result in damage to the instrument.
## 1.5 Technical specifications

### 1.5.1 Dimensions and weight

Select the laboratory bench space before your system arrives. Pay attention to the total height requirements. Avoid bench space with overhanging shelves. Allow at least 20 cm clearance between the back of the equipment and a wall to dissipate hot air.

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (mm/inches)</td>
<td>420 / 16.5</td>
</tr>
<tr>
<td>Width (mm/inches)</td>
<td>240 / 9.4</td>
</tr>
<tr>
<td>Length (mm/inches)</td>
<td>540 / 21.3</td>
</tr>
<tr>
<td>Weight (Kg/lbs)</td>
<td>21 / 46.2</td>
</tr>
</tbody>
</table>

### 1.5.2 Power Consumption

The number and type of electrical outlets depend on the size and complexity of your system. Each TD unit will have a label next to the power cord connector that lists the line voltage requirements. CIA Advantage-xr is automatically compatible with all conventional mains power supplies ranging from 100 to 240 V and 50 or 60 Hz. It is not necessary to manually select or switch voltages.

The power consumption and requirements depend on the system ordered.

<table>
<thead>
<tr>
<th>Electrical Properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Power (W)</td>
<td>900</td>
</tr>
<tr>
<td>Line voltage (V)</td>
<td>100-240*</td>
</tr>
<tr>
<td>Frequency (Hz)</td>
<td>50-60</td>
</tr>
<tr>
<td>Inrush Current (A)</td>
<td>&lt;40 (cold start)</td>
</tr>
<tr>
<td></td>
<td>*Automatically selected</td>
</tr>
</tbody>
</table>

### 1.5.3 PC Specification

The recommended minimum PC specifications are:

| Processor                          | 1 GHz 64-bit dual core or better |
| RAM                                 | 4 GB                               |
| Free Disk Space                    | 2 GB                               |
| Graphics card                      | DirectX 9 or later                 |
| Operating System                   | Windows 7, 8 and 10, English       |
| Minimum Resolution                 | 1024 x 768                         |
| Peripherals                         | Windows compatible keyboard and mouse |

CIA Advantage-xr requires either a free serial port or a free USB port for communication with the PC.
1.5.4 Pressure controlled supply of dry air or nitrogen (pneumatic gas)

CIA Advantage-xr requires a pressure-regulated supply of dry air or nitrogen (dewpoint lower than -50°C) at 50-60 psig both to actuate the main valve and to purge the cold trap box.

The pneumatics gas is used to switch several pneumatically operated valves. The pressure required for this gas supply is 50-60 psig. The supply can be shared with that on the UNITY purge gas although a separately regulated supply is recommended. A gas pneumatics accessory (U-GAS01) is supplied with every CIA Advantage-xr to facilitate this.

**NOTE** CIA Advantage-xr will not operate properly without this gas supply.

1.5.5 Pressure controlled carrier gas supply

CIA Advantage-xr requires a regulated supply of carrier gas. This carrier gas should be 5.0 grade (i.e. 99.999%) purity or higher helium or nitrogen, supplied at a pressure approximately equal to the UNITY-xr or UNITY 2 minimum carrier gas pressure required for the analytical system which should not exceed 60psig.

The gas pneumatics accessory (U-GAS01) supplied with every CIA Advantage-xr facilitates regulation of this supply.

The pressure in the laboratory carrier gas line should be at least 10 psi higher than that supplied to CIA Advantage-xr.

**NOTE** CIA Advantage-xr will not operate properly without this gas supply.

**WARNING** Hydrogen is not suitable as a carrier gas for CIA Advantage-xr.

1.5.6 Pressure-controlled supply of purge gas (optional)

A purge gas that is different to the carrier gas can be used to facilitate clean-up after running very high concentration samples. Nitrogen or humidified nitrogen is recommended. If not used carrier gas will be used to perform flow path purging.

**NOTE** A humidified gas is more effective, than its dry equivalent, at removing contamination. For trace level analysis a humid purge gas is not required.

The supply pressure should be set approximately equal to the CIA Advantage-xr carrier gas pressure, but must not exceed 60 psig.
1.5.7 Pressure-controlled supply of internal standard gas (optional)

If an Internal Standard is to be used, a pressurised cylinder containing an appropriate calibration gas can be connected. The cylinder must be equipped with appropriate (inert) step-down gas pressure regulation and should be connected to the CIA Advantage-xr using a length of 1/8-inch or 1/16-inch clean, stainless steel tubing. The pressure of the internal standard should be set approximately 2 psi below the pressure of the CIA Advantage-xr carrier gas but must not exceed 30 psig.

A suitable internal standard would contain one or more gas-phase organic components that behave in a similar way to the target analytes but are not found in the sample. For example, deuterated toluene is commonly selected as an internal standard for BTX analysis, while the US EPA method TO-15 internal standard contains bromochloromethane, 1-bromo-4-fluorobenzene, chlorobenzene-d5 and 1,4-difluorobenzene.

1.6 Environmental Operating Conditions

It is advisable to operate the system in a clean laboratory environment, with minimal atmospheric concentrations of organic vapours. Performance can be affected by sources of heat and cold from heating, air conditioning systems or drafts. The instrument should be protected from conditions that could cause exposure to frost, dew, percolating water, rain or excessive direct sunlight.

1.6.1 Temperature

Recommended operating ambient temperature range is 15 to 30°C.

1.6.2 Humidity

Recommended operating humidity range is 5 to 95% non-condensing.

1.6.3 Altitude

This product should not be operated above 2000m (~6500ft).

**CAUTION** For storage or shipping the allowable temperature range is -40 to 70°C and the allowable humidity range is 5-95% non-condensing. After instrument exposure to extremes of temperature or humidity, allow 2 hours for return to the recommended ranges before switching on.

1.7 Technical Support Contact Details

In the first instance please contact your supplier. If they are unable to resolve your query, please contact Markes International on the details below.

Website:  [www.markes.com](http://www.markes.com)
E-Mail:  [support@markes.com](mailto:support@markes.com)
2. Instrument Familiarisation

The UNITY-xr or UNITY 2 Thermal Desorber normally requires sample introduction by means of a standard sample tube. This could be a sorbent tube (used for diffusive or pumped sampling) or an empty tube into which solid or liquid samples are weighed for direct desorption. The CIA Advantage-xr accessory connects to UNITY-xr or UNITY 2 and extends the compatible sample range to include whole air/gas samples e.g. continuous monitoring of air/gas streams or samples collected in whole-air containers such as canisters or Tedlar bags. Tubes can still be desorbed using a UNITY-xr or UNITY 2 configured with the CIA Advantage-xr accessory.

2.1 CIA Advantage-xr

The CIA Advantage-xr contains a stream selection valve, switching valves and an interface to UNITY, all of which are controlled via Markes Instrument Control software.

The CIA Advantage-xr is compatible with gas-phase samples ranging in pressure from sub-atmospheric to 60 psig.

Depending upon the instrument configuration, between four and twenty-seven inlet ports will be available. CIA Advantage-xr is now shipped with a fully inert sample flow path.

2.1.1 Instrument Configurations

CIA Advantage T-xr

The CIA Advantage T-xr is a system for analysis of trace-level components in ambient air or gas streams. The system is able to introduce mass flow controlled samples, in volumes from 5 mL up to 15 L onto the cold trap within UNITY-xr. The CIA Advantage T-xr has four sample channels.

CIA Advantage HL-xr

The CIA Advantage HL-xr is a versatile system for the analysis of both high and low concentration samples and for screening unknowns. The CIA Advantage HL-xr is capable of introducing sample volumes from 0.5 mL using a gas loop, in addition to mass flow control for the widest sample volume range. The CIA Advantage HL-xr has 14 sampling channels.

CIA Satellite-xr

The CIA Satellite-xr can be added to either CIA Advantage T-xr or CIA Advantage HL-xr to provide additional sample capacity. A CIA Satellite-xr connected with a CIA Advantage T-xr provides 17 channels, while in combination with a CIA Advantage HL-xr 27 channels are available.

NOTE: CIA Satellite-xr cannot be interfaced directly to UNITY.
2.1.2 Serial Number Format

CIA Advantage-xr serial numbers take the following formats:

- **CIA Advantage HL-xr**: GB00H\textsuperscript{1}nnnn and GB00H\textsuperscript{2}nnnn (inert version)
- **CIA Advantage T-xr**: GB00H\textsuperscript{4}nnnn and GB00H\textsuperscript{5}nnnn (inert version)
- **CIA Satellite-xr**: GB00H\textsuperscript{7}nnnn and GB00H\textsuperscript{8}nnnn (inert version)

### Location

The model type and serial number of the instrument can be found on the back panel of the instrument. The instrument serial number is also shown on a label on the top front panel.

2.1.3 Electrical Connections

**Summary of connections:**

#### Power

The CIA Advantage-xr is supplied with a power cord and a plug appropriate for the country from which the order originates. Power cord lengths for the CIA Advantage-xr are approximately 2 m in length.

#### Fuse

The CIA Advantage-xr is fitted with a replaceable 12 A time lag fuse, with high breaking capacity. A replacement fuse is supplied in the CIA Advantage-xr shipping kit (**SERZ-FS12A0**).

#### PC Connection

Connection to the controlling PC is made using a RS232 null modem serial cable (**SERZ-0189**). The cable should be connected to an available serial port on the control PC. A USB-serial adapter (**U-USBSR**) is supplied for use if the PC in question does not have an available serial port.

#### Remote Start Connection

This connector can be used to provide a start signal for the CIA Advantage-xr. Typically, this connection is not used.
2.1.4 Gas connections

Description of Gas Connections:

**Pneumatic gas (Air/N2)**

The pneumatics gas is used to switch several pneumatically operated valves. The pressure required for this gas supply is 50-60 psig. The supply can be shared with that on the UNITY purge gas although a separately regulated supply is recommended. A gas pneumatics accessory (U-GAS01) is supplied with every CIA Advantage-xr to facilitate this.

**Carrier Gas**

CIA Advantage-xr requires a regulated supply of carrier gas, in addition to the UNITY-xr carrier gas supply. The carrier gas should be 5.0 grade (i.e. 99.999%) or higher-purity helium or nitrogen, supplied at a pressure approximately equal to that of the UNITY carrier gas supply. As with the UNITY carrier gas supply, this pressure must not exceed 60 psig.

The gas pneumatics accessory (U-GAS01) supplied with every CIA Advantage-xr facilitates regulation of this supply. The pressure supplied should be set to approximately 2 psi greater than that supplied to the Unity-xr.

**Internal Standard**

If an Internal Standard is to be used, a pressurised cylinder containing an appropriate calibration gas can be connected here. The cylinder must be equipped with appropriate (inert) step-down gas pressure regulation and should be connected to the CIA Advantage-xr using a length of 1/8-inch or 1/16-inch clean, stainless steel tubing. The pressure of the internal standard should be set approximately 2 psi below the pressure of the CIA Advantage-xr carrier gas, but must not exceed 30 psig.

**Purge Gas**

A purge gas that is different to the carrier gas can be used to facilitate clean-up after running very high concentration samples. Nitrogen or humidified nitrogen is recommended. If not used carrier gas will be used to perform flow path purging. This is usually set no higher than at 10psi

**Canister Vent**

The canister vent is opened occasionally during operation to prevent any sample being contaminated with a previous sample or diluted with carrier gas. The canister vent should be connected to a pump to be fully effective.

**Sample Channels**

The sample channels are located on the right hand side of the CIA Advantage-xr. On CIA Advantage HL-xr there are fourteen channels while on a CIA Advantage T-xr there are four channels.

**NOTE** The pressure supplied to any one of these channels must not exceed 60 psig.
Gas Vents

There are two vents located on the top of the CIA Advantage HL-xr, one is for the Internal Standard and the other is a sample vent. The CIA Advantage T-xr only has the Internal Standard vent. The CIA Satellite-xr has no vents.

At the end of sampling and after a purge of carrier gas to eliminate air from the trap, the UNITY-xr focusing trap heats in the normal way, transferring compounds of interest to the analytical system and triggering the measurement cycle. The outlet split at this point may be entered in the software and is controlled by the...
mass flow controller. Collection of the next sample can begin, if required, as soon as the cold trap has re-equilibrated at its trapping temperature.

2.1.5 Nafion Dryer

The Nafion dryer is a sample drying accessory which extracts water from the sample gas stream using a permeable membrane and a counter flow of dry gas. Some concurrent losses of polar species from the sample stream are also observed so the Nafion dryer is only recommended during the analysis of non-polar species. The Nafion dryer is installed onto the frame of the CIA-Advantage-xr and the sample gas stream diverted through the dryer prior to collection on the focusing trap.

2.1.6 Kori-xr

The Kori-xr is installed between the CIA Advantage-xr and UNITY-xr and consists of a cryogen-free trap that is placed into the sample flow path, upstream of the sorbent trap. The Kori-xr selectively removes water from the sample gas stream with virtually no loss of polar or non-polar species. It is ideal for GC-MS analysis of complex air samples.

2.1.7 UNITY-xr Gas supplies

Pneumatic gas (Air/N2)

The pneumatics gas is used to switch several pneumatically operated valves and purge the trap box. The pressure required for this gas supply is 50-60 psig and it is essential that this gas is dry (dewpoint below -50°C).

Helium or hydrogen should never be used as the pneumatic gas.

**NOTE** UNITY-xr will not operate properly without this gas supply.

Carrier Gas

UNITY-xr requires a regulated supply of carrier gas. The carrier gas should be 5.5 grade (i.e. 99.9995%) or higher-purity helium or nitrogen. Carrier gas supply this pressure must not exceed 60 psig.

**NOTE** UNITY-xr will not operate properly without this gas supply.

2.2 ULTRA-xr

The ULTRA-xr is a 100 tube autosampler that can be connected to the UNITY-CIA Advantage-xr, allowing analysis of sample tubes as well as on-line sampling within the same sequence. For more details on the ULTRA-xr, please refer QUI-1120 UNITY-ULTRA-xr User manual.
3. Installing CIA Advantage-xr

3.1 Unpacking CIA Advantage-xr

Remove the instrument from its packaging. It is strongly recommended that the instrument packaging is retained for future use if ever the system is to be shipped using conventional carriers. Shipping the instrument in non-standard packaging may irreversibly damage the equipment and invalidate the warranty. It is recommended that 2 people unpack the instrument to minimise the lifting hazard.

Check the packing list included with the instrument to confirm the condition and completeness of ship kit and report any problems i.e. missing or damaged parts.

3.2 Positioning CIA Advantage-xr

The position of the CIA Advantage-xr relative to other instrumentation is dependent on the system configuration.

If a Kori-xr is also to be installed, please refer to the Kori-xr Installation manual (QUI-1138) for full system positioning.

3.2.1 UNITY-xr (UNITY2)/CIA Advantage-xr

3.2.1.1 Installing CIA-Advantage-xr in the desorb side.

In the standard configuration the CIA Advantage-xr heated interface (SERASX-5004) is used and is installed in the desorb side of the UNITY-xr (UNITY 2).
The above configuration also applies if an ULTRA-xr is present alongside a UNITY 2. The ULTRA-xr must be removed from the UNITY 2 tube oven prior to installation of the CIA Advantage-xr and vice versa. Please refer to the ULTRA-xr installation manual (QUI-1118) for details. Separate software configurations must be used for each of the two configurations.

3.2.1.2 Installing CIA-Advantage-xr on the Unity-xr split side.

In this configuration the CIA Advantage-xr heated interface (SERASX-5031) is used and is installed in the desorb side of the UNITY-xr. This configuration cannot be used for Unity 2.

This new configuration is only available in MIC version 2.0 or greater. To enable this configuration, the ‘Connect to Unity Split’ Checkbox must be enabled as shown.

This configuration allows single tube desorption of a sorbent tube to be performed in the absence of an Ultra-xr autosampler and as a result a standard 2-3 stage tube desorption template method is available in the method editor.
3.2.2 UNITY-xr/-ULTRA-xr/CIA Advantage-xr

In this configuration the CIA Advantage-xr heated interface (SERASX-5031) is used and is installed in the split side of the UNITY-xr. **Note**: Unity 2 cannot be used in this configuration.
3.3 Connections to CIA Advantage-xr

3.3.1 Purge gas connection

Connect the purge gas line on the rear of CIA Advantage-xr to the dedicated GAS-01 supplied with the CIA-Advantage-xr via 4mm o.d. nylon tubing (p/n Z-0055). Purge gas should be set to approximately 50-60psi. Ensure this pressure is maintained ±5psi while the rotary valves actuate.

3.3.2 Carrier gas connection

Please refer to the relevant installation manuals for the UNITY-xr (QUI-1117) and UNITY 2 (QUI-1056) for the correct gas connections with and without electronic carrier control (ECC).

Once determined, the recommended purge gas and carrier gas supply to the CIA Advantage-xr to the UNITY-xr (UNITY 2) should be made using the brass 1/8” T-pieces and copper tubing supplied in the CIA Advantage-xr shipping kit as shown below.

3.3.3 Cable connections

Connect the power cable (SERZ-0024).

Connect the CIA Advantage-xr to the PC with the serial cable (SERZ-0189). If there are no available serial ports on the PC, use the USB-Serial cable adapter (U-USBSR) provided.
### 3.4 Installing the heated transfer lines

CIA Advantage-xr is supplied with two heated transfer lines. The choice of transfer line used will depend on the configuration of the thermal desorption system. If the configuration of the system demands that the sample outlet from CIA Advantage-xr enters the desorb side of UNITY-xr (UNITY 2) then transfer line (SERASX-5004) is used. If the configuration of the system demands that the sample outlet from CIA Advantage-xr enters the split side of UNITY-xr (UNITY 2) then transfer line (SERASX-5031) is used.

#### 3.4.1 Installing the Heated Transfer Line between CIA Advantage-xr and UNITY-xr or UNITY 2 (SERASX-5004), no ULTRA-xr configuration

| Ensure that CIA Advantage-xr is switched off and cool. |
| Remove the rear top cover by removing the four screws identified and pulling it up vertically. |

**SERASX-5004**
Connect the shorter length of 1/16” tubing of SERASX-5004 to the sample outlet the rear of the CIA Advantage-xr valve oven.

Connect the four-way Molex connector of SERASX-5004 to the terminal on the chassis of CIA Advantage-xr as indicated.
Connect the longer piece of 1/16” tubing of SERASX-5004 to the brass 1/16” union shown using the brass nut and 1/16” x 1/16” graphite vespel ferrule provided in the CIA-Advantage-xr shipping kit.

Modify the UNITY-xr or UNITY 2 tube oven cover by unscrewing the black knob, removing the 2” metal extension piece then reattaching the black knob.
Carefully position the interface tube of **SERASX-5004** horizontally into the tube oven / cradle on UNITY-xr or UNITY 2 with the narrow part of the interface tube nearest the rear of the instrument.

Gently but firmly lower the tube oven cover on UNITY-xr taking care not to damage the insulation on the interface line.

The oven cover must be lowered completely to ensure a good seal.

---

3.4.2 *Installing the Heated Transfer Line between UNITY-xr/ULTRA-xr/CIA-Advantage configuration (SERASX-5031)*

Remove the CIA Advantage-xr top cover as described in Section 3.4.1

**SERASX-5031**
Connect the shorter length of 1/16” tubing of SERASX-5031 to the sample outlet the rear of the CIA Advantage-xr valve oven.

Connect the four-way Molex connector of SERASX-5031 to the terminal on the chassis of CIA Advantage-xr as indicated.
Connect the longer piece of 1/16" tubing of **SERASX-5031** to the brass 1/16" union shown using the brass nut and 1/16" x 1/16" graphite vespel ferrule provided in the CIA-Advantage-xr shipping kit.

To enable the CIA Advantage-xr heated transfer line (**SERASX-5031**) to be installed in UNITY-xr, it is first necessary to remove the split tube support by remove the two screws indicated.
The split tube slider assembly must now be pushed back to allow the split tube and transfer line increased room of installation. Loosen the two screws indicated, and pull the split tube slider assembly back a sufficient distance on the slots to allow installation.

Insert the split tube and CIA Advantage-xr transfer line (SERASX-5031) into the split side of the UNITY-xr heated valve as shown and fully lower the split tube cover to ensure a leak tight seal.

Tighten the split tube slider screws once the split tube and transfer line are securely installed.
The length of 1/16” stainless steel tubing at this end of the transfer line should be connected to the bulkhead union on the top of UNITY-xr as shown.

3.5 Installing the split tube in CIA Advantage-xr

Carefully position the split tube (SERAAA-1600) horizontally into the split cradle.

Gently but firmly lower the split cradle cover on CIA Advantage-xr.

The oven cover must be lowered completely to ensure a good seal.
3.6 Installing dryer assembly (optional accessory)

- Place the dryer assembly on top of the CIA Advantage-xr and secure it using the two screws supplied then remove the top rear cover by unscrewing the 4 screws as shown in Section 3.4.1.

- Attach the 25 cm stainless steel tubing to the outlet of the valve oven and the 35 cm stainless steel tubing to the brass nut using the 1/16” union provided.

- Remove the right hand side panel of the CIA Advantage-xr and locate the Nafion dryer connector from the control PCB. It may be necessary to cut the cable ties securing the wiring so it can be plugged into the Nation dryer.
• If necessary, disconnect the legacy plug fitted to the Nafion dryer and fit the provided extension cable. Then attach the cable to the connector from the control PCB.

• Attach the transfer line to the side of the Nafion dryer.

CAUTION Rotating the fitting on the Nation dryer will damage the membrane and cause leaks – damage caused by ignoring this warning will not be covered by warranty.

Secure this fitting with a 7/16” spanner while tightening the 1/16” stainless steel nut on the transfer line

• Connect Transfer Link for Nafion Dryer for CIA-Advantage-xr to the Transfer Line (supplied with Nafion Dryer, SERASX-5137)
Connect the Nafion Dryer transfer link electrical connection.

- Place the top and side covers back in place and secure. Ensure the 35 cm and 25 cm lengths of stainless steel tubing from step 3 are can be accessed with the top plate fitted. Ensure the transfer line electrical connections do not become trap between panels.
- Connect the 35 cm tubing to the brass 1/16” union on the transfer line using 1/16” Brass Cap & Graphite Vespel Ferrule supplied in the Shipping Kit
- Connect the 25 cm tubing (from the valve oven) to the bottom of the dryer.

**CAUTION** Rotating the fitting on the Nafion dryer will damage the membrane and cause leaks – damage caused by ignoring this warning will not be covered by warranty.
• Connect the dry gas supply to the 1/8” connection on the Nafion dryer assembly (maximum supply pressure 50 psi).

• Once the software starts the Nafion dryer air flow can be set and measured as shown below

**NOTE**  The Nafion dry gas flow is always activated when the CIA Advantage-xr is switched on. When the system is not in use the dry gas can be switched off at the regulator.

Nafion dry gas flow can be adjusted here (should be 2 – 5 times the sample flow)

Nafion dry gas flow can be measured here with a flow meter (once activated in the software)
3.7 Installing CIA-Satellite (optional accessory)

- Place the CIA-Satellite on the desk close enough to the CIA Advantage-xr for the interconnection line to be fitted to both.

- Fit the interconnection line to the CIA-Satellite.

- Fit the interconnection line to the CIA-Advantage. Ensure that the line is connected to position 14 of the CIA Advantage.

**NOTE**
The CIA Satellite connects to position 4 when used with the CIA Advantage-T.
4. Configuring CIA Advantage-xr in Markes Instrument Control (MIC) software

**NOTE:** This installation manual assumes that the latest version of software, MIC 2.0 is installed.

Locate the Markes Instrument Control (MIC) software supplied on a USB stick in the shipping kit. Insert the USB stick into the appropriate compartment of the PC and follow the instructions on the screen. Once the CIA Advantage-xr software has been loaded onto your PC you can access the program from Start > Programs or install an appropriate shortcut.

During the software download, the display language, English or Chinese can be set.

![Display language selection](image)

**4.1 Configuring the software**

With the all instruments switched off, start the software either by double clicking the MIC icon placed on the desktop or from Start > Programs. The following Connecting window will appear,

![Connecting window](image)

Click Configure to open the **configuration** page.

**4.1.1 UNITY-xr (UNITY2)/CIA Advantage-xr**

Initially select the UNITY version from the available instruments section, as appropriate, and then click the right arrow to move the selection into the current configuration section. The list of available options will then update.

Select the CIA-Advantage-xr configuration present and then click the right arrow to move the selection into the current configuration section. For example, shown below is the instrument configuration for Unity/CIA-Advantage-xr HL.
If a CIA Satellite and/or Nafion dryer is present, update the instrument configuration further by selecting the instrument and clicking on the right arrow to move into the current configuration, for example as shown below.
4.1.2 **UNITY-xr/-ULTRA-xr/CIA Advantage-xr**

Initially select UNITY-xr, then Ultra-xr from the available instruments section. The list of available options will then update.

Select the CIA-Advantage-xr configuration present and then click the right arrow to move the selection into the current configuration section. For example, shown below is the instrument configuration for Unity-xr/Ultra-xr/CIA-Advantage-xr HL.

![Instrument Configuration](image)

For each configuration, the correct ports will depend on the PC setup and can be checked by opening up the device manager window on the PC. Make sure that each communications cable is initially disconnected from the PC, when it is then plugged in the appropriate com port will appear. Make note of its com port and then ensure the correct ones are selected in the instrument configuration page as shown.
After making any necessary changes in the **Configuration** Tab click ‘OK and the following message appears, Click OK to close the software.

On reopening, the software communications will be correctly configured.

4.2 **Detecting the CIA Advantage-xr system**

Ensure that the gas supplies to the system - especially the dry air or nitrogen purge gas used for valve actuation and purging the cold trap box - are on.

Having checked the above, alongside all other instruments, switch all instruments on using the switch located on the back panels.

If communications between the PC and all instruments are established successfully the instrument status will change to Idle.
If for some reason, a configured instrument is not detected, the configuration page will automatically reopen. Ensure that the correct PC Com port is selected, click ‘OK’ twice and allow the software to close for configuration.

The MFC configuration should be automatically uploading if the instrument configuration is set correctly. For all Unity-xr/CIA Advantage HL configurations, with and without ULTRA-xr, the MFC configuration should be as shown below.

![MFC Configuration](image)

Note, the CIA-Advantage T does not have an MFC associated with the CIA and therefore the MFC configuration features only the two Unity-xr MFCs.

Next, left click on the idle icon to display the instrument status. Check that all the heated zones are heating and reach setpoint and that the pressure transducers and MFCs are correctly identified and record the appropriate pressures and flows. The instrument status windows for the UNITY-xr /CIA Advantage-xr HL and UNITY-xr/ULTRA-xr/CIA Advantage-xr HL respectively are shown below.
Finally, right click on the instrument icon to display direct control. Check that the schematic is directly displayed for the desired configuration. The instrument status windows for the UNITY-xr/CIA Advantage-xr HL and UNITY-xr/ULTRA-xr/CIA Advantage-xr HL respectively are shown below.
UNITY-xr /CIA Advantage-xr HL

UNITY-xr/ULTRA-xr/CIA Advantage-xr HL
5. Installation qualification

5.1 Leak Testing

Note: These following instructions show the Unity-xr/CIA Advantage-xr HL configuration but apply to all configurations equally.

Right click on the configured instrument tile in the MIC homepage and select Direct Control.

- Click the ‘Pressurise 1/2’ button to pressurise the flow path with carrier gas.

- Click ‘Leak Test’ and observe the Unity and CIA vent gauges. A leak is defined if the pressure does not drop by more than 7.5% in 45 seconds. Monitor the split gauge pressure, if this remains stable then the CIA Advantage-xr is leak tight in the sampling flow path. If carrier gas has been supplied to the rear of the CIA-Advantage-xr, monitor the CIA Vent gauge pressure as well. If a leak is detected here, further investigation of the internal standard plus post-sample purge flow path is required.

- If a leak is found, use a helium leak detector to determine the source of the leak dependent on which gauge pressure dropped.
• Click the ‘Pressurise 2/2’ button to pressurise the rest of the flow path with carrier gas.

• Click ‘Leak Test’ and observe the CIA canister gauge. A leak is defined if the pressure does not drop by more than 7.5% in 45 seconds. Monitor the canister gauge pressure, if this remains stable then the CIA Advantage-xr is leak tight in the canister vent flow path.

• If everything is leak tight, click on depressurise and then return the instrument to standby mode.

5.2 Condition the Cold Trap

Different cold traps require different conditioning procedures. Failure to follow the correct procedure can result in permanent damage to the cold trap adsorbents. The preset conditioning conditions for some common cold traps are provided in the trap heat template method.

5.3 Chromatographic Test

Take a sample of gas standard if available (or laboratory air if not) and evaluate chromatography. See QUI-1142 CIA-Advantage-xr user manual for details of this and the following tests.

5.4 Internal Standard Test

Confirm internal standard operation (if internal standard is available) and use the ‘Check IS flow’ button in direct control to establish the IS loop fill flow (recommended 50ml/min).

5.5 Sample Analysis

At this point, with a correctly configured and leak tight system, samples are ready to be analysed according to customer protocols.