Centurion Scientific Ltd

K3 & K3R series
Benchtop Centrifuges

Instruction Manual

Download from www.centurionscientific.co.uk
click ‘K3 Series’
click ‘Manual Instruction Technical’

GENERAL SAFETY

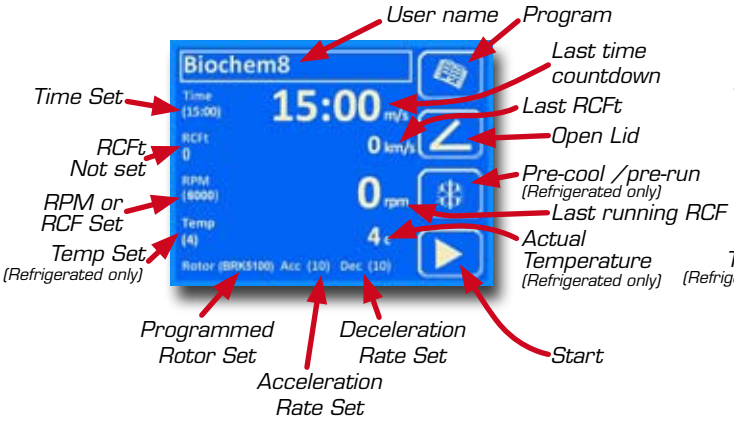
To ensure that the centrifuge is operated in a safe manner, avoiding the hazard of injury to personnel or damage to material goods, the following safety precautions should be followed at all times:

- The centrifuge must only be opened by trained personnel competent in its use
- Never use the centrifuge unless the rotor is properly mounted and secure
- Never open, or attempt to open the lid while the centrifuge rotor is still turning.
- Only use original parts for the centrifuge
- Never operate the centrifuge if components are missing or damaged.
- If the rotor shows visible signs of wear its use must be discontinued and replacement fitted.
- The rotor must not be over loaded, the maximum allowed density of samples at full operating speed is 1.2g/cm^3.
- Always endeavour to make sure that opposite tubes are of the same weight to avoid rotor imbalance. If the tubes are filled with the same material they must, therefore, be filled with the same amount.
- No changes should be made to the mechanical or electrical components without prior consultation with and the written permission of Centurion Scientific.
- The centrifuge's has not been manufactured from inert materials or to be explosion proof. Ensure that it is not operated within an environment, or with materials that makes these a requirement.
- During operation a "safe" zone of 30cm must be maintained around the centrifuge. This zone should be clear of personnel and hazardous materials at all times during the run.
- Substances of a radioactive, flammable or explosive nature must not be centrifuged.
- Substances prone to react briskly with each other must not be centrifuged at the same time.
- Toxins and pathogenic micro-organisms must not be centrifuged unless the proper precautions for their handling have been taken. These may include, but are not limited to, biological seals. Should toxins or pathogens enter the centrifuge or its parts the proper procedures for disinfecting the centrifuge should be carried out.
- Strongly corrosive substances that may cause damage to or impair the mechanical strength of the rotor may only be centrifuged inside protective vessels. Should any doubt exist regarding the substance or the suitability of a particular vessel for use with it, consult the Safety Inspector.

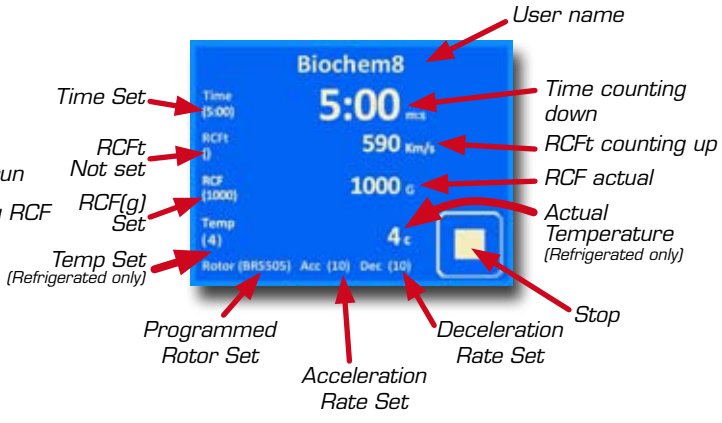
Key to Displays

(See pages 5-9 of this manual for programming instructions - a larger copy of this KEY is included in an appendix)

Start Screen



Screen when running



INSTALLATION

The instrument has been designed in such a way that installation should present no problems to a technician familiar with equipment of this type.
Should any problems of questions arise during the installation of the instrument please refer to Centurion Scientific for advice. During installation the record for the individual centrifuge (to be found with our manual) must be completed.

WORK surface

The work surface must be stable and, where possible, resonance free – a standard laboratory bench is usually suitable. The location of the centrifuge should be well ventilated and out of direct sunlight, having sufficient room to allow air to circulate around it freely. A safety zone extending for 30cm in all directions must be maintained around the centrifuge. This space should be kept clear, in particular no hazardous material may be place in the area during centrifugation.

MAINS connection

Before connecting the unit to the mains, ensure that the voltage and frequency of supply match the specifications on the instrument. A mains plug, provided with a 5 amp fuse (or 13amp for refrigerated units) and of a type suitable for use where the centrifuge is to be installed, should be fitted. This plug must be wired up according to the international convention.

ROTOR assembly

The rotor assembly locates on to the tapered shaft of the drive shaft, being held securely in position by a flat washer and locking screw. It is important that these items are assembled in the correct order and that the washer is used as intended.
To locate the rotor first, check that both the exterior surface of the shaft and the tapered bore of the rotor itself are free dirt or any foreign debris.
The rotor should then be lowered into position on the tapered shaft, care being taken to ensure that it seats firmly and evenly. The flat washer followed by the screw is then placed into the threaded portion of the shaft, the assembly then being secured by the screw. The screw should be hand tightened with the key provided.

Rotor screw fixing

Rotor bolt fixing

OPERATION

FILLING and loading of sample tubes.

The centrifuge functions in the most efficient manner when unbalance of the rotor is minimised. This prevents undue vibration perturbing the separation zones of the substance being centrifuged. It is therefore important that unbalance due to unequal loading of the sample tubes is minimised as far as possible.
The maximum permissible imbalance of the rotor is 1g.
Imbalance may be minimised by following a few simple and quick procedures as described in the following paragraphs.
• The sample tubes should be filled as evenly as possible. Where practical, tubes containing the same substance should be placed opposite each other.
• The rotor should be loaded symmetrically, this being best achieved by using all of the bores . When only partially loading the rotor it must be ensured that opposite bores always receive tubes of the same weight.
The following pictures provide examples of correct and incorrect loading of the rotor.

EMERGENCY lid release in case of lid lock failure

In the unlikely event of the lid lock failing and the user being unable to remove their samples, an emergency lid release is provided.
WARNING: OPERATION OF THE EMERGENCY LID RELEASE MUST ONLY BE UNDERTAKEN BY QUALIFIED AND APPROVED PERSONNEL.
UNDER NO CIRCUMSTANCES MAY THE CENTRIFUGE BE OPERATED IN THE CONDITION.
Wait until the rotor has stopped turning (view through the lid port) and switch off the power to the centrifuge.
Remove the black plastic seals to front underside of centrifuge and PULL BOTH CORDS DOWN.
WARNING: UNDER NO CIRCUMSTANCES MUST THE EMERGENCY LID RELEASE BE USED WHILE THE CENTRIFUGE IS RUNNING.

Cleaning, Disinfecting and Maintenance

WARNING: ISOLATE AND DISCONNECT THE POWER SUPPLY BEFORE CARRYING OUT CLEANING OR MAINTENANCE.

CENTRIFUGE BODY

• Regularly wipe down the external surfaces with a mild detergent.
• Mop up any spillage with an absorbent cloth. Check to ensure that the liquid has not entered the main body of the centrifuge.
WARNING : If any liquid has entered the main body of the centrifuge it MUST NOT be used. Contact the supplier or Centurion Scientific Ltd immediately for advice.

ROTOR

• Remove the locking screw with the key provided.
• Remove the flat washer.
• Pull the rotor off the shaft by applying equal force of both sides.
NOTE: If any stiffness or difficulty is experienced when attempting to remove the rotor this may be overcome by applying a sharp tap to the rotor shaft. A non-metallic object (e.g. plastic mallet) must be used to prevent damage to the shaft.
• Clean the rotor using a suitable detergent and hot water. Alternatively the rotor may be cleaning in an autoclave at a maximum temperature of 120°C
• Thoroughly rinse and dry the rotor.
• Inspect the rotor for any hairline cracks , damage or other defects. If any are found please contact your supplier or Centurion Scientific Ltd.

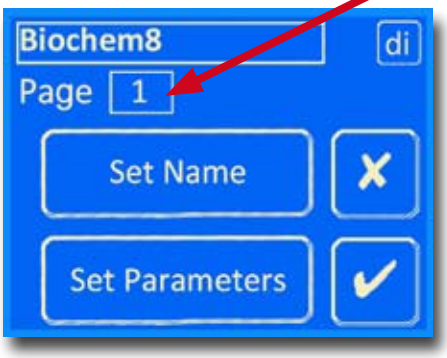
Start point

FIRST build a program

Display shown at turn on

PRESS program key

(book emblem top right)

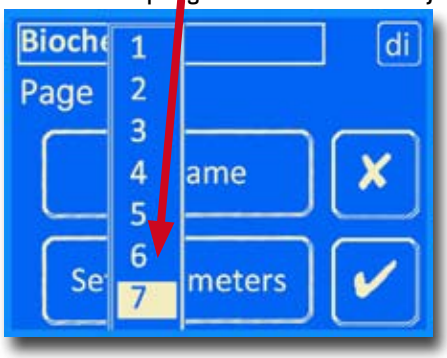


Display shown when program key pressed

PRESS Page number rectangle

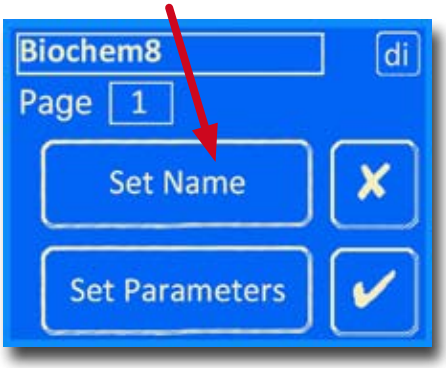
SELECT page number required

1-9 pages with 12 names per page (a total of 108 programs can be stored)



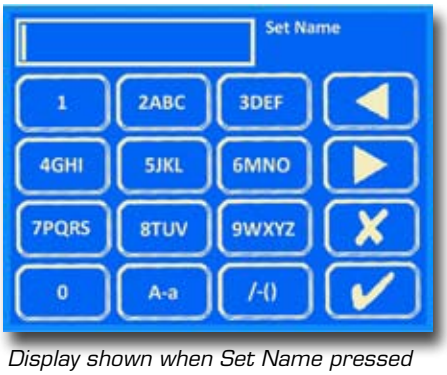
Display shown when Page key pressed

PRESS Set Name



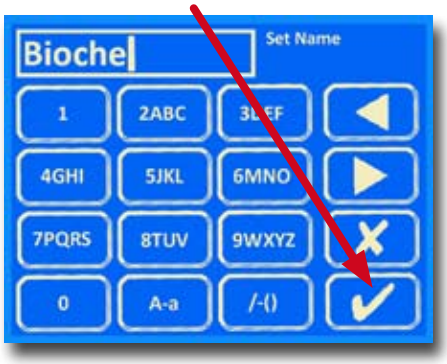
KEY in name required

Up to 14 characters, letters & numbers (we have chosen Biochem8 for these illustrations)



Display shown when Set Name pressed

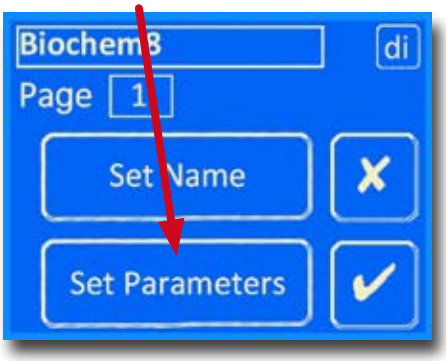
PRESS tick if correct



Display shown when chosen name is being entered

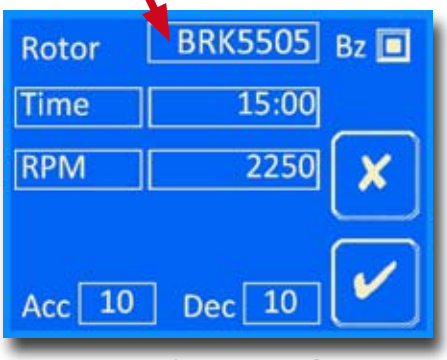
ROTOR PROGRAMMING

PRESS Set Parameters



Display shown after pressing Tick on name settings

PRESS Rotor rectangle



Display shown after pressing Set Parameters

SELECT rotor required by pressing down and releasing

Display shown after pressing Rotor rectangle

continued...

Correct rotor should be shown in Rotor display

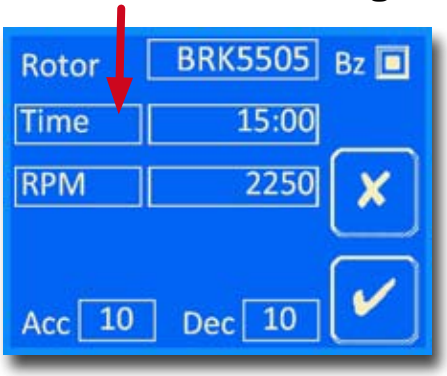
Display shown after selecting rotor

- Turn ON Shows white square in centre

Turn end of run buzzer off by PRESSING Bz
(Top right of display)

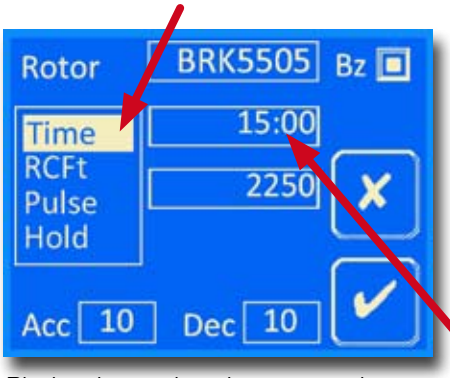
TIME PROGRAMMING

PRESS Time rectangle



Display shown

SELECT and PRESS desired timer type:



Display shown when timer rectangle key pressed

Time 0 - 9999 minutes

RCFt See W2t document for explanation

Pulse Timer counts up in seconds when START button held down. (90 seconds max)

Hold Timer is held on till stop button is pressed

PRESS Rectangle next to Time box

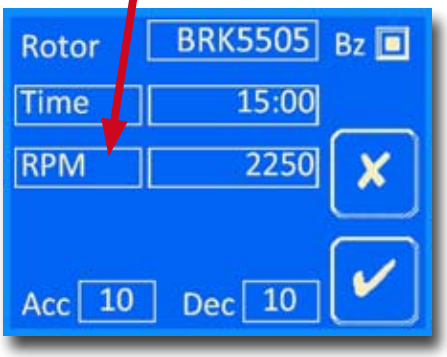
SELECT Time required in minutes & seconds
Hold and Pulse cannot be changed
Or select RCFt number from previous run

PRESS Tick after selection

Display shown when Time Numerical rectangle is selected

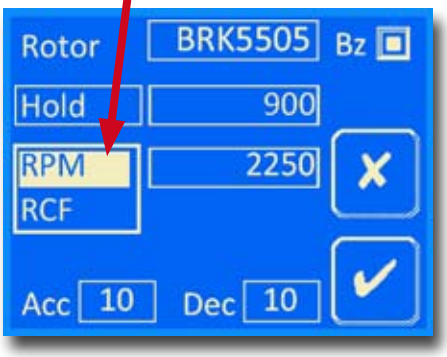
RPM PROGRAMMING

PRESS RPM square



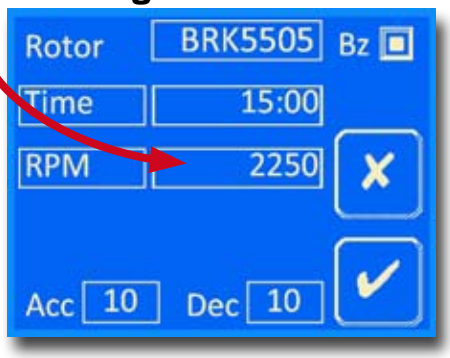
Display shown

SELECT RPM (speed) or RCF (G Force)



Display shown when RPM pressed

PRESS Numerical rectangle next to box



Display shown after selecting RPM

continued...

SET Speed (RPM) or RCF in numerical form

Display shown after pressing numerical rectangle

PRESS Tick after selection.

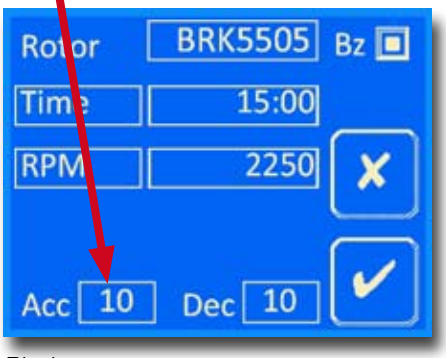
for REFRIGERATED MODELS only SET Temperature - SEE following page 7A,

then return to set Acceleration and Deceleration rates below

ACCELERATION and DECELERATION rates

SET Acceleration rate

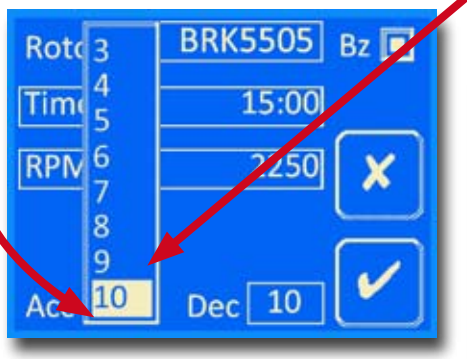
PRESS Acc Square



Display

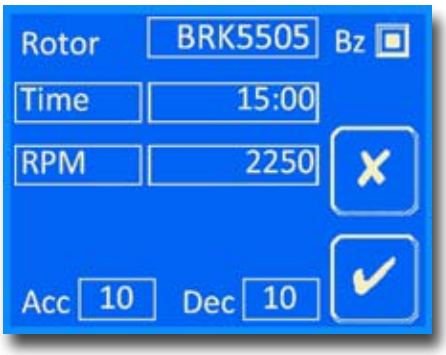
SELECT Rate 1-10

(1 is slowest 10 fastest)



Display shown when Acc pressed

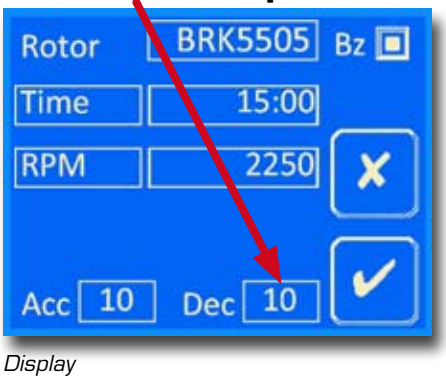
PRESS number required & release



Display after selecting Acc

SET Deceleration (Brake) rate

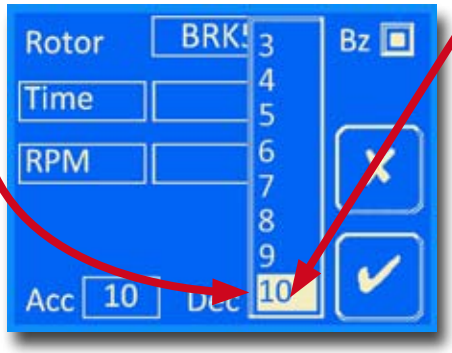
PRESS Dec Square



Display

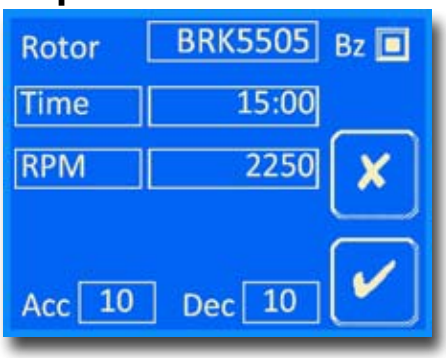
Select rate 1-10

(1 is off 10 full braking)



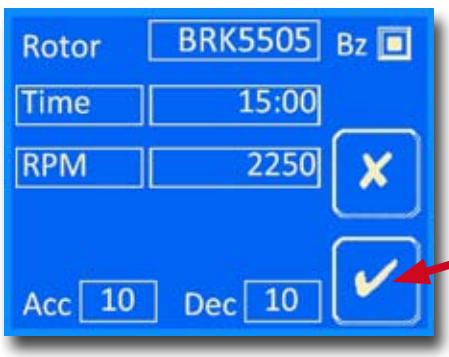
Display shown when Dec pressed

PRESS number required & release



Display after selecting Acc and Dec rates

If you are satisfied with all parameters Check Rotor, timer type, RPM or RCF Acc & Dec rates



Then PRESS Tick box

(bottom right)

continued page 8...

Refrigerated Centrifuges only

K2015R,K241R and K243R

Centurion Scientific refrigerated centrifuges have a range of **- 9°C** to **40°C**.

We accurately control this temperature by running the refrigeration unit and pulsing heat via a loop close to the coils. PID system is used to control.

Imagine a bath at home, to control the temperature accurately you would run both hot and cold taps together. This is far more effective than filling with cold water and topping up with hot as the temperature difference would be enormous.

By using this method our chamber temperature control is unsurpassed.

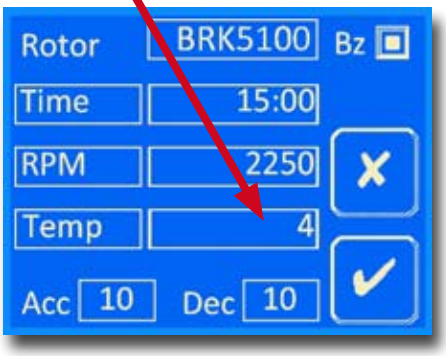
Note Due to the efficient management of temperature control you may see some ice patches or in turn, notice some slightly hotter areas. This is quite normal and it is the overall chamber temperature that matters.

For accurate temperature control we recommend you use the Pre-cool /pre-run facility ❄.
Fit your desired rotor and securely fasten as per our Instructions.
After programming your desired parameters, IE selection of a rotor, speed, time, acceleration & deceleration rates, (as an example). Leave the centrifuge to reach the desired temperature and then press the ❄ Pre-cool symbol. This will run the centrifuge at 20% of the maximum speed of the rotor for 20 minutes, a ❄ will show in the Rpm section to show the Pre-cool mode is in operation. It is advisable to let the time run to 20 minutes, but you can stop at any time. Once stopped load your samples (which should be at your set temperature) and press the start arrow button.

For ease it is advisable to set your samples to the desired centrifuge temperature before placing in the centrifuge and separating, otherwise allow sufficient time for them to reach the temperature in the chamber.

TEMPERATURE PROGRAMMING (Refigerated models only - K2015R,K241R and K243R)

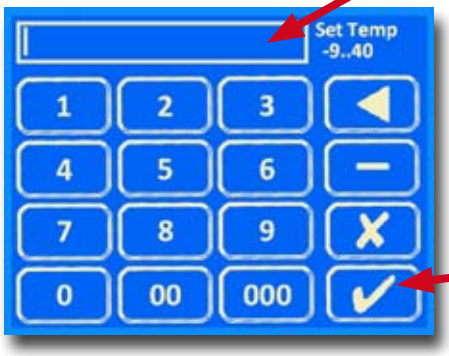
PRESS Temperature numeric square



Display shown K2015R,K241R and K243R (all our illustrated screens show a chosen and actual temperature of 4°C)

Note: *Displays illustrated elswhere in this manual do not show the Temp square or the Temperature numeric square however they will be present on all refigerated model displays as will set temperature and actual temperature where appropriate (see Key to Displays on page 1)*

SET Temp (-9°C...40°C) in numerical form



Display shown when Temp is pressed

Note: *See rotor appendix for minimum possible temperature at maximum speed per rotor.*

PRESS Tick after selection.

Pre-cool /pre-run START button.

See instructions above detailing use of this feature - note that this screen will show your selected parameters.

return to page 7 to set Acceleration and Deceleration rates...

NOW LOAD THE CENTRIFUGE

Display

PRESS Central button on right to open lid

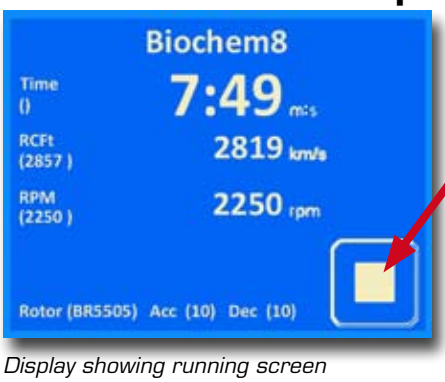
LOAD your samples evenly
(see Safety Instructions, page2)

FIT LID to rotor (if part of rotor type)

CLOSE Centrifuge lid pressing both sides down firmly.

PRESS Start button (arrow triangle, bottom right)

RUNNING screen display



Display showing running screen

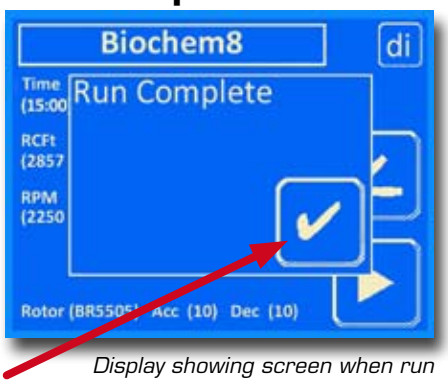
If you require early termination
Time, Hold, RCFt
PRESS Square bottom right.

OR in pulse mode
RELEASE when counter (seconds) has reached desired number

PRESS lid open button
(centre right)

You may now retrieve your samples

Run Complete



Display showing screen when run finished (with Buzzer selected)

PRESS run complete Tick
(only shows IF Buzzer is selected)

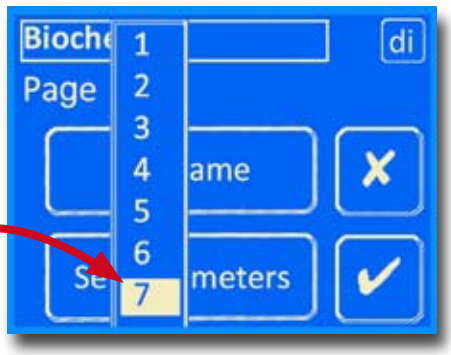
HOW TO RETRIEVE SET PROGRAMS

PRESS program button
(top right)

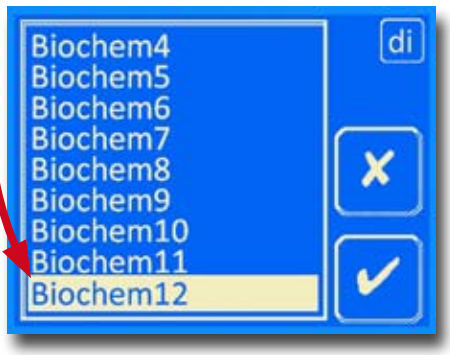
Display

Note:
Centurion K3 range centrifuges can store up to 108 programs, these are convieniently grouped into 9 pages with up to 12 names available per page, each name can consist of up to 14 alphanumeric characters.

PRESS & SELECT required name then **PRESS desired name (12 names availble)**

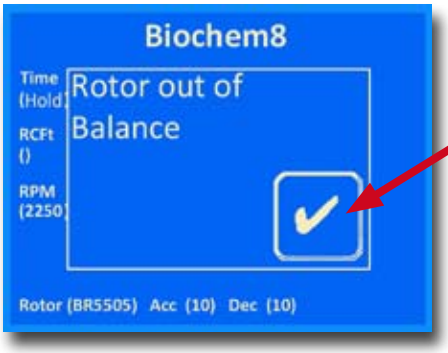


PRESS Page numerical box (9 pages available)



your stored program will now be retrieved.

ERROR CODES ON DISPLAY



Error code shown on display

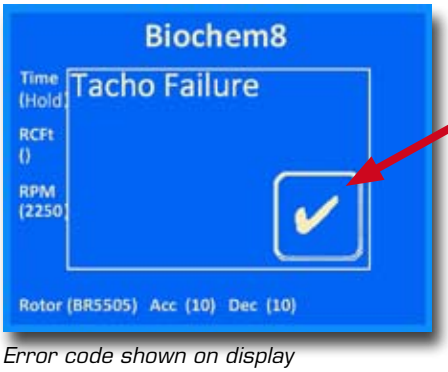
If Display shows Rotor out of balance

An imbalance has occurred

When centrifuge has stopped PRESS tick button

PRESS Lid open button

Check for:
Improperly loaded tubes
(see Safety pages)
Broken tubes or
incorrectly measured tube

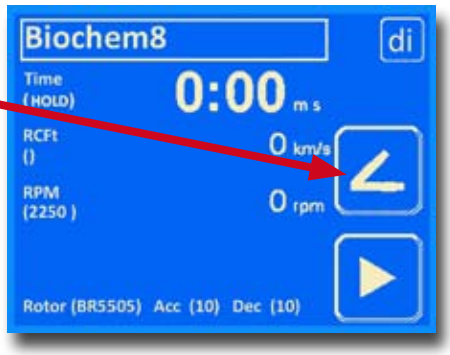


Error code shown on display

If Display shows Tacho failure

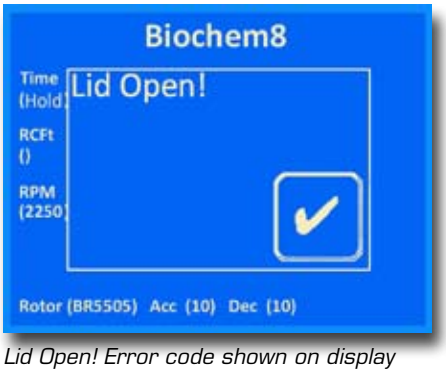
PRESS Tick button

PRESS Lid open button



Check rotor for free rotation
Are the tubes too tall?

CALL service department



Lid Open! Error code shown on display

If Display shows Lid Open!

Check lid is closed correctly

PRESS down firmly on lid (at both sides near front)

If not then CHECK SENSOR as below
Or CALL Service Department

To check sensors go to parameters page.

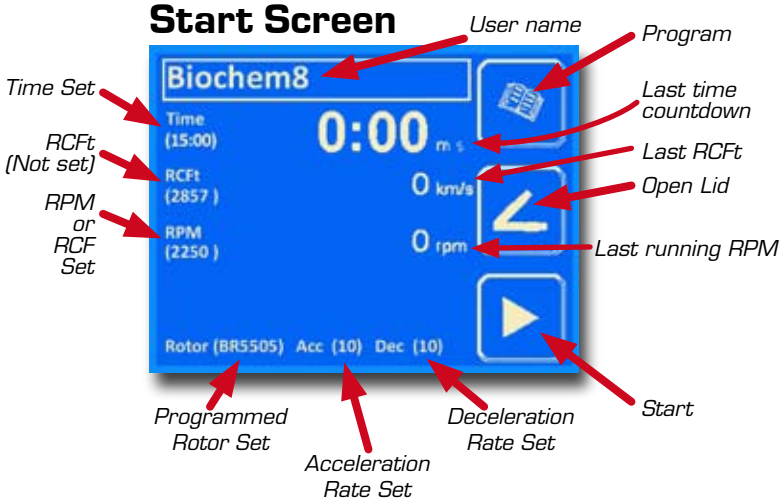
First make sure Centrifuge lid is open.
Press 'di' (top right small button) for Diagnostics screen. *(Shown below)*
It reads as follows: *(either 0 or 1 may show when this screen first appears, follow instructions below to perform diagnostic checks)*

.... or greater *(version number of installed firmware)*
.....0 or 1 .....By rotating rotor Tacho will show 0 or 1 as rotor turns if so Tachometer is working
.....0 or 1 .....By rotating rotor Rotor Rec will show 0 or 1 as rotor turns if so sensor is working
.....0 or 1 .....By pressing rotor firmly or shaking hard Balance will show 0 or 1
.....0 or 1 .....By shutting the lid the Lid switch will go from 0 to 1 showing correct sensing

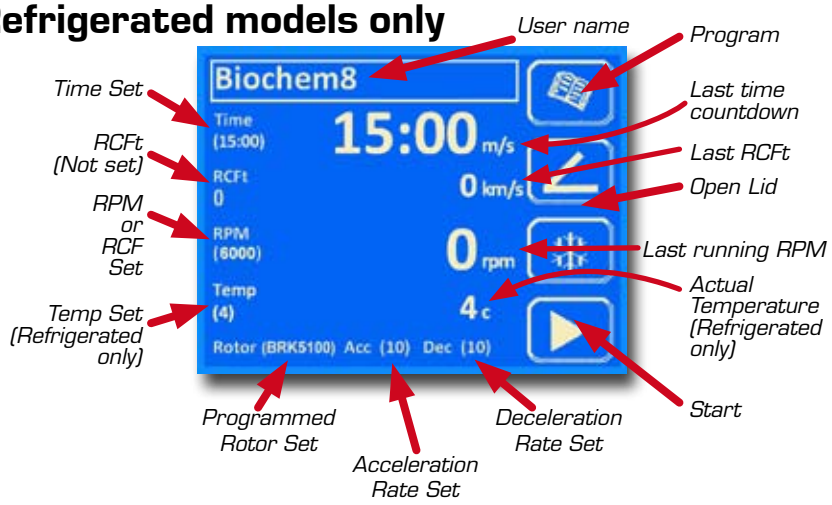
Key to Displays

(See previous pages for programming instructions)

Start Screen



Start Screen Refrigerated models only



Screen when running