

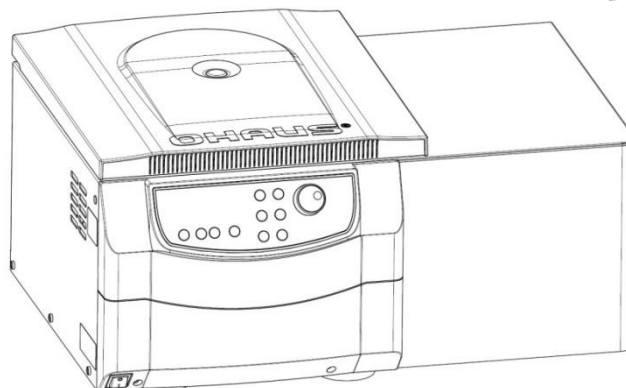
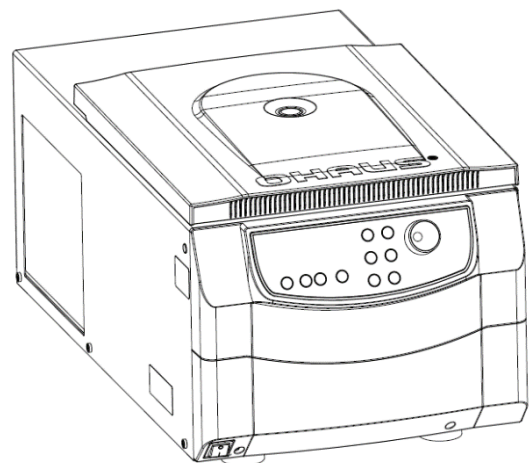
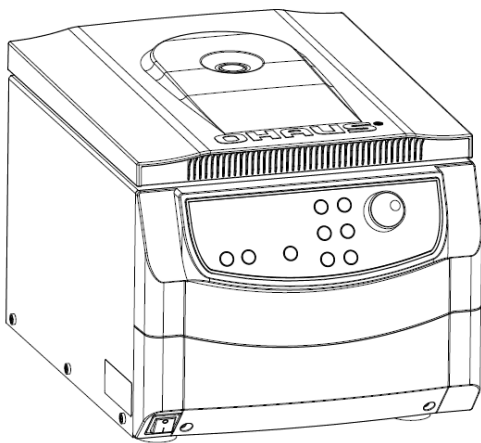


Frontier™ Centrifuge FC5714/FC5718/FC5718R/FC5816/FC5816R/FC5916/FC5916R Instruction Manual



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Sketch map of FC5714 / FC5718 / FC5816 / FC5916

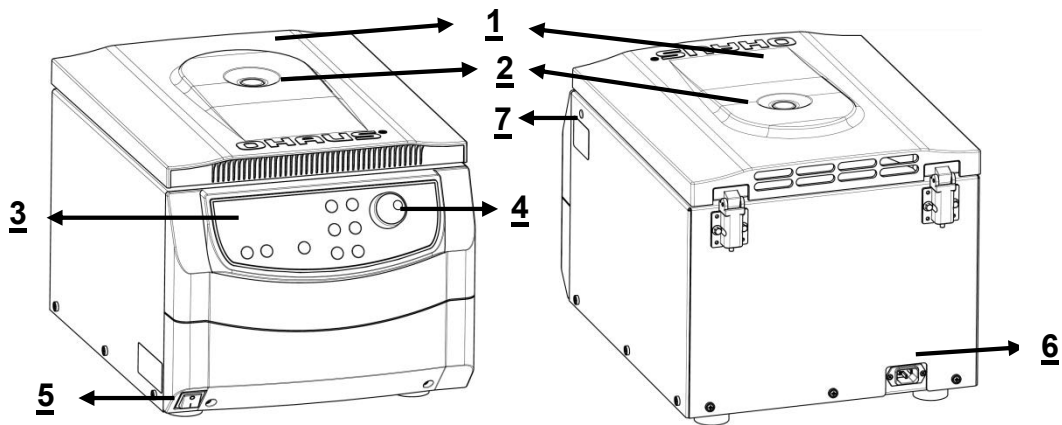


Figure.1

Sketch map of FC5718R

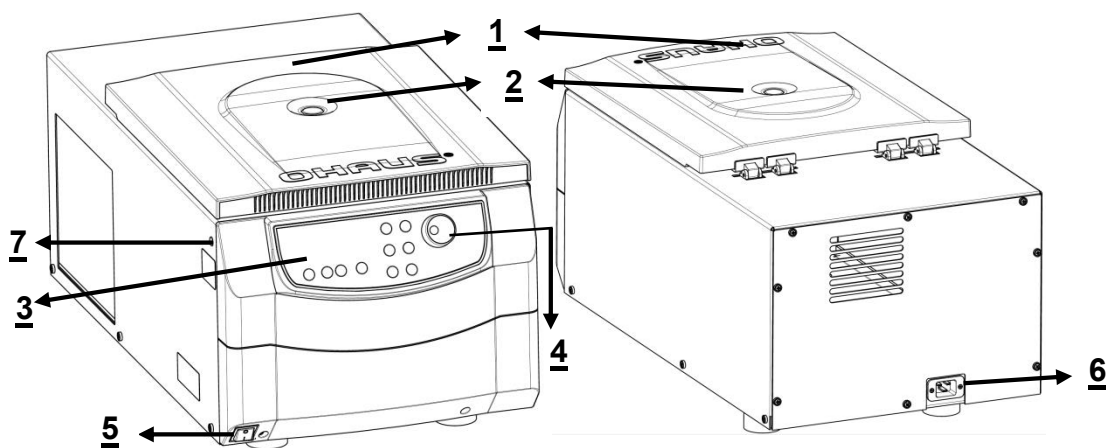


Figure.2

Sketch map of FC5816R / FC5916R

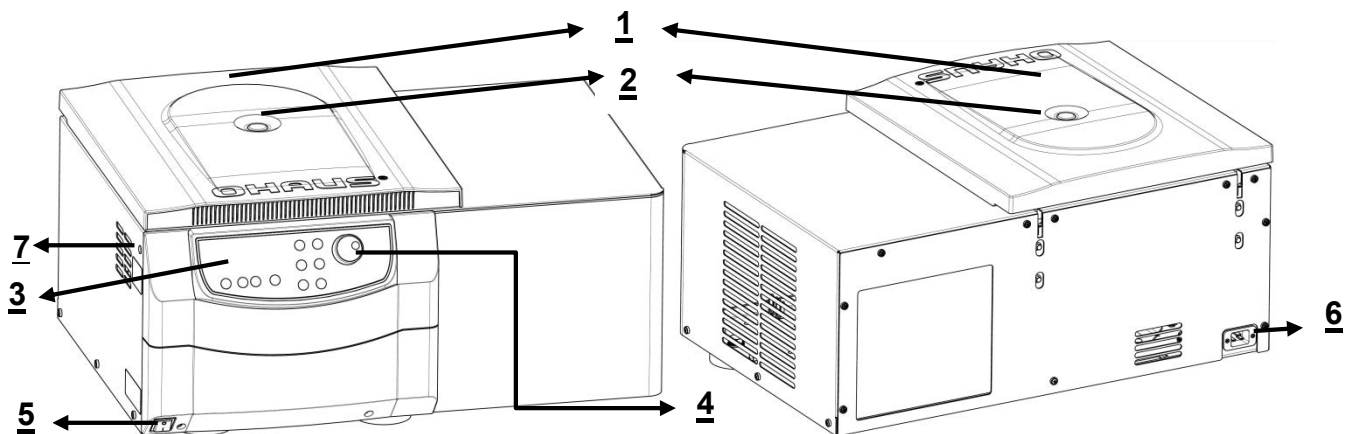


Figure.3

1 Centrifuge Lid	2 Rotor Window
3 Display	4 Function Label
5 Main Power Switch	6 Power Connection
7 Emergency Release	

Function Label for FC5714/FC5718/FC5718R/FC5816/FC5816R/FC5916/FC5916R

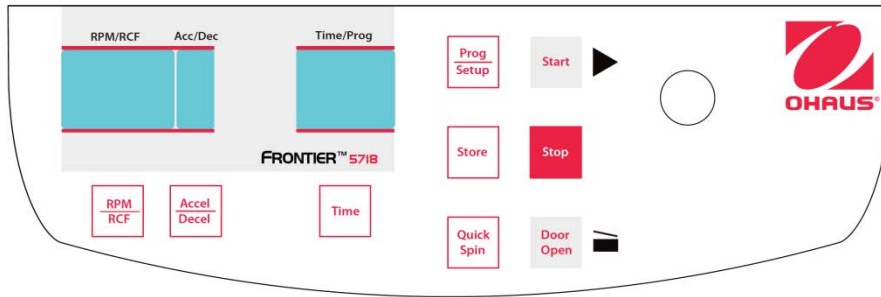


Figure.4

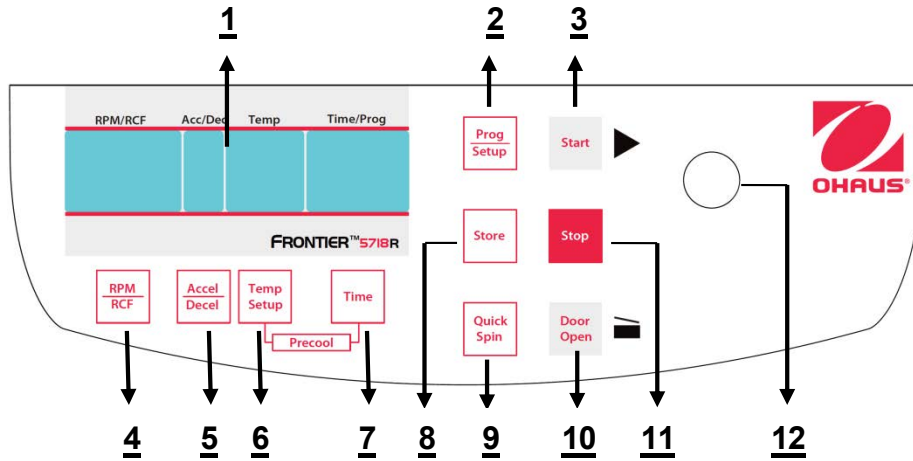


Figure.5

1. LCD Display	2. Program setup model
3. Start centrifugation	4. RPM/RCF model and select
5. Acceleration/Deceleration intensity model and select	6. Temperature setup model (Only FC5515R)
7. Time setup model	8. Store setup information
9. Short/quick spin centrifugation	10. Release lid
11. Stop centrifugation / setup	12. Adjusting knob/Dial: Change the number

LCD Display

The following picture shows the individual elements of the LCD-display.

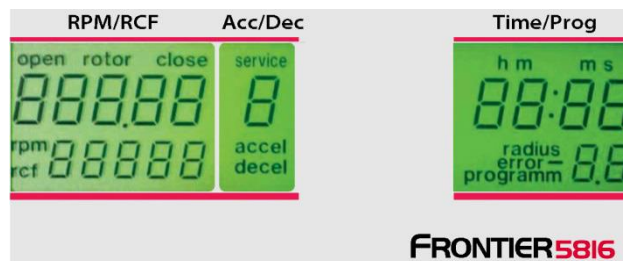


Figure.6

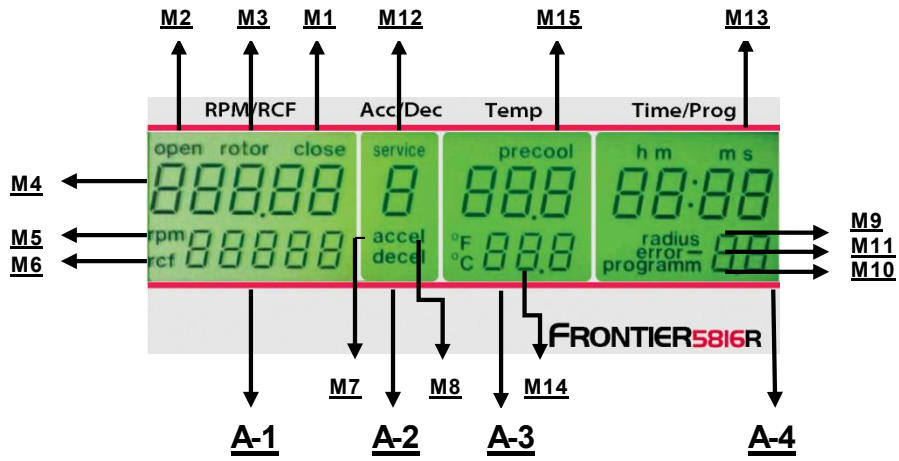


Figure.7

Display fields:

- A-1 Display field – "RPM/RCF"
- A-2 Display field – "Acc/Dec" "Service"
- A-3 Display field – "Time/Prog"
- A-4 Display field – "Temp"

Messages/logs of the display fields

M1	"close"	M2	"open"	M3	"rotor"
M4	"Rotor-No."	M5	"rpm"	M6	"rcf"
M7	"accel"	M8	"decel"	M9	"radius"
M10	"program"	M11	"error"	M12	"service"
M13	"h m s"	M14	"temperature"	M15	"precool"

Rotor Information Table

Rotor No. display	Order No.	Capacity	Compatible						
			FC5714	FC5718	FC5718R	FC5816	FC5816R	FC5916	FC5916R
61	30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	•	•	•	•	•	•	•
20	30314820	Rotor, Swing out, 4x250ml, ID				•	•		
21	30314821	Rotor, Angle, 6x250ml FB, ID				•	•	•	•
22	30314822	Rotor, Swing out, 4x100ml, ID	•	•	•				
23	30314823	Rotor, Swing out, 4x100ml, ID, Sealable	•	•	•				
24	30314824	Rotor, Swing out, 2x3MTP, ID	•	•	•	•	•	•	•
25	30314825	Rotor, Angle, 6x85ml RB, ID, Hi		•	•				
26	30314826	Rotor, Angle, 6x85ml RB, ID		•	•	•	•	•	•
27	30314827	Rotor, Angle, 4x85ml RB, ID, Hi		•	•	•	•	•	•
28	30314828	Rotor, Swing out, 16x50ml, ID				•	•		
29	30314829	Rotor, Angle, 10x50ml FA, ID		•	•	•	•	•	•
30	30314830	Rotor, Angle, 6x50ml RB/FA, ID	•	•	•				
31	30314831	Rotor, Angle, 6x50ml RB, ID, Hi		•	•	•	•	•	•
32	30314832	Rotor, Angle, 30x15ml RB/FA, ID	•	•	•	•	•		
33	30314833	Rotor, Angle, 20x10ml RB, ID, Hi		•	•	•	•	•	•
34	30314834	Rotor, Angle, 12x15ml RB/FA, ID	•	•	•				
35	30314835	Rotor, Angle, 44x1.5/2.0ml, ID		•	•	•	•	•	•
36	30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	•	•	•			•	•
38	30314838	Rotor, Angle, 24x1.5/2.0ml, ID	•	•	•	•	•	•	•
39	30314839	Rotor, Angle, 12x1.5/2.0ml, ID		•	•				
40	30314840	Rotor, Angle, 64x0.5ml, ID		•	•				
41	30314841	Rotor, Angle, 4x8-w PCR Strip, ID		•	•			•	•
85	30553085	Rotor SwingOut 4x750ml D99mm ID SL						•	•
86	30553086	Rotor Angle 4x500ml D69mm ID						•	•

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1. INTRODUCTION

1.1 Description and Intended Purpose

Thank you for choosing this OHAUS product.

All symbols indicate safety instructions and points to potential dangerous situations. Please read the manual completely before using the Frontier™ MultiPro Centrifuges to avoid incorrect operation.

Frontier™ MultiPro Centrifuges were designed for the separation of materials or mixtures with different densities. OHAUS centrifuges are intended exclusively for indoor use and for use by qualified personnel.

1.2 Brief description

The models FC5714/FC5718/FC5816/FC5916 are non-refrigerated universal centrifuges.

The models FC5718R/FC5816R/FC5916R are refrigerated universal centrifuges.

All models are offered in two voltage variations, 230V or 120V.

The centrifuges can be used with swing-out and angle rotors.

All parameters are accessible via buttons and selected with the central adjuster. All pre-selected and current values will be shown permanently on the LCD-display.

The centrifuge is powered by a maintenance-free induction motor.

Detailed technical data are in the "Technical data" section.

1.3 Definition of Signal Warnings and Symbols

Safety notes are marked with signal words and warning symbols. These show safety issues and warnings. Ignoring the safety notes may lead to personal injury, damage to the instrument, malfunctions and false results.

The degree of danger is a part of a safety note and distinguishes the possible results of non-observance from each other.

Signal Words

DANGER	Will lead to severe injuries or death if not avoided.
WARNING	For a hazardous situation with medium risk, possibly resulting in injuries or death if not avoided.
CAUTION	For a hazardous situation with low risk, resulting in damage to the device or the property or in loss of data, or injuries if not avoided.
ATTENTION	For important information about the product. May lead to equipment damage if not avoided
NOTE	For useful information about the product

Warning Symbols



General Hazard



Electrical Shock Hazard



Alternating Current



Biohazard



Explosion



Crushing

Warning and information signs on the surface of centrifuge

Warning
Four carrier must be used at all times on four place swing out rotors or damage will occur to the centrifuge. Such damage will not be covered under the product warranty.

Four carriers must be used at all times on four place swing out rotors or damage will occur to the centrifuge. Such damage will not be covered under the product warranty.

Attention!!
Check the fastening of the rotor nut before each run.
Achtung!!
Vor jedem Lauf Befestigungsschraube auf festen Sitz prüfen.

Attention! Check the fastening of the rotor nut before each run.

Vor manueller Entriegelung oder öffnen des Gehäuses Netzstecker Ziehen!

TAKE OFF MAINS PLUG before opening the housing or the emergency release!

Take off mains plug before opening the housing or the emergency release.

RETIREZ LE CORDON avant toute intervention a l'intérieur de l'appareil



Direction of rotation – clockwise rotation for the rotor drive



Reference for loading rotors

1.4 Safety Precautions

1.4.1 User

OHAUS centrifuges are intended exclusively for indoor use and for use by qualified personnel. This device may only be operated by trained specialist staff. They must have carefully read the operating manual and be familiar with the functions of the device.

1.4.2 Rotor and accessories

Only OHAUS original rotors and accessories shall be used. Any other use or intended use is considered improper. OHAUS is not liable for damage resulting from improper use.



CAUTION:

Read all safety warnings before installing, making connections, or servicing this equipment. Failure to comply with these warnings could result in personal injury and/or property damage. Retain instructions for future reference.

1.4.3 Measures for your protection



WARNING: Never work in an environment subject to explosion hazards! The housing of the instrument is not gas tight. (Explosion hazard due to spark formation, corrosion caused by the ingress of gases)



WARNING: When using chemicals and solvents, comply with the instructions of the producer and the general lab safety rules.



WARNING: The centrifuge is not sealed. Use suitable protection measures when using the centrifuge for infectious and pathogenic samples. Follow appropriate safety precautions when handling these samples.

1.4.4 Exclude the following environmental influences

- Powerful vibrations
- Direct sunlight
- Atmospheric humidity greater than 80%
- Corrosive gases present
- Temperatures below 2 °C and above 35 °C
- Powerful electric or magnetic fields:

**WARNING:**

Electrical shock hazards exist within the housing. The housing should only be opened by authorized and qualified personnel. Remove all power connections to the unit before opening.

1.4.5 Measures for operational safety

- Do not unscrew the two halves of the housing
- Dry off any liquid spills immediately! The instrument is not watertight
- Verify that the equipment's input voltage range and plug type are compatible with the local power supply.
- Only connect the power cord to a properly grounded power receptacle.
- Only use a power cord with a rating that exceeds the specifications on the equipment label.
- Do not position the equipment such that it is difficult to disconnect the power cord from the power receptacle.
- Make sure that the power cord does not pose a potential obstacle or tripping hazard.
- The equipment is for indoor use only. Use the equipment only in dry locations.
- Use only approved accessories.
- Operate the equipment only under ambient conditions specified in these instructions.
- Disconnect the equipment from the power supply when cleaning.
- Do not operate the equipment in hazardous or unstable environments.
- Service should only be performed by authorized personnel.

1.4.6 Danger and precautions

To protect people and environment the following precautions should be observed:

- During centrifugation, the presences of people and the setting up of hazardous materials are prohibited within 30 cm around the centrifuge according to the regulations of EN 61010-2-020.
- FC5714/FC5718/FC5718R/FC5816/FC5816R/FC5916/FC5916R are not explosion-proof and must therefore not be operated in explosion-endangered areas or locations. Centrifugation of flammable, explosive, radioactive, or such substances, which chemically react with high energy, is strictly prohibited. The final decision on the risks associated with the use of such substances is the responsibility of the user of the centrifuge.
- Never spin toxic or pathogenic material without adequate safety precautions, i.e. centrifugation of buckets / tubes with missing or defective hermetic sealing is strictly prohibited. The user is obliged to perform appropriate disinfection procedures in case dangerous substances have contaminated the centrifuge and or its accessories. When centrifuging infectious substances, always pay attention to the general laboratory precautions. If necessary, contact your safety officer!
- It is prohibited to run the centrifuge with rotors other than listed for this unit.
- Under no circumstances open the lid of the centrifuge while the rotor is still running or rotating with a speed of > 2m/s

1.4.7 Abbreviations used in this manual

Symbol/Abbreviations	Unit	Description
RPM	[min ⁻¹] rpm	revolutions per minute
RCF	[x g]	relative centrifugal force
PCR		Polymerase chain reaction
PP	-	Polypropylene
PC	-	Polycarbonate
accel	-	acceleration
decel	-	deceleration
prog	-	program

2. INSTALLATION

2.1 Unpacking

Carefully remove your centrifuge and each of its components from the package. The included components vary depending on the centrifuge model (see table below). Save the packaging to ensure safe storage and transport. The instruction manual must always be kept with the centrifuge!

Rotor(s) / Accessories will be packed separately.



WARNING: Lifting Hazard. Single person lift could cause injury. Use a mechanical lifting device or team lifting procedures when lifting or moving the equipment.

Please refer to section 8.3 for details about lifting the equipment out of the packaging.

2.1.1 Delivery package

Quantity	Description
1	Centrifuge FC5714/FC5718/FC5718R/FC5816/FC5816R/FC5916/FC5916R
1	Power Cable
1	Warranty Card
1	Instruction Manual/Quick Guide
1	Rotor Key

2.2 Selecting the Location



NOTE!

Avoid excessive vibrations, heat sources, air current, or rapid temperature changes.

- The centrifuge should be installed on an even, solid and level surface, if possible on a laboratory cabinet / table or some other solid vibration free surface.
- During centrifugation, the centrifuge must be placed in a way, that there is a minimum space of 30 cm on each side of the unit according to the standards EN 61010-2-020.
- Do not place the centrifuge next to a window or a heater, where it could be exposed to excessive heat, as the performance of the unit is based on an ambient temperature of 23°C.

2.3 Installation

Follow these steps:

- Check whether the power supply corresponds with the one specified on the manufacturer's rating label, which is located on the rear panel.
- For FC5714/FC5718/FC5816, the power line should be protected by a 10 A rating circuit breaker (type K).
- For FC5718R/FC5816R /FC5916/FC5916R, the power line should be protected by a 16 A rating circuit breaker (type K).
- In case of emergency, there must be an emergency switch off installed outside the room in order to disconnect the power supply from the unit.
- Connect the centrifuge to a grounded power receptacle.
- Connect the centrifuge with the mains. (The socket for the power cord must be easy to reach for disconnection)
- Turn the instrument on using the mains power switch.
- Open the lid by using the Door Open button.
- Remove the transport securing device of the motor.

2.4 Safety precautions during operation and warranty

- Do not operate the centrifuge in case it is not installed correctly.
- Do not lean on the centrifuge during operation.
- Do not stay within the 30 cm clearance envelope longer than necessary for operational reasons.
- Do not place any potentially hazardous materials within the 30 cm clearance envelope.
- Do not operate the centrifuge when disassembled (e.g. without housing).
- Do not run the centrifuge when mechanical or electrical components have been tampered with.
- Do not use accessories such as rotors and buckets, which are not exclusively approved by OHAUS Corporation, except commercially available centrifuge tubes made of glass or plastic.
- Do not spin extremely corrosive substances, as they may damage or weaken the materials.
- Do not operate the centrifuge with rotors or buckets, which show any signs of corrosion or mechanical damage.
- The manufacturer is responsible for safety and reliability of the centrifuge, only if:
 - 1) The unit is operated in accordance with this instruction manual.
 - 2) Modifications, repairs or other adjustments are performed by OHAUS authorized personnel and the electrical installation complies with the relevant electrical code.



NOTE! Warranty

The centrifuge has been subjected to thorough testing and quality controls. In the unlikely case of any manufacturing faults occurring, the centrifuge and rotors are covered by warranty. This warranty becomes invalid in case of mishandling, damage and negligence and further in case of usage of inappropriate spare parts and / or accessories or unauthorized modification of the unit.

Technical modification rights are reserved by the manufacturer in respect to technical improvement!

3. OPERATION

3.1 Mounting and loading rotor

3.1.1 Installation of rotors

Clean the drive shaft as well as the collet with a clean, grease-free piece of cloth. Place the rotor onto the drive shaft. (See figure below). Take care that the rotor is fully installed onto the motor shaft.



Motor shaft and chamber
Figure.8



Nut for Rotor



Tool for rotor
with nut



Tool for rotor
without nut



Snap-on lid



Screw-on lid

Figure. 9

Figure.10

Hold the rotor with one hand and secure the rotor to the shaft by turning the fixing nut clockwise. Tighten the fixing nut with enclosed rotor key (See figures 9-10)

We will provide a tool for none-nut rotor with centrifuge, the tool for nut-rotor will be provided with rotor.



ATTENTION!

Check that the fixing screw is properly installed before each run. (See figure 9-10)

Do not operate the centrifuge with rotors or buckets which show any signs of corrosion or mechanical damage.

Do not operate with extremely corrosive substances, which could damage the rotor, buckets and materials.

In case of any questions, please contact the manufacturer!

3.1.2 Loading angle rotors

Rotors must be loaded symmetrically and with equal weight (See figure below). The adapter may only be loaded with the appropriate vessels. The weight differences between the filled vessels should be kept as low as possible. Therefore we recommend weighing them with a balance. This reduces the wear of the drive and the acoustic operating noise.

The maximum load per hole is stated on each rotor.



Figure.11 WRONG



Figure.12 CORRECT (6 tubes)

3.1.3 Loading swing out rotors

Loading of the buckets / vessels must be made in accordance to the figure below.

It is allowed to operate e.g. a 4-place-rotor with 2 loaded buckets only. But the loaded buckets must be opposite to each other. Make sure that the unloaded buckets also be put inside the rotor (see below).

In principle swing out rotors may not be taken into operation until all buckets or racks are put into the rotor.

The bolts at the rotor must be greased with the "High TEF oil". The sample tubes have to be filled evenly by eye and put into the drillings or tube racks. The weight difference of the loaded buckets should not exceed approx. 1.0 g.



ATTENTION!

Swing out rotors may be taken in operation only if all locations are filled in with either four buckets or four carriers – do not mix buckets and carriers together!!



ATTENTION!

Do not operate the centrifuge with rotors or buckets which show any signs of corrosion or mechanical damage.

Do not operate with extremely corrosive substances, which could damage the rotor and buckets. In case of any questions, please contact the manufacturer!

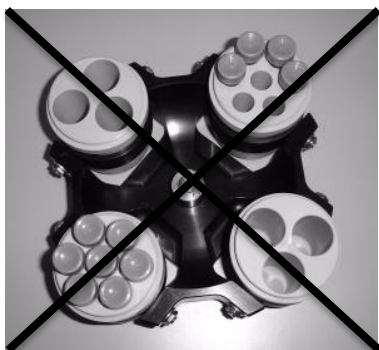


Figure.13 WRONG



Figure.14 CORRECT

3.1.4 Loading and overloading of rotors

All approved rotors are listed with their maximum speed and maximum filling weight in "**table 2 permissible net weight**" (See APPENDIX).

The maximum load permitted for a rotor, which is determined by the manufacturer, as well as the maximum speed allowed for this rotor (See label on rotor), must not be exceeded. The liquids the rotors are loaded with should have a maximum homogeneous density of 1.2 g/ml or less when the rotor is running at maximum speed.

In order to spin liquids with a higher density, the speed has to be reduced according to the following formula:

$$\text{Reduced speed } n_{\text{red}} = \sqrt{\frac{1,2}{\text{higher density}}} \times \text{max. speed } (n_{\text{max}}) \text{ of the rotor}$$

Example:

$$n_{\text{red}} = \sqrt{\frac{1,2}{1,7}} \times 4.000 = 3.360 \text{ rpm}$$

If in case of any questions, please contact the manufacturer!

To determine the relative centrifugal force(RCF/G-force) for a specific adapter, you can calculate per DIN 58 970 using the attached formula:

$$\text{RCF} = 1.117862 \cdot 10^{-5} \cdot n^2 \cdot r_{\text{max}}$$

n: revolutions per minute (RPM)

r_{max}: max centrifuging radius in cm by using the bottom of tubes

3.1.5 Removing the rotor

Untighten the rotor fixing nut completely (screw over the stiff point) and lift the rotor vertically out of the centrifuge. (See figure 9 and 10).

3.2 Lid control

3.2.1 Lid open

After the run, when the lid of the centrifuge is closed, the word "**close**" (M1) appears in the display "**RPM | RCF**" (A-1). Additionally, if there is a rotor in the centrifuge, the word "**rotor**"(M3) appears as well as the code number of the respective rotor, which is in the centrifuge system "**71**" (M4). If there is no rotor in the centrifuge, the word "**rotor**" (M3) flashes and additionally the word "**no**"(M4) appears. By pressing the key "**Door Open**" (7) you can release the lid of the centrifuge. As soon as the electromagnetic lid is completely released, the word "**open**" (M2) appears. Now you can open the lid of the centrifuge. Please refer to figure 15 below for reference.

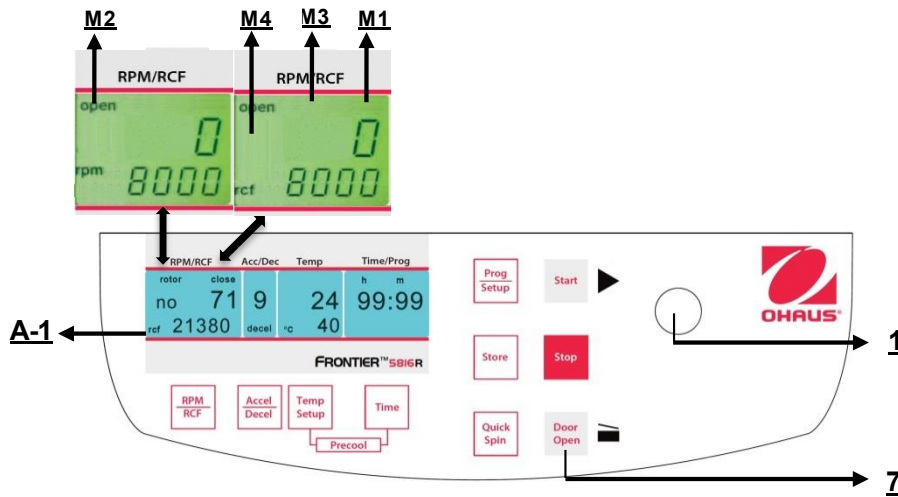


Figure. 15

During the run you can call up the rotor type at any time by pressing the key **"Door Open"** (7).

3.2.2 Lid lock

The lid should only be put down slightly. An electromagnetic lid lock closes the lid, at the same time the word **"open"** (M2) disappears (refer to figure 15).

As a sign that the centrifuge is ready for starting, in the display **"RPM | RCF"** (A-1) the word **"close"** (M1) appears. Simultaneously the word **"rotor"** (M3) is displayed, as well as the code number of the rotor, which is in the centrifuge system, **"no 71"** (M4). With that, all rotor specific data, like e. g. max. speed, acceleration etc., are adopted.



ATTENTION:

Don't grip your fingers between lid and device or locking mechanism when closing the lid!

3.3 Preselection

3.3.1 Preselection of speed / RCF-value

This pre-selection is activated through the key **"RPM | RCF"** (4) (refer to figure 16 below). By pressing the key once the word **"rpm"** (M5) flashes. By pressing the key twice the pre-selection of the centrifugal forces can be selected. Then the flashing word **"rcf"** (M6) appears. You can set the desired values with the adjusting knob (1). In the display (A-1) the regulated value is shown permanently, before, during and after the run.

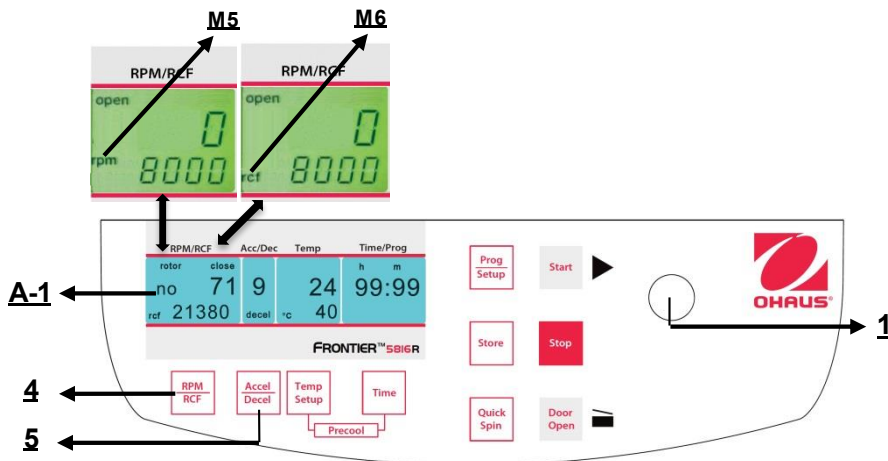


Figure. 16

As long as no rotor is inserted, the speed is adjustable between 200 rpm and maximum revolution of the centrifuge. If there is a rotor in the centrifuge the speed can only be pre-selected until the maximum permissible revolution of that rotor. It is the same with the pre-selection of the RCF-value. The setting range is between the centrifugal force at 200 rpm and the maximum permissible centrifugal force of the rotor.

See **"Table 3: max. speed and RCF-values for permissible rotor"** (See APPENDIX). All important values are listed there.



ATTENTION:

Please also check the maximum permissible revolutions of your test tubes with the manufacturer.

3.3.2 Preselection of running time

The running time can be pre-selected in three different ranges from 10 seconds up to 99 hours 59 minutes.

1. Range from 10 seconds up to 59 minutes 50 seconds in steps of 10 seconds
2. Range from 1 hour up to 99 hours 59 minutes in steps of 1 minute.
3. The continuous run "cont", which can be interrupted by the key "Stop" (10) (refer to figure 17).

The running time can be pre-selected with the lid open or closed.

To activate the setting of the running time press the key "Time" (6).

In the display "Time/Prog" (A-3) flashes the indication "m : s" or "h : m", depending on the previous setting.

To set the desired value, use the adjusting knob (1). After exceeding 59 min 50 sec the indication changes automatically into "h : m". After exceeding 99 hours 59 min the word "cont" appears in the display "Time/Prog" (A-3). That continuous run can only be interrupted by pressing the key "Stop" (10). The time countdown starts as soon as the set speed is reached.

The display always shows the remaining running time. (See figure 17)

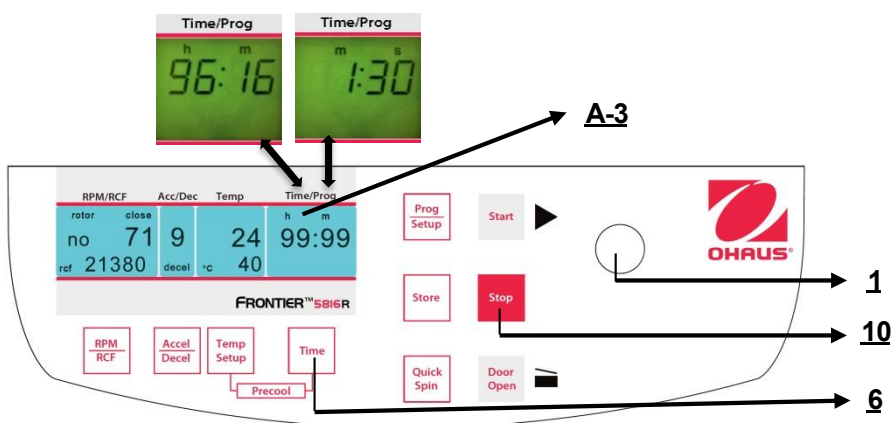


Figure. 17

3.3.3 Preselection of brake intensity and acceleration

This function is activated through the key "Accel/Decel" (5) (refer to figure18).

By pressing the key once the word "accel" (M7) flashes in the display "Acc/Dec" (A-2). The desired acceleration can be pre-selected by the adjusting knob (1). The value 0 is equivalent to the lowest and the value 9 to the highest acceleration.

By pressing the key "Accel/Decel" (5) twice, the display "Acc/Dec" (A-2) indicates the word "decel" (M8). Now the desired brake intensity can be pre-selected by the adjusting knob (1). The value 9 is equivalent to the shortest and the value 0 to longest possible brake time.

See "**table 5: acceleration and deceleration times**" (APPENDIX). There the acceleration and deceleration times for the acceleration and deceleration stages 0 to 9 for permissible rotors are shown.

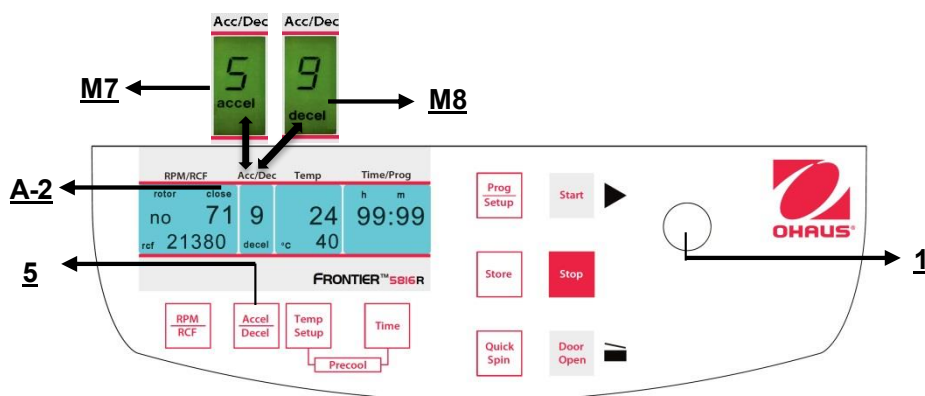


Figure. 18

3.3.4 Pre-selection of temperature (Only Refrigerated Models)

This function is activated by the key "**Temp/Setup**" (13). After pressing this key in the display "**Time/Prog**" the indication "**°C**" (A-4) flashes. By the adjusting knob (1) the desired test temperature can be pre-selected in steps of 1°C in a range from -20°C up to +40°C.

The value is indicated permanently in the display (figure 19) - before, during and after the run. Please notice the respective lowest temperatures of the rotors at maximum speed!

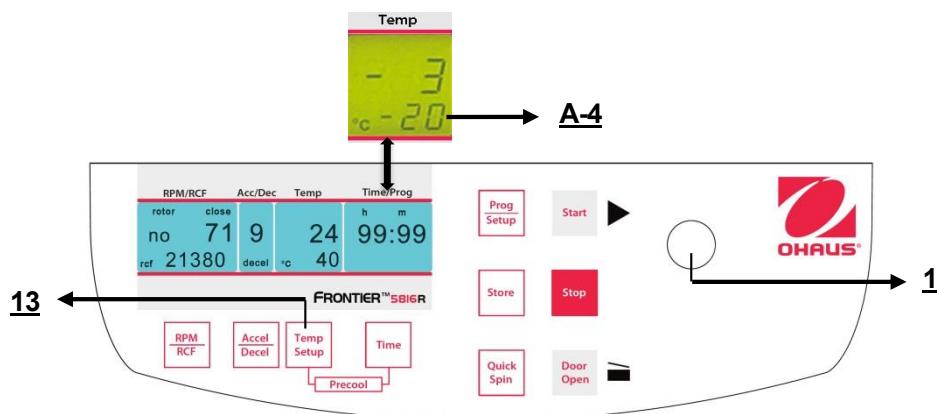


Figure. 19

3.3.5 Pre-cooling (Only Refrigerated Models)

If the samples are temperature-sensitive it is useful to pre-cool the centrifuge, the rotor and eventually the buckets to the required working temperature. Therefore, insert the desired rotor and pre-set the respective temperature. By simultaneous pressing the keys "**Temp/Setup**" (13) (refer to figure 20) and "**Time**" (6) you start the run. While running, the unit chooses automatically a rotational speed that is equivalent to 20 % of the permitted rotational speed of the respective rotor. After the pre-set temperature is reached you can leave the pre-cooling run with the "**Stop**" key (10).

Depending on the inserted rotor the pre-cooling goes between approx. 10 and 20 min.

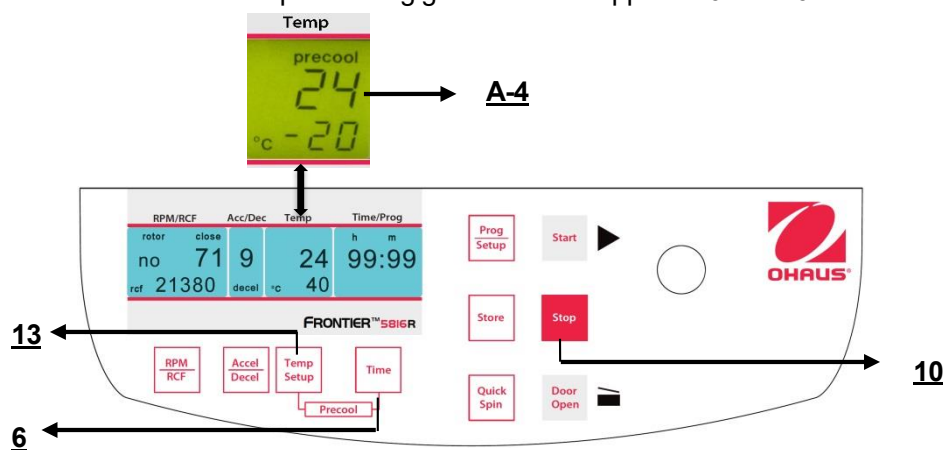


Figure. 20

3.4 Radius correction

If you use adapters or reducers it could change the centrifugal radius of the respective rotor. In that case you can correct the radius manually. Please proceed as follows:

Close the lid, then press the key "**Time**" (6) (refer to figure 21) and the key "**Prog/Setup**" (11) at the same time and hold them.

In the display "**Time/Prog**" (A-3) the word "**radius**" (M9) appears. By the adjusting knob (1) you can preselect the respective radius correction (See Table 7, APPENDIX) in steps of 0.1 cm. As soon as you have set a radius correction the word "**radius**" (M9) appears. This word will be visible until you put the radius correction back to 0 again.

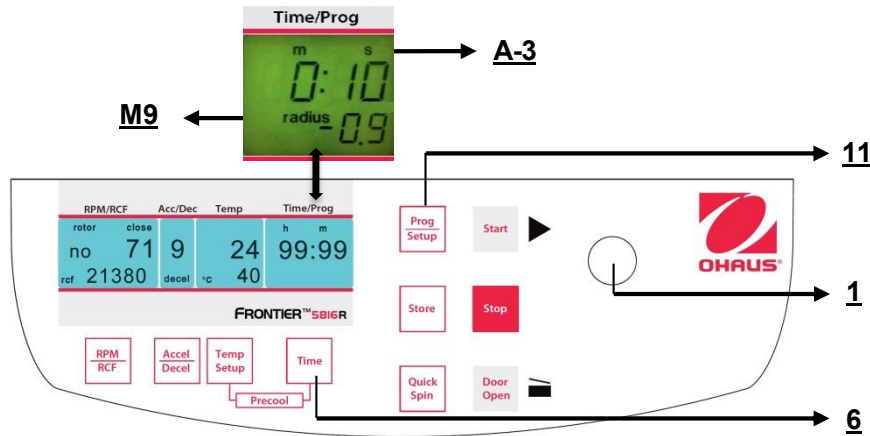


Figure. 21

3.5 Program

3.5.1 Storage of programs

You can store up to 99 runs with all relevant parameters, including the used rotors. You can use any free program number and call it up again.

Put the needed rotor into the centrifuge. By pressing the key **"Prog/Setup"** (11) in the display **"Time/Prog"** (A-3) the word **"programm"** appears. With the adjusting knob (1) you can chose the desired program number.

If a program number is already occupied, in the display **"RPM | RCF"** (A-1), the words **"rotor"** (M3) and **"xx"** (M4) will appear. In case of free program numbers, 0 appears.

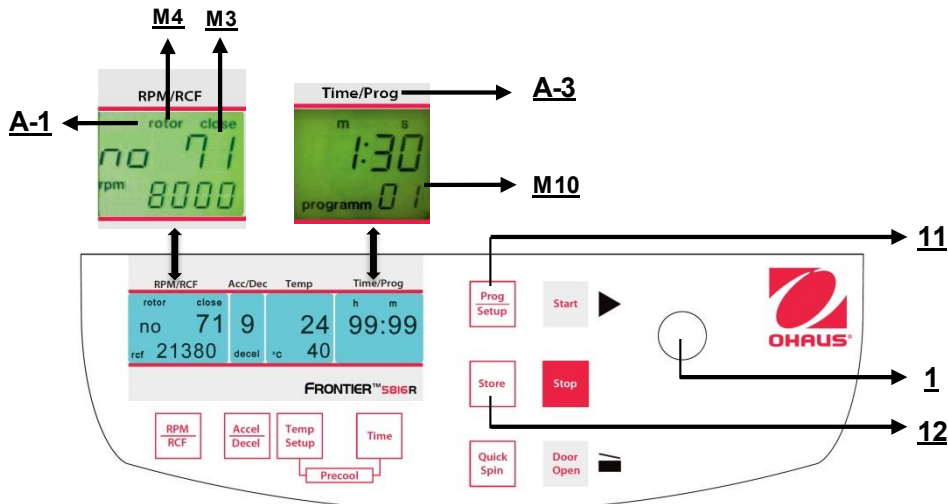


Figure. 22

Close the lid of the centrifuge. Now proceed as described previously to set all important run parameters. If the lid isn't closed when storing the program, in the display **"RPM/RCF"** (A-1), the words **"FirSt"** and **"CLOSE Lid"** (See figure 23) flashes alternately. If you want to start the run without storing the program, in the display **"RPM/RCF"** (A-1), the words **"First"** and **"PrESS StoreE"** (See figure 24) flashes alternately.

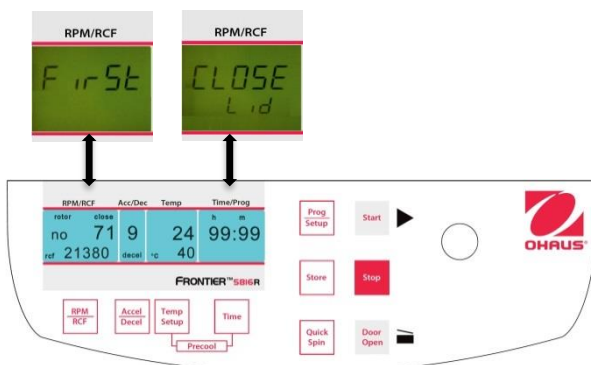


Figure. 23

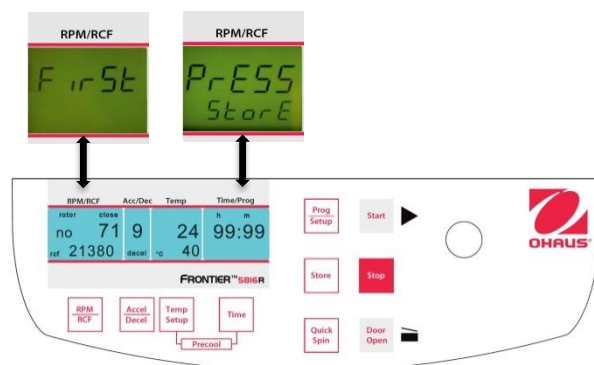


Figure. 24

For adaption of data press the key **"Store"** (12) (refer to figures 23 and 24) for approx. 1 second. If the program is stored correctly, the word **"StorE"** appears in the display **"RPM/RCF"** (A-1). As a result, the word **"programm"** (M10) disappears.

As soon as the key **"Store"** (12) is released, the word "programm xx" (M10) reappears – the (xx) stands for the chosen program location.

If all program numbers are occupied you can take an old number that is not necessary anymore and just put in the new parameters.

3.5.2 Recall of stored programs

To recall stored programs press the key **"Prog/Setup"** (11) (refer to figure 25) while the lid is already closed. Inside the display **"Time/Prog"** (A-3), **"programm --"**(M10) appears. The desired program number can be pre-selected with the adjusting knob (1).

In the respective displays the stored values for that program will appear.

If the wrong rotor is inside the centrifuge for the pre-selected program, in the display **"RPM | RCF"** (A-1), the word **"rotor"** (M3) flashes. At the same time the word **"FALSE"** and the stored rotor number **"xx"** (M4) will flashing by turns.

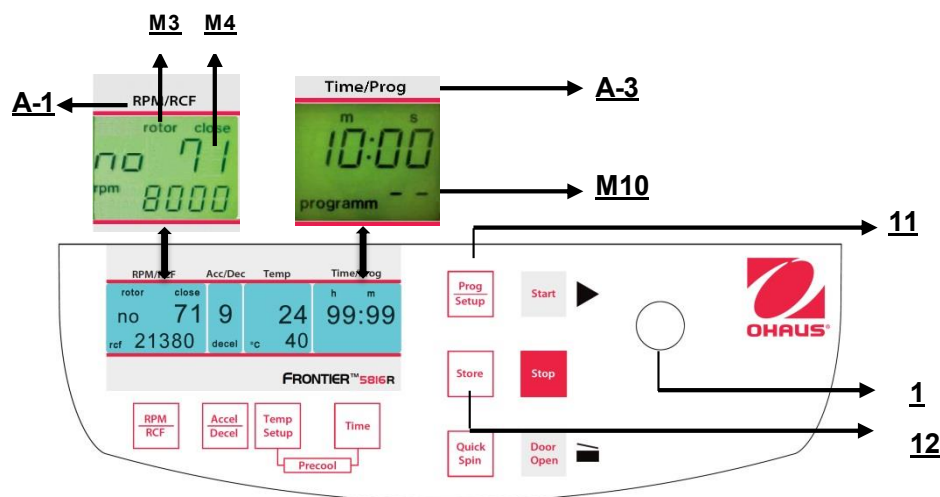


Figure. 25

3.5.3 Leaving program mode

To leave the program mode just press the key **"Prog/Setup"** (11) (refer to figure 25). Then inside the display **"Time/Prog"** the word **"programm"** appears.

Set the display to **"programm--"** (M10) with the adjusting knob (1).

3.6 Starting and stopping the centrifuge

3.6.1 Starting the centrifuge

You can start the centrifuge either with the **"Start"** key (9) (refer to figure 26) or the **"Quick Spin"** key (8).

By the **"Start"** key (9) you can start stored runs or runs with manually pre-selected parameters.

When the respective pre-selected running time has ended the centrifuge will stop automatically.

By the **"Quick Spin"** key (8) you can start runs, which will last just a few seconds.

By pressing the **"Quick Spin"** key (8) the centrifuge accelerates up to the pre-selected revolution.

In the display **"Time/Prog"** (A-3) the passed running time is indicated from the date of pressing the **"Quick Spin"** key (8).

By releasing the **"Quick Spin"** key (8) the centrifuge stops and the running time is indicated until the opening of the lid.

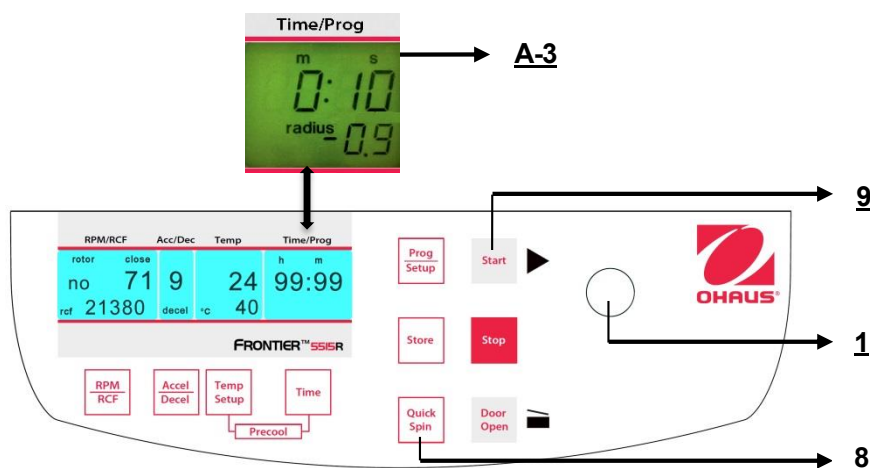


Figure. 26

3.6.2 The "STOP" key

By the **"Stop"** key (10) (See figure 27) you can interrupt the run at any time. After pressing the key the centrifuge decelerates with the respective pre-selected intensity down to stand still.

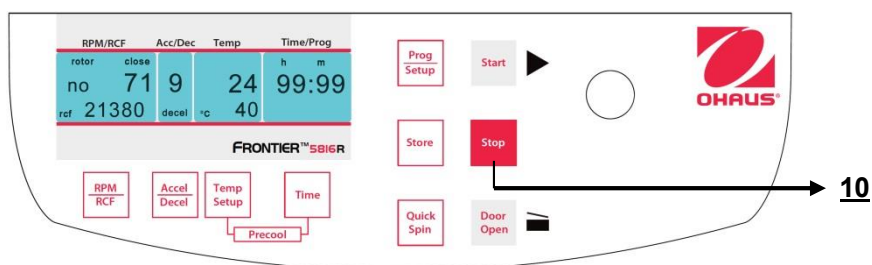


Figure. 27

3.7 Imbalance detection

In case of the rotor not being equally loaded, the drive will turn off during acceleration. The rotor decelerates to stand still.

When in the display **"Time/Prog"** (A-3) the word **"error"** (M11) together with the number **"01"** appear, the weight difference of the samples is too large. Distribute the weight evenly.

Load the rotor as described in chapter 3.1.2 and 3.1.3.

When inside the display **"Time/Prog"** (A-3) the word **"error"** together with the number **"02"** (See figure 28) appear, it could be due to the following reason: The imbalance switch is defective.

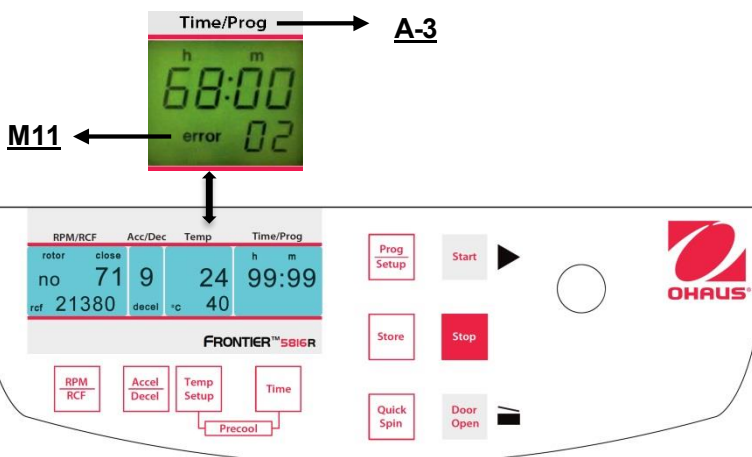


Figure. 28

4. SETTING

4.1 Basic adjustments

4.1.1 Access to mode "Operating Data"

When using the centrifuge, the following parameters can be set:

- Temperature indication °C or °F
- Acoustic signal turn on/off
- Keyboard sound turn on/off
- Volume pre-selection of sound signal
- Song selection of sound signal **"end of run"**

While the centrifuge is turned off, press simultaneously the keys **"Time"**(6) and **"Door Open"** (7) and turn on the main switch of the centrifuge. Now release both keys and as a result a display test is executed for approx. 5 seconds. All indicators will appear at the same time (See figure 29).

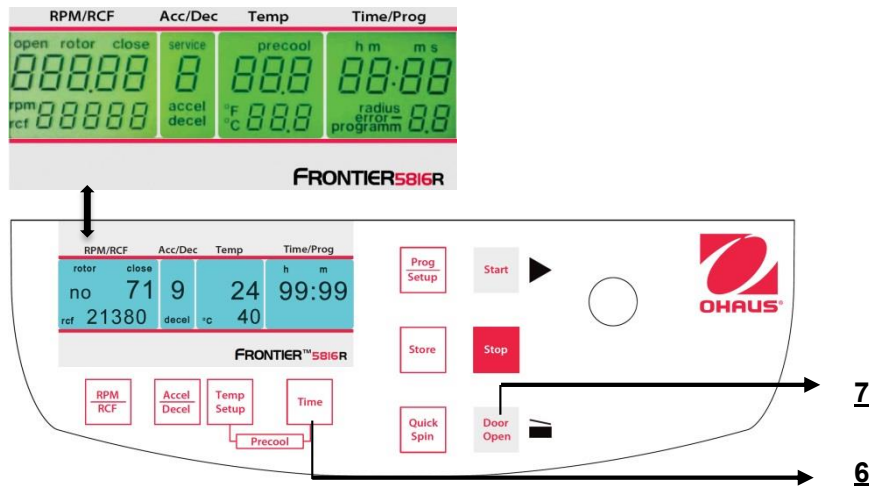


Figure. 29



ATTENTION:

Please notice that you must enter the program as described under point 4.1.1 to change the adjustments of the points **4-12** → **A-1** after you have stored the settings you can change to normal program mode again by switching on the centrifuge for a short while.

All changed settings must be confirmed by the key **"Start"**(9). The word **"Store"**(12) appears in the display **"RPM | RCF"**(A-1) - Only then the pre-selections are valid!

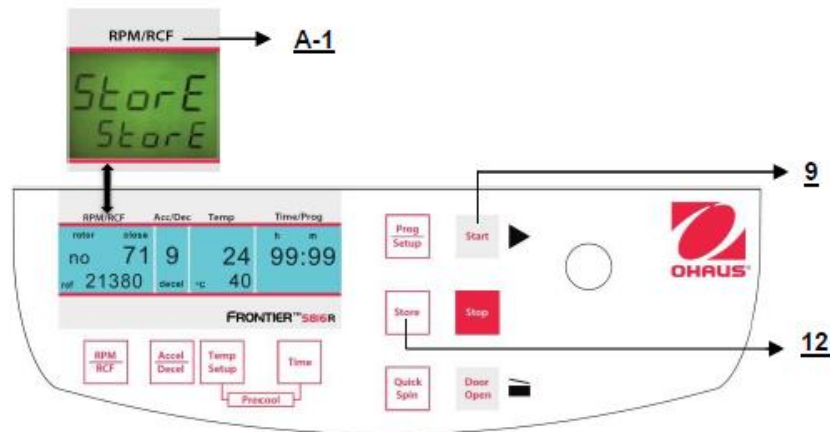


Figure. 30

4.1.2 Temperature indication

Proceed as described under point 4.1.1 to enter this program mode and then press the key **"Accel/Decel"** (5). In the display **"Acc/Dec"** (A-2) the word **"Service"** appears. Now select the letter **"C"** with the adjusting knob (1). As a result, in the display **"RPM | RCF"** (A-1), the words **"CELSI/temp"** appear. If you press the key **"RPM | RCF"** (4),

the word **"CELSI"** flashes and you can change the display into Fahrenheit **"FAREN"**, with the adjusting knob (1) (See figure 31). After you have stored the settings (See 4.1.1) you change back to the normal program mode again by switching off the centrifuge for a short while.

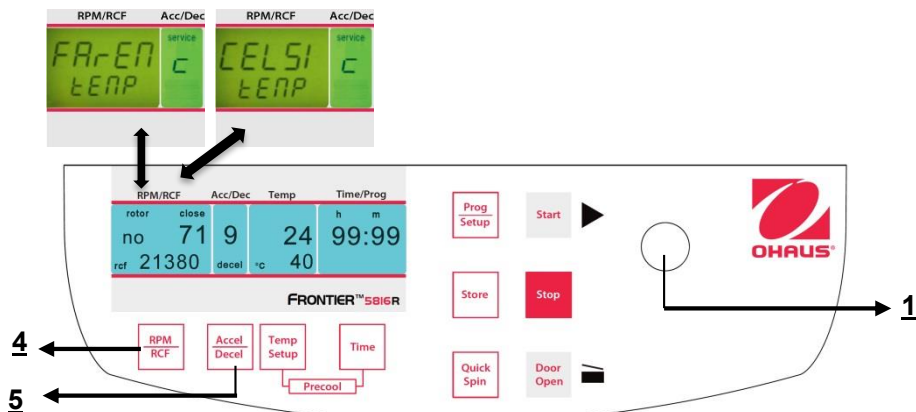


Figure. 31

4.1.3 Signal turn on / off

Proceed as described under point 4.1.1 to enter this program mode and then press the key **"Accel/Decel"** (5). In the display **"Acc/Dec"** (A-2) the word **"Service"** flashes. Now select the letter **"L"** with the adjusting knob (1). As a result, the words **"On Sound"** appears in the display **"RPM | RCF"** (4). If you press the key **"RPM | RCF"** (4) now, the word **"On"** flashes and you can switch off the sound with the adjusting knob (1) (See figure 32). After you have stored the settings (See 4.1.1) you change back to the normal program mode again by switching off the centrifuge for a short while.

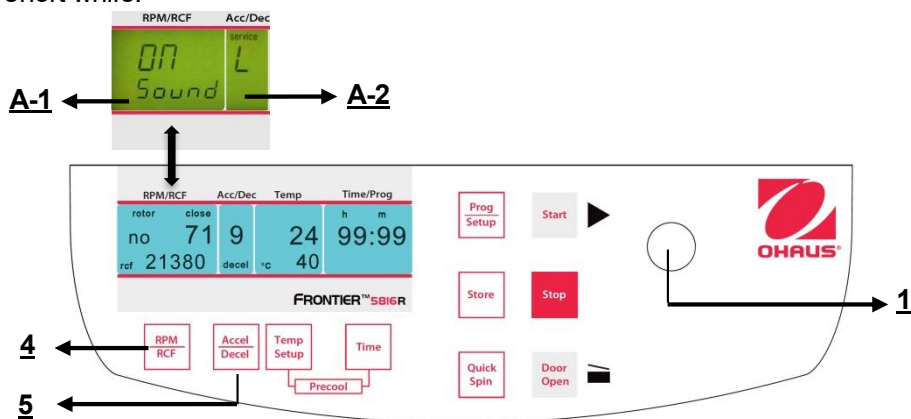


Figure. 32

4.1.4 Volume pre-selection of sound signal

Proceed as described under point 4.1.1 to enter this program mode and then press the key **"Accel/Decel"** (5). In the display **"Acc/Dec"** (A-2) the word **"Service"** flashes. Now select the letter **"U"** with the adjusting knob (1). As a result, in the display **"RPM | RCF"** (A-1) the words **"Vol=0- 9/Sound"** appear. After pressing the key **"RPM | RCF"** (4), you can adjust the desired volume between 0 (low) and 9 (loud) with the adjusting knob (1) (See figure 33). After you have stored the settings (see 4.1.1) you can change back to the normal program mode again by switching off the centrifuge for a short period.

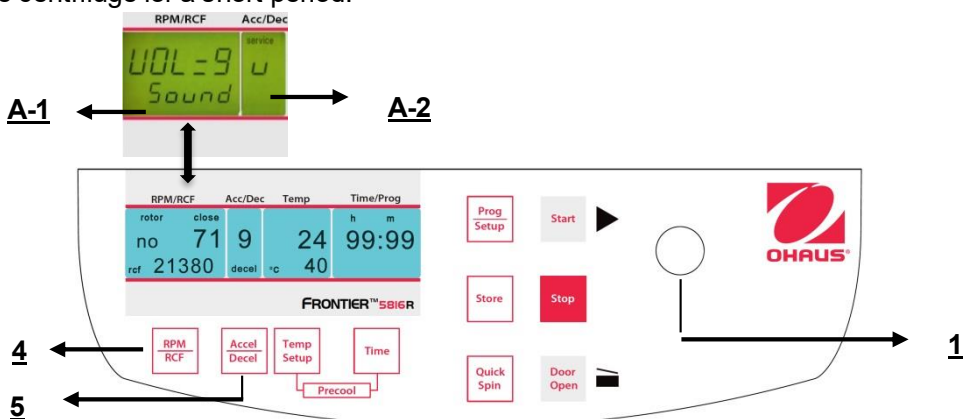


Figure. 33

4.1.5 Song selection for sound signal - end of run

Proceed as described under point 4.1.1 to enter this program mode and then press the key **"Accel/Decel"** (5). In the display **"Acc/Dec"** (A-2) the word **"Service"** flashes. Now select the letter **"G"** with the adjusting knob (1). As a result, in the display **"RPM | RCF"** (A-1), the word **"SonGo/Sound"** appears. After pressing the key **"RPM | RCF"** (4), you can select a song with the adjusting knob (1). (See figure 34). After you have stored the settings (see 4.1.1) you can change back to the normal program mode again by switch off the centrifuge for a short while.

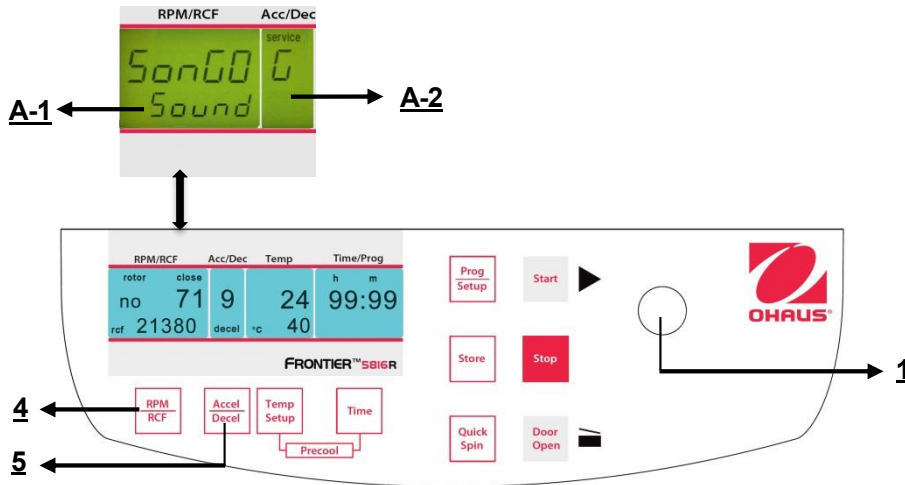


Figure. 34

4.1.6 Keyboard sound turn on / off

Proceed as described under point 4.1.1 to enter this program mode and then press the key **"Accel/Decel"** (5). In the display **"Acc/Dec"** (A-2) the word **"Service"** flashes. Now select the letter **"B"** with the adjusting knob (1). As a result, in the display **"RPM | RCF"** (A-1), the word **"ON/BEEP "** appears. After pressing the key **"RPM | RCF"** (4), you can turn the keyboard sound (On) or (Off) with the adjusting knob (1). (See figure 39). After you have stored the settings (see 4.1.1) you can change back to the normal program mode again by switch off the centrifuge for a short while.

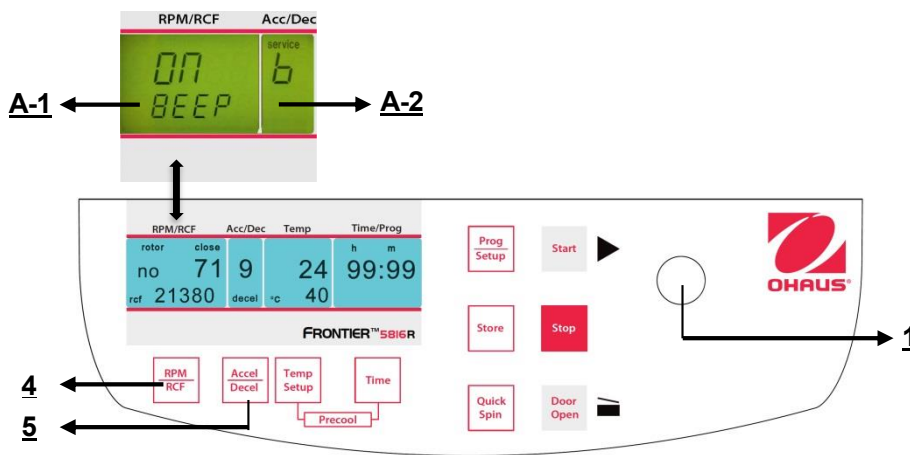


Figure. 35

4.1.7 Call up operating data



ATTENTION:
This should only be performed by advanced user or service engineer.

In the mode **"Basic Adjustments"** you can call up the operating data of the centrifuge. Please proceed as described under point 4.1.2 to enter this program mode. Press the key **"Accel/Decel"** (5). In the display **"Acc/Dec"** (A-2) the word **"Service"** flashes. With the adjusting knob (1) the different information can be accessed:
A= previous starts of the centrifuge

H= previous operating hours

S= software version

r= converter software

E= list of previous error messages

h= running time of the motor

The list of the last 99 error messages can be looked over by pressing the key "**RPM | RCF**" (4) and scroll through it by the adjusting knob (1). The respective error codes appear in the display "**RPM | RCF**" (A-1). Please refer to "**Table 6: error messages**" (see APPENDIX).

To change back to normal program mode again, switch off the centrifuge for a short period.

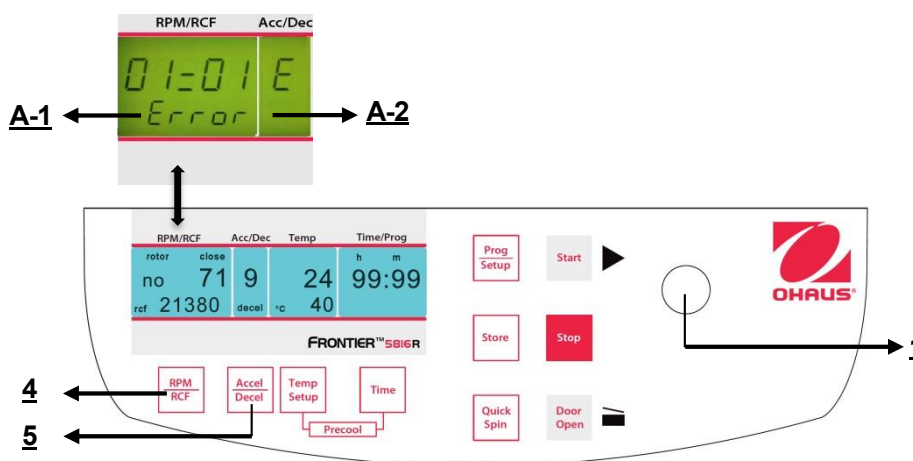


Figure. 36

5. MAINTENANCE

5.1 Maintenance and cleaning

5.1.1 General

Care:

Maintenance of the centrifuge is confined to keeping the rotor, the rotor chamber and the rotor accessories clean as well as to regularly lubricating the rotor insert bolts of a swing out rotor (if available).

The most suitable lubricant is the High TEF oil.

Lubricants containing molycote and graphite are not allowed.

Please pay special attention to anodized aluminum parts. Breakage of rotors can be caused even by slight damage.

In case of rotors, buckets or tube racks getting in touch with corrosive substances the concerned spots have to be cleaned carefully.

Corrosive substances are for instance: alkalis, alkaline soap solutions, alkaline amines, concentrated acids, solutions containing heavy metals, water-free chlorinated solvents and saline solutions. e.g. salt water, phenol, halogenated hydrocarbons.



Cleaning – units, rotors, accessories:

- Turn the device off and disconnect it from the power supply before you begin any cleaning or disinfecting. Do not pour liquids into the housing interior.
- Do not spray disinfectant on the device.
- Thorough cleaning not only has its purpose in hygiene but also in avoiding corrosion due to pollution.
- In order to avoid damaging anodized parts such as rotors, reduction plates etc., only pH-neutral Detergents with a pH-value of 6-8 may be used for cleaning. Alkaline cleaning agents (pH-value > 8) must not be used.

- After cleaning, please ensure all parts are dried thoroughly, either by hand or in a hot-air cabinet (max. Temperature + 50°C).
- It is necessary to coat anodized aluminum parts with anti-corrosion oil regularly in order to increase their life-spans and reduce corrosion predisposition.
- Due to humidity or not hermetically sealed samples, condensate may be formed. The condensate has to be removed from the rotor chamber with a soft cloth regularly.



The maintenance procedure has to be repeated every 10 to 15 runs, or at least once a week.

- Connect the unit to the power supply, after the equipment is completely dry.
- Do not carry out disinfection with UV-, beta- and gamma-rays or other high energy radiation.
- Metal rotors can be autoclaved.
- Rotor lid and adapters can also be autoclaved (max. 121°C, 20 min).
- The tube racks are made of PP and **cannot** be autoclaved at 134°C.

5.1.2 Cleaning and disinfection of the unit

1. Open the lid before you turn off the unit. Disconnect it from the power supply.
2. Open the rotor nut by turning the rotor key counter clockwise.
3. Remove the rotor.
4. For cleaning and disinfection of the unit and the rotor chamber use the above mentioned cleaner.
5. Clean all accessible areas of the device and its accessories, including the power cord with a damp cloth.
6. Wash the rubber seals and rotor chamber thoroughly with water.
7. Rub the dry rubber seals with glycerol or talc to prevent these to becoming brittle. Other components of the unit, e.g. the lid lock, motor shaft and rotor must not be greased.
8. Dry the motor shaft with a soft, dry and lint-free cloth.
9. Control the unit and accessories for damage.

Make sure that the centrifuge is turned off the unit and disconnect the unit from the power supply. Then remove adherent dust from the ventilation slots in the centrifuge by using a soft brush. Do this at least every six months.

5.1.3 Cleaning and disinfection of the rotor

1. Clean and disinfect the rotors, rotor lids and adapters with the above mentioned cleaner.
2. Use a bottle brush to clean and disinfect the rotor bores.
3. Rinse the rotors, rotor lid and adapter with clear water. Particularly the drillings of angle rotors.
4. For drying of the rotors and accessories set them on a towel. Place the angle rotors with bores down.
5. Dry the rotor cone with a soft, dry and lint-free cloth and look for damage. Do not grease the rotor cone.

5.1.4 Disinfection of aluminum rotors

In case of infectious material spilling into the centrifuge, the rotor and rotor chamber have to be disinfected directly after the run. Rotors may be autoclaved at a maximum temperature of 121°C.

5.1.5 Disinfection of PP-rotors

Autoclaving

The recommended time for autoclaving: 15 – 20 min at 121°C (1 bar)



ATTENTION:

The sterilization time of 20 min. must not be exceeded. Repeated sterilization will cause reduction of the mechanical resistance of the plastic material

Before autoclaving the PP-rotor and adapter must be thoroughly cleaned to avoid the burning in of dirty residues. You can disregard the consequences of some chemical residues to plastic materials at ambient temperatures. But at the high temperatures during autoclaving those residues may corrode and destroy the plastic. The objects must be thoroughly rinsed with distilled water after the cleaning but before the autoclaving. Residues of any cleaning liquids may cause fissures, whitening and stains.

Gas sterilization

Adapters, bottles and rotors may be gas sterilized with Ethylenoxyd. Make sure to air out the items after the sterilization and before using them again.



ATTENTION:

Because the temperature may rise during the sterilization, rotors, adapters and bottles must not be closed and must be totally unscrewed

Chemical sterilization

Bottles, adapters and rotors may be treated with the usual liquid disinfectants.



ATTENTION:

Before applying any other cleaning or decontamination method than recommended by the manufacturer, contact the manufacturer to ensure that it will not damage the unit or the rotor.

5.1.6 Glass breakage

With high g-values, the rate of glass tube breakage increases. Glass splinters have to be removed immediately from rotor, buckets, adapters and the rotor chamber itself. Fine glass splinters will scratch and therefore damage the protective surface coating of a rotor. If glass splinters remain in the rotor chamber, fine metal dust will build up due to air circulation. This very fine, black metal dust will significantly pollute the rotor chamber, the rotor, the buckets and the samples.

If necessary, replace the adapters, tubes and accessories to avoid further damage. Check the rotor bores regularly for residues and damage.



ATTENTION:

Please check the relevant specifications of the tubes centrifuges with the manufacturer.

5.2 Life time of rotors, buckets, accessories

Rotors and rotor lid made of aluminum or stainless steel, have an operating time of max. **7 years** from first use. Transparent rotor lids and caps made of PC or PP as well as rotors, tube racks and adapters of PP have a maximum operating time up to **3 years** from first use.

Condition for the operating time: Proper use damage-free condition, recommended care.

6. TROUBLESHOOTING

6.1 Error message: Cause / Solution

The error messages are listed to help localize possible errors faster.

The diagnosing referred to in this chapter may not always be the case, as they are only theoretically occurring errors and solutions.

Please keep us informed about any kind of error occurring, which is not listed in this chapter. Only through your information are we able to improve this operation manual.

Many thanks in advance for your support.

6.2 Survey of possible error messages and their solutions

6.2.1 Lid release during power failure (Emergency Lid Release)

In case of power failure or malfunction, the lid of the centrifuge can be opened manually in order to retrieve your samples.

For FC5718/FC5718R/FC5816/FC5816R/FC5916/FC5916R (motor driven lock)

Please proceed as follows:

1. Switch off the centrifuge and unplug the power cord, wait until the rotor has come to a standstill (this may take several minutes)
2. On the left side of the centrifuge housing there is a plastic stopper. Remove this stopper and behind it there is a hexagon nut.
3. Take the included box spanner, put it in the hole and lock the box spanner with the hexagon nut (See figure 37).
4. Now turn the box spanner to the right side (clockwise) up to the limit.



ATTENTION: 3

- a) **Just turn to the limit, don't tighten the nut.**
- b) **Now open the lid of the centrifuge.**
- c) **Switch the centrifuge on again, to resume work.**



Figure. 37

For 5714

Please proceed as follows (see Figure 38):



ATTENTION:

- Switch the centrifuge off and unplug the power cord, wait until the rotor stands still (this may take several minutes). At the right side of the centrifuge there is a plastic stopper (Figure 38). Remove this stopper, which is connected to the lid lock, horizontally from the housing until the centrifuge lid opens.
- Now open the lid of the centrifuge



Figure. 38

6.2.2 Description of the error message system

The error message **"error"** (M11) is shown in the **"Time/Prog"** (A-3) display (See figure 39). Detailed information about possible error messages are in **"table 6: error messages"** (See Appendix).

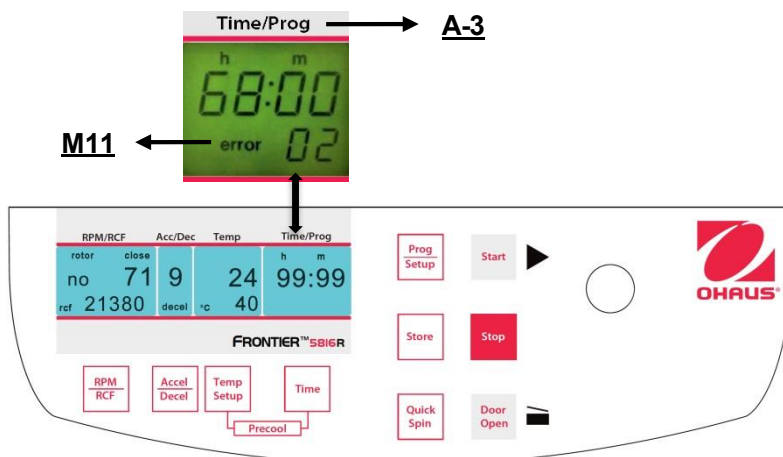


Figure. 39

7. RECEIPT OF CENTRIFUGES TO REPAIR



Health risk from contaminated equipment, rotors and accessories.
In case of returning the centrifuge for repairing to the manufacturer, please notice the following:

The centrifuge **must** be decontaminated and cleaned before the shipment for the protection of persons, environment and material.

Decontamination certificate at goods return delivery (See APPENDIX)

We reserve the right to not accept contaminated centrifuges.

Further on all costs occurred for the cleaning and disinfection of the units will go to the debit of the customer's account.



8. TRANSPORT, STORAGE AND DISPOSAL

8.1 Transport

Before transporting, take out the rotor.

Only transport the unit in the original packaging.

Install the transport protection material to secure the motor shaft, when transporting over longer distances.

	Air temperature	rel. humidity	Air pressure
General transportation	-25 to 60 °C	10 to 75 %	30 to 106 kPa

8.2 Storage

During storage of the centrifuge the following environmental conditions must be observed:

	Air temperature	rel. Humidity	Air pressure
in transport packaging	-25 to 55 °C	10 to 75 %	70 to 106 kPa



8.3 Transporting, Installing, Transferring and Disposing of the Centrifuge FC5714/FC5718/FC5718R/FC5816/FC5816R

These instructions complement the previous general instructions in chapter 8 and do not replace them.

8.3.1 Transport

- Please transport the device in the original packaging.
- The centrifuge should always be transported using a mechanical transport device.

8.3.2 Installation

➤ Opening the carton and lifting out the device.

1. Cut the adhesive tape.
2. Open all 4 flaps of the carton.
3. Remove the accessories.
4. Carefully lift the centrifuge from the carton.



WARNING: Lifting Hazard. Single person lift could cause injury. Use a mechanical lifting device or team lifting procedures when lifting or moving the equipment.

- Place the device on a stable, horizontal and non-resonant lab bench
 1. Remove the front and back transport protection material.
 2. Remove the plastic sleeve.
 3. Observe a minimum distance of 30 cm to adjoining devices at the sides and from the rear side to the wall.
 4. Install the device in a well-ventilated location which is protected from direct sunlight to prevent it from overheating.



- Connect the device
 1. After installation, wait for four hours before switching the centrifuge on in order to avoid damage to the compressor.
 2. Check that the mains voltage and frequency match the requirements on the device name plate(see rear side of the device) and then connect the device to the power supply.
- Remove the transport protection material from the rotor chamber
 1. Switch on the device at the mains power switch.
 2. Open the centrifuge lid using the open button.
 3. Remove the transport protection material.
 4. Place the rotor vertically onto the motor shaft.
 5. Turn the rotor nut using the rotor key clockwise until the rotor nut is tightened.

- The device is now ready to use

Retain the packaging and all transport protection material for shipping the device at a later date.

8.3.3 Packing

Pack the centrifuge in reverse order.

8.3.4 Passing on the Device

When passing the equipment on to third parties, please make sure to also include this instruction manual.

9. TECHNICAL DATA

9.1 Specifications

9.1.1 Centrifuge FC5714

Model	FC5714	
Speed Range	200 rpm -14000 rpm; 10 rpm/set	
Maximum RCF	18624 x g; 10 x g/set	
Maximum Capacity(Rotor)	4x100ml	
Temperature range(N/A)	Air cool	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 63 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	5595 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	1.3 A	2.4 A
Power consumption	240 W	300 W
Dimensions (W × D × H)	362 x 493 x 330 mm	
	14.3 x 19.4 x 13.0 in	
Net Weight (without rotor)	30 kg	
	66 lb	
Shipping Dimensions (W × D × H)	580 x 490 x 460 mm	
	22.8 x 19.3 x 18.1 in	
Shipping Weight (without rotor)	32.5 kg	
	72 lb	
Ambient conditions (EN/IEC 61010-1)		
Environment	For indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		

9.1.2 Centrifuge FC5718

Model	FC5718	
Speed Range	200 rpm -18000 rpm;10 rpm/set	
Maximum RCF	23542 x g;10 x g/set	
Maximum Capacity (Rotor)	4x100ml	
Temperature range (N/A)	Air cool	
Running Time Noise level	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 60 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	16672 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	2.0 A	4.0 A
Power consumption	455 W	475 W
Dimensions (W × D × H)	408 x 499 x 351 mm	
	16.1 x 19.7 x 13.8 in	
Net Weight (without rotor)	43 kg	
	95 lb	
Shipping Dimensions (W × D × H)	650 x 520 x 490 mm	
	25.6 x 20.5 x 19.3 in	
Shipping Weight (without rotor)	53 kg	
	117 lb	
Ambient conditions (EN/IEC 61010-1)		
Environment	for indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		

9.1.3 Centrifuge FC5718R

Model	FC5718R	
Speed Range	200 rpm -18000 rpm; 10 rpm/set	
Maximum RCF	23542 x g; 10 x g/set	
Maximum Capacity(Rotor)	4x100ml	
Temperature range(Digital)	-20~40°C	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 60 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	25111 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	3.0 A	6.0 A
Power consumption	660 W	660 W
Dimensions (W × D × H)	407 x 731 x 359 mm	
	16.0 x 28.8 x 14.1 in	
Net Weight (without rotor)	60 kg	
	132 lb	
Shipping Dimensions (W × D × H)	840 x 640 x 590 mm	
	33.1 x 25.2 x 23.2 in	
Shipping Weight (without rotor)	77 kg	
	170 lb	
Ambient conditions (EN/IEC 61010-1)		
Environment	for indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		

9.1.4 Centrifuge FC5816

Model	FC5816	
Speed Range	200 rpm -15000 rpm;10 rpm/set	
Maximum RCF	21379 x g;10 x g/set	
Maximum Capacity(Rotor)	6 x 250ml	
Temperature range(N/A)	Air cool	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 61 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	34363 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	2.4 A	4.2 A
Power consumption	530 W	520 W
Dimensions (W × D × H)	446 x 538 x 354 mm	
	17.6 x 21.2 x 13.9 in	
Net Weight (without rotor)	52 kg	
	115 lb	
Shipping Dimensions (W × D × H)	840 x 640 x 590 mm	
	33.1 x 25.2 x 23.2 in	
Shipping Weight (without rotor)	77 kg	
	170 lb	
Ambient conditions (EN/IEC 61010-1)		
Environment	for indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		

9.1.5 Centrifuge FC5816R

Model	FC5816R	
Speed Range	200 rpm -16000 rpm;10 rpm/set	
Maximum RCF	24325 x g;10 x g/set	
Maximum Capacity(Rotor)	6 x 250ml	
Temperature range(Digital)	-20~40°C	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 63 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	34363 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	3.7 A	7.8 A
Power consumption	785 W	850 W
Dimensions (W × D × H)	723 x 538 x 354 mm	
	28.5 x 21.2 x 13.9 in	
Net Weight (without rotor)	77 kg	
	170 lb	
Shipping Dimensions (W × D × H)	840 x 640 x 590 mm	
	33.1 x 25.2 x 23.2 in	
Shipping Weight (without rotor)	87 kg	
	192 lb	
Ambient conditions (EN/IEC 61010-1)		
Environment	for indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		

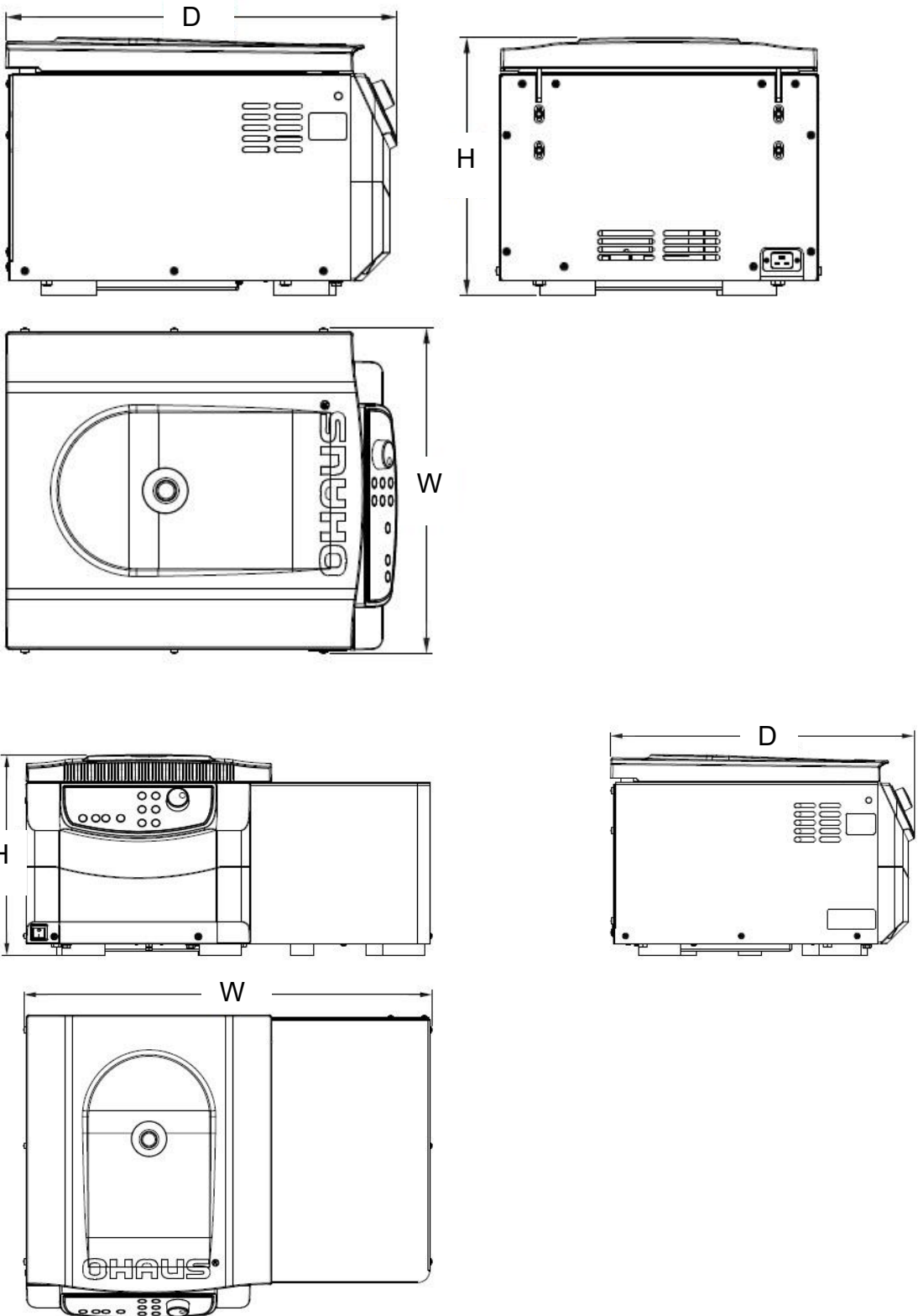
9.1.6 Centrifuge FC5916

Model	FC5916	
Speed Range	200 rpm -16000 rpm;10 rpm/set	
Maximum RCF	24325 x g;10 x g/set	
Maximum Capacity(Rotor)	4x750ml	
Temperature range(N/A)	Air cool	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 63 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	60629 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	2.8 A	5.6 A
Power consumption	640 W	680 W
Dimensions (W × D × H)	540 x 670 x 390 mm	
	21.3 x 26.4 x 15.4 in	
Net Weight (without rotor)	85 kg	
	187 lb	
Shipping Dimensions (W × D × H)	780 x 670 x 590 mm	
	30.7 x 26.4 x 23.3 in	
Shipping Weight (without rotor)	98 kg	
	216 lb	
Ambient conditions (EN/IEC 61010-1)		
Environment	For indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		

9.1.7 Centrifuge FC5916R

Model	FC5916R	
Speed Range	200 rpm -16000 rpm; 10 rpm/set	
Maximum RCF	26331 x g; 10 x g/set	
Maximum Capacity(Rotor)	4x750ml	
Temperature range(Digital)	-20~40°C	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 63 ± 2 dB(A)	
Allowable density at maximum speed	1.2 g/ml	
Allowable kinetic energy	54458 Nm	
Mains power connection AC	230 V ~ 50/60 Hz	120 V ~ 50/60 Hz
Voltage fluctuation	± 10 %	± 10 %
Current consumption	7.2 A	20 A
Power consumption	1630 W	1750 W
Dimensions (W × D × H)	730 x 670 x 390 mm	
	28.7 x 26.4 x 15.4 in	
Net Weight (without rotor)	118 kg	
	260 lb	
Shipping Dimensions (W × D × H)	900 x 750 x 560 mm	
	40.0 x 29.5 x 22.0 in	
Shipping Weight (without rotor)	137 kg	
	137 kg	
Ambient conditions (EN/IEC 61010-1)		
Environment	for indoor use only	
Altitude	Use up to an altitude of 2000 m	
Ambient temperature	2°C up to 35 °C	
Max. relative humidity	Max. relative humidity 80 % for temperatures up to 31°C, decreasing linearly to 50 % relative humidity up to 35°C.	
Overvoltage category (IEC 60364-4-443)	II	
Degree of contamination	2	
Class of protection	I	
Not suitable for use in hazardous environments.		


9.2 Drawings and dimensions




Model	W (mm / in.)	D (mm / in.)	H (mm / in.)
FC5714	362 / 14.3	493 / 19.4	330 / 13.0
FC5718	408 / 16.1	499 / 19.7	351 / 13.8
FC5718R	408 / 16.1	731 / 28.8	359 / 14.1
FC5816	446 / 17.6	538 / 21.2	354 / 13.9
FC5816R	723 / 28.5	538 / 21.2	354 / 13.9
FC5916	540 / 21.3	670 / 26.4	390 / 15.4
FC5916R	730 / 28.7	670 / 26.4	390 / 15.4

10. COMPLIANCE

Compliance to the following standards is indicated by the corresponding mark on the product.

Marking	Standard
	This product complies with the applicable harmonized standards of EU Directives 2011/65/EU (RoHS), 2014/30/EU (EMC) and 2014/35/EU (LVD) and 2014/31/EU (NAWI). The EU Declaration of Conformity is available online at www.ohaus.com/ce .

	<p>Disposal</p> <p>In conformance with the European Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) this device may not be disposed of in domestic waste. This also applies to countries outside the EU, per their specific requirements.</p> <p>Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.</p> <p>If you have any questions, please contact the responsible authority or the distributor from which you purchased this device.</p> <p>Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related.</p> <p>For disposal instructions in Europe, refer to www.ohaus.com/weee.</p> <p>Thank you for your contribution to environmental protection.</p>
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FCC Supplier Declaration of Conformity

Unintentional Radiator per 47CFR Part B

Trade Name: OHAUS CORPORATION

Model: FC...

Party issuing Supplier's Declaration of Conformity:

Ohaus Instruments (Changzhou) Co., Ltd.

2F, 22 Block, 538 West Hehai Road, Xinbei District, Changzhou

Jiangsu 213022

China

Phone: +86 519 85287270

Responsible Party – U.S. Contact Information:

Ohaus Corporation

7 Campus Drive, Suite 310

Parsippany, NJ 07054

United States

Phone: +1 973 377 9000

Web: www.ohaus.com

FCC Compliance Statement:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

11. APPENDIX

TABLE 1: PERMISSIBLE NET WEIGHT

TABLE 2: LOWEST TEMPERATURES AT MAX. SPEED

TABLE 3: MAX. SPEED AND RCF-VALUES FOR PERMISSIBLE ROTORS

TABLE 4: ACCELERATION AND DECELERATION TIMES

TABLE 5: ERROR MESSAGES

TABLE 6 (PART 1): RADIUS CORRECTION

TABLE 7: REDEMPTION FORM / DECONTAMINATION CERTIFICATE

11.1 Table 1: Permissible net weight

Rotor number	Rotor Description	Permissible net weight	Max Speed (x1000 rpm)						
			FC5714	FC5718	FC5718R	FC5816	FC5816R	FC5916	FC5916R
30304361	Rotor, Angle, 24x 1.5/2.0ml, ID, Sealable	24x 3.4 g	14.0						
				14.0					
					15.0				
						15.0			
							16.0		
								16.0	
30314820	Rotor, Swing out, 4x250ml, ID	4x 536 g				4.5			
							4.5		
30314821	Rotor, Angle, 6x 250ml FB, ID	6x 355 g				8.0			
							8.0		
								8.0	
									8.0
30314822	Rotor, Swing out, 4x 100ml, ID	4x 340 g	4.5						
				4.5					
					4.5				
30314823	Rotor, Swing out, 4x 100ml, ID, Sealable	4x 465 g	4.0						
				5.0					
					5.0				
30314824	Rotor, Swing out, 2x 3MTP, ID	2x 310 g	4.5						
				4.5					
					4.5				
						4.5			
							4.5		
								4.5	
30314825	Rotor, Angle, 6x 85ml RB, ID, Hi	6x 140 g		11.0					
					13.5				
30314826	Rotor, Angle, 6x 85ml RB, ID	6x 140 g		9.0					
					9.0				
						11.0			
							13.0		
								11.0	
30314827	Rotor, Angle, 4x 85ml RB, ID, Hi	4x 140 g							
				12.0					
					12.0				
						12.0			
							12.0		
								15.0	
30314828	Rotor, Swing out, 16x 50ml, ID	4x 557 g				4.5			
							4.5		

30314829	Rotor, Angle, 10x50ml FA, ID	10x74 g	7.5						
				7.5					
					9.0				
						10.5			
							10.0		10.0
30314830	Rotor, Angle, 6x50ml RB/FA, ID	6x72 g	6.0						
				6.0					
					6.0				
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	6x94 g	12.0						
					12.0				
						13.0			
							13.0		
								13.0	13.0
30314832	Rotor, Angle, 30x15ml RB/FA, ID	30x32 g	4.5						
				4.5					
					4.5				
						4.5			
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	20x18 g	12.0						
					12.0				
						12.0			
							12.0		
								12.0	12.0
30314834	Rotor, Angle, 12x15ml RB/FA, ID	12x25 g	6.0						
				6.0					
					6.0				
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	44x3.8 g	13.5						
					13.5				
						15.0			
							16.0		
								16.0	16.0
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	30x3.4 g	12.0						
				13.0					
					14.0				
							15.0		15.0
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	24x3.4 g	14.0						
				14.0					
					15.0				
						15.0			
							16.0		
								15.0	15.0
30314839	Rotor, Angle, 12x1.5/2.0ml, ID	12x3.4 g	18.0						
					18.0				
30314840	Rotor, Angle, 64x0.5ml, ID	64x2.3 g	13.5						
					13.5				
30314841	Rotor, Angle, 4x8-w PCR Strip, ID	4x3.5 g	15.0						
					15.0				
							15.0		15.0
30553085	Rotor SwingOut 4x750ml D99mm ID SL	4x995 g					4.0	4.0	
30553086	Rotor Angle 4x500ml D69mm ID	4x708 g					8.0	8.0	

11.2 Table 2: Lowest temperatures at max. speed (Only Refrigerated Models)

Rotor number	Rotor Description	Model	Max Speed	N-max
30304361	Rotor, Angle, 24x 1.5/2.0ml, ID, Sealable	FC5718R	15000 rpm	6 °C
		FC5816R	15000 rpm	6 °C
		FC5916R	16000 rpm	1 °C
30314821	Rotor, Angle, 6x 250ml FB, ID	FC5916R	8000 rpm	-1 °C
30314822	Rotor, Swing out, 4x 100ml, ID	FC5718R	4500 rpm	-7 °C
		FC5816R	4500 rpm	-7 °C
30314823	Rotor, Swing out, 4x 100ml, ID, Sealable	FC5718R	5000 rpm	-3 °C
		FC5816R	5000 rpm	-3 °C
30314824	Rotor, Swing out, 2x 3MTP, ID	FC5718R	4500 rpm	-6 °C
		FC5816R	4500 rpm	-6 °C
		FC5916R	4500 rpm	-8 °C
30314825	Rotor, Angle, 6x 85ml RB, ID, Hi	FC5718R	13500 rpm	17 °C
		FC5816R	13500 rpm	17 °C
30314826	Rotor, Angle, 6x 85ml RB, ID	FC5718R	9000 rpm	-5 °C
		FC5816R	9000 rpm	-5 °C
		FC5916R	13000 rpm	8 °C
30314827	Rotor, Angle, 4x 85ml RB, ID, Hi	FC5718R	12000 rpm	5 °C
		FC5816R	12000 rpm	5 °C
		FC5916R	16000 rpm	7 °C
30314829	Rotor, Angle, 10x 50ml FA, ID	FC5718R	7500 rpm	9 °C
		FC5816R	7500 rpm	9 °C
		FC5916R	10500 rpm	2 °C
30314830	Rotor, Angle, 6x 50ml RB/FA, ID	FC5718R	6000 rpm	-8 °C
		FC5816R	6000 rpm	-8 °C
30314831	Rotor, Angle, 6x 50ml RB, ID, Hi	FC5718R	12000 rpm	-5 °C
		FC5816R	12000 rpm	-5 °C
		FC5916R	13000 rpm	-4 °C
30314832	Rotor, Angle, 30x 15ml RB/FA, ID	FC5718R	4500 rpm	-9 °C
		FC5816R	4500 rpm	-9 °C
30314833	Rotor, Angle, 20x 10ml RB, ID, Hi	FC5718R	12000 rpm	2 °C
		FC5816R	12000 rpm	2 °C
		FC5916R	12000 rpm	-2 °C
30314834	Rotor, Angle, 12x 15ml RB/FA, ID	FC5718R	6000 rpm	-11.5 °C
		FC5816R	6000 rpm	-11.5 °C
30314835	Rotor, Angle, 44x 1.5/2.0ml, ID	FC5718R	13500 rpm	1 °C
		FC5816R	13500 rpm	1 °C
		FC5916R	16000 rpm	3 °C
30314836	Rotor, Angle, 30x 1.5/2.0ml, ID, Sealable	FC5718R	14000 rpm	9 °C
		FC5816R	14000 rpm	9 °C
		FC5916R	15000 rpm	3 °C
30314838	Rotor, Angle, 24x 1.5/2.0ml, ID	FC5718R	15000 rpm	6 °C
		FC5816R	15000 rpm	6 °C
		FC5916R	16000 rpm	1 °C
30314839	Rotor, Angle, 12x 1.5/2.0ml, ID	FC5718R	18000 rpm	-2 °C
		FC5816R	18000 rpm	-2 °C
30314840	Rotor, Angle, 64x 0.5ml, ID	FC5718R	13500 rpm	2 °C
		FC5816R	13500 rpm	2 °C
30314841	Rotor, Angle, 4x 8-w PCR Strip, ID	FC5718R	15000 rpm	-1 °C
		FC5816R	15000 rpm	-1 °C
		FC5916R	15000 rpm	-2 °C
30553085	Rotor SwingOut 4x 750ml D99mm ID SL	FC5916R	4500 rpm	4 °C
30553086	Rotor Angle 4x 500ml D69mm ID	FC5916R	8000 rpm	0 °C

All temperature indications refer to a room temperature of 23°C. By exceeding this value or direct solar radiation to the centrifuge, these values can't be kept up.

11.3 Table 3: Max. speed and RCF-values for permissible rotors

Rotor number	Rotor Description	Model	Max Speed	
			RPM	RCF
30304361	Rotor, Angle, 24x 1.5/2.0ml, ID, Sealable	FC5714	14000	18624 xg
		FC5718	14000	18624 xg
		FC5718R	15000	21379 xg
		FC5816	15000	21379 xg
		FC5816R	16000	24325 xg
		FC5916	16000	24325 xg
		FC5916R	16000	24325 xg
30314820	Rotor, Swing out, 4x250ml, ID	FC5816	4500	3780 xg
		FC5816R	4500	3780 xg
30314821	Rotor, Angle, 6x 250ml FB, ID	FC5816	8000	10016 xg
		FC5816R	8000	10016 xg
		FC5916	8000	10016 xg
		FC5916R	8000	10016 xg
30314822	Rotor, Swing out, 4x 100ml, ID	FC5714	4500	3350 xg
		FC5718	4500	3350 xg
		FC5718R	4500	3350 xg
30314823	Rotor, Swing out, 4x 100ml, ID, Sealable	FC5714	4000	2486 xg
		FC5718	5000	3885 xg
		FC5718R	5000	3885 xg
30314824	Rotor, Swing out, 2x3MTP, ID	FC5714	4500	2716 xg
		FC5718	4500	2716 xg
		FC5718R	4500	2716 xg
		FC5816	4500	2716 xg
		FC5816R	4500	2716 xg
		FC5916	4500	2716 xg
		FC5916R	4500	2716 xg
30314825	Rotor, Angle, 6x 85ml RB, ID, Hi	FC5718	11000	13932 xg
		FC5718R	13500	20984 xg
30314826	Rotor, Angle, 6x 85ml RB, ID	FC5718	9000	10413 xg
		FC5718R	9000	10413 xg
		FC5816	11000	15555 xg
		FC5816R	13000	21726 xg
		FC5916	11000	15555 xg
		FC5916R	13000	21726 xg
30314827	Rotor, Angle, 4x 85ml RB, ID, Hi	FC5718	12000	14809 xg
		FC5718R	12000	14809 xg
		FC5816	12000	14809 xg
		FC5816R	12000	14809 xg
		FC5916	15000	23140 xg
		FC5916R	16000	26328 xg
30314828	Rotor, Swing out, 16x 50ml, ID	FC5816	4500	3735 xg
		FC5816R	4500	3735 xg

30314829	Rotor, Angle, 10x50ml FA, ID	FC5718	7500	8174 xg
		FC5718R	7500	8174 xg
		FC5816	9000	11771 xg
		FC5816R	10500	16022 xg
		FC5916	10000	14532 xg
		FC5916R	10500	16022 xg
30314830	Rotor, Angle, 6x50ml RB/FA, ID	FC5714	6000	4427 xg
		FC5718	6000	4427 xg
		FC5718R	6000	4427 xg
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	FC5718	12000	13522 xg
		FC5718R	12000	13522 xg
		FC5816	13000	15869 xg
		FC5816R	13000	15869 xg
		FC5916	13000	15869 xg
		FC5916R	13000	15869 xg
30314832	Rotor, Angle, 30x15ml RB/FA, ID	FC5714	4500	2830 xg
		FC5718	4500	2830 xg
		FC5718R	4500	2830 xg
		FC5816	4500	2830 xg
		FC5816R	4500	2830 xg
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	FC5718	12000	15775 xg
		FC5718R	12000	15775 xg
		FC5816	12000	15775 xg
		FC5816R	12000	15775 xg
		FC5916	12000	15775 xg
		FC5916R	12000	15775 xg
30314834	Rotor, Angle, 12x15ml RB/FA, ID	FC5714	6000	4427 xg
		FC5718	6000	4427 xg
		FC5718R	6000	4427 xg
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	FC5718	13500	17113 xg
		FC5718R	13500	17113 xg
		FC5816	15000	21128 xg
		FC5816R	16000	24039 xg
		FC5916	16000	24325 xg
		FC5916R	16000	24325 xg
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	FC5714	12000	15131 xg
		FC5718	13000	17758 xg
		FC5718R	14000	20595 xg
		FC5916	15000	23643 xg
		FC5916R	15000	23643 xg
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	FC5714	14000	18624 xg
		FC5718	14000	18624 xg
		FC5718R	15000	21379 xg
		FC5816	15000	21379 xg
		FC5816R	16000	24325 xg
		FC5916	16000	24325 xg
		FC5916R	16000	24325 xg

30314839	Rotor, Angle, 12x 1.5/2.0ml, ID	FC5718	18000	23542 xg
		FC5718R	18000	23542 xg
30314840	Rotor, Angle, 64x 0.5ml, ID	FC5718	13500	16298 xg
		FC5718R	13500	16298 xg
30314841	Rotor, Angle, 4x 8-w PCR Strip, ID	FC5718	15000	15343 xg
		FC5718R	15000	15343 xg
		FC5916	15000	15343 xg
		FC5916R	15000	15343 xg
30553085	Rotor SwingOut 4x 750ml D99mm ID SL	FC5916	4000	3434 xg
		FC5916R	4500	4346 xg
30553086	Rotor Angle 4x 500ml D69mm ID	FC5916	8000	10367 xg
		FC5916R	8000	10367 xg

11.4 Table 4: Acceleration and deceleration times

Item No	Rotor Description	Model	Acceleration* Time in sec		Deceleration* Time in sec	
			level 0	level 9	level 0	level 9
30304361	Rotor, Angle, 24x 1.5/2.0ml, ID, Sealable	FC5714	200	25	230	35
		FC5718	240	23	240	16
		FC5718R	230	25	420	17
		FC5816	251	25	610	26
		FC5816R	249	20	635	27
		FC5916	204	21	421	30
		FC5916R	204	21	421	30
30314820	Rotor, Swing out, 4x250ml, ID	FC5816	309	34	458	36
		FC5816R	309	34	458	36
30314821	Rotor, Angle, 6x250ml FB, ID	FC5816	664	130	2906	92
		FC5816R	664	130	2906	92
		FC5916	573	66	1903	84
		FC5916R	573	66	1903	84
30314822	Rotor, Swing out, 4x100ml, ID	FC5714	110	14	170	19
		FC5718	100	15	150	15
		FC5718R	100	15	150	15
30314823	Rotor, Swing out, 4x100ml, ID, Sealable	FC5714	110	14	170	17
		FC5718	100	15	150	15
		FC5718R	100	15	150	15
30314824	Rotor, Swing out, 2x3MTP, ID	FC5714	230	25	340	26
		FC5718	160	20	360	15
		FC5718R	160	20	360	15
		FC5816	452	43	616	38
		FC5816R	452	43	616	38
		FC5916	249	27	488	23
		FC5916R	249	27	488	23
30314825	Rotor, Angle, 6x85ml RB, ID, Hi	FC5718	400	40	960	40
		FC5718R	500	60	1260	50
30314826	Rotor, Angle, 6x85ml RB, ID	FC5718	360	40	1050	40
		FC5718R	360	40	1050	40
		FC5816	697	85	2313	70
		FC5816R	2313	70	1630	76
		FC5916	463	48	1654	46
		FC5916R	549	69	1307	67
		30314827	Rotor, Angle, 4x85ml RB, ID, Hi	FC5718	300	60
FC5718R	300			60	820	40
FC5816	506			60	1745	49
FC5816R	506			60	1745	49
FC5916	448			50	1251	45
FC5916R	448			50	1251	45
30314828	Rotor, Swing out, 16x50ml, ID	FC5816	311	34	387	36
		FC5816R	311	34	387	36
30314829	Rotor, Angle, 10x50ml FA, ID	FC5718	380	63	796	37
		FC5718R	380	62	1069	36
		FC5816	753	115	2395	72
		FC5816R	753	115	2395	72
		FC5916	480	60	1747	68
		FC5916R	480	60	1747	68
30314830	Rotor, Angle, 6x50ml RB/FA, ID	FC5714	101	11	206	14
		FC5718	89	13	239	11
		FC5718R	90	12	463	11

30314831	Rotor, Angle, 6x50ml RB, ID, Hi	FC5718	360	40	570	30
		FC5718R	360	40	570	30
		FC5816	446	48	1323	49
		FC5816R	446	48	1323	49
		FC5916	264	28	921	32
30314832	Rotor, Angle, 30x 15ml RB/FA, ID	FC5714	157	19	370	20
		FC5718	160	15	380	10
		FC5718R	160	15	380	10
		FC5816	149	25	985	20
		FC5816R	149	25	985	20
30314833	Rotor, Angle, 20x 10ml RB, ID, Hi	FC5718	360	40	570	30
		FC5718R	360	40	570	30
		FC5816	512	54	1439	47
		FC5816R	512	54	1439	47
		FC5916	305	32	988	37
30314834	Rotor, Angle, 12x 15ml RB/FA, ID	FC5714	102	11	167	14
		FC5718	88	13	222	11
		FC5718R	88	12	433	11
		FC5718	196	22	204	18
		FC5718R	196	22	204	18
30314835	Rotor, Angle, 44x 1.5/2.0ml, ID	FC5816	257	29	436	28
		FC5816R	274	31	485	29
		FC5916	233	25	283	30
		FC5916R	233	25	500	25
		FC5714	250	27	280	34
30314836	Rotor, Angle, 30x 1.5/2.0ml, ID, Sealable	FC5718	200	25	360	25
		FC5718R	210	25	360	30
		FC5916	221	23	561	30
		FC5916R	221	23	561	30
		FC5714	200	22	230	35
30314838	Rotor, Angle, 24x 1.5/2.0ml, ID	FC5718	210	23	240	16
		FC5718R	230	25	420	17
		FC5816	251	25	610	26
		FC5816R	249	30	635	27
		FC5916	204	21	421	30
30314839	Rotor, Angle, 12x 1.5/2.0ml, ID	FC5916R	204	21	421	30
		FC5718	240	25	210	20
		FC5718R	240	25	210	20
		FC5718	150	17	170	12
		FC5718R	150	17	170	12
30314841	Rotor, Angle, 4x8-w PCR Strip, ID	FC5718	130	16	130	12
		FC5718R	130	16	130	12
		FC5916	100	12	201	12
		FC5916R	100	12	201	12
30553085	Rotor SwingOut 4x 750ml D99mm ID SL	FC5916	483	47	1287	49
		FC5916R	551	55	1501	54
30553086	Rotor Angle 4x 500ml D69mm ID	FC5916	575	73	2317	82
		FC5916R	575	73	2317	82

*Note: accelerates from 0 to Vmax; decelerates from Vmax to 0.

11.5 Table 5: Error messages

Error-No.:	Description
1	Imbalance arose
2	Imbalance sensor is defective
4	Imbalance switch has been activated for longer than 5 seconds
8	Transponder in the rotor is defective
11	Temperature sensor is defective
12	Chamber over temperature
14	Leap of speed is too big between two measurements
CLOSE lid	
33	Open lid while motor is running
34	Lid contact defective
38	Lid motor is blocked
40	Communication with frequency converter disturbed during start
41	Communication with frequency converter disturbed during stop
42	Short circuit in the frequency converter
43	Undervoltage frequency converter
44	Overvoltage frequency converter
45	Over temperature frequency converter
46	Over temperature motor
47	Over current frequency converter
48	Timeout between control unit and frequency converter
49	Other error frequency converter
55	Overspeed
70	Timeout between controller and RS232 interface
99	Rotor is not allowed in this centrifuge
FALSE	Inserted rotor does not exist in the program
rotor no	Rotor is not detected

11.6 Table 6: Radius correction and adapter specifications

Rotor	Rotor Description	Bucket/Adapter	Bucket/Adapter Description	Radius (cm)	Correction (cm)	Compatible						
						FC5714	FC5718	FC5718R	FC5816	FC5816R	FC5916	FC5916R
30304361	Rotor, Angle, 24x 1.5/2.0ml, ID, Sealable	Blank	NO Bucket/Adapter	8.5		•	•	•	•	•	•	•
		30130884	Adapter, 1x 0.2/0.4ml D6mm, 6/pk	8.2	-0.3	•	•	•	•	•	•	•
		30130885	Adapter, 1x 0.5ml D8mm, 6/pk	7.5	-1.0	•	•	•	•	•	•	•
30314820	Rotor, Swing out, 4x 250ml, ID	Blank	NO Bucket/Adapter	16.7					•	•		
		30314903	Rack, 1x 250ml D62mm FB, 2/pk	15.7	-1.0				•	•		
		30314904	Rack, 1x 100ml D41mm RB, 2/pk	15.9	-0.8				•	•		
		30314905	Rack, 3x 50ml D29mm RB, 2/pk	16.3	-0.4				•	•		
		30314906	Rack, 3x 50ml D29mm FA, 2/pk	16.7	0.0				•	•		
		30314907	Rack, 1x 50ml D34mm RB, 2/pk	15.8	-0.9				•	•		
		30314908	Rack, 2x 50ml D29mm Rim, 2/pk	15.8	-0.9				•	•		
		30314909	Rack, 1x 50ml D29mm Rim, 2/pk	16.1	-0.6				•	•		
		30314910	Rack, 5x 25ml D24.5mm RB, 2/pk	16.1	-0.6				•	•		
		30314911	Rack, 3x 25ml D24.5mm Rim, 2/pk	15.5	-1.2				•	•		
		30314912	Rack, 9x 15ml D17mm RB, 2/pk	16.3	-0.4				•	•		
		30314913	Rack, 7x 15ml D17mm FA, 2/pk	16.4	-0.3				•	•		
		30314914	Rack, 7x 15ml D17mm Rim, 2/pk	16.1	-0.6				•	•		
		30314915	Rack, 8x 10ml D16mm RB, 2/pk	16.3	-0.4				•	•		
		30314916	Rack, 14x 5-7ml D13mm RB, 2/pk	15.9	-0.8				•	•		
		30314917	Rack, 10x 1.6-7ml D13mm Vac, 2/pk	15.9	-0.8				•	•		
		30304367	Rack, 8x 4-10ml D16mm Vac, 2/pk	16.3	-0.4				•	•		
30304368	Adapter, 9x 1.5/2.0ml D11mm, 2/pk	15.7	-1.0				•	•				
30314821	Rotor, Angle, 6x 250ml FB, ID	Blank	NO Bucket/Adapter	14.1					•	•	•	•
		30304369	Adapter, 8x 1.5ml D11mm, 2/pk	13.2	-0.9				•	•	•	•
		30304370	Adapter, 5x 10ml D16mm RB, 2/pk	13.3	-0.8				•	•	•	•
		30304371	Adapter, 4x 15ml D17mm FA, 2/pk	13.0	-1.1				•	•	•	•
		30304372	Adapter, 2x 30ml D26mm RB, 2/pk	12.5	-1.6				•	•	•	•
		30304373	Adapter, 1x 50ml D29mm RB, 2/pk	12.0	-2.1				•	•	•	•
		30304374	Adapter, 1x 50ml D30mm FA, 2/pk	11.7	-2.4				•	•	•	•
		30559412	Adapter 15x 1.5/2.0ml D11mm MTBx 2 V1	9.5 13.6	-4.6 -0.5				•	•	•	•
		30559413	Adapter 1x 250ml D60mm CBCx 3 V1	11.8	-0.5				•	•	•	•
		30559414	Adapter 1x 175/225ml D61mm FAx 2 V1	12.8	-2.3				•	•	•	•
30314822	Rotor, Swing out, 4x 100ml, ID	Blank	NO Bucket/Adapter	14.8		•	•	•				
		30314842	Rack, 1x 100ml D46mm RB, 2/pk	14.1	-0.7	•	•	•				
		30314843	Rack, 1x 85ml D38mm RB, 2/pk	14.1	-0.7	•	•	•				
		30314844	Rack, 1x 50ml D34mm RB, 2/pk	14.2	-0.6	•	•	•				
		30314845	Rack, 1x 50ml D29mm RB, 2/pk	14.2	-0.6	•	•	•				
		30314846	Rack, 1x 50ml D29mm FA, 2/pk	14.1	-0.7	•	•	•				
		30314847	Rack, 1x 50ml D29mm Rim, 2/pk	14.3	-0.5	•	•	•				
		30314848	Rack, 1x 30ml D25mm Rim, 2/pk	13.8	-1.0	•	•	•				
		30314849	Rack, 1x 25ml D25mm RB, 2/pk	14.4	-0.4	•	•	•				
		30314850	Rack, 2x 15ml D17mm FA, 2/pk	14.8	0.0	•	•	•				
		30314851	Rack, 1x 15ml D17mm Rim, 2/pk	14.5	-0.3	•	•	•				

		30314852	Rack, 7x 15ml D17mm RB, 2/pk	14.5	-0.3	•	•	•				
		30314853	Rack, 9x 5-7ml D13mm RB, 2/pk	14.2	-0.6	•	•	•				
		30314854	Rack, 10x 1.5ml D11mm, 2/pk	9.9	-4.9	•	•	•				
		30314855	Rack, 9x 4.5ml D12mm FB, 2/pk	14.0	-0.8	•	•	•				
		30314856	Rack, 7x 5-7ml D13mm RB, 2/pk	11.6	-3.2	•	•	•				
		30314857	Rack, 7x 5-7ml D13mm Vac, 2/pk	14.2	-0.6	•	•	•				
		30314858	Rack, 5x 4-10ml D16mm Sar, 2/pk	14.3	-0.5	•	•	•				
30314823	Rotor, Swing out, 4x 100ml, ID, Sealable	Blank	NO Bucket/Adapter	14.6		•	•	•				
		30314860	Bucket, 100ml w/o Cap, Sealable, 2/pk	14.2	-0.4	•	•	•				
		30314861	Bucket, 100ml w/ Cap, Sealable, 2/pk	14.2	-0.4	•	•	•				
		30314864	Rack, 1x 100ml D40mm RB, 2/pk	13.8	-0.8	•	•	•				
		30314865	Rack, 1x 85ml D38mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314866	Rack, 1x 50ml D34mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314867	Rack, 1x 50ml D29mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314868	Rack, 1x 50ml D29mm FA, 2/pk	14.1	-0.5	•	•	•				
		30314869	Rack, 1x 50ml D29mm Rim, 2/pk	13.9	-0.7	•	•	•				
		30314870	Rack, 1x 30ml D25mm Rim, 2/pk	13.1	-1.5	•	•	•				
		30314871	Rack, 1x 25ml D25mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314872	Rack, 1x 15ml D17mm FA, 2/pk	14.1	-0.5	•	•	•				
		30314873	Rack, 2x 15ml D17mm FA, 2/pk	14.1	-0.5	•	•	•				
		30314874	Rack, 2x 15ml D17mm Rim, 2/pk	14.0	-0.6	•	•	•				
		30314875	Rack, 4x 15ml D17mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314876	Rack, 7x 5-7ml D13mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314877	Rack, 5x 1.5ml D11mm, 2/pk	14.0	-0.6	•	•	•				
		30314878	Rack, 3x 10ml D17mm Sar, 2/pk	14.0	-0.6	•	•	•				
		30314879	Rack, 4x 5-7ml D13mm RB, 2/pk	14.0	-0.6	•	•	•				
		30314880	Rack, 4x 10ml D17mm Vac, 2/pk	14.0	-0.6	•	•	•				
30314881	Bucket, 2x 50ml D29mm FA, w/ Rack, 2/pk	14.6	0.0	•	•	•						
30314882	Bucket, 3x 15ml D17mm FA, w/ Rack, 2/pk	14.6	0.0	•	•	•						
30314883	Cyto, Rectangular Bucket, 2/pk	6.3	-8.3	•	•	•						
30314824	Rotor, Swing out, 2x 3MTP, ID	Blank	NO Bucket/Adapter	12.0		•	•	•	•	•	•	•
		30314891	Adapter, 48x 1.5/2.0ml D11mm, 2/pk	12.0	0.0	•	•	•	•	•	•	•
30314825	Rotor, Angle, 6x 85ml RB, ID, Hi	Blank	NO Bucket/Adapter	10.3		•	•					
		30314893	Adapter, 1x 15ml D17mm RB, 2/pk	9.6	-0.7	•	•					
		30314894	Adapter, 1x 30ml D25mm RB, 2/pk	9.6	-0.7	•	•					
		30314895	Adapter, 1x 50ml D29mm RB, 2/pk	10.0	-0.3	•	•					
		30314896	Adapter, 1x 50ml D29mm FA, 2/pk	9.8	-0.5	•	•					
		30314897	Adapter, 1x 15ml D17mm FA, 2/pk	9.3	-1.0	•	•					
		30314898	Adapter, 2x 15ml D17mm RB, 2/pk	10.3	0.0	•	•					
		30314899	Adapter, 1x 16ml D18mm RB, 2/pk	9.5	-0.8	•	•					
30314826	Rotor, Angle, 6x 85ml RB, ID	Blank	NO Bucket/Adapter	11.5		•	•	•	•	•	•	•
		30314893	Adapter, 1x 15ml D17mm RB, 2/pk	10.6	-0.9	•	•	•	•	•	•	•
		30314894	Adapter, 1x 30ml D25mm RB, 2/pk	10.4	-1.1	•	•	•	•	•	•	•
		30314895	Adapter, 1x 50ml D29mm RB, 2/pk	10.9	-0.6	•	•	•	•	•	•	•
		30314896	Adapter, 1x 50ml D29mm FA, 2/pk	10.6	-0.9	•	•	•	•	•	•	•
		30314897	Adapter, 1x 15ml D17mm FA, 2/pk	10.4	-1.1	•	•	•	•	•	•	•
		30314898	Adapter, 2x 15ml D17mm RB, 2/pk	11.1	-0.4	•	•	•	•	•	•	•
		30314899	Adapter, 1x 16ml D18mm RB, 2/pk	10.4	-1.1	•	•	•	•	•	•	•

30314827	Rotor, Angle, 4x 85ml RB, ID, Hi	Blank	NO Bucket/Adapter	9.2			•	•	•	•	•	•	
		30314893	Adapter, 1x 15ml D17mm RB, 2/pk	8.5	-0.7		•	•	•	•	•	•	•
		30314894	Adapter, 1x 30ml D25mm RB, 2/pk	8.4	-0.8		•	•	•	•	•	•	•
		30314895	Adapter, 1x 50ml D29mm RB, 2/pk	8.9	-0.3		•	•	•	•	•	•	•
		30314896	Adapter, 1x 50ml D29mm FA, 2/pk	8.6	-0.6		•	•	•	•	•	•	•
		30314897	Adapter, 1x 15ml D17mm FA, 2/pk	8.3	-0.9		•	•	•	•	•	•	•
		30314898	Adapter, 2x 15ml D17mm RB, 2/pk	7.5	-1.7		•	•	•	•	•	•	•
		30314899	Adapter, 1x 16ml D18mm RB, 2/pk	8.3	-0.9		•	•	•	•	•	•	•
30314828	Rotor, Swing out, 16x 50ml, ID	Blank	NO Bucket/Adapter	16.5					•	•			
		30304375	Rack, 4x 50ml D29mm FA, 2/pk	16.5	0.0				•	•			
		30314583	Rack, 10x 15ml D17mm FA, 2/pk	16.5	0.0				•	•			
30314829	Rotor, Angle, 10x 50ml FA, ID	Blank	NO Bucket/Adapter	13.0			•	•	•	•	•	•	
		30130894	Adapter, 1x 15ml D17mm RB, 2/pk	12.8	-0.2		•	•	•	•	•	•	
		30130889	Adapter, 1x 7ml D13.5mm RB, 2/pk	12.2	-0.8		•	•	•	•	•	•	
		30130890	Adapter, 1x 5ml D13.5mm, 2/pk	10.4	-2.6		•	•	•	•	•	•	
		30130886	Adapter, 1x 1.5/2.0ml D11mm, 6/pk	8.9	-4.1		•	•	•	•	•	•	
30314830	Rotor, Angle, 6x 50ml RB/FA, ID	Blank	NO Bucket/Adapter	11.0		•	•	•					
		30130891	Adapter, 1x 30ml D26mm, 2/pk	10.7	-0.3	•	•	•					
		30130892	Adapter, 1x 16ml D18mm, 2/pk	10.3	-0.7	•	•	•					
		30130893	Adapter, 1x 15ml D17mm, 2/pk	10.6	-0.4	•	•	•					
		30130894	Adapter, 1x 15ml D17mm RB, 2/pk	10.6	-0.4	•	•	•					
		30130889	Adapter, 1x 7ml D13.5mm RB, 2/pk	10.2	-0.8	•	•	•					
		30130890	Adapter, 1x 5ml D13.5mm, 2/pk	8.3	-2.7	•	•	•					
		30130886	Adapter, 1x 1.5/2.0ml D11mm, 6/pk	6.7	-4.3	•	•	•					
30314831	Rotor, Angle, 6x 50ml RB, ID, Hi	Blank	NO Bucket/Adapter	8.4			•	•	•	•	•	•	
		30130891	Adapter, 1x 30ml D26mm, 2/pk	8.2	-0.2		•	•	•	•	•	•	
		30130892	Adapter, 1x 16ml D18mm, 2/pk	7.9	-0.5		•	•	•	•	•	•	
		30130893	Adapter, 1x 15ml D17mm, 2/pk	8.0	-0.4		•	•	•	•	•	•	
		30314892	Adapter, 1x 15ml D17.5mm FA, 2/pk	7.7	-0.7		•	•	•	•	•	•	
30314832	Rotor, Angle, 30x 15ml RB/FA, ID	Blank	NO Bucket/Adapter	12.5		•	•	•	•	•			
		30130889	Adapter, 1x 7ml D13.5mm RB, 2/pk	12.2	-0.3	•	•	•	•	•			
		30130890	Adapter, 1x 5ml D13.5mm, 2/pk	10.5	-2.0	•	•	•	•	•			
		30130886	Adapter, 1x 1.5/2.0ml D11mm, 6/pk	9.0	-3.5	•	•	•	•	•			
30314834	Rotor, Angle, 12x 15ml RB/FA, ID	Blank	NO Bucket/Adapter	11.0		•	•	•					
		30130889	Adapter, 1x 7ml D13.5mm RB, 2/pk	10.6	-0.4	•	•	•					
		30130890	Adapter, 1x 5ml D13.5mm, 2/pk	9.1	-1.9	•	•	•					
		30130886	Adapter, 1x 1.5/2.0ml D11mm, 6/pk	7.7	-3.4	•	•	•					
30314835	Rotor, Angle, 44x 1.5/2.0ml, ID	Blank	NO Bucket/Adapter	8.4			•	•	•	•	•	•	
		30130884	Adapter, 1x 0.2/0.4ml D6mm, 6/pk	8.2	-0.2		•	•	•	•	•	•	
		30130885	Adapter, 1x 0.5ml D8mm, 6/pk	7.7	-0.7		•	•	•	•	•	•	
30314836	Rotor, Angle, 30x 1.5/2.0ml, ID, Sealable	Blank	NO Bucket/Adapter	9.4		•	•	•			•	•	
		30130884	Adapter, 1x 0.2/0.4ml D6mm, 6/pk	9.1	-0.3	•	•	•			•	•	
		30130885	Adapter, 1x 0.5ml D8mm, 6/pk	8.4	-1.0	•	•	•			•	•	
30314838	Rotor, Angle, 24x 1.5/2.0ml, ID	Blank	NO Bucket/Adapter	8.5		•	•	•	•	•	•	•	
		30130884	Adapter, 1x 0.2/0.4ml D6mm, 6/pk	8.2	-0.3	•	•	•	•	•	•	•	
		30130885	Adapter, 1x 0.5ml D8mm, 6/pk	7.5	-1.0	•	•	•	•	•	•	•	
30314839	Rotor, Angle, 12x 1.5/2.0ml, ID	Blank	NO Bucket/Adapter	6.5		•	•						
		30130884	Adapter, 1x 0.2/0.4ml D6mm, 6/pk	6.3	-0.2	•	•						
		30130885	Adapter, 1x 0.5ml D8mm, 6/pk	5.6	-0.9	•	•						



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