



• MAS Rotor Test Station

Bruker MAS Rotor Test Station
User Manual

Version 001



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1 About

1.1 This Manual

This manual is intended to be a reference guide for operators and service technicians. It provides detailed information about the user level maintenance and service and overall use of the Bruker device.

The figures shown in this manual are designed to be general and informative and may not represent the specific Bruker model, component or software/firmware version you are working with. Options and accessories may or may not be illustrated in each figure.

Carefully read all relevant chapters before working on the device!

This manual describes parts and procedures relevant to the device version it is delivered with. For older hardware, please refer to the manual supplied at the time.

1.2 Policy Statement

It is the policy of Bruker to improve products as new techniques and components become available. Bruker reserves the right to change specifications at any time.

Every effort has been made to avoid errors in text and figure presentation in this publication. In order to produce useful and appropriate documentation, we welcome your comments on this publication. Support engineers are advised to regularly check with Bruker for updated information.

Bruker is committed to providing customers with inventive, high quality products and services that are environmentally sound.

1.3 Symbols and Conventions

Safety instructions in this manual are marked with symbols. The safety instructions are introduced using indicative words which express the extent of the hazard.

In order to avoid accidents, personal injury or damage to property, always observe safety instructions and proceed with care.



! DANGER

This combination of symbol and signal word indicates an immediately hazardous situation which could result in death or serious injury unless avoided.



WARNING

This combination of symbol and signal word indicates a potentially hazardous situation which could result in death or serious injury unless avoided.



CAUTION

This combination of symbol and signal word indicates a possibly hazardous situation which could result in minor or slight injury unless avoided.

NOTICE

This combination of symbol and signal word indicates a possibly hazardous situation which could result in damage to property or the environment unless avoided.

i This symbol highlights useful tips and recommendations as well as information designed to ensure efficient and smooth operation.

2 Introduction

2.1 Concept

The MAS Rotor Test Station provides test possibilities for rotors, which help to prevent rotation problems in the spectrometer.

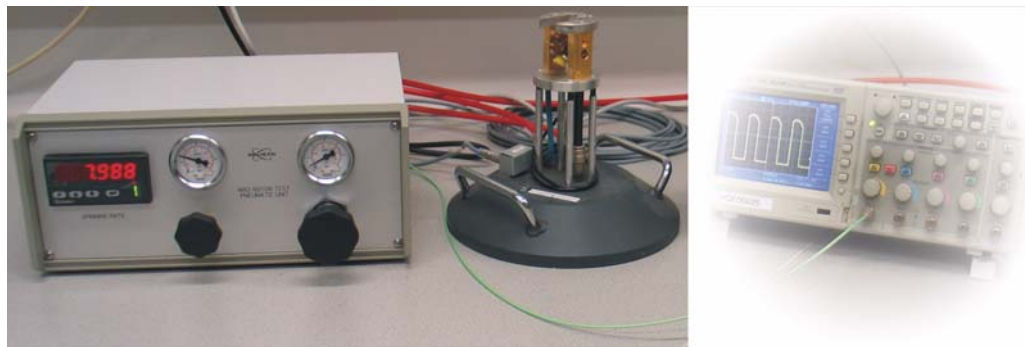


Figure 2.1 MAS Rotor Test Station

2.2 Limitation of Liability

All specifications and instructions in this manual have been compiled taking account of applicable standards and regulations, the current state of technology and the experience and insights we have gained over the years.

The manufacturer accepts no liability for damage due to:

- Failure to observe this manual
- Improper use
- Deployment of untrained personnel
- Unauthorized modifications
- Technical modifications
- Use of unauthorized spare parts

The actual scope of supply may differ from the explanations and depictions in this manual in the case of special designs, take-up of additional ordering options, or as a result of the latest technical modifications.

The undertakings agreed in the supply contract as well as the manufacturer's Terms and Conditions and Terms of Delivery and the legal regulations applicable at the time of conclusion of the contract shall apply.

2.3 Before You Begin

This user manual contains information and safety information that are necessary for the safe operation of the device.

Any user maintenance and repairs are to be accomplished using the information in this manual.

Consider all safety references!

Information for ordering spare parts is available in the spare parts section from the Bruker Service Center (see contacts).

2.4 Minimum Qualifications for Operating Personnel

Type of Task	Personnel	Training and Experience
Transportation	No special requirements.	No special.
Installation	Bruker certified personnel only.	Technically skilled, with a good knowledge of MAS.
Routine Use	Appropriately certified and experienced personnel with fundamental knowledge about MAS technology.	
Daily Maintenance		
Servicing	Bruker certified personnel only.	

Table 2.1 Overview Installation and Operation Requirements for Personnel

2.5 The Bruker Service

Our customer service division is available to provide technical information, see "[Contact](#)" on page 37 for details.

In addition, our employees are always interested in acquiring new information and experience gained from practical application; such information and experience may help improve our products.

2.6 Transport to Manufacturer

When the device must be returned to the manufacturer for a major repair, use the original packaging for transportation.

3 Safety

This section provides an overview of all the main safety aspects involved in ensuring optimal personnel protection and safe and smooth operation.

Non-compliance with the action guidelines and safety instructions contained in this manual may result in serious hazards.

3.1 Intended Use

The device must only be used for driving BRUKER test stators.

Intended use also includes compliance with all specifications in this manual.

Any use which exceeds or differs from the intended use shall be considered improper use.

No claims of any kind for damage will be entertained if such claims result from improper use.

3.2 Owner's Responsibility

Owner

The term 'owner' refers to the person who himself operates the device for trade or commercial purposes, or who surrenders the device to a third party for use or application, and who bears the legal product liability for protecting the user, the personnel or third parties during the operation.

Owner's Obligations

The device is used in the industrial sector, universities and research laboratories. The owner of the device must therefore comply with statutory occupational safety requirements.

In addition to the safety instructions in this manual, the safety, accident prevention and environmental protection regulations governing the operating area of the device must be observed.

In this regard, the following requirements should be particularly observed:

- The owner must obtain information about the applicable occupational safety regulations, and - in the context of a risk assessment - must determine any additional dangers resulting from the specific working conditions at the usage location of the device. The owner must then implement this information in a set of operating instructions governing operation of the device.

- During the complete operating time of the device, the owner must assess whether the operating instructions issued comply with the current status of regulations, and must update the operating instructions if necessary.
- The owner must clearly lay down and specify responsibilities with respect to installation, operation, troubleshooting, maintenance and cleaning.
- The owner must ensure that all personnel dealing with the device have read and understood this manual. In addition, the owner must provide personnel with training and hazards information at regular intervals.
- The owner must provide the personnel with the necessary protective equipment.
- The owner must warrant that the device is operated by trained and authorised personnel as well as all other work, as transportation, mounting, start-up, the installation, maintenance, cleaning, service, repair and shutdown, that is carried out on the device.
- All personnel who work with, or in the close proximity of the device, need to be informed of all safety issues and emergency procedures as outlined in this user manual.
- The owner must document the information about all safety issues and emergency procedures in a laboratory SOP (Standard Operating Procedure). Routine briefings and briefings for new personnel must take place.
- The owner must ensure that new personnel must be supervised by experienced personnel. It is highly recommended to implement a company training program for new personnel on all aspects of product safety and operation.
- The owner must ensure that personnel is regularly informed of the potential hazards within the laboratory. This is all personnel that work in the area, but in particular laboratory personnel and external personnel such as cleaning and service personnel.
- The owner is responsible for taking measures to avoid inherent risks in the handling of dangerous substances, preventing industrial disease, and providing medical first aid in emergencies.
- The owner is responsible for providing facilities according to the local regulations for the prevention of industrial accidents and generally accepted safety regulations according to the rules of occupational medicine.
- All substances needed for operating and cleaning the device samples, solvents, cleaning agents, gases, etc. have to be handled with care and disposed of appropriately. All hints and warnings on storage containers must be read and adhered to.
- The owner must ensure that the work area is sufficiently illuminated to avoid reading errors and faulty operation.
- The owner must ensure that the laboratory is equipped with an oxygen warning device, in case the device is operated with nitrogen.

Furthermore, the owner is responsible for ensuring that the device is always in a technically faultless condition. Therefore, the following applies:

- The owner must ensure that the maintenance intervals described in this manual are observed.
- The owner must ensure that all safety devices are regularly checked to ensure full functionality and completeness.

3.3 Personnel Requirements

3.3.1 Qualifications

i Note: Only trained Bruker personnel are allowed to mount, retrofit, repair, adjust and dismantle the unit!

This manual specifies the personnel qualifications required for the different areas of work, listed below:

Laboratory Personnel

Laboratory personnel are health care professionals, technicians, and assistants staffing a research or health care facility where specimens are grown, tested, or evaluated and the results of such measures are recorded. Laboratory personnel are able to carry out assigned work and to recognize and prevent possible dangers self-reliant due to their professional training, knowledge and experience as well as profound knowledge of applicable regulations.

The workforce must only consist of persons who can be expected to carry out their work reliably. Persons with impaired reactions due to, for example, the consumption of drugs, alcohol, or medication are prohibited from carrying out work on the device.

When selecting personnel, the age-related and occupation-related regulations governing the usage location must be observed.

3.3.2 Unauthorized Persons



⚠ WARNING

Risk to life for unauthorized personnel due to hazards in the danger and working zone!

Unauthorized personnel who do not meet the requirements described in this manual will not be familiar with the dangers in the working zone. Therefore, unauthorized persons face the risk of serious injury or death.

- ▶ Unauthorized persons must be kept away from the danger and working zone.
- ▶ If in doubt, address the persons in question and ask them to leave the danger and working zone.
- ▶ Cease work while unauthorized persons are in the danger and working zone.

3.3.3 Instruction

The personnel must receive regular instruction from the owner. The instruction must be documented to facilitate improved verification.

Date	Name	Type of Instruction	Instruction Provided By	Signature

3.4 Personal Protective Equipment

Personal protective equipment is used to protect the personnel from dangers which could affect their safety or health while working.

The personnel must wear personal protective equipment while carrying out the different operations at and with the device.

This equipment will be defined by the head of laboratory. Always comply with the instructions governing personal protective equipment posted in the work area.

4 Technical Data

4.1 General Information

Data	Value	Unit
Weight	3.0	Kg
Length	290	mm
Width	360	mm
Height	160	mm

Table 4.1 Technical Data: General Information

4.2 Connection Values

Electrical

Data	Value	Unit
Voltage	100-240	V AC
Apparent power consumption, maximum	30	W
Frequency	47-63	Hz

Table 4.2 Electrical Connection Values

Pneumatic

Data	Value	Unit
Operating pressure, maximum	12	bar
Operating pressure, minimum	4	bar
Operating pressure, ideal	6-8	bar
Compressed air requirement depending on spin rates	up to 300	l/min
Oiling, maximum	oil free	-

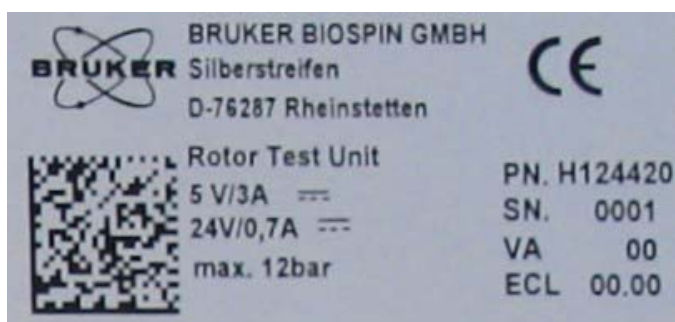
Table 4.3 Pneumatic Connection Values

4.3 Operating Conditions

Environment

No special requirements in respect to temperature and humidity are required. The MAS Rotor Test Station will operate under standard laboratory conditions suitable for NMR spectrometers.

4.4 Rating Plate



The rating plate is located at the rear side and includes the following information:

- Manufacturer
- Model
- Voltage
- Current
- Maximum Pressure

- PN: Part Number
- SN: Serial Number
- Va: Variation Number
- ECL: Engineering Change Level

5 Design and Function

5.1 Overview

The MAS Rotor Test Station controls a test stator, which is used to analyze the spin characteristics of MAS rotors before they are inserted into a spectrometer. Thus, the MAS Rotor Test Station is not a part of a spectrometer. With the MAS Rotor Test Station the bearing pressure and the drive pressure in the test stator are regulated.

5.2 Brief Description

The mechanics includes the following items:

Rotor Test Station - Front Side

1. Frequency-Counter to display the current spinning rate, see [Figure 5.1/\(1\)](#).
2. Manometer to display the bearing pressure, see [Figure 5.1/\(2\)](#).
3. Manometer to display the drive pressure, see [Figure 5.1/\(3\)](#).
4. Control valve to regulate the bearing pressure, see [Figure 5.1/\(4\)](#).
5. Control valve to regulate the drive pressure, see [Figure 5.1/\(5\)](#).



Figure 5.1 Rotor Test Station - Front Side

Rotor Test Station - Rear Side

1. Input for gas (dried compressed air or nitrogen), maximum 12 bar, see [Figure 5.2/\(1\)](#).
2. Eject output for an optional pneumatic switch, see [Figure 5.2/\(2\)](#).
3. Output for bearing gas with maximum 4.5 bars, see [Figure 5.2/\(3\)](#).
4. Output for drive gas with maximum 5 bars, see [Figure 5.2/\(4\)](#).
5. Rating plate, see [Figure 5.2/\(5\)](#).
6. Spinning optic input, see [Figure 5.2/\(6\)](#).
7. Trigger/spin rate signal output, see [Figure 5.2/\(7\)](#).
8. Power supply input, see [Figure 5.2/\(8\)](#).



Figure 5.2 Rotor Test Station - Rear Side

5.3 Connections

5.3.1 Pneumatic Diagram

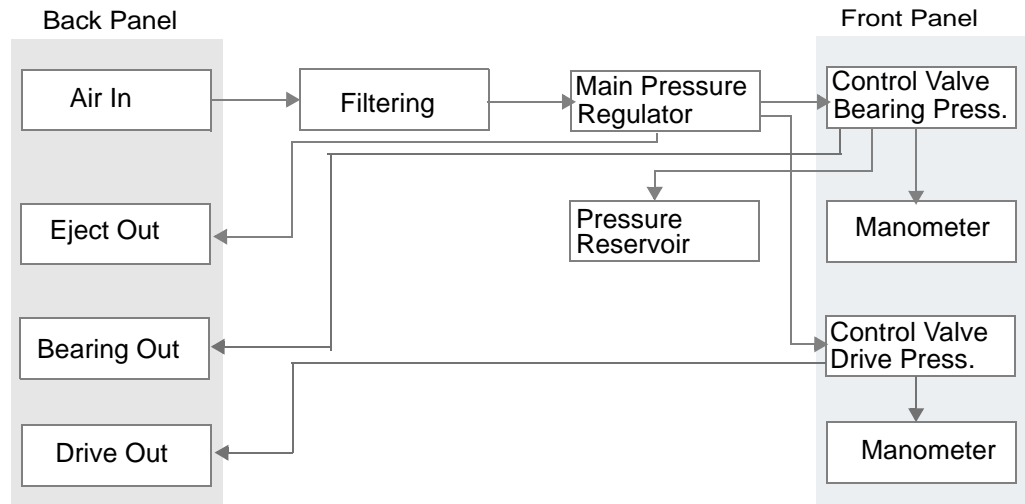


Figure 5.3 Pneumatic Diagram

5.3.2 Electronics

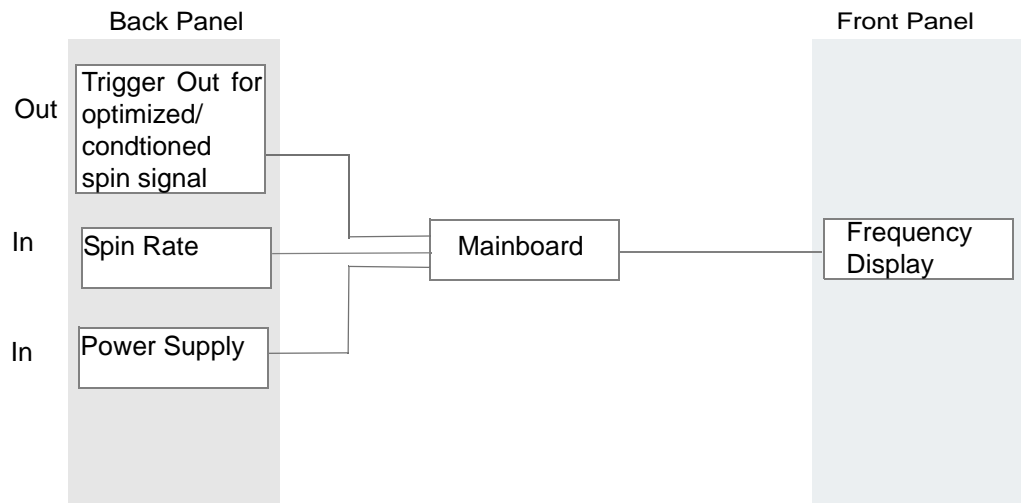


Figure 5.4 Electronics Diagram

5.4 Accessories

* Items marked with the symbol * are included in the delivery scope of the Rotor Test Station.

** Items marked with 2 symbols ** are sets with tubes, cables and adapters.

Accessories Pack/Set

Description	Part Number
MAS Rotor Test Cable Set	H6437

Electronics

Description	Part Number
Power Supply	1801718*
Line cord EU	3000*
Line cord US	35929
Spinrate cable	HZ16808

Pneumatics

Description	Part Number
Tube adapter 10mm -> 8mm	88492
Pneumatic tube 8mm	88569
Pneumatic tube 10mm	88576

Test Stator

Description	Part Number
Test Stator BL1,3	H122561
Test Stator BL1,3 Set**	H122562
Test Stator BL2,5	H8677
Test Stator BL2,5 Set**	H8682
Test Stator BL3,2	H13138
Test Stator BL3,2 Set**	H13245
Test Stator BL4/18	K0152
Test Stator BL4/18 Set**	K1003
Test Stator BL7 STR	H8953
Test Stator BL7 STR Set**	H8952
Test Stator BL7/18	K0157
Test Stator BL7/18 Set**	K0983
Test Stator DAB7/21	K0151
Test Stator DAB7/21 Set**	K1002
Test Stator DB7/18	K0150
Test Stator DB7/18 Set**	K1001

6 Transport, Packaging and Storage

6.1 Symbols on the Packaging

The following symbols are affixed to the packaging material. Always observe the symbols during transport and handling.

Fragile



Marks packages with fragile or sensitive contents.

Handle the package with care; do not allow the package to fall and do not allow it to be impacted.

Protect Against Moisture



Protect packages against moisture and keep dry.

Protect from Heat



Protect packages against heat and direct sunlight.

6.2 Inspection at Delivery

Upon receipt, immediately inspect the delivery for completeness and transport damage.

Proceed as follows in the event of externally apparent transport damage:

- Do not accept the delivery, or only accept it subject to reservation.

- Note the extent of the damage on the transport documentation or the shipper's delivery note.
- Initiate complaint procedures.

i Issue a complaint in respect to each defect immediately following detection. Damage compensation claims can only be asserted within the applicable complaint deadlines.

6.3 Packaging

About Packaging

The individual packages are packaged in accordance with anticipated transport conditions. Only environmentally friendly materials have been used in the packaging.

The packaging is intended to protect the individual components from transport damage, corrosion and other damage prior to assembly. Therefore do not destroy the packaging and only remove it shortly before assembly.

Handling Packaging Materials

Dispose of packaging material in accordance with the relevant applicable legal requirements and local regulations.

6.4 Storage

Storage of the Packages

Store the packages under the following conditions:

- Do not store outdoors.
- Store in dry and dust-free conditions.
- Do not expose to aggressive media.
- Protect against direct sunlight.
- Avoid mechanical shocks.
- Storage temperature: 15 to 35 °C.
- Relative humidity: max. 60%.

If stored for longer than 3 months, regularly check the general condition of all parts and the packaging. If necessary, top-up or replace preservatives.

7 Installation

WARNING



Danger of injury from improper operation!

Improper operation can result in serious injury and significant damage to property.

- ▶ If you are using an optional eject switch, you have to disconnect the Rotor Test Station from the gas supply. Because the eject outlet always provides the full gas pressure. If you are trying to remove the plug, you can get hurt!

i Installation, initial commissioning, retrofitting, repairs, adjustments or dismantling of the device must only be carried out by employees of the manufacturer or persons authorised by the manufacturer.

i Note: The unit has no on/off switch. To power up or down the unit, you have to plug or unplug the mains cable.

Bearing



1. Connect the pit shaped connector of the gas tube to the test stator. Connect the other end of the tube to the Bearing out connector on the Rotor Test Station.

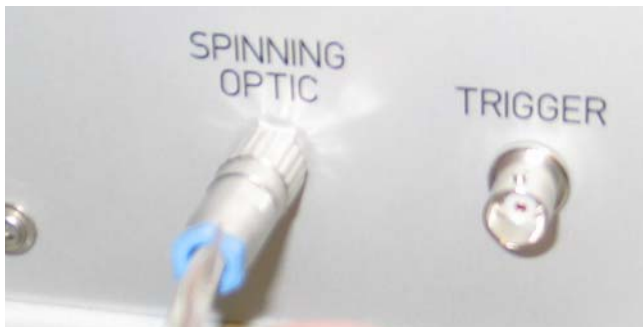
Installation

Drive



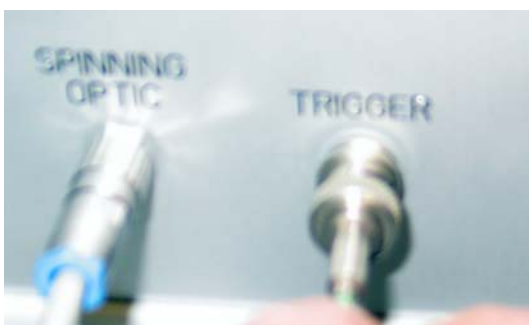
2. Connect the quick release connector of the drive gas tube to the quick release connector of the test stator. Connect the other end of the tube to the Drive Out connector on the Rotor Test Station.

Spin Rate



3. Connect one end of the spinning rate cable to the test stator, and the other end to the Spinning Optic connector on the Rotor Test Station.

Trigger



4. Optionally, connect the BNC cable to an oscilloscope and the other end to the Trigger connector on the Rotor Test Station.

Eject



5. Optionally, connect a quick release tube to a pneumatic switch and the other end of the tube to the Eject Out connector on the Rotor Test Station.

Gas Supply



6. Gas supply: When all connections are made, connect a tube between the Air In connector of the Rotor Test Station and the gas input.

Power Supply



7. Connect the external power supply to the Rotor Test Station and lock it with the bayonet lock. Now connect the power supply with the country specific power cord to the mains supply.

8 Operation

8.1 Safety

WARNING



Danger of injury from improper operation!

Improper operation can result in serious injury and significant damage to property.

- ▶ If you are using an optional eject switch, you have to disconnect the device from the gas supply. Because the eject outlet always provides the full gas pressure. If you are trying to remove the plug, you can get hurt!

8.1.1 Emergency Shutdown

i Note: The unit has no on/off switch. To power up or down the unit, you have to plug or unplug the mains cable.

In dangerous situations, it is vital to stop moving components as quickly as possible and to switch off the power supply. In an emergency proceed as follows:



1. Close the drive valve slowly and carefully.



2. Slowly close the bearing valve.



3. Unplug the power cord.

8.2 Start and Stop Rotation

WARNING



Danger of Rotor Damage or Damage of the Rotor Test Station or the Test Stator!

Values out of the range can damage the rotor, the Rotor Test Station or the Test Stator.

- ▶ Take care of the maximum allowed values for pressure and spin rate! See also "[Connection Values](#)" on page 13.

Start rotation

1. Open the bearing valve.
2. Slowly open the drive valve.
3. Adjust the bearing and drive depending on the diameter and the weight of the rotor used, to rotate at the demanded spin rate.

Stop rotation

1. Slow down the rotor by adjusting the bearing and drive valve.
2. Slowly close the drive valve.
3. Slowly close the bearing valve.



Note: When using an Oscilloscope to view the trigger signal, be sure that the corresponding channel of the scope is configured as high impedance, NOT as a 50 Ohms channel.



Note: If an optional eject switch is used, it must withstand a pressure of at least 5 bars!

9 Maintenance

9.1 Cleaning the Outside of the Rotor Test Station

Do not use any detergent or other cleaning solvents. Use only water or neutral cleaning fluids. Usage of volatile cleaners like thinner or benzine may damage the surface of the unit.

- Clean the outside of the Rotor Test Station with a soft, lint-free cloth dampened in water.

i Wait until the unit is completely dry before you reconnect the power cable.

10 Troubleshooting

In the event of repeated faults contact the customer service. See ["Contact" on page 37](#) for contact details.

Contact the manufacturer in the event of faults and attach the following informations:.

- Test Stator with part number or type.
- Rotor with part number or type.
- Rotor Cap with part number or type.
- Demanded Spin Rate.
- Kind of Rotor Filling.

11 Disposal

Following the end of its useful life, the device must be disposed of in accordance with the environmental regulations.

- i** Installation, initial commissioning, retrofitting, repairs, adjustments or dismantling of the device must only be carried out by employees of the manufacturer or persons authorised by the manufacturer.
-

12 Contact

Manufacturer:

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D-76287 Rheinstetten
Germany
Phone: +49 721-5161-0
<http://www.bruker-biospin.com>

NMR Hotlines

Contact our NMR service centers.

Bruker BioSpin NMR provide dedicated hotlines and service centers, so that our specialists can respond as quickly as possible to all your service requests, applications questions, software or technical needs.

Please select the NMR service center or hotline you wish to contact from our list available at:

http://www.bruker-biospin.com/hotlines_nmr.html

Bruker, your solution partner

Bruker provides a world class, market leading range of analytical solutions for your molecular and material research needs. Our solution-oriented approach enables us to work closely with you to identify your specific needs and determine the best solution package for you from our comprehensive range. Furthermore, we offer you the opportunity to collaborate with us on new developments.

Our ongoing efforts and substantial investment in research and development demonstrate our long term commitment to technological innovation on behalf of our customers. With 50 years of experience in meeting the needs of the scientific community across a range of specialist disciplines, Bruker has built a sound rapport with professionals from the community through understanding specific requirements.

This cooperative relationship with our customers allows us to provide them with effective solutions and a service of unmatched quality.



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