INSTRUCTION MANUAL
FOR THE
HAWK 15/05
Refrigerated CENTRIFUGE

READ BEFORE USE!

Models: MSB005.CR2.K
        MSB005.CR2.H

71100-1454-7
0401
MSE (UK) LTD
Health and Safety at Work

MSE (UK) Ltd is required under the Health and Safety at Work Act, 1974 and other UK legislation as designers, manufacturers, suppliers and importers of articles for use at work to ensure that, as far as is reasonably practicable, articles which we design, produce, supply or import are safe and without risk to health.

We are required to provide information on the safety and handling precautions to be observed when installing, operating, maintaining and servicing our products. Such advice is contained in this manual.

We are also obliged to update this information should circumstances change and to operate a system to this end.

We should also like to point out, however that you as users have an important responsibility in the provision and maintenance of safe working practices and conditions.

Accordingly, we draw the following matters to your attention:

1. This apparatus should only be used as intended, within its design parameters by suitably qualified and trained personnel who have read and understood the relevant sections of this manual.

2. This manual should be readily available to such personnel at all times.

3. In addition to that which is written in the manual, normal common-sense safety precautions must be taken at all times to avoid the possibility of accidents. Particular care is required when working with apparatus at high temperature or pressure.

4. Installation, maintenance, repairs and servicing should only be carried out by an MSE (UK) Ltd approved engineer, and connection to electrical supplies should only be carried out by suitably trained personnel.

TECHNICAL SUPPORT, WARRANTY SERVICE AND MAINTENANCE

UK customers: if you are in any doubt whatsoever regarding the correct use of this apparatus, or if you require any technical data or assistance, please contact the MSE (UK) Ltd Technical Support Department at:

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Web Page: www.mseuk.co.uk

OVERSEAS CUSTOMERS: Should contact their local MSE (UK) Ltd Distributor, details can be found on our website.

ELECTRICITY SUPPLIES: Voltage and frequency
MSE (UK) Ltd electrical apparatus is offered and labelled for one, or for a choice of two or more voltage ranges and, where necessary, different frequencies of mains supply. MSE (UK) Ltd does not accept any responsibility for the operation of any such apparatus should it be connected to electricity supplies which are normally outside, or vary outside, the stated voltage and frequency values for which it is designed, nor for any consequential loss, damage or injury, howsoever caused.

Read This Before Use!
Thank you for buying a MSE  HAWK 15/05 Centrifuge. Please read this operating manual before using your centrifuge; it will provide you and your colleagues with useful information on all aspects of the equipment.

As our customer, we should like to ensure that you are totally satisfied at all times. Do not hesitate to contact us.

Your views are very important to us.
MSE (UK) LTD PRODUCT WARRANTY
Terms and Conditions

We hope that you do not have the need to use the extensive warranty cover that MSE (UK) Ltd extends to you. However should you have a problem, our prompt response is greatly helped if you have filled in and posted the pre-paid Warranty Registration Card supplied with your new equipment.

MSE (UK) Ltd gives a one-year warranty from the date of delivery. During this period, component parts proven to be defective in materials or workmanship will be repaired or replaced at our expense. Installation, commissioning and calibration are not covered by this warranty agreement. The MSE (UK) Ltd approved service agent must be contacted for warranty determination and direction prior to any work being carried out.

These warranties are only applicable to new products, and not second hand nor refurbished products even if repaired by MSE (UK) Ltd. Any such products are covered by separate warranty terms and conditions which will be made available on request.

Replacement or repair of component parts or equipment under this warranty shall not extend the warranty to either the equipment or the component part beyond the original one year warranty period unless agreed in writing by MSE (UK) Ltd.

The above warranties are extended to the original purchaser upon full invoice payment. A purchase receipt or other proof of purchase may be required before warranty service will be performed. These warranties only cover failures due to defective workmanship which occur during the normal operation of the product by the original purchaser, and not failures which result from accident, misuse, abuse, neglect, mishandling, misapplication, alteration, faulty installation, electrical power fluctuations, dust, or other environmental extremes, modification or service other than by an approved service agent or following the written authority of the manufacturer, or damage that is attributable to acts of God. Expendable items such as motor brushes, door seals, lid seals, "O" rings or lamps are excluded.

MSE (UK) Ltd, or its approved service agent, reserves the right to repair defective equipment on the premises of the customer, or at a service station, at the sole discretion of MSE (UK) Ltd or their approved agent. In the event of return to an approved service centre the customer is responsible for the safe packaging of the instrument and notification to the service centre. Neither MSE (UK) Ltd nor its agents are responsible for any damage occurring during shipment.

Specification and Material Changes: MSE (UK) Ltd reserves the right to supply our latest and improved models at time of shipment.

Taxes: The prices quoted do not include any taxes imposed by the State or Country in which the purchase was made.

Installation: Installation of all equipment shall be by, and at the expense of the purchaser unless stated otherwise. Access to the site, and the provision of required utilities e.g. Power, water and drainage to suitable connections, will be the responsibility of the purchaser, and at the purchaser's expense.

Limitation of liability: In no event, whether as a result of breach of contract or warranty, shall MSE (UK) Ltd be liable for any consequential or incidental damages including, but not limited to, loss of profit or revenues, loss of use of the equipment or any associated equipment, down time costs, costs of substitute equipment, costs of labour, costs due to delays or claims of purchaser's own customers for such damages. The purchaser agrees to indemnify MSE (UK) Ltd and to hold them harmless from any and all liability, claims, demands, actions, suits, expenses or costs, including attorney's fees relating to such consequential or incidental damages.

All expressed and implied warranties, including the warranties of merchantable quality and fitness for a particular purpose, are limited to the application period of one year.

Validity: Legal rights vary from country to country and states within countries, so some or all of the exclusions or limitations listed above may not apply, but if any part of these conditions shall be found to be unenforceable it shall not affect the validity or enforceability of the remainder of the conditions.
ELECTRICITY SUPPLY

Before connecting this apparatus to the electricity supply check the information given on the rating plate and ensure that:

A) Your supply is single phase AC (alternating current) of the stated frequency with neutral nominally at earth potential.

B) Your supply voltage is within the stated range.

C) The current rating is within the capacity of your outlet.

D) Your plug or electricity supply circuit is fitted with a suitable fuse.

<table>
<thead>
<tr>
<th>Fuse rating</th>
<th>230v</th>
<th>110v – 120v</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 amp</td>
<td>12 amp</td>
<td></td>
</tr>
</tbody>
</table>

**WARNING!** This apparatus must be earthed.

The wires in the mains lead are coloured in accordance with the following code:

<table>
<thead>
<tr>
<th></th>
<th>230v</th>
<th>110v – 120v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live</td>
<td>Brown</td>
<td>Black</td>
</tr>
<tr>
<td>Neutral</td>
<td>Blue</td>
<td>White</td>
</tr>
<tr>
<td>Earth</td>
<td>Green and Yellow</td>
<td>Green</td>
</tr>
</tbody>
</table>

Connect the wires to a non-reversible 3-pin plug as follows:

Green and Yellow or Green to terminal marked E (Earth), G (Ground), coloured Green or Green and Yellow or marked with the Earth symbol.

Blue or white wire to terminal marked N (Neutral) or Common or coloured Blue.

Brown or black wire to terminal marked L (Live) or Phase or coloured brown.

**Note: 110v – 120v installations to comply with National and State Wiring Codes.**

**IMPORTANT** Consult an electrician if in any doubt or if your supply system has any of the following:

- No earth
- A colour code different from above
- Reversible plugs
- Supply and return leads that are both above earth potential.
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1. INTRODUCTION TO YOUR CENTRIFUGE

The HAWK bench top centrifuge joins the well-established range of MSE centrifuges.

The entire MSE range of centrifuges has been designed to meet the present and future demands of routine research laboratories.

A comprehensive range of rotors and accessories are available to accommodate the most commonly used centrifuge tubes and bottles.

With the HAWK, MSE have utilised the best of current technology to produce the most advanced, safe and reliable instrument possible.

Advanced design features include:

- INTELLIGENT MICROPROCESSOR CONTROL
- LED DISPLAY / TACTILE CONTROL PANEL
- INVERTER CONTROLLED BRUSHLESS MOTOR
- AUTOMATIC ROTOR PRESENCE SYSTEM
- LAST RUN RECALL
- FULL LID INTERLOCK
- SIMPLE TO USE
- MODULE ASSEMBLY FOR EASE OF SERVICING
- REFRIGERATION
- PRE COOL FACILITY
• Rating Label is located on the side

Figure 1 Front View

Figure 2 Rear View
# 1.1 Specifications

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Refrigerated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power supply options</strong></td>
<td>120v 60Hz single phase</td>
</tr>
<tr>
<td></td>
<td>230v 50Hz single phase</td>
</tr>
<tr>
<td><strong>Power consumption at full load</strong></td>
<td>120v - 760 watts (1500 watts)</td>
</tr>
<tr>
<td>(Acceleration power shown in brackets)</td>
<td>230v - 700 watts (1200 watts)</td>
</tr>
<tr>
<td><strong>Time DISPLAY/RANGE</strong></td>
<td>0 - 99 minutes</td>
</tr>
<tr>
<td><strong>Timing Accuracy</strong></td>
<td>0.1 second</td>
</tr>
<tr>
<td><strong>Speed range</strong></td>
<td>up to 15,000 rpm</td>
</tr>
<tr>
<td><strong>Speed control accuracy</strong></td>
<td>± 10 rpm</td>
</tr>
<tr>
<td><strong>Speed DISPLAY</strong></td>
<td>± 20 rpm</td>
</tr>
<tr>
<td><strong>Speed SETTING increments</strong></td>
<td>100 rpm</td>
</tr>
<tr>
<td><strong>RCF range</strong></td>
<td>up to 23140g</td>
</tr>
<tr>
<td><strong>RCF SETTING increments</strong></td>
<td>100g</td>
</tr>
<tr>
<td><strong>Temp range</strong></td>
<td>0 to +40°C</td>
</tr>
<tr>
<td><strong>Temp accuracy</strong></td>
<td>± 2°C</td>
</tr>
<tr>
<td><strong>Precool</strong></td>
<td>-9 to ambient</td>
</tr>
<tr>
<td><strong>Acceleration rates</strong></td>
<td>10 off (0 - 9)</td>
</tr>
<tr>
<td><strong>Brake rates</strong></td>
<td>10 off (0 - 9)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>Height 345 mm</td>
</tr>
<tr>
<td></td>
<td>Width 290 mm</td>
</tr>
<tr>
<td></td>
<td>Depth 517 mm</td>
</tr>
<tr>
<td></td>
<td>(not including mains cable)</td>
</tr>
<tr>
<td></td>
<td>Weight 40.8 kg (120v)</td>
</tr>
<tr>
<td></td>
<td>37.8 kg (230v)</td>
</tr>
<tr>
<td><strong>Standard operating conditions</strong></td>
<td>Atmospheric pressure 950-1015 mbar</td>
</tr>
<tr>
<td></td>
<td>(13.78 - 14.71 psi)</td>
</tr>
<tr>
<td></td>
<td>Ambient temperature +10°C to +30°C</td>
</tr>
<tr>
<td></td>
<td>Max. operating temperature +30°C</td>
</tr>
<tr>
<td></td>
<td>Humidity up to 70% RH, non condensing</td>
</tr>
</tbody>
</table>
The HAWK Centrifuge is CE marked in line with European Directives for EMC and LVD compatibility, see “Declaration of Conformity” for EC directive/standard used.

120v units designed for CSA approval to the following standards:

CAN/CSA C22.2 No. 1010.1-92

CAN/CSA C22.2 No. 1010.2.020-94

**INDEPENDENT SPEED SENSING** – To comply with certain USA standards, the HAWK Centrifuge is fitted with an inspection window in the cover. This allows independent speed check directly from the rotor with the use of an optically coupled tachometer.
2. INSTALLATION

Remove the centrifuge from its packaging and place it on a rigid, level surface. **DO NOT LIFT THE CENTRIFUGE BY ITS LID.** The location of the display, air inlet, lid lock access hole, and the release button are shown in Figure 1 on page 9. The location of the power switch and fuses are shown in Figure 2 on the same page. The rating label is located on the side towards the back of the unit.

**IMPORTANT: THE ROTOR MUST NOT BE FITTED WHEN MOVING THE CENTRIFUGE.**

Check that the available power supply corresponds to that stated on the rating plate located at the rear of the instrument.

If a restraint system (see “Centrifuge restraint”) is not used to secure the centrifuge on the bench then, it is the recommendation of BS EN61010-2-020 that a clearance of 300 mm is allowed around the base of the centrifuge when in the final operating position.

**NOTE:** Laboratory management procedures should require that no person or any hazardous materials are within a 300mm boundary while the centrifuge is operating.

![Figure 3 Recommended clearances](image-url)

*Note: 75mm if solid surface (i.e. wall) otherwise 300mm*
2.1 Connecting the power supply

230v centrifuge - Connect the 3-core cable to a 3-pin plug, fitted with a 5 amp fuse.

Brown wire to Live (L) terminal
Blue wire to Neutral (N) terminal
Yellow/Green wire to Earth (E) terminal

NOTE: BS EN 61010-2-020 ‘Particular Requirements for Centrifuges’ states that a remote switch, preferably adjacent to the room exit is a requirement in case of unit malfunction.

120v centrifuge – Supplied with fitted plug

2.2 Centrifuge restraint

A suggested restraint system, which secures the centrifuge to a sound work surface, is shown in Figure 4. It consists of 4 anchor brackets, positioned at each corner of the centrifuge base, which are bolted or screwed to the work surface.

2.3 Accessories supplied with each centrifuge

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
<th>Part No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency over-ride key</td>
<td>1</td>
<td>76600.004</td>
</tr>
<tr>
<td>Guarantee card 120v/230v</td>
<td>1</td>
<td>71100.1052/71100.958</td>
</tr>
<tr>
<td>Operating manual</td>
<td>1</td>
<td>71100.1414</td>
</tr>
<tr>
<td>Rotor Box Spanner</td>
<td>1</td>
<td>96500.384AD</td>
</tr>
</tbody>
</table>

Figure 4 Suggested Restraint System
3. GOOD OPERATOR PRACTICE

Please read the following notes before attempting to operate the centrifuge.

3.1 Spillage

In the event of a liquid spillage the affected surfaces should be cleaned immediately. The rotor and accessories should be removed for thorough cleaning. Regular cleaning of the centrifuge is highly recommended to avoid the build up of contaminants.

In the event of spillage or contamination of a 26 x 2ml, 30 x 0.75ml or 36 x 0.4ml rotor ensure that the rotor assembly is thoroughly dried following disinfecting prior to being reused - the rotor assemblies are balanced units and due to the nature of their construction the user is advised not to dismantle the assemblies.

3.2 Materials with specific gravity in excess of 1.2

The maximum speed of each rotor is calculated on the basis of samples with a specific gravity of 1.2. If materials of a higher specific gravity are used, then the maximum rotor speed must be reduced according to the formula below.

\[ M = \sqrt{\frac{1.2 \times N^2}{S}} \text{ RPM} \]

Where
- \( M \) = New maximum speed
- \( N \) = Normal maximum speed
- \( S \) = Specific gravity of sample

3.3 Corrosive materials

Where particularly corrosive materials are to be centrifuged, the samples should be placed in sealed containers and all necessary precautions observed. The following list gives examples of corrosive materials used in laboratories.

- Phenol/cresol/water
- Chloroform/isoamyl alcohol
- Salt solutions (especially ammonium sulphate)
- Solutions of ammonium hydroxide and acidic solutions e.g. hydrochloric, trichloracetic and perchloric acids.

Other materials may be equally corrosive, the user is responsible for checking the characteristics of substances used.

NOTE: The following materials are prohibited:

- Flammable or explosive materials
- Materials which chemically interact vigorously
3.4 Infective samples

Very special care is necessary when infective materials are to be centrifuged. Sealed containers should always be used. The caps should be double checked to ensure that they are not damaged and fit correctly prior to starting the centrifuge. After use containers and caps should be sterilised immediately using a non-corrosive method.

NOTE: Sealed containers and related components are intended to be part of biosafety systems such as are specified in international and national biosafety guide lines, and cannot be relied on as the only means of safeguarding workers and the environment when handling pathogenic micro-organisms.

3.5 Pre-machine Use

Before any centrifuging is carried out it is recommended that the centrifuge is primed and ready for use by operating a precool run at -2°C for approximately 15 minutes.

NOTE: If also during the life of the centrifuge, it becomes unused for some length of time, it is recommended to repeat the precool step as above before further use.

3.6 Servicing

It is advisable to have this centrifuge serviced regularly by a competent engineer, preferably the manufacturer's representative, at least once per year.

It is good practice after cleaning the rotors to inspect all surfaces, particularly near the drive shaft and fixing screws, for damage, corrosion, hairline cracks, surface pitting, discoloration of the metal or scratches/wear to the protective anodised coating. If any of the above conditions are found, the rotor must be examined before use by the manufacturer's representative, or replaced with a new rotor.
4. THE DISPLAY/CONTROL PANEL

The displays and keys on the control panel are labelled as follows:

1. Speed/RCF display
2. Accel/brake rate display
3. Run time display
4. Temp display
5. RCF indicator
6. Time hold indicator
7. Precool indicator
8. Rotor start key
9. Rotor stop key
10. Speed key
11. RCF key
12. Accel. key
13. Brake key
14. Scroll up key
15. Scroll down key
16. Run time key
17. Time hold key
18. Temperature key
19. Precool key
20. Lid lock open indicator
21. Pulse key

Figure 5 The display/control panel
5. HOW TO USE YOUR HAWK CENTRIFUGE

Connect to the power supply. Press the power ON switch at the rear of the centrifuge (see Figure 2) - 0 = OFF, I = ON. The displays will become active and an audible signal (a single beep) will inform the user that the instrument is ready for use.

On power up the centrifuge will display the values that were current when the instrument was last switched off. An example of the display is shown below.

![Figure 6 The display on power-up](image)

5.1 Opening the lid

To open the lid, press the release button on the front of the unit. The lid is supported by a gas strut and will open automatically.

5.2 Rotors and accessories

The Hawk centrifuge comes complete supplied with a 26 x 2ml angle rotor balanced true to match with the machine. (Indicated by painted dots).

When using any of the alternative rotors it would be advisable to rotate the rotor through 90°, 180° and 270° to it’s first location on the drive head to check for the quietest position when running at maximum speed.

Mark the rotor adapter appropriately in line with the pre-painted dot on the drive head.

The tables in Section 7 list the full range of rotors and accessories available for use with the HAWK centrifuge.
5.3  Fitting the rotor

Before fitting a rotor ensure that the drive head and rotor bore are both clean. Tighten the rotor bolt firmly by hand. Then holding the rotor stationary, use the supplied box spanner to tighten further - figure 7. It is imperative, for safe operation, that the bolt is fully tightened before running the rotor assembly.

**DO NOT ATTEMPT TO RUN THE CENTRIFUGE WITHOUT A ROTOR BEING FITTED TO THE DRIVE SHAFT. FAILURE TO COMPLY WITH THIS REQUIREMENT WILL CAUSE AN ERROR TO BE DISPLAYED.**

![Figure 7 Tightening the Rotor Bolt](image)

5.4  Loading the rotor

All rotors are supplied as matched balanced assemblies. It is important that all components should be stored and used together. It is not necessary for all tubes to be loaded, provided that the loads are placed symmetrically around the rotor.

Refer to the chapter headed “Good Operator Practice” on page 14 for centrifugation of samples with the following characteristics:
- Specific gravity in excess of 1.2
- Corrosive materials
- Infective samples

5.5  Balancing the rotor

The loads should be reasonably balanced, which, in most cases, means equalising the liquid levels by eye. An unbalanced rotor will make the centrifuge vibrate, reducing operating life, and it will be noisy in operation.
5.6 Removing the rotor

Open the lid. Using the supplied spanner, unscrew and remove the rotor bolt. Grip the rotor on opposite sides and lift it clear of the drive head. **NEVER USE EXCESSIVE FORCE.**

Remember that when refitting the rotor always ensure that the painted dots on the rotor drive adapter and drive head are aligned.

5.7 Closing the lid

Once you have loaded the rotor close the lid and push it firmly down. You will hear a ‘click’ this means that the lid has locked down securely.

5.8 Parameter entry

The current parameters are shown in the display windows. To start the machine with the current parameters press \( \text{(start)} \). To alter the parameters press the relevant keys as described below. The parameters can be changed in any order.

5.8.1 Entering run time

To change the run time, press the \( \text{(time)} \) key. The time display will flash. Using the \( \text{\uparrow} \) \( \text{\downarrow} \) keys scroll through to the required number of minutes and press \( \text{(time)} \) again. The display will then stop flashing.

**N.B.** The maximum time that can be entered is 99 minutes, the minimum set time is one minute.

5.8.2 Time hold

If the unit is not required to run to a specific time press the **TIME HOLD** key, the time display will read “hold”. To revert back to a timed run press time hold again. On time hold the unit will run for 99 minutes before stopping. It can be manually stopped at any time by pressing the \( \text{(stop)} \) key.

5.8.3 Entering speed (RPM)

To change the speed, press the \( \text{(speed)} \) key. The displayed speed will flash. Enter the required speed. Once the correct speed is entered press the \( \text{(speed)} \) key again, the display will then stop flashing.

The equivalent RCF value can be displayed for 5 seconds by pressing the RCF key before the run commences. **NOTE:** see also 5.8.4 for correct setting of rotor codes.
5.8.4 Entering an RCF value

To set the RCF value press RCF. The speed/RCF display will show rotor code ‘rt0’ or the last stored entry. To enter a different code use the scroll keys, once the required code is displayed press the RCF key. The RCF value can then be set using the scroll keys and pressing the RCF key once more.

While the machine is running in RCF mode the RPM value can be displayed for 5 seconds by pressing the Speed key.

Refer to the table below for the rotor codes and the corresponding rotors:

<table>
<thead>
<tr>
<th>Rotor Code</th>
<th>Rotor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>26 x 2ml angle rotor</td>
</tr>
<tr>
<td>1</td>
<td>30 x 0.75ml angle rotor</td>
</tr>
<tr>
<td>2</td>
<td>36 x 0.4ml angle rotor</td>
</tr>
<tr>
<td>3</td>
<td>24 place haematocrit rotor</td>
</tr>
<tr>
<td>4</td>
<td>24 x 2ml stepped angle rotor</td>
</tr>
</tbody>
</table>

N.B. Each rotor has a maximum RCF value. Setting the correct code will ensure accurate RCF display/setting and also correct RPM to RCF conversion.

5.8.5 Entering Temperature

To change the temperature, press the (temperature) key. The displayed temperature will flash. Enter the required temperature. Once the correct temperature is entered press the key again. The display will then stop flashing.

5.8.6 Precool

To precool the rotor and samples, fit the rotor and load the samples as outlined in Section 0. Close the lid and press down firmly to engage the lid lock. Enter the required temperature as described in 5.8.5 (Entering Temperature). Press the PRECOOL key. The precool indicator will illuminate. Note: the lowest precool temperature obtainable is -9 °C

5.8.7 Entering Acceleration and Brake Rate

To change the acceleration rate press the ACCEL key. The accel/brake display will flash. Enter the acceleration rate using the scroll keys and press ACCEL again. Enter the brake rate in the same manner using the BRAKE key.
Figure 8 Acceleration and brake rate curves
5.9 Sample Temperature Control Procedure

The Hawk centrifuge is designed to control bowl air temperature. This may, under certain temperature/speed conditions, cause the sample to freeze or overheat. When the sample temperature is critical it is recommended that a test is run to determine a temperature setting that will achieve the desired results and prevent the sample from freezing or overheating.

The following test run procedure should be carried out for each different protocol used, to determine the correct temperature offset. This offset will be different for each speed/temperature/rotor combination used.

1. Prepare 2 tubes with equal amounts of dispersible fluid. The dispersible fluid should have a freezing point well below the desired sample temperature.
2. Precool the centrifuge to the desired sample temperature.
3. Place the sample tubes (which should already be at the required sample temperature) into the rotor.
4. Run the centrifuge at the required speed/time.
5. When the centrifuge stops, open and very quickly check sample temperature using an immersible thermometer. Care should be taken not to change the sample temperature by handling the tube or immersing a warm thermometer.
6. Adjust the set temperature up or down according to the temperature differential between the original set temperature and the measured sample temperature.

**Example**

If the original set temperature was +4°C and the sample measured +8°C, there is a 4°C differential. To obtain +4°C sample temperature the set temperature should be reset to 0°C.

5.10 Starting the run

Ensure that the rotor is correctly loaded and fitted. Close the lid and press down firmly to engage the lid lock. Press the rotor start key. The display will now change to show actual values of speed, run time and brake rate. The status of the unit is ramp up at speed and stopping. At the end of the run an audible bleep will be heard, and ‘End’ displayed.

5.11 Manual termination of run.

At any time the run may be stopped by pressing the (STOP) key.

5.12 Using the Pulse Key

A useful feature of the Hawk centrifuge is the inclusion of a pulse key. This allows the operator to run the rotor for as long as the key is pressed - the run will accelerate, decelerate and have a maximum speed equal to the last stored entry for these parameters.
5.13 Opening the lid if there is a power failure

It will not be possible to open the lid by the normal method of pushing the release button if there is a power failure, or if the lid lock has been deliberately disabled by the control system for safety reasons. The procedure below should be followed in these circumstances:

1. Switch the centrifuge OFF - WAIT 5 MINUTES TO ENSURE THE ROTOR HAS STOPPED.
2. Insert the emergency over-ride key at a slight angle into the small hole located at the front of the left side panel, (see Figure 1 page 9).
3. Move the key as shown in Figure 9 below to move back the lid slamlock to disengage the lid catch.

Figure 9 Lid lock override method (viewed from front)
6. ERROR MESSAGES

Any error message is intermittently displayed in the Speed/RCF display. The display is accompanied by an audible alarm.

Refer to the error message table for a full explanation of each message and the correct course of action.

IMPORTANT:- ENSURE THAT THE AIR INLET AND OUTLET ARE NOT OBSTRUCTED IN ANY WAY.
6.1 Error message table

NOTE: If taking the suggested action does not rectify an error, if it is erratic or persists without apparent cause, disconnect the power supply and contact the service engineer.

<table>
<thead>
<tr>
<th>ERROR MESSAGE</th>
<th>EXPLANATION</th>
<th>EFFECT ON MACHINE</th>
<th>OPERATOR ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOP (Lid Open)</td>
<td>Malfunction of lid lock mechanism or interlock switch</td>
<td>Machine will stop Lid lock will prevent normal lid operation</td>
<td>1. Open lid (if lid is locked follow procedure on page 17) 2. Remove rotor 3. Disconnect from power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>LUN (Lid Unlocked)</td>
<td>Malfunction of lid lock mechanism or interlock switch</td>
<td>Machine will stop Lid lock will prevent normal lid operation</td>
<td>1. Open lid (if lid is locked follow procedure on page 17) 2. Remove rotor 3. Disconnect from power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>NOT (No Tacho)</td>
<td>Fault in tacho system</td>
<td>Machine will stop Lid lock will prevent normal lid operation</td>
<td>1. Wait for 5 minutes or until the rotor has stopped turning 2. Follow the procedure on page 17 for opening the lid 3. Remove the rotor 4. Disconnect the power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>BST (Bad Stop)</td>
<td>Rotor is stationary when it should be running</td>
<td>Machine is stationary</td>
<td>1. Press stop</td>
</tr>
<tr>
<td>ERROR MESSAGE</td>
<td>EXPLANATION</td>
<td>EFFECT ON MACHINE</td>
<td>OPERATOR ACTION</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>-------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>SP- (Speed Minus)</td>
<td>Set value has not been achieved</td>
<td>Machine will stop Error cannot be cancelled until the rotor has stopped turning</td>
<td>1. Press stop key and open lid 2. Remove rotor 3. Disconnect the power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>SPP (Speed Plus)</td>
<td>Set value has been exceeded</td>
<td>Machine will stop Error cannot be cancelled until the rotor has stopped turning</td>
<td>1. Press stop key and open lid 2. Remove rotor 3. Disconnect the power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>NAC (No Acknowledge)</td>
<td>Link to inverter is not functioning</td>
<td>Machine will stop Error cannot be cancelled until the rotor has stopped turning</td>
<td>1. Press stop key and open lid 2. Remove rotor 3. Disconnect the power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>SFR (Serial Frame)</td>
<td>Software data not correctly synchronised</td>
<td>Machine will stop Error cannot be cancelled until the rotor has stopped turning</td>
<td>1. Press stop key and open lid 2. Remove rotor 3. Disconnect the power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>STO (Serial Time Out)</td>
<td>Inverter is not responding to the software</td>
<td>Machine will stop Error cannot be cancelled until the rotor has stopped turning</td>
<td>1. Press stop key and open lid 2. Remove rotor 3. Disconnect the power supply DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</td>
</tr>
<tr>
<td>ERROR MESSAGE</td>
<td>EXPLANATION</td>
<td>EFFECT ON MACHINE</td>
<td>OPERATOR ACTION</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Segments within the speed/rcf display rotate. | There has been an interruption of the power supply to the machine | Machine will stop Error cannot be cancelled until the rotor has stopped turning - segments stop rotating. | 1. Press stop and open lid  
2. Check power supply                                                                |
| HTD (Hot Motor)                     | Motor has overheated                                  | Machine will stop Error cannot be cancelled until the rotor has stopped turning Thermostat will reset once the motor has cooled | 1. Press stop and open lid  
2. Ensure that the inlet and outlet vents are not blocked.                            |
| NRT (No Rotor)                      | Rotor has not been identified or rotor not fitted.    | Machine will stop Error cannot be cancelled until the rotor has stopped turning     | 1. Press stop and open lid  
2. Check rotor has been fitted  
3. Remove rotor, clean drive head and top surface of motor  
4. Clean and inspect rotor bore and underside of rotor                                      |
| BTH (Bad Thermistor)                | Malfunction of temperature sensor                    | Machine will stop Error cannot be cancelled until the rotor has stopped turning     | 1. Press stop and open lid  
2. Remove rotor  
3. Disconnect from power supply  
DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER            |
| UFO                                 | The rotor nut is not sufficiently tightened - the rotor is rotating at a greater speed than the motor. | Machine will stop Lid lock will prevent normal lid operation | 1. Open lid (if lid is locked follow procedure on page 17)  
2. Check rotor nut and tighten if required.  
3. If rotor nut was not loose then disconnect unit from power supply  
DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER |
<table>
<thead>
<tr>
<th>ERROR MESSAGE</th>
<th>EXPLANATION</th>
<th>EFFECT ON MACHINE</th>
<th>OPERATOR ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LTP</strong> (Low Temperature)</td>
<td>Set value has been exceeded</td>
<td>Machine will continue until the end of run. Cancelling error will stop the machine, error will sound once machine has stopped.</td>
<td>1. Press stop key to cancel error. 2. Run precool @ -2°C for 15 minutes (See note 3.5)</td>
</tr>
<tr>
<td><strong>HTP</strong> (High Temperature)</td>
<td>Set value has not been maintained</td>
<td>Machine will continue until the end of run. Cancelling error will stop the machine, error will sound once machine has stopped.</td>
<td>1. Press stop key to cancel error. 2. Run precool @ -2°C for 15 minutes (See note 3.5)</td>
</tr>
<tr>
<td><strong>T45</strong> (Temp over 45°C)</td>
<td>Bowl temperature is over +45°C</td>
<td>Machine will stop Audible alarm will sound</td>
<td>1. Press stop and open lid 2. Remove rotor 3. Disconnect from power supply <strong>DO NOT USE THE MACHINE UNTIL IT HAS BEEN CHECKED BY A SERVICE ENGINEER</strong></td>
</tr>
<tr>
<td><strong>NAT</strong> (Not Achieved Temp.)</td>
<td>The machine has not achieved set temperature.</td>
<td>Machine will stop Audible alarm will sound</td>
<td>1. Press stop key to cancel error. 2. Run precool @ -2°C for 15 minutes (See note 3.5)</td>
</tr>
<tr>
<td><strong>BEE</strong> (Bad Eeprom)</td>
<td>Software memory problem: previous set run values have been corrupted.</td>
<td>Machine will keep running and set corrupt values to default values.</td>
<td>1. Press stop 2. Check set values</td>
</tr>
<tr>
<td><strong>LUP</strong> (Lid Up)</td>
<td>Lid has been open for more than four minutes with the refrigeration on</td>
<td>Audible alarm will sound</td>
<td>1. Press stop 2. Close lid.</td>
</tr>
</tbody>
</table>
7. ROTORS AND ACCESSORIES

The following pages contain tables listing the rotors and accessories that are available for use with your HAWK centrifuge.

7.1 26 X 2ml Angle Rotor - for use with HAWK 15/05 R
Rotor 43117-620.  15000 rpm (max. speed)
ROTOR CODE 0

Accessories
Lid 43117-629.
‘O’rings for lid (77050.172 inner, 77050.170 outer)
1.5ml Disposable tube (1000 off 43551-6022)

HAWK 15/05 Refrigerated - 15000RPM

<table>
<thead>
<tr>
<th>TUBE</th>
<th>Radius (mm)</th>
<th>RCF x g (max)</th>
<th>MAX. TUBE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dia.(mm)</td>
</tr>
<tr>
<td>1.5ml Disposable</td>
<td>87</td>
<td>21882</td>
<td>10.5</td>
</tr>
<tr>
<td>2.0ml Disposable</td>
<td>87</td>
<td>21882</td>
<td>10.5</td>
</tr>
</tbody>
</table>
7.2 30 X 0.75ml Angle Rotor - for use with HAWK 15/05 R
Rotor 43117-621.  15000 rpm (max. speed)
ROTOR CODE 1

Accessories
Lid 43117-629.
‘O’rings for lid (77050.172 inner, 77050.170 outer)
0.75ml Disposable tube (1000 off 43551-6037)

HAWK 15/05 Refrigerated - 15000RPM

<table>
<thead>
<tr>
<th>TUBE</th>
<th>Radius (mm)</th>
<th>RCF x g (max)</th>
<th>MAX. TUBE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75ml Disposable</td>
<td>81</td>
<td>20373</td>
<td>Dia.(mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8.0</td>
</tr>
</tbody>
</table>
7.3 36 X 0.4ml Angle Rotor - for use with HAWK 15/05 R

Rotor 43117-622. 15000 rpm (max. speed)

ROTOR CODE 2

Accessories
Lid 43117-629.
‘O’rings for lid (77050.172 inner, 77050.170 outer)
0.4ml Disposable tube (1000 off 43551-6041)

HAWK 15/05 Refrigerated - 15000RPM

<table>
<thead>
<tr>
<th>TUBE</th>
<th>Radius (mm)</th>
<th>RCF x g (max)</th>
<th>MAX. TUBE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4ml Disposable</td>
<td>92</td>
<td>23140</td>
<td>Dia. (mm) 6.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Length 49</td>
</tr>
</tbody>
</table>
7.4 24 Place Haematocrit Rotor - for use with HAWK 15/05 R
Rotor 43117-624 . 15000 rpm (max. speed)
ROTOR CODE 3

HAWK 15/05 Refrigerated - 15000RPM

<table>
<thead>
<tr>
<th>TUBE</th>
<th>Radius (mm)</th>
<th>RCF x g (max)</th>
<th>MAX. TUBE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dia.(mm)</td>
</tr>
<tr>
<td>Capillary</td>
<td>89</td>
<td>22385</td>
<td>1.5</td>
</tr>
</tbody>
</table>
7.5 24 X 2ml Sealed Stepped Angle Rotor - for use with HAWK 15/05R
Rotor 43117-626. 15000 rpm (max. speed)
ROTOR CODE 4

Accessories
Lid 43117.628
‘O’ring for lid (77050.171)
1.5ml Disposable tube (1000 off 43551-6022)

HAWK 15/05 Refrigerated - 15000RPM

<table>
<thead>
<tr>
<th>TUBE</th>
<th>Radius (mm)</th>
<th>RCF x g (max)</th>
<th>MAX. TUBE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dia.(mm)</td>
</tr>
<tr>
<td>1.5ml Disposable</td>
<td>73</td>
<td>18361</td>
<td>10.5</td>
</tr>
<tr>
<td>2.0ml Disposable</td>
<td>73</td>
<td>18361</td>
<td>10.5</td>
</tr>
</tbody>
</table>

* RCF value is that attainable at the outer set of tubes
8. MAINTENANCE

This section describes the basic maintenance procedures, in particular, the methods and materials used for cleaning the centrifuge, rotors and accessories.

To ensure reliability and safety, it is recommended that an inspection of the centrifuge is made after 1000 hours of operation, or once a year, whichever occurs first. This should include rotors and accessories.

Electricity at Work Regulations (1989). Portable Appliance Testing (PAT) - where applicable this centrifuge should be inspected and tested regularly in accordance with these regulations and the appropriate records kept.

For Warranty Service and Maintenance please see the details given at the front of this manual.

8.1 Cleanliness

To maintain a good appearance and to prevent dirt build-up, the casing and the inside of the bowl should be cleaned regularly using a soft cloth dampened with a neutral detergent and warm water. The control panel and display may also be cleaned in this manner, but should be wiped dry immediately.

If corrosive materials are used in the centrifuge, it is especially important to clean out the centrifuge bowl thoroughly. If a major spillage occurs in the bowl, the excess liquid should be mopped out and the bowl then cleaned using a suitable cleaning agent.

8.2 Drive shaft

The drive shaft should be cleaned periodically with a solvent to remove excessive grease.

8.3 Rotors and accessories

The typical environment used in centrifuging, can, over a period of time create a strength degrading effect in rotors and accessories used, also additional hazards in the form of corrosion and/or stress corrosion. These conditions can reduce the basic strength of the centrifuge component and could lead to premature failure.

Simple corrosion, particularly in Aluminium, can usually be seen by the naked eye and appears in the form of pitting or white fluffy deposits on the material surface. Stress corrosion usually is more damaging than simple corrosion and is the adverse effect created by a combination of both stress and chemical reaction.

Washing the rotor and accessories in warm water containing a mild detergent, ensuring it’s thoroughly dry, followed by spraying with MSE Rotor Protection Spray (Cat No 17341-1512) will help to prolong the life of your rotor and accessories. Always handle rotors and accessories with care to avoid damage.
8.4 O-Rings
Ensure that the O-Rings fitted to the sealing lids are lightly coated with silicone grease. Check the O-Rings regularly for cuts and abrasions, replacing as necessary but at least once a year.

8.5 Sterilisation
All of the rotors and sealing lids (with seals removed) may be sterilised by autoclaving at 120°C.

DO NOT autoclave any parts where the protective finish is scratched or damaged.

8.6 Disinfecting
The following cleaning fluids may be used

TERMINEX 2 (available from Arrow Chemicals Ltd.)
VIRKON (available from Antec International)

These cleaning agents if used as instructed by the manufacturer should not be harmful to this centrifuge, or accessories supplied for use with it.

WARNING!
SOLVENTS OR GRITTY CLEANERS SHOULD NEVER BE USED
EXCESSIVE USE OF WATER SHOULD ALSO BE AVOIDED

If the means available for disinfecting of certain microbiological agents are inadequate, the safety officer should be consulted and appropriate steps taken.

8.7 Bowl/Lid seal.
Lightly coat the seal with French chalk occasionally and in particular after cleaning. If the seal becomes damaged it should be replaced by the service engineer.
8.8 Replacing the fuse

**TO BE CARRIED OUT BY A QUALIFIED ELECTRICIAN ONLY.**
The main power supply incorporates a fuse protection on both the live and the neutral connections, the locations of the fuses are shown in Figure 2 on page 9. The main connection plug on the 230v instrument should also be fitted with a fuse.

The appropriate fuse ratings are as follows:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>HAWK 15/05 Refrigerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine 120v</td>
<td>2 off 12 amp (6.3x32mm)</td>
</tr>
<tr>
<td>Machine 230v</td>
<td>2 off 5 amp (5x20mm)</td>
</tr>
<tr>
<td>Plug 120v</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Plug 230v</td>
<td>5 amp (1/4&quot; x 1&quot;)</td>
</tr>
</tbody>
</table>

If one or both of the fuses have blown, and the centrifuge is switched on, the display will not function.

To replace the centrifuge fuse proceed as follows:

1. **Disconnect the power supply at the main plug.**
2. Move the centrifuge to gain access to the rear,
3. Release the fuses using a flat head screwdriver. Inspect and replace as necessary with the correct rating. For 230v model, the plug fuse may also need to be checked.

NB - If the fuse blows immediately or blows again during normal use, the power supply should be disconnected and the service engineer called.

9. **Product Disposal - ISO 14001 Compliance**

This product should be treated as industrial waste and disposed of accordingly. There are no toxic material used in the manufacture of this product. The majority of materials used in this product are recyclable, and all can be disposed of safely. Where the product has refrigeration, it is important that prior to disposal the refrigerant gas is recovered by a qualified person. The insulation material is non-toxic but could be an irritant. If removed from the product it should be bagged and disposed of at an authorised site.
10. HOW TO OBTAIN SERVICE ON YOUR HAWK CENTRIFUGE

MSE (UK) Ltd is committed to giving our customers the best possible service. If your centrifuge should require service at any time please follow these procedures:

**All countries except UK:** Contact your local MSE (UK) Ltd distributor, details can be found on our website: www.mseuk.co.uk

**UK only:** For all technical and service enquires contact:

MSE (UK) Ltd  
Worsley Bridge Road  
Lower Sydenham  
London  
SE26 5AZ  
Telephone +44 (0) 870 609 4097  
Fax +44 (0) 208 650 8408  
E-mail: sales@mseuk.co.uk

1. Contact the repairs centre - have the model, serial number, and date of purchase and fault description available.
2. You will be given a return goods authorisation number and directions for shipping.
3. Remove all rotors, buckets and adapters. Do not ship these items - only the centrifuge.
4. Thoroughly clean and disinfect the centrifuge.
5. Fill out the attached service request form and place inside the centrifuge.
6. Pack in a protective box (preferably that in which the centrifuge was originally supplied).
7. MSE will specify the carrier to be used and will give details of how the freight is to be charged.
## HAWK CENTRIFUGE SERVICE REQUEST FORM

We are sorry it is necessary to have your MSE centrifuge repaired. Please take a few moments to fill out this form which will help us to ensure you receive the best and fastest service possible.

<table>
<thead>
<tr>
<th>Model</th>
<th>Refrigerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial number:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>(plate on right side panel)</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Date purchased:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Where purchased:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Brief description of fault:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>(Error message displayed)</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Date fault first occurred:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Date repair centre contacted:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Authorisation number:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Condition of centrifuge:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Has it been disinfected?</td>
<td>Yes / No</td>
</tr>
<tr>
<td>Disinfectant used:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Contact name:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Address:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Telephone Number:</td>
<td>..........................................................</td>
</tr>
<tr>
<td>Signature:</td>
<td>...................................................................</td>
</tr>
</tbody>
</table>