



OPERATING MANUAL

Renishaw Vacuum Mixer

WHITEBRIDGE WAY - WHITEBRIDGE PARK
STONE
STAFFORDSHIRE ST15 8LQ
ENGLAND
TEL: +44 (0) 1785 285000
FAX: +44 (0) 1785 285001
www.renishaw.com
ampd.sales@renishaw.com

RENISHAW VACUUM MIXER



Thank you for purchasing a Renishaw Vacuum Mixer. The unit has been designed for use with the Renishaw series of silicone rubbers, high viscosity resins supplied for the manufacture of prototype tools via the Renishaw vacuum casting system.

This manual describes the operation of the mixer and gives instructions for its use and maintenance. To enjoy trouble-free use while prolonging the life of the unit, please follow the recommendations carefully.

SAFE WORKING PRACTICES

Users of equipment should satisfy themselves that they comply with the requirements of the relevant legislation within the United Kingdom (or equivalent regulations within the country of use).

Particular attention is drawn to the following:-

- Health and Safety at Work etc. Act 1974;
- Personal protective Equipment at Work Regulations 2002;
- Provision and Use of Work Equipment Regulations 1998;

Provision and Use of Work Equipment Regulations

In general terms, the Regulations require that equipment provided for use at work is:

- Suitable for the intended use;
- Safe for use, maintained in a safe condition and, in certain circumstances, inspected to ensure this remains the case;
- Used only by people who have received adequate information, instruction and training; and;
- Accompanied by suitable safety measures, e.g. protective devices, markings and warnings.

Personal Protective Equipment

Users should be aware of the requirements of the Personal Protective Equipment at Work Regulations 1992 when providing equipment.

The main requirements of the PPE at Work Regulations 1992 is that personal protective equipment is to be supplied and used at work wherever there are risks to health and safety that cannot be adequately controlled in other ways.

Because the effectiveness of PPE can easily be compromised, e.g. by not being worn properly, it should always be considered as a last resort and only used where other precautions cannot adequately reduce the risk of injury.

Even where engineering controls and safe systems of work have been applied, some hazards might remain. In considering methods of safeguarding machinery the use of personal protective equipment may be used to minimise the risk of injury. This includes the need for special clothing, including footwear, hearing, eye and respiratory protection.

The guidance shown below may be used to consider the risks which may or may not be present. The user should make his own assessment of risks depending upon the circumstances of use.

	Hazards	Options
HANDS 	Abrasion; Temperature extremes; cuts and punctures; impact; chemicals; skin irritation.	Gloves, gauntlets Notes: <ul style="list-style-type: none"> • Don't wear gloves when operating machines where gloves might get caught. • Care in selection is needed.
EYES 	Chemical or metal splash; dust; projectiles.	Spectacles, goggles, visors. Notes: <ul style="list-style-type: none"> • Make sure the eye protection chosen has the right combination of protection for the task.
FEET 	Wet; slipping; falling objects; heavy loads; metal and chemical splash	Safety boots and shoes. Notes: <ul style="list-style-type: none"> • Consider conditions of use.
BODY 	Heat; chemical or metal splash; spray from pressure leaks; impact; entanglement of own clothing.	Conventional or disposable overalls, aprons. Notes: <ul style="list-style-type: none"> • Consider choice of materials in relation to the chemicals involved.
RESPIRATORY 	Dusts; gases and vapours.	Disposable respirators, half masks or full face masks, powered respirators. Notes: <ul style="list-style-type: none"> • The right type of respiratory must be used for the substance being handled.
HEARING 	Impact noise; intensities; pitch.	Ear plugs or defenders. Notes: <ul style="list-style-type: none"> • See Noise at Work Regulations 1989.

NOTE: Use personal protective equipment only as a last resort. Wherever possible engineering controls and safe systems of work should be used instead. All those required to wear protective equipment should be given training in its proper use, care and maintenance.

SPECIFICATION

WEIGHT AND DIMENSIONS

	Height	Width	Depth	Weight
Metric (mm/kg)	1090	550	900	140kg
Imperial (ins/lb)	42.91"	21.65"	35.43"	308 lb

ELECTRICAL SUPPLY

The unit requires a 230V 50/60 Hz single-phrase supply (110V models are available to order). Power consumption is 2.0 kW (1.8kw for 110V models).

Each machine is fitted with a plug of a pattern appropriate to the country in which it is sold (in the United Kingdom, with a 13A fuse to BS 1362).

A 10A miniature circuit breaker is fitted within the machine in the live supply lead. In order to comply with safety regulations in certain countries.

PRINCIPLE of OPERATION

Silicone rubber for vacuum casting moulds is formed by mixing a base liquid with a catalyst. The resulting liquid has a limited life during which it must be poured before setting; it must also be de-gassed. To ensure the necessary rapid, thorough and efficient mixing and de-gassing, the RENISHAW VACUUM MIXER employs a turntable with reversible, programmable rotation and a reciprocating paddle, contained within a vacuum chamber.

The simple control panel can be used to set the machine to operation in either manual or automatic mode.

WORKING CAPACITY

The recommended maximum load is 10kg (9-10 litres) when using the standard size of container : up to this amount, there should be no problem of overflow through rapid de-gassing. Although it is possible to exceed this quantity, constant supervision is then required.

Excessive gas evolution can be repressed by partially releasing the vacuum by intermittent use of the leak valve.

OPERATING SAFETY

All units bear the mark .  The Declaration of Conformity will be found on page 8.

Users should consult the safety data sheets and product use instructions before handling the silicone rubber components. The general technique used in the vacuum casting of resins is described in the manual VACUUM CASTING TECHNIQUE – A GUIDE FOR NEW USERS supplied to purchasers of Renishaw vacuum casting machines.

INSTALLATION

When removing packaging, the machine should remain in the upright position as shown on the container : this is to guard against any possibility of leakage from the vacuum pump, which in a new machine is ready-primed with oil.

The unit is free-standing on lockable castors, and may be sited on a level floor in any place convenient for electrical connection.

Before making electrical connection, allow a few minutes for the oil to settle in the vacuum pump and check the level (see Page 7, MAINTENANCE). Adjust if necessary.

Check that the leak valve is closed. Connect to the electrical supply and turn on the main isolator of the machine.

Turn on the power switch and check that its internal lamp is illuminated.



Fig. 1

OPERATING INSTRUCTIONS

SWITCHING ON

With the power on, check that the POWER indicator on the control panel is illuminated.

The machine is now ready for operation.

LOADING THE MACHINE

For the convenience of users, the machine has been designed so that the standard 20 kg drums in which Renishaw silicone and high viscosity resins are supplied may be used as containers for mixing.

Measure the components (base and catalyst) into the container according to the instructions for use, set the container on the turntable, push the latch home until it locks.

Mount the paddle on its pillar and lower the blade into its working position.

Set the lid of the machine in position, arrow to arrow, and close the leak valve. The machine is now prepared for use in either manual or automatic mode.

The Silicone Mixer is controlled by the use of the Screen and Keyboard in the form of the Omron NT11S, shown in Fig.1. This screen displays the available actions, which are then acted upon by use of the accompanying keyboard. The keys available include a numeric keypad an Enter, Clear and four Function keys and four cursor keys. The function keys correspond to the screen display in that should an action be accessed by one of the function keys, the action will appear above the function key in reverse video.

Safety; an Emergency Stop button is mounted on the fascia which when operated will stop all functions of the Mixer. The button has a twist release, which will need to be released after each operation.

Title Screen

The opening screen displays the Machine Title and software version number, in this case the software version is V1.0. Below this on the left of the screen, in reverse video, is the prompt to move to the NEXT screen. This is placed above Function key F1. Thus, pressing F1 will take you to the next screen, the Menu Screen.



Menu Screen

The Menu Screen gives the user two options, Auto and Man. These represent Automatic mode and Manual mode. When the machine is run for the first time the user should first select Automatic mode to enable access to the set-up of the machine parameters. As with the Title screen, the function key that takes the user to the required screen is the one directly under the prompt.



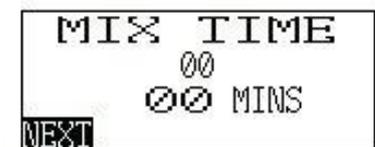
Automatic Mode Screen

The Automatic screen allows the user to run the Silicon Mixer through a simple automatic sequence, which is set-up via the TIME function key F3. This screen then allows the user to START and STOP the automatic sequence via F1 and F2. Finally, the user can EXIT the screen back to the Menu screen via F4. The Automatic sequence will be described in more detail later in this section.



Initial Set-up: MIX TIME

As mentioned above, there are some initial settings, which require the user to set-up before the Mixer can be used. The first is the MIX TIME. This sets the time that the Automatic sequence will run; it is formatted in Minutes. The user simply enters the number of minutes on the numeric keypad and then presses the



OPERATING INSTRUCTIONS continued

Enter key to accept this time. As the user enters the numbers, these will be displayed in smaller numbers and then when Enter is pressed will be transferred to the larger numbers.

To move to the next parameters, F1 should be pressed taking the user to the NEXT screen.

MIXER DIRECTION

This screen controls the time that the mixer moves in each direction and is entered in seconds. As we now have two values to enter, the user has to move between the two values using the cursor direction keys at the side of the screen. The numeric keypad should be used to enter the values. If either value is left at zero, the motor will run continually in the opposite direction.



```
DIR TIME
000 SECS 000
000 FWD 000 REV
NEXT
```

Note: When using larger volumes than 10kg it is recommended that the operation is closely supervised

The program has a minimum time value of 5 seconds to protect the motor and gearbox, so any value of less than 5 seconds will result in the same action as with a value of zero. A 1-second time delay is built into the operation allowing the drum to stop before changing direction.

NOTE: These timers MUST be set for the motor to operate at all.

The action of turning clockwise and anti-clockwise is to prevent the mix from spilling over the edge of the drum. The NEXT key F1 will take the user to the Degas Screen.

DEGAS TIME.

This screen allows the user to set-up the times for the operation of the Leak Valve timer during the Automatic sequence. The reason for this is to collapse expanding material when degassing more than 10kg. Amounts greater than 10kg may expand in volume that would lead to spillage over the edge of the drum. So leaking air into the chamber regularly during the degassing cycle helps to ensure efficient and safe operation when using larger volumes of material.



```
DEGAS
000 SECS 000
000 INT 000 DUR
NEXT
```

This screen is very similar to the previous screen and should be edited in the same manner. The two values are for the degas interval (INT) and the degas duration (DUR).

The interval is the times between degas operations and the duration is the time that the Leak valve remains open at each operation.

When the user has entered these values the NEXT key F1 will take the user back to the Automatic screen.

Automatic Sequence

Once all the parameters have been set, the user can now run the Automatic sequence. The user must first have a drum with the correct mix quantity sitting in position on the mixer, the mixer arm in position and the cover fitted in place, ensuring that the cover operates the limit switch.

When the user is happy with the above points, they may start the Automatic sequence by pressing the START button F1. The sequence will now start. First the Vacuum pump will start, once this is running the mixer will start to oscillate according to the setting of the direction timers. At the correct interval the Degas timer will operate the Leak valve.

During the mix sequence, the time will be displayed on the screen.

The user can stop the sequence at any time by pressing the STOP key F2. If the sequence is not interrupted, the sequence will stop at the end of the mix time. The vacuum motor, rotation motor will stop and the Leak valve will open, releasing the Vacuum. The sequence can be re-started at any time.

To EXIT from this screen back to the Menu screen, the user presses F4.

Manual Operation

The manual operation of the machine is controlled from the Manual Screen accessed from the Menu screen. From this screen the user can operate each part of the machine individually. The screen displays the three main operations; PUMP, MIXER and LEAK. These all operate on a toggle basis in that the first press causes the item to operate and then a second press causes the item to stop operating.



```
MANUAL
PUMP 00:00
PUMP MIXER LEAK EXIT
```

The display also shows a timer reading the time the pump has run on each occasion.

ROUTINE MAINTENANCE PROCEDURES

Avoid as far as possible any spillage on or within the unit, and remove it immediately if it occurs.

Keep the machine clean by regularly wiping over with a mild detergent solution, followed by clean water. Always wipe dry.

Inspect the cover seals periodically for damage, such as accidental cuts and scores. After inspecting, wipe them clean and re-grease lightly with silicone high vacuum grease.

THE VACUUM PUMP

Check the oil-level at regular intervals. The oil should be changed regularly in accordance with the instructions of the pump manufacturer, a copy of which is provided with the RENISHAW VACUUM MIXER; use only the oil recommended.

EC DECLARATION OF CONFORMITY



Renishaw AMPD Plc
Whitebridge Park
Stone
Staffordshire.
ST15 8LQ

Tel + 44 (0) 1785 285000
Fax + 44 (0) 1785 285001
ampd.sales@renishaw.com

Acc. To European Community Instructions for machines (2006/42/EC)

We, Renishaw AMPD Plc, herewith declare that the product defined below meets the basic requirements regarding safety and health of the relevant EEC directives.

This declaration is valid for the unmodified original state of the product. Any product changes, which are made without our approval, will void this declaration.

Product Description: **Renishaw Vacuum casting system**

Model: **Renishaw Vacuum mixer**

Serial Number: **071Q77**

The product meets the requirements of the following directives:

2006/42/EC Machinery Directive
2002/96/EC Low Voltage Directive
2004/108/EC EMC Directive
2002/96/EC Waste of Electrical & Electronic Equipment (WEEE) Directive

Standards and Technical Specifications used:

EN ISO 12100-1:2003, Safety of Machinery - Basic concepts, general principles for design - Part 1 :
EN ISO 12100-2:2003, Safety of Machinery - Basic concepts, general principles for design - Part 2 :
EN 60204-1:1997, Safety of Machinery - Electrical equipment of machinery - Part 1 :
EN ISO 13849-1: Feb. 2007, Safety of Machinery - Safety-related parts of control systems - Part 1 :
EN ISO 13849-1: Dec. 2003, Safety of Machinery - Safety-related parts of control systems - Part 2 :

Location, Date: Stone Staffordshire, 26th April 2011

Signature:

Simon P Scott
Divisional General Manger

The person responsible for compiling the technical file:

Peter Terry
CEproof Directives Ltd
Bordesley Hall
Alvechurch
Birmingham
B48 7QA