



# **VWR Micro 1814, Micro 1816, Micro 2416 Digital Centrifuge**

## **INSTRUCTION MANUAL**

### **North American Catalog Number(s):**

<b>Micro 1814:</b>	<b>37001-296</b>
<b>Micro 1816:</b>	<b>37001-298</b>
<b>Micro 2416:</b>	<b>37001-300</b>

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## Warning

 Use of this product in a manner not specified by the manufacturer may impair any safety protection provided by the equipment and may result in physical damage and/or personal injury. Please read all operating instructions in the Operation Manual prior to use of this device. See Good Laboratory Safety Precautions listed below.

## Safety Information

Please follow the guidelines below, and read this manual in its entirety to ensure safe operation of the unit.

 Blocking the air inlet reduces cooling air to the motor and may cause the rotor to come off.

## Good Laboratory Safety Precautions

VWR recommends good laboratory practice which requires the following safety precautions be observed:

- The unit must be placed at least 300mm from any bench edge. A boundary area of 300mm around the centrifuge should be marked and laboratory management procedures should require that no person or any hazardous materials or breakable items be located within this boundary while the centrifuge is operating.
- An emergency switch for disconnection of the AC (mains) power to the centrifuge, in case of malfunction, is required. This switch must be located away from the centrifuge, preferably outside the room in which the centrifuge is housed or adjacent to the exit from that room.
- Always wear OSHA approved, wraparound eye protection. Observe appropriate safety precautions for the materials being centrifuged as detailed by the Material Safety Data Sheets.
- The centrifuge must not be used with flammable or explosive materials, or with materials which could chemically interact.
- Do not expose the centrifuge, rotor, rotor cover or accessories to materials or processes which could cause chemical or mechanical damage. Refer to Rotor Usage Guide and cleaning instructions.
- Thoroughly inspect the centrifuge, rotor and accessories for mechanical and chemical damage *prior to each use*. Mechanical damage can often be visually observed, and includes cracks, scratches or gouges on the centrifuge lid or rotor. Chemical damage can often be visually observed and includes crazing, peeling or similar deterioration, especially on the rotor and the inner surfaces of the centrifuge.
- **DO NOT USE THE CENTRIFUGE OR ROTOR IF DAMAGE IS EVIDENT. REPLACE DEFECTIVE PARTS IMMEDIATELY.**
- Do not dispose of the centrifuge by incineration.
- Use only manufacturer-approved accessories with the unit.
- *Replace rotors on an annual basis, or immediately if dropped or damaged.* (Refer to the “Rotor Usage Guide” in this manual for guidelines on replacing heavily used rotors.)
- Sample tubes used must be compatible with the maximum Relative Centrifugal Force (RCF) rating of the centrifuge. Sample tubes have a limited life and should be used per the sample tube manufacturer’s recommendations. Do not mix the sample tube types within a rotor. The weight of each sample should be within 5% of all other samples. To maintain balance, equally distribute loaded sample tubes in the rotor.
- The rotor cover provided is not intended to be a bioseal (as defined by IEC 1010-2-020) for containment of pathogenic microbiological specimens during use.
- Do not move the centrifuge during operation, as the unit may become unbalanced the rotor may become dislodged.
- While a small amount of vibration during rotor acceleration or deceleration is normal, immediately stop the centrifuge if excessive vibration is evident at any time.
- Do not obstruct any air inlet or exhaust vent on the centrifuge.
- The centrifuge is not designed to spin more than 2.5 grams of fluid per sample tube.
- Additional safety information can be found in the “Centrifuge Rotor Usage Guide” section of this manual.

## Package Contents

Centrifuge	1
Power cord	1
Rotor and wrench	1
Operation manual	1
Purchase registration card	1

## Installation


1. Remove unit from packaging; verify rotor is clear and all package contents are included.
2. Locate the centrifuge at least 300mm from the all edges of the lab bench.
3. Connect the centrifuge to the power cord first, then plug the power cord into the wall AC outlet.
4. A soft beep can be heard as the microcentrifuge powers up. Factory default settings will be displayed on the front panel. NOTE: If the lid latch does not release after power up, press the RED stop button.

## Intended use

This product is intended for indoor use only. Applications include microfiltration, mini or quick spin columns, small volume pelleting of cells in liquid culture, quick spin downs, and low speed sedimentation.

## Symbols and conventions

The following chart is an illustrated glossary of the symbols that are used in this manual.

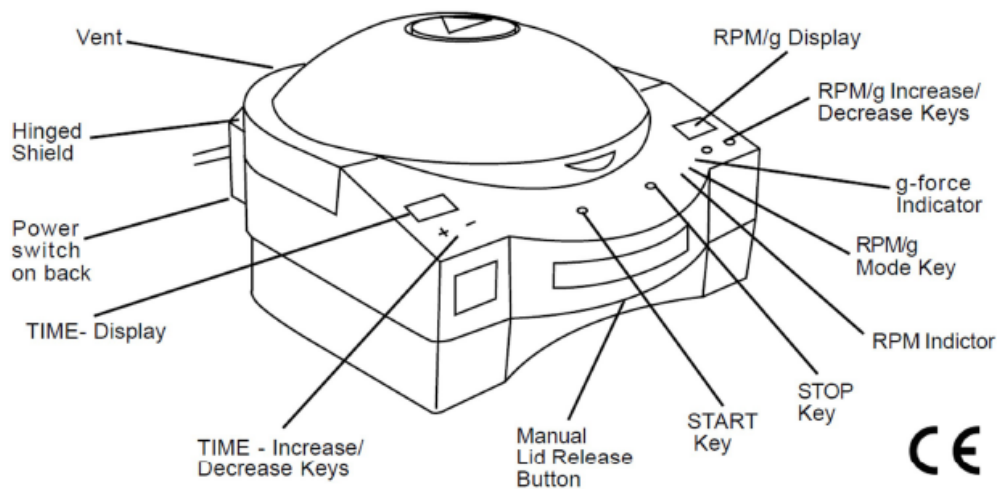
	<b>CAUTION</b> This symbol indicates a potential risk and alerts you to proceed with caution
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## Product Specifications

	<b>1814: 1816</b>	<b>2416</b>
- Maximum speed:	13,000 rpm / 14,000 xg 14,000rpm/16,000xg	13,300 rpm / 16,000 xg
- Maximum capacity:	18 x 1.5/2.0 ml	24 x 1.5/2.0 ml
- Timer:	99 minutes	99 minutes
- Dimensions:	26.7 x 23.8 x 17.8 cm	26.7 x 23.8 x 17.8 cm
- Operating temperature:	4° to 40°C	4° to 40°C
- Operating humidity:	0% to 95% humidity	0% to 95% humidity
- The weight:	5.0 kg (11 pounds)	5.3 kg (11.75 pounds)
- Electrical:	120V, 100V, 230V:50/60 Hz Max 185W 1.5A, 0.8A (230V only) 2.5AT, 1.25AT (230V only)	120V, 100V, 230V:50/60 Hz Max 185W 1.5A, 0.8A (230V only) 2.5AT, 1.25AT (230V only)

## Instruction for Use

This microcentrifuge has been carefully designed and constructed for easy operation and proven durability. Digital displays, quiet operation, simple controls, autoclavable rotors and rotor covers are a few of this microcentrifuge's features



## Operation

1. Inspect the rotor and inner centrifuge surfaces for cracks and crazing.
2. Load the rotor with sample tubes. Note: It is recommended that the rotor be loaded and the lid placed on the rotor while the rotor is out of the centrifuge.
3. Always use the rotor cover on the rotor. Press the rotor cover onto the rotor by applying pressure and twisting slightly.
4. Open the centrifuge lid and press the rotor onto the octagonal rotor drive spindle. The rotor is precision balanced for quiet operation at maximum speed. To minimize vibration and maintain quiet operation, the point of the black arrow on the underside of the rotor should be aligned with the black mark on the octagonal drive spindle.
5. Close the lid and select the mode of operation

## Modes of Operation - Normal

To program for normal operation, do the following:

1. On the right hand side of the microcentrifuge, press the MODE key once to select RPM or g-force as indicated by the Display Mode Indicator.
2. Press either the up or down arrow key to select the desired speed or g
3. To set the TIME, press either the + or - key to select the desired run time.
4. Press lightly on the lid, while pressing the GREEN start key to begin the run.
5. You will hear a BEEP at the end of the run when the lid lock is released. To stop the unit before the time period expires, press the RED stop key.

## Modes of Operation - Pulse

To program for PULSE operation, do the following:

1. Select RPM or g as previously explained.
2. Set the time to ZERO
3. Press lightly on the lid
4. Press and hold the GREEN start key. The time will count up in seconds.
5. Release the GREEN start key to stop.
6. You will hear a BEEP at the end of the run when the lid lock is released.

## Manual Lid Lock Release

Should a power failure occur while the centrifuge is in operation, the lid of the centrifuge will remain locked until power is restored. However, it is possible to gain access to valuable samples by releasing the lid lock manually.

1. Locate the plastic release button on the front of the centrifuge.
2. Pry the button out of the centrifuge housing.
3. A wire is attached to the button. Once the button is free of the housing, tug firmly on the button and wire to release the lid lock.
4. The lid of the centrifuge can now be opened and samples removed.
5. Before operating the centrifuge again, replace the release button.

**NOTE: Do not attempt to operate the release while the rotor is spinning.**

## To Calculate Separation Acceleration & RPM:

$$\text{RCF} = 11.18 \times r \times (n/1000)^2$$

Where: r = radius in cm  
n = speed in rpm

The effective centrifugal radius of the 18 x 1.5ml rotor is 7.3 cm; 24 x 1.5ml rotor is 8.1 cm

### RCF Quick Reference (approx.)

RPM	1814/16	2416
1000	82	91
2000	326	362
3000	735	815
4000	1306	1449
5000	2040	2264
6000	2938	3260
7000	3999	4437
8000	5223	5796
9000	6611	7335
10000	8161	9056
11000	9875	10958
12000	11752	13040
13000	13793	16019*
14000	15996	

\*Value given is for the maximum speed of the centrifuge, 13,300 rpm.

## Centrifuge Rotor Usage Guide

The rotors are intended for the sole purpose of spinning samples in the microcentrifuge.

**Use of this product in a manner not specified by the manufacturer may impair or negate any safety protection provided by the maker.**

Good laboratory practice includes observing and following the safety precautions listed in this guide.

**As with any centrifuge, always wear shatterproof, full coverage, wraparound eye protection and laboratory clothing with long sleeves. Observe all appropriate safety precautions for the materials in use as detailed by Material Safety Data Sheets.**

### Rotor Maintenance

Visually inspect the rotor for mechanical or chemical damage *prior to each use*. Do not use the rotor if any damage or change is evident. Clean any spills *immediately*.

**Routinely perform mechanical and chemical inspections as follows:**

- Check the web area for cracks and crazing.
- Check the rotor underside, including hub area for cracks and crazing.
- Check the outer rim of the rotor.
  - Chemical damage appears as discoloration, crazing, granulation, peeling or similar deterioration of the finish.
  - Hidden mechanical damage may be detected by an increase in noise or vibration during a spin. If noise level increases, stop use immediately.

***If any such changes are apparent, discontinue use immediately.***

### Loading Samples

- Never spin samples which are flammable, explosive or which chemically interact vigorously when mixed.
- Discard any rotor and rotor cover that becomes contaminated by radioactive samples, as the exposure may reduce the strength of the rotor material.

- The rotor cover should not be applied nor should the rotor be loaded while it is mounted on the centrifuge; doing so may damage the motor. Place the rotor on a tabletop to load samples and apply the rotor cover.
- Never use underrated tubes or tubes that are of poor quality. Sample tubes must be compatible with the Relative Centrifugal Force (RCF) rating of the centrifuge (see instruction manual). Use only tubes that are rated at or above the g-level of the spin.

The fit of the sample tube within the rotor tube slot is critical. Use only sample tubes that are shaped so as to be fully supported by tube inserts. Sample tubes have a limited life and should be used as per the sample tube manufacturer's recommendations.

- Never overload sample tubes. Most sample tubes are designed to be used with liquid samples only. Do not load solid material into tubes.
- Never attempt to centrifuge any liquid or substance having a homogenous density greater than 1.2g/ml.
- Never mix the sample tube type within a rotor. The weight of each sample should be within 5% of all other samples by weight. To maintain proper balance, place loaded sample tubes into the into tube slots that are opposite each other.
- **Always use the rotor cover.** The rotor cover is designed to minimize wind resistance on the spinning rotor enabling it to achieve speed more quickly. ***Spinning without the rotor cover may result in motor failure.***
- The rotor cover is not intended to be a bioseal (as defined by IEC 1010-2-020) for containment of pathogenic microbiological specimens; however, it does provide an extra layer of protection against contamination in the event of tube breakage.

### **Rotor Installation**

- To install the rotor in the centrifuge: Center the rotor and push down until the rotor locks into position. Spin the rotor by hand and check that it is flat and evenly spaced within the chamber.
- The centrifuge must be located at least 300mm from the any bench edge. Never stand within the safety zone of 300mm of a centrifuge during a spin. Wait until the rotor has stopped spinning before opening the unit. Never attempt to open or move the unit while the rotor is still in motion.

### **Rotor Use and Handling**

- The rotor may be cleaned using methyl or isopropyl alcohol, soap solutions, heptane, hexane, naphtha or Freon<sup>®</sup> TF cleaner. Do not use corrosive cleaning solvents with partially halogenated hydrocarbons, such as 1,1,1 trichloroethane, phenol, methylene chloride or ketones such as MEK.
- When necessary, the rotor and cover may be autoclaved at 115 kPa absolute pressure (121°C to 124°C). **Note: autoclaving decreases the usable life of the rotor. If the rotors are autoclaved frequently (once a day) replace your rotors every 3 months. If you autoclave your rotors more than once a day, please replace them after 60 autoclaving cycles.**

## **IMPORTANT NOTICE**

The use of IsoQuick<sup>®</sup> brand nucleic acid extraction kits with this product is not advised. If the IsoQuick<sup>®</sup> extraction matrix or dye components come in contact with the Ultem<sup>®</sup> rotor used in the product, they may cause cracks or striations. Cracked rotors may disrupt during use. If any

IsoQuick<sup>®</sup> brand components come in contact with the rotor in this product, immediately replace the rotor. Please fully read the Rotor Usage Guide section of this manual to learn more about rotor safety.



## Troubleshooting

If a problem should arise with the centrifuge, please refer to this troubleshooting guide. For additional assistance, contact the service department.

<b>Problem</b>	<b>Solution</b>
Lid will not open*	<ul style="list-style-type: none"><li>• Is the rotor spinning? Allow rotor to come to a complete stop before attempting to open the lid.</li><li>• Check for and remove any obstructions in the lid latch holes.</li><li>• Has the unit lost power? Lid will remain locked until power is restored.</li><li>• Turn power switch off then on again.</li></ul>
Unit will not start/does not achieve speed	<ul style="list-style-type: none"><li>• Lid is open. Press lightly on the lid while pressing the green start key.</li><li>• Rotor is unbalanced. Reload properly.</li><li>• Rotor cover is missing. Replace cover.</li></ul>
No power	<ul style="list-style-type: none"><li>• Check that power cord is intact and not pinched and is connected to both unit and outlet. Check the outlet. Check power switch.</li><li>• Check fuse. Replace with properly rated fuse if necessary.</li><li>• The unit may have received a large static discharge. Turn off the unit, wait one minute, and turn unit back on.</li></ul>
Excessive vibration	<ul style="list-style-type: none"><li>• Load is not balanced. Redistribute the sample tubes in the rotor.</li><li>• Check installation of the rotor and cover.</li><li>• Replace rotor.</li></ul>
No display	<ul style="list-style-type: none"><li>• Check the power connections. (See “No power”, above.)</li></ul>
Tone sounds when started.	<ul style="list-style-type: none"><li>• This indicates that the lid has not been closed or that the safety latch is not engaged. Confirm that the lid is completely closed and there are no obstructions in the latch holes. Press lightly on the lid while pressing the green start button to restart the unit.</li></ul>

\*It is possible to release the lid lock manually to open the lid and remove samples in the event of a power failure. Follow the instructions under “Manual Lid Lock Release” to open the lid and retrieve samples.

## General Maintenance

- There are no user serviceable parts within the unit. Opening the case will void the warranty.
- The unit should be wiped down after each use with a soft cloth. Periodic cleaning of the rotor and chamber should be performed to keep the unit in proper operating condition. Clean any spills immediately.
- Disconnect electrical power from the microcentrifuge before cleaning.
- Do not immerse the body of the centrifuge in any liquid
- Use mild soap or diluted bleach and a soft cloth. Do not use chemical solvents for cleaning.
- The removable rotor and rotor cover may be autoclaved at 115 kPa absolute pressure (121° to 124°C - see Rotor Usage Guide section of this manual).
- Before using any cleaning or decontamination method, except those recommended by the manufacturer, verify with the manufacturer that the proposed method will not damage the equipment

**Note: An excessive buildup of dirt and grime in the centrifuge or on the rotor may affect operation of the unit. It is the responsibility of the user to maintain the centrifuge in the proper manner. Failure to do so may affect the warranty coverage.**

## Accessories

Description	Quantity	Cat. No.
Adapter for 500µl tubes	pack of 6	521-2817
Adapter for 250/400µl tubes	pack of 6	521-2818
Adapter for 200µl tubes	pack of 6	521-2819

\*All adapters fit into 1.5ml rotor, each adapter holds one tube.

## Technical service

### Web Resources

Visit the VWR's website at [www.vwr.com](http://www.vwr.com) for:

- Complete technical service contact information
- Access to VWR's Online Catalogue, and information about accessories and related products
- Additional product information and special offers

**Contact us** For information or technical assistance contact your local VWR representative or visit. [www.vwr.com](http://www.vwr.com).

## Warranty

**VWR International** warrants that this product will be free from defects in material and workmanship for a period of two (2) years from date of purchase. If a defect is present, VWR will, at its option, repair, replace, or refund the purchase price of this product at no charge to you, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear.

For your protection, items being returned must be insured against possible damage or loss. This warranty shall be limited to the replacement of defective products. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

## Equipment disposal



This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste. Instead it's your responsibility to correctly dispose of your equipment at lifecycle -end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment. For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Thank you

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