



Linkam Scientific Instruments

**CCR1000**  
Catalyst Cell Reactor

**USER GUIDE**

## Contents

Before Setting Up Your Equipment.....	3
Important Notice .....	4
Warranty.....	4
Technical Support.....	4
Equipment Maintenance.....	4
Pressure Warning .....	4
Safety Precautions .....	5
Symbol Reference.....	5
Feedback .....	5
Introduction .....	6
Stage Anatomy.....	6
Mounting Stage to Microscope with Dovetail Substage .....	7
Set Up the CCR1000 .....	8
Electrical Cable Connectors.....	8
Connection to T95 System Controller .....	9
Connect the ECP Water Circulator Pump.....	10
Connect the Gas Lines .....	10
Pressure Warning .....	10
Load a Sample.....	11
Remove Sample Holder .....	11
Load Sample Filter .....	12
Warning .....	12
Important Note Before Heating Sample .....	12
Load Sample into Sample Holder .....	13
Load Sample Holder into CCR1000.....	14
Appendix.....	15
Spares and Accessories .....	15
Contacts Details.....	16

## **Before Setting Up Your Equipment**

Please register your products by going to [www.linkam.co.uk](http://www.linkam.co.uk) and click on the product/software registration button.

You will need to register your equipment with us to:

- Activate your warranty and technical support
- Access the online setup videos
- Permanently unlock the Linksys32 software (if purchased)

If you have purchased Linksys32 software, please install the software first. This process will guide to register all of your products.

See Linksys32 manual for further installation instructions.

A CD with a setup videos is supplied with your system.

## **Important Notice**

Please check that your Linkam equipment has not been damaged during transport. If there is any evidence of external damage DO NOT SWITCH ON ANY ELECTRICAL ITEMS.

Contact LINKAM SCIENTIFIC or their appointed distributor immediately. Your warranty may be impaired if Linkam is not informed of any transport damage within 7 working days of delivery.

NO attempt should be made to repair or modify the equipment in any way, as there are **no user replaceable parts**.

No attempt should be made to open the case except by qualified personnel as hazardous voltages are present.

Please contact Linkam for custom modifications for specific applications.

In order to use this equipment successfully, please take time to read this manual all the way through before starting to work.

## **Warranty**

This equipment has a warranty against defects in material and workmanship for a period of 12 months. Linkam will either repair or replace products that prove to be defective. For warranty service or repair, this product must be returned to Linkam or a designated service facility.

The warranty shall not apply to defects resulting from interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation or maintenance.

## **Technical Support**

Any technical questions or queries should be addressed to the Technical Support Department at the address shown on the back of this manual.

## **Equipment Maintenance**

The programmer does not require any regular maintenance. If for any reason it is necessary to check the electronic calibration then a set of standard resistances can be supplied, which simply plug into the programmer in place of the stage, and indicate known temperature values. The standards are traceable to NAMAS (National Accreditation of Measuring and Sampling)

Before cleaning the case or front panel of the programmer, remove the mains lead from the wall outlet. Use a small quantity of isopropyl alcohol with a soft cloth and gently wipe the surface.

## **Pressure Warning**

The CCR1000 has been tested to 5bar pressure using 22mm quartz windows of 1mm thickness. Windows must always be inspected with magnifying lens to check there are no microscopic cracks or scratches before using the stage under pressure. Never stand within 1m of CCR1000 when using high pressure between 2-5bar.

Linkam cannot guarantee pressure with IR transparent windows due to the inconsistent mechanical strength of the windows.

Contact Linkam if there is any concern with pressurizing this stage.

## Safety Precautions

- 1) Read this guide before using the equipment. Save these instructions for later use.
- 2) Follow all warnings and instructions which may be placed on the programmer or stage.
- 3) If for any reason the mains fuse needs to be replaced then it must be replaced by one of the same type and rating as shown in the equipment ratings.
- 4) To prevent electric shock, do not remove the cover of the controller or associated electronics.
- 5) Never use the equipment if a power cable has been damaged. Do not allow any heavy objects to rest on the power cables. Never lay the power cables on the floor.
- 6) Do not obstruct any ventilation holes. Do not attempt to insert anything into these openings. Provide adequate ventilation of at least 75mm all around the equipment.
- 7) Do not expose the equipment to water. If for any reason it gets wet then unplug it from the mains and contact Linkam Scientific Technical Support.
- 8) The equipment is not intended to be used outdoors.
- 9) Each product is equipped with a 3-wire grounded (earth) mains plug or a free-end 3 wire mains lead. The plug only fits into a grounded-type outlet. The free-end mains lead should be connected to a correctly grounded 3-wire mains outlet. Do not defeat the purpose of the grounded (earth) type plug.

Free - end mains leads are colour coded as follows :

Colour	Function
Brown	Live
Blue	Neutral
Green/Yellow	Earth (Ground)

- 10) If any problems occur then unplug the equipment from the mains outlet and contact Linkam Scientific Technical Support.
- 11) Do not remove the cover from the equipment unless the mains inlet has been removed. Any servicing should be carried out by qualified service personnel.

## Symbol Reference

### Caution:



This safety symbol is on the back panel of the equipment and warns:-  
The user must not make or remove any connections while the unit is powered on.  
To avoid electric shock do not remove the cover. Refer servicing to qualified service personnel.

### Caution:



This warning symbol indicates that the surface labelled with this symbol may be hot.

## Feedback:

Your feedback will be greatly appreciated, please go to [www.linkam.co.uk](http://www.linkam.co.uk) to fill in the Feedback form.

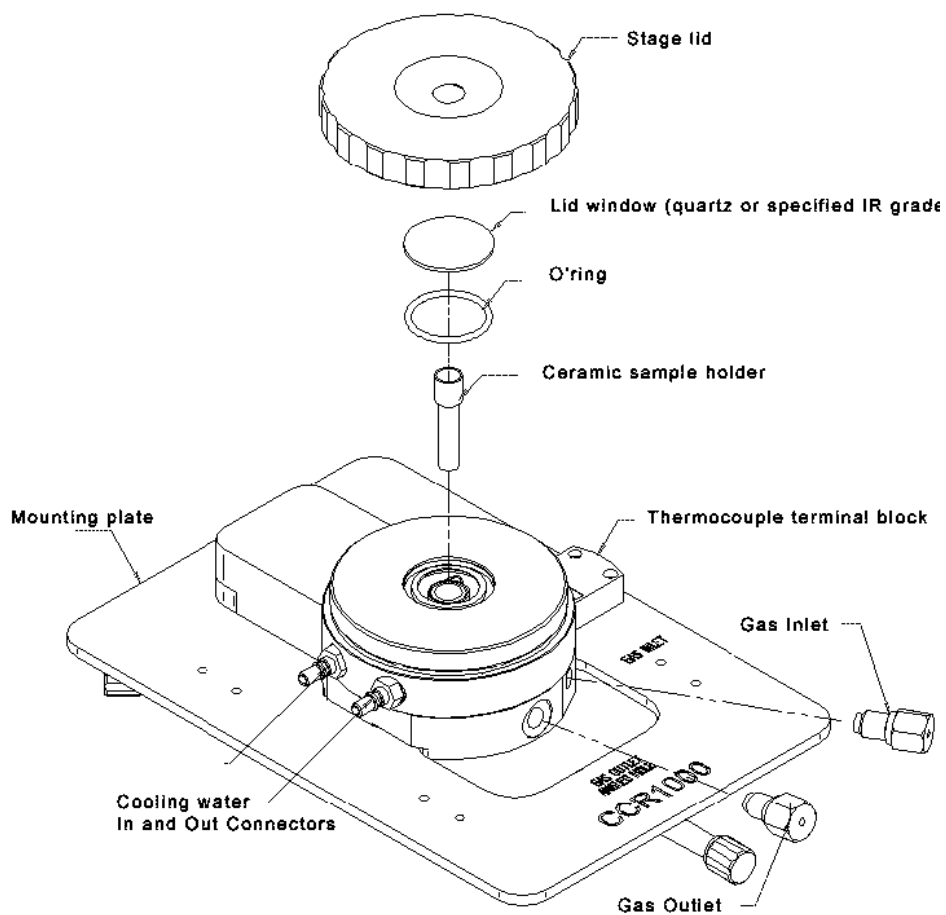
## Introduction

Thank you for purchasing the CCR1000 High Temperature Catalyst Cell Reactor. Please take the time to read through the manual as it will help you to make the most out of the equipment.

The Catalytic Cell Reactor system consists of a removable ceramic sample holder which is heated by a resistance coil. Samples are placed on a highly porous ceramic cloth filter. Gas is introduced via a high pressure valve and is then heated by sample holder before passing through the sample. A high pressure outlet valve can be connected to various gas analysis equipment. All materials used in the CCR1000 stage have been carefully selected to be as un-reactive as possible.

Either quartz windows for standard brightfield microscopy, fluorescence and Raman or IR grade windows such as zinc selenide and Barium Fluoride for IR work (pressure range dependent on type of window used).

### Stage Anatomy



## Mounting Stage to Microscope with Dovetail Substage

The CCR1000 is designed to work with an upright microscope using reflected light only.

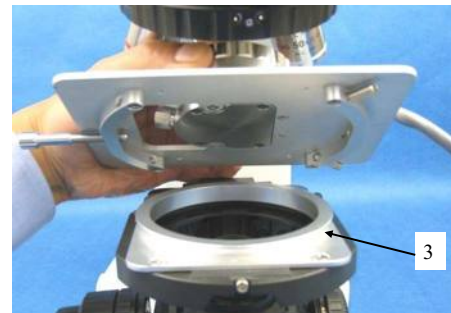
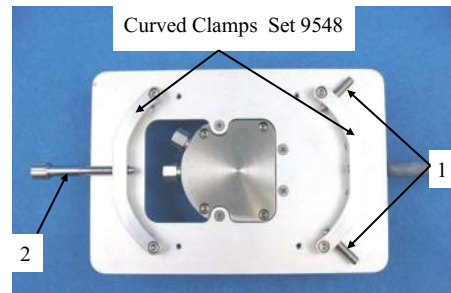
The following description is for mounting the stage on to microscopes which have a circular dovetail substage assembly.

Attach the curved stage clamps (part no. 9548) to the base of the stage using the supplied hex screws and the outer most holes in the base plate.

Adjust the two positioning screws (1) and the thumb screw (2) so that approximately 5mm of thread is exposed on the inside edge of the clamp. This will roughly position the stage in the centre of the dovetail (3).

Place the stage onto the dovetail then tighten the thumbscrew (2) to fix the stage in place.

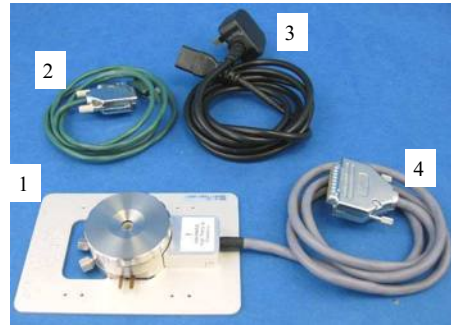
For other types of microscope sub-stages, refer to the diagram included with the stage adaptor.



### Set Up the CCR1000

Please check that all of the following parts have been supplied with the CCR1000.

1. CCR1000
2. Green Temperature Sensor Cable
3. Power Cable
4. Stage Connection Lead

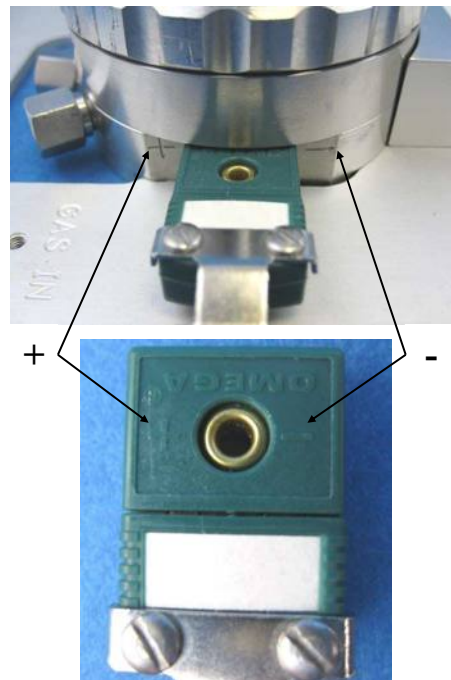


### Electrical Cable Connectors

Plug in the green Temperature Sensor cable to stage.



Make sure the '+' and '-' markings on the cable and connector match and push the cable firmly in place.

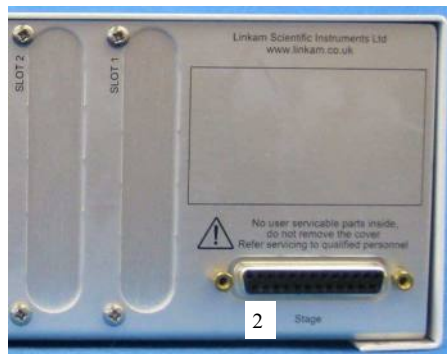
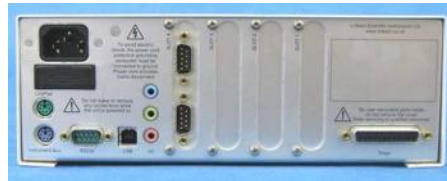




*Connection To T95 System Controller*

From the stage: connect the green Temperature Sensor cable to the Stage Socket (1) and connect the Stage Connection Lead to Stage Connection Socket (2).

Refer to the T95-LinkPad Manual for more details.

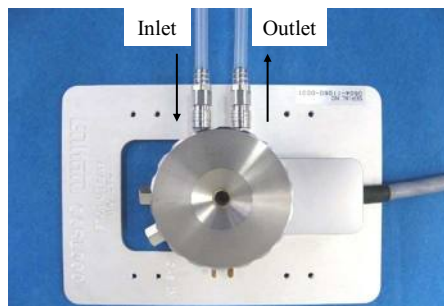


### Connecting the ECP Water Circulator Pump

Note: An ECP pump filled with cool water, 15-18°C, has large enough capacity for upto 2 hours operation of the stage at 1000°C or over. It is not recommended for longer term work at these temperatures.

Connect the Inlet and Outlet tubing from the ECP to the CCR1000 as shown.

Refer to the ECP, Water Circulator Pump Manual for more details.



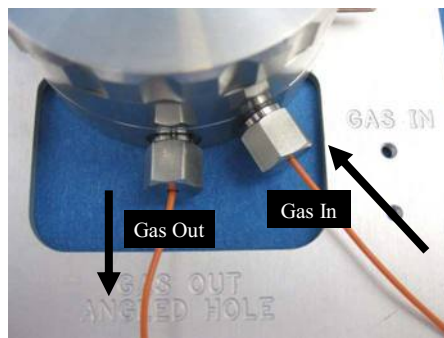
### Connect the Gas Lines

The gas connectors are standard size fittings that require 1/16inch peak or stainless tubing. High pressure peak ferrule can also be use to seal into the stage body.

Unscrew the hexagonal stainless steel gas connectors by hand. Insert your gas line into the connector so that a couple of millimetres extend beyond the end of the connector.

Relocate the gas line and connector into the stage body. No force is necessary. Now screw in the connector until it stops, using only fingers. No spanner is necessary (unless using stainless steel tubing).

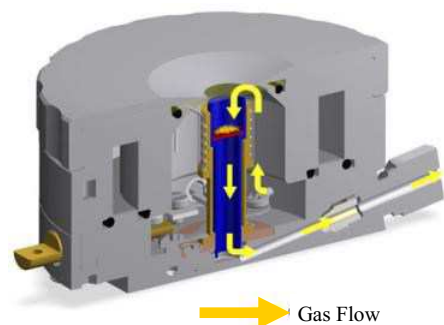
Note: The CCR1000 is designed to flow reactive gases over the sample. Make sure the GAS IN and GAS OUT lines are connected correctly as shown by the arrows. Use a flow rate of less than 50cc/min.



### Pressure Warning

The CCR1000 has been tested to 5 bar pressure using 22mm quartz windows of 1mm thickness. Windows must always be inspected with magnifying lens to check there are no microscopic cracks or scratches before using the stage under pressure. Never stand within 1m of CCR100 when using high pressure between 2-5bar. Linkam cannot guarantee pressure with IR transparent windows due to the inconsistent mechanical strength of the windows.

Contact Linkam if there is any concern with pressurizing this stage.

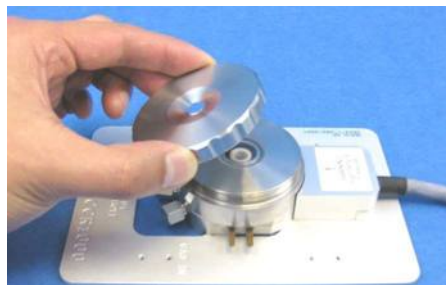


## Load A sample

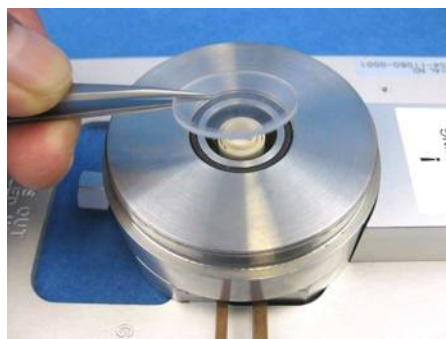
### *Remove Sample Holder*

Before removing the sample holder please ensure that the heater assembly has cooled to room temperature. When using the Loading Tool, care must be taken as the heater assembly is very fragile.

Remove lid by unscrewing anti clockwise.



Remove the 22x1mm quartz window.

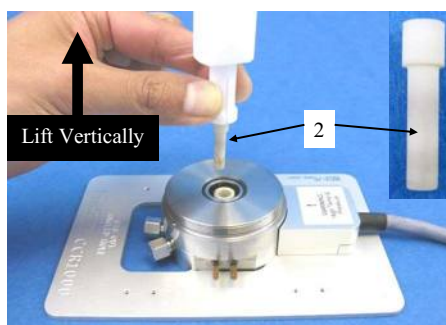


Use the Sample Holder Removal Tool (1) as shown in the picture.

Carefully lower the Sample Holder Removal Tool over the Sample Holder (2).

The next step requires great care and minimal force. Once the tool is axially aligned with the sample holder it will need to be pressed over the outer diameter of the Sample Holder. Rotate the tool slightly to make this easier. The tool will come to a stop after approximately 1.5mm. No further force is required otherwise the user risks damaging the heater assembly. Gently pinch the tool with a thumb and fore finger. This will allow the tool to grip the outer diameter of the sample holder.

Lift the tool vertically away from the CCR1000. If the sample holder is lifted out at an angle it could break.



### Load Sample Filter

The sample filters come as a sheet of alumina / silica ( $\text{Al}_2\text{O}_3$  96%/SiO<sub>2</sub> 4%) Non-Woven Fabric. A small disc of this fabric is needed to place the sample on. The following procedure must be used to load the filter into the Sample Holder.

**Warning:** The above material is harmful by inhalation and when in contact with skin. Possible risk of irreversible effects. Wear suitable protective clothing. Wear suitable gloves, eye/face protection or work in a fume cupboard. This material is NON-CARCINOGENIC.

**Important Note Before Heating Sample:** The Alumina/Silica Fabric filter on which the sample is loaded should be heated up to 600°C before doing a sample run. Either heat the fabric in an autoclave or using the CCR1000. Remove the lid window and run gas through the stage during the heating phase. This is so that any dust or debris in the stage or fabric filter is burned off and carried away before start of experiment.

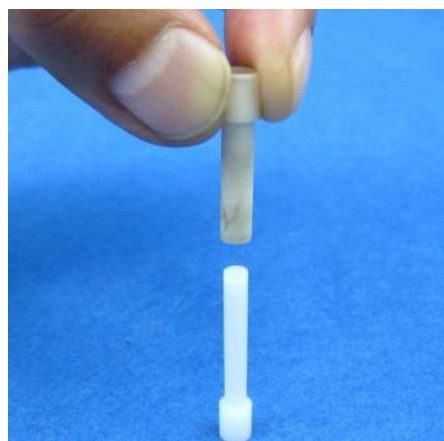
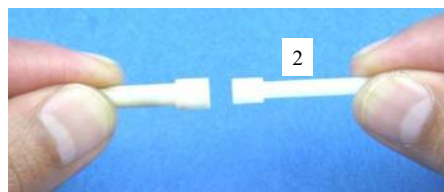
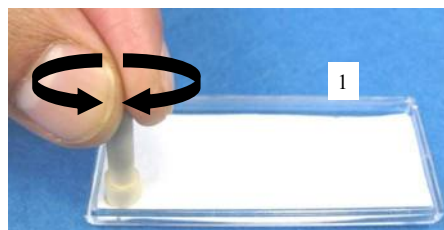
Turn the Sample Holder upside down and with a forefinger and thumb gently rest it over the alumina/silica fabric (1). Once the sample holder is in position, apply a very light force and rotate the sample holder into the alumina/silica Non-Woven Fabric. This will cut the fabric to fit the sample holder.

Gently lift the sample holder away from the fabric. The filter will now be the perfect size for the sample holder.

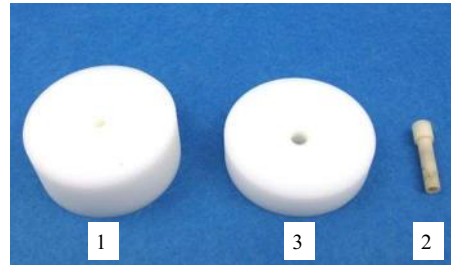
The filter is not yet low enough in the sample holder and needs to be pressed into position. This can be achieved by the using the Filter Load/Removal Tool (2).

The filter should be in the sample holder and ready to be pressed into position as shown above. Make sure that the tool is round the correct way to press the filter into the sample holder.

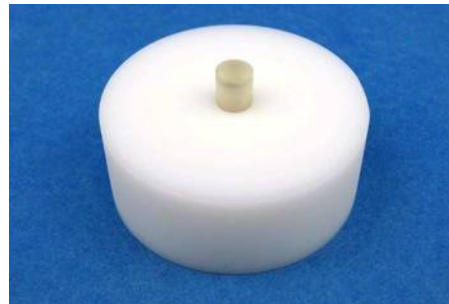
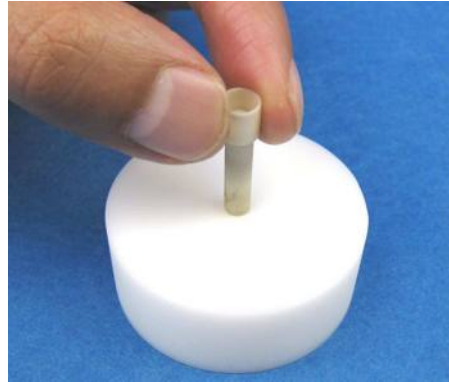
Note: To remove the filter, the tool can be used to push it out of the sample holder. Balance the tool on a flat surface so that the smaller diameter of the tool is protruding upwards. Hold the sample holder over the tool (the Filter Load/Removal Tool can be supported by hand if required). Gently lower the sample holder over the filter load/removal tool.



*Load Sample into Sample Holder*



Place the Sample Loading Base (1) on a flat surface and hold the Sample Holder (2) above it. Gently press and rotate the Sample Holder into the central hole in the sample loading base until resistance is felt. Excessive forces are not needed as the sample holder should slide into the sample loading base.



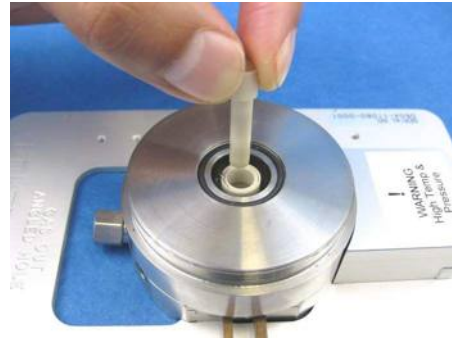
Place the Sample Loading Funnel (3) on top of the sample holder and the sample loading base as shown below.

The sample can now be easily guided through the top of the funnel into the sample holder.



*Load Sample Holder into CCR1000*  
Carefully pick up the top of the Sample Holder and hold it over the heater assembly.

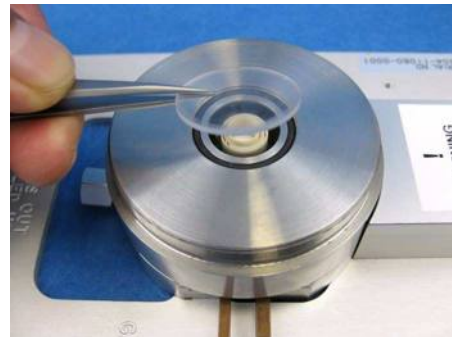
Very carefully lower the Sample Holder into the heater assembly. Rotate the sample holder to make sure that it is axially aligned with the heater assembly.



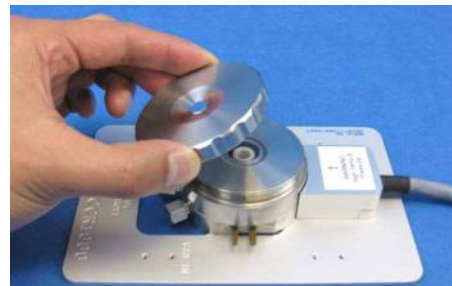
Once the sample holder is positioned in the heater assembly place a fore finger on top of the sample holder. Gently press down and rotate the sample holder so that it sits firmly in place.



Replace the quartz window.



Replace the Lid.



## Appendix

### *Spares and Accessories*

Here is a list of spares you may require in the future. Contact your Linkam representative for other spare parts that are not listed below.

Part No.	Part Name	Part Description
<b>9848</b>	CCR1000 KIT	Replacement Spares Kit
	CCR-SLK	Sample Loading Kit
	CCR-CC	Ceramic Cloth for Sample Loading (6x3.5cm) <b>x4</b>
	CCR-CPF	Cole Palmer Fitting with Ferrule <b>x4</b>
	W22Q1	22mm Diameter Quartz Window, 1mm thick <b>x2</b>
	CCR-ALSH	Alumina Sample Holder
	RING	O Ring ID18.0 x CS1.5 Viton <b>x2</b>
	WTK	Water Tube Kit: 3x WVC Hose Valve, 3x Clear PVC 3x6mm Tubing
	CCR-SP	Micro Spatula

Part No.	Part Name	Part Description
<b>9754</b>	CCR-B	Ceramic Heating Element including S-Type Thermocouple

