Contents

This manual is for guidance on the use of the CSR product specified on the front cover. This manual should be read thoroughly before unpacking and using the furnace or oven. The model details and serial number are shown on the back of this manual. Use the product for the purpose for which it is intended.

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1.0 Introduction

1.1 Scope and Purpose

This product is intended to be used within a laboratory or industrial environment to test the strength of coke after reaction. It is designed to meet the requirements of the Standard Test Method for Coke Strength After Reduction (ASTM D5341-19/D5341M-19 and ISO 18894-2018).

It must be installed, commissioned, and operated in accordance with the instructions contained within this manual, and only by trained personnel.

For maintenance assistance, please click here.

Note: Depending on customer specifications at the time of order, this product may incorporate bespoke design features that are not covered in this manual. Please refer to the supplementary product documentation pack and/or contact CRI-CSR for additional assistance.

Note: If this product is used for any application other than its intended purpose, as stated by CRI-CSR, the protection provided by this equipment may be impaired.

Note: Failure to comply with the instructions as stated within this manual will constitute misuse and subsequently void any warranty provided by CRI-CSR.

This product is supplied with a documentation pack, including instruction manuals and supplementary technical information. Read all documentation before proceeding with the installation and operation of this product.

1.1.1 Responsibilities

The customer is responsible for conducting their own risk assessment and ensuring that any materials to be processed within the product are suitable to be safely heated to the required temperature, and that appropriate safety measures are taken when handling such materials:

- Any material that is combustible or liable to cause explosions or generate combustible gas must not be processed unless the product is supplied with specialist equipment designed to manage such reactions

- The customer must provide an adequate ventilation and fume extraction system to manage any fumes given off by materials during processing

The customer is responsible for providing and maintaining the connections for the electrical power supply. The furnace should not be operated until all required supplies are connected.

This product should not be modified or used for any purpose other than that for which it is intended.

1.2 Prerequisites to Use

Prior to the commissioning and use of this product, all personnel involved in its installation, operation and maintenance must be deemed competent and have:

- Read and understood the information contained within this manual
- Received the relevant training regarding safety and operation of the product
- Been provided with the appropriate PPE (Personal Protective Equipment) required for the safe operation of this product

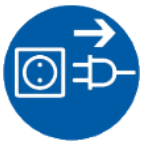
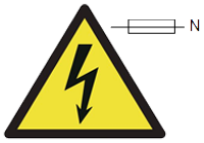
Note: The customer is responsible for ensuring that all of the above conditions are satisfied before the product is commissioned for use.

Note: Unless otherwise specified, the customer is responsible for the installation of this product and the safe connection of any additional equipment and gas or liquid supply lines.

2.0 Safety

2.1 Symbols and Warnings

Note: Observe and take the appropriate precautions if any of the following warning symbols are displayed on this product or in your working environment.

	Refer to the instruction manual before operating or maintaining the equipment		Disconnect the product from the power supply before performing any maintenance
	Wear eye protection		Wear a heat-resistant face shield
	Wear heat-resistant gloves		Wear breathing apparatus
	Wear protective footwear		Wear protective clothing
	Minimum of 2 people required to lift		DANGER: Heavy load. Specialist equipment required!
	WARNING!		DANGER: Risk of electric shock!
	DANGER: Fire risk!		DANGER: Hot surface!
	CAUTION: Double Pole/ Neutral Fusing!		DANGER: Risk of slipping!

	DANGER: Suspended loads!		WARNING: Adequate ventilation required!
	CAUTION: ROTATING EQUIPMENT		DANGER: Risk of crushing injury!
	DANGER: Explosive materials / atmosphere!		Any action noted beside this symbol is strictly forbidden!
	DO NOT use this product to cook or heat food or beverages!		DO NOT dispose! Recycle according to WEEE Regulation guidelines!

2.2 Operator Safety

Note: It is the responsibility of the customer to ensure that all personnel required to operate this product are fully trained and equipped with the appropriate PPE (Personal Protective Equipment).

CRI-CSR recommend that the appropriate PPE is worn at all times whilst working with and around this product.

2.3 Risk Prevention and Mitigating Residual Risks

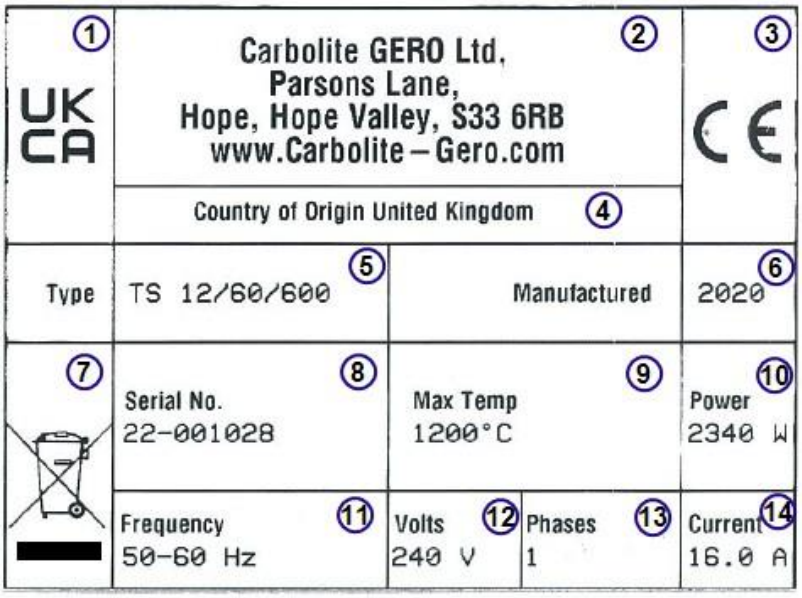
Risk		Prevention Measures
	Hot Surface	• Wear appropriate PPE e.g. heat resistant gloves • Do not place any objects on top of the product • Ensure the product is sited on a non-flammable surface, and that all adjacent surfaces are also non-flammable
	Ventilation required	• Only operate in a well ventilated area • If necessary, only operate in a fume cupboard
	Fire / Explosion	• Only trained operators should use this equipment • Only process materials for which a suitable risk assessment has been carried out
	Electric shock	• Ensure the product is isolated from the electrical supply before performing maintenance
	Unit Toppling Over	• Ensure that the correct manual handling procedures are followed when manoeuvring the product

3.0 Product Overview

3.1 Product Rating Label

The product rating label is located on the side of the product control box.

Note: The image below is an example and does not reflect the product(s) covered by this manual.



1	UKCA Mark
2	CRI-CSR address and website
3	CE Mark
4	Country of Origin
5	Product Model
6	Year of Manufacture
7	Dispose of according to WEEE regulations (Waste Electrical and Electronic Equipment Directive)
8	Product Serial Number
9	Maximum Temperature
10	Power Rating
11	Frequency (Hertz)
12	Design Voltage
13	Design Phases
14	Current (Amps)

3.2 Part Identification

Note: Some models may have additional options and features that are not represented by the following images.

1	Safety Guard
2	Rotary System
3	Control Panel
4	Clips
5	Removable Tumbler

4.0 Specifications

Tumbler	
External Dimensions (closed): Height x Width x Length (between doors) (mm)	305 x 115 x 370
External Dimensions (open): Height x Width x Depth (mm)	1750 x 800 x 700
Rotation Speed (rpm)	20

Note: Please refer to the separate product documentation pack for additional specifications relevant to your product.

5.0 Electrical Specifications

This equipment MUST be earthed!

5.1 Fuses and Power Settings

Please refer to the supplementary electrical information in the product document pack provided with this product.

5.2 Operating / Storage Environment

The products covered by this manual contain electrical parts and should be stored and used in indoor conditions as follows:

Temperature:	5°C - 40°C
Relative humidity:	Maximum 80% up to 31°C decreasing linearly to 50% at 40°C
Altitude:	Not exceeding 2000 metres

6.0 Options and Accessories

Note: Any additional equipment to be used with this product should be supplied by CRI-CSR. Accessories from third-party sources are not designed to CRI-CSR's specifications and may result in poor performance, damage to equipment or dangerous working conditions.

7.0 Installation

7.1 Manual Handling

Refer to section 4.0 of this manual for product dimensions.

Mechanical lifting equipment may be necessary!
Consult personnel responsible for health and safety before attempting to move this product!

It is the responsibility of the customer to provide any mechanical lifting aids, such as pallet trucks, forklifts or cranes, and to ensure that all operators of such equipment are fully trained and qualified.

All manual handling must be carried out according to local health and safety guidelines.

Note: The customer is responsible for all manual handling procedures performed on their own premises.

7.2 Unpacking

Note: Check that all items intended for delivery are present and undamaged before proceeding to install the product.

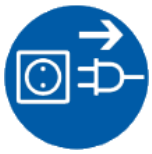
For safety and manoeuvrability, the product is delivered secured to a pallet inside a crate.

It is advised that the product is left on the pallet until it has been moved as close as possible to its intended installation location.

- Using the appropriate tools, carefully open the crate and remove all external packaging. Retain the crate panels and packaging.
- Ensuring that the product is stable and secure, remove any straps retaining the product to the pallet.
- Use appropriate lifting equipment to lift the unit from underneath the base.
- Manoeuvre the product into the desired position, ensuring that there is sufficient clearance above and around the sides of the furnace body.

7.3 Siting and Setting Up

Use the manual handling method recommended by your health and safety officer to place the product on a level, stable surface that is not prone to vibration or movement. The surface upon which the product is placed must be of a height suitable to allow the operator to easily and safely use the equipment.



Ensure that the power supply or isolating switch is easily accessible to the operator.

- The surface on which the equipment is mounted should be stable and not subject to movement or vibrations.
- The height of the mounting surface is important to avoid operator strain when loading and unloading samples.

Note: Adequate space must be provided to accommodate the CSR with the guard open.

Under no circumstances should any objects be placed on top of the product.

7.4 Installing the Tumbler Vessel

Use the manual handling method recommended by your health and safety officer when handling the tumbler vessel.

To install the vessel into the tumbler unit:

• Open the safety guard, then carefully slide the tumbler vessel into the holding ring on the rotary system, ensuring that the lid of the vessel is facing upwards.	
• Secure the vessel in place using the three clips attached to the holding ring.	

7.5 Electrical Connections

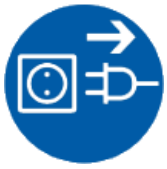
For products supplied without pre-fitted plugs, it is recommended that all electrical connections are carried out by a qualified electrician.

The product covered by this manual normally requires a single phase A.C. supply, which may be "Live to Neutral non-reversible", "Live to Neutral reversible" or "Live to Live". Some models may be ordered for 3-phase use, which may be with or without neutral.

Check the product rating label before connection. The supply voltage should correspond with the voltage on the label and the supply capacity should be sufficient for the current on the label.

The supply should be fused at the next size equal to, or higher than the current on the label. This manual contains a table of the most common fuse ratings.

- When the mains cable is factory-fitted / supplied, internal fuses are also fitted. It is essential that the operator ensures that the power supply is correctly fused.
- Products with a factory fitted supply cable but without a plug are designed to be wired directly to an isolator or fitted with a line plug compliant with the customer's local regulations and supply.
- Products without a factory-fitted supply cable require a permanent connection to a fused and isolated supply. The product's electrical component access panel should be temporarily removed, and connections made to the internal terminals / fuse holder.



When connecting the product to the power supply, the plug or isolating switch should be accessible, easy to remove / operate, and within reach of the operator.

Note: The supply MUST incorporate an earth (ground).

7.5.1 3-Phase Connections

Terminal Label	Cable Colour	Connection
L1	Black	to phase 1
L2	Black	to phase 2
L3	Black	to phase 3
N	Light Blue	to neutral (if fitted)
PE	Green / Yellow	to earth (ground)

8.0 Controller

Please refer to the separate controller manual(s) provided.

9.0 Commissioning

Note: This equipment should not be put into use until it has been commissioned by a competent person in accordance with the instructions contained within this manual, and any local regulations. CRI-CSR offer an installation and commissioning service. Please contact CRI-CSR Service for details.

9.1 Pre-Commissioning

When the product is cold and disconnected from the power supply, visually check the following:		**Checked by:**
Siting / Securing	Check that the product is placed on a secure, level surface and cannot topple over.	
Packaging	Check that all packaging material has been removed from inside and around the product.	
General Condition	Check that no damage has occurred during delivery and siting.	
Panels	Check that all covers and access panels are securely fitted.	
General Access	Check that there is sufficient clearance around the top and all sides of the product.	
Electrical Supply	• Check that the voltage stated on the product rating label matches the electrical supply of the installation site. • Check that all electrical supply cables are securely attached to/ plugged into the product.	
Earth Connection	Check that an earth connection has been made. The control cabinet and all removable panels on the furnace should be earthed.	
Rating Label / Warning Labels	Check that all labels are fitted and all information is legible.	

9.2 Commissioning - Initial Function Checks

When the product has been connected to the mains electrical supply, check the following:		**Checked by:**
Power Switch	Check that when turned to the ON position, the instrumentation on the control cabinet illuminates.	
Safety Switch	Check that the power to the rotation system is switched off when the guard is opened.	
Rotation System	Check that all moving parts are sufficiently lubricated, and that they move freely without obstruction.	

10.0 Operation

10.1 Safe Operation

Refer to the "Safety" section of this manual for details on ensuring operator safety.

10.2 Loading the Tumbler

• Undo the two clips holding securing the safety guard in place, then lift the guard up to gain access to the tumbler vessel.	
• Undo the three clips securing the lid of the tumbler vessel, then remove the lid.	

• Load the sample into the tumbler vessel.	
• Replace the lid and secure it in place with the three clips.	
• Close the safety guard and secure it in place with the two clips.	

10.3 Unloading the Tumbler

• Undo the two clips holding securing the safety guard in place, then lift the guard up to gain access to the tumbler vessel.	
• Undo the three clips securing the tumbler vessel to the rotation system.	
• Carefully remove the tumbler vessel from the unit.	

• Undo the three clips securing the lid of the tumbler vessel, then remove the lid.	
• Pour your sample into an appropriate receptacle.	

10.4 Operating Cycle

Note: The customer is responsible for conducting their own risk assessment prior to operating this product.

Note: Ensure that all pre-commissioning and commissioning checks have been performed before proceeding with normal operation of this product. Please refer to section 9.0 for a list of recommended checks.

Note: Always ensure that the operator is wearing the appropriate PPE when operating this product. Please consult your Health and Safety personnel and refer to section 2.0.

1. Load the prepared test sample into the tumbler (see section 10.2).
2. After installing all equipment and accessories as required, connect the product to the electrical supply.
3. Turn the mains isolator switch to the ON position. A white lamp will illuminate on the control cabinet to indicate that there is power to the unit.
4. Ensure that the counter is reset before each cycle. The counter is preset with the number of required revolutions. If this must be adjusted, please refer to the separate counter controller manual provided.
5. Press and hold the START button until the tumbler begins to rotate. The tumbler will then rotate for the set number of revolutions.
6. The tumbler will automatically stop after the number of revolutions has been completed, and will stop with the tumbler lid facing upwards.
7. The tumbler rotation can be stopped at any point during the operating cycle by pushing the emergency stop button.
8. Once the tumbler has stopped rotating, open the safety guard and unload the tumbler (see section 10.3).
9. Turn the mains isolator switch to the OFF position.

Note: If the product is to be left switched off and unattended, isolate it from the mains electrical supply.

11.0 Maintenance

11.1 General Maintenance

Preventive rather than reactive maintenance is recommended. The type and frequency depends on the product use; the following are recommended.

11.2 Maintenance Schedule

CUSTOMER
QUALIFIED PERSONNEL

DANGER! ELECTRIC SHOCK. Risk of fatal injury. Only electrically qualified personnel should attempt these maintenance procedures.

Maintenance Procedure	Method	Frequency				
		Daily	Weekly	Monthly	Bi-Annually	Annually
Safety						
Safety Switch Function	Start the tumbler rotating and open the safety cage. The safety switch should stop the rotation.		■			
Safety Switch Function	Electrical measurement 					●
Electrical Safety (external)	Visual check of external cables and plugs			■		
Electrical Safety (internal)	Physically check all connections and cleaning of the power plate area					●
Function						
Operational Check	Check that all functions are working normally	■				
Operational Check	Thorough inspection and report incorporating a test of all functions					●
Performance						
Power Consumption	Measure the current drawn on each phase / circuit 					●

11.3 Cleaning

Note: Disconnect the product from the electrical supply before carrying out any maintenance procedures.

- With the product switched off, cold, and electrically isolated from the mains, wipe over surfaces using a damp cloth, wrung almost dry.
- **DO NOT** use solvents.
- If necessary, vacuum out the inside of the product to remove any dust or minor debris and dispose of any material removed, in accordance with local regulations, at an approved disposal facility.

11.4 After-Sales Service

CRI-CSR Service has a team of Service Engineers who can offer repair, calibration and preventive maintenance of furnace and oven products both at the CRI-CSR factory and at customers' premises throughout the world. A telephone call or email often enables a fault to be diagnosed and the necessary parts to be despatched.

In all correspondence please quote the serial number and model type given on the rating label of the product. The serial number and model type are also given on the back of this manual when supplied with the product.

CRI-CSR Service and CRI-CSR contact information can be found on the back page of this manual.

11.5 Recommended Spare Parts and Spare Parts Kit

CRI-CSR can supply individual spare parts or a kit of the items most likely to be required. Ordering a kit in advance can save time in the event of a breakdown.

Please consult CRI-CSR's Sales Department for details of recommended spare parts.

12.0 Decommissioning, Storage and Disposal

12.1 Decommissioning

1. Isolate the product from the power supply
2. Allow the product to cool to room temperature
3. Disconnect the product from the power supply
4. Disconnect all additional equipment and external connections

12.2 Storage (Long Term)

Store in a cool, dry place.

Note: If the furnace is exposed to a humid environment during storage, it must be fully dried out before recommissioning. All internal electrical circuits should be checked for signs of moisture. If there are visible signs of moisture, the product should be isolated from the power supply and allowed to dry out at ambient temperature for at least 24 hours. Please contact CRI-CSR Service for further advice.

12.3 Disposal

Note: This product should only be disposed of in accordance with local regulations and requirements regarding electrical equipment.

Within the European Community the disposal of electrically operated devices is regulated according to guidance based on the EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE). Disposal regulations may differ worldwide.

If uncertain, please contact CRI-CSR for advice on disposal.

Notes

Service Record

Engineer Name	Date	Record of Work