Bruker BioSpin

SampleXpress

Sample Changer
User Manual

Version 001

think forward

NMR Spectroscopy

This manual was written by

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Rheinstetten, Germany

P/N: Z31900

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For further technical assistance on the SampleXpress unit, please do not hesitate to contact your nearest BRUKER dealer or contact us directly at:

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1 About

1.1 This Manual

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

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.

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 new Bruker sample changer SampleXpress allows automatic measurement of NMR samples with Bruker NMR spectrometers. It is the successor of the B-ACS sample changer system. Its compact, exceptionally integrated design, drastically reduces sample transfer distances, delivering exchange times of just a few seconds, making SampleXpress ideal for optimizing throughput in standard NMR service laboratories running 30-200 samples per day. In addition, efficiency is maximized thanks to exchangeable, easy-fill, cassette modules that can be loaded off-system and in parallel with current experiments.

2.1 Concept

SampleXpress is controlled by TopSpin or ICON-NMR, Bruker's graphical user interface for fully-automated acquisition and processing.

The system is also equipped with integrated barcode reader registration, which is under control of SampleTrack, Bruker's information and data management software.

Refer to "Design and Function" on page 35 for a complete description of the design and function of SampleXpress.

Figure 2.1 SampleXpress

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 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

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

2.5 Customer Service

Our customer service division is available to provide technical information. See "Contact" on page 121 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.

2.6 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 **SampleXpress H15000 & SampleXpress Lite H15200**

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 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)

13.07.2010
(Date)

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

(Signature)

2.7 EG-Konformitätserklärung

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 **SampleXpress H15000 & SampleXpress Lite H15200**

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

Referenz No..	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 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)

13.07.2010
(Date)

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

(Unterschrift)

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.

The combined safety notices for this manual in **English** can be found in "Safety Notices" on page 123.

The combined safety notices for this manual in **French** can be found in "Avertissements De Sécurité" on page 133.

The combined safety notices for this manual in **German** can be found in "Sicherheitshinweise" on page 145.

3.1 Intended Use

The device has been designed and constructed solely for the intended use described here.

The SampleXpress must only be used for keeping NMR samples in a cassette module, inserting them into the NMR spectroscopy magnet and ejecting them after measurement back into the magazine.

Intended use also includes compliance with all specifications within 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/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 SampleXpress 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 SampleXpress 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

3.3.1 Qualifications

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

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 Position of the Safety Devices

EMERGENCY STOP Button

The position of the EMERGENCY STOP button is indicated in the illustration by an arrow.

Figure 3.1 Position of the Emergency Stop

3.5.2 Description of the Installed Safety Devices

EMERGENCY STOP Button

Pressing the EMERGENCY STOP button triggers an emergency stop. After the emergency stop button has been pressed, it must be unlocked by rotating it in order to enable a restart.

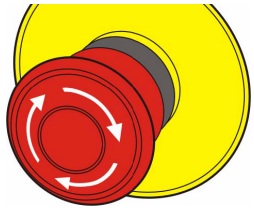


Figure 3.2 Emergency Stop Button

3.5.3 General Workplace Dangers

Dirt and Scattered Objects

⚠ CAUTION

Danger of injury from tripping over dirt and scattered objects!

Dirt and scattered objects may cause people to slip or trip. A fall may result in injuries.

- ▶ Always keep the work area clean.
- ▶ Remove objects which are no longer required from the work area and particularly from the floor.
- ▶ Indicate unavoidable hazards using marking tape.

Working in Heights

⚠ CAUTION

Accident hazard from falling from ladder!

It is possible to fall from a ladder when it is used to reach the SampleXpress on some magnets.

- ▶ Do not use a ladder.
- ▶ Use an approved platform to reach the device on the magnet.
- ▶ Wear non-slip shoes.

Software Error

NOTICE

Material damage due to a software error!

Samples or SampleXpress 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.

- ▶ Dummy samples must be used during installation and service.
- ▶ Personnel should be alerted to unexpected malfunctions.

Impacting Magnet

NOTICE

Material damage hazard due to impacting the magnet!

Impacting the magnet may result in a quench.

- ▶ Mount the SampleXpress carefully on the magnet.
- ▶ Avoid banging the magnet during installation and operation, e.g. when replacing the sample cassette.

Genuine Samples

NOTICE

Material damage due to the use of genuine samples during installation and maintenance!

Using genuine samples during installation and maintenance may result in material damage.

- ▶ Use only dummy samples during installation and maintenance.

3.5.4 Dangers from Electric Power

Stored Charges

⚠ DANGER

Danger to life from stored charges!

Electric charges may be stored in electrical components even after the system has been switched off and disconnected from the power supply. Contact with these components may result in serious or fatal injury.

- ▶ Before working on the specified components, ensure that they have been completely disconnected from the power supply. Allow 10 minutes to elapse in order to ensure that the internal capacitors have been fully discharged.

Electric Current

⚠ WARNING

Electrical hazard from electrical shock!

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

- ▶ Disconnect the device from the electrical power supply before opening the device. 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.

Residual Electrostatic Potentials

⚠ WARNING

Danger to life from residual electrostatic potentials!

Friction between material being conveyed may result in significant development of electrostatic potential. Contact with parts immediately following the conveying operation may therefore be life-threatening.

- ▶ Therefore, potential equalisation must be ensured before making contact with parts, unless such equalisation is provided by the customer.

Electrostatic Discharge

i Electrostatic discharge from friction may occur, resulting in an electric spark and loud bang. Use ESD flooring and wear ESD shoes.

3.5.5 Mechanical Dangers

Moving Parts

⚠ CAUTION

Accident hazard from movement of mechanical parts!

The fingers or hand may be pinched due to movement of mechanical parts.

- ▶ Shut off the SampleXpress before accessing the device.

Falling Objects

⚠ CAUTION

Accident and material damage hazard from falling objects!

Equipment may fall down during assembly, retrofitting, or dismantling. This may result in personal injury or equipment damage.

- ▶ If necessary, assembly/disassembly the device in multiple parts.
- ▶ Use a platform with railings instead of a ladder to reach the assembly area.
- ▶ Avoid working over the head. When this can not be avoided, wear a protective hard hat.
- ▶ Follow the mounting instructions in the installation manual.

Chain Drive

⚠ CAUTION

Accident hazard from loose clothing or long hair becoming caught in magazine chain!

Wearing loose clothing or long hair around the magazine chain may result in the clothing or hair being pulled into the magazine chain causing injury.

- ▶ Do not wear loose clothing or jewelry in the vicinity of the magazine chain.
- ▶ Those who have long hair should stay well clear of the magazine chain.

3.5.6 Dangers from Gases Under Pressure

Pneumatics

⚠ WARNING

Danger of injury due to movements caused by stored pneumatic forces!

Pneumatically driven components may move unexpectedly due to stored residual forces, causing serious injuries.

- ▶ Work on the pneumatics system must only be carried out by trained pneumatics technicians.
- ▶ Before starting work on the pneumatics system, ensure that it has been completely depressurised. The pressure accumulator must be completely relieved.

Suffocation

⚠ WARNING

Accident hazard from asphyxiation!

A break in the pneumatic hose may result in the uncontrolled exit of nitrogen into the laboratory.

- ▶ An oxygen warning device should be present in the laboratory if the device is operated with nitrogen.
- ▶ Note that leakage from the main supply line cannot be stopped by the SampleXpress!

3.5.7 Dangers from Radiation

Strong Magnetic Fields

⚠ WARNING

Danger to life from strong magnetic fields!

Strong magnetic fields may cause serious injuries or death and significant damage to property.

- Persons fitted with heart pacemakers must be kept away from the appliance. The functionality of the heart pacemaker could be compromised.
- Persons with metal implants must be kept away from the appliance. Implants may heat up or be subject to magnetic attraction.
- Ferromagnetic materials and electromagnets must be kept away from the magnetic source. Such materials could be subject to magnetic attraction and may fly around the room, injuring or killing people. Minimum distance 3 meters.
- Remove magnetic items (jewelry, watches, pens etc.) before carrying out maintenance work.
- Keep electronic equipment away from the magnetic source. Such equipment could be damaged.
- Keep storage media, credit cards etc. away from the magnetic source. Data could be erased.

i Note: The magnetic field of the SampleXpress does not cause any personal injuries or property damage. For further information see the manual of the magnet used.

Bright LED Light

⚠ CAUTION

Accident hazard from bright LED light!

Peering into the lighting system of optical sensors, e.g. barcode reader, may result in temporary blinding of the eyes due to the bright light.

- Do not look into the ray of light.
- Switch off the equipment before maintenance work.

3.5.8 Dangers Due to High or Low Temperatures

Hot or Cold Air

⚠ CAUTION

Accident hazard from hot or cold air escaping out of the unit.

When the cassette is removed, hot or cold air may exit the unit or BST, which may result in serious burns.

- ▶ Ensure that personnel are aware of this risk.
- ▶ Refer to the unit manual for more information.

Hot or Cold Surfaces

⚠ 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 device parts of cooled or heated units.
- ▶ Do not use damaged samples.
- ▶ After removing a sample or cassette allow it to cool or thaw before coming in contact.

Thermal Shock

NOTICE

Material damage hazard from overflow of cryogens.

Material damage may result from the overflow of cryogens.

- ▶ Turn off the SampleXpress during magnet servicing.
- ▶ Cover the SampleXpress 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 cryogens some parts of the magnet may be icy. Be sure to remove the ice to avoid its melting onto the SampleXpress.

3.5.9 Danger from Chemical Substances

Glass Tube Breakage

DANGER

Danger of injury from glass tube breakage!

Broken glass tubes may cause minor injuries or material damage, but may also result in a life threatening situation if hazardous substances are used.

- If a glass tube breaks, refer to the corresponding precautions and cleaning/disinfection instructions.
- Wear protective equipment.
- Perform all tasks with the cassette and glass tubes carefully.
- Before carrying out any maintenance work, remove the samples and use dummy samples if necessary.
- Strictly observe the correct sample adjustment, i.e. the maximum sample height.
- Always transport the cassette with the cover. Never turn the cassette upside down or on it‘s side.

The **laboratory supervisor** is responsible for:

- Establishing and enforcing standard sample handling and cleaning procedures.
- Establishing and enforcing the use of protective clothing and equipment.
- Training laboratory personnel.
- Preparing an emergency plan.

Vapor Formation

WARNING

Danger of injury from vapor formation!

During the work process, vapors may form which cause serious injury if inhaled.

- Only install the appliance in a well-ventilated room or ensure that an extractor is fitted.

NMR Solvents

NOTICE

Material damage hazard from material contact with NMR solvents!

Material damage may result when the device comes in contact with NMR solvents.

- ▶ Follow instructions provided in the manual for correct handling of solvents.
- ▶ Follow the sensor cleaning procedures described in this manual.
- ▶ If surface damage should occur, contact Bruker for repair of damaged parts.

NOTICE

Material damage hazard from heavy samples!

Samples may be damaged due to incorrect sample lift pressure adjustment.

- ▶ Adjustment is valid only for 1 sample configuration and weight.
- ▶ Personal must be trained.

Safety Devices

⚠ WARNING

Danger to life from nonfunctional safety devices!

If safety devices are not functioning or are disabled, there is a danger of serious injury or death.

- ▶ Check that all safety devices are fully functional and correctly installed before starting work.
- ▶ Never disable or bypass safety devices.
- ▶ Ensure that all safety devices are always accessible.

Protective Earth Conductor

⚠ WARNING

Danger to life from contact voltage!

Absent or faulty protective earth conductor may result in contact voltage. This may pose a risk of injury or death.

- ▶ Before the initial commissioning of the appliance, connect the main power supply to the socket and verify the complete functionality of the protective earth conductor.

Overpressure Valve

The high pressure system includes an overpressure valve which safely reduces the excess pressure in the event of inadmissible pressure conditions developing as a result of faulty operation, component failure or other irregular events.

3.6 Environmental Protection

NOTICE

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.

The following pollutants are used:

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

3.7 Signage

The following symbols and information signs can be found in the work area. They refer to their immediate surroundings.

i Note: The identification and placement of warning labels are included in the manual. The laboratory supervisor is responsible for ensuring that all the warning labels are maintained in their proper place any time that the device is used.

Electrical Voltage

Only qualified electricians are permitted to work in a work room marked by this sign. unauthorized persons must not enter the workplaces thus marked and must not open the marked cabinet.

Danger Spot

Warning indicating a danger spot in work rooms.

Hand Injury

Keep hands away from areas bearing this warning sign. There is a danger that hands could be crushed, drawn in or otherwise injured.

Maximum Sample Height

There is a danger that the sample breaks, if the sample exceeds the maximum sample height.

3.8 Spare Parts

NOTICE

Material damage hazard from glass tube breakage or sample blockage in the BST.

Material damage from glass breakage or samples becoming stuck in the BST may result if non-OEM replacement parts are used.

- ► Replacement parts must meet OEM standards.

Loss of Guarantee

If non-approved spare parts are used the manufacturer's guarantee is invalidated.

Purchase spare parts from authorised dealers or directly from the manufacturer. See "Contact" on page 121 for manufacturer's address.

3.9 Location of Safety Label

Figure 3.3 Location of Cassette Warning Label

4 Technical Data

4.1 General Information

Data	Value	Unit
Weight without cassette	17	kg
Weight with 60s cassette (without any sample)	25	kg
Length	85	cm
Width	65	cm
Height	50	cm

Table 4.1 Technical Data: General Information

4.2 Connection Values

Electrical

Data	Value	Unit
Voltage	208 - 230	V C
Apparent power consumption, maximum	120	VA
Circuit protection	2 x 1.0 Slow Blow	A
Frequency	50/60	Hz

Table 4.2 Electrical Connection Values

Pneumatic

Data	Value	Unit
Operating pressure	4-7	bar
Compressed air requirement, minimum	> 100	l/min.
Oiling, maximum	0.005	mg/m^3

Table 4.3 Pneumatic Connection Values

i Pressure supply above 7 bar will be automatically repressed to avoid damage to the SampleXpress.

4.3 Operating Conditions

Environment

Data	Value	Unit
Temperature range	5-30	°C
Relative humidity at 31 °C, maximum	< 80	%
Decreasing linear till relative humidity < 50% at 40 °C, maximum	< 50	%

Table 4.4 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 4.5 Bruker Site Planning Guides

4.4 Rating Plate

Figure 4.1 Rating Plate

The rating plate is located at the power input and includes the following information:

- Manufacturer
- Type
- Voltage
- Frequency
- Apparent power consumption, maximum
- Year of Production
- PN: Part Number
- SN: Serial Number
- Va: Variant
- ECL: Engineering Change Level

4.5 Sample Usage

SampleXpress can handle any type of sample with standard spinner geometry:

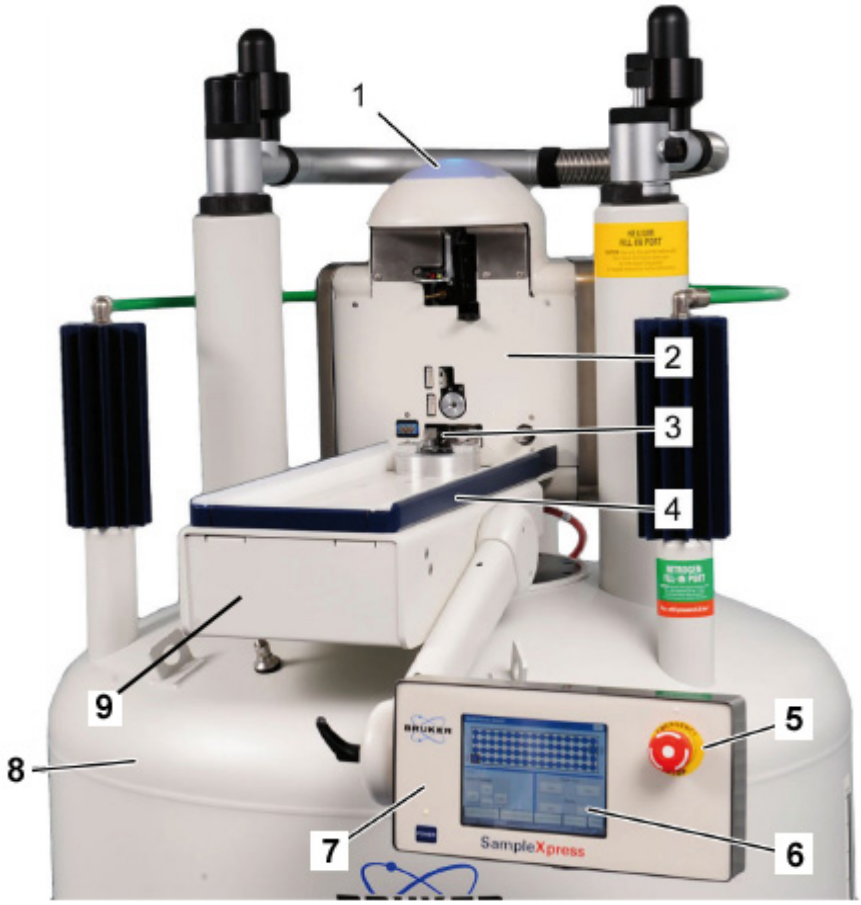
- Standard NMR tubes (3-10 mm).
- Melted reference samples.
- Match spinner (1, 1.7, 2, 2.5, 3, 4, 4.25, 5 mm).
- Shuttle POM for sample tubes 1-1.7 mm.
- Dummy samples.
- Samples with or without horizontal barcode.

The sample is handled at the spinner only!

Figure 4.2 Samples Allowed: Maximum Height 7“ (180 mm)

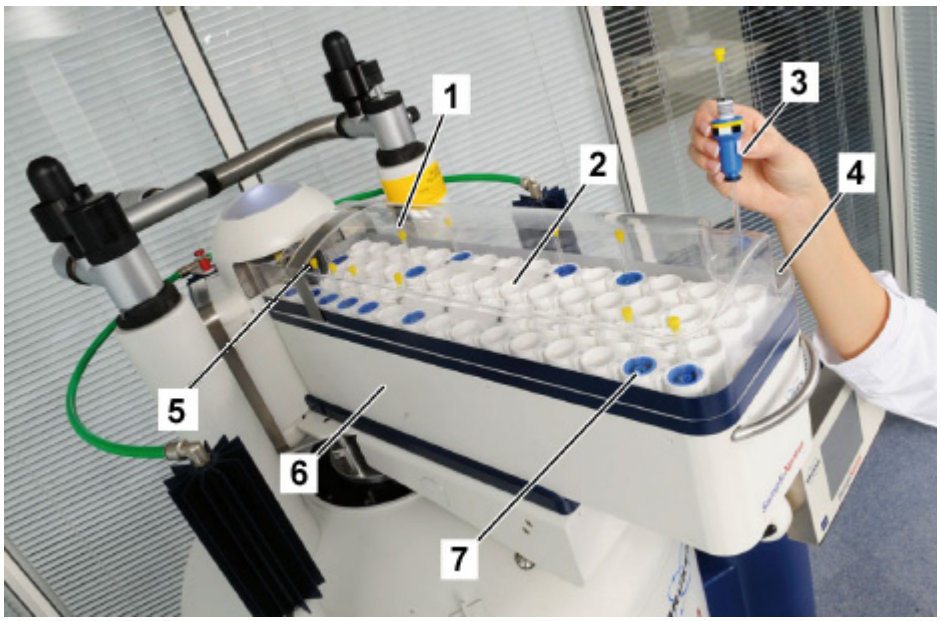
5 Design and Function

5.1 Overview



1. Status Light
2. Base Unit
3. NMR Access Position
4. Cassette Guide
5. Emergency Stop
6. Touch Panel
7. Control Panel
8. Magnet
9. Base Plate

Figure 5.1 Overview



1. Cassette Cover
2. Sample Conveyor Chain
3. Spinner with Sample
4. Operator Access Position
5. NMR Access Position
6. Cassette
7. Sample Pool

Figure 5.2 Overview

5.2 Brief Description

The SampleXpress sample changer allows the automatic measurement of samples in connection with a spectroscopy magnet. The samples are inserted into the magnet by the SampleXpress, and are stored in a removable cassette. Thereby it is possible to remove the cassette for filling/removing samples. The cassette has a capacity of 60 samples. Operation of the unit is controlled by the application software.

The SampleXpress will not automatically move an actor during a running NMR measurement, unless it is desired by the operator, e.g. to move to another position.

5.3 Unit Description

5.3.1 Base Unit

Figure 5.3 Base Unit Mounted on Base Plate

The base unit contains all of the actuators and most of the sensors. It is placed on top of the base plate and fixed with 4 screws on the bottom side, and 2 screws on the top side of the base plate. The mechanical tolerances are fixed, there is no need to adjust anything between the base plate and the base unit.

Pneumatic Cylinders

All actuators, except the motor driving the sample conveyor chain, are pneumatic cylinders. All cylinders are single acting, this means they will move to their home position without electrical power or sufficient air supply.

Under normal operation the sample release lever, the cassette clamp mechanism and the sample guide are open.

Conveyor Chain Motor

The SampleXpress uses an electric DC motor to drive the sample conveyor chain in the cassette. To minimize the influence on the NMR measurement, this motor is mounted with special vibration damping parts.

As an option for very strong magnetic fields, the motor can be placed outside the 5 Gauss line.

Cassette Clamp Mechanism

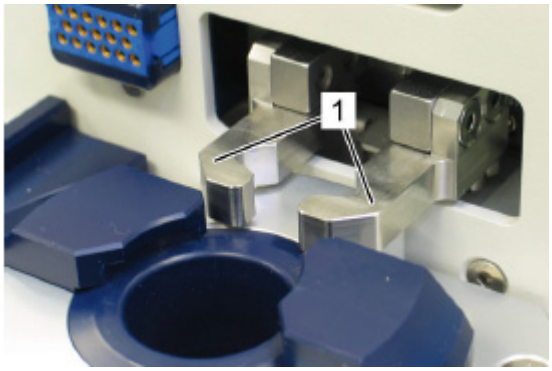


Figure 5.4 Clamp Closed

1. Gripper

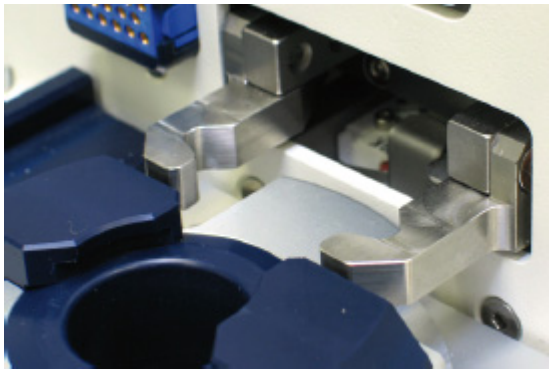


Figure 5.5 Clamp Open

When a cassette is moved into the SampleXpress, it is fixed by a clamping mechanism. This is a special kind of gripper adapted to a pneumatic gripper cylinder.

The gripper (Figure 5.4/1) is placed behind a metal shield to avoid injury to personell while the unit is operating.

Sample Guide

Figure 5.6 Sample Guide

The sample guide serves to guide the samples into the magnet. As the samples drop down from the cassette into the magnet, they have to be safely led into the proper position.

The sample guide is driven by a pneumatic cylinder placed in the base unit. The pneumatic cylinder fits into the opening in the rear side of the cassette (Figure 5.7). In this opening there is a movable half shell and a fixed half shell, which interact with the sample guide.

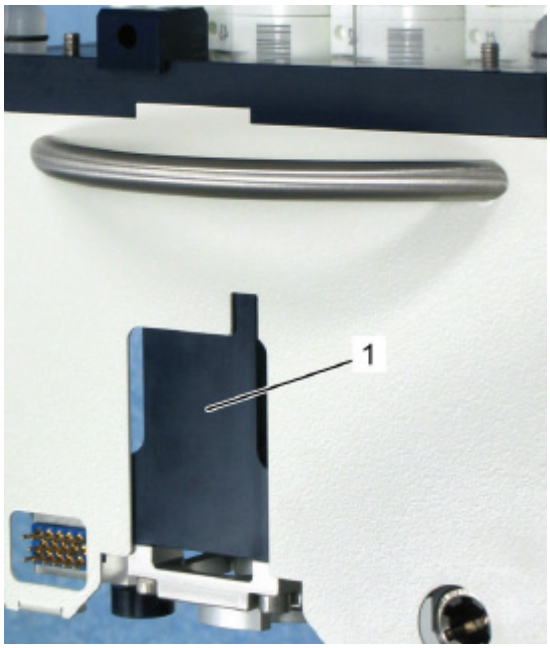
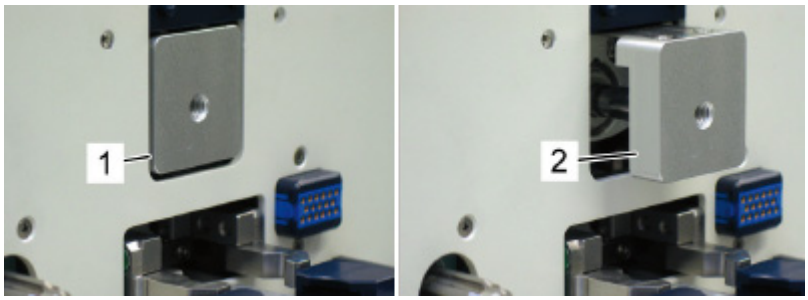


Figure 5.7 Cassette

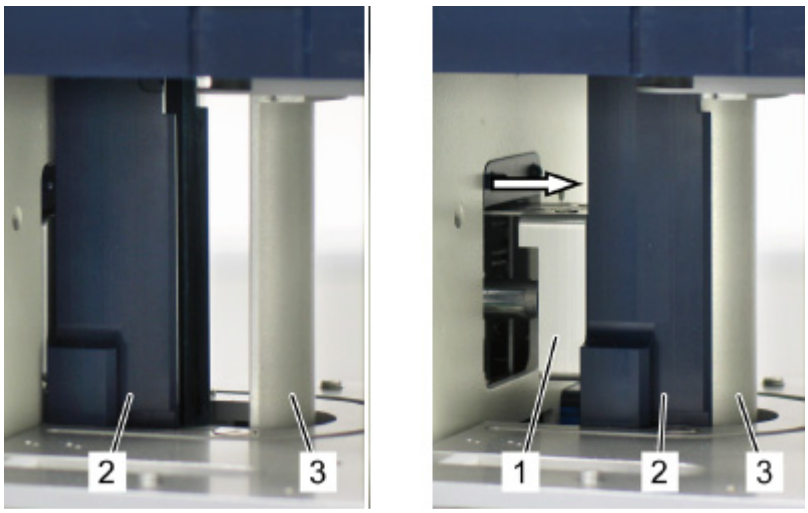
1. Movable Half Shell



1. Guide inactivated
2. Guide activated

Figure 5.8 Sample Guide

Another function of the sample guide is to mechanically lock the conveyor chain. When a conveyor chain link is positioned in proximity of the NMR access position above the BST, the chain link contains a lot of deliberate play which makes it easier for the unit to align on the correct position. When the conveyor chain link is stopped near the correct position, the sample guide is activated and works as a conveyor chain block lever, whereas the movable half shell (Figure 5.9/2) clasps the lower part of the conveyor chain link and fixes it in the precise NMR access position required above the BST.



1. Sample Guide (active)
2. Moveable Half Shell
3. Fixed Half Shell

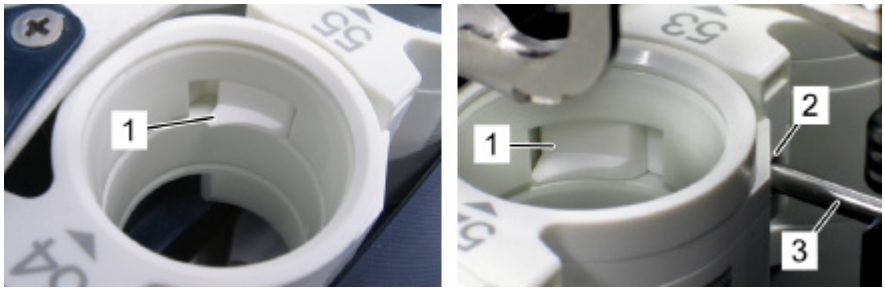
Figure 5.9 Inside the Cassette

Sample Release Lever

1. Sample Release Lever

Figure 5.10 Base Unit

Each conveyor chain link has its own sample release lever (Figure 5.11/1) to hold the sample in place. This lever is pressed to its home position by a spring which is placed inside each conveyor chain link. Each conveyor chain link has a small hole (Figure 5.11/2), into which the sample release lever (Figure 5.11/3) fits. When the conveyor chain link is positioned above the BST, the sample release lever is led through the opening in the conveyor chain link and thus releases the sample. The sample falls through the conveyor chain link into the magnet.



1. Lever of conveyor chain link
2. Opening for sample release lever
3. Sample release lever

Figure 5.11 Conveyor Chain Link

Sample Brake

Figure 5.12 Sample Brake

The sample brake slows down the sample on its way back from the BST tube.

5.3.2 Cassette

The removable cassette has a capacity of 60 samples, which can be filled individually, or can be removed from the base unit and all the conveyor chain links can be filled at once.

To ease the loading/unloading of samples from the sample pool, the cassette can be placed on a desk or table.

Single Access Mode

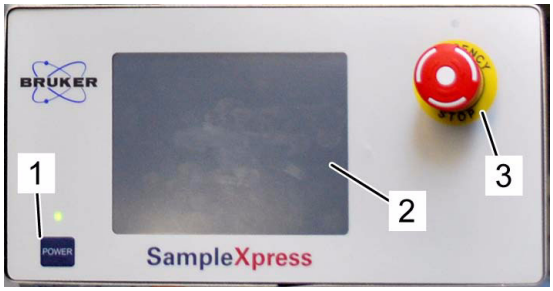
In Single Access mode the cassette is connected to the base unit and the cassette cover is installed. The cassette can then be filled with samples one by one at the operator access position. This is the standard operation mode when SampleTrack is used as the control software.

Random Access Mode

In Random Access mode the cassette cover is removed. The samples can be filled in any available position. This mode is often used in closed laboratories with frequent sample exchange.

5.3.3 Control Panel

The control panel is the central operating control for the device. It is mounted on a swivel arm on the front side of the device. The control panel is equipped with a touch screen, which controls the application software.



1. Push button **Power**
2. Touch screen
3. **EMERGENCY-STOP** button

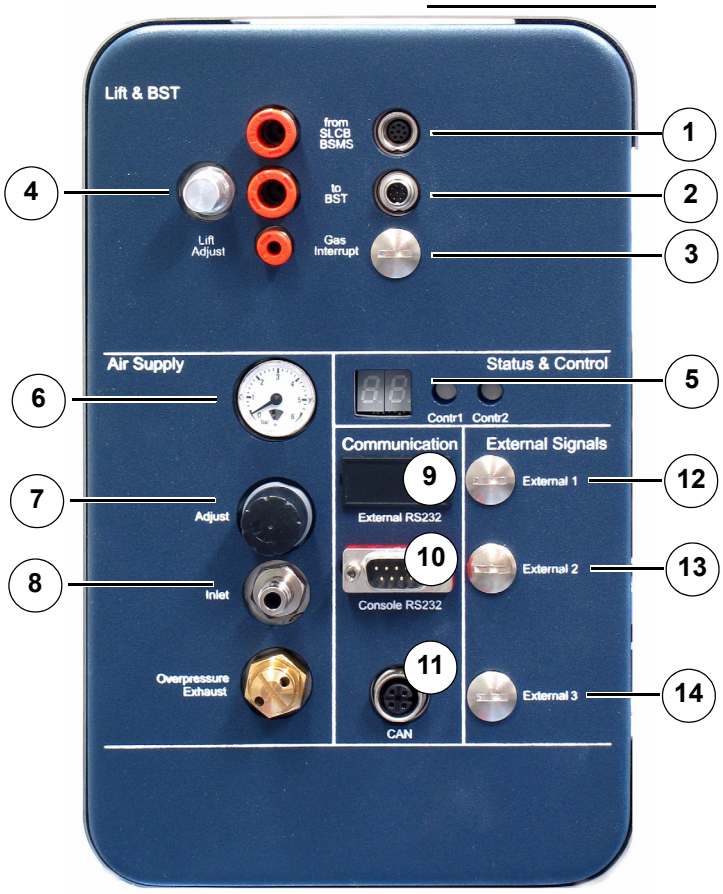
Figure 5.13 Control Panel

Battery

Note: The Control Panel contains a battery which is responsible for the correct functioning of the date and time.The expected life time of the battery is about six years.

Replacement of the battery must only be carried out by employees of the manufacturer.

5.4 Connections



1. BST Interface Cable from SLCB BSMS
2. BST Interface Cable to BST
3. Gas Interrupt (future feature)
4. Lift Adjustment Knob
5. Status and Control
6. Pressure Gauge
7. Air Supply Adjustment Knob
8. Air Supply
9. External R232 (future feature)
10. Console RS232
11. CAN Network to Control Panel
12. External Signal 1 (future feature)
13. External Signal 2 (future feature)
14. External Signal 3 (future feature)

Figure 5.14 Connections Left Side

i The connections available are dependant on the configuration.

1. Power Control from Control Panel
2. Fuse Cartridge
3. DC In (future feature)
4. Power Supply

Figure 5.15 Connections Right Side

5.5 Indicator Lamp

Indicator Lamp

The indicator lamp indicates the various operating status using different colored light signals.

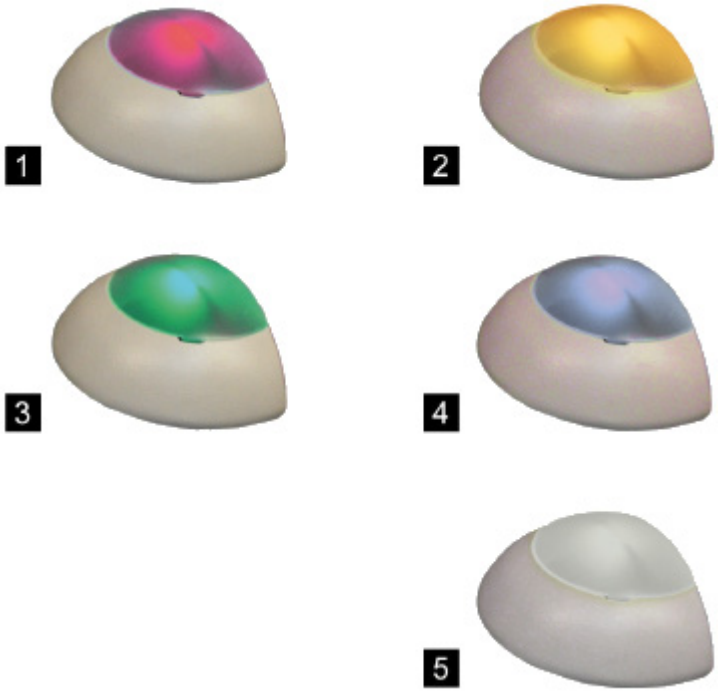


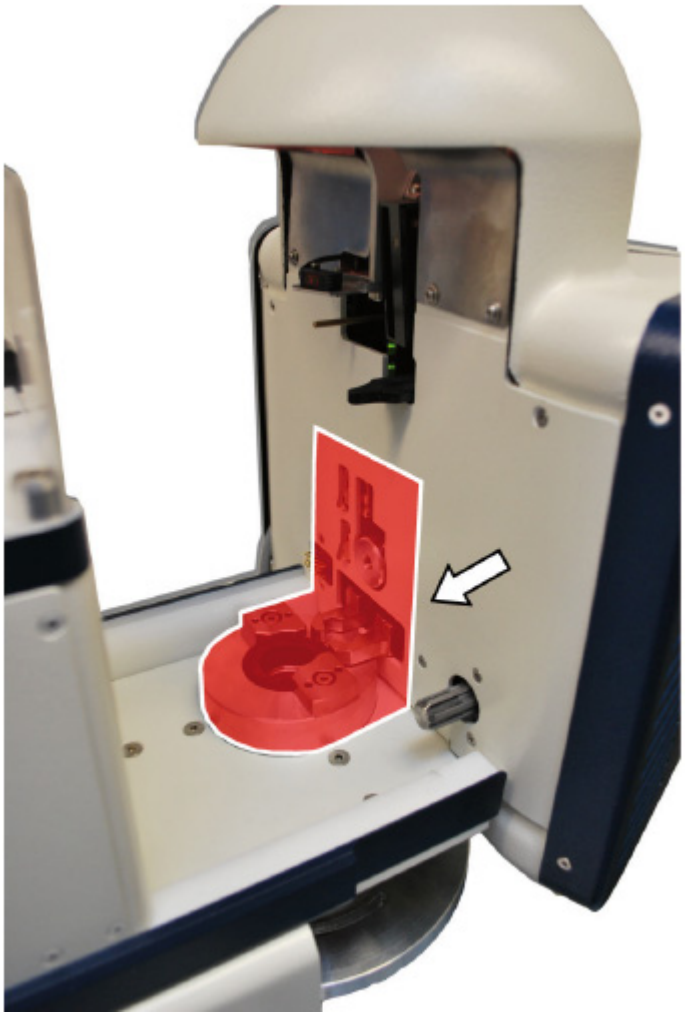
Figure 5.16 Indicator Lamps

Pos.	Light Signal	Description
1	Fault event (red)	The red indicator lamp is illuminated when an internal error occurs.
2	Service Mode (orange)	The orange indicator lamp is illuminated when the device is in service mode or when the system is booting.
3	Operating readiness (green)	The green indicator lamp is illuminated when the device is accessible.
4	Operating readiness (blue)	The blue indicator lamp is illuminated when user interaction is required, for example when the: • cassette is absent, • cassette is processed, • cassette is empty.
5	Operating (white)	The white indicator lamp is illuminated during automatic operations.

Table 5.1 Indicator Lamps

5.6 Work and Danger Zones

NMR Access Position



The arrow indicates the danger zone. When no cassette is present it is possible that the device operator may be caught in the gripper claws.

Figure 5.17 NMR Access Position

Cassette and Control Panel

The arrow indicates the danger zones. It may be possible that the device operators bang their heads against the SampleXpress, due to the height of the control panel or the cassette.

Figure 5.18 Cassette and Control Panel

5.7 Accessories

Stair

It is recommended to use stairs when charging or changing the cassette:

Stair	Part Number
Stair with 2 steps	Z106255
Stair with 4 steps	Z106254

Cover

During magnet maintenance it is recommended to cover the SampleXpress with the following cover:

Accessory	Part Number
BACS2 Protective Cover Magnet Service	1804420

Barcode Collar Set

Accessory	Part Number
Barcode Collar Set	H10113

Shortened Status Cupola for Cryofit and HR-MAS Changer Adaptation

Accessory	Part Number
Shortened Status Dome	HZ17007

Cryofit Mounting Kit

Accessory	Part Number
Cryofit Mounting Kit	HZ16826

External Control Panel

Accessory	Part Number
External Control Panel	H118947

Figure 5.19 External Control Panel

6 Transport, Packaging and Storage

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.

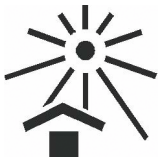
Component Sensitive to Electrostatic Charge

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

Only allow packaging to be opened by trained personnel.

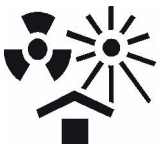
Establish potential equalisation before opening.

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. 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.

i 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, 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.

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 use the emergency stop device to trigger an emergency stop, whereas:
   - All actuators are inactivated.
   - All valves are opened.
   - All motors stop running.
2. Notify a doctor and the fire brigade.
3. Notify those responsible for the area of use.
4. Switch off the mains switch and secure to prevent a restart.
5. Keep access routes clear for emergency service vehicles.
6. If warranted by the gravity of the emergency, notify the responsible authorities.
7. Delegate specialist personnel to rectify the fault.
8. 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 SampleXpress.

NMR Measurement

Do not operate the unit, e.g. exchange sample cassettes, during an NMR measurement as this may disturb the NMR system. The laboratory supervisor should define procedures regarding access to the unit and/or the 5 Gauss area around the magnet.

Sample Mix-up

Sample mix-up from improperly read sample labels or position markings may result when adequate lighting is not provided. Use the operator access position for monitored sample loading/unloading, or place the cassette on a desk before loading/unloading samples.

The laboratory supervisor should define who should be allowed to load or unload samples from cassettes, and when. The operator should work carefully and, optimally, use tube ID barcode collars.

ID Barcode

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

Temperature Changes

When the ambient temperature changes significantly (for example, after moving the SampleXpress from the stock room before mounting), wait at least 1 hour until the device has achieved room temperature before turning on the device.

Contamination of Samples

Reusing NMR glass tubes may result in contamination of a new NMR sample from the old substance.

8.2.1 Switching On the Device

Press the **Power** button on the control panel.

➨ Bruker screen appears.

If a cassette is inserted, the SampleXpress starts initialization. The device checks if a sample is in the cassette.

The indicator lamp switches over to blue (see also page 64).

Figure 8.1 Power Button

8.2.2 Switching Off the Device

1. Press the **Power** button at the control panel (Figure 8.1).

➨ A warning screen appears.

2. Press **Confirm** to shut off the device, or **Cancel** to continue operation.

Note: Pressing and holding the **Power** button for 5 seconds will also shut down the SampleXpress.

8.2.3 Sample Adjustment and Maximum Sample Height

DANGER

Danger of injury due to glass tube breakage!

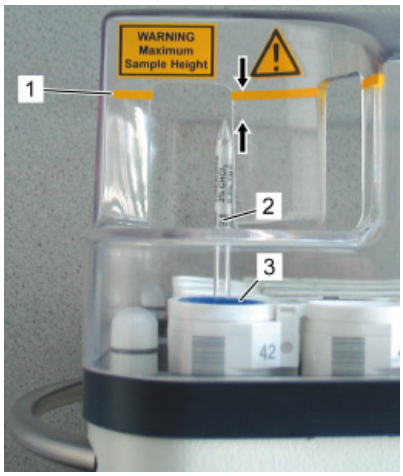
Broken glass tubes may cause minor to severe injuries as well as material damage. Substances escaping the broken glass tubes may be hazardous or allergenic and therefore cause minor or severe injuries or even death.

- Wear protective equipment.
- Refer to the corresponding precautions and cleaning/disinfection instructions.
- Perform all tasks with the cassette and glass tubes carefully.
- Never turn the cassette upside down or turn it on one side.

Before the spinner is inserted into the cassette:

1. Adjust the spinner using the sample depth adjustment gauge.
2. Insert the spinner at the **Operator Access Position** into the holder.
3. Check if the sample (Figure 8.2/2) is under the maximum sample height. **The glass tube must be below the yellow line, otherwise it will break**. (Figure 8.2/1).

   If the sample is too long, **do not use it** in the SampleXpress!



1. Maximum Sample Height
2. Sample
3. Spinner

Figure 8.2 Operator Access Position

9 Operation

The SampleXPress is operated via the application control software or by the TopSpin/ Icon-NMR. In this chapter the application control software is described.

The application control software consists of a main screen and four touch screen buttons. This chapter provides an overview of the different displays and the operating steps to be performed. Be sure to read the safety and related operational instructions in "Operation Overview" on page 57 before operating the device. The functions and the buttons depend on the selected operation mode.

9.1 Operation Modes

The application software consists of three modes of operation:

Single Access Mode

In the Single Access Mode the cassette is used with the cover and the only way to fill the casette is at the **Operator Access Position**. A correct assignment of sample and position is only possible in this mode, which leads to high throughput operation.

The operating description in the following sections refer to this operation mode.

Random Access Mode

In the Random Access Mode it is possible to place the samples in any empty holder. The cassette is not covered here. In this mode the position of the samples on the display may differ from their actual position in the cassette, because samples can be inserted and removed without program control.

Manual Mode

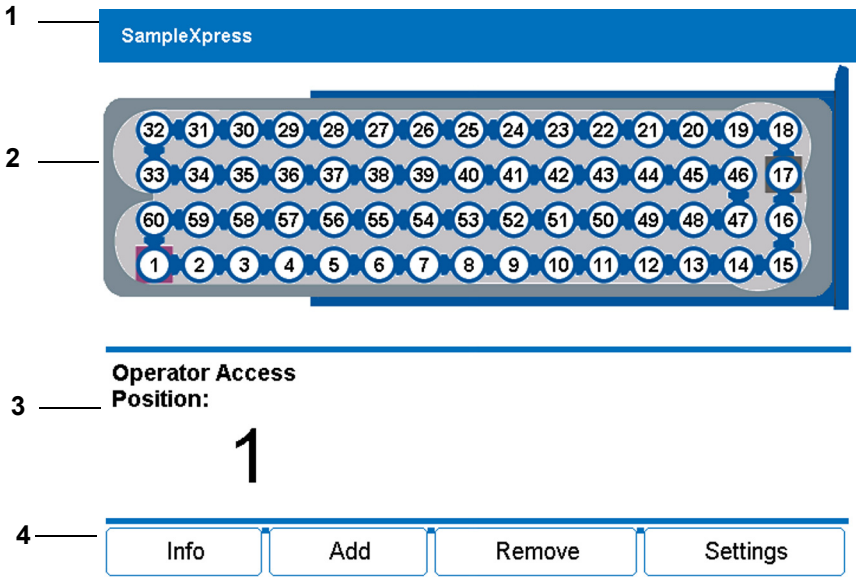
In Manual Mode the spectrometer is used without the SampleXpress device.

See also "Working in Manual Mode" on page 88.

9.2 Main Display

The main display screen shows all the information necessary during processing.

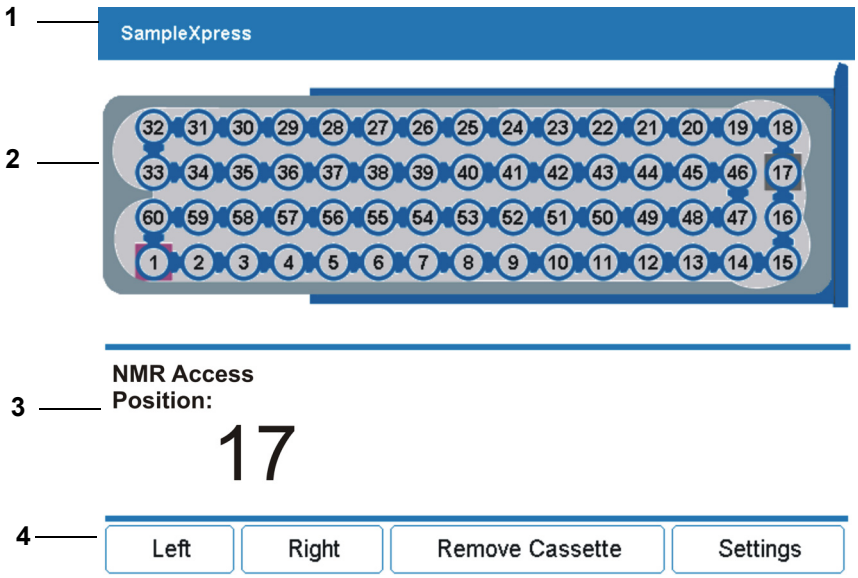
Main Screen in Single Access Mode



Position	Function
1	Message display.
2	Displays the cassette with its 60 positions. • Gray positions are empty positions. • White positions are loaded with samples.
3	Information about **Operator Access Position** and Sample Down.
4	Touch screen buttons.

Figure 9.1 Main Screen Example in Single Access Mode

Main Screen in Random Access Mode



Position	Function
1	Message display.
2	Displays the cassette with its 60 positions. **Only gray positions are displayed.** The system does not show which positions are empty or filled.
3	No information is displayed in Random Access Mode.
4	Touch screen buttons.

Main Screen Example in Random Access Mode

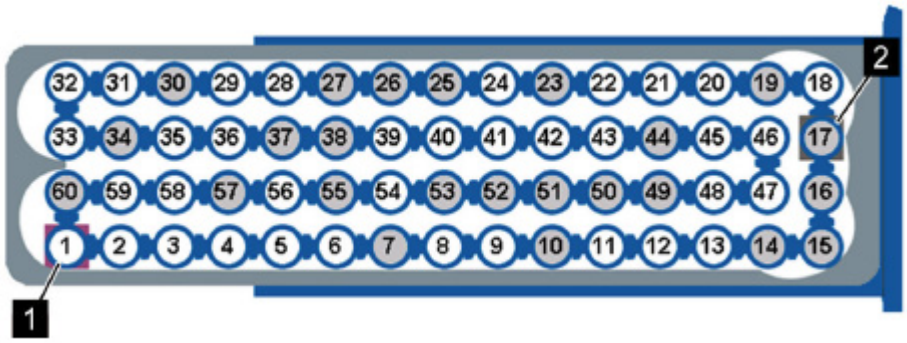
See also "Working in Random Access Mode" on page 87.

Cassette

The cassette in the main screen displays the sample numbers and their positions.

The **Operator Access Position** (Figure 9.2/1) is the position where the spinner can be inserted when a cover is used. When no cover is used, the spinner can be inserted in any empty position.

The sample in the **NMR Access Position** (Figure 9.2/2) is the sample that is transferred to the magnet. The sample is transmitted back to the **NMR Access Position** after the measurement.



1 Operator Access Position

2 NMR Access Position

Figure 9.2 Cassette

Each position can be displayed in different colors, with different meanings:

Icon	Color	Function
	Blue	A sample has been transferred from the **NMR Access Position** to the BST and is in measurement.
	White	A sample occupies this position.
	Gray	The position is empty and available.
	Green	Indicates the measurement is finished.
	Orange	The position selected for adding/removing a sample.
	Red	Instrument Error.
	Pink	Positions on their way to the **NMR Access Position** for measurement are pink colored. Their state is **Queued**.
	Yellow	Sample after **Security Eject**.

Table 9.1 Cassette Color Symbols and Their Meanings

9.2.1 Main Menu Touch Screen Buttons in Single Access Mode

Screen	Submenu	Function
Main	„Info“	Displays all positions occupied with samples.
	„Add“	For adding samples to the cassette.
	„Remove“	For removing samples or the cassette.
	„Settings“	For device configuration. See also chapter "The Settings Window" on page 82

Figure 9.3 Main Menu Touch Screen Buttons

Enabled/Disabled Touch Screen Buttons

When the button text is black, with a blue frame, it means the function is **enabled** and available for use.

When the button text is gray, with italic letters and a gray frame, it means the function is **disabled** and not available for use.

The Back Button

Use the **Back** button in the upper right corner of the screen to return to the previous menu. This button can be used in all submenus.

In some menus the program automatically returns to the previous menu, when no action was performed within a given time.

9.3 Starting the Application Software

After turning on the device, the indicator lamp (see "Indicator Lamp" on page 46) switches to orange, and the application software boots automatically. After a successful initialization the indicator lamp switches to green, otherwise the indicator lamp switches to red indicating an error has occurred.

➥ The initialization display appears:

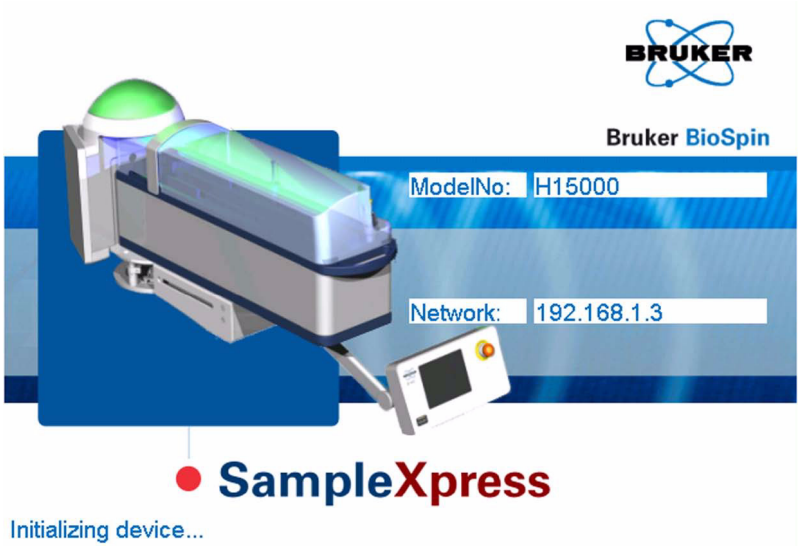


Figure 9.4 SampleXpress Device Initialization

9.3.1 Program Start

After starting the program several messages are displayed in the message display.

Figure 9.5 Message Display: Adapting cassette

Figure 9.6 Message Display: Scanning all samples

When no cassette has been inserted, the program displays a message prompting, that a cassette should be inserted:

Figure 9.7 Message Display: Insert cassette

When a new cassette has been inserted, all 60 positions are rescanned. The device detects filled positions and displays them as white. Empty positions are displayed as gray.

9.4 Displaying Position Information

The **Info** button in the main menu opens a screen showing all the positions which are filled with a sample.

1. Press the **Info** button in the main screen.

➨ The sample information screen is displayed:

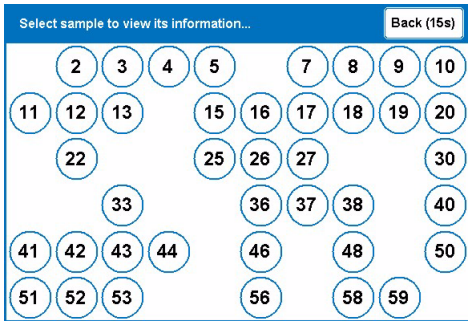
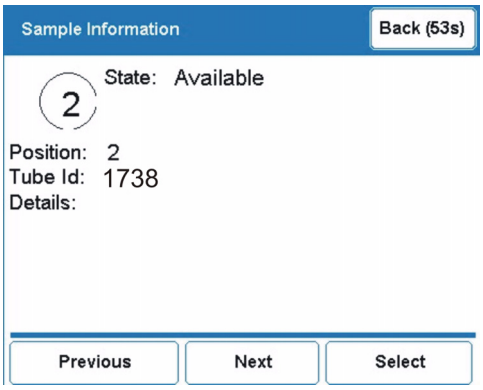


Figure 9.8 Information Screen

2. Press on a position to view the position details:



3. Press the **Previous** or **Next** button to see the details of the previous or next loaded position.
4. Press the **Back** button to return to the information screen.

➨ The previous menu is displayed.

9.5 Add or Remove Samples in Single Access Mode

With this function it is possible to add or remove samples from the cassette. All actions with the **Add** or the **Remove** button apply to the **Operator Access Position** (Figure 9.2/ 1).

i The laboratory supervisor is responsible for adding/removing samples. Never add or remove samples without the permission of the laboratory supervisor.

Figure 9.9 Main Menu Touch Screen Buttons

9.5.1 Adding Samples

1. Press the **Add** button.

➨ The Add selection window appears displaying 3 buttons: When no empty position is left, the **Go to free** button is disabled and grayed.

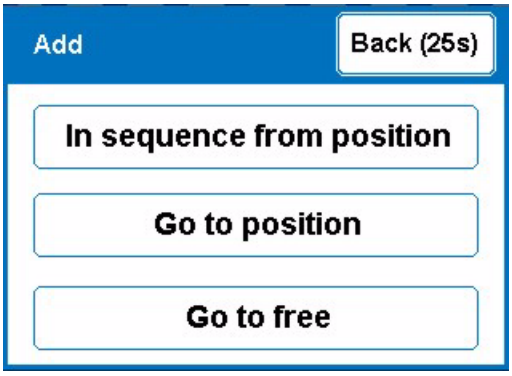


Figure 9.10 The Add Selection Window

2. Press the **Go To Position** button to choose the sample position.

➨ The Position selection screen appears:

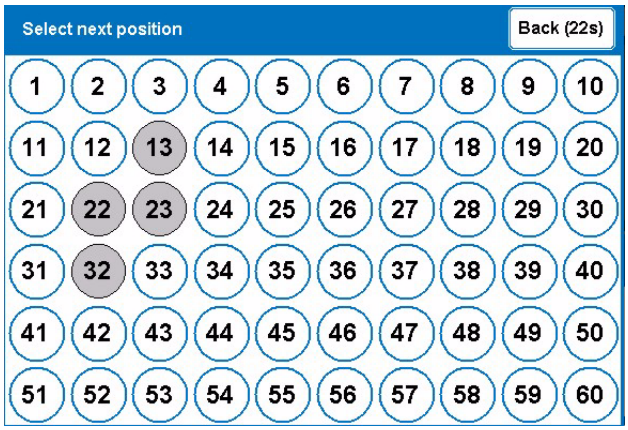


Figure 9.11 Position Selection Screen

3. Select an empty gray position to insert the sample into (white positions are loaded with samples).

➨ The conveyor chain rotates the selected position to the **Operator Access Position**, during which a message is displayed on the screen:

Figure 9.12 Going to the Operator Access Position

➥ When the operator access position is reached the following message is displayed:

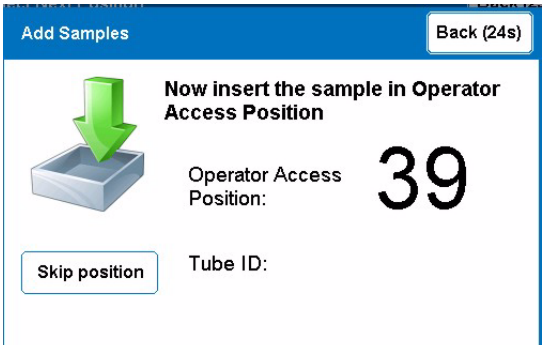


Figure 9.13 Insert Sample Screen

4. Insert the sample into the **Operator Access Position** (Figure 9.14/1).

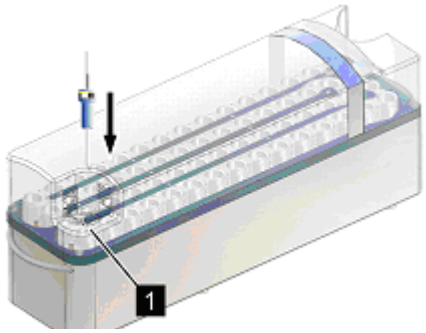


Figure 9.14 Operator Access Position

Note: Make sure the sample height is within the limits set in "Sample Adjustment and Maximum Sample Height" on page 60.

➥ The selection screen (Figure 9.11) will be displayed again:

5. To finish this function,

   ► press the Back button,

   or

   To add another sample,

   ► press a gray position,

   or

   To replace a sample,

   ► press a white position. The following message is displayed:

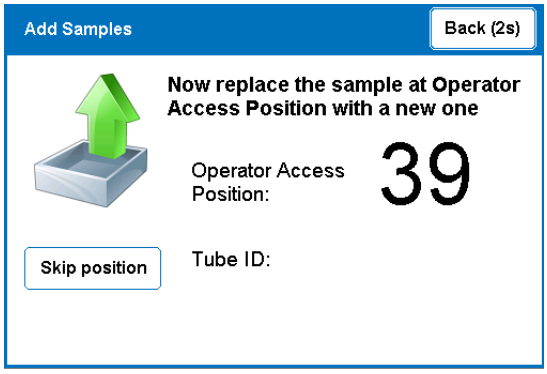


Figure 9.15 Replacing a Sample

9.5.1.1 Adding Samples - Go to Free Position

When samples do not need to be in any specific order, it is faster to add a sample in the nearest free position:

1. Press the **Add** button in the main screen.

Figure 9.16 Add/Remove Button

➡ The Add selection screen is displayed:

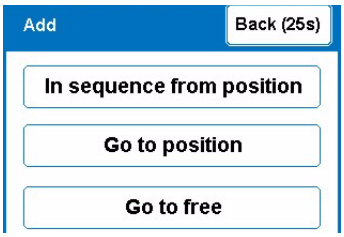


Figure 9.17 Go to free

2. Press the **Go to free** button.

➨ The chain rotates to the next free position:

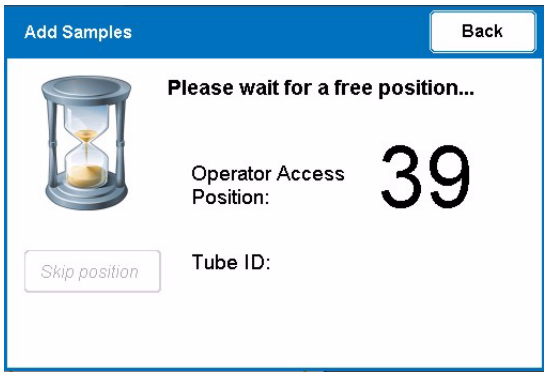


Figure 9.18 Waiting for a free position

3. Insert a new sample, or press the **Skip position** button to continue to the next available position:

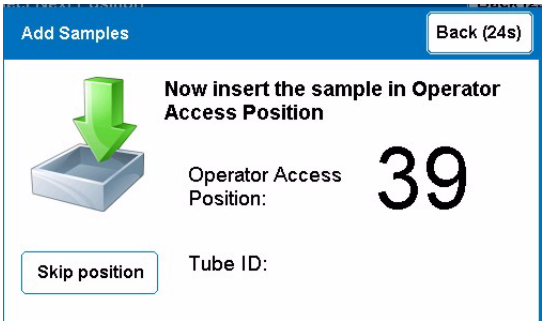


Figure 9.19 Inserting the Sample

➨ When a sample has been inserted, the chain rotates automatically to the next free position.

Exception: When the chain has been completely filled, an information screen is displayed:

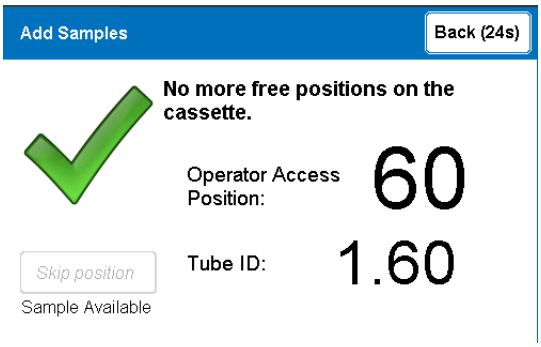


Figure 9.20 Display: No more free positions

4. When all samples have been inserted, press the **Back** button to return to the main menu.

9.5.1.2 Adding/Replacing Samples in Sequence

This functions allows samples to be added or replaced sequentially in ascending order, until the **Back** button is pressed.

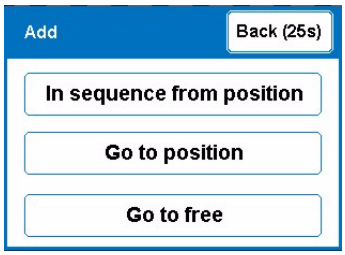


Figure 9.21 Removing Samples in Sequence from Position

1. Press the **Add** button (Figure 9.16) in the main screen.

➨ The Add selection screen is displayed.

2. Press the **In sequence from position** button.

➨ The Position selection screen appears.

3. Select an empty gray position for adding a sample or a filled position for replacing.
4. Add the sample to the position selected.

➨ The chain rotates in ascending order to the next position, whereas another sample can be added or replaced.

Use the **Skip Sample** button to skip a sample. Use the **Back** button to return to the main menu.

9.5.2 Removing Samples

1. Press the **Remove** button (Figure 9.16) in the main screen.

➨ The Remove selection screen is displayed:

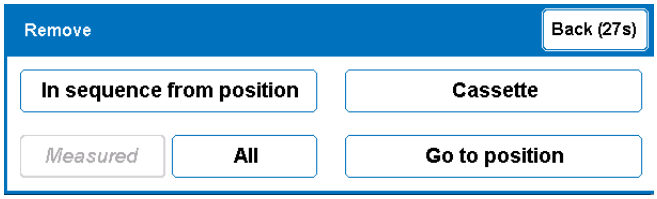


Figure 9.22 Remove Selection Screen

2. Press the **Go to position** button to choose the sample position.

➨ The Position selection screen appears:

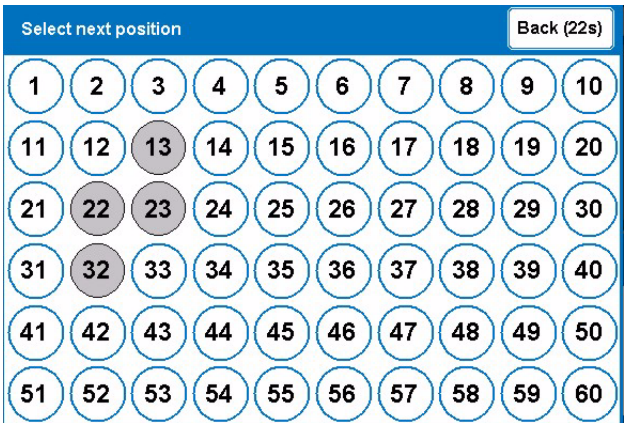


Figure 9.23 Position Selection Screen

3. Select a white (loaded) position for removing (gray positions are empty positions).

➨ While the conveyor chain rotates the selected position to the **Operator Access Position**, a message is displayed on the screen:

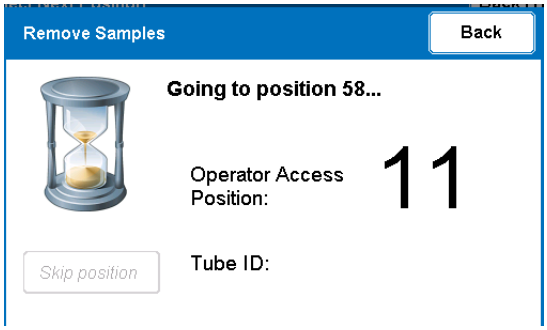


Figure 9.24 Going to Position

➨ When the sample arrives at the **Operator Access Position** the following message is displayed:

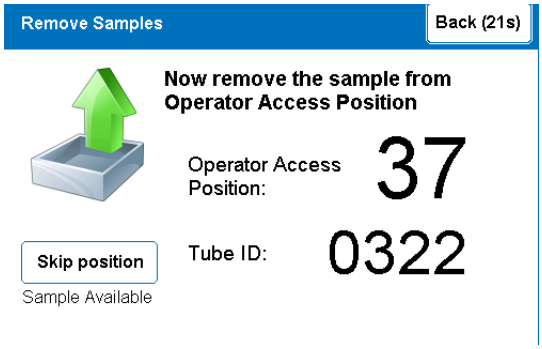


Figure 9.25 Remove Sample Screen

4. Remove the sample from the **Operator Access Position**.

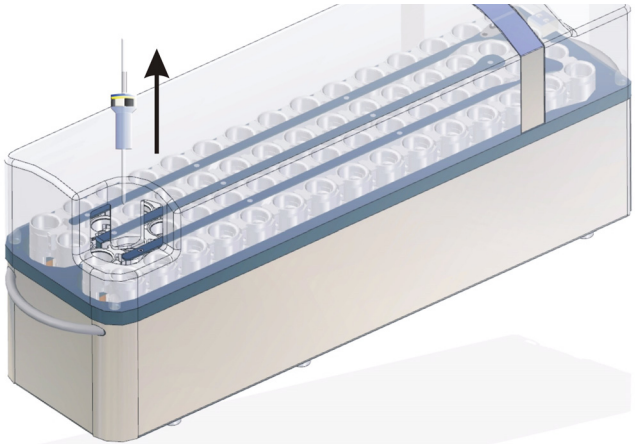


Figure 9.26 Operator Access Position

➨ The selection screen (Figure 9.11) will be displayed again.

5. To finish this function:

   ▶ Press the Back button,

   or

   To remove another sample,

   ▶ Press a white position.

9.5.2.1 Removing All the Samples

To remove all the samples individually through the **Operator Access Position**.

1. Press the **Remove** button (Figure 9.16) in the main screen.

➨ The Remove selection screen is displayed.

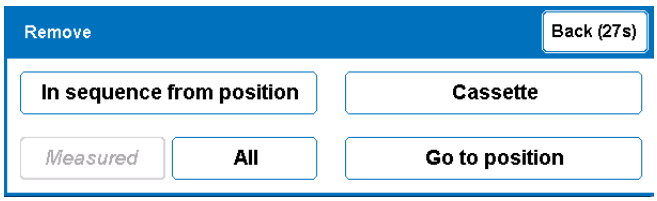


Figure 9.27 Remove All

2. Press the **All** button.

➥ The chain rotates to the next position filled with a sample and a message is displayed:

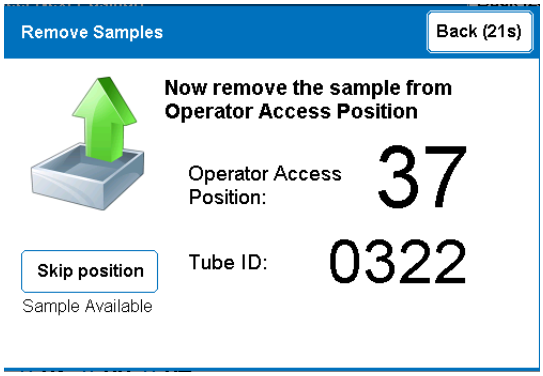


Figure 9.28 Removing the sample

3. Remove the sample.

➥ The chain rotates to the next position filled with a sample.

This procedure will be repeated, until all samples are removed from the cassette. To skip a sample, press the **Skip position** button.

When all samples have been removed, a message is displayed that no more samples are in the cassette (apart from any skipped samples):

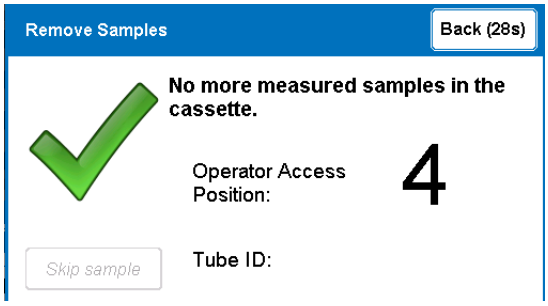


Figure 9.29 No more samples in the cassette

4. Press the **Back** button to return to the main menu.

9.5.2.2 Remove Measured Samples from the Cassette

It is possible to remove just the measured samples from the cassette. The measured sample positions are green colored, their state is **Finished**.

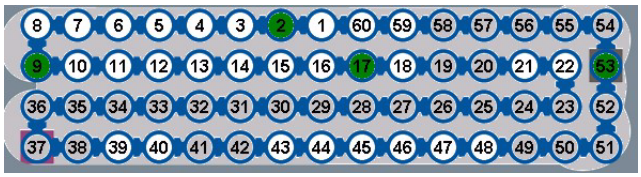


Figure 9.30 Finished Samples

To remove all measured samples individually through the **Operator Access Position**:

1. Press the **Remove** button (Figure 9.16) in the main screen.

➨ When measured samples exist, the **Measured** button is enabled.

2. Press the **Measured** button.

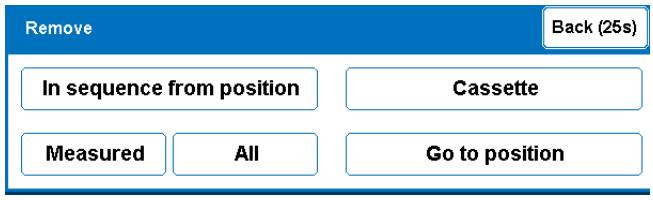


Figure 9.31 Remove Measured

➨ The chain rotates the nearest measured sample to the **Operator Access position**.

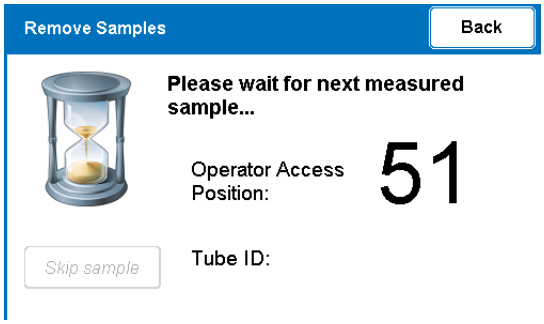


Figure 9.32 Removing Measured

When the measured sample arrives in the **Operator Access Position**, a message is displayed:

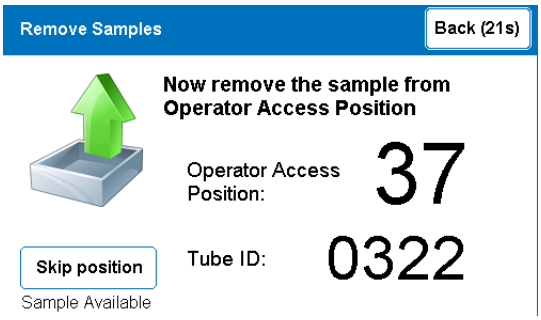


Figure 9.33 Removing finished samples

3. Remove the sample.

➥ The chain rotates to the next position filled with a measured sample.

This procedure will be repeated, until all measured samples are removed from the cassette. To skip a measured sample, press the **Skip Sample** button.

When all finished samples have been removed, a message is displayed that no more finished samples are in the cassette (apart from any skipped samples):

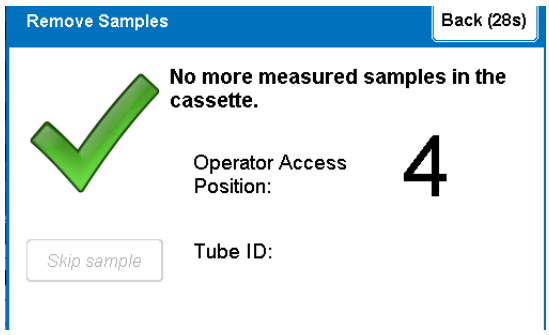


Figure 9.34 No more measured samples in the cassette

4. Press the **Back** button to return to the main menu.

9.5.2.3 Removing Samples in Sequence

This functions allows the removal of samples sequentially in ascending order from a selected position, until the next empty position is reached.

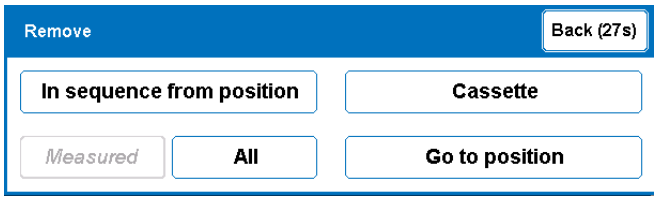


Figure 9.35 Removing Samples in Sequence from Position

1. Press the **Remove** button (Figure 9.16) in the main screen.

➨ The Remove selection screen is displayed.

2. Press the **In sequence from position** button.

➨ The Position selection screen appears.

3. Select a white (loaded) position for removing (gray positions are empty positions).

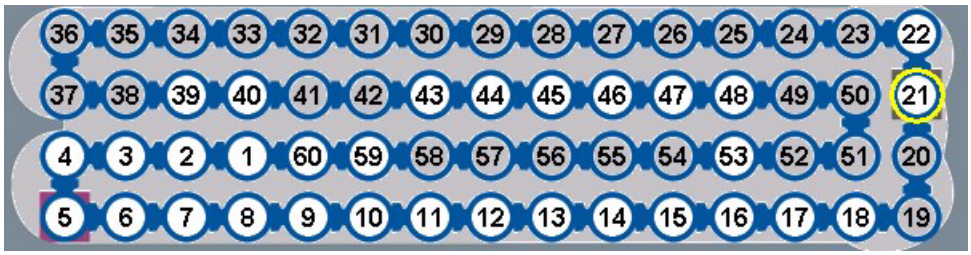
Use the **Skip Sample** button to skip a sample. Use the **Back** button to return to the main menu. See also the figures in chapter "Removing Samples" on page 74.

9.5.3 Security Eject

The Security Eject function is only active when no BST Sample Down Detection Sensor was configured in the setup.

After inserting a new cassette or when rebooting the system, the device performs a security eject to ensure that only one sample is in the magnet. During the security eject, a message is displayed:

When a sample is found, it is ejected and the position displayed in yellow, so that it still can be identified when the chain has moved again.



9.6 Removing and Inserting the Cassette

This function enables the cassette to be removed from the device. This allows the cassette to be filled outside of the unit.

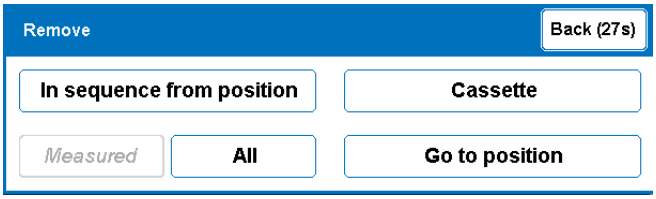
9.6.1 Removing the Cassette

To remove the cassette

1. Press the **Remove** button in the main menu.

Figure 9.36 Main Screen

➨ The Remove selection screen is displayed.



2. Press the **Cassette** button.

➨ The conveyor chain link 1 moves to the **Operator Access Position**.

➨ An information screen is displayed:

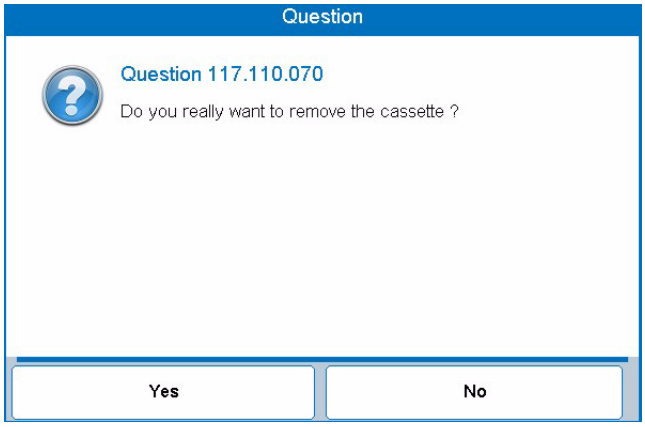


Figure 9.37 Question for removing the cassette

➨ The lamp indicator switches to blue.

➨ The program will ask for confirmation.

3. Press **Yes**.

➨ The cassette will be released and a message will be displayed:

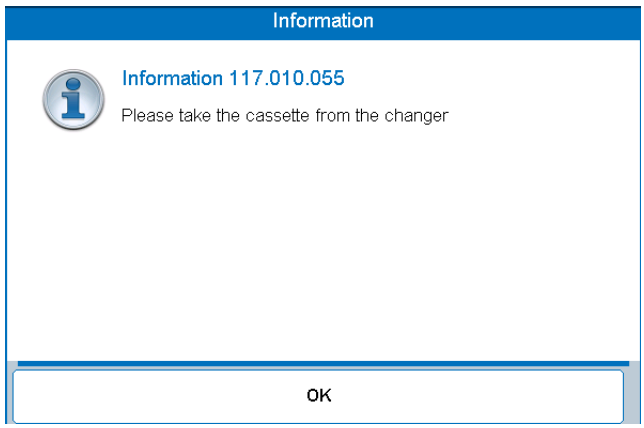


Figure 9.38 Information Screen

4. Lift the cassette using the hand holds.

➨ You should feel a slight resistance.

5. Remove the cassette carefully.

➨ The buttons will no longer be accessible (gray colored) and a message is displayed:

Figure 9.39 Message Screen

9.6.2 Inserting the Cassette

1. Lift the cassette using its hand holds.
2. Fit the cassette into the cassette guide.
3. Push the cassette carefully into the SampleXpress. Avoid banging it into the SampleXpress unit or the magnet.

➨ The engagement will be clearly audible.

➨ The indicator lamp switches from blue to white.

4. All positions are rescanned.

After the scan all touch buttons are white colored and enabled.

i The cassette can be used without a cover. In this mode the control display may not be accurate, because samples can be inserted or removed without program control.

9.7 The Settings Window

The **Settings** button opens a settings window containing two tabs:

- A **User** tab for touch screen calibration and for setting the date and time;
- A **Service (Bruker)** tab, which is password protected and can only be used by Bruker service.

9.7.1 Touch Screen Calibration

The touch screen can be calibrated through the **Settings** button.

1. Press the touch screen **Settings** button in the main menu.

➨ The settings screen will appear:

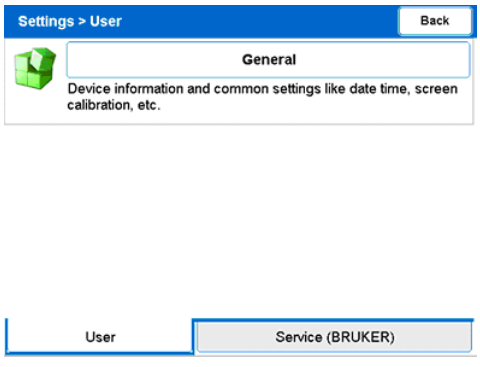


Figure 9.40 Settings Screen

2. Press the **General** button on the user tab.

➨ The Settings -> General Touch Screen screen will appear.

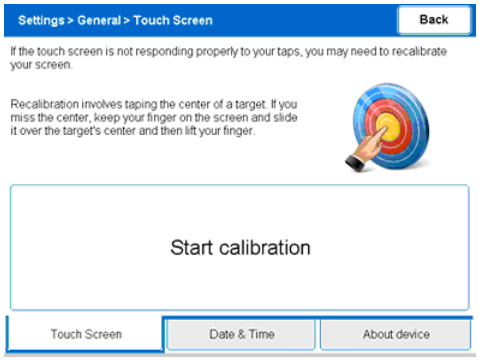


Figure 9.41 Touch Screen

The Settings - General window has 3 tabs:

- Touch Screen
- Date & Time
- About the device

3. Select the **Touch Screen** tab and press the **Start Calibration** button.

➨ A calibration screen will appear:

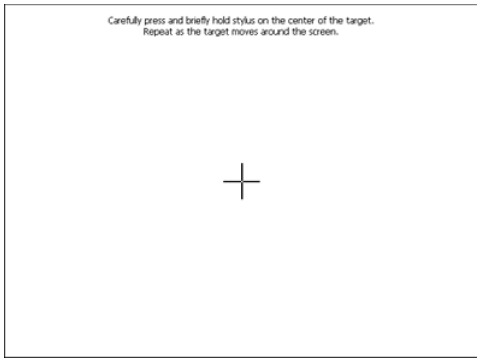


Figure 9.42 Calibration Screen

4. Follow the information on the screen, using your fingers to move the cross for calibration.

---

i It is important to press the middle of the cross where it appears on the screen.

After the calibration is complete the program will automatically return to the general setting screen.

9.7.2 Date and Time Setting

The date and time of the device can be adjusted from the user settings screen.

1. Press the touch screen **Settings** button in the main menu.

➥ The Settings -> User screen will appear:

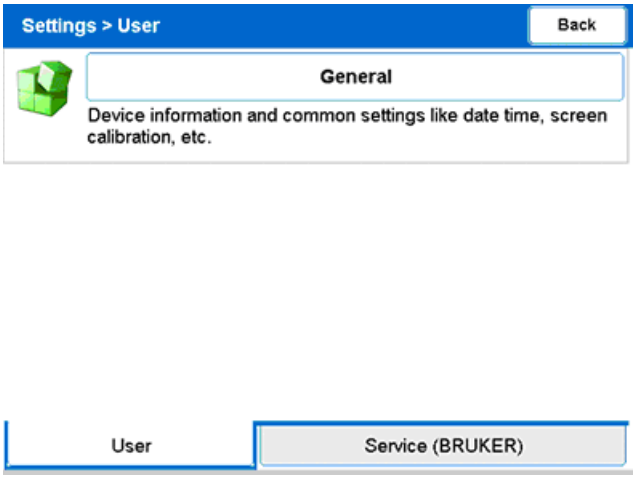


Figure 9.43 Settings Screen

2. Press the **General** button on the User tab.
3. Press the **Date & Time** tab.

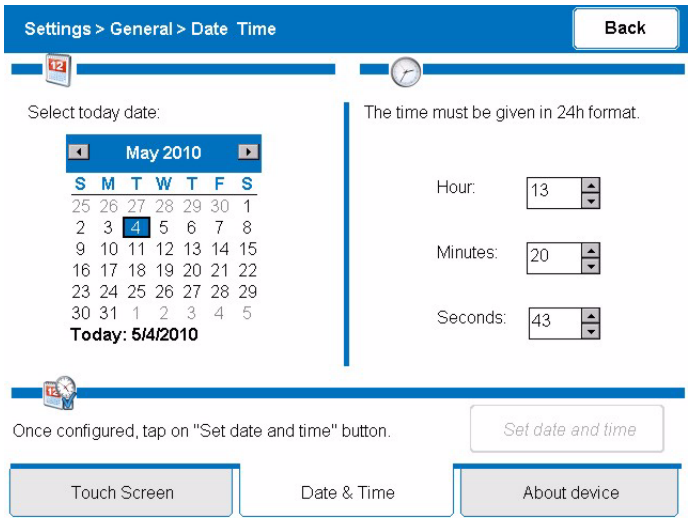


Figure 9.44 Date and Time Screen

4. Change the date and time.

➥ The **Set Date and Time** button will be activated and will change to black.

5. Save the settings by pressing the **Set Date and Time** button.

9.7.3 About the Device

This screen displays the following information about the device:

- Device Identification
  - Device type
  - Model number
  - Serial number
  - ECL: Engineering Change Level
- Software & Others
  - Firmware
  - Network

1. Press the **Settings** button in the main menu.

➨ The Settings screen will appear:

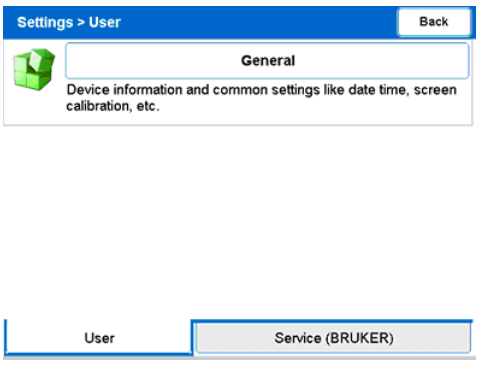


Figure 9.45 Settings Screen

2. Press the **General** button on the **User** tab.
3. Select the **About device** tab to display the device data.

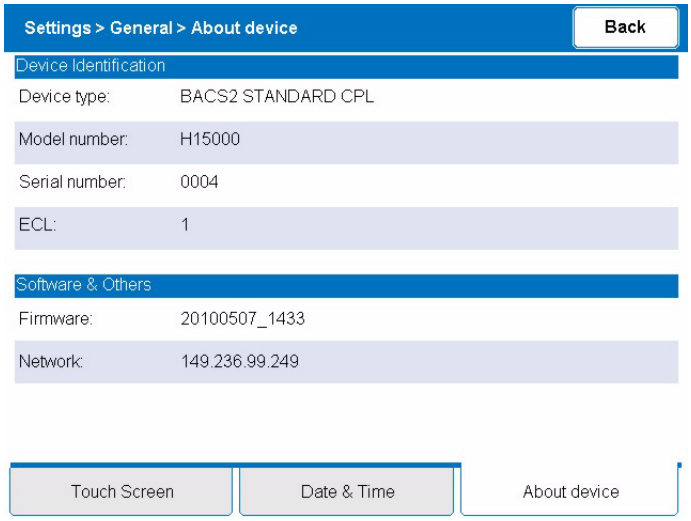


Figure 9.46 About Device Screen

4. Press the **Back** button to return to the previous screen.

9.8 Working in Random Access Mode

When the cover is not used, the sample does not need to be added at the Operator Access Position, but can be added to any empty position. In this Random Access Mode, the main screen is different than the menu in Single Access Mode.

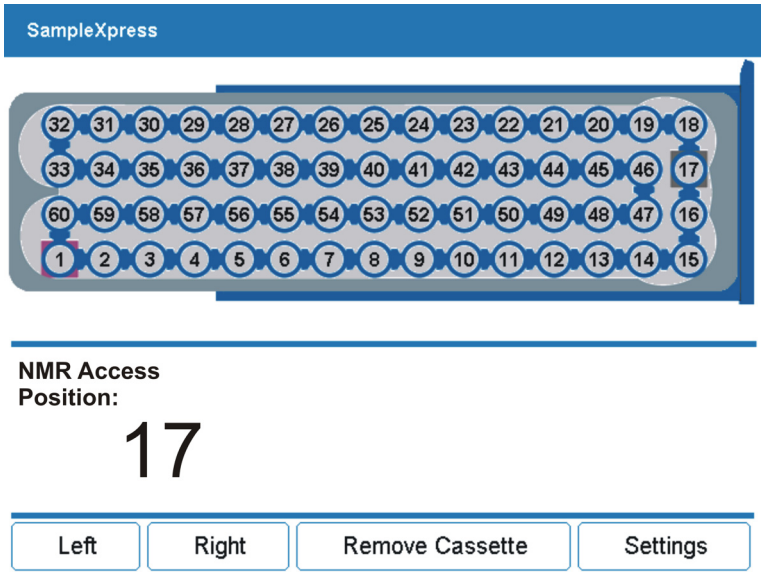


Figure 9.47 Main Menu in Random Access Mode

Use the **Left** and **Right** buttons to move the conveyor chain left or right. By pressing one of these buttons for a short interval, the chain moves one position. Likewise, by pressing one of the buttons for a longer interval the chain moves for as long as the button is pressed. During this time only gray positions are displayed, the system does not show which positions are empty or filled.

For the **Remove Cassette** button see "Removing the Cassette" on page 80.

For the **Settings** button see "The Settings Window" on page 82.

9.9 Working in Manual Mode

The SampleXpress can be used without a cassette, but the spectroscopy magnet has to be loaded manually.

Figure 9.48 Sample Transfer Position

Inserting the sample manually into the magnet:

1. Wait until the outstanding job is completed.

➨ The lamp indicator switches to green.

2. Remove cassette (see section "Removing the Cassette" on page 80).
3. Switch the SampleXpress off (see section "Switching Off the Device" on page 59).
4. The sample can be inserted manually into the BST at the sample **NMR Access Position**, just as it was inserted before the SampleXpress device was mounted.

⚠ WARNING

Danger of injury from an unexpected restart!

In the event of an unexpected restart of the power supply during manual mode, there is a danger of serious injuries for persons in the danger zone. The gripper grips the spinner with the sample with its claws. If the cassette is not inserted, the claws can shear and crimp the limbs.

- ▶ Switch off all power supplies before starting work and make sure they cannot be switched on again.
- ▶ Do not put your fingers into the small opening where the gripper is behind.

10 Maintenance

10.1 Safety

Samples

DANGER

Danger of injury from glass tube breakage!

Broken glass tubes may cause minor injuries or material damage, but may also result in a life threatening situation if hazardous substances are used.

- If a glass tube breaks, refer to the corresponding precautions and cleaning/disinfection instructions.
- Wear protective equipment.
- Perform all tasks with the cassette and glass tubes carefully.
- Before carrying out any maintenance work, remove the samples and use dummy samples if necessary.
- Strictly observe the correct sample adjustment, i.e. the maximum sample height.
- Always transport the cassette with the cover. Never turn the cassette upside down or on it‘s side.

The **laboratory supervisor** is responsible for:

- Establishing and enforcing standard sample handling and cleaning procedures.
- Establishing and enforcing the use of protective clothing and equipment.
- Training laboratory personnel.
- Preparing an emergency plan.

Electrical System

WARNING

Electrical hazard from electrical shock!

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

- Disconnect the device from the electrical power supply before opening the device. 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.

Improperly Performed Maintenance

⚠ WARNING

Danger of injury due to improperly performed maintenance!

Improperly performed maintenance may lead to serious injury and significant material damage.

- ▶ Provide for sufficient mounting clearance before starting to work.
- ▶ Keep the assembly area tidy and clean! Loose components and tools lying around or on top of each other may lead to accidents.
- ▶ When reinstalling previously removed components, make sure that the components are mounted properly, all fixing elements are reinstalled, and all screws are tightened to torque.
- ▶ Before putting the device back into operation:
  - Make sure that all maintenance work has been performed and completed following the instructions and information provided in this manual.
  - Make sure that no persons are still in the danger zone of the device.
  - Make sure that all covers and safety devices have been installed and function properly.

Securing to Prevent Restart

⚠ WARNING

Danger to life from an unauthorized restart!

In the event of an unauthorized restart of the power supply during maintenance, there is a danger of serious injuries or death for persons in the danger zone.

- ▶ Switch off all power supplies before starting work and make sure they cannot be switched on again.

Moving Parts

⚠ CAUTION

Accident hazard from movement of mechanical parts!

The fingers or hand may be pinched due to movement of mechanical parts.

- ▶ Shut off the SampleXpress before accessing the device.

Environmental protection

Observe the following environmental protection instructions during maintenance work:

- In respect to all lubrication points supplied manually with lubricant, remove any escaping, used or surplus grease and dispose of in accordance with applicable local regulations.
- Catch replaced oils in suitable containers and dispose of in accordance with applicable local regulations.

10.2 Replacement Parts

Part Number	Description
H15040	BACS2 Main Unit Standard Complete
H15020	BACS2 Control Panel Complete
H15050	BACS2 Cassette 60 Standard Complete
HZ16216	BACS2 Casette Top Cover

Table 10.1 Bruker Replacement Parts

Replacement parts must be exchanged by Bruker Service staff! The only exception is the cassette.

Only original parts from Bruker are to be used for the SampleXpress. Use of any parts other than from Bruker invalidates all warranty.

Parts which are returned to Bruker for repair or disposal must be accompanied by a repair declaration (see "Repair Declaration" on page 157).

10.3 Preventative Maintenance

All parts in the SampleXpress have been designed to work reliably without routine preventative maintenance.

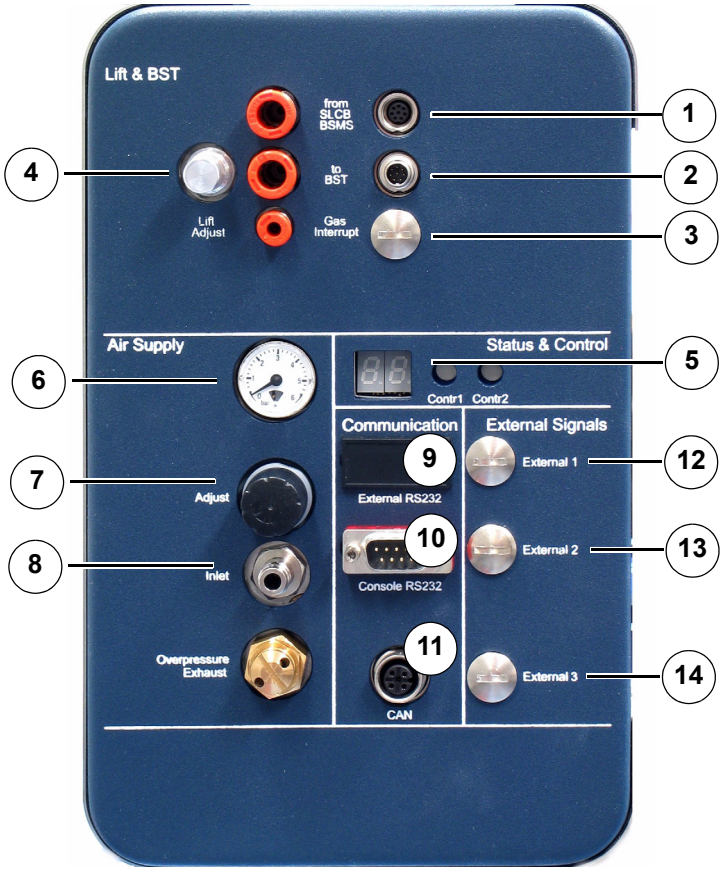
10.4 Lift Adjustment

NOTICE

Material damage hazard from heavy samples!

Samples may be damaged due to incorrect sample lift pressure adjustment.

- ▶ Adjustment is valid only for 1 sample configuration and weight.
- ▶ Personal must be trained.



1. BST Interface Cable from SLCB BSMS
2. BST Interface Cable to BST
3. Gas Interrupt (future feature)
4. Lift Adjustment Knob
5. Status and Control
6. Pressure Gauge
7. Air Supply Adjustment Knob
8. Air Supply
9. External R232 (future feature)
10. Console RS232
11. CAN Network to Control Panel
12. External Signal 1 (future feature)
13. External Signal 2 (future feature)
14. External Signal 3 (future feature)

Figure 10.1 Connections Left Side

Not all connections may be available depending on the configuration.

1. Check the pressure gauge (Figure 10.1/6).
2. If the pressure is below 4 bar, turn the adjustment (Figure 10.1/5) clockwise until the pressure gauge displays 4 bar.

The speed of the sample transported out of the magnet can be varied by regulating the outlet air flows of the cylinder supply connections. A small needle valve is fitted on the exhaust outlet. The needle valves can be manually set to change the linear speed.

10.5 Magnet Service

10.5.1 Refilling

Before refilling helium or nitrogen in the magnet:

1. Turn the SampleXpress off.
2. Remove the main power supply connector.
3. Cover the SampleXpress with a protective cover, e.g. the cover supplied in the accessory case (part number 1804410).
4. Use the exhaust tubes on the nitrogen towers.

After Refilling

1. If parts are icy wait until the ice is thawed and no more water is visible on the cold parts.
2. Remove the protective cover from the SampleXpress.
3. Reconnect the main power supply cable.
4. Restart the SampleXpress.

10.5.2 After a Quench

1. Disconnect the SampleXpress from the power supply.
2. Contact Bruker service immediately. In the event of a quench it is possible that the SampleXpress may be damaged. In this case the SampleXpress should be returned to Bruker for repair.

10.6 Maintenance Schedule

The sections below describe the maintenance work required to ensure optimal and smooth operation of the device.

If increased wear is found during regular checks, the required maintenance intervals should be shortened in accordance with the actual wear occurrences. Contact the manufacturer in the event of queries regarding maintenance work and intervals; see the service address listed under "Contact" on page 121.

Interval	Maintenance Work	Personnel
Daily	Clean the working area.	Laboratory personnel
Weekly	Clean the machine compartment Chapter "Cleaning the Outside of the SampleXpress Chassis and Units" on page 102.	
	Check air maintenance unit "Lift Adjustment" on page 92.	
Semi-annually	Check the safety switch.	
Annually	Clean the Magazine Light Barrier "Cleaning the Magazine Light Barrier" on page 102.	
As needed	Clean Outer Shell of the Device "Cleaning the Outer Shell of the Device" on page 102.	
	Update Firmware "Firmware Upgrade" on page 96.	

Table 10.2 Maintenance Schedule

10.7 Software

The SampleXpress logs all information in a file. With the help of this file customer service can diagnose the system. In case of troubleshooting as a result of an unknown error, the customer service may ask you to send the log files and the system data. From these files the customer service can obtain additional debugging information. These files do not contain any information about your company, samples or spectra. Bruker will not give any information to a third party.

10.7.1 Service File

The customer service at Bruker can send a service file to carry out an automatic maintenance.

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i Note: Make sure that the power supply will not be cut off during the entire procedure. Otherwise you will have to send for a service technician.

Make sure that the USB memory stick has enough free space and is FAT32 formatted.

If the USB memory stick is disconnected, wait 5 seconds until the stick is reconnected.

---

1. Stop all automatic operations.
2. Plug the USB memory stick in the USB port at the right side of the control panel.

➨ A screen appears and the indicator lamp switches over to yellow.

The device searches service files on the USB memory stick. This may take several minutes.

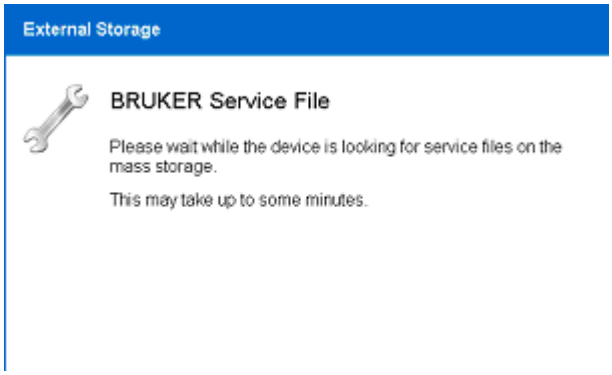


Figure 10.2 Service File

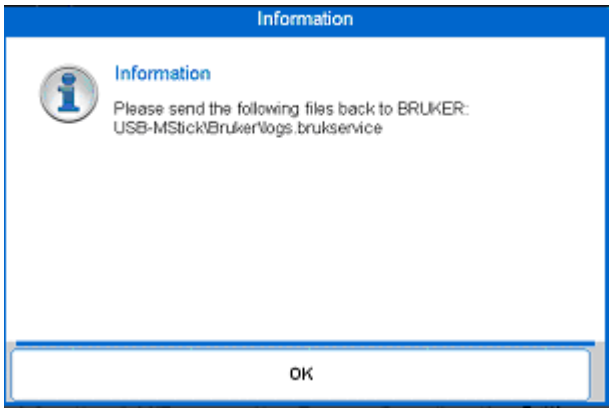


Figure 10.3 Information Screen

3. After the procedure is finished the information screen appears.
4. Note the name and the path of the log file in the information window.

The file is saved in the directory \Bruker\Automation\logs\ on the USB stick. The file name consists of device name, model number, serial number, date (YYYYMMDD) and time (hhmmss), e.g.

X:\Bruker\Automation\logs\SampleXpress_modelno_serialno_YYYYMMDD_hhmmss.log

---

5. Press the **OK** button.
6. Disconnect the USB memory stick from the device.
7. Send the log file to the customer service. See "Contact" on page 121 for contact details.

If the Information screen (Figure 10.3) does not appear, send the new file on the USB memory stick back to the customer service. The file contains information about the device.

10.7.2 Firmware Upgrade

Note: Make sure that the power supply will not be cut off during the entire procedure. Otherwise you will have to send for a service technician.

Make sure that the USB memory stick has enough free space and is FAT32 formatted.

1. Stop all automatic operations.
2. Plug the USB memory stick in the USB port at the right side of the control panel.

➨ A screen appears and the indicator lamp switches over to yellow.

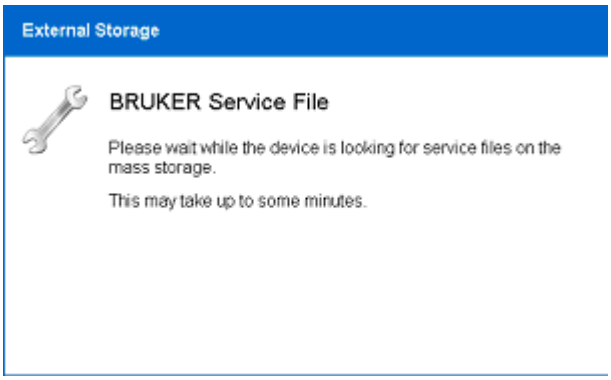
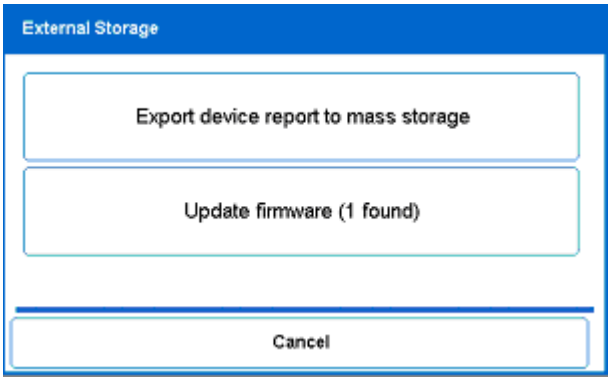


Figure 10.4 Service File

The application software searches service files on the USB memory stick. This may take several minutes.



If the USB memory stick has no firmware saved in the storage, the gray button **No suitable firmware found** appears.

3. Press the **Update firmware** button.

➨ After searching for the USB memory stick a selection screen appears:

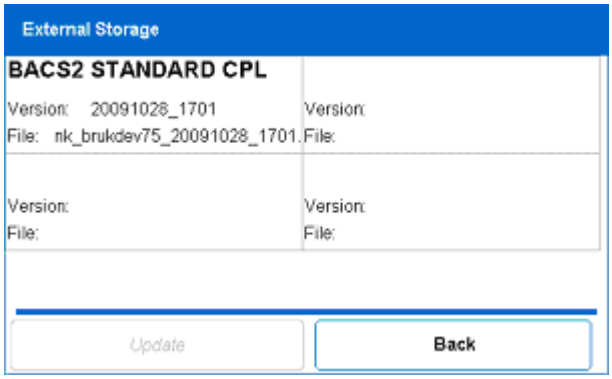


Figure 10.5 Firmware Versions

Several firmware versions may be displayed.

4. Select the firmware version which you want to update on the device. If you are not sure which to use contact Bruker service.

➨ The selected firmware is highlighted purple.

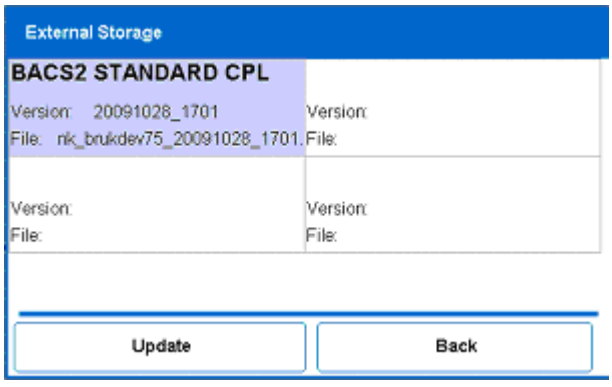


Figure 10.6 Firmware Versions

5. Press the **Update** button.

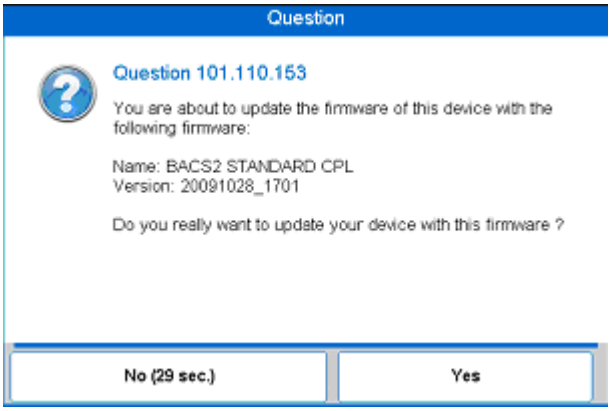


Figure 10.7 Confirm Screen

6. Press the **Yes** button.

➨ Firmware is being updated and a notice appears on the touch screen.

7. After the update is finished disconnect the USB memory stick from the device.

10.7.3 Device Report File

In case of problems with the device, a report can be sent to the customer service.

Note: Make sure that the power supply will not be cut off during the entire procedure. Otherwise you will have to send for a service technician.

Make sure that the USB memory stick has enough free space and is FAT32 formatted.

If the USB memory stick is disconnected, wait 5 seconds until the stick is reconnected.

1. Stop all automatic operations.
2. Plug the USB memory stick in the USB port at the right side of the control panel.

➨ A screen appears and the indicator lamp switches over to yellow.

The application software searches service files on the USB memory stick. This may take several minutes.

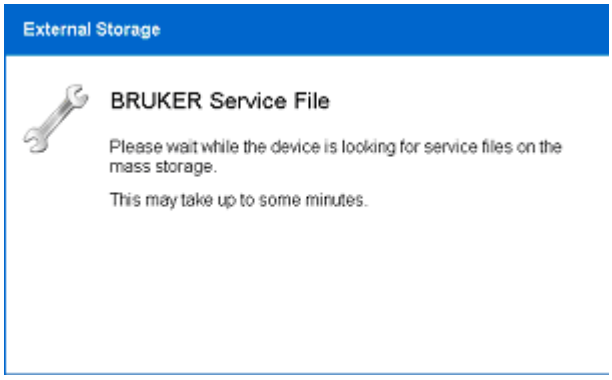
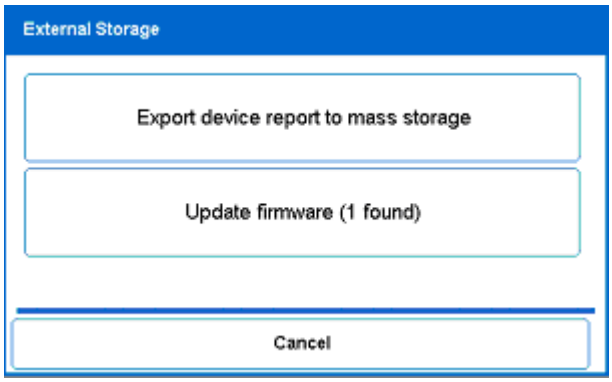


Figure 10.8 Service File



3. After searching for the USB memory stick a selection screen appears.

Press the **Export device report to mass storage** button.

➥ A screen appears and the device report file is copied to the USB memory stick.

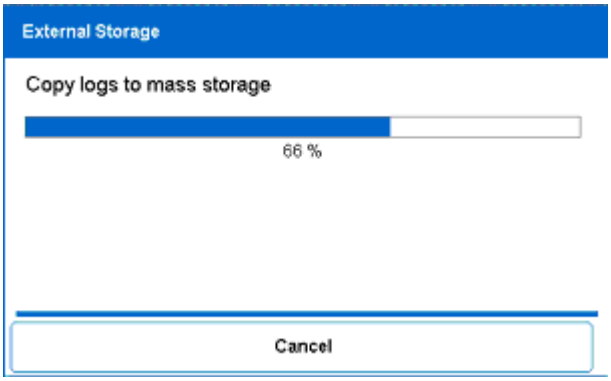


Figure 10.9 Export Device Report

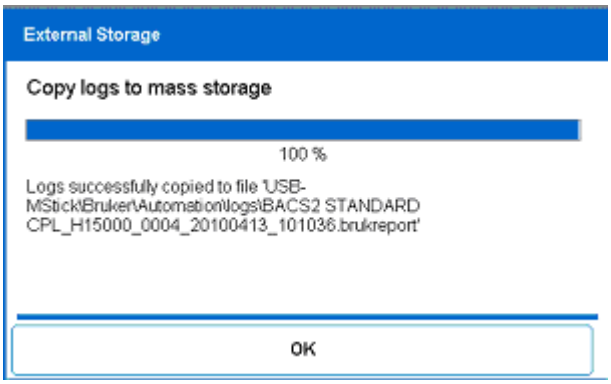


Figure 10.10 Export Device Report

4. When the process is finished write down the name and the path of the log file (Figure 10.10).

---

i The file is saved in the directory \Bruker\Automation\logs\ on the USB stick. The file name consists of device name, model number, serial number, date (YYYYMMDD) and time (hhmmss), e.g.

X:\Bruker\Automation\logs\SampleXpress_modelno_serialno_YYYYMMDD_hhmmss.log

---

5. Press the **OK** button.
6. Disconnect the USB memory stick from the device.
7. Send the file to the customer service.

If the Information screen (Figure 10.3) does not appear, send the new file on the USB memory stick back to the customer service. The file contains information about the device.

10.8 Cleaning

10.8.1 Before Cleaning

1. Stop the submitted jobs in the IconNMR automation mode.
2. Stop the SampleXpress from doing any actions.
3. Switch the power off (see "Switching Off the Device" on page 59).
4. Disconnect the power supply (Figure 10.11/3).

1. Power Control from Control Panel
2. Fuse Cartridge
3. DC In (Future feature)
4. Power Supply

Figure 10.11 Connections Right Side

10.8.2 Cleaning the Outside of the SampleXpress Chassis and Units

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 SampleXpress chassis and units with a soft, lint-free cloth dampened in water.

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

10.8.3 Cleaning the Outer Shell of the Device

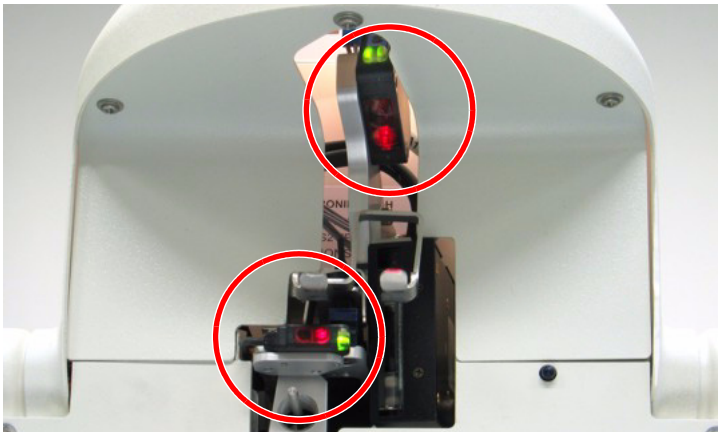
i - Use only water as a cleaning fluid.

- Do not disassembly the device for cleaning.

- Do not use acetone for cleaning.

- Clean only the outer shell of the device with a lint-free cloth dampened in water.

10.8.4 Cleaning the Magazine Light Barrier



Clean the magazine light barrier with warm water and a damp lint-free cotton cloth or towel.

Figure 10.12 Magazine Light Barrier

i Excessive dust or dirt at the lens surface of the optics reduces the optics recognition performance.

- Keep these surfaces clean.

10.8.5 Cleaning the Cassette

1. Remove the cassette.
2. Lift the cassette cover.
3. Clean the magazine with warm water and a damp lint-free cotton cloth or towel.

i Let the cassette dry before using.

10.8.6 Other Cleaning Operations

For all other cleaning operations contact your authorised Bruker service personnel for advice and support. It may be necessary to send in the device for a cleaning service.

No special precautions have been taken in SampleXpress to avoid contamination from a leaking sample tube. 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 device and associated equipment must be cleaned in such a way that no danger emanates from the device and associated equipment, especially for all uninformed personnel. If a device has to be cleaned of all remains of a substance for safety reasons, contact your authorised service personnel for advice and support.

Note that in serious cases it may be necessary for the owner to exchange the device with a new one, contact Bruker service.

Repair Declaration Form

Use the Repair Declaration Form, whenever a device might be exposed to hazardous substances by customers, when it is to be returned to Bruker.

You will find the Repair Declaration Form in the appendix. "Repair Declaration" on page 157.

11 Troubleshooting

The following chapter describes the possible causes of faults, and the steps required to rectify them.

In the event of repeated faults, shorten the maintenance interval (see "Maintenance Schedule" on page 93) in accordance with the actual load.

If a failure occurs during operation, the sample changer interrupts the current procedure. The red indicator lamp switches over to red.

On the touch screen an error message is displayed, i. e. a code number with a corresponding text. Write down the code number and complete error message. Also note the following information:

- Part number and serial number of the SampleXpress.
- Spectrometer type and order number.
- Magnet type.

With this information contact the customer service. See "Contact" on page 121 for contact details.

Also contact the manufacturer in the event of faults which cannot be rectified in accordance with the instructions found in this chapter.

11.1 Safety

Electrical System

⚠ WARNING

Electrical hazard from electrical shock!

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

- ▶ Disconnect the device from the electrical power supply before opening the device. 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.

Securing to Prevent Restart

⚠ WARNING

Danger to life from an uncontrolled restart!

An uncontrolled restart may cause serious injuries or death.

- Before a restart, ensure that the cause of the emergency stop has been rectified and that all safety devices are fitted and completely functional.
- Do not unlock the EMERGENCY STOP button until the danger is no longer present.
- For a software restart, the green Restart Button on the control panel display must also be pressed.

NOTICE

Before you restart the device after an error, make sure that no samples are in an incorrect position, for example, stuck part way down into the magnet, or at an incorrect level in the cassette.

Figure 11.1 Sample Stuck in Magnet

Figure 11.2 Sample Too Deep in the Cassette

Improperly Executed Troubleshooting Procedures

⚠ WARNING

Danger of injury from improper troubleshooting!

Improperly executed troubleshooting work may result in serious injury and significant damage to property.

- ▶ Ensure sufficient assembly space before starting work.
- ▶ Pay attention to orderliness and cleanliness in the assembly location! Loosely stacked or scattered components and tools could cause accidents.
- ▶ If components have been removed, pay attention to correct assembly, refit all fixing elements and comply with bolt tightening torques.
- ▶ Before the restart, ensure that
  - all troubleshooting work has been carried out and completed in accordance with the information and instructions in this manual.
  - no persons are in the danger zone.
  - all covers and safety devices are installed and functioning properly.

Moving Parts

⚠ CAUTION

Accident hazard from movement of mechanical parts!

The fingers or hand may be pinched due to movement of mechanical parts.

- ▶ Shut off the SampleXpress before accessing the device.

Behavior in the Event of Faults

The following principles apply:

1. Immediately initiate an emergency stop in the event of faults posing an immediate danger to people or property.
2. Ascertain the cause of the fault.
3. If fault rectification requires work in the danger zone, shut down the device and secure to prevent restarting.
4. Immediately notify those responsible at the place of use about the fault.
5. Depending on the nature of the fault, have it rectified by authorised specialised personnel or rectify it yourself.

11.2 Fault Indicators

The following touch panel and indicator lamps display device errors.

11.2.1 Touch Panel

Error Message

NOTICE

Contact Bruker customer service!

In the event of a fault, an error message may appear on the touch screen.

- ▶ Do not use the device anymore.
- ▶ Contact the customer service of Bruker (see "Contact" on page 121 for contact details) and follow the instructions of the customer service.

The code of the error message consists of 9 digits. The code has the following form xxx.xxx.xxx. shown in Figure 11.3.

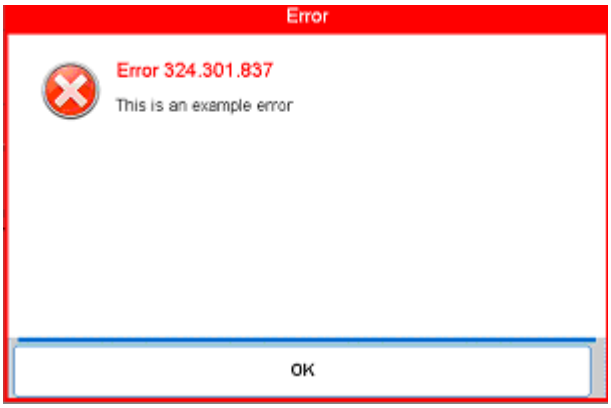


Figure 11.3 Error Message

Device Failure

NOTICE

Contact Bruker customer service!

In the event of a fault an information about a device failure may appear on the touch screen.

- ▶ Contact the customer service of Bruker (see "Contact" on page 121 for contact details) and follow the instructions of the customer service.

The following information is important for the customer service:

- Device number
- Network IP
- Critical error number

Figure 11.4 Device Failure

11.2.2 Indicator Lamp

The indicator lamp indicates the various operating statuses using different colored light signals. Refer to the section "Indicator Lamp" on page 46 for details.

11.3 Start-up Following Fault Rectification

After rectifying the fault, perform the following steps to restart the system:

1. Acknowledge the fault at the controller.
2. Ensure that no persons are in the danger zone.
3. Reset the emergency stop devices.

➥ Screens appear on the touch screen.

➥ A new initialization will begin.

12 Error Codes

All the actors named below (cassette clamp, guide, release and sample chain block) have two sensors for detecting the real system state: one sensor detects the inactive state and the other the active state of the corresponding actor. Physically it is never possible that both sensors are active at the same time, but during a malfunction the SampleXpress may produce errors.

If errors continue to occur after following the hints offered in the following section, you may need to exchange the corresponding sensors.

12.1 List of Error Codes

Error Code	Error Text	Error Description	Error Hints
103.310.004	Unknown Tube ID or position.	The requested Tube ID is not recognized by the device.	• Check if there is a sample in the sample pool available with this Tube ID. • Clean the barcode reader detection surface; • Clean/replace the barcode collar used.
103.310.130	Unknown Tube ID.	The requested Tube ID is not recognized by the device.	• Check if there is a sample in the sample pool available with this Tube ID. • Clean the barcode reader detection surface; • Clean/replace the barcode collar used.
103.310.001 103.310.005 117.310.021	Cassette is missing or could not be identified correctly.	The cassette is missing or the identification failed. The cassette cannot be used.	• Check the electrical connection to the cassette; • Replace the cassette with another one.
103.310.008	Invalid Tube ID.	The Tube ID format received from the reader is not consistent to the requested format. It has an invalid length and the Tube ID read will be ignored.	• Clean the barcode reader detection surface; • Clean/replace the barcode collar used.
103.310.007 103.310.098 103.310.151	Missing sample in magnet.	An operation (e.g. Eject) requested with the Sample in the magnet cannot be executed because there is no sample in the magnet.	• Check if there is really no sample in the magnet.

103.310.107 117.310.126	Missing empty position for security eject.	The cassette was searched for an empty position for executing a security eject attempt. But the cassette is completely filled.	• Activate Sample Down Detection Mode (Bruker service only). This allows a completely filled cassette to be added to the SampleXpress. Otherwise at least 1 empty position is needed in the cassette to execute a Security Eject of a potential sample in the magnet.
103.310.012 103.310.032	Missing empty position.	The cassette was searched for an empty position for executing a security eject attempt. But the cassette is completely filled.	• Allow at least 1 empty position in the cassette. • If the cassette is not filled completely, then clean the sensor surfaces. • Adjust sample detection sensor threshold (Bruker service only).
103.310.063	Sample Detect at magnet failed.	A sample was not detected in the magazine for the requested eject.	Check if: • There is really no sample in the magnet (or the sample down detection sensor threshold is set up not correctly). • The lift air flow is strong enough to eject the sample back into the magazine. • The sample detection sensors work well.
103.310.094 103.310.096 117.310.058 117.310.038 117.310.124	Missing empty position for eject.	The position where the sample from the magnet should be ejected to is occupied. Allow at least 1 empty position in the cassette.	• Check if there is really a sample. • Clean sensor surfaces. • Adjust sample detection threshold (Bruker service only).
103.310.097	Sample from magnet was placed in position XX.	The source position of the sample in the magnet was unknown.	
103.310.099 103.310.100 103.310.101	Source position not empty.	The position in the cassette from where the sample was inserted into the magnet is occupied.	• Do not fill the position from the sample down into the magnet.
103.310.103	Source position not empty, no other empty position found.	The position in the cassette from where the sample was inserted into the magnet is occupied and there is no other empty position available.	• Do not fill the position from the sample down into the magnet.
103.310.131 103.310.134 103.310.136	Missing empty position.	There is no empty position in the cassette for the operation requested.	• Allow at least 1 empty position in the cassette. • If the cassette is not filled completely, then clean the sensor surfaces. • Adjust sample detection threshold (Bruker service only).

103.310.123 103.310.124 103.310.125 103.310.126 103.310.127 103.310.128	Missing Cassette.	There is no cassette available to execute the requested operation.	• Insert a cassette into the SampleXpress to allow full functionality of the device.
103.310.143 103.310.144	Magnet already occupied.	There is already a sample down in the magnet. Inserting further samples is prohibited.	• Check if there is really no sample in the magnet. • Adjust sample detection sensor threshold (Bruker service only).
103.310.148	Tube ID changed unexpected for position XX. Already registered: XXX - New Read: YYY	The Tube ID for this position was read in the past and has changed now to another Tube ID unexpected.	• Check barcode collar Tube ID; • Clean barcode reader detection surface; • Clean/replace barcode collar.
103.310.149	Insufficient air pressure.	The pressure supply fell below 3.0 bars. Device has been halted and all pneumatic valves have been switched off.	• Check the main air pressure supply.
117.310.020	Emergency Stop active.	The emergency stop button is currently pressed.	• Be sure that the device and all of its samples are in a secure state before you release the emergency stop button and restart the device.
117.310.022 117.310.023 117.310.024 117.310.025 117.310.113 117.310.115 117.310.116 117.310.117	Moving to destination position failed.	The requested destination position could not be reached.	• Check if something (e.g. broken glass tubes) blocks the sample conveyor chain motion.
117.310.028 117.310.030 117.310.121	Sample hovering failed.	The sample could not be detected to be hovering at the lift air flow.	• Check the sensor operation and clean the sensor detection surface.
117.310.029	Open Guide failed.	The movable half shell of the guide did not reach its open position.	• Check guide operation manually.
117.310.031 117.410.065 117.410.143 117.410.144	Sensor Error: Sample hovering without lift.	A sample was detected to be hovering without the lift being activated.	• Check the sensor operation • Clean the sensor detection surface.
117.310.032	Security Eject failed.	A sample was detected in the magnet but could not be placed back into the magazine.	• Check sensors working. • Adjust sample detection sensor threshold (Bruker service only).

117.310.033	Security Eject failed.	A sample was detected in the magazine but was expected to be in the magnet.	• Check sensors working. • Adjust sample detection sensor threshold (Bruker service only).
117.310.034	Activate Release failed.	The sample release lever could not be activated to insert the sample into the magnet.	• Check if sample conveyor chain link release lever at this position is working correctly.
117.310.037 117.310.081 117.310.082	Insert failed.	The sample could not be inserted into the magnet, e.g. was not detected down in the magnet.	• Check if sample gets stuck somewhere on its way down into the magnet; • Adjust the sample down detection sensor (Bruker service only).
117.310.039	Sample Detect at Magazine failed.	The sample was ejected from the magnet, but was not detected up in the magazine.	• Check if there was really a sample in the magnet; • Adjust the sample down detection sensor threshold (Bruker service only); • Clean the sensor detection surfaces; Adjust sensor detection threshold (Bruker service only).
117.310.067	No more measured samples available.	There are no more samples in the sample pool which are marked as „measured“.	
117.310.111	Adapting cassette failed.	The cassette could not be adapted successfully.	• Try again.
117.310.112	Closing Clutch failed.	The mechanical adaptation of the driving unit failed. The clutch could not be closed.	• Try again. Use another cassette.
117.310.114	Open Cassette Clamp failed.	The cassette clamp which fixes the cassette could not be opened successfully.	• Lift the front of the cassette a few millimeters and try again.
117.310.118	Close Guide failed	The movable shell half of the guide did not reach its closed position.	• Check guide operation manually. • Check if chain position is really correct; • Check if something (e.g. broken samples) prevents smooth guide motion.
117.310.122	Deactivate Release failed.	The sample release lever could not be deactivated.	• Check if sample conveyor chain link release lever at this position is working correctly.
103.310.145 117.310.123	Sample missing at Insert Position.	The requested insert position is empty.	• Check if there is really no sample. • Clean sensor surfaces. • Adjust sample detection sensor threshold (Bruker service only).
117.410.011	Sensor Error: Cassette: both sensors active!	The internal plausibility check of the sensors failed. The system stopped to avoid any damage to the equipment.	Contact Bruker for replacing the defective parts.

117.410.012	Sensor Error: Clutch: both sensors active!	The internal plausibility check of the sensors failed. The system stopped to avoid any damage to the equipment.	Contact Bruker for replacing the defective parts.
117.410.013	Sensor Error: Cassette Clamp: both sensors active!	The internal plausibility check of the sensors failed. The system stopped to avoid any damage to the equipment.	Contact Bruker for replacing the defective parts.
117.410.014	Sensor Error: Sample Guide: both sensors active!	The internal plausibility check of the sensors failed. The system stopped to avoid any damage to the equipment.	Contact Bruker for replacing the defective parts.
117.410.015	Sensor Error: Sample Release: both sensors active!	The internal plausibility check of the sensors failed. The system stopped to avoid any damage to the equipment.	Contact Bruker for replacing the defective parts.
117.410.016	Sensor Error: Sample Chain Block: both sensors active!	The internal plausibility check of the sensors failed. The system stopped to avoid any damage to the equipment.	Contact Bruker for replacing the defective parts.

Error Codes

13 Dismantling and Disposal

Following the end of its useful life, the device must be dismantled and 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.

13.1 Safety

Electrical System

⚠ WARNING

Electrical hazard from electrical shock!

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

- ▶ Disconnect the device from the electrical power supply before opening the device. 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.

Improper Dismantling

⚠ WARNING

Danger of injury due to improper dismantling!

Stored residual energy, angular components, points and edges on and in the device or on the tools needed can cause injuries.

- ▶ Ensure sufficient space before starting work.
- ▶ Handle exposed, sharp-edged components with care.
- ▶ Pay attention to orderliness and cleanliness in the workplace! Loosely stacked or scattered components and tools could cause accidents.
- ▶ Dismantle the components properly. Note that some components may have a high intrinsic weight. Use hoists if necessary.
- ▶ Secure components so that they cannot fall down or topple over.
- ▶ Consult the manufacturer if in doubt.

13.2 Dismantling

Before starting dismantling:

1. Shut down the device and secure to prevent restarting.
2. Physically disconnect the power supply from the device; discharge stored residual energy.
3. Remove consumables, auxiliary materials and other processing materials and dispose of in accordance with the environmental regulations.
4. Clean assemblies and parts properly and dismantle in compliance with applicable local occupational safety and environmental protection regulations.

13.3 Disposal

If no return or disposal agreement has been made, send the dismantled components for recycling.

- Scrap metals.
- Send plastic elements for recycling.
- Sort and dispose of other components in accordance with their material composition.

NOTICE

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.

Dismantling and Disposal

14 Contact

Manufacturer:
Bruker BioSpin NMR
am Silberstreifen
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

Contact

Appendix A

A.1 Safety Notices

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.

⚠ CAUTION

Accident hazard from bright LED or laser light!

Peering into the lighting system of optical sensors, e.g. bar code reader, may result in temporary blinding of the eyes due to the bright light.

- ▶ Do not look into the ray of light.
- ▶ Switch off the equipment before maintenance work.

⚠ 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 device before maintenance work and/or returning to Bruker for repair.
- ▶ Prepare a list of materials in which the device 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.

⚠ CAUTION

Accident and material damage hazard from falling objects!

Equipment may fall down during assembly, retrofitting, or dismantling. This may result in personal injury or equipment damage.

- ► If necessary, assembly/disassembly the device in multiple parts.
- ► Use a platform with railings instead of a ladder to reach the assembly area.
- ► Avoid working over the head. When this can not be avoided, wear a protective hard hat.
- ► Follow the mounting instructions in the installation manual.

NOTICE

Material damage hazard from heavy samples!

Samples may be damaged due to incorrect sample lift pressure adjustment.

- ► Adjustment is valid only for 1 sample configuration and weight.
- ► Personal must be trained.

⚠ CAUTION

Accident hazard from hazardous materials!

An allergic reaction may be caused by sample substances.

- ► Protective clothing should be used as directed by the laboratory supervisor.
- ► Proper handling of sample substances must be followed.

NOTICE

Material damage hazard software error.

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

- ► Dummy samples must be used during installation and service.
- ► Personal should be alerted to unexpected malfunctions.

NOTICE

Material damage hazard due to impacting the magnet.

Impacting the magnet may result in a quench.

- ▶ Mount the device carefully on the magnet.
- ▶ Avoid banging the magnet during installation and operation, e.g. when replacing the sample cassette.

NOTICE

Material damage hazard from unsafe assembly practices!

Material damage may result from falling from the ladder during assembly, retrofitting, or dismantling. This may result in personal injury or equipment damage.

- ▶ Use a platform with railings instead of a ladder to reach the assembly area.
- ▶ Where appropriate clothing, e.g. slip-free shoes.

NOTICE

Material damage hazard from illicit sample movement!

Material damage may result from illicit sample movement during installation and maintenance.

- ▶ Use only dummy samples during installation and maintenance.

⚠ WARNING

Accident hazard from suffocation!

A break in the pneumatic hose may result in the uncontrolled exit of nitrogen into the laboratory.

- ▶ An oxygen warning device should be present in the laboratory if the device is operated with nitrogen.
- ▶ Note that leakage from the main supply line cannot be stopped by the device!

NOTICE

Material damage hazard from overflow of cryogens!

Material damage may result from the overflow of cryogens.

- ▶ Turn off the device during magnet servicing.
- ▶ Cover the device 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 cryogens some parts of the magnet may be icy. Be sure to remove the ice to avoid its melting onto the device.

⚠ CAUTION

Accident hazard from movement of mechanical parts!

The fingers or hand may be pinched due to movement of mechanical parts.

- ▶ Shut off the device before accessing the device.

⚠ CAUTION

Accident hazard from loose clothing or long hair becoming caught in magazine chain!

Wearing loose clothing or long hair around the magazine chain may result in the clothing or hair being pulled into the magazine chain causing injury.

- ▶ Do not wear loose clothing or jewelry in the vicinity of the magazine chain.
- ▶ Those who have long hair should stay well clear of the magazine chain.

⚠ CAUTION

Accident hazard from contact with hot or cold surfaces on the cassette!

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

- ▶ Do not touch cassette parts of cooled or heated cassettes.
- ▶ Do not use damaged cassettes.
- ▶ After removing a cassette allow it to cool or thaw before coming in contact.

DANGER

Danger of injury from glass tube breakage!

Broken glass tubes may cause minor injuries or material damage, but may also result in a life threatening situation if hazardous substances are used.

- If a glass tube breaks, refer to the corresponding precautions and cleaning/disinfection instructions.
- Wear protective equipment.
- Perform all tasks with the cassette and glass tubes carefully.
- Before carrying out any maintenance work, remove the samples and use dummy samples if necessary.
- Strictly observe the correct sample adjustment, i.e. the maximum sample height.
- Always transport the cassette with the cover. Never turn the cassette upside down or on a side.

The **laboratory supervisor** is responsible for:

- Establishing and enforcing standard sample handling and cleaning procedures.
- Establishing and enforcing the use of protective clothing and equipment.
- Training laboratory personnel.
- Preparing an emergency plan.

NOTICE

Material damage hazard from glass tube breakage or sample blockage in the BST!

Material damage from glass breakage or samples becoming stuck in the BST may result if non-OEM replacement parts are used.

- Replacement parts must meet OEM standards.

NOTICE

Material damage hazard from material contact with NMR solvents!

Material damage may result when the device comes in contact with NMR solvents.

- Follow instructions provided in the manual for correct handling of solvents.
- Follow the sensor cleaning procedures described in this manual.
- If surface damage should occur, contact Bruker for repair of damaged parts.

⚠ CAUTION

Accident hazard from falling from ladder!

It is possible to fall from a ladder when it is used to reach the device on some magnets.

- ▶ Do not use a ladder.
- ▶ Use an approved platform to reach the device on the magnet.
- ▶ Wear non-slip shoes.

⚠ CAUTION

Accident hazard from hot or cold air escaping out of the BST!

When the cassette is removed, hot or cold air may exit the BST, which may result in serious burns.

- ▶ Ensure that personnel are aware of this risk.
- ▶ Refer to the BST or probe manual for more information.

⚠ 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.

⚠ CAUTION

Danger of injury from tripping over dirt and scattered objects!

Dirt and scattered objects may cause people to slide or trip. A fall may result in injuries.

- ▶ Always keep the work area clean.
- ▶ Remove objects which are no longer required from the work area and particularly from the floor.
- ▶ Indicate unavoidable hazards using marking tape.

⚠ DANGER

Danger to life from stored charges!

Electric charges may be stored in electrical components even after the system has been switched off and disconnected from the power supply. Contact with these components may result in serious or fatal injury.

- ▶ Before working on the specified components, ensure that they have been completely disconnected from the power supply. Allow 10 minutes to elapse in order to ensure that the internal capacitors have been fully discharged.

⚠ WARNING

Danger of injury due to movements caused by stored pneumatic forces!

Pneumatically driven components may move unexpectedly due to stored residual forces, causing serious injuries.

- ▶ Work on the pneumatics system must only be carried out by trained pneumatics technicians.
- ▶ Before starting work on the pneumatics system, ensure that it has been completely depressurized. The pressure accumulator must be completely relieved.

⚠ WARNING

Danger to life from strong magnetic fields!

Strong magnetic fields may cause serious injuries or death and significant damage to property.

- Persons fitted with heart pacemakers must be kept away from the appliance. The functionality of the heart pacemaker could be compromised.
- Persons with metal implants must be kept away from the appliance. Implants may heat up or be subject to magnetic attraction.
- Ferromagnetic materials and electromagnets must be kept away from the magnetic source. Such materials could be subject to magnetic attraction and may fly around the room, injuring or killing people. Minimum distance 3 m.
- Remove magnetic items (jewelry, watches, pens etc.) before carrying out maintenance work.
- Keep electronic equipment away from the magnetic source. Such equipment could be damaged.
- Keep storage media, credit cards etc. away from the magnetic source. Data could be erased.

⚠ WARNING

Danger of injury from vapor formation!

During the work process, vapors may form which cause serious injury if inhaled.

- Only install the appliance in a well-ventilated room or ensure that an extractor is fitted.

⚠ WARNING

Danger to life from nonfunctional safety devices!

If safety devices are not functioning or are disabled, there is a danger of serious injury or death.

- Check that all safety devices are fully functional and correctly installed before starting work.
- Never disable or bypass safety devices.
- Ensure that all safety devices are always accessible.

⚠ WARNING

Danger to life from an uncontrolled restart!

An uncontrolled restart may cause serious injuries or death.

- ▶ Before a restart, ensure that the cause of the emergency stop has been rectified and that all safety devices are fitted and completely functional.
- ▶ Do not unlock the EMERGENCY STOP button until the danger is no longer present.
- ▶ For a software restart, the green Restart Button on the control panel display must also be pressed.

⚠ WARNING

Danger to life from contact voltage!

Absent or faulty protective earth conductor may result in contact voltage. This may pose a risk of injury or death.

- ▶ Before the initial commissioning of the appliance, connect the main power supply to the socket and verify the complete functionality of the protective earth conductor.

NOTICE

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.

⚠ 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.

A.2 Avertissements De Sécurité

L'installation, la mise en service initiale, la rénovation "retrofit", les réparations, les réglages et le désassemblage de l'appareil doivent être effectués exclusivement par les employés du fabricant ou par les personnes dûment autorisées par le fabricant.

⚠ ATTENTION

Risque d'accident lié à la luminosité des LED ou à la lumière du laser !

Ne fixez pas des yeux le système d'éclairage des capteurs optiques (par ex. : lecteur de codes-barres) ou vous risquez d'être temporairement aveuglé par la forte luminosité.

- ▶ Ne regardez pas dans le rayon de lumière.
- ▶ Eteignez l'équipement avant d'effectuer les tâches de maintenance.

⚠ AVERTISSEMENT

Risque biologique ou chimique !

Risque d'infection ou de contamination ou autre risque d'exposition préjudiciable à la santé en conséquence du contact avec des substances biologiques ou chimiques, par ex. à cause d'échantillons brisés.

- ▶ Nettoyez l'appareil avant d'effectuer les tâches de maintenance et/ ou de retourner l'appareil à Bruker pour réparation.
- ▶ Préparez une liste des matières avec lesquelles l'appareil a été en contact ou pour lesquelles l'appareil a effectué des mesures.
- ▶ Le client est tenu de faire parvenir à Bruker une confirmation dûment visée attestant que les opérations de nettoyage/ désinfection ont été correctement effectuées. Sans cette confirmation, les pièces qui sont livrées à Bruker pour réparation seront rejetées et renvoyées au client.

⚠ ATTENTION

Risque d'accident et d'endommager le matériel si des objets tombent!

L'équipement peut tomber par terre au cours de l'assemblage, de la rénovation "retrofit" ou du désassemblage, entraînant un risque de blessures aux personnes ou de dommages à l'équipement.

- ▶ Si nécessaire, assemblez/ désassemblez l'appareil en pièces multiples.
- ▶ Utilisez une plateforme munie de garde-fous plutôt qu'un escabeau pour atteindre la zone d'assemblage.
- ▶ Evitez de travailler les bras au dessus de la tête. Si vous ne pouvez l'éviter, portez un casque de protection.
- ▶ Respectez les instructions de montage figurant dans le manuel d'installation.

MISE EN GARDE

Risque d'endommager le matériel à cause d'échantillons trop lourds !

Des échantillons peuvent être endommagés à cause d'un réglage incorrect de la pression de levage des échantillons.

- ▶ Chaque réglage n'est valide que pour un seul poids et un seul type de configuration d'échantillon.
- ▶ Le personnel doit être dûment formé.

⚠ ATTENTION

Risque d'accident lié aux matières dangereuses !

Les substances échantillonnées peuvent provoquer des réactions allergiques.

- ▶ Utilisez les vêtements de protection individuelle imposés par le superviseur du laboratoire.
- ▶ Respectez scrupuleusement les instructions inhérentes à une manipulation correcte des substances échantillonnées.

MISE EN GARDE

Risque d'endommager le matériel à cause d'une erreur logicielle !

Les échantillons ou l'appareil peuvent être endommagés à cause d'une erreur logicielle ayant provoqué un dysfonctionnement du système de commande. L'utilisateur peut également être commotionné à cause d'un dysfonctionnement abrupt ou de la mise en route inopinée du système.

- ▶ Des échantillons factices doivent être utilisés au cours de l'installation et de l'entretien.
- ▶ Le personnel devra être averti du risque de dysfonctionnements inopinés.

MISE EN GARDE

Risque d'endommager le matériel à cause d'un choc sur l'aimant !

Tout choc sur l'aimant peut provoquer un "quench".

- ▶ Installez avec précaution l'appareil sur l'aimant.
- ▶ Evitez de cogner l'aimant au cours de l'installation et du fonctionnement, par ex. lorsque vous remettez la cassette d'échantillonnage en place.

MISE EN GARDE

Risque d'endommager le matériel à cause d'un manque de sûreté dans les pratiques d'assemblage !

Le matériel risque d'être endommagé en tombant du haut de l'escabeau au cours de l'assemblage, de la rénovation "retrofit" ou du désassemblage, risquant du même coup de blesser les personnes ou d'endommager l'équipement.

- ▶ Utilisez une plateforme munie de garde-fous plutôt qu'un escabeau pour atteindre la zone d'assemblage.
- ▶ Portez des vêtements appropriés, par ex. chaussures à semelles antidérapantes.

MISE EN GARDE

Risque d'endommager le matériel à cause d'un mouvement injustifié des échantillons !

Le mouvement injustifié des échantillons au cours de l'installation et de la maintenance peut conduire à endommager le matériel.

- ► Utilisez uniquement des échantillons factices au cours de l'installation et de la maintenance.

⚠ AVERTISSEMENT

Risque d'accident par asphyxie !

Si le flexible pneumatique de l'appareil se casse, une quantité incontrôlée d'azote peut se répandre dans le laboratoire.

- ► Un détecteur d'oxygène doit être installé dans le laboratoire si l'appareil est destiné à fonctionner à l'azote.
- ► Veuillez noter qu'une fuite au niveau du circuit principal d'alimentation ne peut pas être stoppée à l'aide du SampleXpress !!

MISE EN GARDE

Risque d'endommager le matériel à cause d'un débordement de cryogènes !

Le débordement de cryogènes peut endommager le matériel.

- ► Eteignez l'appareil pendant les opérations d'entretien de l'aimant.
- ► Recouvrez l'appareil avec un capot de protection pour éviter tout contact avec des gaz froids.
- ► Veillez à utiliser un circuit de transfert et un flexible d'évacuation en Téflon de longueurs suffisantes pour permettre les appoints en azote et en hélium en se basant sur les recommandations figurant dans le manuel de l'aimant.
- ► Après avoir fait l'appoint en cryogènes, certaines parties de l'aimant peuvent se couvrir de glace. Veillez à retirer la glace afin d'éviter qu'elle ne fonde sur l'appareil.

⚠ ATTENTION

Risque d'accident à cause du mouvement des parties mécaniques !

Les doigts ou la main peuvent se retrouver pincés par le mouvement des pièces mécaniques de l'appareil.

- ▶ Eteignez l'appareil avant d'intervenir dessus.

⚠ ATTENTION

Risque d'accident à cause de vêtements trop amples ou de cheveux longs pris dans la chaîne du magasin !

Vous risquez d'être blessé si vous portez des vêtements amples et les cheveux longs. Ils risquent d'être happés par la chaîne du magasin.

- ▶ Ne portez pas de vêtements amples, ni de bijoux si vous travaillez à proximité de la chaîne du magasin.
- ▶ Toutes les personnes portant les cheveux longs doivent rester à distance de la chaîne du magasin.

⚠ ATTENTION

Risque d'accident à cause du contact avec des surfaces chaudes ou froides de la cassette !

Le contact avec les surfaces chaudes ou froides de la cassette peut provoquer des brûlures graves.

- ▶ Ne portez pas la main sur les parties refroidies ou échauffées des cassettes.
- ▶ N'utilisez pas de cassette endommagée.
- ▶ Après avoir retiré une cassette, laissez-la refroidir ou dégeler avant d'y porter la main.

⚠ DANGER

Danger de blessure à cause d'un tube en verre brisé !

Les éclats de verre des tubes brisés peuvent non seulement causer des blessures mineures et endommager le matériel mais aussi créer une situation sanitaire extrêmement sérieuse si les substances utilisées sont dangereuses.

- ▶ Si un tube en verre se casse, référez-vous aux précautions de sécurité et aux instructions de nettoyage/ désinfection correspondantes.
- ▶ Portez des équipements de protection.
- ▶ Effectuez avec précaution toutes les opérations impliquant la cassette et les tubes en verre.
- ▶ Avant d'effectuer toute tâche de maintenance, retirez les échantillons et, si nécessaire, utilisez des échantillons factices.
- ▶ Respectez scrupuleusement les indications pour le réglage de la hauteur maximum d'échantillon.
- ▶ Transportez toujours la cassette avec son couvercle. Ne tournez jamais la cassette sur un côté et ne la retournez pas tête en bas.

Le superviseur du laboratoire est tenu:

- ▶ d'établir des procédures standards pour la manipulation des échantillons et le nettoyage et se doit de les faire appliquer.
- ▶ d'instaurer l'usage de vêtements et d'équipements de protection et de veiller à ce qu'ils soient portés.
- ▶ de former le personnel du laboratoire.
- ▶ de préparer un plan d'urgence.

MISE EN GARDE

Risque d'endommager le matériel à cause d'un tube en verre brisé ou du blocage d'un échantillon dans le BST !

L'utilisation de pièces de rechange qui ne sont pas des pièces d'origine constructeur accroît le risque d'endommager le matériel car les tubes en verre risquent de se casser et les échantillons risquent de rester coincés dans le BST.

- ▶ Les pièces de rechange utilisées doivent satisfaire aux normes établies par le constructeur.

MISE EN GARDE

Risque d'endommager le matériel à cause de la mise en contact du matériel avec des solvants pour RMN !

Le matériel risque d'être endommagé quand l'appareil est mis en contact avec des solvants pour RMN.

- ▶ Suivez les instructions fournies dans le manuel pour savoir comment manipuler correctement les solvants.
- ▶ Respectez les procédures de nettoyage de la sonde décrites dans ce manuel.
- ▶ Dans l'éventualité d'un dégât de surface, contactez Bruker qui se chargera de réparer les parties endommagées.

⚠ ATTENTION

Risque d'accident pour cause de chute de l'escabeau !

Sur certains aimants, il est nécessaire d'utiliser un escabeau pour atteindre l'appareil, ce qui rend possible le risque de chute.

- ▶ N'utilisez pas d'escabeau.
- ▶ Utilisez une plateforme approuvée pour atteindre l'appareil sur l'aimant.
- ▶ Portez des chaussures à semelles antidérapantes.

⚠ ATTENTION

Risque d'accident à cause de jets d'air chaud ou froid s'échappant du BST !

Lorsque la cassette est retirée, des jets d'air chaud ou froid peuvent s'échapper du BST et entraîner un risque de brûlures graves.

- ▶ Veillez à ce que le personnel soit sensibilisé à ce risque.
- ▶ Référez-vous au manuel du BST ou de la sonde pour de plus amples informations.

⚠ AVERTISSEMENT

Danger de mort pour les personnes non autorisées, à cause des risques encourus dans la zone de danger et la zone de travail !

Le personnel non autorisé qui ne satisfait pas aux exigences décrites dans ce manuel ne peut pas être averti des dangers inhérents à la zone de travail. Par conséquent, toute personne non autorisée encourt un risque de blessure grave ou de mort.

- ▶ Les personnes non autorisées doivent être tenues à l'écart de la zone de danger et de la zone de travail.
- ▶ En cas de doute, adressez-vous aux personnes en question et demandez-leur de quitter la zone de danger et la zone de travail.
- ▶ Cessez de travailler si des personnes non autorisées pénètrent dans la zone de danger et la zone de travail.

⚠ ATTENTION

Danger de blessure par trébuchement si les sols sont encrassés ou encombrés !

Les sols encrassés et encombrés peuvent provoquer des chutes par glissade ou trébuchement et entraîner par conséquent des blessures.

- ▶ Maintenez toujours la zone de travail propre.
- ▶ Retirez de la zone de travail tous les objets qui n'y sont plus indispensables et dégagez plus particulièrement le sol.
- ▶ Signalez les dangers qui ne peuvent être évités à l'aide d'adhésif de marquage.

⚠ DANGER

Danger de mort à cause de charges emmagasinées !

Des charges électriques peuvent rester emmagasinées dans les composants électriques même après que le système ait été éteint et déconnecté de l'alimentation électrique. Le contact de ces composants peut entraîner des blessures graves, voire fatales.

- ▶ Avant de travailler sur les composants spécifiés, veillez préalablement à ce qu'ils soient complètement déconnectés de l'alimentation électrique. Laissez s'écouler 10 minutes afin de garantir que les condensateurs internes se sont totalement déchargés..

⚠ AVERTISSEMENT

Danger de blessure dû aux mouvements causés par des forces pneumatiques emmagasinées !

Des composants à commande pneumatique peuvent bouger de façon inopinée à cause de forces résiduelles emmagasinées, causant ainsi des blessures graves.

- Les opérations réalisées sur le système pneumatique ne doivent être effectuées que par des techniciens en pneumatique dûment formés.
- Avant de commencer toute intervention sur le système pneumatique, veillez à ce qu'il soit complètement vidé de sa pression. L'accumulateur de pression doit être complètement purgé.

⚠ AVERTISSEMENT

Danger de mort à cause de champs magnétiques forts !

Des champs magnétiques forts peuvent causer des blessures graves ou la mort et endommager de manière significative les biens alentour.

- Les personnes dotées d'un stimulateur cardiaque doivent être tenues à l'écart de l'appareil. Le fonctionnement du stimulateur cardiaque pourrait être compromis.
- Les personnes dotées d'implants métalliques doivent être tenues à l'écart de l'appareil. Ces implants pourraient s'échauffer ou subir l'attraction magnétique.
- Les matériaux ferromagnétiques et les électroaimants doivent être tenus à bonne distance de la source magnétique. Ces matériaux peuvent subir l'attraction magnétique et se mettre à voler à travers la pièce, d'où le risque de blessures ou de mort. Distance minimum à respecter : 3 m.
- Débarrassez-vous de tous les objets magnétiques (bijoux, montres, crayons, etc.) avant d'effectuer toute tâche de maintenance.
- Conservez les équipements électroniques à bonne distance de la source magnétique. Ces équipements pourraient être endommagés.
- Conservez tous vos moyens de stockage, cartes de crédit, etc. à bonne distance de la source magnétique. Leurs données pourraient être effacées.

⚠ AVERTISSEMENT

Danger de blessure à cause de la formation de vapeur !

Au cours du processus opératoire, des vapeurs peuvent se former et provoquer des blessures graves par inhalation.

- ▶ Avant d'installer cet appareil, vérifiez que la salle qui l'accueille est bien ventilée ou équipée d'un extracteur.

⚠ AVERTISSEMENT

Danger de mort à cause de dispositifs de sécurité inopérants !

Si les dispositifs de sécurité ne fonctionnent pas ou sont désactivés, il y a danger de blessure grave ou de mort.

- ▶ Vérifiez que tous les dispositifs de sécurité sont totalement fonctionnels et correctement installés avant de commencer à travailler.
- ▶ Ne désactivez jamais les dispositifs de sécurité et ne les bypassez pas.
- ▶ Veillez à ce que l'ensemble des dispositifs de sécurité soient à tout moment accessibles.

⚠ AVERTISSEMENT

Danger de mort à cause d'une remise en route non contrôlée !

La remise en route non contrôlée de l'appareil peut causer des blessures graves ou la mort.

- ▶ Avant toute remise en route, veillez à ce que la cause de l'arrêt d'urgence soit totalement rectifiée. Veillez également à ce que l'ensemble des dispositifs de sécurité soient installés et complètement opérationnels.
- ▶ Déverrouillez le bouton ARRET D'URGENCE seulement si tout danger est écarté.
- ▶ En cas de remise en route logicielle, il faut également appuyer sur le bouton vert "Restart" situé sur l'afficheur du panneau de commande.

⚠ AVERTISSEMENT

Danger de mort à cause d'une tension de contact !

L'absence ou la défaillance d'une terre de protection peut susciter l'apparition d'une tension de contact, qui peut elle-même engendrer un danger de blessure ou de mort.

- ▶ Avant la mise en service initiale de l'appareil, raccordez l'alimentation électrique principale à la prise et vérifiez le bon fonctionnement de la terre de protection.

MISE EN GARDE

Danger pour l'environnement à cause de la manipulation incorrecte de polluants !

La manipulation incorrecte de polluants, et plus particulièrement leur élimination incorrecte avec les ordures, peut causer de sérieux dommages à l'environnement.

- ▶ Respectez toujours les instructions ci-dessous concernant la manipulation et l'élimination des polluants.
- ▶ Prenez les mesures immédiates appropriées dans le cas où des polluants s'échapperaient accidentellement dans l'environnement. En cas de doute, informez les autorités municipales responsables du sinistre et renseignez-vous sur les actions appropriées à entreprendre.

⚠ AVERTISSEMENT

Danger de blessure à cause d'une action impropre !

Toute opération incorrecte peut avoir pour conséquence des blessures graves et des dommages significatifs aux biens alentour.

- ▶ Menez à bien toutes les phases opératoires de l'appareil en vous conformant aux spécifications et instructions contenues dans ce manuel.
- ▶ Avant de commencer à travailler, assurez-vous que tous les capots et les dispositifs de sécurité sont installés et fonctionnent correctement. Vérifiez que personne ne se trouve dans la zone de danger.
- ▶ Ne désactivez jamais les dispositifs de sécurité pendant le fonctionnement de l'appareil. Ne les bypassez pas.

A.3 Sicherheitshinweise

Arbeiten zur Installation, ersten Inbetriebnahme, Nachrüstung, Reparatur, Einstellarbeiten oder zum Zerlegen des Geräts dürfen nur durch Mitarbeiter des Herstellers oder vom Hersteller autorisierte Personen durchgeführt werden.

⚠ VORSICHT

Unfallgefahr durch helles LED- oder Laserlicht!

Der direkte Einblick in Beleuchtungssysteme optischer Sensoren, z.B. von Barcodelesern, kann wegen des verwendeten hellen Lichts zu einer vorübergehenden Beeinträchtigung der Sehleistung des Auges durch das helle Licht führen.

- ▶ Blicken Sie nicht in den Lichtstrahl.
- ▶ Schalten Sie das Gerät vor Wartungsarbeiten aus.

⚠ WARNUNG

Biologische und chemische Gefahren!

Gefahr von Infektion, Ansteckung oder anderer Gesundheitsgefährdung durch den Kontakt mit biologischen oder chemischen Substanzen, z.B. bei zerbrochenen Probenbehältern.

- ▶ Reinigen Sie das Gerät vor allen Wartungsarbeiten bzw. bevor Sie es zur Reparatur an Bruker einsenden.
- ▶ Erstellen Sie eine Liste der Stoffe, mit denen das Gerät in Berührung gekommen ist oder an denen Messungen vorgenommen worden sind.
- ▶ Der Kunde muss eine unterzeichnete Bestätigung vorlegen, dass die Reinigung bzw. Desinfektion korrekt durchgeführt worden ist. Ohne diese Bestätigung werden die zur Reparatur eingesandten Teile nicht angenommen und stattdessen zum Kunden zurückgesandt.

⚠ VORSICHT

Gefahr von Unfällen und Sachschäden durch herabfallende Objekte!

Beim Zusammenbau, bei Nachrüstungen sowie beim Zerlegen des Geräts können Teile herabfallen. Dadurch können Personen- oder Sachschäden verursacht werden.

- Falls erforderlich, sollten Sie das Gerät in mehreren Teilen montieren bzw. zerlegen.
- Benutzen Sie für den Zugang zum Montagebereich statt einer Leiter eine Arbeitsbühne mit Geländer.
- Vermeiden Sie es, über Kopf zu arbeiten. Falls dies nicht möglich ist, sollten Sie einen Schutzhelm tragen.
- Beachten Sie die Montageanweisungen im Installationshandbuch.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch schwere Proben!

Die Proben können bei einer falschen Einstellung des Drucks am Probenlift beschädigt werden.

- Die Einstellung gilt jeweils nur für eine Probenkonfiguration und ein bestimmtes Gewicht.
- Es dürfen nur entsprechend geschulte Mitarbeiter eingesetzt werden.

⚠ VORSICHT

Unfallgefahr durch Gefahrstoffe.

Bestimmte Probensubstanzen können allergische Reaktionen auslösen.

- Es ist die vom Laborleiter vorgeschriebene Schutzkleidung zu tragen.
- Die Anweisungen zur korrekten Handhabung der untersuchten Substanzen sind unbedingt zu beachten.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch Softwarefehler.

Die Proben oder das Gerät können durch Softwarefehler, die zu Funktionsstörungen des Steuersystems führen, beschädigt werden. Außerdem können plötzlich auftretende Funktionsstörungen oder ein unerwartetes Anlaufen des Systems bei den Bedienern zu Schreckreaktionen führen.

- ▶ Während der Installation und der Wartung dürfen nur Dummy-Proben verwendet werden.
- ▶ Die mit der Bedienung beauftragten Mitarbeiter sollten auf die Möglichkeit unerwarteter Funktionsstörungen hingewiesen werden.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch Anstoßen am Magnet!

Beim Anstoßen am Magnet besteht die Gefahr, dass Teile eingequetscht werden.

- ▶ Gehen Sie bei der Montage am Magneten besonders vorsichtig vor.
- ▶ Vermeiden Sie es, bei der Installation und im Betrieb, z.B. beim Austausch der Probenkassette, den Magneten hart anzustoßen.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch unsicheres Arbeiten bei der Montage!

Beim Zusammenbau, bei Nachrüstungen sowie beim Zerlegen des Geräts besteht die Gefahr von Sachschäden, wenn Teile von der Leiter herabfallen. Dadurch können Personen- oder Sachschäden verursacht werden.

- ▶ Benutzen Sie für den Zugang zum Montagebereich statt einer Leiter eine Arbeitsbühne mit Geländer.
- ▶ Tragen Sie geeignete Kleidung, z.B. Schuhe mit rutschfesten Sohlen.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch unbeabsichtigte Bewegung der Proben!

Bei der Installation und Wartung besteht die Gefahr von Sachschäden durch unbeabsichtigte Bewegung der Proben.

- ▶ Verwenden Sie bei der Installation und der Wartung nur Dummy-Proben.

⚠ WARNUNG

Unfallgefahr durch Ersticken!

Bei einer Beschädigung des Pneumatikschlauchs kann es dazu kommen, dass unkontrolliert Stickstoff in das Labor strömt.

- ▶ Wenn das Gerät mit Stickstoff betrieben wird, sollte das Labor mit einer Wareinrichtung für den Sauerstoffgehalt der Atemluft ausgestattet sein.
- ▶ Beachten Sie, dass der Austritt von Stickstoff an der Hauptversorgungsleitung von Seiten des SampleXpress nicht abgestellt werden kann!

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch überlaufendes Kühlmittel!

Gefahr von Sachschäden durch überlaufendes Kühlmittel.

- ▶ Schalten Sie das Gerät während Servicearbeiten am Gerät aus.
- ▶ Decken Sie das Gerät mit einer Schutzabdeckung ab, um die Berührung mit kalten Gasen zu vermeiden.
- ▶ Achten Sie darauf, beim Nachfüllen von Stickstoff und Helium ausreichend lange Nachfüllleitungen und Teflon-Ablaufschläuche zu verwenden. Beachten Sie hierzu die Empfehlungen im Handbuch zum Magneten.
- ▶ Nach dem Nachfüllen des Kühlmittels können Teile des Magneten vereist sein. Achten Sie darauf, dieses Eis zu entfernen, damit beim Abtauen kein Wasser auf das Gerät tropft.

⚠ VORSICHT

Unfallgefahr durch sich bewegende Teile!

Es besteht die Gefahr von Quetschungen an Hand oder Fingern durch sich bewegende Teile.

- ▶ Schalten Sie das Gerät ab, bevor Sie hinein greifen.

⚠ VORSICHT

Unfallgefahr durch Verfangen lose hängender Kleidungsstücke oder langer Haare in der Magazinkette!

Falls in der Nähe der Magazinkette mit lose herabhängenden Kleidungsstücken oder langen Haaren gearbeitet wird, besteht Verletzungsgefahr dadurch, dass Haare oder Kleidungsstücke in die Magazinkette geraten.

- ▶ Tragen Sie bei Arbeiten in der Nähe der Magazinkette keine lose herabhängende Kleidung oder Schmuckstücke.
- ▶ Personen mit langen Haaren sollten sich nicht in der Nähe der Magazinkette aufhalten.

⚠ VORSICHT

Unfallgefahr durch Berühren heißer oder kalter Oberflächen an der Kassette!

Beim Berühren heißer oder kalter Oberflächen an der Kassette besteht die Gefahr schwerer Verbrennungen.

- ▶ Berühren Sie keine gekühlten oder erhitzten Teile der Kassetten.
- ▶ Verwenden Sie keine beschädigten Kassetten.
- ▶ Lassen Sie die Kassetten nach dem Entnehmen abkühlen bzw. abtauen, bevor Sie sie berühren.

⚠ GEFAHR

Verletzungsgefahr durch zerbrochene Glasbehälter!

Zerbrochene Glasbehälter können zu geringfügigen Sachschäden oder Verletzungen, ebenso aber auch zu lebensbedrohlichen Situationen führen, wenn Gefahrstoffe freigesetzt werden.

- ▶ Falls ein Glasbehälter zerbricht, beachten Sie bitte die entsprechenden Anweisungen zu Vorsichtsmaßregeln und zur Reinigung bzw. Desinfektion.
- ▶ Tragen Sie geeignete Schutzausrüstung.
- ▶ Gehen Sie bei allen Arbeiten mit Kassette und Glasbehältern besonders vorsichtig vor.
- ▶ Entfernen Sie vor allen Wartungsarbeiten noch vorhandene Proben und verwenden Sie bei Bedarf Dummy-Proben.
- ▶ Beachten Sie unbedingt die Angaben zur korrekten Einstellung der Proben, d.h. die maximale Probenhöhe.
- ▶ Transportieren Sie die Kassette nur mit der Abdeckung. Stellen Sie die Kassette nicht auf den Kopf und drehen Sie sie nicht auf die Seite.

Der Laborleiter ist verantwortlich für:

- ▶ die Festlegung und Durchsetzung von Standardverfahren zur Handhabung der Proben und zur Reinigung.
- ▶ die Festlegung und Durchsetzung der Anweisungen zur Schutzkleidung und -ausrüstung.
- ▶ die Schulung des Laborpersonals.
- ▶ die Erstellung eines Notfallplans.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch zerbrochene Glasbehälter oder Blockieren der Proben im BST!

Bei Verwendung nicht zugelassener Ersatzteile kann es zu Sachschäden durch zerbrochene Glasbehälter oder Blockieren von Proben im BST kommen.

- ▶ Die Ersatzteile müssen den OEM-Standards entsprechen.

HINWEISE ZUM BETRIEB

Gefahr von Sachschäden durch Kontakt mit NMR-Lösungsmitteln!

Wenn das Gerät mit NMR-Lösungsmitteln in Berührung kommt, besteht die Gefahr von Sachschäden.

- ▶ Beachten Sie die Anweisungen im Handbuch zur korrekten Handhabung der Lösungsmittel.
- ▶ Beachten Sie die Beschreibung zur Reinigung des Sensors im Handbuch.
- ▶ Falls Oberflächen beschädigt werden, sollten Sie sich zur Reparatur der beschädigten Teile an Bruker wenden.

⚠ VORSICHT

Unfallgefahr durch Sturz von der Leiter!

Beim Versuch, das Gerät an einigen Magneten mit einer Leiter zu erreichen, besteht Sturzgefahr.

- ▶ Benutzen Sie keine Leiter.
- ▶ Benutzen Sie stattdessen eine zugelassene Arbeitsbühne, um das Gerät am Magneten zu erreichen.
- ▶ Tragen Sie Schuhe mit rutschfesten Sohlen.

⚠ VORSICHT

Unfallgefahr durch aus dem BST austretende heiße oder kalte Luft!

Beim Entnehmen der Kassette kann aus dem BST heiße oder kalte Luft austreten. Dadurch besteht die Gefahr schwerer Verbrennungen.

- ▶ Sorgen Sie dafür, dass den Mitarbeitern diese Gefahr bewusst ist.
- ▶ Verweisen Sie für weitere Informationen auf die Probenkopf- bzw. BSTHandbücher.

⚠ WARNUNG

Lebensgefahr für nicht autorisiertes Personal durch verschiedene Risiken im Gefahren- und Arbeitsbereich!

Nicht autorisiertes Personal, das die in diesem Handbuch beschriebenen Bedingungen nicht erfüllt, ist mit den Gefahren im Arbeitsbereich nicht vertraut. Daher besteht für nicht autorisiertes Personal die Gefahr von Unfällen mit schweren Verletzungen oder Todesfolge.

- ▶ Nicht autorisierte Personen dürfen keinen Zugang zum Gefahren- und Arbeitsbereich erhalten.
- ▶ Sprechen Sie die fraglichen Personen im Zweifelsfall an und fordern Sie sie auf, den Arbeits- und Gefahrenbereich zu verlassen.
- ▶ Stellen Sie die Arbeiten ein, während sich nicht autorisierte Personen im Gefahren- und Arbeitsbereich aufhalten.

⚠ VORSICHT

Verletzungsgefahr durch Ausrutschen auf Verschmutzungen oder Stolpern über herumliegende Gegenstände!

Schmutz und herumliegende Gegenstände führen zu Gefahren durch Ausrutschen oder Stolpern. Bei einem Sturz besteht Verletzungsgefahr.

- ▶ Halten Sie den Arbeitsbereich jederzeit sauber.
- ▶ Entfernen Sie alle Gegenstände, die nicht mehr benötigt werden, aus dem Arbeitsbereich und insbesondere vom Boden.
- ▶ Machen Sie unvermeidliche Gefährdungen durch Markierungsband kenntlich.

⚠ GEFAHR

Lebensgefahr durch gespeicherte elektrische Ladung!

In den elektrischen Bauteilen können auch nach dem Abschalten des Systems und dem Trennen von der Spannungsversorgung elektrische Ladungen gespeichert sein. Bei Berührung dieser Komponenten besteht die Gefahr schwerer oder sogar tödlicher Verletzungen.

- ▶ Prüfen Sie vor Arbeiten an den angegebenen Komponenten, ob diese vollständig von der Spannungsversorgung getrennt worden sind. Warten Sie 10 Minuten, damit sich die Kondensatoren im Inneren des Geräts vollständig entladen können.

⚠ WARNUNG

Verletzungsgefahr durch Bewegungen von Teilen auf Grund gespeicherter pneumatischer Energie!

Pneumatisch angetriebene Komponenten können sich wegen noch im System befindlicher Druckluft unerwartet bewegen und so zu schweren Verletzungen führen.

- ▶ Arbeiten an den Druckluftsystemen dürfen nur von geschulten Pneumatiktechnikern ausgeführt werden.
- ▶ Prüfen Sie vor allen Arbeiten am Druckluftsystem, dass dieses vollständig drucklos ist. Der Druckspeicher muss vollständig drucklos gemacht worden sein.

⚠ WARNUNG

Lebensgefahr durch starke Magnetfelder!

Starke Magnetfelder können zu schweren oder sogar tödlichen Verletzungen und erheblichen Sachschäden führen.

- ▶ Personen mit Herzschrittmachern dürfen sich nicht in der Nähe der Anlage aufhalten. Die Funktion der Herzschrittmacher könnte beeinträchtigt werden.
- ▶ Personen mit Implantaten aus Metall dürfen sich nicht in der Nähe der Anlage aufhalten. Die Implantate könnten sich erwärmen oder vom Magnetfeld angezogen werden.
- ▶ Ferromagnetische Werkstoffe und Elektromagnete dürfen nicht in die Nähe der Quelle des Magnetfelds gebracht werden. Derartige Werkstoffe könnten angezogen werden und durch den Raum fliegen. Dabei bestände die Gefahr von schweren oder sogar tödlichen Verletzungen. Mindestabstand 3 m.
- ▶ Legen Sie vor allen Wartungsarbeiten magnetische Gegenstände (Schmuck, Uhren, Schreibgeräte usw.) in sicherer Entfernung ab.
- ▶ Bringen Sie keine elektronischen Geräte in die Nähe des Magnetfelds. Diese Geräte könnten beschädigt werden.
- ▶ Bringen Sie keine Speichermedien, Kreditkarten usw. in die Nähe des Magnetfelds. Hierbei könnten die Daten gelöscht werden.

⚠ WARNUNG

Verletzungsgefahr durch verdunstende Flüssigkeiten!

Während des Betriebs können sich Dämpfe bilden, die beim Einatmen zu schweren Verletzungen führen.

- ▶ Betreiben Sie die Anlage nur in einem gut belüfteten Raum oder sorgen Sie dafür, dass eine Absaugeinrichtung installiert wird.

⚠ WARNUNG

Lebensgefahr durch nicht funktionierende Sicherheitseinrichtungen!

Falls Sicherheitseinrichtungen nicht funktionieren oder außer Funktion gesetzt werden, besteht die Gefahr schwerer oder sogar tödlicher Verletzungen.

- ▶ Prüfen Sie vor Beginn der Arbeit, dass alle Sicherheitseinrichtungen korrekt installiert sind und einwandfrei arbeiten.
- ▶ Sicherheitseinrichtungen dürfen in keinem Fall blockiert oder umgangen werden.
- ▶ Sorgen Sie dafür, dass alle Sicherheitseinrichtungen ständig zugänglich sind.

⚠ WARNUNG

Lebensgefahr durch unkontrollierten Wiederanlauf!

Bei einem unkontrollierten Wiederanlauf besteht die Gefahr schwerer oder sogar tödlicher Verletzungen.

- ▶ Prüfen Sie vor dem Wiedereinschalten, dass die Ursache der Notabschaltung behoben worden ist, dass alle Sicherheitseinrichtungen vorhanden sind und dass diese einwandfrei funktionieren.
- ▶ Entriegeln Sie die NOT-AUS-TASTE erst dann, wenn keine Gefahr mehr besteht.
- ▶ Für einen Neustart der Software muss außerdem die grüne Neustart-Taste auf dem Bedienfeld gedrückt werden.

⚠ WARNUNG

Lebensgefahr durch Berührungsspannung!

Bei nicht vorhandener oder fehlerhafter Schutzerdung können gefährlich hohe Berührungsspannungen anliegen. Diese Spannungen können schwere oder sogar tödliche Verletzungen verursachen.

- ▶ Bevor Sie die Anlage erstmals in Betrieb nehmen, verbinden Sie die Spannungsversorgung mit der entsprechenden Wanddose und überprüfen Sie die einwandfreie Funktion der Schutzerdung.

HINWEISE ZUM BETRIEB

Gefährdung der Umwelt bei nicht sachgemäßer Handhabung von Gefahrstoffen!

Die unsachgemäße Handhabung von Gefahrstoffen, insbesondere die nicht sachgemäße Entsorgung, kann zu schwerwiegenden Umweltschäden führen.

- ▶ Beachten Sie grundsätzlich die nachstehende Anweisungen, bevor Sie Gefahrstoffe handhaben oder entsorgen.
- ▶ Ergreifen Sie sofort die erforderlichen Maßnahmen, wenn Gefahrstoffe unbeabsichtigt in die Umwelt gelangen. Informieren Sie in Zweifelsfällen die zuständigen örtlichen Behörden über den Schaden und erfragen Sie dort die erforderlichen Maßnahmen.

⚠ WARNUNG

Verletzungsgefahr bei nicht sachgemäßer Bedienung!

Bei nicht sachgemäßer Bedienung besteht die Gefahr schwerer Verletzungen und erheblicher Sachschäden.

- ▶ Führen Sie alle Schritte bei der Bedienung entsprechend den Spezifikationen und Anweisungen in diesem Handbuch aus.
- ▶ Prüfen Sie vor Beginn der Arbeit, ob alle Abdeckungen und Sicherheitseinrichtungen installiert sind und einwandfrei arbeiten.
- ▶ Es dürfen sich im Gefahrenbereich keine Personen aufhalten.
- ▶ Sicherheitseinrichtungen dürfen im Betrieb keinesfalls blockiert oder umgangen werden.

Appendix B

B.1 Repair Declaration

The Equipment Clearance Form on the following page needs to be used for Service, Repair, Disposal or Transfer of the SampleXpress.

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:
NAME:	.....
MAILING ADRESS:	DATE:
CITY/POSTAL CODE/COUNTRY:	
EMAIL:	.....

Appendix C

C.1 Warning Signs

Warning Signs

C.2 Figures

Figures

Figures

C.3 Tables

Tables

C.4 Glossary

BSMS
Bruker Smart Magnet Control System

BST
Bruker Sample Transport

NMR
Nuclear Magnetic Resonance

SLCB
Sample Level Control Board

Glossary

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Bruker BioSpin, your solution partner

Bruker BioSpin provides a world class, market-leading range of analysis solutions for your life and materials science needs.

Our solution-oriented approach enables us to work closely with you to further establish your specific needs and determine the relevant solution package fromour comprehensive range, or even collaborate with you on new developments.

Our ongoing efforts and considerable investment in research and development illustrates our long-term commitment to technological innovation on behalf of our customers. With more than 40 years of experience meeting the professional scientific sector's needs across a range of disciplines, Bruker BioSpin has built an enviable rapport with the scientific community and various specialist fields through understanding specific demand, and providing attentive and responsive service.

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