July 2018 Issue 6

Instructions

Carousel 12 Plus™ Reaction Station

Your Local Distributor

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Thank you for purchasing your Carousel 12 Plus Reaction Station.

Please read this Instruction Manual thoroughly before operating your unit.

1. Introduction

The Carousel Reaction Station is a modular system that provides the capability to perform parallel synthesis for reactions that require heating and/or cooling, in a fully inert atmosphere, and provides a streamlined interface to post synthesis processing.

The Carousel Reaction Station converts a standard stirring hotplate into a 12 place parallel synthesiser.
The Carousel is designed to be used by individual chemists in their own fume cupboard. The affordability of the Carousel Reaction Station brings all the benefits in productivity of multiple parallel synthesis to the chemist at a fraction of the cost of any other comparable system.

• Simultaneously performs up to 12 heated and stirred reactions with use of the heated base.

• Individual glass reaction tubes give a working volume of 1 to 20ml per tube.

• The Carousel fits on a standard Carousel hotplate stirrer, using existing and readily available technology.

• Utilises the single rotating magnetic field of the hotplate stirrer to stir all the positions evenly and powerfully.

• Heated base is heated directly by the stirrer's hotplate; providing an operating temperature range from ambient to +180°C, with temperature accuracy of +/-0.5°C.

• Water cooled aluminium reflux head provides efficient refluxing without traditional glass condensers.

• Removable reflux head allows all tubes to be removed simultaneously from the heated base to allow rapid post synthesis cooling. Quick release valved couplings allow disconnection of cooling water without the loss of water.

• Quick release central inlet/outlet for vacuum and inert gas, combined with a radial gas distribution system and gas-tight PTFE Easy-On Caps, allow reactions to be performed under an inert atmosphere.

• Circular design, with integral window slots in the heated base makes all reaction tubes visible and allows easy addition of reagents and solvents; with no need to lean into the fume cupboard.

• Reliable maintenance free operation with no electrical or moving parts.

• Easy to operate and set-up, with minimal training time and a compact bench-top footprint.

• Modular design allows all reaction tubes to be removed simultaneously from the reactor base, without disconnecting the inert gas or water supply.

• Fully inert fluoropolymer coating facilitates cleaning and provides total chemical resistance to exposed reactor surfaces.

• Unique removable fluoropolymer insulation plate helps insulate the heated base for faster heating and energy savings of up to 36%.

2. Warranty

Carousel 12 Place Reaction Station includes one year full parts and labour warranty from date of original purchase.

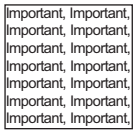
Warranty will only be valid if a completed Warranty Email Back is returned within 1 month of date of purchase (see last page).
In the event of product failure please contact your local distributor.

Please do not return any goods without prior agreement.

3. Safety Information

The following symbols are intended to assist the user in the safe and efficient operation of Carousel 12 Plus Reaction Station.

Warning
Applies when there is a possibility of personal injury.



Important Note
Alerts the user to important facts.

4. Important WARNINGS

• Please read these instructions completely before using your Carousel 12 Plus Reaction Station.

• Operate only in a fume cupboard with protective safety sash.

• The Carousel Reaction Tubes are not designed for pressurised reactions. DO NOT PRESSURISE ABOVE 1psi.

• The Carousel is not suitable for continuous use under vacuum (e.g. for evaporations or for reactions to be carried out under vacuum). Vacuum should only be used intermittently as part of the inerting process.

• Chemical resistance - the Carousel fluoropolymer coating is resistant to the majority of chemicals and solvents. Care should be taken that this coating is not scratched or damaged in any way, as this may expose the aluminium to chemical attack.

• Do not attempt to dismantle the removable reflux head - this will invalidate your warranty.

• To avoid the build-up of limescale in the reflux head please avoid the use of hard water.

• Risk of burns - when heating reactions take care not to touch the reaction block. Use of the removable insulating plate is highly recommended to reduce temperature of exposed surfaces.

• The Carousel unit will remain hot for some considerable time after the heating source has been switched off. A temperature probe or temperature sensitive label can be used to indicate when components are too hot or cold to touch.

• Maximum recommended operating temperature is 180˚C, however block temperatures of 220˚C* can be achieved.
**Prolonged operation above 180˚C can reduce the operational life of the stirring hotplate and should be avoided for extended periods. The maximum base temperature achievable with the Carousel using the Carousel Tech stirring hotplate is around 220˚C. However achieving this temperature is dependent on various factors such as the ambient temperature, the face velocity of the fume cupboard extract, the number of tubes being heated and the liquid load etc. Temperatures above 220˚C are not recommended and will lead to damage of your stirring hotplate.*

Important Note
The Carousel Reaction Station should only be operated by trained and competent personnel. As with all chemistries, a full risk assessment should be performed prior to starting an experiment, and care should be taken to monitor your reactions at all stages. The Carousel should not be left unattended unless in a supervised area.

5. Products & Accessories

Carousel Reaction Systems:- Include all the important components and accessories required for efficient operation.

Carousel 12 Plus Systems

		Pk Qty
RR91091	**Carousel 12 Plus - Basic System 1**	
	1 x RR91030 Carousel 12 Plus Reaction Station	1
	1 x RR91080 Quick-Thread Glass Reaction Tube	6
	1 x RR91081 Quick-Thread Glass Reaction Tube	12
	2 x RR91070 Easy-On PTFE Cap	6
	1 x RR98070 Octagonal Stirring Bar 13mm	20
	1 x RR98091 Cross Shape Stirring Bar 16.5mm RE	20
	1 x RR98094 PTFE Magnetic Stirring Bar Retriever 350 mm	1
	1 x RR98095 PTFE Magnetic Stirring Bar Evaluation Kit	30
	1 x RR98076 Silicone Suba Seals for All Caps	100
	1 x RR98901 Zinc Plated Wire Rack for 36 x Tubes	1
RR91092	**Carousel 12 Plus - Standard System 2**	
	1 x RR91030 Carousel 12 Plus Reaction Station	1
	1 x RR91080 Quick-Thread Glass Reaction Tube	6
	1 x RR91081 Quick-Thread Glass Reaction Tube	12
	2 x RR91070 Easy-On PTFE Cap	6
	1 x RR98070 Octagonal Stirring Bar 13mm	20
	1 x RR98091 Cross Shape Stirring Bar 16.5mm RE	20
	1 x RR98094 PTFE Magnetic Stirring Bar Retriever 350 mm	1
	1 x RR98095 PTFE Magnetic Stirring Bar Evaluation Kit	30
	1 x RR98076 Silicone Suba Seals for All Caps	100
	1 x RR98901 Zinc Plated Wire Rack for 36 x Tubes	1
	1 x RR91038 Carousel 12 Plus Stand	1
	1 x RR91202 Carousel Tech Stirring Hotplate 230v UK Plug	1
	1 x RR91210 Carousel Temperature Controller	1
RR91093	**Carousel 12 Plus - Complete System 3**	
	1 x RR91030 Carousel 12 Plus Reaction Station	1
	1 x RR91080 Quick-Thread Glass Reaction Tube	6
	1 x RR91081 Quick-Thread Glass Reaction Tube	12
	2 x RR91070 Easy-On PTFE Cap	6
	1 x RR98070 Octagonal Stirring Bar 13mm	20
	1 x RR98091 Cross Shape Stirring Bar 16.5mm RE	20
	1 x RR98094 PTFE Magnetic Stirring Bar Retriever 350 mm	1
	1 x RR98095 PTFE Magnetic Stirring Bar Evaluation Kit	30
	1 x RR98076 Silicone Suba Seals for All Caps	100
	1 x RR98901 Zinc Plated Wire Rack for 36 x Tubes	1
	1 x RR91038 Carousel 12 Plus Stand	1
	1 x RR91202 Carousel Tech Stirring Hotplate 230v UK Plug	1
	1 x RR91210 Carousel Temperature Controller	1
	1 x RR91040 Carousel 12 Plus Cooling Reservoir & Lid	1
	1 x RR99905 Digital Thermometer (-250˚C to +400˚C) & 200mm Probe	1
	1 x RR99908 Dry Ice Scoop	1

Carousel 12 Plus

Carousel 12 Plus Heated

RR91040	Carousel 12 Plus Reaction Station	1
	RR91032 Carousel 12 Plus Reflux/Inerting Head	1
	RR91034 Carousel 12 Plus Heating Base	1
	RR91036 Carousel 12 Plus Insulating Plates, pair	1

Carousel 12 Plus Cooled

RR91030	Carousel 12 Plus Cooling Reservoir & Lid	1

Carousel 12 Plus Components

RR91032	Carousel 12 Plus Reflux/Inerting Head	1
RR91034	Carousel 12 Plus Heating Base	1
RR91036	Carousel 12 Plus Insulating Plates, pair	1
RR91038	Carousel 12 Plus Stand	1
RR91041	Carousel 12 Plus Cooling Lid	1

5. Products & Accessories - Continued

Carousel 12 Plus Accessories & Spare Parts

Caps & Tubes		
RR91070	Easy-On PTFE Cap	6
RR91072	Easy-On PTFE Storage Cap	6
RR98076	Silicone Septa for All Caps	100
RR98176	Viton Silicone Septa for All Caps	100
RR91080	Quick-Thread Glass Reaction Tube 24 ø x 150mm	6
RR91081	Quick-Thread Glass Reaction Tube 24 ø x 150mm	12
RR91088	Quick-Thread Reduced Volume Tube 24 ø x 150mm	6
RR91089	Carousel 12 Plus Reduced Volume Inserts	6
PTFE Magnetic Stirring Bars		
RR98070	Octagonal Stirring Bar 13mm	20
RR98071	Pivot Ring Stirring Bar 12 x 6mm	40
RR98075	Cross Shape Stirring Bar 10mm	40
RR98091	Cross Shape Stirring Bar 16.5mm RE	20
RR98096	Elliptical Stirring Bar 10mm RE	40
RR98097	Elliptical Stirring Bar 15mm RE	20
RR98113	Cylindrical Stirring Bar 12mm RE	20
RR98094	PTFE Magnetic Stir Bar Retriever 350mm	1
RR98095	PTFE Magnetic Stir Bar Evaluation Kit	30
RR98114	Stirring Bar Restrainer	1
Stirring Hotplates		
RR91202	Carousel Tech Stirring Hotplate 230v UK Plug	1
RR91202/EURO	Carousel Tech Stirring Hotplate 230v EURO Plug	1
RR91202/JAP	Carousel Tech Stirring Hotplate 110v Japanese Plug	1
RR91202/SWISS	Carousel Tech Stirring Hotplate 240v Swiss Plug	1
RR91202/USA	Carousel Tech Stirring Hotplate 115v US Plug	1
Temperature Controller		
RR91210	Carousel Temperature Controller	1
Includes RR71125 Temp Sensor Support Rod and RR71120 Support Rod Hotplate Adapter		
RR71125	Temp Sensor Support Rod	1
RR71120	Support Rod Hotplate Adapter	1
Racks & Other Accessories		
RR98901	Zinc Plated Wire Rack for 36 x 24mm Tubes	1
RR98902	Zinc Plated Wire Rack for 40 x 24mm Tubes	1
RR98903	Zinc Plated Wire Rack for 80 x 24mm Tubes	1
RR98906	Black Lab Marker	10
Spare Parts & Replacement O-Rings		
RR98160	O-Rings for Caps - Viton 24mm	100
RR98060	O-Rings for Caps - Nitrile 24mm (standard)	100
RR91060	Nitrile O-Rings 4mm Gas Outlet - Bottom	50
RR91061	Nitrile O-Rings 3mm Gas Outlet - Top	50
RR91062	Viton O-Rings 4mm Gas Outlet - Bottom	50
RR91063	Viton O-Rings 3mm Gas Outlet - Top	50
RR91065	Quick Release Male Body Coupling No Shut-off	1
RR91066	Quick Release Barbed Coupling No Shut-off	1
RR99062	Quick Release Barbed Coupling + Shut-off	2
RR99063	90 Elbow Quick Release Barbed Coupling + Shut-off	2
RR99065	Quick Release Male Body Coupling + Shut-off	2
Cooled Carousel 12 Plus Accessories		
RR99905	Digital Thermometer (-250˚C to +400˚C) & 200mm Probe	1
RR99906	Digital Thermometer (-250˚C to +400˚C)	1
RR99907	200mm Temperature Probe	1
RR99908	Dry Ice Scoop	1
RR99909	Cold Temperature Apron 1060mm long, Waterproof	1
RR99910	Protective Face Shield	1
RR98024	Protective Cold Temperature Gloves	1
RR71505	Cooling Protection Kit	1
	RR99909 Cold Temperature Apron 1060mm long, Waterproof	1
	RR99910 Protective Face Shield	1
	RR98024 Protective Cold Temperature Gloves	1

5. Products & Accessories - Continued

5.1. Carousel Stand

The Carousel Stand is designed to facilitate post synthesis processing. The removable reflux head allows all reaction tubes to be removed from the heated base simultaneously, for the purpose of increasing the cooling rate of the reaction mixtures, or simply as a means of storing the reaction tubes prior to further processing, thus freeing up the heating base for further use.

Carousel Reaction tubes can be stored in this way, whilst maintaining an inert atmosphere in the reaction tube, and with continuation of cooling of the reflux head, if required, with use of the Easy-On PTFE Carousel Cap.

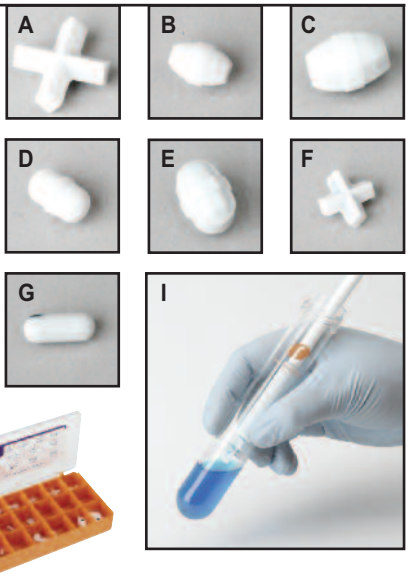
5.2. Carousel Work-Up Station™

The Carousel Work-Up Station is designed to make your post synthesis work-up quick and easy, avoiding downstream bottlenecks.

The Carousel Work-Up Station accepts up to 12 x 70ml columns loaded in to one of two identical stackable racks. The lower rack supporting 12 corresponding Carousel Reaction Tubes or standard 1 inch boiling tubes for subsequent sample collection.

The Carousel Work-Up Station allows up to two levels of 70ml columns stacked one above the other. This enables parallel and/or sequential work-up in 12 samples, using filtration, phase separation or SPE techniques.

5.3. PTFE Magnetic Stirring Bars



A choice of seven styles of PTFE magnetic stirring bars selected for optimised performance with the Carousel and other Radleys synthesisers.

A RR98091 The popular Medium Cross Shaped Rare Earth Stirring Bar contains strong rare earth magnets, it creates a deep vortex and is ideal for stirring resins and viscous samples.

B & C RR98096 & RR98097 Elliptical Rare Earth Stirring Bars facilitate powerful stirring with good vortex even in viscous samples, available in both small and large size.

D & E RR98070 & RR98071 Octagonal Stirring Bars are general purpose stirring bars, available in both small and large size.

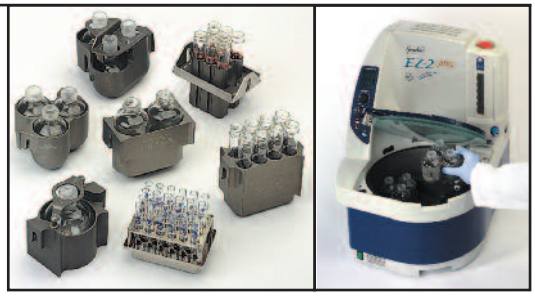
F RR98075 Small Cross Shaped Stirring Bars creates a vortex at slow speeds,

G RR98113 Medium Cylindrical Rare Earth Stirring Bar a small powerful general purpose stirring bar.

H RR98095 Stirring Bar Evaluation Kit contains 3 of each above 7 stirring bars styles, allowing you to identify the best stirring bar for your application.

I RR98094 PTFE Stirring Bar Retriever allows you to retrieve stirring bars from reaction tubes, 350mm long. RR98114 PTFE Stirring Bar Restrainer allows you to restrain your stirring bar with your tube when dispensing liquids.

5.4. Compatible with Genevac Centrifugal Evaporators



All of the Carousel Reaction Tubes are compatible with the full range of Genevac Centrifugal Evaporators, including the EZ-2 Personal Centrifugal Evaporator.

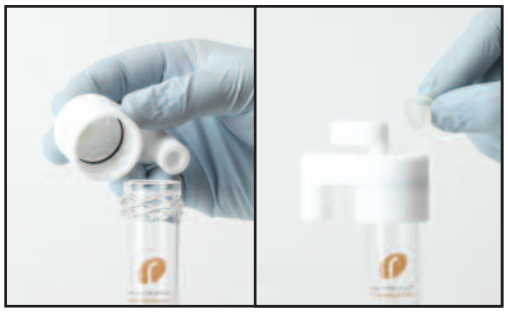
For assistance in selecting the correct Genevac rack for your reaction tubes or flasks, please see page 12 or visit the Genevac web site www.genevac.com

6. Quick Start Guide

6.1. Locate the Carousel Reaction Station on top of the stirring hotplate.

6.2. Assemble the two halves of the insulating plate on the base. Take care to ensure that the central interlocking fingers are correctly joined and to align the hole for the temperature probe in the plate with the corresponding hole in the base.

6.3. Assemble reflux head and base unit, so that they fit securely together. Make sure that the locating pin in the head is properly aligned with the receiving hole in the upper plate of the base - use the arrow on the head to aid with alignment.



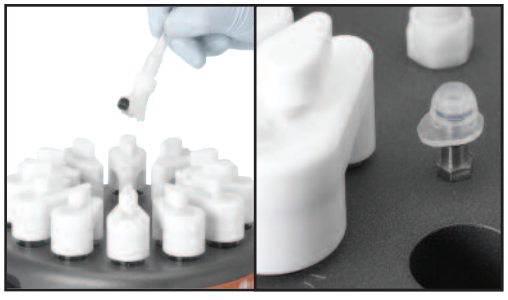
6.4. Place a magnetic stirrer bar into the reaction tube. Assemble Carousel Reaction Tube and Easy-On PTFE Cap by screwing together. This process requires a ¼ turn of the cap, hand tighten until the cap feels secure. Ensure that the tube is properly located within the O-ring seal in the cap.

6.5. Fit a new Silicone Septa to the central hole in the cap, and ensure that the cap valve is in the “open” position.

6.6. Place the assembled capped tube into the assembled Carousel Reaction Station at the required location, push the cap onto the connector pin, until the tube is fully located in the reactor base.

6.7. Connect quick fit water connectors to the reflux head, and start the recirculating coolant supply.

6.8. Connect the central quick fit gas connector to the regulated inert gas supply and switch the gas supply on.



6.9. If all gas connector positions are not in use, unused positions can be blocked off with a Silicone Septa to ensure a satisfactory supply of gas to all reaction tubes.

7. Set-Up & Operation

For Reactions using the heated base

7.1. Locating Carousel 12 on Hotplate Stirrer

The top surface of your hotplate stirrer should be cleaned prior to use. Any small particles on the surface may affect the fit of the Carousel 12 unit, and have an adverse affect on the performance. Wipe the surface with a cloth or tissue, dampened with an appropriate solvent (e.g. acetone) and check for any signs of contamination or obstruction.

The undersurface of the Carousel 12 should also be cleaned prior to use. Wipe the surface with a cloth or tissue, dampened with an appropriate solvent (e.g. acetone) and check for any signs of contamination or obstruction.

Position the Carousel 12 onto the hotplate stirrer unit, making sure that it is secure and properly seated. The circular recess in the base of the unit is designed to fit snugly around the top plate of the stirring hotplate (maximum diameter 135mm).

7.2. Use of the Insulating Plate

The insulating plate has been specifically designed to maximize the performance of the Carousel. It provides a unique thermal barrier that both increases energy efficiency, and provides a safer working environment (see Section 9, Performance Data on page 13 further details).

Position the first half plate on the Carousel base, sliding it past the supporting pillars. The second plate can then be positioned from the opposite side, again sliding it past the supporting pillars, ensuring that the interlocking fingers are properly aligned. When the plate is properly assembled, it should fit flush with the Carousel 12 base, with the 2 halves joined in the centre with minimal gap.

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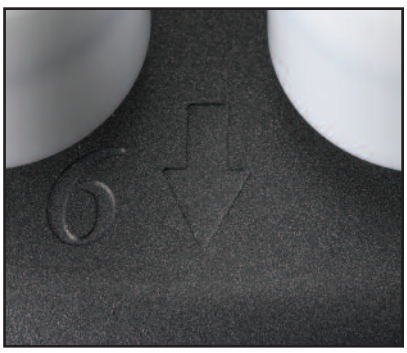
Important Note

Use of the insulating plate at all times is highly recommended. The plate is supplied as 2 identical halves, that are placed over the Carousel 12 base where they join together to form a complete jacket.



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Important Note

If using a Temperature Controller probe to monitor or control the temperature from the Carousel 12 base, care must be taken to ensure that the hole in the insulating plate lines up with the hole in the Carousel base. Each half of the insulating plate has an identical hole. If initial assembly hasn't aligned the holes correctly, remove the plates, and reposition after rotating the base by 90˚C.

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Important Note

It is not possible to position (or remove) the insulating plate once the Carousel 12 has been loaded with glassware. Make sure that the plate is in place before starting to load the Carousel 12.

7.3. Locating the Reflux Head

Assemble reflux head and base unit, so that they fit securely together. Make sure that the locating pin in the head is properly aligned with the receiving hole in the upper plate of the base, use the arrow on the head to aid with alignment.

7. Set-Up & Operation - Continued

The Carousel's modular design allows it to be easily lifted on and off the hotplate stirrer as required. Being circular, it can be rotated when in place to facilitate access to all reaction tubes. This removes the need to lean into the fume cupboard during operation.

The Carousel uses the single rotating magnetic field of the hotplate stirrer to stir all the positions evenly and powerfully.

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Important Note

The Carousel Tech Stirring Hotplate RR91202 is recommended but any stirring hotplate can be used if the top plate diameter does not exceed 135mm.

Warning

The Carousel Reaction Station should always be used in a fume cupboard with protective safety sash.

7.4. Assemble Reaction Tube and Easy-On Cap

Select a suitable magnetic stirrer bar, and place in the reaction tube.

We recommend the RR98091 Rare Earth - Medium Cross Shape PTFE Magnetic Stirring Bars for optimum stirring.

See page Page 5 for details of the complete range of Magnetic Stirring Bars.

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Important Note

All PTFE magnetic stirring bars will lose their magnetism with time and use. Therefore to optimise stirring performance always replace bars regularly.

7.5. Fitting Gas Tight Easy-On Caps to Carousel Reaction Tube

Assemble Carousel Reaction Tube and Easy-On Cap by screwing together. This process requires a ¼ turn of the cap, hand tighten until the cap feels secure. Ensure that the tube is properly located within the O-ring seal in the cap. The Nitrile O-ring forms a gas tight seal with the outside of the Glass Reaction Tube.

Caps feature a replaceable Nitrile o-ring as standard with an optional Viton replacement. These O-rings will be subject to chemical attack and will require periodic replacement.

- RR98060 O-Rings for Caps - Nitrile 24mm (standard), pk 100
- RR98160 O-Rings for Caps - Viton 24mm, pk 100

Fit a new Silicone Septa to the central hole in the cap. Septa are silicone as standard but a Viton alternative is also available.

- RR98076 Silicone Septa for caps, pk 100
- RR98176 Viton Septa for caps, pk 100

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Important Note

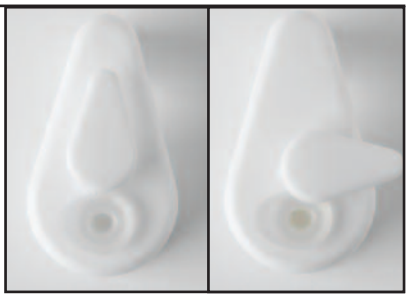
Please note that the Easy-On Caps 'seal' on the Nitrile O-ring before they are fully tightened. Fully tightening the caps will effect a double seal on the fluoropolymer inner of the cap and Nitrile O-ring.

7. Set-Up & Operation - Continued

7.6. Using Easy-On PTFE Caps with Valve & Septum for Inerting & Additions

When using these Caps, to ensure the flow of inert gas, the valve must be in the 'OPEN' position (see image). A quarter turn (anti-clockwise or clockwise) will 'CLOSE' the valve, isolating the Reaction Tube.

A Silicone Septa is located in the top of each PTFE Cap, which permits either reaction monitoring through the withdrawal of aliquots or the addition of reagents during synthesis. Septa will require periodic replacement - order Cat No. RR98076.



Open Close

Warning

Do not over tighten PTFE Caps, as this may damage the cap and cause fracture of the Glass Reaction Tube.

7.7. Place Assembled Capped Tube in Carousel

Place the capped tube into the assembled Carousel at the required location, push the Easy-On Cap onto the connector pin, until the Reaction Tube is fully located in the base.

The stainless steel Gas Outlets feature an upper and lower replaceable Nitrile o-ring as standard with an optional Viton replacement. These O-rings may be subject to chemical attack and will require periodic replacement.

RR91060	Nitrile O-Rings 4mm Gas Outlet - Bottom, pk 50
RR91061	Nitrile O-Rings 3mm Gas Outlet - Top, pk 50
RR91062	Viton O-Rings 4mm Gas Outlet - Bottom, pk 50
RR91063	Viton O-Rings 3mm Gas Outlet - Top, pk 50

7.8. Connect Reflux Coolant Supply

Use of water/coolant in the reflux head is essential to maintain satisfactory refluxing to minimise solvent loss and prevent escape of volatile reagents. Use of a refrigerated recirculating chiller will further reduce solvent losses.

Connect the quick release inlet and outlet to a suitable water (or other circulating coolant) supply and drain respectively, ensuring enough tubing is available for easy rotation of the Carousel. Both the male and female quick release fittings feature a non-return shut-off valve.

High Pressure water/coolant supplies should not be used.

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Important Note

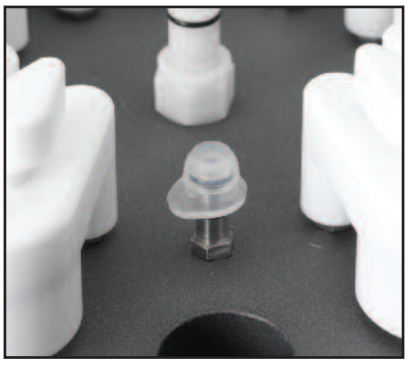
Liquid coolants other than water can be used in the reflux head, but the use of silicone base coolants, for example silicone oils, should be avoided as these will cause damage to internal components of the reflux head.

7.9. Important Tips for Optimum Refluxing

1. For most solvents a water supply of 5˚C to 18˚C will be sufficient for effective refluxing (however with cooling water above 12˚C, care should be taken to carefully control refluxing).
2. For low boiling point solvents such as diethyl ether, dichloromethane and acetone, you may require a chilled water supply with a temperature of 0 to 5˚C.
3. Normally a block temperature of 5 to 10˚C above the boiling point of the solvent is sufficient to achieve reflux.
4. This differential can be affected by ambient temperature and airflow within your fume cupboard. Therefore some experimentation may be necessary to determine the optimum block temperature for your solvent.
5. The use of a slight positive pressure of inert gas (not exceeding 1psi) can help reduce any solvent loss.

7. Set-Up & Operation - Continued

Valve in closed position



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Important Note

To avoid the build-up of limescale in the reflux head please avoid the use of hard water.

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Important Note

Do not attempt to dismantle the Reflux Head – THIS WILL INVALIDATE YOUR WARRANTY. Dismantling the Reflux Head may compromise the silicone seal between the surfaces and cause a water leak during operation.

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Important Note

In the unlikely event of a water leak from the Reflux Head, please stop using the unit immediately.

1. DO NOT TOUCH THE CAROUSEL OR HOTPLATE.
2. Switch off all power supply to the hotplate at the mains.
3. Remove the power plug from the mains.
4. Once the Carousel has cooled sufficiently remove it from the hotplate.

Do not attempt to repair the leak. THIS WILL INVALIDATE YOUR WARRANTY. Please contact your local Radleys distributor.

7.10. Connect Gas/Vacuum supply

The central gas inlet and radial distribution system combined with gas tight Easy-On PTFE Caps allows reactions to be performed under an inert (nitrogen/argon) atmosphere.

For use under an inert atmosphere attach tubing to the central quick-release coupling and connect via a 3-way tap or stopcock to a vacuum source and inert gas supply (recommended maximum pressure 1psi).

Then, by alternately evacuating the system and filling it with a suitable inert gas (repeating 2 to 3 times) will achieve an inert atmosphere within the tubes.

The tubes can be isolated or removed during synthesis by simply closing the valve on the Easy-On PTFE Cap and removing the tube.

Warning

When applying gas to the reaction station gas inlet system do not exceed 1 (one) psi as the Reaction Tube and Easy-On PTFE Caps are not rated for pressure, (they are however suitable for applying a vacuum).

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Important Note

The Carousel is not suitable for continuous use under vacuum (e.g. for evaporations or for reactions to be carried out under vacuum) as there is a risk that the vacuum would pull chemicals up through the Carousel reflux head and damage it. Vacuum should only be used intermittently to remove air and replace it with an inert gas. Also, please note that the Carousel is not designed to be fully vacuum tight.

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Important Note

The Reaction Tubes can be isolated or removed during synthesis by simply closing the valve on the Easy-On PTFE Cap ensuring the other reactions remain under controlled inert conditions.

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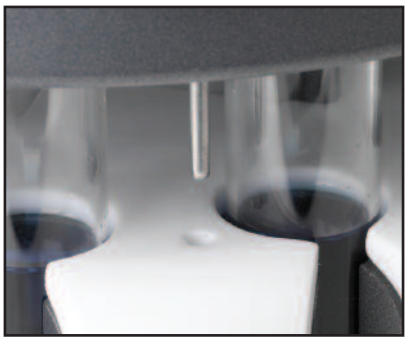
Important Note

If all Gas Outlets are not in use, unused outlets can be blocked off with a inverted Silicone Septa.

8. Temperature Control Set-Up and Operation



Temperature Control

1 Set the stirring speed and temperature of the stirring hotplate to the desired level.

2 The stainless steel temperature sensor is positioned either in one of the Reaction Tubes (through the Silicone Septa) to monitor and control the solution temperature or into the reaction block via the hole between the reflux inlet.

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Important Note

Please read the separate Carousel Stirring Hotplate instructions thoroughly before operation.

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Important Note

Maximum recommended operating temperature is 180 ˚C; however, block temperatures of 220˚C may be achieved.

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Important Note

Always ensure that the temperature sensor is completely immersed into the liquid when inserted into the reaction tube.

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Important Note

Care should be taken to monitor the total set up during synthesis, paying particular attention to regularly check the inert gas supply, flow of cooling water to the reflux head and reaction temperature and make adjustments as necessary.

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Important Note

The Carousel Reaction Station should only be operated by trained and competent personnel. As with all chemistries, a full risk assessment should be performed prior to starting an experiment, and care should be taken to monitor your reactions at all stages. The Carousel should not be left unattended unless in a supervised area.

Once your synthesis is complete:

1. Turn off heating.
2. Turn off gas supply.
3. Disconnect gas inlet.
4. If possible remove the Carousel reflux head from heated base and place on the Carousel Stand other-wise heat transfer from the hotplate will continue.
5. Once the reaction has sufficiently cooled, turn off reflux cooling.
6. The Reaction Tubes can now be removed.

9. Performance Data - Insulating Plate

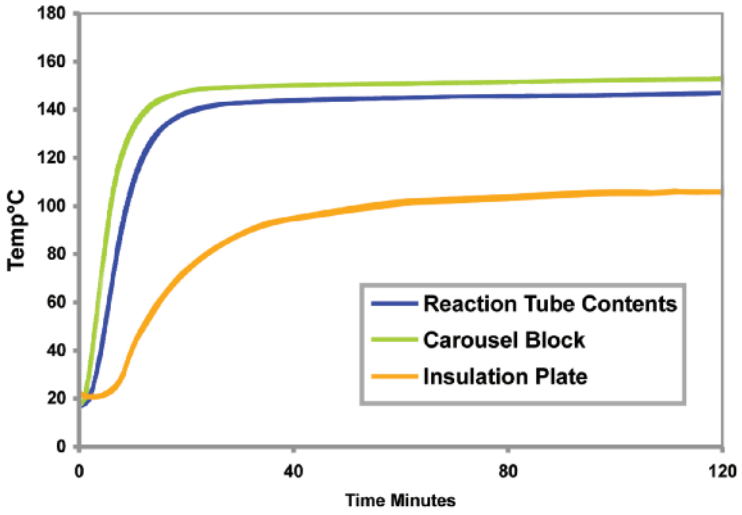
9.1 Use of the PTFE Insulating Plate as a Safety Barrier

The insulating properties of the fluoropolymer material provide a significant safety barrier, protecting the user from high temperatures and reducing the risk of serious burns, in case of accidental personal contact, when the reactor is being used at elevated temperatures. Tests have shown that when reactor components are at 155°C, exposed external surfaces are reduced in temperature by around 50 to 60°C (Fig 1)

Warning

Whilst the insulating plate will reduce the external temperature of the base it may still get hot enough to cause a burn. Therefore please do not touch the insulating plate during heating and always allow to cool fully before removal.

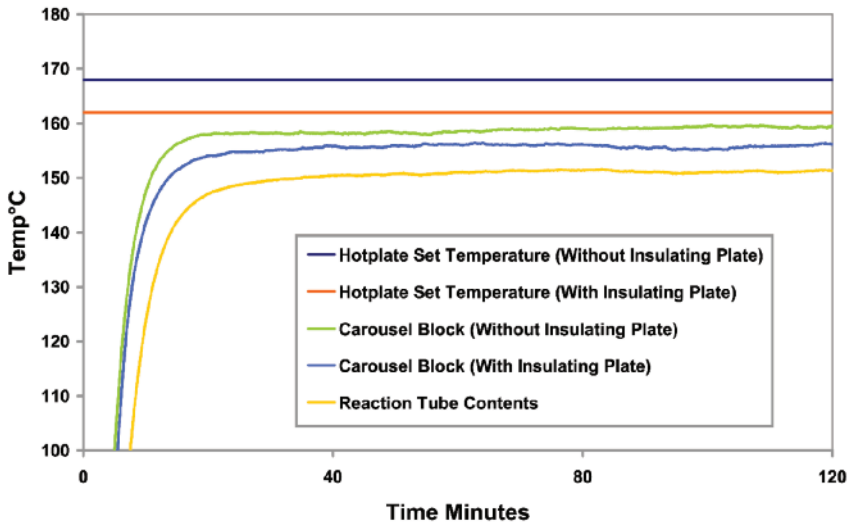
Temperature profile of Insulation Plate, Carousel Block & Reaction Tube Contents (Fig 1)

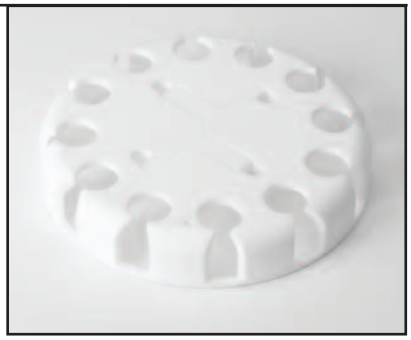


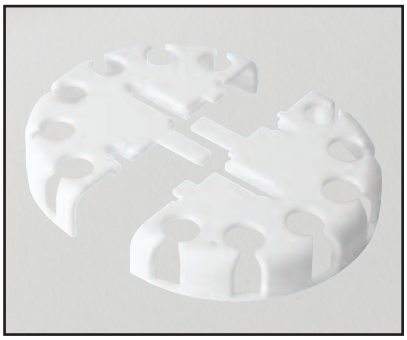
9.2 Use of the PTFE Insulating Plate to Improve Performance

The insulating properties of the fluoropolymer material provide more accurate heating and enhance the energy efficiency of the reactor. Tests have shown that to achieve and maintain a solution temperature of 150°C, the set temperature of the hotplate is 6°C lower, and energy consumption is reduced by up to 36% (Fig. 2)

Temperature profile of Carousel Block, with & without Insulating Plate (Fig 2)







Carousel 12 Plus Stand.

The Carousel stand is designed to support the reflux/inerting head either with or without reaction tubes.

The heavy duty metal stand is fluoropolymer coated for improved chemical resistance and ease of cleaning. The integral drip tray catches any dipping condensation from tubes and gives excellent stability.

- Use between reactions.
- Use when loading tubes.
- Use for reactions that require rapid air cooling.

9. Performance Data - Solvent Evaporation in the Carousel

Table One

Solvent Evaporation in the Carousel (unchilled coolant supply)

Solvent	Boiling point (°C)	1h	2h	3h	6h	12h	24h
Diethyl ether	35	0.8	1.1	1.5	2.1	3.2	4.8
Dichloromethane	40	-	0.1	0.2	0.6	1.0	1.6
Acetone	56	-	-	-	0.1	0.3	0.5
Chloroform	62	-	-	-	-	0.1	0.2
Tetrahydrofuran	67	-	-	-	-	0.1	0.1
t-Butanol	82	-	-	-	-	-	-
Dioxane	101	-	-	-	-	-	-
Toluene	111	-	-	-	-	-	-
Butanol	118	-	-	-	-	-	-
Chlorobenzene	132						
Dimethylformamide	153	-	-	-	-	-	-

Initially 20ml solvent kept at gentle reflux. Coolant temperature 7 to 10°C.

Figures shown indicate volume of solvent lost (in mls).

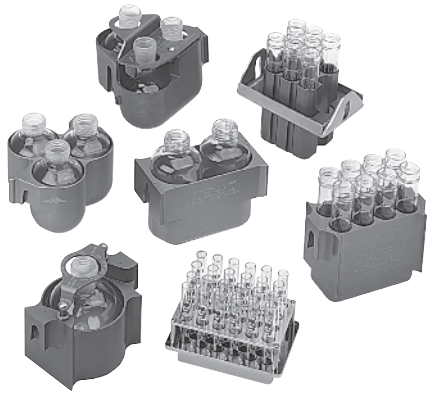
Table Two

Solvent Evaporation in the Carousel (chilled cooling supply)

Solvent	Boiling point (°C)	1h	2h	3h	6h	12h	24h
Diethyl ether	35	-	-	˜0.1	0.1	0.2	0.5
Dichloromethane	40	-	-	-	0.1	0.2	0.4
Acetone	56	-	-	-	-	0.1	0.4

Initially 20ml solvent kept at gentle reflux. Coolant temperature 0°C.

Figures shown indicate volume of solvent lost (in mls).



10. Radleys/Genevac Rack Compatibility Guide

Radleys/Genevac Compatibility	EZ-2			HT-4			HT-8			HT-12			
	Vessels Per Rack	Racks Per Evap	Total Vessels Per Evap	Vessels Per Rack	Racks Per Evap	Total Vessels Per Evap	Vessels Per Rack	Racks Per Evap	Total Vessels Per Evap	Vessels Per Rack	Racks Per Evap	Total Vessels Per Evap	
RR98062 - Threaded Glass Reaction Tube 24mm x 150mm	8	2	16	6	4	24	6	8	48	6	12	72	Carousel 12 Reaction Station Cooled Carousel 12 Reaction Station Metz Syn10 Reaction Station
	70-0670				70-0061		70-0061			70-0061			
RR99052 - 170ml Reaction Flask	3	2	6	N/A			N/A			N/A			Carousel 6 Reaction Station Cooled Carousel 6 Reaction Station
	70-0658												
RR99054 - 100ml Reaction Flask	3	2	6	2	4	8	2	8	16	2	12	24	
	70-0657			70-0706			70-0706			70-0706			
RR99053 - EZ-2/HT 250ml Parallel Evaporation Flask	2	2	4	2	4	8	2	8	16	2	12	24	**Not compatible with Radleys Products**
	70-0581			70-0581			70-0581			70-0581			
RR99041 - 250ml Reaction Flask (Flask only)	1	2	2	1	4	4	1	8	8	1	12	12	Carousel 6 Reaction Station Cooled Carousel 6 Reaction Station
	70-0581			70-0581			70-0581			70-0581			

Warranty – Email Back

sales@radleys.co.uk

To qualify for your warranty please complete, scan and email this form to Radleys

Date of Purchase .....

Supplier's Name and Address

.....

Product Batch/Serial No. (if shown) .....

Your Details

Mr Mrs Miss Ms Dr Prof

Name .....

Position .....

Dept ..... **Building** .....

Organisation .....

Address 1 .....

Address 2 .....

Town/City ..... **County/State** .....

Country ..... **Post/Zip Code** .....

Telephone ..... **Ext** ..... **Fax** .....

Email ..... **Website** .....

Type of Organisation; please tick all boxes relevant

☐ Academic Institution	☐ Consumer Goods	☐ Defence/Military/Forensic	☐ Government	☐ Manufacturing/Industrial	☐ Polymers/Plastics
☐ Animal Health/Zoology	☐ Contract Lab	☐ Environmental/Water	☐ Hospital/Pharmacy	☐ Nuclear/Gas/Electric	☐ Process Engineering
☐ Agrochemical	☐ Contract Synthesis	☐ Flavours/Fragrances	☐ Instrum/Elect & Mech	☐ Petrochemical/Oil	☐ Research Institute
☐ Chemical Manufacture	☐ Cosmetics	☐ Food/Beverages	☐ Lab Equip Dealer/Mnf	☐ Pharma/Biotech/API	☐ Other.....

Areas of Interest; please tick all boxes relevant

☐ Analytical Chemistry	☐ Chromatography	☐ Estate & Facilities	☐ Health & Safety	☐ Organic Chemistry	☐ QC/QA
☐ Automation/HTS	☐ Clinical/Medical/Pathology	☐ Food & Agriculture	☐ Inorganic/Metallurgy	☐ Parallel Chem/Combi-Chem	☐ Sales & Marketing
☐ Biochemistry	☐ Construction	☐ Formulation	☐ Liquid Handling/MicroPlates	☐ Polymers & Oils	☐ Separation/SPE
☐ Biological Sciences	☐ Drug Discovery	☐ Geology	☐ Material Science	☐ Process Dev/Scale-up	☐ Support/Engineering
☐ Catalysis	☐ Environmental Health	☐ Glassblower	☐ Medical Devices	☐ Process Safety/Calorimetry	☐ Temperature Control
☐ Other.....			☐ Medicinal Chemistry	☐ Purchasing/Stores	☐ Veterinary

To request specific product information from Radleys please fill in below

Benchtop and Hotplates
- ☐ Findenser Air Condenser
- ☐ Heat-On Block System
- ☐ Cool-It Insulated Bowls
- ☐ StarFish Work Station
- ☐ Carousel Stirring Hotplates
- ☐ Overhead Stirrers

Jacketed Lab Reactors
- ☐ Reactor-Ready Lab Reactor
- ☐ Reactor-Ready Duo Lab Reactor
- ☐ Reactor-Ready Pilot Lab Reactor
- ☐ Custom Jacketed Reaction Systems

Parallel Reaction Stations
- ☐ Carousel 12 Plus Reaction Station
- ☐ Cooled Carousel 12 Reaction Station
- ☐ Carousel 6 Plus Reaction System
- ☐ Cooled Carousel 6 Plus Reaction Station
- ☐ Carousel Work-Up Station
- ☐ GreenHouse Plus Parallel Synthesiser
- ☐ GreenHouse Work-Up Station
- ☐ GreenHouse Blowdown Evaporator
- ☐ Tornado Overhead Stirring System
- ☐ Breeze Heating/Cooling Work Station
- ☐ Storm Heating/Cooling Work Station

Software
- ☐ AVA Lab Control Software
- ☐ Level 1/2
- ☐ Level 3/4
- ☐ Data Hub

Automated Reaction Stations
- ☐ Mya 4 Reaction Station

Other
- ☐ Huber.....
- ☐ Heidolph.....
- ☐ Other.....