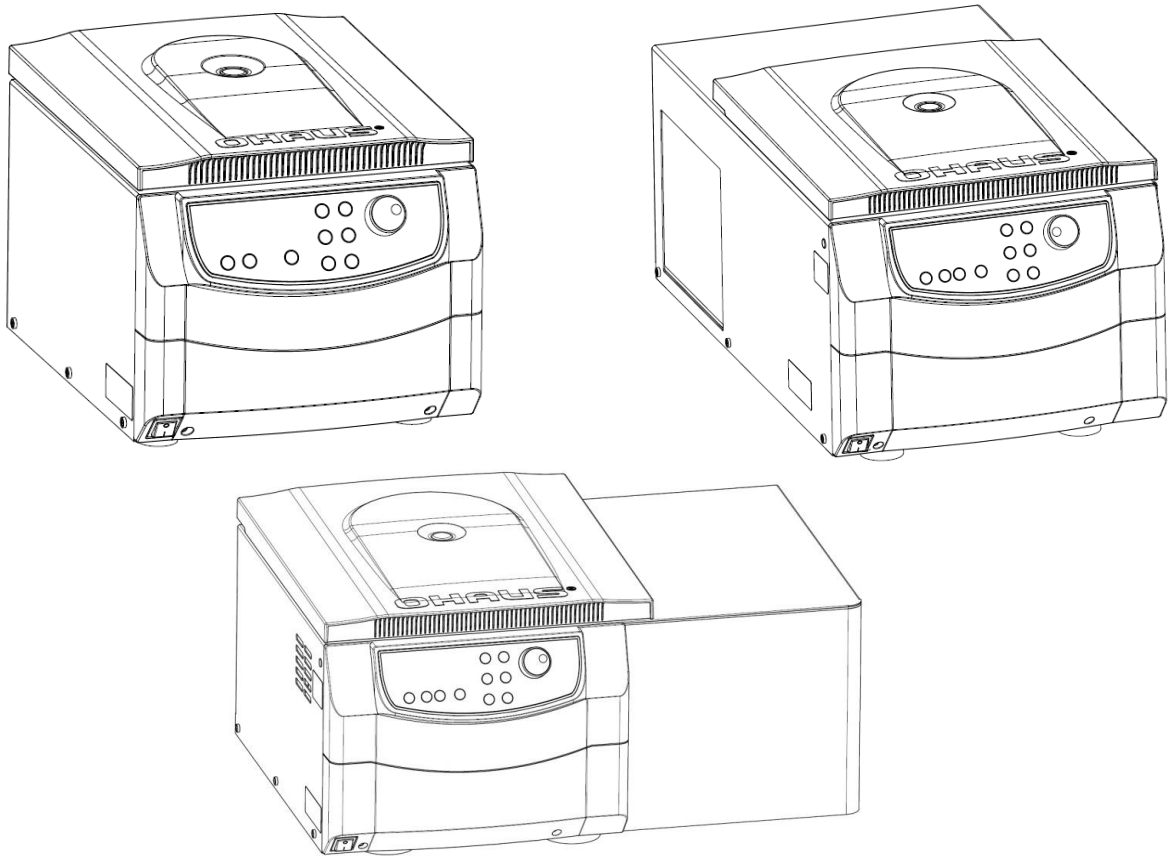
Frontier™ Centrifuge
FC5714/FC5718/FC5718R/FC5816/FC5816R
Instruction Manual

Centrífuga Frontier™
FC5714/FC5718/FC5718R/FC5816/FC5816R
Manual de instrucciones

Centrifugeuse Frontier™
FC5714/FC5718/FC5718R/FC5816/FC5816R
Manuel d'instructions

Frontier™ Zentrifuge
FC5714/FC5718/FC5718R/FC5816/FC5816R
Bedienungsanleitung

Frontier™ Centrifuga
FC5714/FC5718/FC5718R/FC5816/FC5816R
Manuale di Istruzioni



Front and rear view of the centrifuge FC5714/5718/FC5816

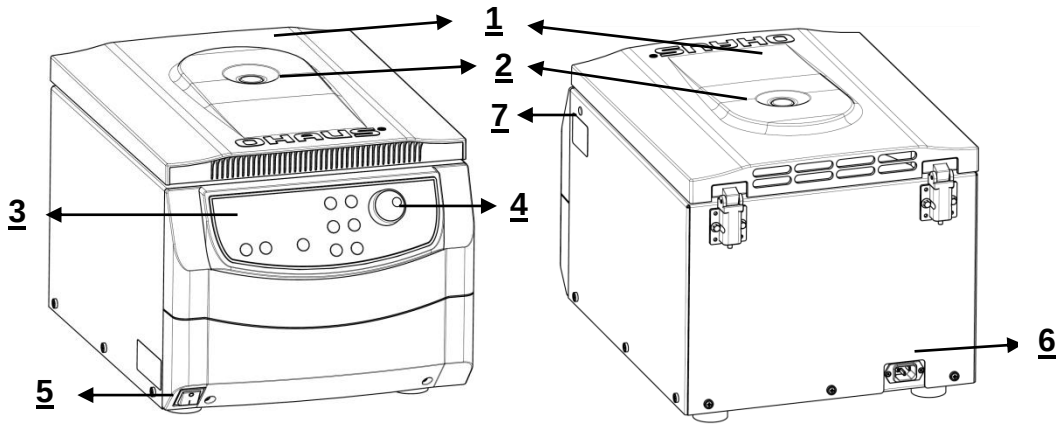


Figure.1

Front and rear view of the centrifuge FC5718R

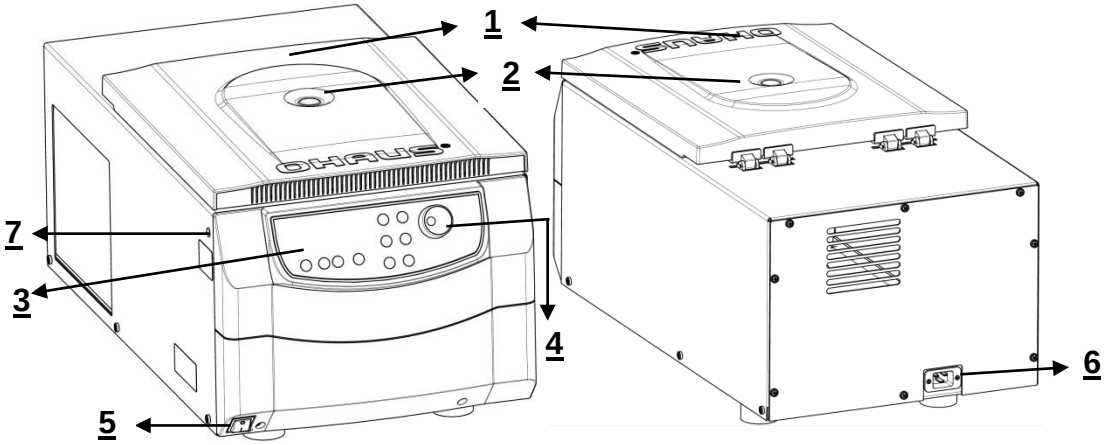


Figure.2

Front and rear view of the centrifuge FC5816R

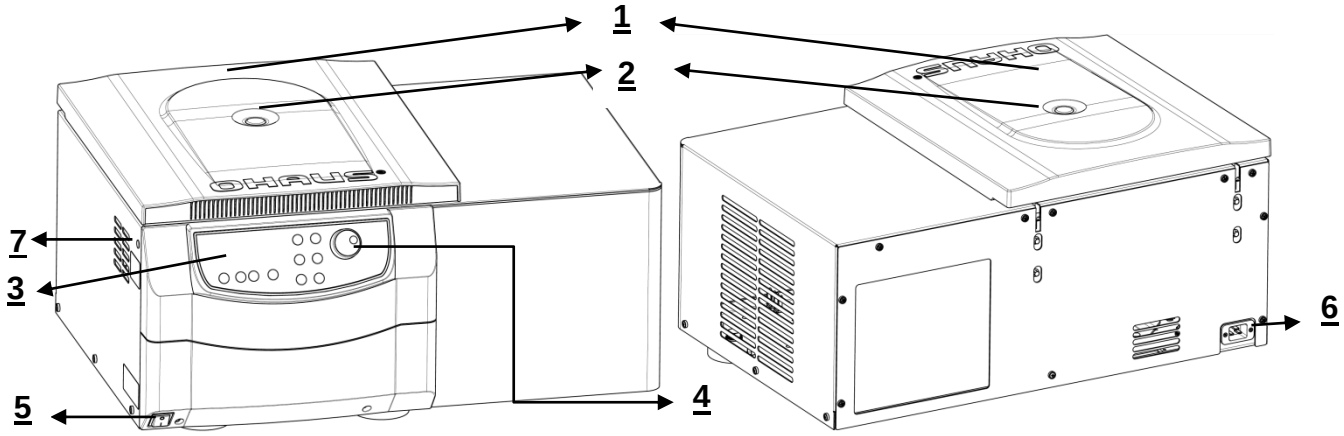


Figure.3

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**

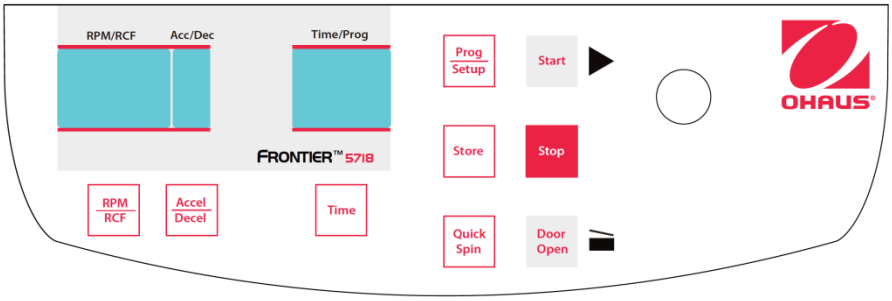


Figure.4

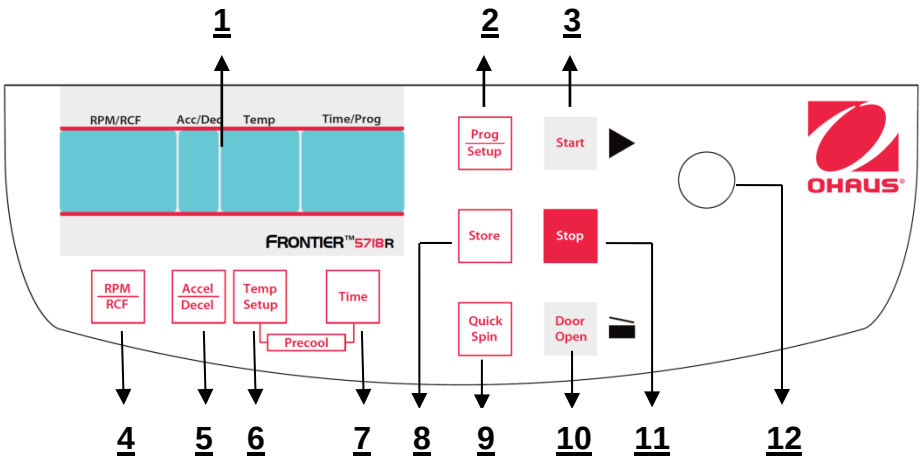


Figure.5

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.

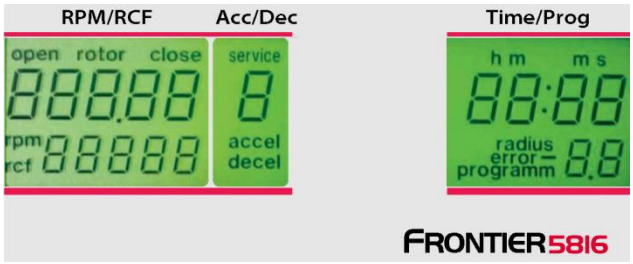


Figure.6

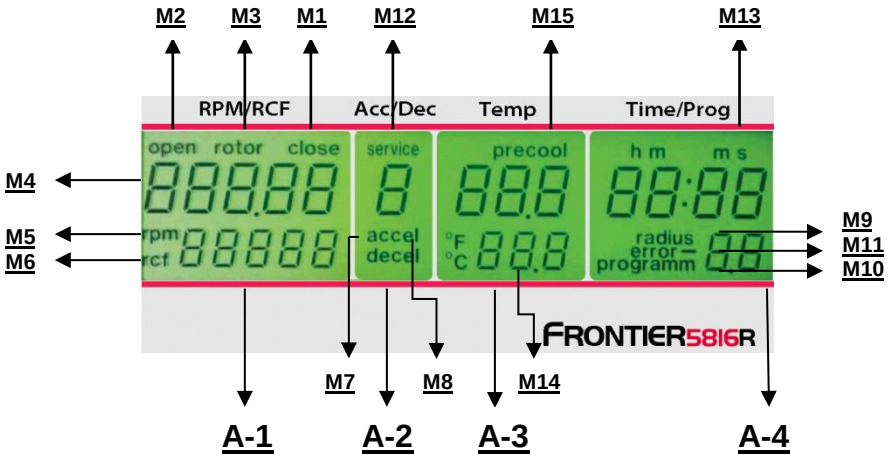


Figure.7

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/logos 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 for FC5714

Rotor No. display	Order No.	Capacity	Compatible
22	30314822	Rotor, Swing out, 4x100ml, ID	5714|5718(R)
23	30314823	Rotor, Swing out, 4x100ml, ID, Sealable	5714|5718(R)
24	30314824	Rotor, Swing out, 2x3MTP, ID	5714|5718(R)|5816(R)
30	30314830	Rotor, Angle, 6x50ml RB/FA, ID	5714|5718(R)
32	30314832	Rotor, Angle, 30x15ml RB/FA, ID	5714|5718(R)|5816(R)
34	30314834	Rotor, Angle, 12x15ml RB/FA, ID	5714|5718(R)
36	30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	5714|5718(R)
61	30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	5714|5718(R)|5816(R)
38	30314838	Rotor, Angle, 24x1.5/2.0ml, ID	5714|5718(R)|5816(R)

Rotor Information Table for FC5718(R)

Rotor No. display	Order No.	Capacity	Compatible
22	30314822	Rotor, Swing out, 4x100ml, ID	5714|5718(R)
23	30314823	Rotor, Swing out, 4x100ml, ID, Sealable	5714|5718(R)
24	30314824	Rotor, Swing out, 2x3MTP, ID	5714|5718(R)|5816(R)
25	30314825	Rotor, Angle, 6x85ml RB, ID, Hi	5718(R)
26	30314826	Rotor, Angle, 6x85ml RB, ID	5718(R)|5816(R)
27	30314827	Rotor, Angle, 4x85ml RB, ID, Hi	5718(R)|5816(R)
29	30314829	Rotor, Angle, 10x50ml FA, ID	5718(R)|5816(R)
31	30314831	Rotor, Angle, 6x50ml RB, ID, Hi	5718(R)|5816(R)
30	30314830	Rotor, Angle, 6x50ml RB/FA, ID	5714|5718(R)
32	30314832	Rotor, Angle, 30x15ml RB/FA, ID	5714|5718(R)|5816(R)
33	30314833	Rotor, Angle, 20x10ml RB, ID, Hi	5718(R)|5816(R)
34	30314834	Rotor, Angle, 12x15ml RB/FA, ID	5714|5718(R)
35	30314835	Rotor, Angle, 44x1.5/2.0ml, ID	5718(R)|5816(R)
36	30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	5714|5718(R)
61	30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	5714|5718(R)|5816(R)
38	30314838	Rotor, Angle, 24x1.5/2.0ml, ID	5714|5718(R)|5816(R)
39	30314839	Rotor, Angle, 12x1.5/2.0ml, ID	5718(R)
40	30314840	Rotor, Angle, 64x0.5ml, ID	5718(R)
41	30314841	Rotor, Angle, 4x8-w PCR Strip, ID	5718(R)

Rotor Information Table for FC5816(R)

Rotor No. display	Order No.	Capacity	Compatible
20	30314820	Rotor, Swing out, 4x250ml, ID	5816(R)
24	30314824	Rotor, Swing out, 2x3MTP, ID	5714|5718(R)|5816(R)
28	30314828	Rotor, Swing out, 16x50ml, ID	5816(R)
21	30314821	Rotor, Angle, 6x250ml FB, ID	5816(R)
26	30314826	Rotor, Angle, 6x85ml RB, ID	5718(R)|5816(R)
27	30314827	Rotor, Angle, 4x85ml RB, ID, Hi	5718(R)|5816(R)
29	30314829	Rotor, Angle, 10x50ml FA, ID	5718(R)|5816(R)
31	30314831	Rotor, Angle, 6x50ml RB, ID, Hi	5718(R)|5816(R)
32	30314832	Rotor, Angle, 30x15ml RB/FA, ID	5714|5718(R)|5816(R)
33	30314833	Rotor, Angle, 20x10ml RB, ID, Hi	5718(R)|5816(R)
35	30314835	Rotor, Angle, 44x1.5/2.0ml, ID	5718(R)|5816(R)
61	30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	5714|5718(R)|5816(R)
38	30314838	Rotor, Angle, 24x1.5/2.0ml, ID	5714|5718(R)|5816(R)

TABLE OF CONTENTS

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™ FC5714/FC5718/FC5718R/FC5816/FC5816Rto avoid incorrect operation.

Frontier™ FC5714/FC5718/FC5718R/FC5816/FC5816R 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 are non-refrigerated universal centrifuges.

The models FC5718R/FC5816R are refrigerated universal centrifuges.

All three 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

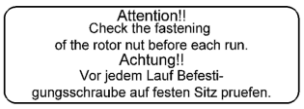

Biohazard


Explosion

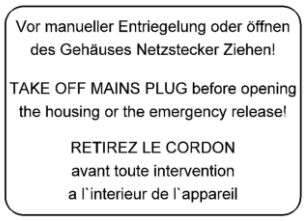

Crushing

Warning and information signs on the surface of centrifuge

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.



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

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 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
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 and FC5816R, 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

Figure. 9

Snap-on lid

Screw-on lid

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!

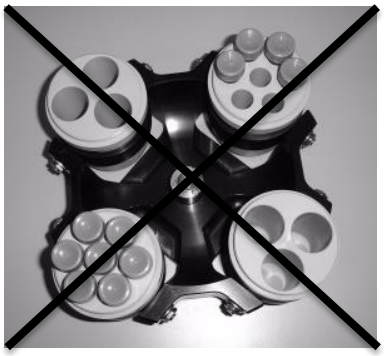


Figure.13 WRONG

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:

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

Example:

n_{red} = $\sqrt{\frac{1,2}{1,7}}$ x 4.000 = 3.360 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:

$RCF = 1.117862*10^{-5}*n^2*r_{max}$
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.

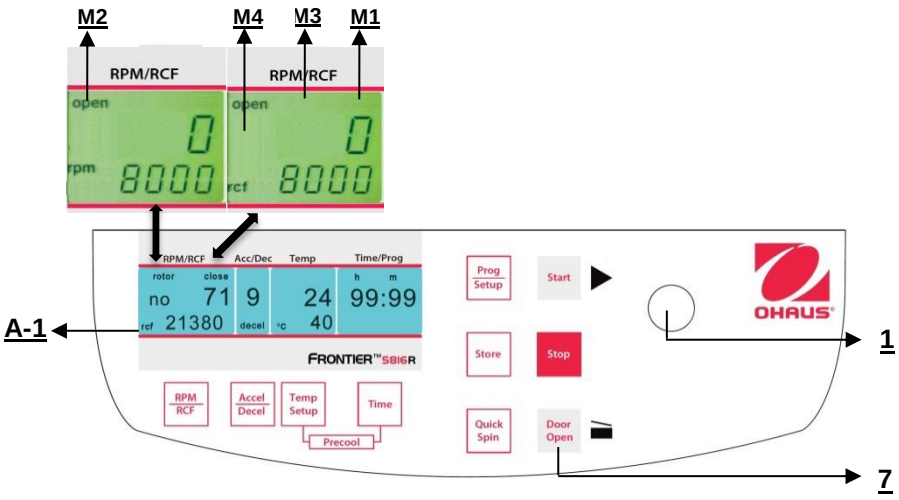


Figure. 15

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.

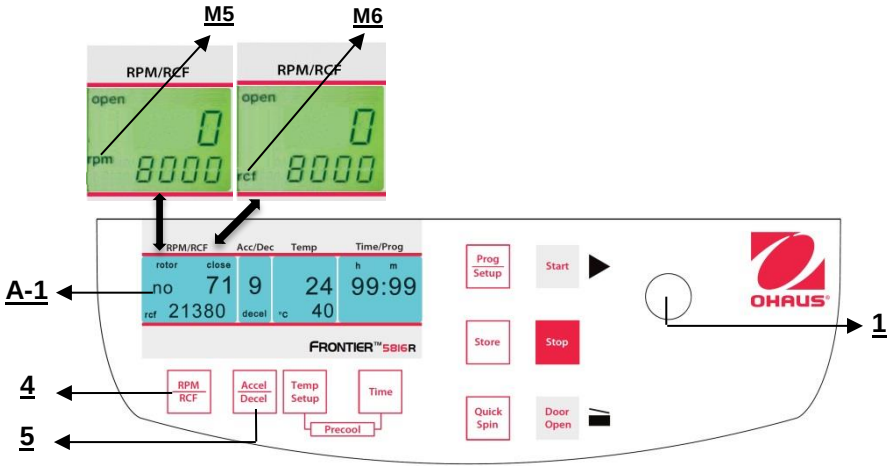


Figure. 16

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 20 x g and the maximum permissible centrifugal force of the rotor.
See **"Table 4: 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)

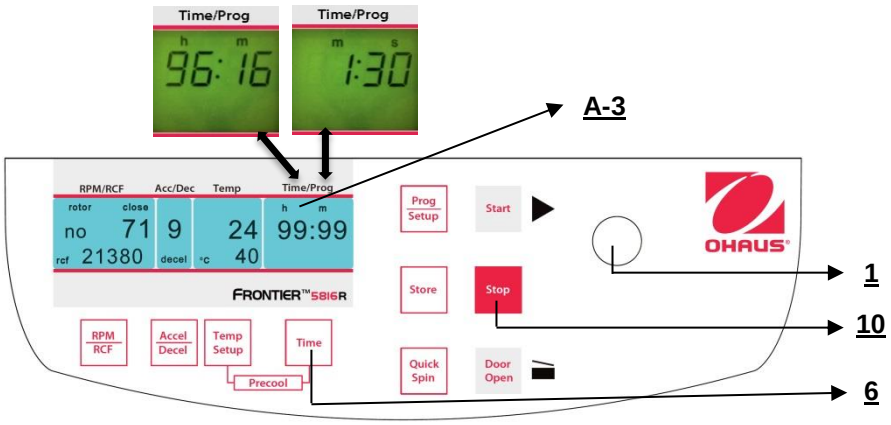


Figure. 17

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.

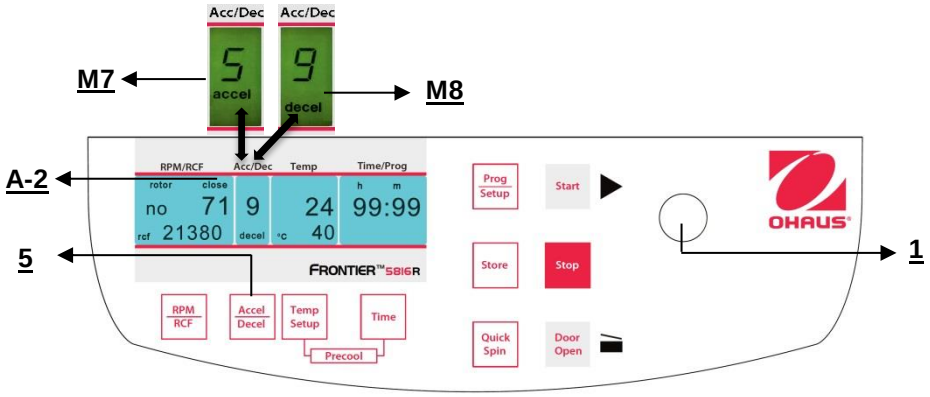


Figure. 18

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!

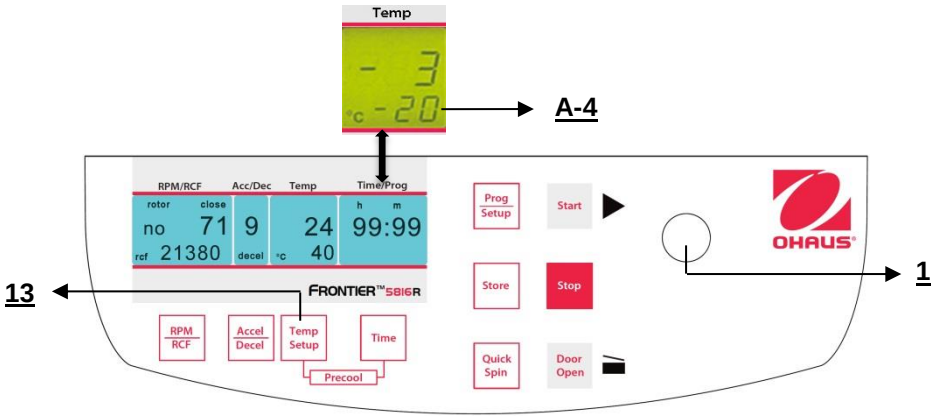


Figure. 19

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.

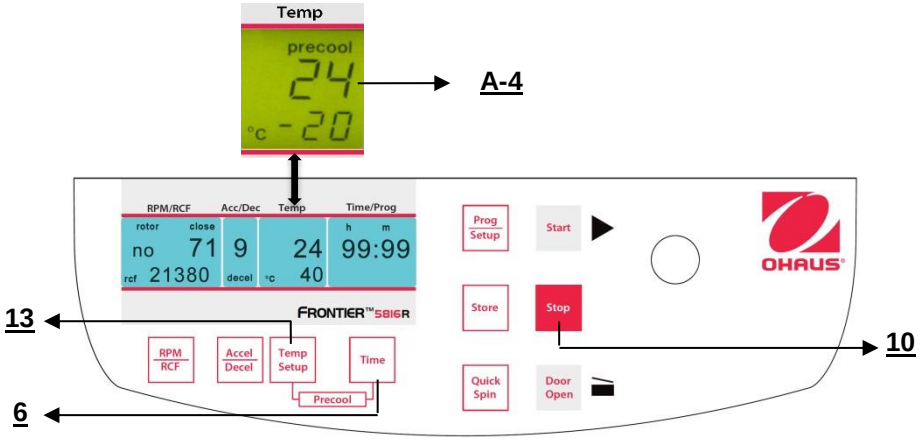


Figure. 20

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.

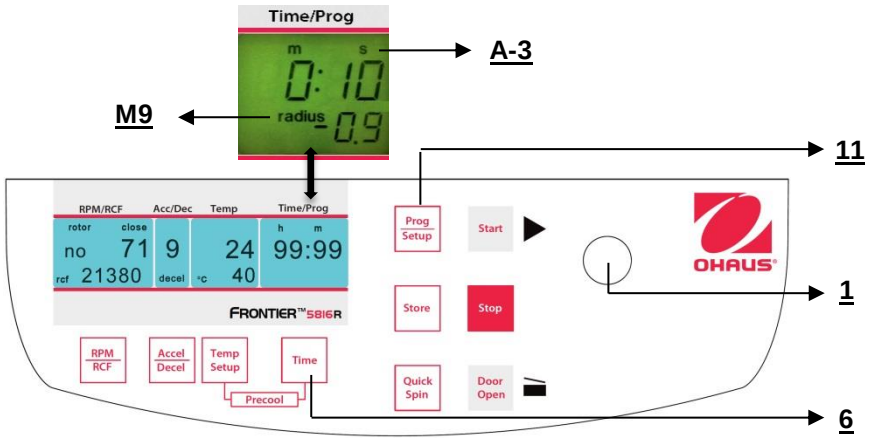


Figure. 21

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.

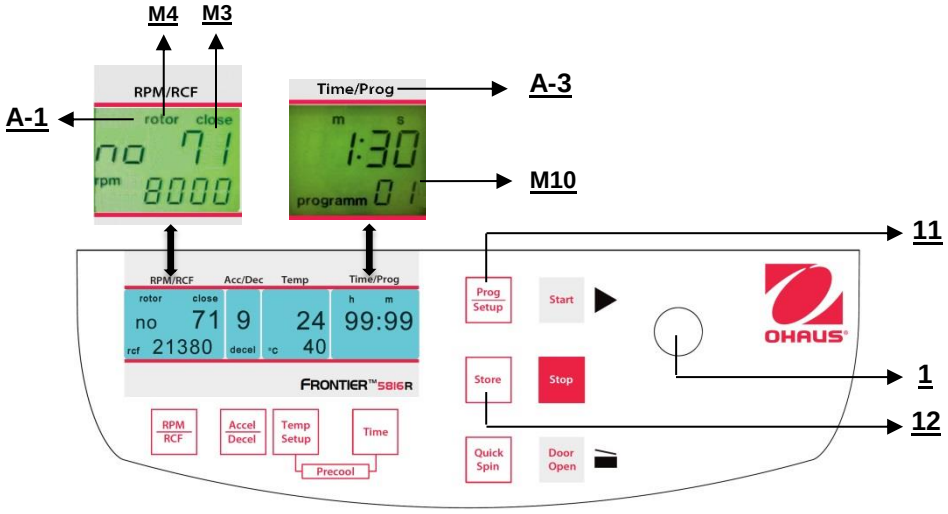


Figure. 22

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.

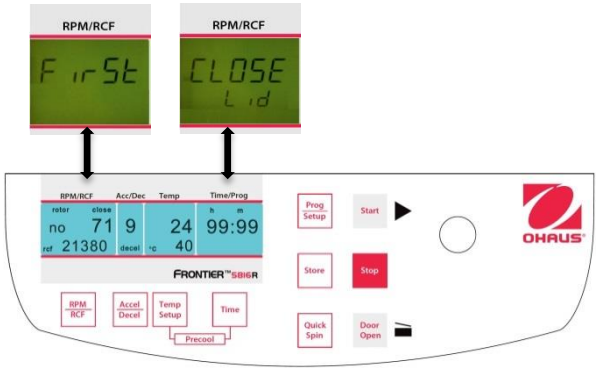


Figure. 23

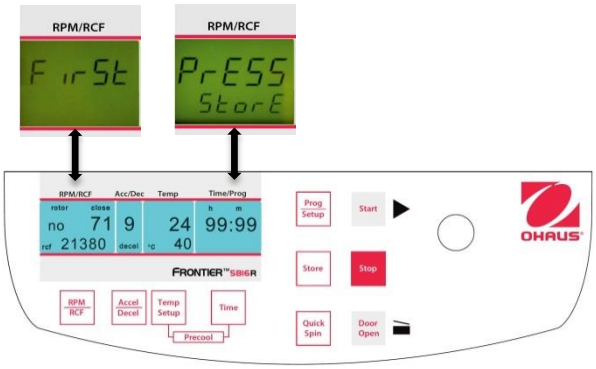


Figure. 24

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.

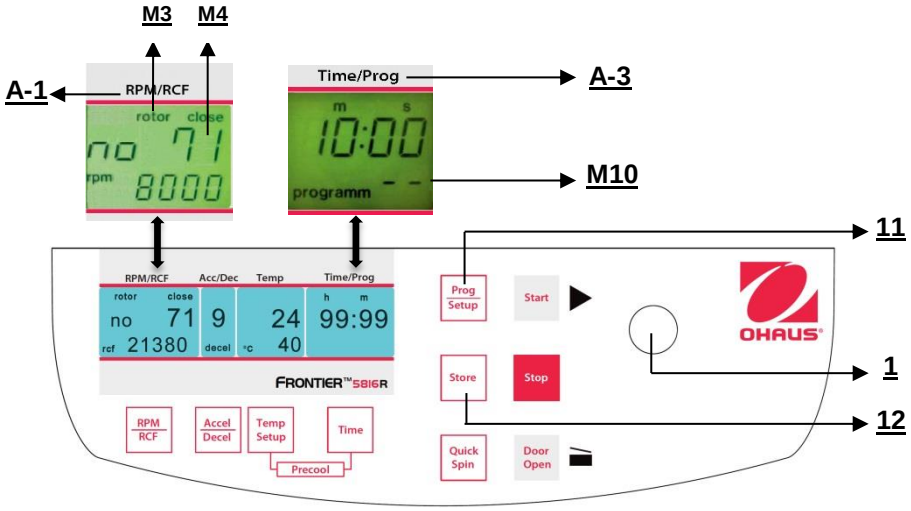


Figure. 25

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.

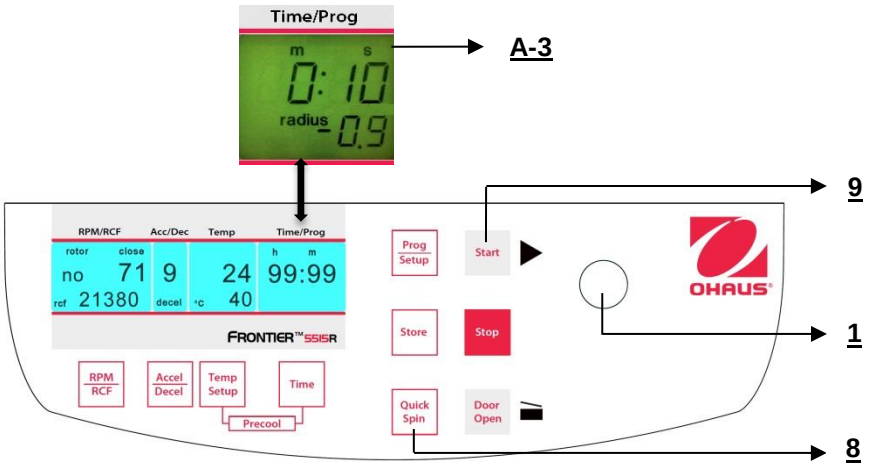


Figure. 26

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.

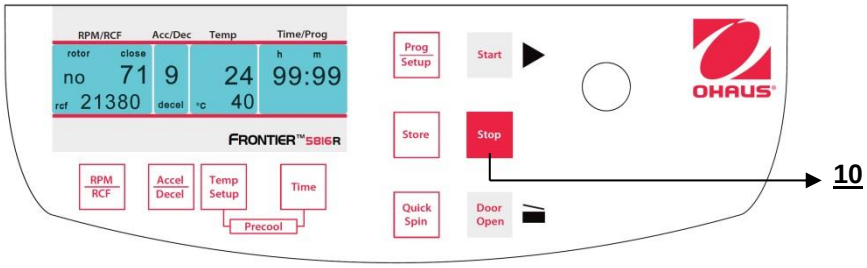


Figure. 27

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.

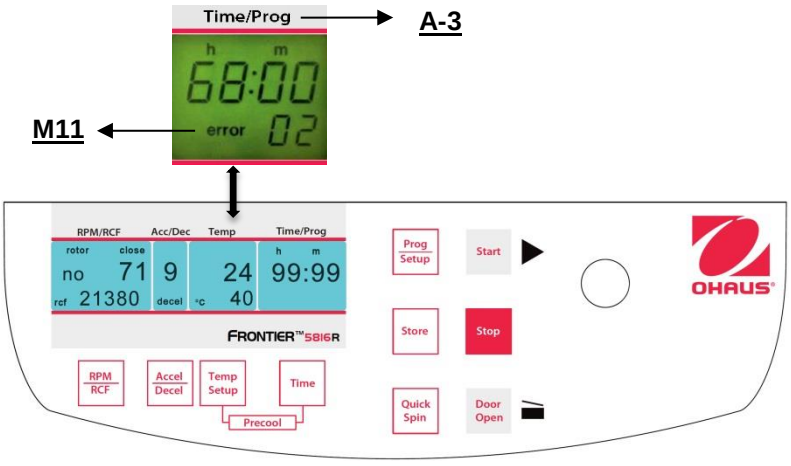


Figure. 28

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).

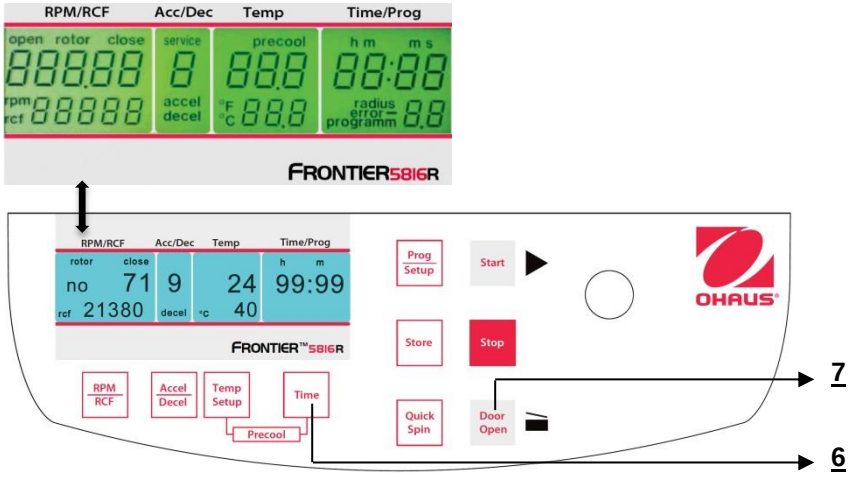


Figure. 29

ATTENTION:
Please notice that you must enter the program as described under point 4.1.1 to change the adjustments of the points 4.1.2 - 4.1.7. After you have stored the settings you can change to normal program mode again by switching off 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!

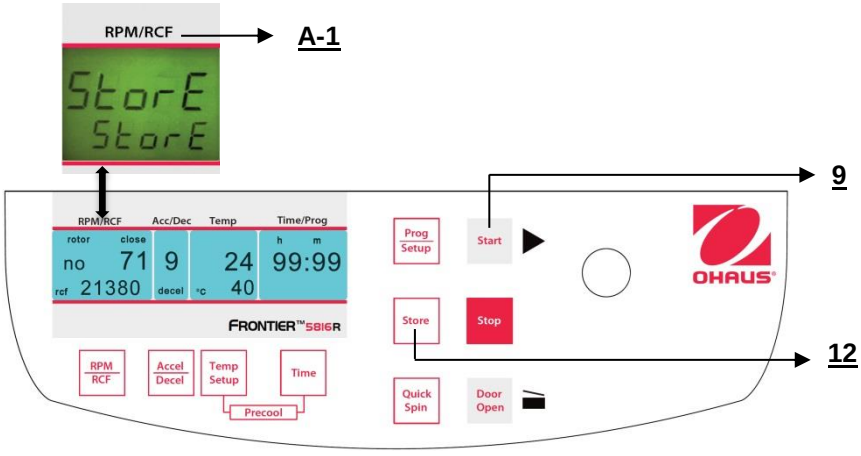


Figure. 30

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.

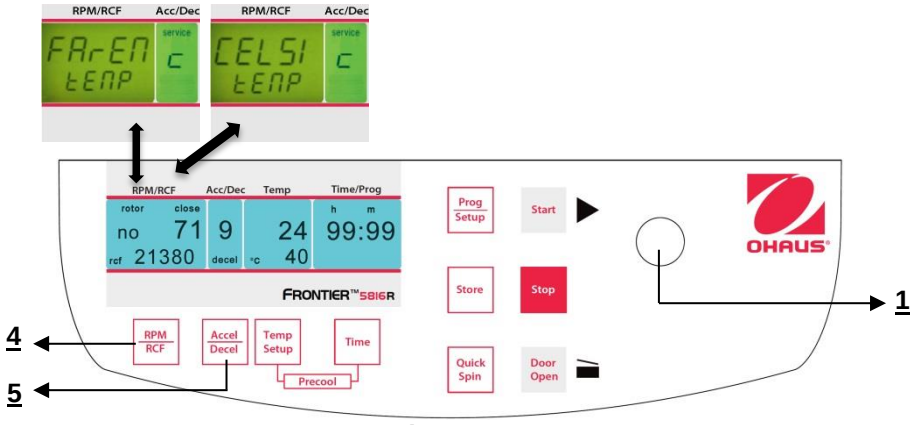


Figure. 31

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.

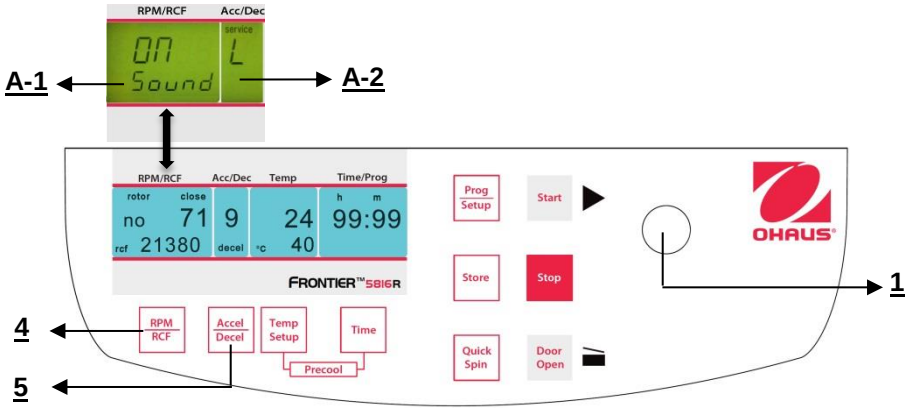


Figure. 32

4.1.4 Volume pre-selection of sound signal

Proceed as described under point 4.1.1to 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.

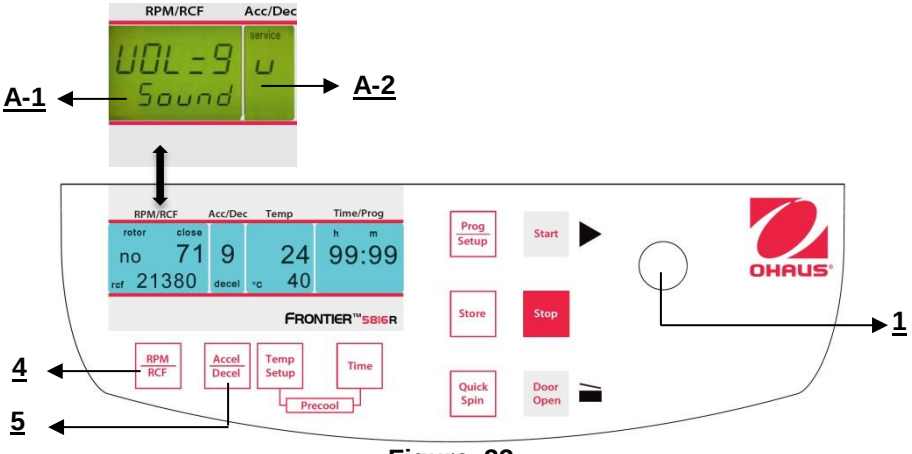


Figure. 33

4.1.5 Song selection for sound signal - end of run

Proceed as described under point 4.1.1to 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.

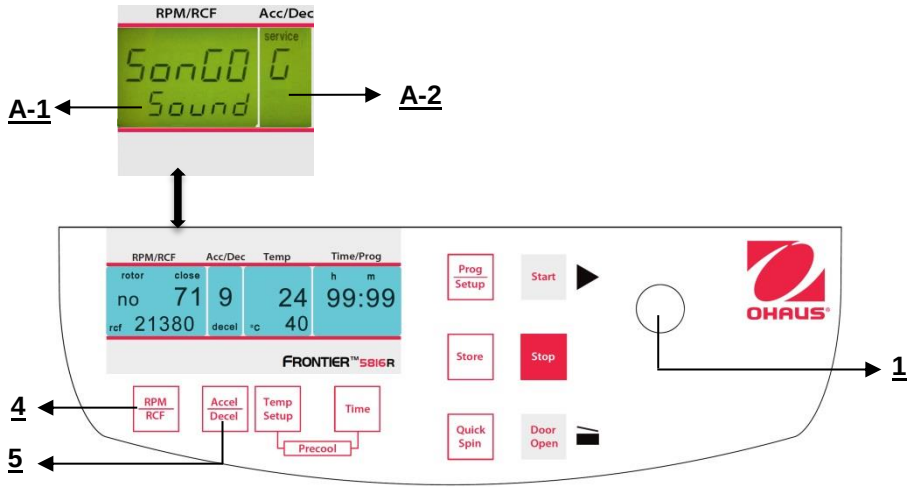


Figure. 34

4.1.6 Keyboard sound turn on / off

Proceed as described under point 4.1.1to 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.

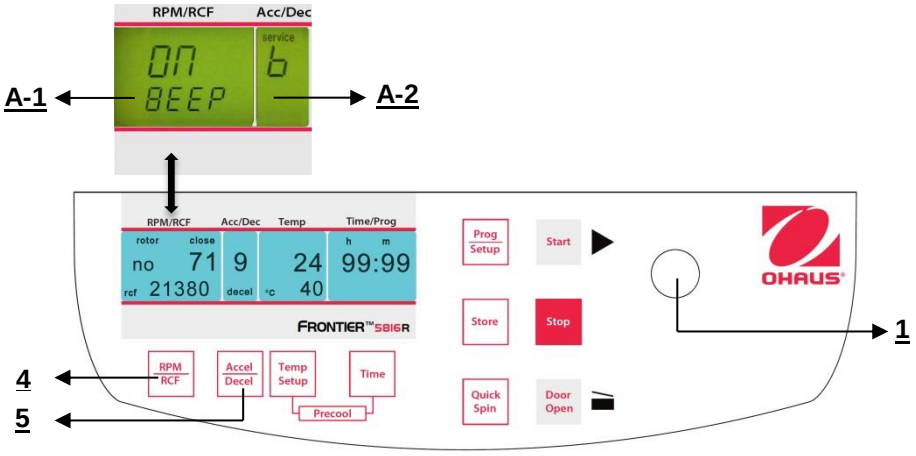


Figure. 35

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.

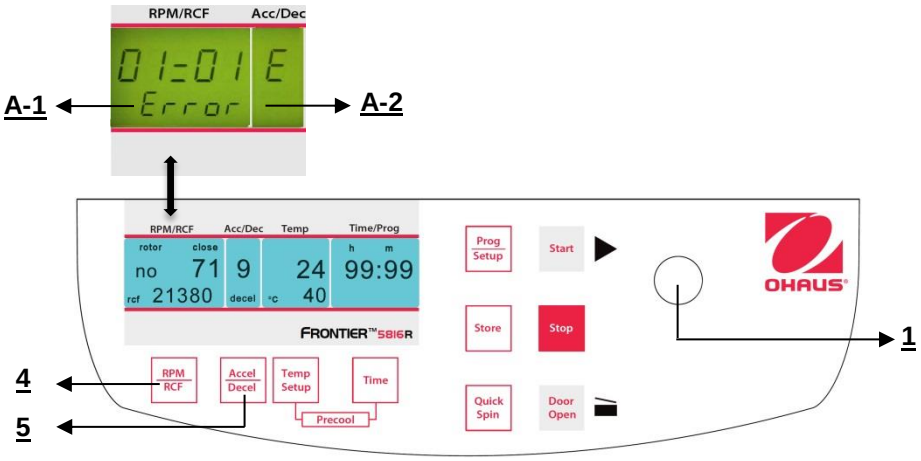


Figure. 36

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, 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 (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:

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.**

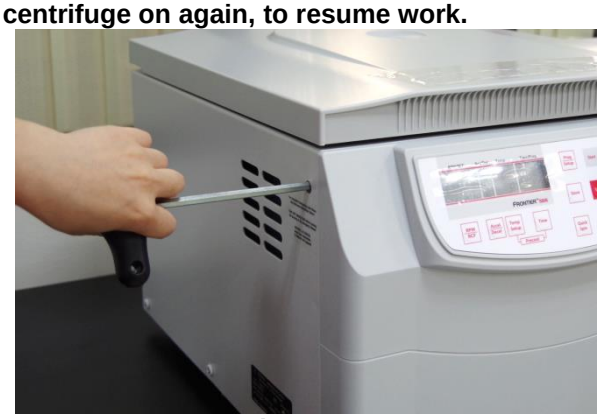


Figure. 37

For 5714

Please proceed as follows (see Figure xx):

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).

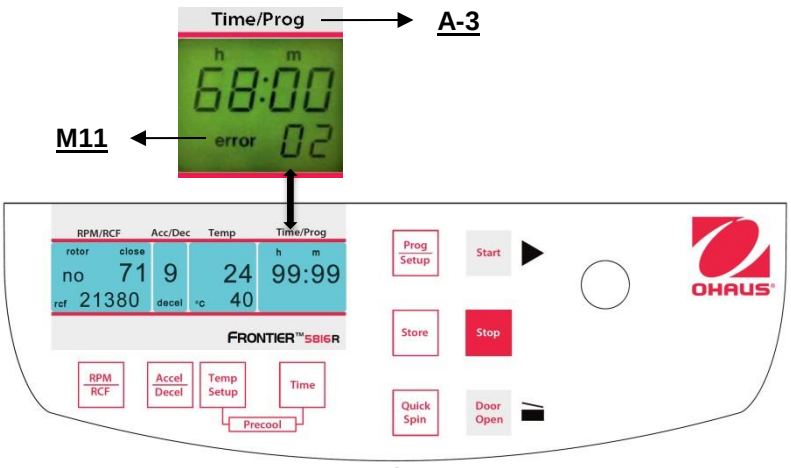


Figure. 39

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℃	
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

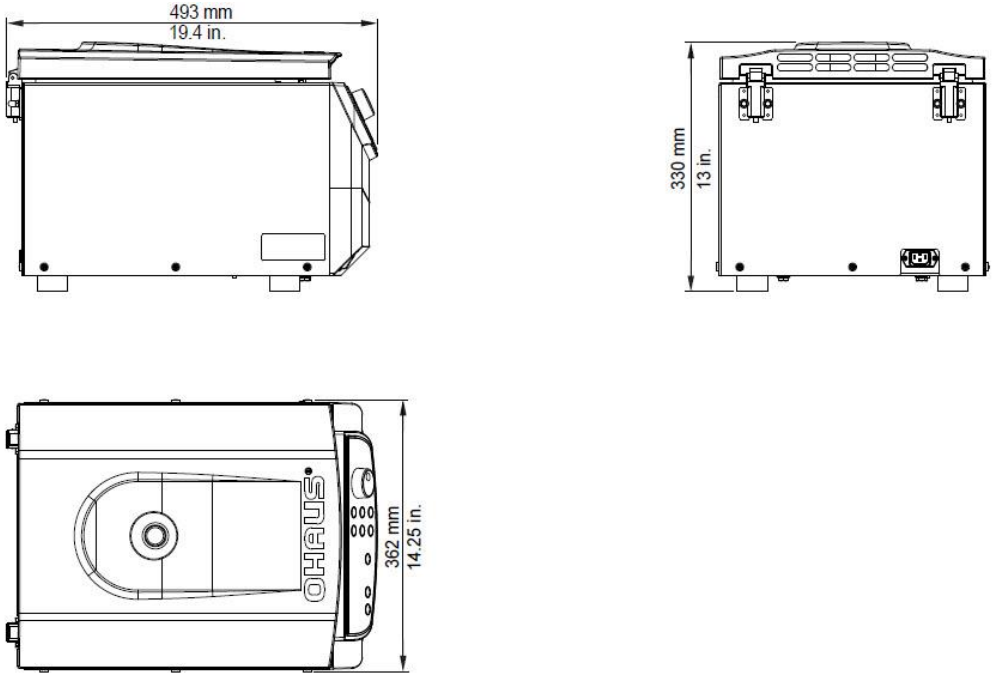
Model	**FC5816**	
Speed Range	200 rpm -15000 rpm;10 rpm/set	
Maximum RCF	21379 x g;10 x g/set	
Maximum Capacity(Rotor)	6 x 250ml	
Temperature range(N/A)	Air cool	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 61 ± 2 dB(A)	
Allowable density at maximum 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

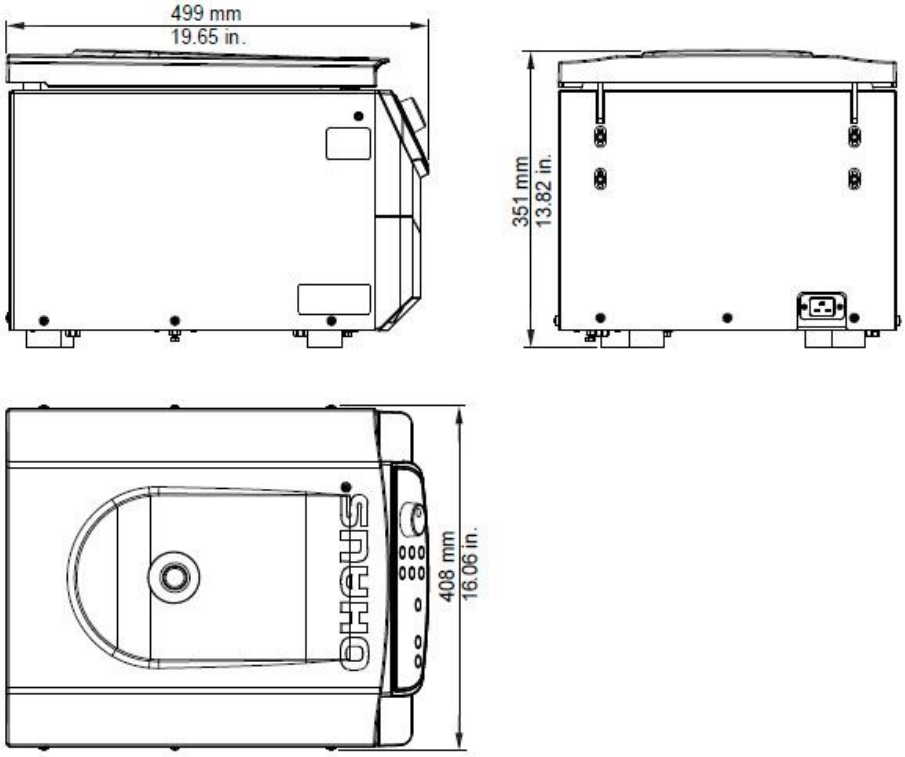
Model	**FC5816R**	
Speed Range	200 rpm -16000 rpm;10 rpm/set	
Maximum RCF	24325 x g;10 x g/set	
Maximum Capacity(Rotor)	6 x 250ml	
Temperature range(Digital)	-20~40℃	
Running Time	10 sec to 99 hr 59 min 59 sec or continuous	
Noise level (depending on the rotor)	≤ 63 ± 2 dB(A)	
Allowable density at maximum 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.		

9.2 Drawings and dimensions

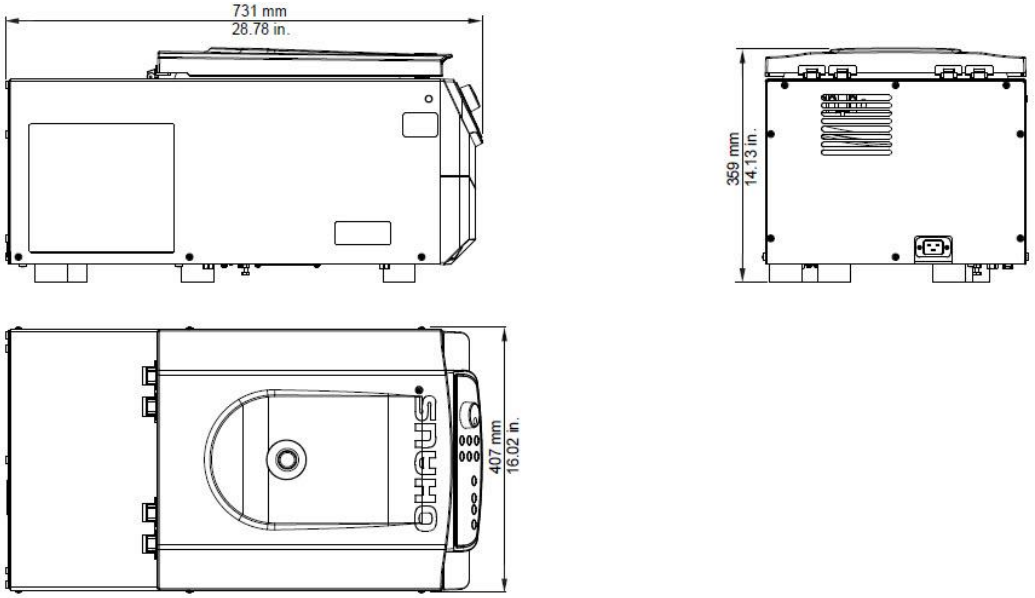
Dimensions for FC5714



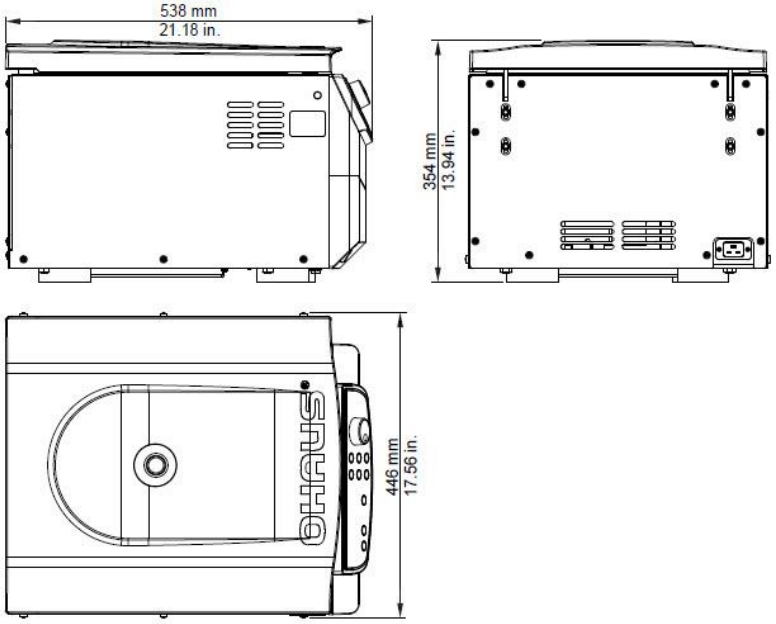
Dimensions for FC5718



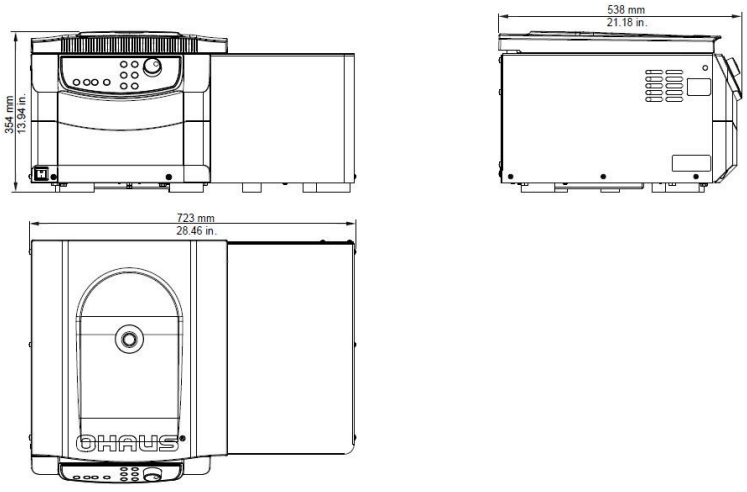
Dimensions for FC5718R



Dimensions for FC5816



Dimensions for FC5816R



10. COMPLIANCE

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

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

	**Disposal** In conformance with the European Directive 2002/96/EC 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. Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment. If you have any questions, please contact the responsible authority or the distributor from which you purchased this device. Should this device be passed on to other parties (for private or professional use), the content of this regulation must also be related. For disposal instructions in Europe, refer to www.ohaus.com/weee. Thank you for your contribution to environmental protection.

11. APPENDIX

11.1 Table 1:EC Declaration of Conformity

EU Declaration of Conformity

Type: **Frontier laboratory centrifuges**

Manufacturer: **OHAUS Corporation**
7 Campus Drive #310
Parsippany, NJ 07054
United States of America

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration: **FC5714, FC5718, FC5718R, FC5816, FC5816R**

The object of the declaration described above is in conformity with the following European directives and standards or normative documents:

Marking	EU Directive	Harmonized standards Normative documents
CE	**2014/30/EU** (OJEU, 2014, L96, p79)	**EN 61326-1:2013**
	2014/35/EU (OJEU, 2014, L96, p357)	**EN 61010-1:2010, EN 61010-2-020:2006**
	2011/65/EU (OJEU, 2011, L174, p88)	**EN 50581:2012**

Place: Parsippany, NJ 07054, USA
Issued: 2016-04-20

Ted Xia
President

Robert Hansen
Compliance Manager

11.2 Table 2: Permissible net weight

5714

Rotor number	Rotor Description	Max. speed	Permissible net weight
30314822	Rotor, Swing out, 4x100ml, ID	4500 rpm	4x340 g
30314823	Rotor, Swing out, 4x100ml, ID, Sealable	4000 rpm	4x465 g
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	2x310 g
30314830	Rotor, Angle, 6x50ml RB/FA, ID	6000 rpm	6x72 g
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	30x32 g
30314834	Rotor, Angle, 12x15ml RB/FA, ID	6000 rpm	12x25 g
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	12000 rpm	30x3.4 g
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	14000 rpm	24x3.4 g
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	14000 rpm	24x3.4 g

5718/5718R

Rotor number	Rotor Description	Max. speed 5718	Max. speed 5718R	Permissible net weight
30314822	Rotor, Swing out, 4x100ml, ID	4500 rpm	4500 rpm	4x340 g
30314823	Rotor, Swing out, 4x100ml, ID, Sealable	5000 rpm	5000 rpm	4x465 g
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	4500 rpm	2x310 g
30314825	Rotor, Angle, 6x85ml RB, ID, Hi	11000 rpm	13500 rpm	6x140 g
30314826	Rotor, Angle, 6x85ml RB, ID	9000 rpm	9000 rpm	6x140 g
30314827	Rotor, Angle, 4x85ml RB, ID, Hi	12000 rpm	12000 rpm	4x140 g
30314829	Rotor, Angle, 10x50ml FA, ID	7500 rpm	7500 rpm	10x74 g
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	12000 rpm	12000 rpm	6x94 g
30314830	Rotor, Angle, 6x50ml RB/FA, ID	6000 rpm	6000 rpm	6x72 g
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	4500 rpm	30x32 g
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	12000 rpm	12000 rpm	20x18 g
30314834	Rotor, Angle, 12x15ml RB/FA, ID	6000 rpm	6000 rpm	12x25 g
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	13500 rpm	13500 rpm	44x3.8 g
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	13000 rpm	14000 rpm	30x3.4 g
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	14000 rpm	15000 rpm	24x3.4 g
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	14000 rpm	15000 rpm	24x3.4 g
30314839	Rotor, Angle, 12x1.5/2.0ml, ID	18000 rpm	18000 rpm	12x3.4 g
30314840	Rotor, Angle, 64x0.5ml, ID	13500 rpm	13500 rpm	64x2.3 g
30314841	Rotor, Angle, 4x8-w PCR Strip, ID	15000 rpm	15000 rpm	4x3.5 g

5816/5816R

Rotor number	Rotor Description	Max. speed 5816	Max. speed 5816R	Permissible net weight
30314820	Rotor, Swing out, 4x250ml, ID	4500 rpm	4500 rpm	4x536 g
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	4500 rpm	2x310 g
30314828	Rotor, Swing out, 16x50ml, ID	4500 rpm	4500 rpm	4x557 g
30314821	Rotor, Angle, 6x250ml FB, ID	8000 rpm	8000 rpm	6x355 g
30314826	Rotor, Angle, 6x85ml RB, ID	11000 rpm	13000 rpm	6x140 g
30314827	Rotor, Angle, 4x85ml RB, ID, Hi	12000 rpm	12000 rpm	4x140 g
30314829	Rotor, Angle, 10x50ml FA, ID	9000 rpm	10500 rpm	10x74 g
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	13000 rpm	13000 rpm	6x94 g
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	4500 rpm	30x32 g
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	12000 rpm	12000 rpm	20x18 g
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	15000 rpm	16000 rpm	44x3.8 g
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	15000 rpm	16000 rpm	24x3.4 g
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	15000 rpm	16000 rpm	24x3.4 g

11.3 Table 3: Lowest temperatures at max. speed (Only Refrigerated Models)

5718R

Rotor number	Rotor Description	Max. speed	N-max
30314822	Rotor, Swing out, 4x100ml, ID	4500 rpm	-7 °C
30314823	Rotor, Swing out, 4x100ml, ID, Sealable	5000 rpm	-3 °C
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	-6 °C
30314825	Rotor, Angle, 6x85ml RB, ID, Hi	13500 rpm	17 °C
30314826	Rotor, Angle, 6x85ml RB, ID	9000 rpm	-5 °C
30314827	Rotor, Angle, 4x85ml RB, ID, Hi	12000 rpm	5 °C
30314829	Rotor, Angle, 10x50ml FA, ID	7500 rpm	9 °C
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	12000 rpm	-5 °C
30314830	Rotor, Angle, 6x50ml RB/FA, ID	6000 rpm	-8 °C
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	-9 °C
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	12000 rpm	2 °C
30314834	Rotor, Angle, 12x15ml RB/FA, ID	6000 rpm	-11.5 °C
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	13500 rpm	1 °C
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	14000 rpm	9 °C
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	15000 rpm	6 °C
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	15000 rpm	6 °C
30314839	Rotor, Angle, 12x1.5/2.0ml, ID	18000 rpm	-2 °C
30314840	Rotor, Angle, 64x0.5ml, ID	13500 rpm	2 °C
30314841	Rotor, Angle, 4x8-w PCR Strip, ID	15000 rpm	-1 °C

5816R

Rotor number	Rotor Description	Max. speed	N-max
30314820	Rotor, Swing out, 4x250ml, ID	4500 rpm	-2°C
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	-3°C
30314828	Rotor, Swing out, 16x50ml, ID	4500 rpm	2°C
30314821	Rotor, Angle, 6x250ml FB, ID	8000 rpm	3°C
30314826	Rotor, Angle, 6x85ml RB, ID	13000 rpm	15°C
30314827	Rotor, Angle, 4x85ml RB, ID, Hi	12000 rpm	5°C
30314829	Rotor, Angle, 10x50ml FA, ID	10500 rpm	9°C
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	13000 rpm	0°C
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	-12°C
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	12000 rpm	0°C
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	16000 rpm	8°C
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	16000 rpm	3°C
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	16000 rpm	3°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.

11.4 Table 4: Max. speed and RCF-values for permissible rotors

5714

Rotor number	Rotor Description	Max. Speed	
		RPM	RCF
30314822	Rotor, Swing out, 4x100ml, ID	4500 rpm	3350 xg
30314823	Rotor, Swing out, 4x100ml, ID, Sealable	4000 rpm	2486 xg
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	2716 xg
30314830	Rotor, Angle, 6x50ml RB/FA, ID	6000 rpm	4427 xg
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	2830 xg
30314834	Rotor, Angle, 12x15ml RB/FA, ID	6000 rpm	4427 xg
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	12000 rpm	15131 xg
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	14000 rpm	18624 xg
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	14000 rpm	18624 xg

5718/5718R

Rotor number	Rotor Description	Max. Speed FC5718		Max. Speed FC5718R	
		RPM	RCF	RPM	RCF
30314822	Rotor, Swing out, 4x100ml, ID	4500 rpm	3350 xg	4500 rpm	3350 xg
30314823	Rotor, Swing out, 4x100ml, ID, Sealable	5000 rpm	3885 xg	5000 rpm	3885 xg
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	2716 xg	4500 rpm	2716 xg
30314825	Rotor, Angle, 6x85ml RB, ID, Hi	11000 rpm	13932 xg	13500 rpm	20984 xg
30314826	Rotor, Angle, 6x85ml RB, ID	9000 rpm	10413 xg	9000 rpm	10413 xg
30314827	Rotor, Angle, 4x85ml RB, ID, Hi	12000 rpm	14809 xg	12000 rpm	14809 xg
30314829	Rotor, Angle, 10x50ml FA, ID	7500 rpm	8174 xg	7500 rpm	8174 xg
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	12000 rpm	13522 xg	12000 rpm	13522 xg
30314830	Rotor, Angle, 6x50ml RB/FA, ID	6000 rpm	4427 xg	6000 rpm	4427 xg
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	2830 xg	4500 rpm	2830 xg

30314833	Rotor, Angle, 20x10ml RB, ID, Hi	12000 rpm	15775 xg	12000 rpm	15775 xg
30314834	Rotor, Angle, 12x15ml RB/FA, ID	6000 rpm	4427 xg	6000 rpm	4427 xg
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	13500 rpm	17113 xg	13500 rpm	17113 xg
30314836	Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	13000 rpm	17758 xg	14000 rpm	20595 xg
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	14000 rpm	18624 xg	15000 rpm	21379 xg
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	14000 rpm	18624 xg	15000 rpm	21379 xg
30314839	Rotor, Angle, 12x1.5/2.0ml, ID	18000 rpm	23542 xg	18000 rpm	23542 xg
30314840	Rotor, Angle, 64x0.5ml, ID	13500 rpm	16298 xg	13500 rpm	16298 xg
30314841	Rotor, Angle, 4x8-w PCR Strip, ID	15000 rpm	15343 xg	15000 rpm	15343 xg

5816/5816R

Rotor number	**Rotor Description**	**Max. Speed FC5816**		**Max. Speed FC5816R**	
		RPM	**RCF**	**RPM**	**RCF**
30314820	Rotor, Swing out, 4x250ml, ID	4500 rpm	3780 xg	4500 rpm	3780 xg
30314824	Rotor, Swing out, 2x3MTP, ID	4500 rpm	2716 xg	4500 rpm	2716 xg
30314828	Rotor, Swing out, 16x50ml, ID	4500 rpm	3735 xg	4500 rpm	3735 xg
30314821	Rotor, Angle, 6x250ml FB, ID	8000 rpm	10016 xg	8000 rpm	10016 xg
30314826	Rotor, Angle, 6x85ml RB, ID	11000 rpm	15555 xg	13000 rpm	21726 xg
30314827	Rotor, Angle, 4x85ml RB, ID, Hi	12000 rpm	14809 xg	12000 rpm	14809 xg
30314829	Rotor, Angle, 10x50ml FA, ID	9000 rpm	11771 xg	10500 rpm	16022 xg
30314831	Rotor, Angle, 6x50ml RB, ID, Hi	13000 rpm	15869 xg	13000 rpm	15869 xg
30314832	Rotor, Angle, 30x15ml RB/FA, ID	4500 rpm	2830 xg	4500 rpm	2830 xg
30314833	Rotor, Angle, 20x10ml RB, ID, Hi	12000 rpm	15775 xg	12000 rpm	15775 xg
30314835	Rotor, Angle, 44x1.5/2.0ml, ID	15000 rpm	21128 xg	16000 rpm	24039 xg
30304361	Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	15000 rpm	21379 xg	16000 rpm	24325 xg
30314838	Rotor, Angle, 24x1.5/2.0ml, ID	15000 rpm	21379 xg	16000 rpm	24325 xg

11.5 Table 5: Acceleration and deceleration times

FC5714

	Acceleration values		Deceleration values	
Item No; Rotor Description	level 0	level 9	level 0	level 9
30314822; Rotor, Swing out, 4x100ml, ID	110	14	170	19
30314823; Rotor, Swing out, 4x100ml, ID, Sealable	110	14	170	17
30314824; Rotor, Swing out, 2x3MTP, ID	230	25	340	26
30314830; Rotor, Angle, 6x50ml RB/FA, ID	101	11	206	14
30314832; Rotor, Angle, 30x15ml RB/FA, ID	157	19	370	20
30314834; Rotor, Angle, 12x15ml RB/FA, ID	102	11	167	14
30314836; Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	250	27	280	34
30304361; Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	200	25	230	35
30314838; Rotor, Angle, 24x1.5/2.0ml, ID	200	22	230	35
	in seconds			
	Acceleration time		Deceleration time	
	from 0 min^{-1} -> U_{max}		from U_{max} -> 0 min^{-1}	

FC5718

	Acceleration values		Deceleration values	
Item No; Rotor Description	level 0	level 9	level 0	level 9
30314822; Rotor, Swing out, 4x100ml, ID	100	15	150	15
30314823; Rotor, Swing out, 4x100ml, ID, Sealable	100	15	150	15
30314824; Rotor, Swing out, 2x3MTP, ID	160	20	360	15
30314825; Rotor, Angle, 6x85ml RB, ID, Hi	400	40	960	40
30314826; Rotor, Angle, 6x85ml RB, ID	360	40	1050	40
30314827; Rotor, Angle, 4x85ml RB, ID, Hi	300	60	820	40
30314829; Rotor, Angle, 10x50ml FA, ID	380	63	796	37
30314831; Rotor, Angle, 6x50ml RB, ID, Hi	360	40	570	30
30314830; Rotor, Angle, 6x50ml RB/FA, ID	89	13	239	11
30314832; Rotor, Angle, 30x15ml RB/FA, ID	160	15	380	10
30314833; Rotor, Angle, 20x10ml RB, ID, Hi	360	40	570	30
30314834; Rotor, Angle, 12x15ml RB/FA, ID	88	13	222	11
30314835; Rotor, Angle, 44x1.5/2.0ml, ID	196	22	204	18
30314836; Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	200	25	360	25
30304361; Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	240	23	240	16
30314838; Rotor, Angle, 24x1.5/2.0ml, ID	210	23	240	16
30314839; Rotor, Angle, 12x1.5/2.0ml, ID	240	25	210	20
30314840; Rotor, Angle, 64x0.5ml, ID	150	17	170	12
30314841; Rotor, Angle, 4x8-w PCR Strip, ID	130	16	130	12
	in seconds			
	Acceleration time		Deceleration time	
	from 0 min^{-1} -> U_{max}		from U_{max} -> 0 min^{-1}	

FC5718R

	Acceleration values		Deceleration values	
Item No; Rotor Description	level 0	level 9	level 0	level 9
30314822; Rotor, Swing out, 4x100ml, ID	100	15	150	15
30314823; Rotor, Swing out, 4x100ml, ID, Sealable	100	15	150	15
30314824; Rotor, Swing out, 2x3MTP, ID	160	20	360	15
30314825; Rotor, Angle, 6x85ml RB, ID, Hi	500	60	1260	50
30314826; Rotor, Angle, 6x85ml RB, ID	360	40	1050	40
30314827; Rotor, Angle, 4x85ml RB, ID, Hi	300	60	820	40
30314829; Rotor, Angle, 10x50ml FA, ID	380	62	1069	36
30314831; Rotor, Angle, 6x50ml RB, ID, Hi	360	40	570	30
30314830; Rotor, Angle, 6x50ml RB/FA, ID	90	12	463	11
30314832; Rotor, Angle, 30x15ml RB/FA, ID	160	15	380	10
30314833; Rotor, Angle, 20x10ml RB, ID, Hi	360	40	570	30
30314834; Rotor, Angle, 12x15ml RB/FA, ID	88	12	433	11
30314835; Rotor, Angle, 44x1.5/2.0ml, ID	196	22	204	18
30314836; Rotor, Angle, 30x1.5/2.0ml, ID, Sealable	210	25	360	30
30304361; Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	230	25	420	17
30314838; Rotor, Angle, 24x1.5/2.0ml, ID	230	25	420	17

30314839; Rotor, Angle, 12x1.5/2.0ml, ID	240	25	210	20
30314840; Rotor, Angle, 64x0.5ml, ID	150	17	170	12
30314841; Rotor, Angle, 4x8-w PCR Strip, ID	130	16	130	12
	in seconds			
	Acceleration time		Deceleration time	
	from 0 min^{-1} -> U_{max}		from U_{max} -> 0 min^{-1}	

FC5816

	Acceleration values		Deceleration values	
Item No; Rotor Description	level 0	level 9	level 0	level 9
30314820; Rotor, Swing out, 4x250ml, ID	309	34	458	36
30314824; Rotor, Swing out, 2x3MTP, ID	452	43	616	38
30314828; Rotor, Swing out, 16x50ml, ID	34	311	36	387
30314821; Rotor, Angle, 6x250ml FB, ID	664	130	2906	92
30314826; Rotor, Angle, 6x85ml RB, ID	697	85	2313	70
30314827; Rotor, Angle, 4x85ml RB, ID, Hi	506	60	1745	49
30314829; Rotor, Angle, 10x50ml FA, ID	753	115	2395	72
30314831; Rotor, Angle, 6x50ml RB, ID, Hi	446	48	1323	49
30314832; Rotor, Angle, 30x15ml RB/FA, ID	149	25	985	20
30314833; Rotor, Angle, 20x10ml RB, ID, Hi	512	54	1439	47
30314835; Rotor, Angle, 44x1.5/2.0ml, ID	29	257	28	436
30304361; Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	251	25	610	26
30314838; Rotor, Angle, 24x1.5/2.0ml, ID	251	25	610	26
	in seconds			
	Acceleration time		Deceleration time	
	from 0 min^{-1} -> U_{max}		from U_{max} -> 0 min^{-1}	

FC5816R

	Acceleration values		Deceleration values	
Item No; Rotor Description	level 0	level 9	level 0	level 9
30314820; Rotor, Swing out, 4x250ml, ID	309	34	458	36
30314824; Rotor, Swing out, 2x3MTP, ID	452	43	616	38
30314828; Rotor, Swing out, 16x50ml, ID	34	311	36	387
30314821; Rotor, Angle, 6x250ml FB, ID	664	130	2906	92
30314826; Rotor, Angle, 6x85ml RB, ID	2313	70	1630	76
30314827; Rotor, Angle, 4x85ml RB, ID, Hi	506	60	1745	49
30314829; Rotor, Angle, 10x50ml FA, ID	753	115	2395	72
30314831; Rotor, Angle, 6x50ml RB, ID, Hi	446	48	1323	49
30314832; Rotor, Angle, 30x15ml RB/FA, ID	149	25	985	20
30314833; Rotor, Angle, 20x10ml RB, ID, Hi	512	54	1439	47
30314835; Rotor, Angle, 44x1.5/2.0ml, ID	31	274	29	485
30304361; Rotor, Angle, 24x1.5/2.0ml, ID, Sealable	249	20	635	27
30314838; Rotor, Angle, 24x1.5/2.0ml, ID	249	30	635	27
	in seconds			
	Acceleration time		Deceleration time	
	from 0 min^{-1} -> U_{max}		from U_{max} -> 0 min^{-1}	

11.6 Table 6: 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 mesaurements
CLOSE lid	
33	Open lid while motor is running
34	Lid contact defective
38	Lid motor is blocked
40	Communication with frequency converter distrubed during start
41	Communication with frequency converter distrubed 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 controler and RS232 interface
99	Rotor is not allowed in this centrifuge
FALSE	Inserted rotor does not exist in the programm
rotor no	Rotor is not detected

11.7 Table 7: Radius correction and adapter specifications
Used for 5714/5718/5718R

Rotor	Bucket/Adapter		Radius(cm)	Correction (cm)
30314822	**Rotor, Swing out, 4x100ml, ID**		14.8	
	30314842	Rack, 1x100ml D46mm RB, 2/pk	14.1	-0.7
	30314843	Rack, 1x85ml D38mm RB, 2/pk	14.1	-0.7
	30314844	Rack, 1x50ml D34mm RB, 2/pk	14.2	-0.6
	30314845	Rack, 1x50ml D29mm RB, 2/pk	14.2	-0.6
	30314846	Rack, 1x50ml D29mm FA, 2/pk	14.1	-0.7
	30314847	Rack, 1x50ml D29mm Rim, 2/pk	14.3	-0.5
	30314848	Rack, 1x30ml D25mm Rim, 2/pk	13.8	-1
	30314849	Rack, 1x25ml D25mm RB, 2/pk	14.4	-0.4
	30314850	Rack, 2x15ml D17mm FA, 2/pk	14.8	0
	30314851	Rack, 1x15ml D17mm Rim, 2/pk	14.5	-0.3
	30314852	Rack, 7x15ml D17mm RB, 2/pk	14.5	-0.3
	30314853	Rack, 9x5-7ml D13mm RB, 2/pk	14.2	-0.6
	30314854	Rack, 10x1.5ml D11mm, 2/pk	9.9	-4.9
	30314855	Rack, 9x4.5ml D12mm FB, 2/pk	14	-0.8
	30314856	Rack, 7x5-7ml D13mm RB, 2/pk	11.6	-3.2
	30314857	Rack, 7x5-7ml D13mm Vac, 2/pk	14.2	-0.6
	30314858	Rack, 5x4-10ml D16mm Sar, 2/pk	14.3	-0.5
30314823	**Rotor, Swing out, 4x100ml, ID, Sealable**		14.6	
	30314860	Bucket, 100ml wo Cap, Sealable, 2/pk	14.2	-0.4
	30314861	Bucket, 100ml w/ Cap, Sealable, 2/pk	14.2	-0.4
	30314864	Rack, 1x100ml D40mm RB, 2/pk	13.8	-0.8
	30314865	Rack, 1x85ml D38mm RB, 2/pk	14	-0.6
	30314866	Rack, 1x50ml D34mm RB, 2/pk	14	-0.6
	30314867	Rack, 1x50ml D29mm RB, 2/pk	14	-0.6
	30314868	Rack, 1x50ml D29mm FA, 2/pk	14.1	-0.5
	30314869	Rack, 1x50ml D29mm Rim, 2/pk	13.9	-0.7
	30314870	Rack, 1x30ml D25mm Rim, 2/pk	13.1	-1.5
	30314871	Rack, 1x25ml D25mm RB, 2/pk	14	-0.6
	30314872	Rack, 1x15ml D17mm FA, 2/pk	14.1	-0.5
	30314873	Rack, 2x15ml D17mm FA, 2/pk	14.1	-0.5
	30314874	Rack, 2x15ml D17mm Rim, 2/pk	14	-0.6
	30314875	Rack, 4x15ml D17mm RB, 2/pk	14	-0.6
	30314876	Rack, 7x5-7ml D13mm RB, 2/pk	14	-0.6
	30314877	Rack, 5x1.5ml D11mm, 2/pk	14	-0.6
	30314878	Rack, 3x10ml D17mm Sar, 2/pk	14	-0.6
	30314879	Rack, 4x5-7ml D13mm RB, 2/pk	14	-0.6
	30314880	Rack, 4x10ml D17mm Vac, 2/pk	14	-0.6
	30314881	Bucket, 2x50ml D29mm FA, w/ Rack, 2/pk	14.6	0
	30314882	Bucket, 3x15ml D17mm FA, w/ Rack, 2/pk	14.6	0
	30314883	Cyto, Rectangular Bucket, 2/pk	6.3	-8.3

30314824	**Rotor, Swing out, 2x3MTP, ID**		12	
	30314891	Adapter, 48x1.5/2.0ml D11mm, 2/pk	12	0
30314830	**Rotor, Angle, 6x50ml RB/FA, ID**		11	
	30130891	Adapter, 1x30ml D26mm, 2/pk	10.7	-0.3
	30130892	Adapter, 1x16ml D18mm, 2/pk	10.3	-0.7
	30130893	Adapter, 1x15ml D17mm, 2/pk	10.6	-0.4
	30130894	Adapter, 1x15ml D17mm RB, 2/pk	10.6	-0.4
	30130889	Adapter, 1x7ml D13.5mm RB, 2/pk	10.2	-0.8
	30130890	Adapter, 1x5ml D13.5mm, 2/pk	8.3	-2.7
	30130886	Adapter, 1x1.5/2.0ml D11mm, 6/pk	6.7	-4.3
30314832	**Rotor, Angle, 30x15ml RB/FA, ID**		12.5	
	30130889	Adapter, 1x7ml D13.5mm RB, 2/pk	12.2	-0.3
	30130890	Adapter, 1x5ml D13.5mm, 2/pk	10.5	-2
	30130886	Adapter, 1x1.5/2.0ml D11mm, 6/pk	9	-3.5
30314834	**Rotor, Angle, 12x15ml RB/FA, ID**		11	
	30130889	Adapter, 1x7ml D13.5mm RB, 2/pk	10.6	-0.4
	30130890	Adapter, 1x5ml D13.5mm, 2/pk	9.1	-1.9
	30130886	Adapter, 1x1.5/2.0ml D11mm, 6/pk	7.7	-3.4
30314836	**Rotor, Angle, 30x1.5/2.0ml, ID, Sealable**		9.4	
	30130884	Adapter, 1x0.2/0.4ml D6mm, 6/pk	9.1456	-0.3
	30130885	Adapter, 1x0.5ml D8mm, 6/pk	8.4	-1
30304361	**Rotor, Angle, 24x1.5/2.0ml, ID, Sealable**		8.5	
	30130884	Adapter, 1x0.2/0.4ml D6mm, 6/pk	8.2	-0.3
	30130885	Adapter, 1x0.5ml D8mm, 6/pk	7.5	-1
30314838	**Rotor, Angle, 24x1.5/2.0ml, ID**		8.5	
	30130884	Adapter, 1x0.2/0.4ml D6mm, 6/pk	8.2	-0.3
	30130885	Adapter, 1x0.5ml D8mm, 6/pk	7.5	-1

Only used for 5718/5718R or 5816/5816R

Rotor	Adapter		Radius(cm)	Correction (cm)
30314825	**Rotor, Angle, 6x85ml RB, ID, Hi**		10.3	
	30314893	Adapter, 1x15ml D17mm RB, 2/pk	9.6	-0.7
	30314894	Adapter, 1x30ml D25mm RB, 2/pk	9.6	-0.7
	30314895	Adapter, 1x50ml D29mm RB, 2/pk	10	-0.3
	30314896	Adapter, 1x50ml D29mm FA, 2/pk	9.8	-0.5
	30314897	Adapter, 1x15ml D17mm FA, 2/pk	9.3	-1
	30314898	Adapter, 2x15ml D17mm RB, 2/pk	10.3	0
	30314899	Adapter, 1x16ml D18mm RB, 2/pk	9.5	-0.8
30314826	**Rotor, Angle, 6x85ml RB, ID**		11.5	

	30314893	Adapter, 1x15ml D17mm RB, 2/pk	10.6	-0.9
	30314894	Adapter, 1x30ml D25mm RB, 2/pk	10.4	-1.1
	30314895	Adapter, 1x50ml D29mm RB, 2/pk	10.9	-0.6
	30314896	Adapter, 1x50ml D29mm FA, 2/pk	10.6	-0.9
	30314897	Adapter, 1x15ml D17mm FA, 2/pk	10.4	-1.1
	30314898	Adapter, 2x15ml D17mm RB, 2/pk	11.1	-0.4
	30314899	Adapter, 1x16ml D18mm RB, 2/pk	10.4	-1.1
30314827	**Rotor, Angle, 4x85ml RB, ID, Hi**		9.2	
	30314893	Adapter, 1x15ml D17mm RB, 2/pk	8.5	-0.7
	30314894	Adapter, 1x30ml D25mm RB, 2/pk	8.4	-0.8
	30314895	Adapter, 1x50ml D29mm RB, 2/pk	8.9	-0.3
	30314896	Adapter, 1x50ml D29mm FA, 2/pk	8.6	-0.6
	30314897	Adapter, 1x15ml D17mm FA, 2/pk	8.3	-0.9
	30314898	Adapter, 2x15ml D17mm RB, 2/pk	7.5	-1.7
	30314899	Adapter, 1x16ml D18mm RB, 2/pk	8.3	-0.9
30314829	**Rotor, Angle, 10x50ml FA, ID**		13	
	30130894	Adapter, 1x15ml D17mm RB, 2/pk	12.8	-0.2
	30130889	Adapter, 1x7ml D13.5mm RB, 2/pk	12.2	-0.8
	30130890	Adapter, 1x5ml D13.5mm, 2/pk	10.4	-2.6
	30130886	Adapter, 1x1.5/2.0ml D11mm, 6/pk	8.9	-4.1
30314831	**Rotor, Angle, 6x50ml RB, ID, Hi**		8.4	
	30130891	Adapter, 1x30ml D26mm, 2/pk	8.2	-0.2
	30130892	Adapter, 1x16ml D18mm, 2/pk	7.9	-0.5
	30130893	Adapter, 1x15ml D17mm, 2/pk	8	-0.4
	30314892	Adapter, 1x15ml D17.5mm FA, 2/pk **(can only be used without rotor lid!)**	7.7	-0.7
30314835	**Rotor, Angle, 44x1.5/2.0ml, ID**		8.4	
	30130884	Adapter, 1x0.2/0.4ml D6mm, 6/pk	8.2	-0.2
	30130885	Adapter, 1x0.5ml D8mm, 6/pk	7.7	-0.7
30314839	**Rotor, Angle, 12x1.5/2.0ml, ID**		6.5	
	30130884	Adapter, 1x0.2/0.4ml D6mm, 6/pk	6.3	-0.2
	30130885	Adapter, 1x0.5ml D8mm, 6/pk	5.6	-0.9
	30314900	Adapter, 1x1.5ml for over16000xg, 6/pk	6.4	-0.1

Only used for 5816/5816R

Rotor	Adapter		Radius(cm)	Correction (cm)
30314820	**Rotor, Swing out, 4x250ml, ID**		16.7	
	30314903	Rack, 1x250ml D62mm FB, 2/pk	15.7	-1
	30314904	Rack, 1x100ml D41mm RB, 2/pk	15.9	-0.8
	30314905	Rack, 3x50ml D29mm RB, 2/pk	16.3	-0.4
	30314906	Rack, 3x50ml D29mm FA, 2/pk	16.7	0
	30314907	Rack, 1x50ml D34mm RB, 2/pk	15.8	-0.9
	30314908	Rack, 2x50ml D29mm Rim, 2/pk	15.8	-0.9
	30314909	Rack, 1x50ml D29mm Rim, 2/pk	16.1	-0.6
	30314910	Rack, 5x25ml D24.5mm RB, 2/pk	16.1	-0.6
	30314911	Rack, 3x25ml D24.5mm Rim, 2/pk	15.5	-1.2
	30314912	Rack, 9x15ml D17mm RB, 2/pk	16.3	-0.4
	30314913	Rack, 7x15ml D17mm FA, 2/pk	16.4	-0.3
	30314914	Rack, 7x15ml D17mm Rim, 2/pk	16.1	-0.6
	30314915	Rack, 8x10ml D16mm RB, 2/pk	16.3	-0.4
	30314916	Rack, 14x5-7ml D13mm RB, 2/pk	15.9	-0.8
	30314917	Rack, 10x1.6-7ml D13mm Vac, 2/pk	15.9	-0.8
	30304367	Rack, 8x4-10ml D16mm Vac, 2/pk	16.3	-0.4
	30304368	Adapter, 9x1.5/2.0ml D11mm, 2/pk (USEABLE IN THE BUCKET 30314903 ONLY!)	15.7	-1
30314828	**Rotor, Swing out, 16x50ml, ID**		16.5	
	30304375	Rack, 4x50ml D29mm FA, 2/pk	16.5	0
	30314583	Rack, 10x15ml D17mm FA, 2/pk	16.5	0
30314821	**Rotor, Angle, 6x250ml FB, ID**		14	
	30304369	Adapter, 8x1.5ml D11mm, 2/pk	13.2	-0.8
	30304370	Adapter, 5x10ml D16mm RB, 2/pk	13.3	-0.7
	30304371	Adapter, 4x15ml D17mm FA, 2/pk	13	-1
	30304372	Adapter, 2x30ml D26mm RB, 2/pk	12.5	-1.5
	30304373	Adapter, 1x50ml D29mm RB, 2/pk	12	-2
	30304374	Adapter, 1x50ml D30mm FA, 2/pk	11.7	-2.3

11.8 Table 8: Redemption form / Decontamination certificate

Enclose this form with all returns of equipment and assemblies!
The completed declaration about the decontamination is a prerequisite for the assumption and further processing of the return. If no corresponding explanation is enclosed, we carry out decontamination with costs at your expense.

Surname; last name: _____
Organization / company: _____
Street: _____
ZIP CODE: _____ place:_____
Telephone: _____ fax:_____
E-Mail: _____

Please fill out in block capitals!

Pos.	Crowd	Decontaminated object	Serial number	Description / Comment
1				
2				
3				
4				

Are the parts listed above in contact with the following substances?

Health endangering watery solutions, buffers, acids, alkalis:…….... ☐ Yes ☐ No
Potentially infectious agents: …… ☐ Yes ☐ No
Organic reagents and solvent: …….. .. ☐ Yes ☐ No
Radioactive substances: ……☐ α..☐ β..☐ γ… ☐ Yes ☐ No
Health endangering proteins: …….. ☐ Yes ☐ No
DNA: …… ☐ Yes ☐ No
These substances have reached the equipment/assembly? ……. ☐ Yes ☐ No
Which one, if yes:
_____
Description of the measures for the decontamination of the listed parts:

I confirm the proper decontamination:
Company/Dept ._____ Place and Date: _____