## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>CR22N (ICE Model)</th>
<th>CR22N (Non-ICE Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Speed</td>
<td>20,000 rpm</td>
<td>20,000 rpm</td>
</tr>
<tr>
<td>Max. RCF</td>
<td>55,200 x g</td>
<td>55,200 x g</td>
</tr>
<tr>
<td>Max. Capacity</td>
<td>1.500mL x 4 tubes (56mL)</td>
<td>1.500mL x 4 tubes (56mL)</td>
</tr>
<tr>
<td>Temperature Control Range</td>
<td>-8°C to +40°C</td>
<td>-8°C to +40°C</td>
</tr>
<tr>
<td>Acceleration/Deceleration Mode</td>
<td>Acceleration: 2 m/s², Deceleration: 3 m/s² (with/without braking)</td>
<td>Acceleration: 2 m/s², Deceleration: 3 m/s² (with/without braking)</td>
</tr>
<tr>
<td>Program Function</td>
<td>30 programs, with 9 programs x 3 functions</td>
<td>30 programs, with 9 programs x 3 functions</td>
</tr>
<tr>
<td>Group Unit</td>
<td>Induction Motor (Permanent)</td>
<td>Induction Motor (Permanent)</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>Inverter-controlled Reciprocating Condensing Unit, E 10A</td>
<td>Inverter-controlled Reciprocating Condensing Unit, E 10A</td>
</tr>
<tr>
<td>Safety Functions</td>
<td>Non-contact Imbalance Detection, Abnormal Temperature Detection</td>
<td>Non-contact Imbalance Detection, Abnormal Temperature Detection</td>
</tr>
<tr>
<td>User Lockout Function</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Data Communication</td>
<td>USB port</td>
<td>USB port</td>
</tr>
<tr>
<td>Operating Log Management</td>
<td>+log (Operating history can be output through USB port)</td>
<td>+log (Operating history can be output through USB port)</td>
</tr>
<tr>
<td>Display</td>
<td>High-resolution 5.7 inch color LCD</td>
<td>High-resolution 5.7 inch color LCD</td>
</tr>
<tr>
<td>Keypad</td>
<td>Touch-sensitive LCD panel (with GUI icon)</td>
<td>Touch-sensitive LCD panel (with GUI icon)</td>
</tr>
<tr>
<td>Noise</td>
<td>64 dB(A) at 1 m front (at 20,000 rpm)</td>
<td>64 dB(A) at 1 m front (at 20,000 rpm)</td>
</tr>
<tr>
<td>Recycling Mode</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>CE mark</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dimensions (W x D x H: mm)</td>
<td>EN1810:04, EN1810:04</td>
<td>EN1810:04, EN1810:04</td>
</tr>
<tr>
<td>Weight</td>
<td>80 kg</td>
<td>80 kg</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>Single Phase AC 200 V, 208 V, 220 V, 240 V to 1.15% 30A (580VA)</td>
<td>Single Phase AC 200 V, 208 V, 220 V, 240 V to 1.15% 30A (580VA)</td>
</tr>
<tr>
<td>Part No.</td>
<td>91339251</td>
<td>91339001</td>
</tr>
</tbody>
</table>

Note: * MD: Low-Voltage Directive, MD: Machinery Directive

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**CAUTION:**
For safety and proper use of your machine, carefully read and follow the Instruction Manual.

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https://www.himac-science.com/
Compact body, Larger Capacity

In the past, 6 Liter capacity rotor was available only for large-capacity refrigerated centrifuge or high-end model of the high-speed refrigerated centrifuges. With newly developed drive unit and 1.2L bottle, now you can use 1L, 3L, or 4 bottles with a new standard model of the high-speed refrigerated centrifuge model CR22N. In addition, the CR22N has a more compact body than our former model CR21/31 series.

Easy Operation with Color Touch-Sensitive LCD

High-resolution color touch-sensitive LCD and GUI (graphical user interface) with high contrast against back screen in black color enable users easily to operate the system or select various menus and function by touching the icon on the display. Of course, operation status is identified at a glance by fluorescent screen design.

Self-Locking Rotor System

CR22N original “self-locking rotor system” is the simplest system to place the rotor onto the drive shaft. You just simply place the rotor on the drive shaft and that’s all. The rotor is locked by centrifugal force automatically. You do not need to install the rotor by screw or push the bottom to lock or unlock the rotor like other models available in the market.

All Standard Rotors Maintained at 4°C

CR22N is the first centrifuge equipped with an inverter refrigerator system in this class. The inverter refrigerator system provides you efficient temperature control of the rotor and less electricity consumption is anticipated. Also, the refrigeration capacity was improved, so new CR22N standard rotors can be maintained at 4°C at their maximum speed without vacuum system, (inside room temperature at 25°C). (There are some exceptions about standard rotors.) In addition, the refrigerator system has required operating noise, because there is no startup noise of conventional refrigerator system.

Energy Saving and Environment Friendly Design

Economy Mode (automatic standby function)

CR22N has Economy Mode (automatic standby function) in it. If the display is not touched for a specific time period while the rotor is not spinning, the system automatically lowers backlight and stops its refrigerator. And it reduces maximum 83% of standby electricity consumption**. Just press a button, so you can contribute to the energy saving.

Re-generating Brake System

The drive unit has a regenerating brake system. It changes the kinetic energy, which was exhausted into the room as a heat in deceleration, to electricity. So it can reduce the temperature increase and return to power source by maximum 40% of electricity consumption which is used in whole operation.

Environment Friendly Design

CR22N is designed according to our “Design for Environment Assessment System” standard. The more than 90% materials of the product are reusable or recyclable. It has reduced use of harmful substances in materials and components. Also, the refrigerator of CR22N is in ODP (Ozone Depletion Potential).

Non-Contact Imbalance Detection System

The himac original imbalance sensor continuously measures oscillation over the entire speed range. The system immediately detects abnormal vibrations caused by the imbalance of the rotor. And it stops the rotation of the rotor automatically.

Appearance

Top view  Front view  Side view  Display & Operation Panel

• First introduced in October 2012 as high-speed refrigerated centrifuge.
• Equipped with standby electricity consumption without Economy Mode under in-house conditions.
• ODP (Ozone Depletion Potential) is nil.
Automatic Rotor Identification

This function automatically adjusts optimized running condition based on the rotor automatically identified by compensating for air friction and Implement temperature control.

RCF Calculation and Display

CR22N automatically calculates from speed value to RCF(cg) value and eliminates many troublesome and time-consuming manual calculations using many parameters, such as speed and R(95%).

You can start operation by entering RCF(cg) value, instead of running speed.

Actual Run Timer

Conventional run timer starts when the rotor starts acceleration. But it isn’t the original Actual Run Timer. It starts when the set speed is attained. It enables users to control actual net run time and obtain higher reproducibility of the separation.

RTC (Real-Time Control) Function

imac original RTC function makes time setting easier than conventional daily time setting. You can simply set date and time when you want to start to finish the centrifugation, calendar and clock are equipped with the system.

Programmed Operation

You can program 30 operations into the memory. You can set another three programs with three-step-mode operation. (total 33 programs)

Automatic Rotor Cover Detector

It detects status of a fixed angle rotor covered or uncovered by ultrasonic sensor on the door. It prevents from unexpected accident caused by uncovered rotor in advance.

Pre-Cool Function

This function maintains temperature inside rotor chamber at 15°C with preventing from stopping in order to reach target temperature shortly. When the rotor is not set on the drive shaft, the refrigerator control the temperature inside the rotor chamber at the set temperature.

Zoom Function

Display of running speed and time is enlarged on the screen in order to find the operating status from distance. Screen is switch from “Run Screen” to “Zoom Display” automatically at 20 sec. after reaching the set speed.

User Administration

You can register up to 40 users into the memory. You can set access level and PIN (personal identification number) of each user. There are two access level “Administrator” or “User”. Administrator can access all function, but “User” cannot access administrator function when the user lockout function is on.

User Lockout Function

In case the user lockout function is enabled, only registered user can login the system by entering registered 4 digit PIN. It is useful function to control user access based on the group of responsibilities.

Rotor Management

Your rotors can be registered to the system in order to manage followings:
* Serial number of each rotor
* Total accumulated operating time (hours)
* Total number of operation (runs)

Operation Flow Diagram

Color touch-sensitive LCD

Run Screen

Color touch-sensitive LCD enables users easily to operate the system. Menu screen is displayed by just touching the menu tab.

RTC function

You can set a timer to start programmed operation.

Alarm Indication

Indicating a cause and corrective action of the alarm by text.

Setting parameters

Pop-up keyboard is displayed by touching the screen.

Manager (Admin)

Setting administrative parameters

Rotor Catalog

Referring applicable model and spec. of rotors

Run History

Recording previous running parameters automatically and loading it for new run.

CUSTOM Screen

Zoom

Zooming speed and time indication on run screen

Stop Signal

5 miliaps and an electronic beep are selectable.

Pre-Cool

Keeping rotor chamber temperature at 15°C to avoid the chamber icing.

Backlight

Adjusting brightness of the screen. Setting to dim the backlight

Economy Mode (auto standby)

Reducing electricity consumption of the back light, fan and refrigerator in waiting.
Biosafety Option

Biosafety is the first priority in all laboratories. This is why we design and offer multiple options for biosafety. Not only biosafety rotors or special-needled type fixed angle rotor, but also the Micro Filter can be assembled in the CR32N system for enhanced level of biosafety at your option. This Micro Filter modification of the CR32N system is our factory option (option part number S102549B).

Data Communication and Operating Log Management

USB
USB port is equipped as standard specification. The system records up to 100 operating histories in its memory. Operating data can be output in CSV format through the USB port.

LAN
Optional LAN board is also available (optional part number S205392A or S205392B). You can link CR32N to your PC through ethernet or internet. Optional software “himac LogManager Ver.5.0 (Network Edition)” can be installed in your PC and operating history and data of CR32N can be easily managed by your PC.

himac LogManager Ver.5.0 for Windows® (Network Edition)
- Optional log management software

himac LogManager Ver.5.0 for Windows® (Network Edition) is useful and convenient software to manage real time operating log of himac CP-NX series, CS130NX, CS160NX, CR430N, CR502N and CR602N series. Maximum 16 units of the abovementioned centrifuges can be registered to the software. As data communication between the centrifuge and PC is done via LAN or Ethernet, there is no distance limitation to establish a network. You can easily establish the network configuration and retrieve with commercially available LAN devices. Optional LAN board is required for the centrifuge. It means you can manage the operating log at the different location from the installation site of the centrifuges.

The software is real-time log management software; recording period is selectable from 10 seconds to 5 minutes intervals. Of course, the software supports U.S. FDA 21 CFR Part 11, following functions are available:
- Digital Signature
- Audit Trail
- Encrypted Data Files

Required Operating System
Windows® 7, Windows® 8, and Windows® 10

Windows®, Windows® 7, Windows® 8, and Windows® 10 are registered trademarks of Microsoft Corporation in the United States and other countries.

Unique 6L Rotor model R9A2 and 1500PP Bottle (WM)

We proudly introduce the newly developed 1500PP Bottle (WM) with a wide mouth. We are the first manufacturers developed unique 1.2L triangular bottle for high-speed refrigerated centrifuging use. This unique bottle has the wide mouth so it is easy to collect separated sample ( pledges) and clean the bottle inside. We could minimize the size and weight of our new 6L capacity fixed angle rotor with 1.2L triangular bottle.

R9A2 rotor and 1500PP Bottle (WM) including its cap can be sterilized by autoclave (at 121°C for 20 minutes.) The R9A2 rotor includes 4 sets of 1500PP Bottle (WM), their Cap, Cap Support, Inner Cap and O-ring as of standard accessories.

Specifications of Rotor R9A2

<table>
<thead>
<tr>
<th>Metric</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. Speed</td>
<td>8,500 rpm</td>
</tr>
<tr>
<td>Max. RCF</td>
<td>15,100 g</td>
</tr>
<tr>
<td>Nominal Capacity</td>
<td>1,500 ml × 4 bottles</td>
</tr>
<tr>
<td>Tube/Cavity Angle</td>
<td>22°</td>
</tr>
<tr>
<td>K-factor</td>
<td>4.313</td>
</tr>
<tr>
<td>Weight</td>
<td>17.1 kg</td>
</tr>
<tr>
<td>Product No.</td>
<td>9143/400</td>
</tr>
</tbody>
</table>

Configuration of 1500PP Bottle (WM)

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S3100087A</td>
<td>1500PP Bottle (WM) (4 pockets : bottle only)</td>
</tr>
<tr>
<td>S3100071B</td>
<td>1500AL Cap (2 pockets : cap only)</td>
</tr>
<tr>
<td>S412032A</td>
<td>Cap Support (4 pockets : cap support only)</td>
</tr>
<tr>
<td>S412033A</td>
<td>1000 Inner Cap (WM) (2 pockets : inner cap only)</td>
</tr>
<tr>
<td>S413035A</td>
<td>O-ring (10 pieces : O-ring only)</td>
</tr>
</tbody>
</table>
### Standard Fixed Angle Rotors

**New Rotors**

- **R21A2**
  - The R21A2 rotor is designed for 30×4 x 6 tubes and has 45° tube cavity angles. It is suitable for pelleting, 405S tube and 40T tube (for ultracentrifuges) can be used.
  - Specifications:
    - Max. Speed: 21,000 rpm
    - Max. RCF: 16,000 g
    - Nominal Capacity: 30×4 x 6 tubes
    - Tube Capacity: 45°
    - Weight: 4.6 kg
    - Product No.: 01447203

- **R22A6**
  - The R22A6 rotor is designed for 10×1.5 tubes and has 45° tube cavity angles. It is suitable for pelleting. 125S tube and 17 T tube (for ultracentrifuges) can be used.
  - Specifications:
    - Max. Speed: 22,000 rpm
    - Max. RCF: 17,000 g
    - Nominal Capacity: 10×1.5 tubes
    - Tube Capacity: 45°
    - Weight: 3.9 kg
    - Product No.: 01447200

**High-capacity Light Weight Rotors**

- **Innovative aluminum alloy made light weight rotor**
  - The rotors in this series are half the weight of conventional rotors in the same capacity. They greatly reduce time for acceleration and deceleration. They can be rotated at Max. speed with bottles filled with any volume, as long as balanced.

- **Wide Mouth Bottle**
  - It is easy to collect separated sample and then the bottle inside.

**Fixed Angle Rotors for 50mL TC (Conical-Bottom) Tube**

- **R10A5**
  - Net weight: 17 kg
  - 16.000 rpm / 16,000 × g
  - 1000xH4 + 4 x Bottles

- **R10A3**
  - Net weight: 14.9 kg
  - 13,000 rpm / 12,600 × g
  - 1000xH4 + 4 x Bottles

- **R12A6**
  - Net weight: 19.1 kg
  - 15,000 rpm / 15,000 × g
  - 1000xH4 + 4 x Bottles

**Fixed Angle Rotors with Fluid Annulus**

- **R22A4**
  - 22,000 rpm / 18,000 × g
  - 30×4 x 6 tubes

- **R20A2**
  - 20,000 rpm / 18,000 × g
  - 25×4 x 6 tubes

- **R14A**
  - 14,000 rpm / 12,000 × g
  - 25×4 x 6 tubes

- **R12A3**
  - 12,000 rpm / 10,000 × g
  - 25×4 x 6 tubes

### Standard Swinging Bucket Rotors

**General-purpose Swinging Bucket Rotor**

- **R4SS**
  - Stacked 20 x 1 mL tubes
  - Available in high centrifugal force!

**Versatile Swinging Bucket Rotor**

- **R3S**
  - Stacked 15 x 10 mL tubes
  - Suitable for pelleting samples with control angle tube

**High-speed Swinging Bucket Rotor for TC (Conical Bottom) Tube**

- **R8S**
  - Max. Speed: 8,000 rpm
  - Max. RCF: 11,000 g
  - No wind-sealed design offers easy operation to users.
  - Nominal Capacity: 50mL TC tube (conical type) × 4 tubes
  - Availability of rotor R8S is restricted by country.

**R854**

- Swivel sealing cap for biosafety (optional, Part No. 389102-A, 4 pieces)

**Swinging Bucket Rotor for Micro Plate**

- **R5S4**
  - 24×4 x 4×4 wells
  - 72×4 x 12 wells

### Specifications

- **Max. Speed**: 21,000 rpm
- **Max. RCF**: 16,000 g
- **Nominal Capacity**: 30×4 x 6 tubes
- **Tube Capacity**: 45°
- **Weight**: 4.6 kg
- **Product No.**: 01447203

- **Max. Speed**: 22,000 rpm
- **Max. RCF**: 17,000 g
- **Nominal Capacity**: 10×1.5 tubes
- **Tube Capacity**: 45°
- **Weight**: 3.9 kg
- **Product No.**: 01447200

- **Net weight**: 17 kg
- **Max. Speed**: 16,000 rpm
- **Max. RCF**: 16,000 g
- **Nominal Capacity**: 1000xH4 + 4 x Bottles

- **Net weight**: 14.9 kg
- **Max. Speed**: 13,000 rpm
- **Max. RCF**: 12,600 g
- **Nominal Capacity**: 1000xH4 + 4 x Bottles

- **Net weight**: 19.1 kg
- **Max. Speed**: 15,000 rpm
- **Max. RCF**: 15,000 g
- **Nominal Capacity**: 1000xH4 + 4 x Bottles

- **Net weight**: 17 kg
- **Max. Speed**: 16,000 rpm
- **Max. RCF**: 16,000 g
- **Nominal Capacity**: 1000xH4 + 4 x Bottles

- **Net weight**: 14.9 kg
- **Max. Speed**: 13,000 rpm
- **Max. RCF**: 12,600 g
- **Nominal Capacity**: 1000xH4 + 4 x Bottles

- **Net weight**: 19.1 kg
- **Max. Speed**: 15,000 rpm
- **Max. RCF**: 15,000 g
- **Nominal Capacity**: 1000xH4 + 4 x Bottles

- **Max. Speed**: 8,000 rpm
- **Max. RCF**: 11,000 g
- **No wind-sealed design offers easy operation to users.
  - Nominal Capacity: 50mL TC tube (conical type) × 4 tubes
  - Availability of rotor R8S is restricted by country.

- **Swivel sealing cap for biosafety (optional, Part No. 389102-A, 4 pieces)

- **24×4 x 4×4 wells
  - 72×4 x 12 wells**
### Standard Rotor: Rotors and Accessories List

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Part No.</th>
<th>Weight (g)</th>
<th>For Tubes</th>
<th>Standard accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed angle 250</td>
<td>R17A</td>
<td>3149600D</td>
<td>22,000</td>
<td>58,700</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>R21A</td>
<td>3149700D</td>
<td>22,000</td>
<td>58,700</td>
<td>6.0</td>
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<tr>
<td></td>
<td>R21A2</td>
<td>3149710D</td>
<td>21,000</td>
<td>50,000</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>R21B</td>
<td>3149720D</td>
<td>21,000</td>
<td>50,000</td>
<td>5.6</td>
</tr>
<tr>
<td></td>
<td>R22A</td>
<td>3149800D</td>
<td>20,400</td>
<td>42,000</td>
<td>5.6</td>
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<tr>
<td></td>
<td>R22B</td>
<td>3149830D</td>
<td>18,000</td>
<td>32,000</td>
<td>5.6</td>
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<tr>
<td></td>
<td>R22C</td>
<td>3149860D</td>
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<tr>
<td></td>
<td>R22D</td>
<td>3149890D</td>
<td>12,000</td>
<td>32,000</td>
<td>5.6</td>
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<td></td>
<td>R22E</td>
<td>3149920D</td>
<td>8,600</td>
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<td>R22F</td>
<td>3149950D</td>
<td>4,000</td>
<td>15,100</td>
<td>4.0</td>
</tr>
</tbody>
</table>

### Made-to-Order Rotor

#### Fixed Angle Rotors

- **R22A**: 42,000 g, 5.6
- **R22B**: 32,000 g, 5.6
- **R22C**: 30,000 g, 5.6
- **R22D**: 32,000 g, 5.6
- **R22E**: 18,000 g, 4.0

#### Swinging Bucket Rotors

- **R10H1**: 10,900 g, 5.6
- **R11H**: 7,800 g, 4.0
- **R10H**: 6,300 g, 3.2

#### Special Sealed-type Fixed Angle Rotors

- **R18A**: 30,000 g, 5.6
- **R18B**: 20,000 g, 4.0
- **R18C**: 10,000 g, 2.5

#### Continuous Flow Rotors

- **R11D2**: 15,800 g, 3.2
- **R11D**: 10,500 g, 2.5
- **R10D**: 7,800 g, 1.6

#### Soil Dehydration Rotor

- **R18C**: 30,000 g, 5.6

#### Horizontal Rotors

- **R10C**: 7,800 g, 1.6

### Continuous Flow Rotors: R18C, R13C and R10C

#### Batch Rotors

- **R10D**: 7,800 g, 1.6
- **R11D**: 10,800 g, 2.5
- **R11D2**: 15,800 g, 3.2

### Notes

1. BMF rotors are available upon request. Contact your local dealer for details.
2. *R* denotes rotors that are available upon request. Contact your local dealer for details.
3. Figures in parentheses indicate the recommended weight for the rotor. For weights exceeding 15,000 g, please consult your local dealer for special handling instructions.
4. Figures in parentheses indicate recommended speed limits for the rotor. For speeds exceeding 15,000 g, please consult your local dealer for special handling instructions.
5. Please consult your local dealer for special handling instructions for rotors exceeding 15,000 g.
6. Monthly limits are specified based on the recommended weight for the rotor. For weights exceeding 15,000 g, please consult your local dealer for special handling instructions.
7. BMF rotors are available upon request. Contact your local dealer for details.
8. Figures in parentheses indicate recommended speed limits for the rotor. For speeds exceeding 15,000 g, please consult your local dealer for special handling instructions.
9. BMF rotors are available upon request. Contact your local dealer for details.