

# SamplePro hr-MAS

Sample Changer  
User Manual

Version 001



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# 1 About

## 1.1 This Manual

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This manual enables safe and efficient handling of the device.

This manual is an integral part of the device, and must be kept in close proximity to the device where it is permanently accessible to personnel.

Before starting any work, personnel must have read the manual thoroughly and understood its contents. Compliance with all specified safety instructions and operating instructions is vital to ensure safe operation.

In addition, local accident prevention regulations and general safety instructions must be observed for the operational area of the device.

Illustrations in this manual are intended to facilitate basic understanding, and may differ from the actual design.

This user manual must be kept with the device. In addition to the user manual, instructions concerning labor protection laws, operator regulations tools and supplies must be available and adhered to.

## 1.2 Policy Statement

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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.



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

### Special Safety Instructions

The following symbols are used in the safety instructions to draw attention to specific danger:



## **DANGER**

This combination of symbol and signal word indicates dangers posed by electric power. If the safety instructions are not observed, there is a danger of serious or fatal injuries.

## 2 Introduction

The SamplePro hr-MAS is a sample changer that was developed for high throughput, high resolution, magic angle spinning (hr-MAS) applications, such as the measurement of biological samples.

The new sample changer is part of a Bruker NMR system for standard NMR MAS applications and is used to transfer prepared MAS samples to and from Bruker NMR instruments to ensure they stay in continuous operation.

### 2.1 Concept

---

The sample changer consists of a laboratory robot (SamplePro) and a transfer system connecting the laboratory robot to the probe inside the NMR magnet.

The sample changer provides a Bruker standard interface, through which the changer can be controlled from TopSpin and IconNMR software.

Refer to "[Design and Function](#)" on page 25 for a complete description of the design and function of SamplePro hr-MAS.

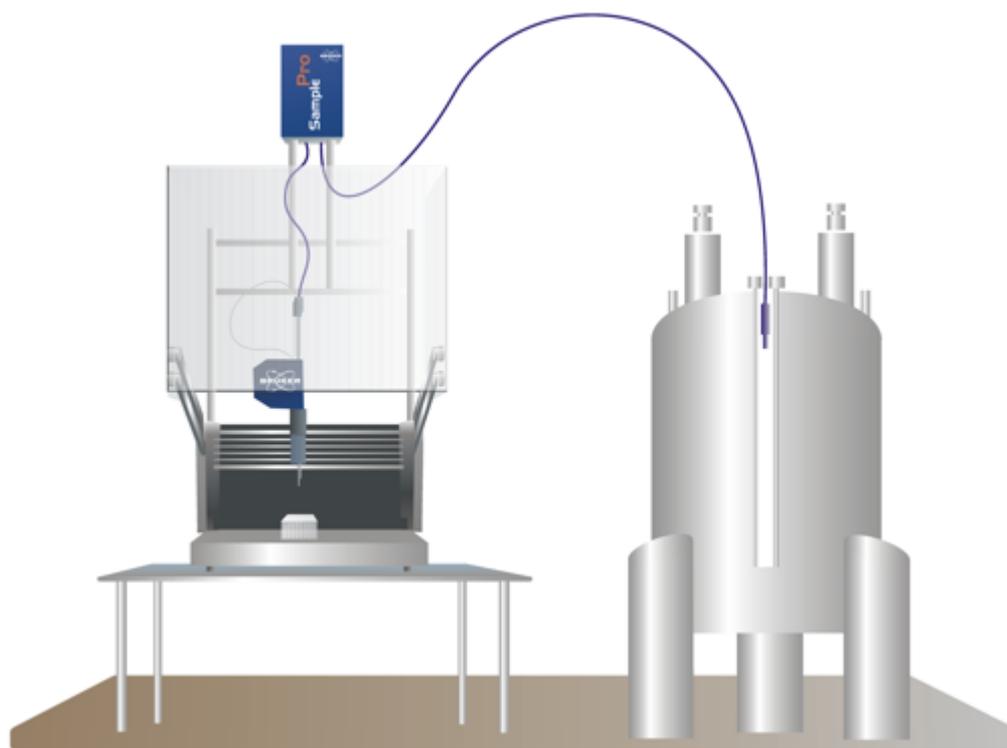


Figure 2.1 SamplePro hr-MAS

## 2.2 Limitations 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 the conclusion of the contract shall apply.

## 2.3 Copyright

---

This manual is protected by copyright and intended solely for internal use.

This manual must not be made available to third parties, duplicated in any manner or form – whether in whole or in part – and the content must not be used and/or communicated, except for internal purposes, without the written consent of the manufacturer.

Violation of the copyright will result in legal action for damages. We reserve the right to assert further claims.

## 2.4 Warranty Terms

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The warranty terms are included in the manufacturer's Terms and Conditions.

## 2.5 Customer Service

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Our customer service division is available to provide technical information. See "[Contact](#)" on page 67 for contact 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.

# 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 SamplePro hr-MAS sample changer has been designed and constructed solely for the intended use described here.

The sample changer must only be used for keeping NMR samples in a specially designed rotor container, inserting them into the NMR spectroscopy magnet and ejecting them after measurement back into the rotor container.

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

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### Owner

The term „owner“ refers to the person who themselves operates the unit for trade or commercial purposes, or who surrenders the unit to a third party for use/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, such 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 are 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 are 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

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### 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 persons due to hazards in the danger and working areas.**

Unauthorized persons who do not meet the requirements described here 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

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.

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 the laboratory. Always comply with the instructions governing personal protective equipment posted in the work area.

## 3.5 Basic Dangers

---

The following section specifies residual risks which may result from using the device and have been established by means of a risk assessment.

In order to minimize health hazards and avoid dangerous situations, follow the safety instructions specified here as well as in the following chapters of this manual.

### 3.5.1 Location of the Robot ON/OFF Switch

---

The robot ON/OFF switch is located on the right side of the deck tray:



Figure 3.1 The Robot ON/OFF Switch

## 3.5.2 General Workplace Dangers

### NOTICE

#### **Material damage hazard from overflow of cryogenics.**

Material damage may result from the overflow of cryogenics.

- ▶ Turn off the unit during magnet servicing.
- ▶ Cover the unit with a protective cover to avoid contact with cold gases.
- ▶ Be sure to use sufficient transfer line and Teflon evacuation hose for nitrogen and helium refills based on recommendations in the magnet manual.
- ▶ After refilling cryogenics some parts of the magnet may be icy. Be sure to remove the ice to avoid its melting onto the unit.

### CAUTION



#### **Accident hazard from contact with hot or cold surfaces on the unit.**

Contact with the hot or cold surfaces of the unit may result in serious burns.

- ▶ Do not touch unit parts of cooled or heated units.
- ▶ Do not use damaged units.
- ▶ After removing any part of the unit, allow it to cool or thaw before coming in contact.

### WARNING



#### **Accident hazard from asphyxiation.**

A break in a tube or hose may result in the uncontrolled exit of nitrogen into the laboratory.

- ▶ An oxygen warning device must be present in the laboratory if the device is operated with nitrogen.
- ▶ Proper air ventilation must be planned and implemented in the laboratory.

**⚠ CAUTION****Accident hazard from breaking or spilled samples.**

Samples may break or be spilled due to improper adjustment or cap loss. This may result in personal injury or equipment contamination.

- ▶ Follow the mounting, installation and adjustment instructions in the manual.
- ▶ Confirm the correct installation at the customer site through use of acceptance protocol.
- ▶ Standard operating procedures for sample preparation and usage must be implemented.
- ▶ During installation and maintenance use only rotors with dummy samples. Remove all MAS rotors (also from the magnet) before the installation and maintenance!

**⚠ WARNING****Biological, chemical hazard.**

Infection, contamination, or other health endangerment as a result of contact with biological or chemical substances, e.g. from broken samples.

- ▶ Clean the unit before maintenance work and/or returning to Bruker for repair.
- ▶ Prepare a list of materials in which the unit came into contact with or measured.
- ▶ A signed confirmation of correctly carrying out cleaning/disinfection is required from the customer. Without this confirmation the parts delivered for repair will be rejected and returned to the customer.

**NOTICE****Material damage hazard due to improper restart.**

Device deadlock may occur as a result of restarting the unit when an equipment failure has occurred.

- ▶ When an error has occurred, do not try to restart the unit until the cause of the error has been corrected.
- ▶ Only trained personnel should carry out maintenance work.

## DANGER

### **Accident and/or material damage hazard from sample breakage.**

Contact with hazardous substances contained in sample rotors that break may result in a life threatening situation or material damage. The contents of the sample rotors are the responsibility of the laboratory supervisor. The laboratory supervisor is responsible for:



- ▶ Defining disinfectant and cleaning procedures.
- ▶ Establishing and enforcing the use of protective clothing (gloves, eye protection, mask etc.).
- ▶ Preparing laboratory instructions for handling this type of accident.
- ▶ Preparing an emergency plan.
- ▶ Enforcing standard sample handling procedures, e.g. removing all samples from the rotor container and using sample rotors with dummy contents before maintenance work etc.
- ▶ Training laboratory personnel.



Note: Reference measurements should be made at regular intervals to help detect possible vibration and/or electromagnetic interference.

## NOTICE

### **Material damage hazard from icing due to lack of nitrogen.**

Material damage may result from icing caused by a lack of nitrogen flow.

- ▶ The nitrogen fill level must be controlled regularly.
- ▶ When icing occurs, the rotors must be defrosted according to established laboratory procedures.

## NOTICE

### **Material damage hazard software error.**

Samples or the unit may be damaged due to a software error causing malfunction of the control system. Users may also be shocked by abrupt malfunction or unexpected system start.

- ▶ Sample rotors with dummy contents must be used during installation and service.
- ▶ Personal should be alerted to unexpected malfunctions.

- 
- i** To avoid mix-up of the contents in rotors, proper standard laboratory operating procedures must be followed.
- 

## 3.6 Environmental Protection

---

### CAUTION



#### **Danger to the environment from incorrect handling of pollutants!**

Incorrect handling of pollutants, particularly incorrect waste disposal, may cause serious damage to the environment.

- ▶ Always observe the instructions below regarding handling and disposal of pollutants.
- ▶ Take the appropriate actions immediately if pollutants escape accidentally into the environment. If in doubt, inform the responsible municipal authorities about the damage and ask about the appropriate actions to be taken.

#### **Helium Inert Gas**

Helium inert gas may cause suffocation at high concentrations. Disposal of the empty gas cylinders must be performed by a specialist disposal company.

#### **Coolants**

When released, coolants develop decomposition products which are hazardous to the environment. Maximum care and caution are required when handling coolants. Always observe the safety data sheet issued by the manufacturer. Ensure that personnel handling coolants are regularly informed about potential dangers and are instructed in the safe handling of coolants.

#### **Cleaning Liquids**

Cleaning liquids incorporating solvents contain toxic substances. They must not be allowed to escape into the environment. Disposal must be carried out by a specialist disposal company.

## 3.7 Signage

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### 3.7.1 Warning Signs

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Warning indicating a danger zone in work rooms.



Warning indicating a biological hazard.



Warning indicating severe hand injury.

# 4 Technical Data

## 4.1 General

---

### Weight

Data	Value	Unit
System	60	kg
Robot	40	kg
Exchange Unit	10	kg
Cooling Unit	4.5	kg
Accessories	5.5	kg

Table 4.1 Technical Data: Weight

### Dimensions

Data	Height	Width	Depth	Unit
System	1800	566	650	mm
Robot	750	566	650	mm
Exchange Unit	300	150	350	mm

Table 4.2 Technical Data: Dimensions

### Noise Level

Data	Value	Unit
The highest measured workstation accepted value, with consideration of a standard deviation of 1.5 dB from the measurement inaccuracy.	71.5	dB(A)
The highest value 1 meter from the vicinity of the neighboring workstation.	69.5	dB(A)

Table 4.3 Technical Data: Noise Level

## Height

The SamplePro hr-Mas System can be operated in a height up to maximum 2000 m.

## Cooling Range

Data	Value	Unit
Cooling device temperature range	-16 to room temperature	°C

Table 4.4 Cooling Device Temperature Range

## Sample Usage

SamplePro hr-MAS can utilize standard MAS 4 mm rotors.

## 4.2 Electrical

---

### System

System	Value	Unit
Voltage (automatic voltage regulation)	90 - 240	Volts
Maximum Power Consumption	1045	Watts

Table 4.5 Electrical Connection Values

### Components

Components	Value	Unit
Robot	500	Watts
Exchange Unit	30	Watts
Cooling Unit	150	Watts
PC	320	Watts
Monitor	45	Watts

Table 4.6 Maximum Power Consumption

### 4.3 Operating Conditions

#### Environment

Data	Value	Unit
Temperature range	15 to 30	°C
Relative humidity at 30 °C, maximum, non-condensing	10-85	%

Table 4.7 Operating Environment

For the appropriate temperature see also the Bruker site planning guides on the BASH CD (Bruker Advanced Service Handbook):

Manual	Bruker Part Number
Site Planning for AVANCE Systems 300-700 MHz (UM)	Z31276
Site Planning for AVANCE Systems 750 -950 MHz (UM)	Z31686

Table 4.8 Bruker Site Planning Guides

### 4.4 Rating Plate System



## 4.5 Rating Plate Robot



Figure 4.1 Rating Plate Robot

## 4.6 Rating Plate Exchange Unit

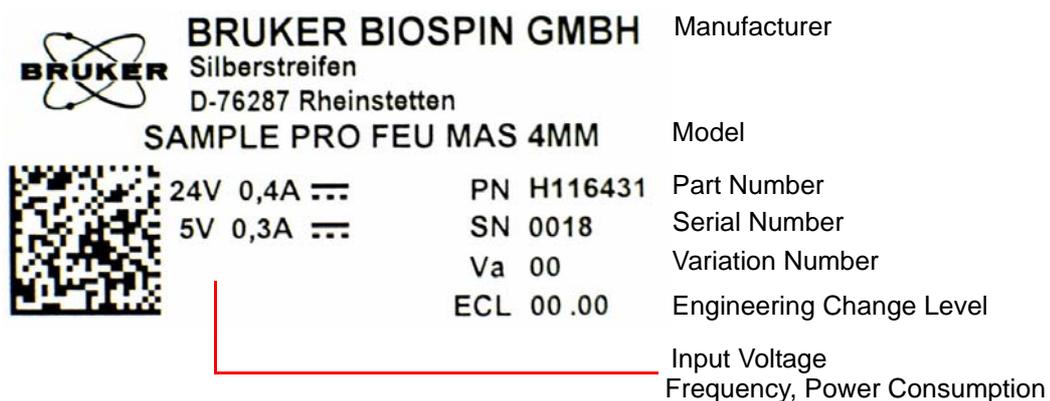


Figure 4.2 Rating Plate Exchange Unit

# 5 Design and Function

## 5.1 Overview

The principal components of the SamplePro hr-MAS system are:

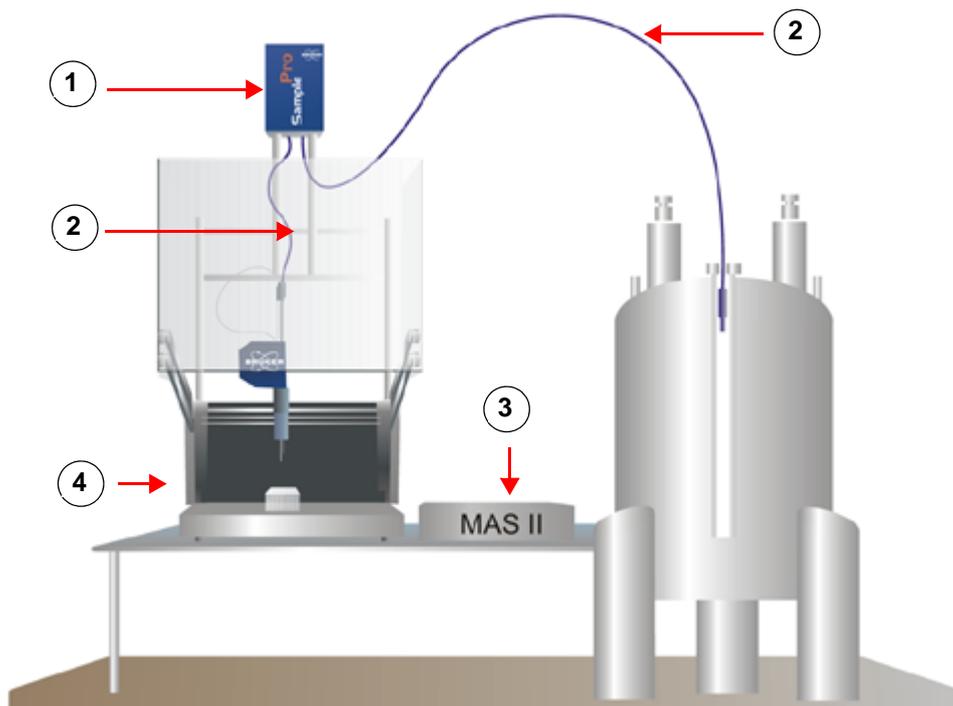


Figure 5.1 SamplePro hr-MAS Overview

1. The **SamplePro Exchange Unit**, which is used to transfer rotors from rotor containers to the NMR probe and back.
2. **Flexible hoses**, which are connected between the SamplePro robotic system, the SamplePro Exchange Unit and the MAS probe.
3. The **MAS II Unit**.
4. The **SamplePro Robotic System**, also called the changer device.

## 5.2 Brief Description

---

The SamplePro hr-MAS is a sample changer that was developed for high throughput, high resolution, magic angle spinning (hr-MAS) applications, such as the measurement of biological samples.

The new sample changer is part of a Bruker NMR system for standard NMR MAS applications and is used to transfer prepared MAS samples to and from Bruker NMR instruments to ensure they stay in continuous operation.

## 5.3 System Description

---

The SamplePro hr-MAS sample changer consists of:

- A SamplePro robotic system.
- The Exchange Unit transfer system connecting the laboratory robot to the probe inside the NMR magnet.
- A MAS Pneumatic Control Unit, which is used by SamplePro to control the spinning rate of the sample.
- A MAS probe, which is the interface between a sample and the spectrometer

The samples to be measured are supplied in a special rotor container, which can hold up to 48 samples. The rotor containers can be uniquely identified by their barcode through an optional barcode reader. The rotor container is assigned to a dedicated position on the robot system by laboratory personnel.

Since samples may undergo degradation at room temperature, sample cooling is also available as an option. Samples stored in the robot system are cooled down to a preset temperature between room temperature and -16°C.

The sample changer provides a Bruker standard interface, through which the changer can be controlled from TopSpin and IconNMR software.

## 5.4 Description of The SamplePro Robotic System

The SamplePro Robotic System consists of the following parts:

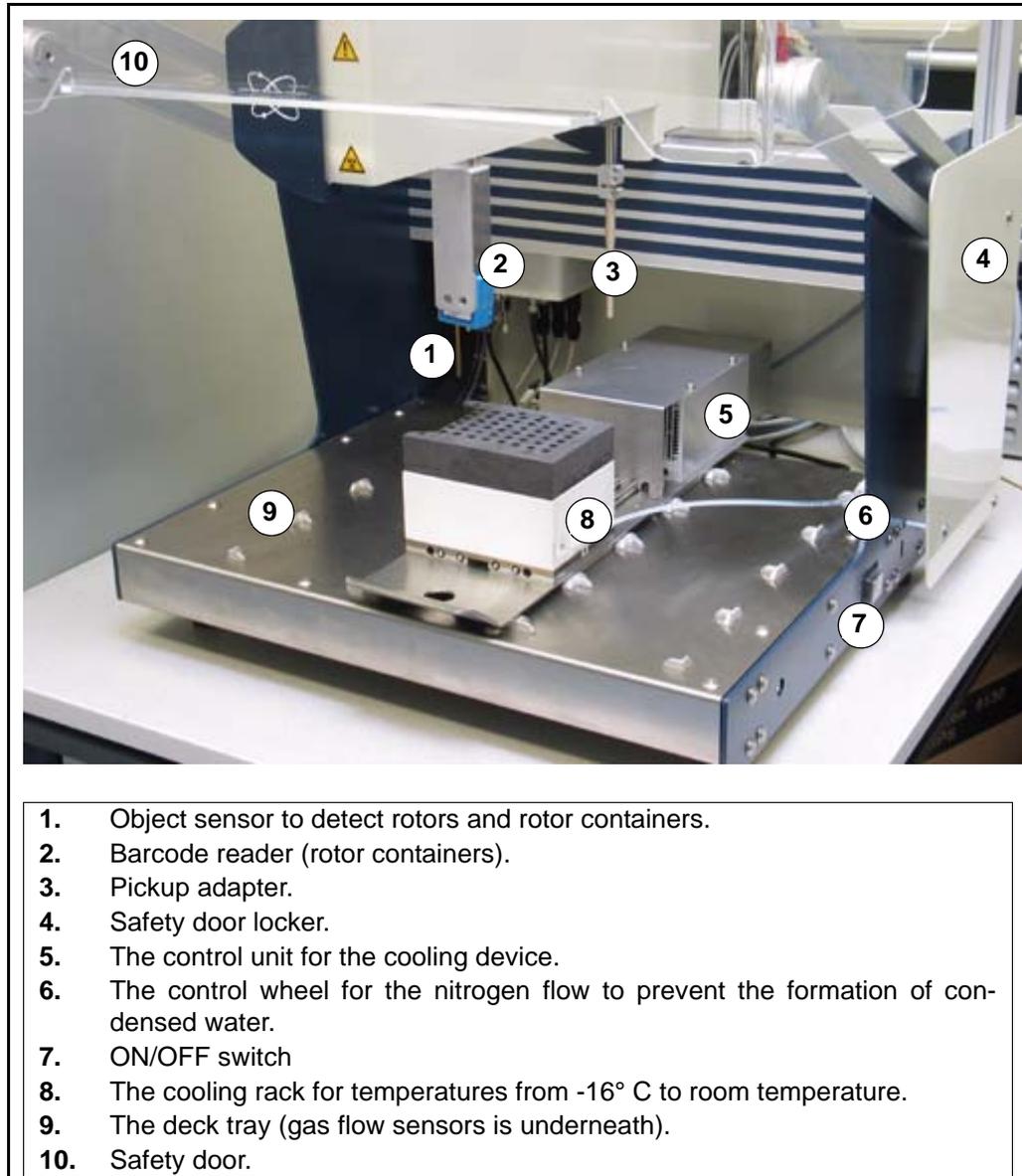
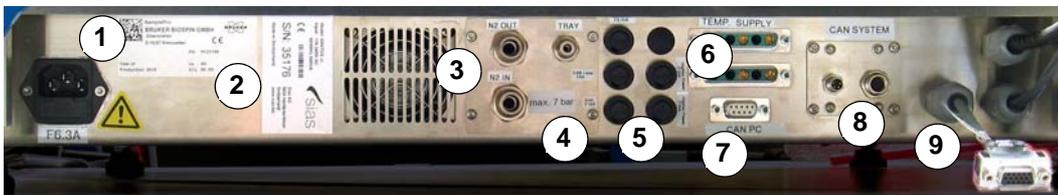


Figure 5.2 The SamplePro Robotic System

## 5.4.1 The Robot Back Panel



1. Power Supply and Main Fuse
2. Rating Plates
3. N2 OUT, N2 IN
4. Tray
5. Output Fuses
6. Supply for external temperature units, for future versions.
7. CAN Interface to PC
8. CAN Interface for temperature unit
9. Status light connection

## 5.4.2 The SamplePro LED Status Light

The robotic system also has an LED status lamp located on the upper frame of the unit:

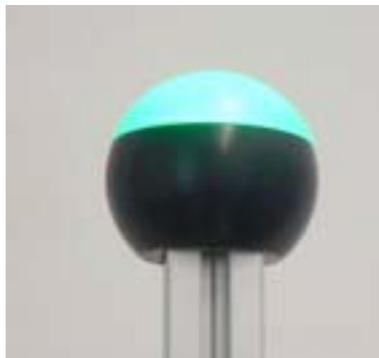


Figure 5.3 The SamplePro LED Status Light

The LED light utilizes different colors, whereas each light symbolizes a different system status:

- Blue:** A user interaction is required.
- White:** The system is initializing or running tasks.
- Green:** The SamplePro robotic system is ready and waiting for requests.
- Red:** A SamplePro hr-MAS device error has occurred. Further tasks cannot be performed.
- Orange:** The system is running in service mode.

## 5.4.3 The Door Lock

The SamplePro robotic system provides a door lock for safety.

The door locks when:

- The door is closed and the barcode scanner scans the rotor containers for barcodes. After the scan the door is automatically unlocked.
- A transfer to the MAS probe or a transfer back has been started within the control software SamplePro hr-MAS. After a transfer the door is automatically unlocked.

## 5.5 The SamplePro Exchange Unit

The SamplePro Exchange Unit (EU) was designed to transfer 4 mm MAS rotors from one end of a flexible hose to the other. An optional barcode reader can be supplied for reading barcodes on the rotors.

### 5.5.1 Exchange Unit Back Panel



1. Vacuum Generator Exhaust
2. Ventilation Valve
3. Type Label
4. Transfer Pressure Adjustment
5. Gas Inlet 1
6. Gas Inlet 2
7. CAN Connector
8. Power Supply Connector

Figure 5.4 Exchange Unit Back Panel

Name	Notes
Vacuum Generator Exhaust	Used for the exhaust of the vacuum generator. Ensure that the outlet channels are not covered or congested.
Ventilation Valve	Used for the ventilation of the valves, supplied from gas inlet 1. The ventilation provides a protective atmosphere for the EU. All valves that are not supplied by a protective gas (e.g. nitrogen) have to ventilate through Outlet 2. P/N of the silencer: 85947
Type Label	The type label displays the basic information for the unit, e.g. the part and serial number.
Transfer Pressure Adjustment	The transfer pressure can be adjusted using this set screw. Typical is a value of about 1400 mbar.
Gas Inlet 1	This inlet supplies the vacuum pickup adapter and all valves that don't have contact with the transfer pneumatic. Thus, there is no need to use dry air or nitrogen. Pressure range: 6-8 bar, Gas flow: above 120 NL
Gas Inlet 2	This inlet supplies only the transfer pneumatic. Only dry air or nitrogen must be used. This gas is usually taken from the outlet on the robot. Pressure range: 6-8 bar, Gas flow: above 60 NL
CAN Connector	This connector provides the CAN connection to the control unit. This end is with 120 Ohms terminated. Pinout at this connector: 1 - Shield 2 - VCC CAN (not used) 3 - GND 4 - CAN High 5 - CAN Low Part number for the CAN cable (with 9 pol. D-Sub on the other side): HZ16758.
Power Supply Connector	This connector supplies the EU with 5V/0,4A for the electronics and 24V/0,3A for the pneumatic valves. Pinout at this connector: 1 - 5V 2 - 24V 3 - n.c. 4 - GND 5 - GND Part number for the mains adaptor: 1801718 Part number for the power supply cable: HZ16759

Table 5.1 Exchange Unit Back Panel

## 5.6 Description of the MAS Pneumatic Control Unit

The SamplePro hr-MAS uses the MAS/MAS II Pneumatic Control Unit to control the spinning rate of the samples. The MAS/MAS II units also are used to control the drive gas pressure in an NMR system.

### 5.6.1 COM Mode

#### Com Mode old MAS

If you are using the RS232 connection you can select whether the MAS II unit should use a compatible mode to the old MAS unit (P/N H2620) for communication with the spectrometer.

This setting is necessary if you want to use a Topspin version prior to 3.0. When using Topspin version 3.0 or newer, the old COM mode should not be used!

1. Press the key **Unit Setup** from the main selection menu.

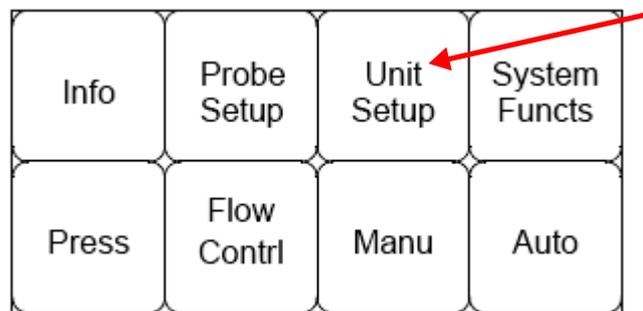


Figure 5.5 MAS Unit Setup

- The submenu MAS II Unit Setup will appear.
2. Press the Change Setup button.
- The Setup Window will appear:

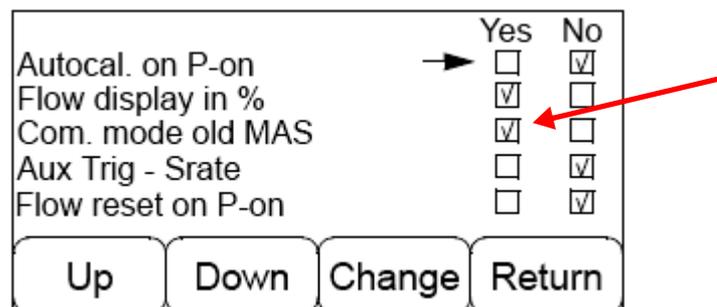


Figure 5.6 Selecting the Old MAS Communication Mode

3. Use the **Up** and **Down** buttons to move to the checkboxes for **Com. mode old MAS**.
4. Use the **Change** button to select **YES**.
5. Press the **Return** button.
  - The Storing MAS Setup Changes window will appear:

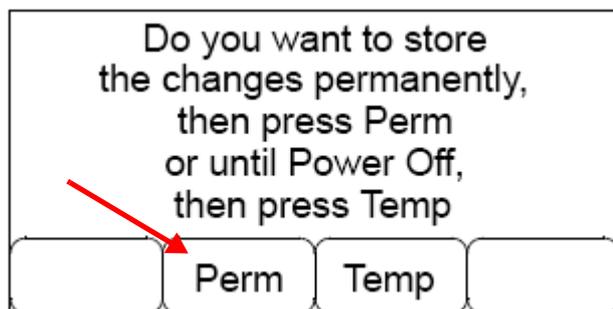


Figure 5.7 Storing MAS Setup Changes

6. Store the changes by pressing the **Perm** button.

## 5.7 Description of the hr-MAS Probe

---

Probes are the interface between a sample and the spectrometer. High Resolution Magic Angle Spinning (hr-MAS) probes are configured with a Z-gradient aligned along the magic angle enabling the researcher to access a wide variety of NMR experimental techniques including gradient enhanced solvent suppression and artifact free 2D homo-nuclear and hetero-nuclear experiments.

The hr-MAS probes are controlled by the MAS (II) control unit. For cooled samples a cooling unit is used to control the gas flow temperature.

Refer to the corresponding user manual for more information over the probe(s) you are using.

# 6 Transport, Packaging and Storage

---

**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.

---

## 6.1 Symbols on the Packaging

---

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

### Top



The arrow tips on the sign mark the top of the package. They must always point upwards; otherwise the content may be damaged.

### 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.

## Attach Here



Lifting gear (lifting chain, lifting strap) must only be attached to points bearing this symbol.

## Center of Gravity



Marks the center of gravity of packages.

Note the location of the center of gravity when lifting and transporting.

## Weight, Attached Load



Indicates the weight of packages.

Handle the marked package in accordance with its weight.

## Permitted Stacking Load



Indicates packages which are partially stackable.

Do not exceed the maximum load-bearing capacity specified on the symbol in order to avoid damaging or destroying the content.

## Do not Damage Air-tight Packaging



The packaging is air-tight. Damage to the barrier layer may render the contents unusable.

Do not pierce.

Do not use sharp objects to open.

## Component Sensitive to Electrostatic Charge



The packaging contains components which are sensitive to an electrostatic charge.

Only allow packaging to be opened by trained personnel.

Establish potential equalisation before opening.

## Protect from Heat



Protect packages against heat and direct sunlight.

## Protect from Heat and Radioactive Sources



Protect packages against heat, direct sunlight and radioactive sources.

## 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 or when returning the product to the manufacturer. Therefore do not destroy the packaging and only remove the parts from the packaging if instructed to do so by the Bruker Service Engineer.

### 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.



Under certain circumstances, storage instructions may be affixed to packages which expand the requirements specified here. Comply with these accordingly.

---

# 7 Installation and Initial Commissioning

Installation and initial commissioning of the SamplePro hr-MAS sample changer must be done by a trained Bruker representative in the diagnostic or NMR laboratory.

## WARNING



### **Danger to life from incorrect installation and initial commissioning!**

Errors during installation or initial commissioning may result in potentially fatal situations and may cause significant damage to property.

- ▶ Installation and initial commissioning must only be carried out by manufacturer or persons authorized by the manufacturer.
- ▶ Also consult the manufacturer in the case of subsequent location changes.
- ▶ Desist from unauthorized installation and location changes.



# 8 Operation Overview

## 8.1 Safety

---

### Improper Operation

#### **WARNING**



#### **Danger of injury from improper operation!**

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

- ▶ Carry out all operating steps in accordance with the specifications and instructions in this manual.
- ▶ Before starting work, ensure that
  - all covers and safety devices are installed and functioning properly.
  - no persons are in the danger zone.
- ▶ Never disable or bypass safety devices during operation.

### 8.1.1 Emergency Shutdown

---

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. Immediately disconnect the system from the mains power source and secure the power cables to prevent re-connection.
2. Notify a doctor and the fire brigade when the severity of the emergency warrants this.
3. Notify those responsible for the area of use.
4. Keep access routes clear for emergency service vehicles.
5. If warranted by the gravity of the emergency, notify the responsible authorities.
6. Delegate specialist personnel to rectify the fault.
7. Before the restart, check the device and ensure that all safety devices are installed and fully functional.

## 8.2 General Operating Guidelines

---

There are several general rules and procedures that should be observed while operating the device.

### NMR Measurement

During an NMR measurement try to minimize interaction with the SamplePro hr-MAS system, e.g. exchanging samples, as this may disturb the NMR measurement results.

The laboratory supervisor should define procedures regarding access to the unit and/or the 5 Gauss area around the magnet.

### Sample Mix-up

The laboratory supervisor should define through an SOP who should be allowed to load or unload samples from rotor containers, and when. The operator should work carefully and, optimally, use rotor ID barcode collars.

### ID Barcode

When the rotor ID barcode is dirty it should be cleaned according to established instruction or the barcode may be incorrectly read.

### Contamination of Samples

Reusing rotors may result in contamination of a new NMR sample from the old substance. Clean reusable rotors in accordance to established GLP and SOP standards.

### 8.2.1 Switching On the Device

---

1. Press the **Power** button on the host computer.
2. Press the **Power** button on the robot.

### 8.2.2 Switching Off the Device

---

1. Shut down the host computer.
2. Turn off the robot.

# 9 Assembling the Tray with Rotors

## Severe Hand Injury



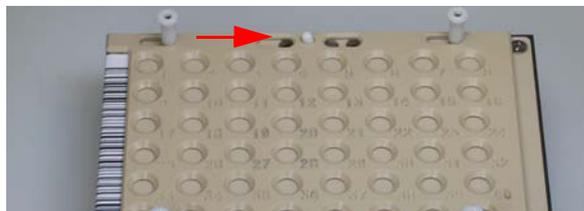
### WARNING

#### Severe hand injury.

When accessing the work area of the robot, movements of the robot may cause personal injury.

- ▶ Always open the safety door before accessing the working area of the robot.
- ▶ If the safety door cannot be opened, stop the automation using the control software (IconNMR).
- ▶ Do not reach over the safety door to access the work area.

Before the tray with rotors can be assembled, the rotors must be inserted in the tray.



1. Open the tray locking bar by sliding the white knob on the tray.

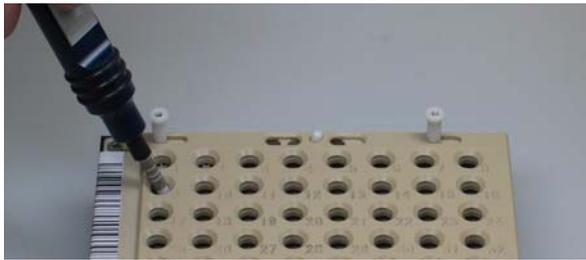


2. Insert a rotor into the slot of the rotor handling tool and press the cap downward to ensure that the rotor cap is fitted correctly.

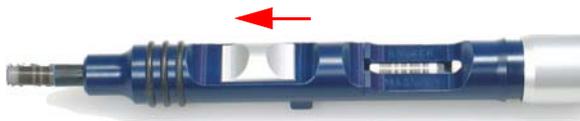
## Assembling the Tray with Rotors



3. Remove the rotor from the slot and insert it, cap first, into the flexible nozzle.

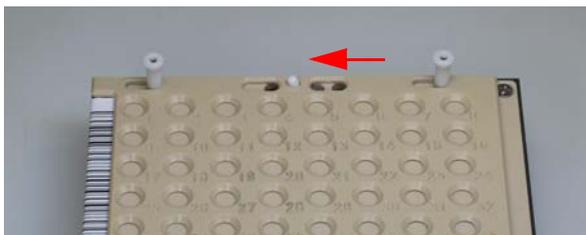


4. Insert the nozzle with the cap into the intended position in the tray.



5. Eject the rotor by moving the slider downward.

6. Insert the other rotors as described in steps 2-5.



7. When all rotors have been inserted, close the tray using the locking bar (white knob).



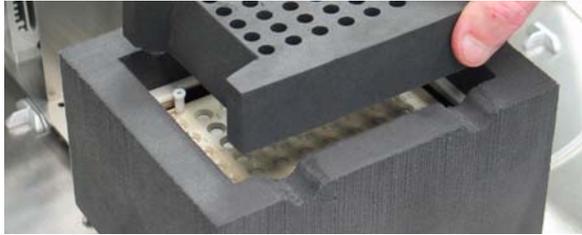
8. Hold the tray by the small white lifting arms and insert the tray into the cooling rack.

## Assembling the Tray with Rotors

---

**i** Notice: The tray must be inserted with the barcode on the left side.

---



9. Cover the cooling rack with the cap.

---

**i** Notice: The slot must be on the left side, so that the barcode labels can be read.

---

**i** Notice: When working in the mode **48 Rotors no cooling device**, use a non-cooled rotor container. The container must be set in the last position to the right, as shown in the following figure. Do not forget to use the adapter plate for room temperature to fix the rotor container. The adapter plate must be inserted before inserting the tray. The plate must be inserted so that the text "FRONT" is in the front.

---

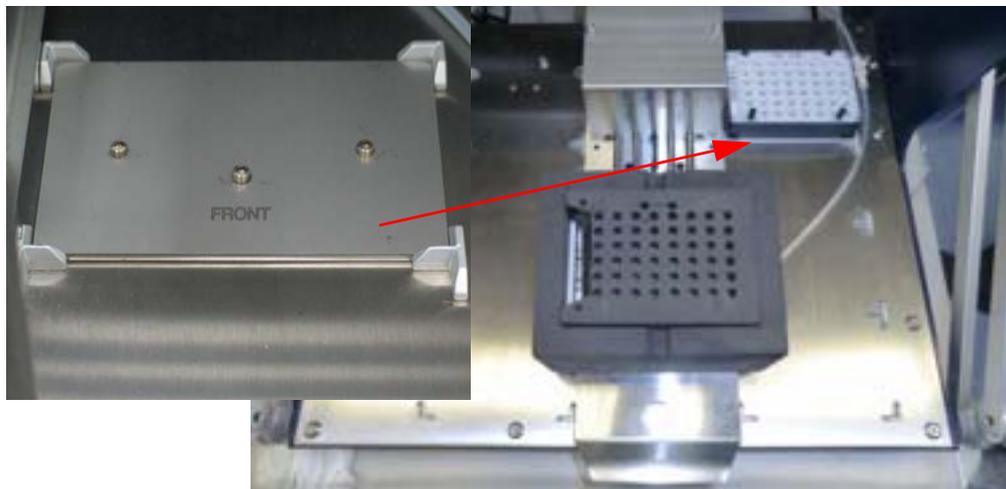


Figure 9.1 Adapter Plate for Room Temperature in Last Position to the Right



# 10 Operation

The SamplePro hr-MAS sample changer can be operated using three different modes:

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**i** Note: The application must run in all different modes!

---

1. Using **TopSpin**, whereas two commands are available:
  - **sx ej**: Used to eject a rotor from the probe.
  - **sx [position]**: Used to eject a rotor from the probe and to insert the rotor from the position indicated in brackets to the probe.
2. Using **IconNMR** to control of the automation. Select the automation mode **B-ACS** in IconNMR and press the **GO** button.

For further information please refer to the IconNMR user manual.

3. Using the application control software **SamplePro hr-MAS**. This chapter will describe the application control software in detail.

The next section describes the user interfaces for the SamplePro hr-MAS, if you are already familiar with this program you may proceed to the "[Basic Commands](#)" on page 53.

---

**i** Note: All panels and shields must be in place before operating this device!

---

## 10.1 SamplePro hr-MAS Main Display

The menu-driven application control software SamplePro hr-MAS consists of a left and right panel providing important information over the system.

The left panel of the main screen graphically displays or lists diverse information over three tabs:

- The "[System View](#)"
- The "[Holder View](#)"
- The "[Sample Holder List](#)"

The right panel of the main screen also offers important information over the current status of the system, see the "[Right Window Panel](#)" for details.

## 10.1.1 System View

The control software controls the transfer of the sample to the probe and the transfer back to the SamplePro hr-MAS. The tab **System View** graphically displays the current rotor position during the transport of the sample between the SamplePro hr-MAS system and the probe in the magnet. The system view also indicates the current status of the safety door.

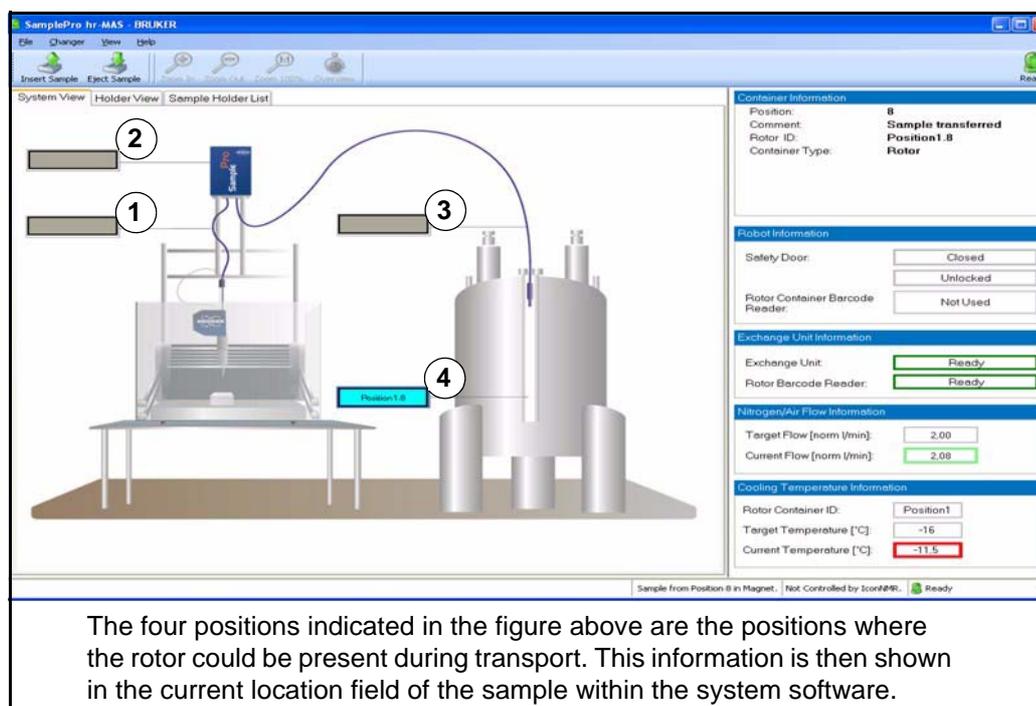


Figure 10.1 The Main Window of the Control Software SamplePro hr-MAS

## 10.1.2 Holder View

The main display tab **Holder View** displays rotor container information based on what has been read by the container barcode reader (optionally) or detected by the object detector:

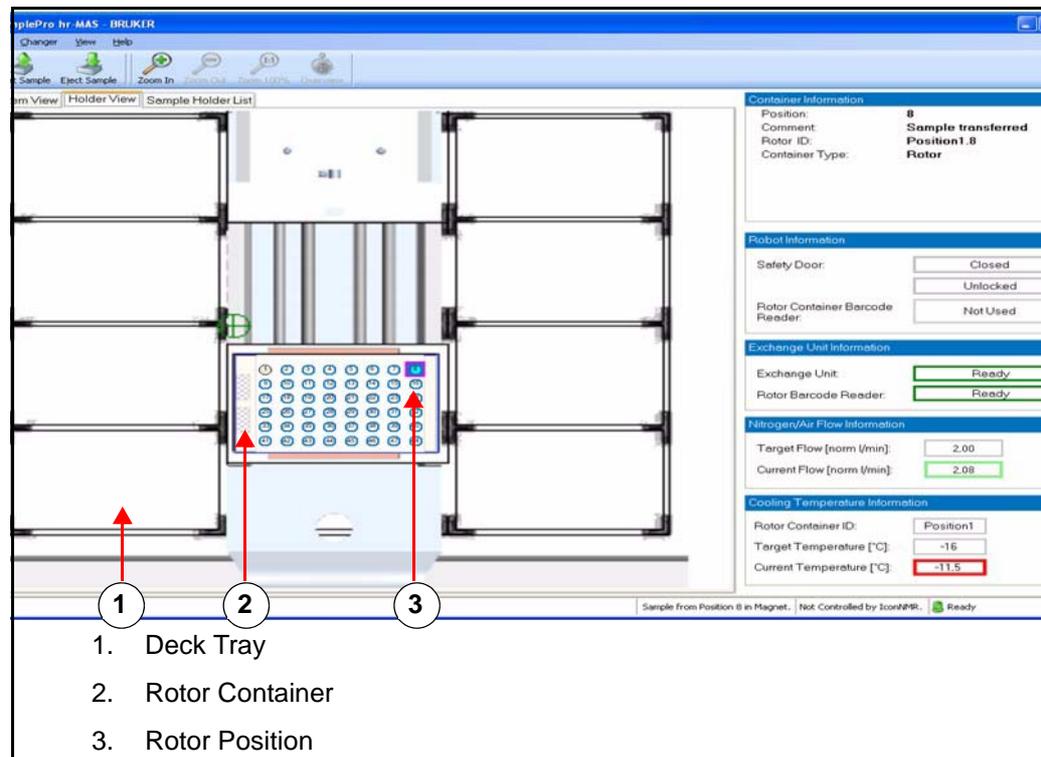


Figure 10.2: Holder View

The information about the selected area is displayed on the right information panel by selecting an area by clicking on it with a mouse.

## 10.1.3 Sample Holder List

The tab **Sample Holder List** provides information on the status of the measurement orders.

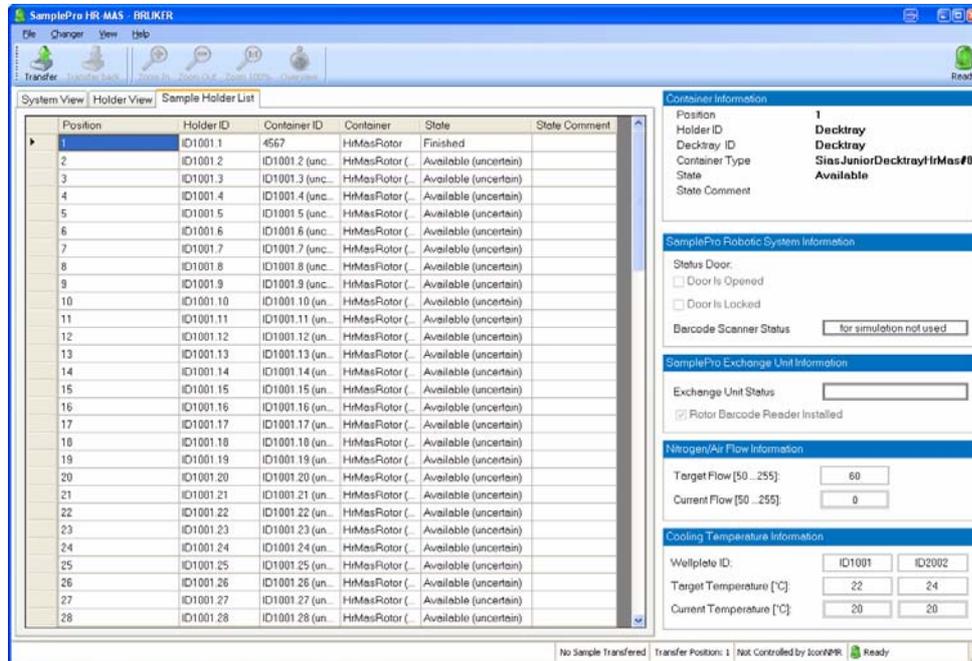


Figure 10.3 Sample Holder List

## 10.1.4 Right Window Panel

The window panel on the right side of the main window provides information about the current system status, including:

- "Container Information"
- "Robot Information"
- "Exchange Unit Information"
- "Nitrogen/Air Flow Information"
- "Cooling Temperature Information"

### 10.1.4.1 Container Information

A container is an object that can be one of three possible types:

- Rotor
- Rotor container
- Deck tray

## Displaying Rotor Information

To display information about the rotor in the container information section, click on the rotor.

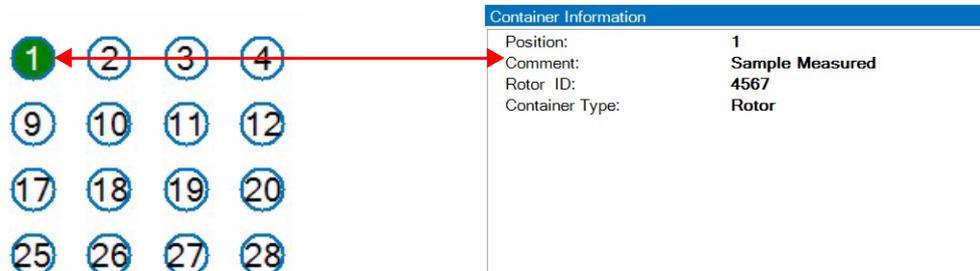
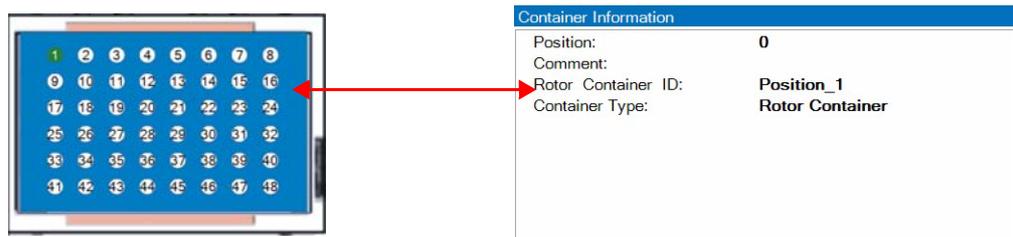


Figure 10.4: Container Information - Rotor

## Displaying Rotor Container Information

To display information about the rotor container in the container information panel, click on the rotor container, i.e. the blue area in the figure below.



## Displaying Deck Tray Information

To display information about the deck tray in the container information section, click on the corresponding deck tray area.

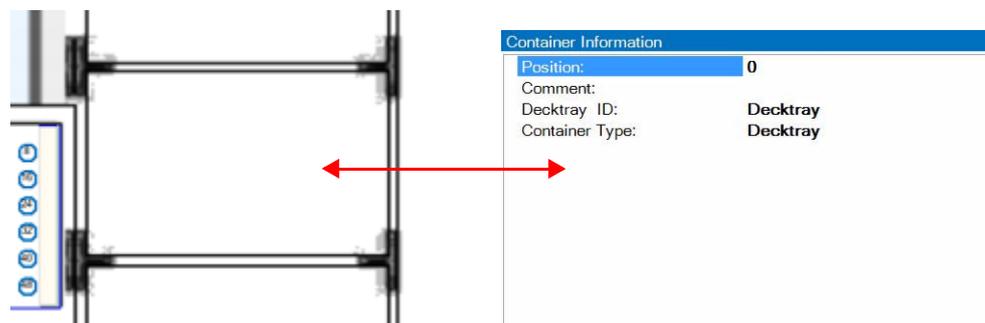


Figure 10.5: Container Information - Deck Tray

## 10.1.4.2 Robot Information

The Robot Information panel provides status information about the safety door and the rotor container barcode reader.

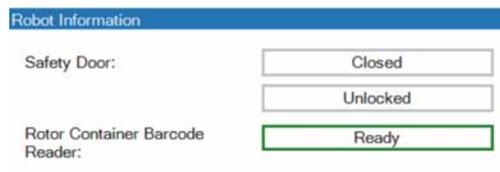


Figure 10.6 Robot Information about the Safety Door and Rotor Container Barcode Reader.

### Safety Door

There are four possible status for the safety door:

- **OPEN:** The safety door is open.
- **CLOSED:** The safety door is closed.
- **LOCKED:** The safety door is locked.
- **UNLOCKED:** The safety door is unlocked.

### Rotor Container Barcode Reader

A **Ready** status by the rotor container barcode reader indicates that the barcode scanner is initialized and ready for scanning.

A **Not Used** status indicates that the barcode reader is either not available or not ready for use.

## 10.1.4.3 Exchange Unit Information

The Exchange Unit Information panel displays the status of the SamplePro Exchange Unit and the optional rotor barcode reader. In both cases a **Ready** status indicates that the device is ready for use. Likewise, a **Not Used** status indicates that the device is either not available or not ready for use.

In automation mode, the exchange unit must have the status **Ready**.



Figure 10.7: SamplePro Exchange Unit Information

## 10.1.4.4 Nitrogen/Air Flow Information

The nitrogen or air flow are used on cooled racks to keep samples from freezing. The Nitrogen/Air Flow Information panel displays a target flow value and the current flow.

The value fields are color coded, when the flow value is within the target flow value, the Current Flow field border is green.

Nitrogen/Air Flow Information	
Target Flow [norm l/min]:	2.00
Current Flow [norm l/min]:	2.08

Figure 10.8 Nitrogen/Air Flow Information

When the difference in the target and current values exceed preset values, an error message appears and the current flow field border will turn to red. These preset values must be entered by a trained service representative.

## 10.1.4.5 Cooling Temperature Information

The Cooling Temperature Information panel display the target and current temperatures of the selected rotor container, as well as the rotor container ID.

Cooling Temperature Information	
Rotor Container ID:	ID1001
Target Temperature [°C]:	-20
Current Temperature [°C]:	-16.4

Figure 10.9: Cooling Device Information

The value fields are color coded, when the temperature value is within the target temperature value the current temperature field border is green.

When the difference in the target and current values exceed preset values, an error message appears and the Current Temperature field border will turn to red. These preset values must be entered by a trained service representative.

## 10.1.5 Menu and Button Navigation Overview

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### Main Menu

#### File

Open Device Service Web Page	Used to open the device service Web page (currently not available).
Export Device Report	Used to export a file containing device information (part number, serial number, etc.), device statistics (total run-time minutes, etc.) and other helpful information for diagnostic. This data should be sent to Bruker when problems occur.
Service and Settings	Used to open the service window (for service personnel only).
Exit	Used to exit the program.

#### Changer

Insert Sample	Used to begin the insert sample procedure.
Eject Sample	Used to begin the eject sample procedure.

#### View

Container Information	Used to toggle the container information on and off on the right panel of the main screen.
Zoom In	Used in the holder view to zoom in.
Zoom Out	Used in the holder view to zoom out.
Zoom	Used in the holder view to select a specific zoom factor (100%, 150%, or 200%).
Zoom Overview	Opens an overview window in the holder view to navigate over the holder in zoom mode.
Activity History	Opens a new window showing the activity history.

#### Help

Bruker Home Page	Used to open the Bruker internet homepage.
Info	Used to display the product version and copyright.

### Button Bars

There are two button bars available that provide quick access to the most popular commands:

The **Changer** button bar containing:

- Insert Sample
- Eject Sample

The **View** button bar containing:

- Zoom In
- Zoom Out

- Zoom 100%
- Overview

## 10.2 Basic Commands

---

Procedures that can be initiated from SamplePro hr-MAS include:

"Insert Sample"

"Eject Sample"

During a sample transfer:

- The container information fields will be continuously updated to the present status.
- The status bars on the button bar and the bottom of the system program will show **Automation Running**. When the transfer is complete the status will change to **Ready**.

When a transfer procedure begins, the system immediately locks the door, whereas the lock is graphically displayed in the System View:



Figure 10.10 Door Locked

The safety door will be unlocked when the transfer is complete.

**Note:** During the transfer procedure the current position of the rotor can be viewed in the System View. As the rotor proceeds through the system the four positions (Figure 10.1) will light and show the rotor ID. This transfer procedure can be very fast and almost invisible on the screen.

## 10.2.1 Insert Sample

**i** Note: The safety door must be closed before a sample can be transferred!

To insert a new sample into the probe:

1. Press the **Insert Sample** button or select **Changer -> Insert Sample** from the main menu.
  - The Insert Sample dialog window will open displaying all the sample positions.

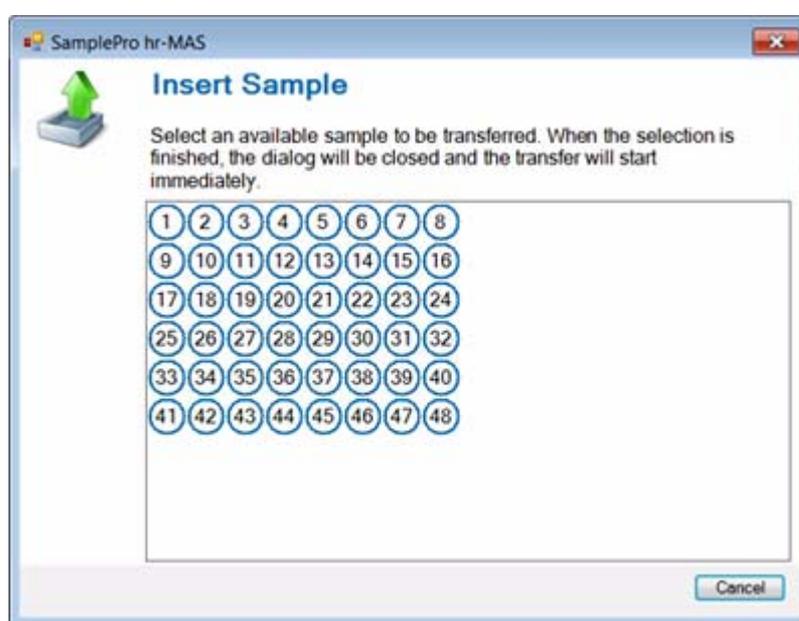


Figure 10.11 The Insert Sample Selection Screen

2. Select an available sample to be transferred by clicking on the sample position with your mouse.
  - The dialog window will close and the transfer will start immediately.

**Note:** When a sample is already in the probe, the system will automatically perform an Eject Sample and remove the old rotor. In this case, the new rotor will automatically be inserted into the probe when the old sample has been ejected.
  - When the transfer is complete, the Rotor ID of the inserted sample will be shown in the system view magnet position (see [Figure 10.1/4](#)), with a blue background indicating the sample is **In Measurement**.

## 10.2.2 Eject Sample

**i** Note: The safety door must be closed before a sample can be transferred!

To eject a sample from the probe:

1. Press the **Eject Sample** button or select **Changer -> Eject Sample** from the main menu.
  - The system will transfer the sample back to the rotor container. When the transfer is complete, the four positions in the System View (Figure 10.1) will all be blank.

## 10.3 Exchanging Rotors and rotor containers

Before opening the safety cover to exchange rotors or rotor containers, make sure that a transfer is not in progress and the status bars are showing a **Ready** status.

**Note:** After the safety cover is opened, then closed, the rotor deck tray of the container will be scanned and all information will be reset.

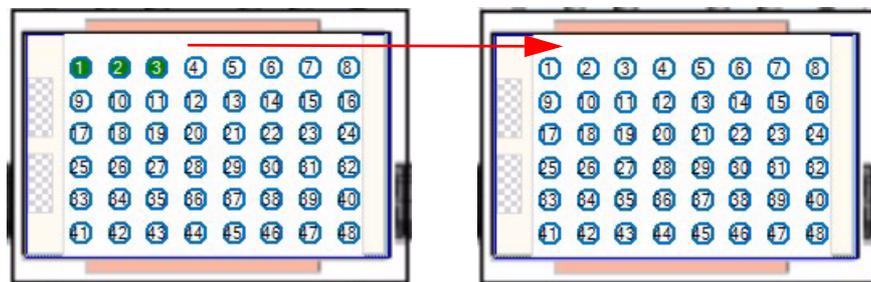


Figure 10.12 Example Before and After Opening the Safety Door

1. Open the safety cover.
  - A warning message is displayed:



Figure 10.13 Close safety door

2. Replace the rotors and rotor containers as desired and close the safety door.
  - The warning message automatically disappears and the rotor deck tray of the container will be scanned.
  - The information will be reset.

**Note:** When the door is opened when a sample is still in the magnet, by the next Insert Sample or Eject Sample command the SamplePro will try to return the sample to its origin. When this position is occupied by another sample an error message will be displayed and the sample will be transported to the Security Eject Position.

## 10.4 Activity History

---

The SamplePro hr-MAS program offers an activity history that can be used, for example, by the laboratory manager to monitor user activities or troubleshooting.

1. To open the activity history select in the menu **View - Activity History**.
  - A new report window will open displaying all available activity history files. Each history file is date and time stamped and includes the activity and activity type:

Activity History					
available Activity History Files: 26.05.2010 14:05:36 (current)					
Symbol	Activity	Activity Type	Date Started	Date Finished	Execution Time
?	105.110.014: The door of the SamplePro robot is open. Please, close the door and answer with <Retry> if you want to continue. Message answered by Dialog Message Box with answer Retry.	Question	26.05.2010 14:05:46	26.05.2010 14:05:56	00:00:09.9998720
i	Application started with user "Developer user".	Information	26.05.2010 14:06:13	26.05.2010 14:06:13	00:00:00
g	Insert Sample: Sample from holder Decktray.1.1 transferred.	Action	26.05.2010 14:16:11	26.05.2010 14:17:08	00:00:56.5149016
g	Insert Sample: Sample transfer canceled.	Action	26.05.2010 14:17:34	26.05.2010 14:17:36	00:00:01.8437264
g	Insert Sample: Sample transfer canceled.	Action	26.05.2010 14:19:47	26.05.2010 14:19:49	00:00:01.7187280
g	Eject Sample: No sample in magnet.	Action	26.05.2010 14:20:00	26.05.2010 14:20:20	00:00:20.2809904
g	Security Test: Finished	Action	26.05.2010 14:20:00	26.05.2010 14:20:20	00:00:20.2028664
i	No sample in magnet. Message answered by Dialog Message Box with answer OK.	Information	26.05.2010 14:20:20	26.05.2010 14:20:21	00:00:01.4062320

Figure 10.14 Activity History



# 11 Preventative Maintenance

## 11.1 Safety

### WARNING



#### **Electrical hazard from electrical shock**

A life threatening shock may result when the door to the housing is open during operation.

- ▶ Disconnect the device from the electrical power supply before opening the device for maintenance. Use a voltmeter to verify that the device is not under power!
- ▶ Be sure that the power supply cannot be reconnected without notice.
- ▶ The housing must be closed during operation.
- ▶ Ensure that all warning labels are in place.
- ▶ Only trained personnel should carry out maintenance.

### NOTICE

#### **Material damage hazard due to improper maintenance.**

Device deadlock may occur as a result of failures due to a lack of proper maintenance.

- ▶ Maintenance intervals must be properly followed.
- ▶ Use appropriate tools to avoid damaging parts or modules.
- ▶ Only trained personnel should carry out maintenance work.

#### Robotic System Preventative Maintenance

The SamplePro hr-MAS robotic system is designed with a minimum amount of maintenance by the user. However, to preserve the accuracy and reliability of the instrument, the following Preventive Maintenance (PM) procedures must be performed on a regular basis according to the maintenance schedules given below.

#### **Daily Preventive Maintenance**

Daily PM is performed by the operator at the end of each day or after 8 hours of operation whatever comes first, and takes a few minutes.

## Weekly Preventive Maintenance

Weekly PM is performed by the operator at the end of the week, and takes only a few minutes in addition to the daily maintenance.

## Periodic Preventive Maintenance

The SamplePro hr-MAS has been developed to be maintenance free, there is no periodic maintenance required. In the event problems should occur contact Bruker Service.

## Maintenance Log

A log sheet should be used for verification of maintenance. Whenever preventive maintenance actions are performed the corresponding form should be completed. It is important to maintain this record, as repairs necessitated by misuse; abuse or negligence is not covered under the warranty or service contract.

### 11.1.1 Cleaning and Decontamination

---

Use a 70% ethanol solution and a lint free tissue (only) to clean and decontaminate the instrument (e.g. deck, tips, deck trays, racks).

### 11.1.2 Weekly Maintenance

---

Weekly maintenance is performed by the operator once a week, in addition to the daily maintenance.

1. Check the position of the first rotor position when inserting and ejecting a rotor.
2. Check the object sensor position when inserting and ejecting a rotor.

### 11.1.3 Cleaning and Lubrication

---

The following parts should be cleaned on a 6 monthly basis (more frequently if the unit is in constant use).

#### 11.1.3.1 Pickup Adapter and Object Sensor Z-racks

---

There is a risk of injury, infection and contamination from parts to be cleaned, which could contain toxic and/or infected material. Appropriate protective clothing, gloves, and glasses are required for this step!

Use a lint free tissue to clean the sensors. Move the Z-rack manually slowly up and down several times to check for smooth movement.

- Never apply alcohol, alcohol solutions, or lubricant to the toothed rack or sleeve bearings, as they may expand and block Z-movement.

## 11.2 Cleaning the Outside of the SamplePro hr-MAS and Units

---

Clean the outside of the SamplePro hr-MAS chassis and units with a soft, lint-free cloth dampened in water.

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

### 11.2.1 After Cleaning

---

Wait until the unit is completely dry before you reconnect the line plug.

### 11.2.2 Other Cleaning Operations

---

For all other cleaning operations contact your authorized service station for advice and support. It may be necessary to send in the probe for a cleaning service, if cleaning of the probe becomes necessary due to excessive background signal. No special precautions have been taken in standard BRUKER probes to avoid contamination from a broken rotor. BRUKER accepts no responsibility for any damage which may occur when samples are used containing radioactive or other hazardous materials.

In case of an accident with toxic, radioactive, explosive or biologically active substances, the probe and associated equipment must be cleaned in such a way that there is no longer any danger in any form, especially for all uninformed personnel. If a probe has to be cleaned of all remains of a substance for safety reasons, contact your authorized service station for advice and support, as there is no standard cleaning procedure that is applicable for all probe types. Note that in serious cases it may be necessary for the customer to properly dispose of the probe and replace it with a new one.

## 11.3 Cleaning the Robot Barcode Reader

---

Clean the robot barcode reader once a year with warm water and a damp lint-free cotton cloth or towel.

**Note:** Excessive dust or dirt at the lens surface of the optics reduces the optics recognition performance. Keep these surfaces clean.



# 12 Dismantling and Disposal

## 12.1 Repair Declaration Form

---

A Safety and Repair Declaration Form must be filled out, whenever a probe or other unit situated in a magnet room are exposed to hazardous substances, and must be returned to Bruker.

● **Safety and Repair Declaration**

Equipment Clearance Form for Service, Repair, Disposal or Transfer



Use this form, whenever a probe or another unit situated in a magnet room or an analytical instrument might be exposed to hazardous substances by customers, when it is to be returned to Bruker.

Whenever a customer returns a system or its components to Bruker, e.g. for repair, upgrade, loan returns, exchange, etc., **the customer accepts the following obligation:**

**It is the explicit responsibility of the customer to make sure that the returned products are absolutely free of any hazardous substances. In case of omission to do so, Bruker will hold the customer liable for any resulting injuries and/or damages, caused to employees of Bruker and/or to other persons exposed to the hazardous substances. The customer is further liable for all damage caused to Bruker, e.g. decontamination, security measures, etc. The customer is finally liable for all other direct and/or indirect damages caused to Bruker by the hazardous substances.**

**I ACCEPT THIS OBLIGATION**

The repair declaration, completed and signed by the **safety representative**, has to be attached to the returned product. The declaration **must be attached** to the delivery note on the package exterior. Any returned product without a properly completed and duly signed declaration cannot be repaired. If we think that there is a risk of damage because of a contaminated returned product, we must dispose the hazardous material at the expense of the customer.

The safety & repair declaration form may be signed by a Bruker service engineer if the system was never operated by the customer (e.g. prior to completion of the installation).

The customer/signatory confirms that the returned product is absolutely free of any hazardous substances (e.g. toxic, corrosive, explosive, biologically dangerous or radioactive).

PRODUCT PART NO.:	SERIAL NO.:
FAULT DESCRIPTION (reason for return) :	
DATE FAILURE OCCURRED:	SYSTEM ORDER NO./ DISPATCH NO.:
COMPANY/INSTITUTE:	SIGNATURE: .....  DATE: .....
NAME:	
MAILING ADDRESS:	
CITY/POSTAL CODE/COUNTRY:	
EMAIL:	

Figure 12.1: Repair Declaration Form

# 13 EC-Declaration of Conformity

## ● EC-DECLARATION OF CONFORMITY

Bruker BioSpin GmbH



The undersigned, representing the following manufacturer

**Manufacturer:** Bruker BioSpin GmbH  
**Address:** Silberstreifen 4, 76287 Rheinstetten, Germany

herewith declares that the product

**SamplePro**  
**H121100**



is in conformity with the provisions of the following EC directives. (including all applicable amendments)

Reference no.	Title
2004/108/EC	Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC, former 89/336/EWG
2006/95/EC	Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (Low Voltage Directive), former 73/23/EWG
2006/42/EC	Directive of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast), former 98/37/EWG

This declaration is in conformity with the following standard(s) or other normative document(s)

Harmonized standards:

Standard	Title
EN 61010-1:2002	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements (IEC 61010-1:2001)
EN 61010-2-081	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-081: Particular requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes (IEC 61010-2-081:2001 + A1:2003); German version EN 61010-2-081:2002 + A1:2003
EN 61326-1:2006	Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements (IEC 61326-1:2005);
EN 61000-3-2:2010	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current = 16 A per phase) (IEC 61000-3-2:2005);
EN 61000-3-3:2009	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current = 16 A per phase and not subject to conditional connection (IEC 61000-3-3:2008);
DIN EN ISO 12100-1 & DIN EN ISO 12100-2	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003) & Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-2:2003)

Rheinstetten, Germany  
 (Place)

08.11.2010  
 (Date)

Dr. Tonio Gianotti, Director R&D  
 (Name and function of the signatory empowered to bind the manufacturer or his authorized representative)

(Signature)

● **EG-Konformitätserklärung**

Bruker BioSpin GmbH



Der Unterzeichner, der den nachstehenden Hersteller vertritt

**Hersteller:** Bruker BioSpin GmbH  
**Anschrift:** Silberstreifen 4, 76287 Rheinstetten, Germany



erklärt hiermit, dass das Produkt **SamplePro H121100**

in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinien (einschließlich aller zutreffenden Änderungen) ist.

Referenz Nr.	Title
2004/108/EG	Richtlinie 2004/108/EG des Europäischen Parlaments und des Rates vom 15. Dezember 2004 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit und zur Aufhebung der Richtlinie 89/336/EWG (früher 89/336/EWG)
2006/95/EG	Richtlinie 2006/95/EG des Europäischen Parlaments und des Rates vom 12. Dezember 2006 zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen (früher 73/23/EWG)
2006/42/EG	Richtlinie 2006/42/EG des Europäischen Parlaments und des Rates vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung) (früher 89/392/EWG)

Standard	Folgende harmonisierte Normen wurden angewandt:
EN 61010-1:2002	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 1: Allgemeine Anforderungen (IEC 61010-1:2001); Deutsche Fassung EN 61010-1:2001
EN 61010-2-081	Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 2-081: Besondere Anforderungen an automatische und semiautomatische Laborgeräte für Analysen und andere Zwecke (IEC 61010-2-081:2001 + A1:2003); Deutsche Fassung EN 61010-2-081:2002 + A1:2003
EN 61326-1:2006	Elektrische Mess-, Steuer-, Regel- und Laborgeräte - EMV-Anforderungen - Teil 1: Allgemeine Anforderungen (IEC 61326-1:2005); Deutsche Fassung EN 61326-1:2006
EN 61000-3-2:2010	Elektromagnetische Verträglichkeit (EMV) - Teil 3-2: Grenzwerte - Grenzwerte für Oberschwingungsströme (Geräte-Eingangsstrom = 16 A je Leiter) (IEC 61000-3-2:2005 + A1:2008 + A2:2009); Deutsche Fassung EN 61000-3-2:2006 + A1:2009 + A2:2009
EN 61000-3-3:2009	Elektromagnetische Verträglichkeit (EMV) - Teil 3-3: Grenzwerte - Begrenzung von Spannungsänderungen, Spannungsschwankungen und Flicker in öffentlichen Niederspannungs-Versorgungsnetzen für Geräte mit einem Bemessungsstrom = 16 A je Leiter, die keiner Sonderanschlussbedingung unterliegen (IEC 61000-3-3:2008); Deutsche Fassung EN 61000-3-3:2008
DIN EN ISO 12100-1 & DIN EN ISO 12100-2	Sicherheit von Maschinen - Grundbegriffe, allgemeine Gestaltungsleitsätze - Teil 1: Grundsätzliche Terminologie, Methodologie (ISO 12100-1:2003); Deutsche Fassung EN ISO 12100-1:2003 & Teil 2: Technische Leitsätze (ISO 12100-2:2003); Deutsche Fassung EN ISO 12100-2:2003

Rheinstetten, Germany  
 (Place)

08.11.2010  
 (Date)

Dr. Tonio Gianotti, Director R&D  
 (Name und Funktion des vom Hersteller oder von seinem Bevollmächtigten zur Unterschrift berechtigten Person)

(Unterschrift)

CE-Declaration 2010-DE-HR-MAS

19.11.2009  
 1 (1)

# 14 Contact

**Manufacturer:**

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Silberstreifen  
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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](http://www.bruker-biospin.com/hotlines_nmr.html)



# Appendix A

## A.1 Warning Signs

---

### C

#### Caution

- Accident hazard from breaking or spilled samples. .... 17
- Accident hazard from contact with hot or cold surfaces on the unit. .... 16
- Danger to the environment from incorrect handling of pollutants! .... 19

### D

#### Danger

- Accident and/or material damage hazard from sample breakage. .... 18

### N

#### Note

- All panels and shields must be in place before operating this device! ..... 45
- Only trained Bruker personnel are allowed to mount, retrofit, repair, adjust and dismantle the unit! ..... 13
- Reference measurements should be made at regular intervals to help detect possible vibration and/or electromagnetic interference. .... 18
- To avoid mix-up of the contents in rotors, proper standard laboratory operating procedures must be followed. .... 19

#### Notice

- Material damage hazard due to improper maintenance. .... 17, 59
- Material damage hazard from icing due to lack of nitrogen. .... 18
- Material damage hazard from overflow of cryogens. .... 16
- Material damage hazard software error. .... 18

### W

#### Warning

- Accident hazard from asphyxiation. .... 16
- Biological, chemical hazard. .... 17
- Danger to life from incorrect installation and initial commissioning! .... 37
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## A.4 Glossary

**B-ACS**

Bruker Automatic Sample Changer.

**EU**

The SamplePro Exchange Unit

**GLP**

Good Laboratory Practices

**hr-MAS**

High Resoluton Magic Angle Spinning.

**Icon NMR**

Bruker software package for automation.

**MAS**

Magic Angle Spinning.

**NMR**

Nuclear Magnetic Resonance.

**SamplePro**

Bruker name for the Sias Xantus robot (XANTUS and XANTUS Junior).

**SOP**

Standard Operating Procedure



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# **Bruker**

## **your solution partner**

Bruker provides a world class, market leading range of analytical solutions for your molecular and material research needs. Our solution-based 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 considerable investment in research and development demonstrates our long-term commitment to technological innovation on behalf of our customers. With more than 50 years of experience in meeting the needs of the scientific community across a range of disciplines, Bruker has built a sound rapport with professionals from the community through understanding their 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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