SampleXpress Lite

Sample Changer

Service Manual

Version 001

NMR Spectroscopy

Innovation with Integrity

This manual was written by

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For further technical assistance on the SampleXpress Lite 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 is intended to be a reference guide for operators and service technicians. It provides detailed information about the user level maintenance and service and overall use of the Bruker device.

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

Carefully read all relevant chapters before working on the device!

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

1.2 Policy Statement

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

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

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

1.3 Symbols and Conventions

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

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

DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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

2 Introduction

This service manual is intended to be used by trained Bruker service staff only. It contains the following information about the SampleXpress Lite installation, working principle and troubleshooting.

2.1 Concept

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

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

Refer to SampleXpress Lite User manual for a complete description of the design and function of SampleXpress Lite.

Figure 2.1 SampleXpress Lite

2.2 Limitation of liability

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

The manufacturer accepts no liability for damage due to:

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

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

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

2.3 Before you begin

This service manual contains information and safety information that are necessary for the installation and servicing of the SampleXpress Lite.

All maintenance and repairs are to be accomplished using the information in this manual. At the same time references over general maintenance and care from the User Manual are also to be followed.

Consider all safety references!

Be sure that no NMR measurement is in progress during the installation as it might be disturbed.

Information for ordering spare parts is available in the spare parts section from the Bruker Service Center (see "Contact" on page 117).

2.4 Minimum Qualifications for Service Personnel

Type of Task	Personnel	Training and Experience
Transportation	No special requirements.	No special.
Installation	Bruker certified personnel only.	Technically skilled, with a good knowledge of the application field.
Routine Use Daily Maintenance	Appropriately certified and experienced personnel, familiar with use of computers and automation in general	Laboratory technicians or equivalent. Training is usually done in-house. Familiar with MS Windows® environment.
Setup and optimization of program	Bruker certified personnel only.	Experienced laboratory technician. High degree of knowledge of the relevant application field.
Preventive Maintenance	Bruker certified personnel only.	Technically skilled with a basic understanding of the application.
Servicing	Bruker certified personnel only.	Background and experience in electronics/mechanics with computer knowledge.

Table 2.1 Overview Installation and Operation Requirements for Personnel

2.5 The Bruker Service

Our customer service division is available to provide technical information. See "Contact" on page 117 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 Transport to Manufacturer

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

Include a good description of the problem.

Introduction

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.

Read the following safety instructions carefully before you start installation or working with the SampleXpress Lite.

3.1 General

Before you start any repair inside of the SampleXpress Lite, be aware of high voltages 230/115V. Even if these voltages are protected by security features to avoid any contact with your body, it is still possible that you unintentionally touch these voltages with a tool, e.g. screwdriver etc.

Therefore, always check if you really need the power supply to be switched on during your work. Otherwise turn the SampleXpress Lite off and disconnect the power cable from the wall socket to the SampleXpress Lite. Avoid that anyone can re-power the system without your notice.

3.2 Personnel Requirements

3.2.1 Qualifications

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

3.2.2 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 Personal Protective Equipment

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

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

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

3.4 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.

3.4.1 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 Lite 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 Lite carefully on the magnet.
- ▶ Avoid banging the magnet during installation and operation, e.g. when replacing the sample carousel.

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.

3.4.2 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.

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.

3.4.3 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 device before accessing.

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, assemble/disassemble 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.

3.4.4 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 Lite!

3.4.5 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 Lite 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.

3.4.6 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 device during magnet servicing.
- ▶ Cover the device with a protective cover, e.g. P/N 1804420 provided in the accessory case, 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.

3.4.7 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 carousel 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.
- Never turn the carousel 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.
- ▶ Personnel 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.

3.4.8 Description of the Installed Safety Devices

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.

3.5 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:

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

3.6 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.

3.7 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 117 for manufacturer's address.

4 Tool Requirements

All tools required for the installation are provided in the accessory case.

Be sure to use non-magnetic tools, especially when working on unshielded magnets.

Tool Requirements

5 Installation

The SampleXpress Lite is mounted directly on top of the BST. The installation consists of 6 major steps:

1. "Before You Begin"
2. "Mounting the SampleXpress Lite Components"
3. "External Cable Connections"
4. "Starting the device"
5. "Adjustments"
6. "Installation Acceptance"

5.1 Before You Begin

Before you begin the installation be sure to:

- Verify the "Site Planning Considerations" on page 29.
- Perform the procedure "Checking if SampleXpress Fits on the Magnet"
- Read the "Important Safety Information" on page 32.
- Start filling out the Installation Acceptance Form (see "SampleXpress Lite Installation Acceptance Form" on page 119).

5.1.1 Site Planning Considerations

There are several laboratory site considerations that must be met before installing the SampleXpress Lite sample changer. The considerations that are specific for the SampleXpress Lite are listed in this section. Note that the standard site considerations for Bruker Avance spectrometers must also be realized, unless otherwise noted in this section. Refer to the corresponding Avance Site Planning Manual for details.

Electrical Supply Specifications

Voltage: 208 - 230V AC 50/60Hz.

Normal Operation: 40 W/120VA.

Air Supply Specifications

Pressure: 5 to 7 bar.

Flow: More than 100 l/min.

Oil: Oil-free (below 0.005 ppm = 0.005 mg/m³).

Water Content: The air must be dry with a dew-point below 4°C.

Particles: below 5 µm.

Environmental Specifications

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 5.1 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 5.2 Bruker Site Planning Guides

NMR Magnet specifications

The SampleXpress Lite can be mounted on the following NMR magnets:

- Unshielded <= 600 MHz
- Shielded (US, US2) <= 800 MHz

The minimum distance between the helium towers must be 228 mm.

The correct BST length corresponding to the magnet must be mounted. The BST upper level must be between 56 and 174 mm above the upper magnet flange level (see Figure 5.2).

IMPORTANT NOTE:

The SampleXpress Lite can NOT be mounted on the new generation of refrigerated Magnets, i.e. dewar types D345, D346 and D355.

5.1.2 Checking if SampleXpress Fits on the Magnet

Outline Geometry

At the end of this manual is a two-page outline template of the SampleXpress Lite. The template consists of a left and a right part which has to be printed out and assembled to check if the unit will fit on the magnet. The following instructions must be carried out carefully:

1. Deselect any page scaling options in Adobe Acrobat Reader and print the two pages. **The page must not be rescaled!**
2. Use a ruler to confirm the printout scale.
3. Place the template on top of the BST, using the center of the BST for alignment.
4. The template must fit between all the towers on the top of the magnet.
5. The template contains information about the height of the SampleXpress base unit. Be sure that there is enough clearance to the magnets manifold (helium pipes).

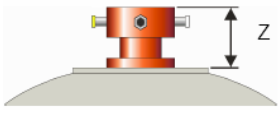
IMPORTANT:

If your magnet has a drop-off plate (red, circular cap) below the SampleXpress template check the following:

If the vertical distance between the template and upper surface of the drop-off plate is below 80 mm, the SampleXpress must be placed on an BST elongation part with a length of 50 mm. You must add 50 mm to the height information given on the SampleXpress template and repeat step 5.

BST Height

Verify that the length Z of the BST coming out of the magnet is in a range between 56 and 174 mm.



IMPORTANT:

Widebore BST‘s are currently not supported.

5.1.3 Important Safety Information

The magnet safety devices, especially the drop-off plate, must remain unobstructed when the SampleXpress Lite is mounted. Be sure that all cables are secured as described in "Placing the Cables" on page 41.

5.1.3.1 Checking the Functionality of the Drop-Off Plate

To guarantee the functionality of the drop-off plate, ensure that no cables, hoses, etc. are blocking it, and that it can be opened up to at least a 45° angle to a horizontal line.

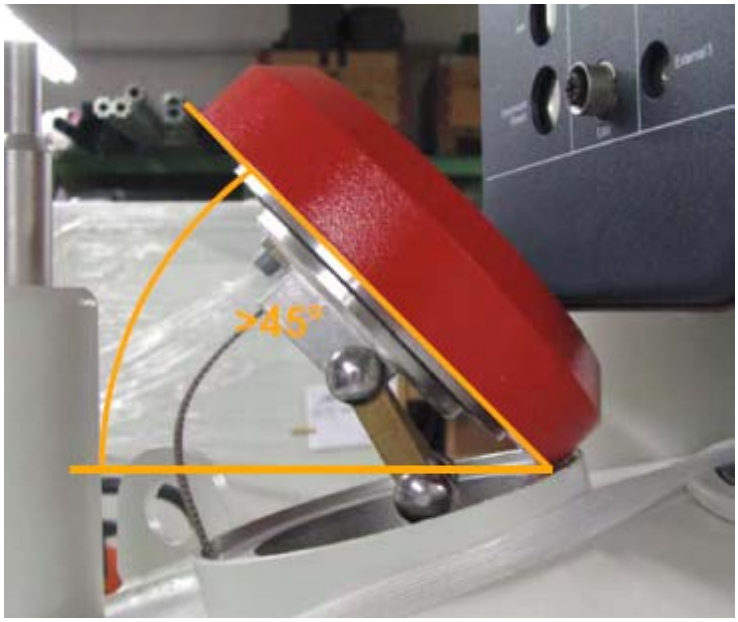


Figure 5.1 Drop-Off Plate in the Open Position

Some magnets have 2 drop-off plates, be sure to check both sides of the magnet!

To help identify a potential obstruction, measure the distance Z between the magnet upper level and the BST upper level (see the figure below).

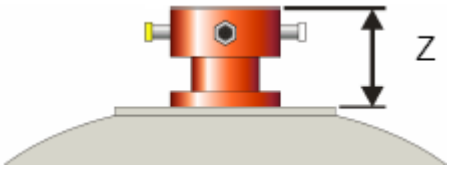


Figure 5.2 Measuring the Distance Z of the Magnet Dewar

If the distance Z is below 100 mm, it is especially important to verify whether an obstruction exists. Likewise, the following magnet dewar types should be checked:

D315 D325 D335 D345 D355 D365 D375

Refer to the magnet identification plate for the dewar type.

If you are uncertain whether the functionality of the drop-off plate is guaranteed, it is best to use the BST 50 mm elongation (P/N H121852).

To mount the BST 50 mm elongation, place it on top of the BST and rotate it until it is locked.

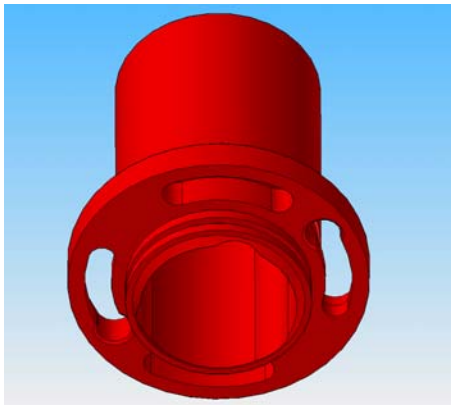


Figure 5.3 P/N H121852: BST 50 mm Elongation

5.2 Mounting the SampleXpress Lite Components

The following steps should be followed in sequential order:

1. "Preparation"
2. "BST Clamping Ring with N2 Connector"
3. "Mounting the Height & Level Adjustment Kit"
4. "Mounting the SampleXpress Lite on the Height & Level Adjustment Unit"
5. „Remounting the Base Unit“

5.2.1 Preparation

Before mounting the SampleXpress Lite components:

- Make sure that the BST inside the magnet is mounted, attached and configured correctly as described in the BST installation manual (P/N Z31123).
- Make sure that the NMR samples can be transported without obstruction through the BST and that the spectrometer is operating correctly.

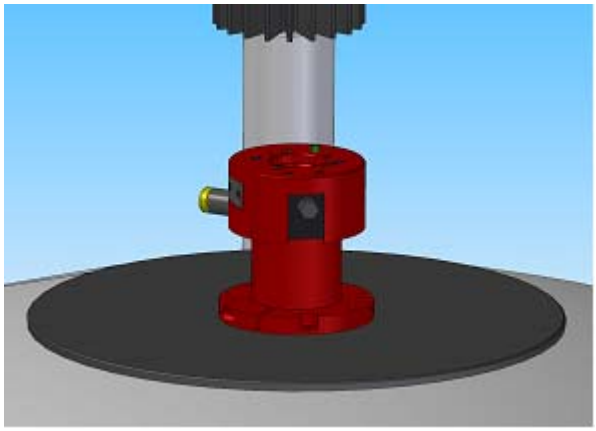


Figure 5.4 Connections on the Top of the BST

1. Disconnect the yellow cable from the top of the BST.
2. Disconnect the white and the yellow hoses from the top of the BST.

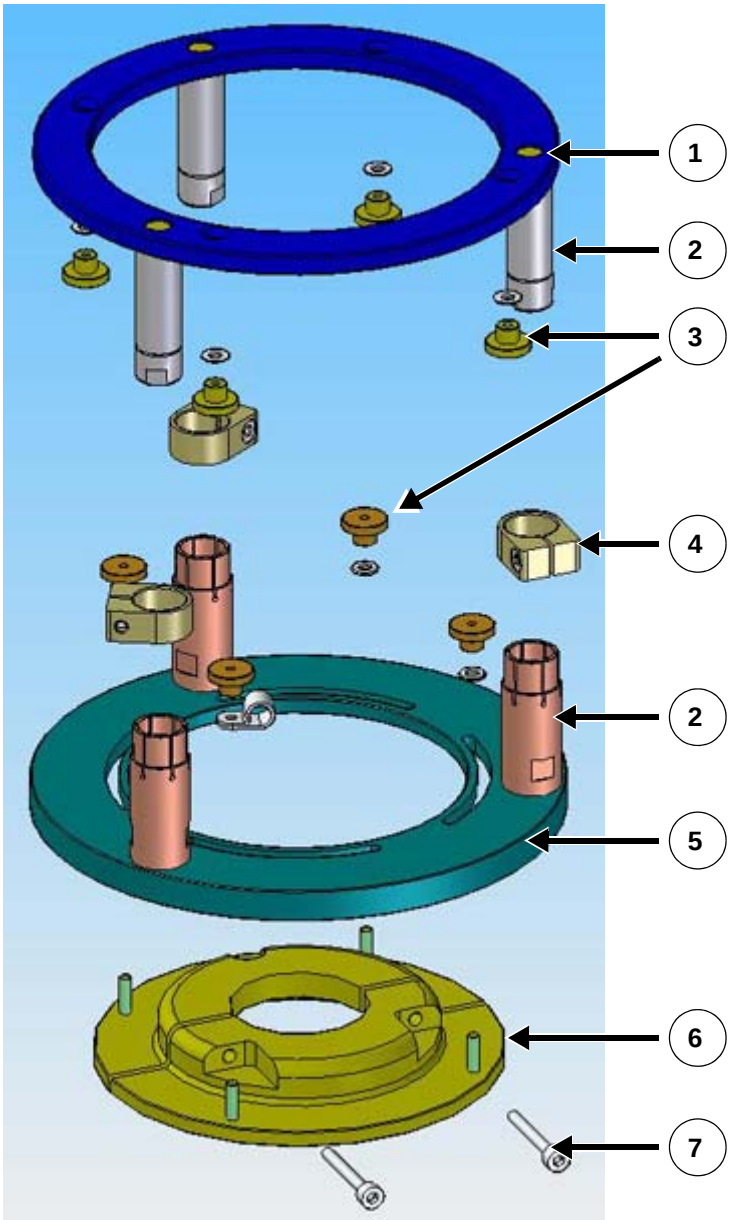
5.2.2 BST Clamping Ring with N2 Connector

If the BST clamping ring is equipped with a N2 connector, replace the straight connector with a 90° angular one, e.g. P/N 1804500 provided in the accessory case.

5.2.3 Mounting the Height & Level Adjustment Kit

Part Identification

Refer to the following figure for the location of the parts mentioned in this section.



1. Base Main Flange
2. Columns
3. Knurled Thumb Screw (with washer)
4. Clamping Bracket
5. Rotating Flange
6. Clamping Flange (2 halves)
7. Screws for Clamping Flange

Figure 5.5 Height & Level Adjustment Kit Parts

1. Measure the distance Z from the magnet top level to the BST upper level, or if mounted, to the top of the BST 50 mm elongation (P/N H121852, see "Checking the Functionality of the Drop-Off Plate" on page 32).

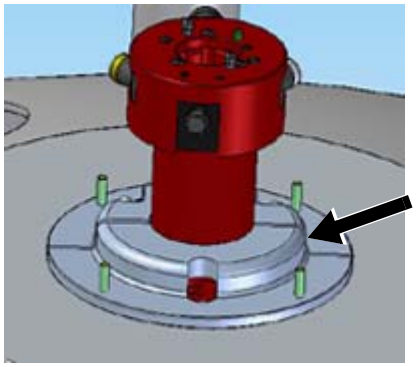
Without BST 50 mm Elongation **With BST 50 mm Elongation**

Figure 5.6 Measuring the Z-Distance for the Height & Level Adjustment Kit

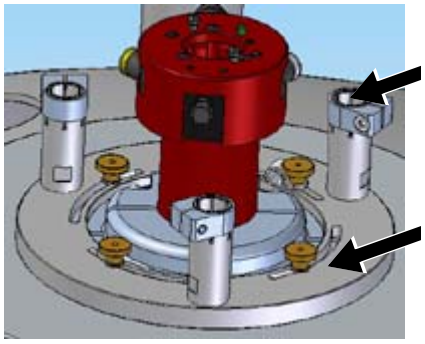
2. Select one of the following sets of height adjustment columns from the accessory case based on the Z distance obtained in the previous step:

   Short: Z range 56-77 mm
   Medium: Z range 74-112 mm
   Long: Z range 106-174 mm

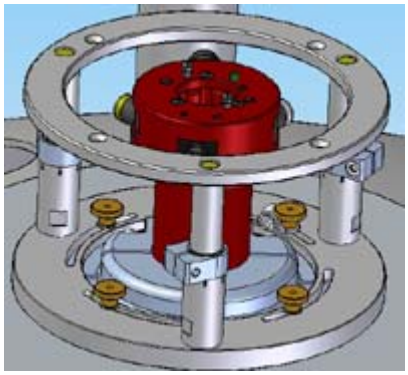
3. Mount the columns to the base main flange by screwing them onto the preset screws.



4. Place the clamping flange, which is split into two halves, onto the top of the magnet.
5. Tighten the 2 screws to clamp the flange.

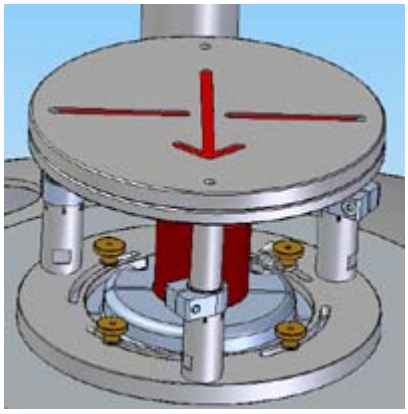


6. Place the rotating flange above the clamping flange. Insert the knurled thumb screws, but do not tighten them completely, to allow for rotation of the flange.
7. Place the 3 small clamping brackets onto the columns, but do not tighten them.



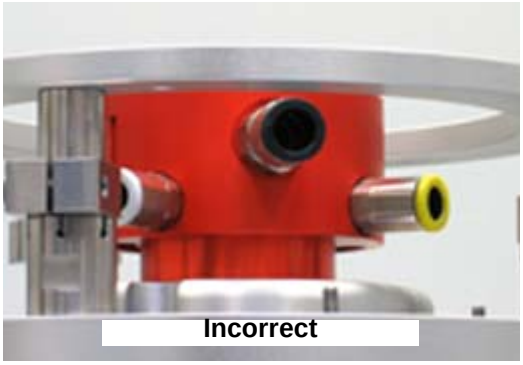
8. Insert the base main flange columns into the columns of the rotating flange.

   Tighten the clamping brackets slightly to where the base main flange can still move up and down within the columns.

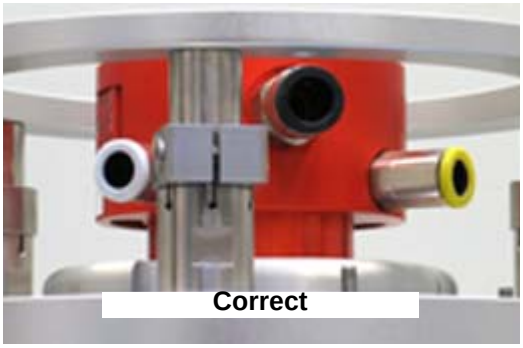


9. Place the level adjustment plate with arrow on the top of the base main flange and attach it using the 4 screws and nuts from the accessory case.
10. Rotate the whole unit in such a way that the arrow points toward the front of the magnet.
    - Do not place a column of the rotating flange in front of a pneumatic or electrical connector of the BST.
11. Move the base main flange columns up or down until the level adjustment plate is perfectly level on the top of the BST. Use a level gauge to check for level.

12. Tighten the clamping brackets on the columns.
13. Recheck the level and repeat step 11 if necessary.

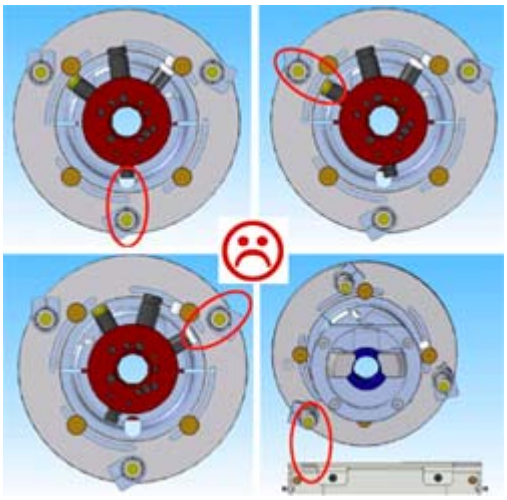


Incorrect



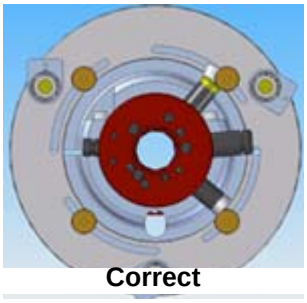
Correct

14. Align the rotating flange with the columns and base main flange so that no column is directly in front of the BST connectors or the Ethernet connector.
15. Tighten the 3 small clamping bracket screws and the 4 knurled thumb screws on the lower clamping flange.

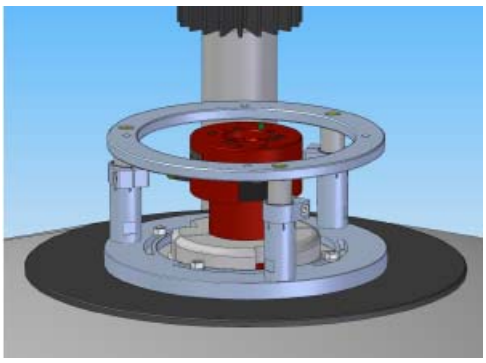


Note: If the knurled thumb screws collide with the columns, use the screw nuts provided in the accessory case (used for attaching the level adjustment plate temporarily) to attach the mounting kit.

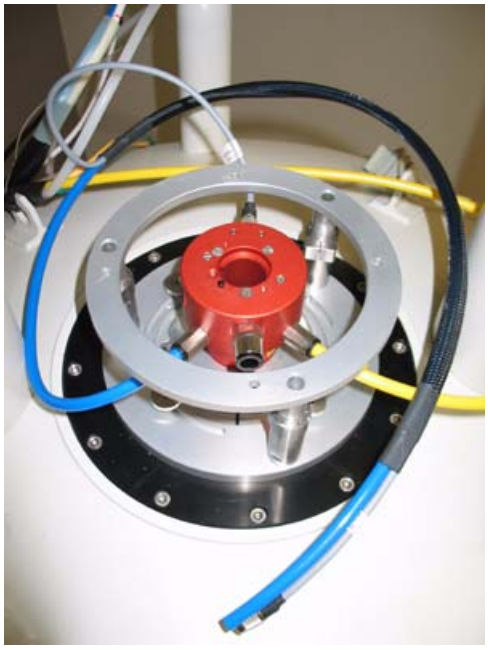
At least 3 of the 4 screws on the bottom and on the top must be mounted to attach the device properly.



Correct



16. Remove the level adjustment plate with arrow from the top of the base main flange.
17. Recheck all the screws for the Height & Level Adjustment Kit to see if they are properly tightened.

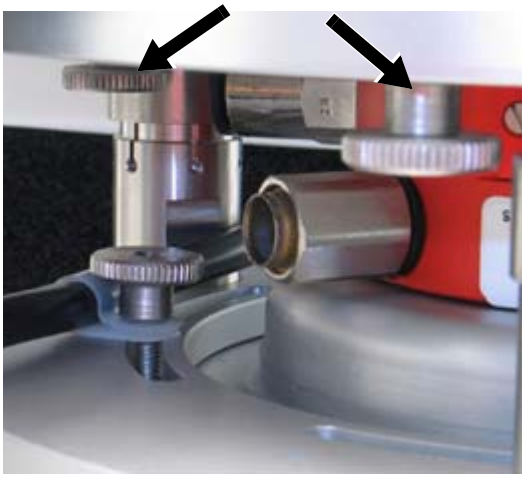


18. Connect the blue BST Interface Cable (P/N HZ16836) to the BST.
    - The 8 pin male connector from the cable is connected to the 8 pin female connector of the BST.
    - The pneumatic hose is connected to the white lift air inlet of the BST.
19. Reconnect the yellow hose to the yellow spin air inlet of the BST. Use the 90° angle pneumatic connectors from the accessory case if necessary.

    For details see "External Cable Connections" on page 41.

5.2.4 Mounting the SampleXpress Lite on the Height & Level Adjustment Unit

The SampleXpress Lite is delivered with the base plate and base unit completely assembled. However for some magnets, for example, those with a short distance between the helium towers, it might be necessary to remove the base unit from the base plate before the base plate can actually be mounted onto the magnet.



20. Place the base plate (with base unit if attached) onto the top of the base main flange.
21. Secure the base plate using the knurled thumb screws from the bottom side of the upper ring of the adjustment pillar unit.

5.3 External Cable Connections

The SampleXpress Lite consists of the following cable connections:

- Power Supply Cable
- Pneumatic Supply Hose
- Ethernet Cable
- RS232 cable
- BST Interface Cable
- Pneumatic BST Connection

The power supply cable, the ethernet cable and the pneumatic supply hose are delivered in one cable supply set, with two variations:

- P/N HZ16796 (length 7 meters), or,
- P/N HZ16797 (length 15 meters).

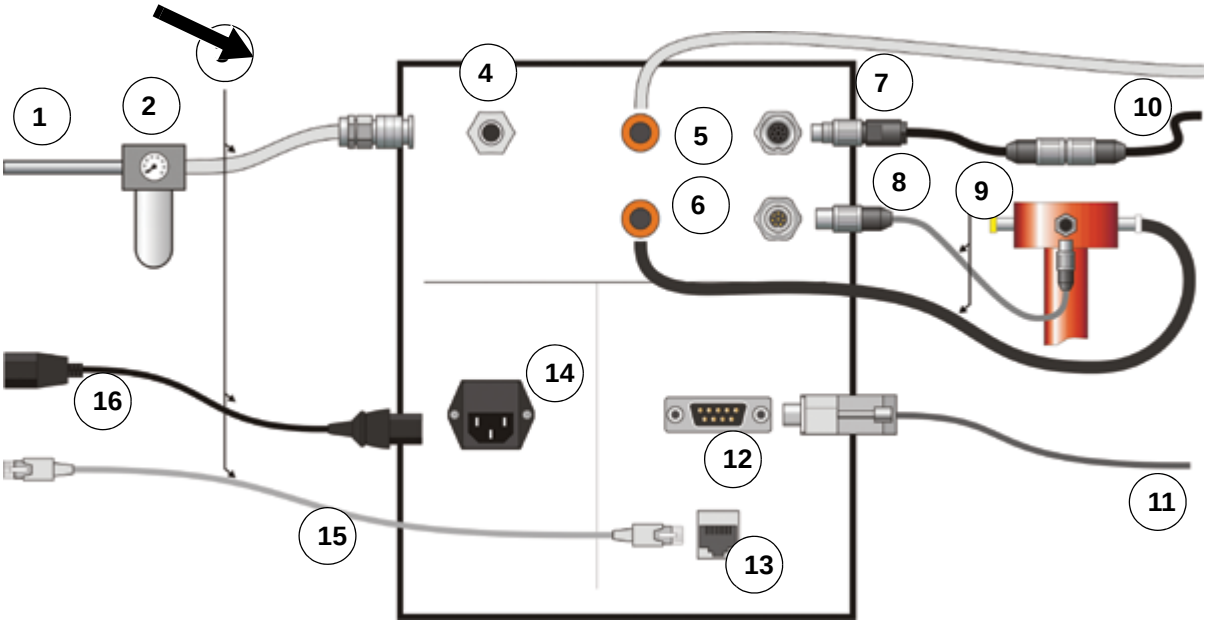
The length is the distance (vertical + horizontal) from the SampleXpress Lite to the console. The actual cable length is about 3-4 meters longer, which provides adequate length for the installation.

- The power supply cable must be connected to the power outlet of the console to avoid grounding short circulating which might lead to reduced spectra sensitivity.
- The pneumatic supply can be connected to a wall armature or taken from the console supply using the T-piece at the end of the pneumatic supply hose.

The SampleXpress Lite is connected to a free RS232 interface on the spectrometer. This provides 100% backwards compatible to the B-ACS.

The BST interface cable allows the SampleXpress Lite to directly detect the signals at the BST.

The pneumatic BST connection is used for the activation of the sample eject function in the BST.



1. Compressed Air / N2
2. Wall Armature with Filter
3. Supply Set 7m HZ16796
   Supply Set 15 m HZ1Z16797
4. Air Supply Inlet
5. Lift & BST from SLCB, BSMS
6. Lift & BST to BST
7. Cable P/N 1803543
8. BST Interface Set HZ16836
9. BST Interface Set HZ16836
10. To/from Spectrometer
11. Spectrometer CCU: TTY08
12. Communication Console RS232
13. Ethernet
14. Power Supply Mains
15. Ethernet Cable
16. Power Supply Power Control

Figure 5.7 External Cable Connections

Placing the Cables

1. Be sure that all cables are attached properly, e.g. with a cable tie.
2. To avoid obstruction, be sure that the cables are not placed above the drop-off plate.
3. Be sure that the power supply cable is attached using the clamp as shown in the picture below

Figure 5.8 Attaching the Power Cable

5.4 Starting the device

To start the SampleXpress Lite, press the button on the front of the unit. The SampleXpress Lite will start initialization after a few seconds.

5.5 Adjustments

After the SampleXpress Lite is operational, several adjustments must be made.

- "BACS Lift Configuration"
- "Sample Down Detection"
- "Sample Lift"
- "Sample Lift"
- "Sample at NMR Access Position Present"

5.5.1 BACS Lift Configuration

The spectrometer software doesn‘t recognize that a SampleXpress Lite is mounted above the BST, thus ejecting a sample may cause it to break when the carousel is positioned directly above the BST (the NMR access position) and the position is already occupied.

Likewise, configuring the lift control by the BSMS will create an error message when starting an ICON-NMR run.

To avoid this, the sample changer must control the lift operation:

1. Execute the spectrometer software **cf** command and answer the question “Should the Sample Changer control the lift” with “**Yes**”.

➨ This will set the lift control to “BACS lift” and as a result the SampleXpress Lite will simulate a mounted overpressure cap on top of the BST. This avoids starting the eject air at the BSMS and triggers the error message “Lid is closed”.

5.5.2 Sample Down Detection

The SampleXpress Lite is equipped with an internal sample down detection mechanism, that must be activated:

1. Go to the Service Page “Misc” and select “Auto”.

5.5.3 Sample Lift

The sample lift is adjusted using the lift adjustment screw on the left rear side of the SampleXpress Lite base unit. This adjustment screw opens/closes a needle valve inside the base unit and reduces the air flow to the BST.

When a sample is lifted, the “Sample Hovering Sensor” (see "Sample Hovering Sensor" on page 55) should find the sample hovering slightly lifted above the top of the carousel. If this is not the case, open the valve until the sample is lifted as described.

Check the lift adjustment by ejecting a sample. It should rise with a moderate speed, and not shoot out of the BST and brake hard at the sample stop fork above the carousel.

Important: The lift adjustment is only valid for a single sample weight!

When using different spinners (plastic & ceramic) or samples (7 inch tubes, heavy tubes with polymers inside, long samples i.e. with J.Young valve) you may need to make a new adjustment for each sample weight.

5.5.3.1 How to Perform the Sample Lift Adjustment

Note: Make sure that there is no sample in the magnet!

1. Insert a dummy sample (see accessory case) into position 1 of the carousel.
2. Close the lift adjust needle valve by turning it clockwise.
3. Enter SX_1 in TopSpin.

➨ Wait until the dummy sample is inserted.

4. Enter SX_EJ in TopSpin.
5. Open the needle valve until the sample comes up smoothly and is detected optimally by the sample hovering sensor.

➨ The basic adjustment is finished, proceed with the fine adjustment.

Fine Adjustment

6. Replace the dummy sample in position 1 with a real sample.
7. Repeat steps 3-5 until the sample is transported optimally.

5.5.4 Sample at NMR Access Position Present

Normally, this sensor is adjusted at the factory. Change the adjustment only if necessary, e.g. samples are not detected even if they are present (or vice versa). The orange LED at the sensor should only be active when a sample is available in the carousel magazine position directly beneath the sensor.

Figure 5.9 Reflex Sensor at the NMR Access Position

Be aware that the sensor is mounted in the other direction than on the SampleXpress.

Adjusting the pivot of the sensor.

1. Loosen the 2 screws slightly that hold the sensor in place.
2. Rotate the sensor down to the end of the long hole.
3. Rotate the sensor upwards and observe the display.
4. Rotate it up until the display shows 999 (or the maximum value that can be achieved).
5. Tighten the 2 sensor screws in this position.

Adjusting the light intensity threshold

To adjust the threshold, the blue plastic spinners (part number Z42516) are ideally suited.

When a blue plastic spinner is available:

1. Without a sample in place, press the “SET” button.
2. With a sample in the magazine, press the “SET” button once again. The threshold will blink in the display 3 times. It should show a value above 850.

If you do not have a blue plastic spinner:

1. Set the threshold to a value of approximately 100 below the value displayed without a spinner, by using the up/down arrows at the sensor.

Checking the adjustment

1. When no sample is present in the magazine, the green LED must be active and the orange LED must be off.
2. With a sample is present in the magazine, both the green and orange LED must be active.

5.6 Installation Acceptance

After completing the installation and adjustment fill out the rest of the Installation Acceptance Form and sign it together with the customer.

The Installation Acceptance Form is available in the Appendix "SampleXpress Lite Installation Acceptance Form" on page 119.

6 Principles of Operation

6.1 Main Components

The main components of the SampleXpress Lite consist of:

1. Status Light
2. NMR Access Position
3. Carousel
4. ON/OFF Button
5. Carousel Base
6. Base Plate
7. Base Unit
8. Connection Panel

Figure 6.1 SampleXpress Lite Main Components

6.2 Unit Description

6.2.1 Base Plate

The base plate is mounted on top of the magnet and holds all the other components.

6.2.2 Base Unit

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

1. Base Unit
2. Carousel Base

Figure 6.2 Base Unit and Carousel Base Mounted on Base Plate

6.2.3 Pneumatic Cylinders

All actuators, except the motor driving the carousel, are pneumatic cylinders. All cylinders are single acting, which means, they will return to their home position when no electrical power is present or the air supply is insufficient. The home position for each pneumatic cylinder component is different:

- **Carousel Block**: Inactive. The carousel can be moved manually.
- **Sample release lever**: Inactive. The sample release lever in the carousel position is not activated, it is pressed to its home position by the internal spring.

6.2.4 Carousel Motor

The SampleXpress Lite uses an electric DC motor to drive the carousel. To minimize influence on the NMR measurement, the motor is mounted with special vibration damping parts.

Figure 6.3 Carousel Chain Motor

6.2.5 Carousel Base

The carousel base contains:

- A gear box which drives the carousel disk.
- Electronics with 2 light barriers and a disk with holes which detects which position is above the magnet (NMR access position).
- The ON/OFF button.
- Wheels which hold the carousel in place.

6.2.6 Carousel Block

The carousel block is driven by a pneumatic cylinder placed in the base unit. The pneumatic cylinder fits into the opening in the carousel.

Carousel Block Inactive **Carousel Block Active**

Figure 6.4 Carousel Block

Another function of the carousel block is to mechanically lock the carousel chain. When a sample position is positioned in proximity of the NMR access position above the BST, the carousel contains a lot of deliberate play which makes it easier for the unit to align on the correct position. When the carousel is stopped near the correct position, the carousel block is activated and fixes it in the precise NMR access position required above the BST.

6.2.7 Carousel

The removable carousel has a capacity of 16 samples, which can be filled individually, or can be removed from the carousel base and all the carousel positions can be filled at once. To ease the loading/unloading of samples from the sample position pool, the carousel can be placed on a desk or table.

6.2.8 Sample Release Lever

Each carousel position has its own sample release lever to hold the sample in place. This lever is pressed to its home position by a spring which is placed inside each carousel position. Each carousel position has a small hole, into which the sample release rod fits. When the carousel is positioned above the BST, the sample release rod is led through the opening in the carousel and thus releases the sample. The sample falls through the carousel into the magnet.

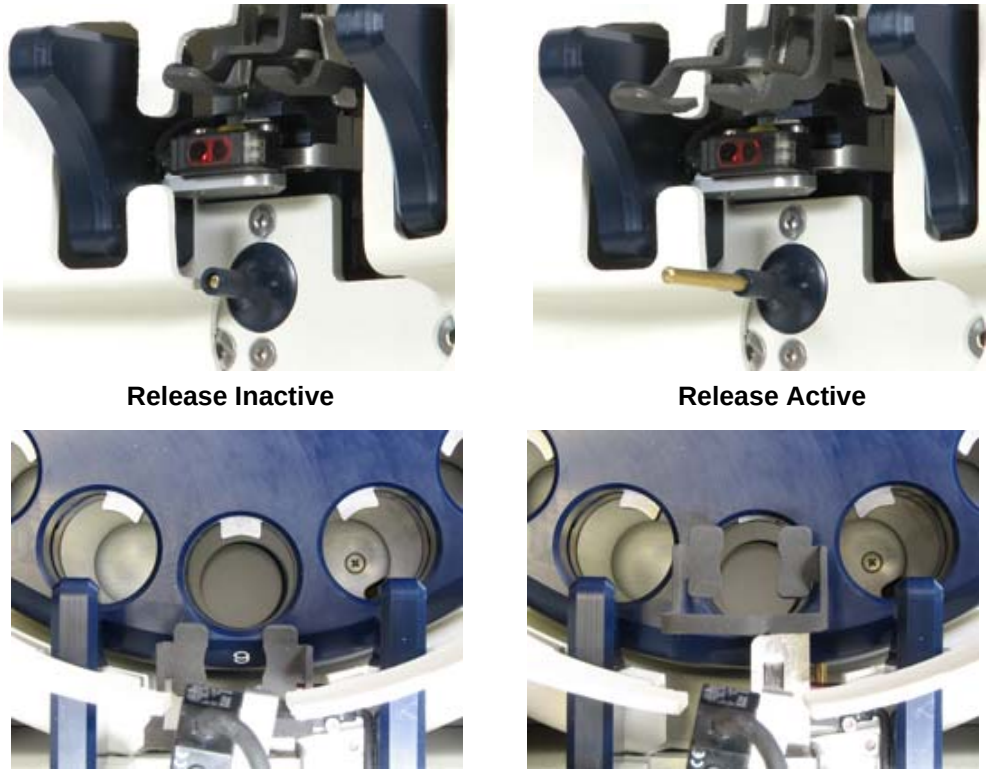


Figure 6.5 Sample Release Lever

6.2.9 Sample Brake

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

Figure 6.6 Sample Brake

6.3 Sensors

Every actor has at least one sensor to detect the state of the actor.

6.3.1 Detecting the Carousel

Sensors for detecting the carousel are placed in the carousel base. These sensors are microswitches which detect if a carousel is available.

Figure 6.7 Sensors for Detecting the Carousel

6.3.2 Pneumatic Cylinders End Position Microswitches

6.3.2.1 General Information

All pneumatic cylinders have microswitches on both end positions:

- One for an inactive position (without air supply or without electrical supply), and,
- One for the active position (with air and electrical supply).

Using these microswitches, the current state of all pneumatic actors can be monitored.

Figure 6.8 Pneumatic Cylinder End Position Microswitches

The switch on the left side of a pneumatic cylinder is for the „active“ state, the switch on the right side is for the “inactive” state.

The state of each of the end position microswitches are indicated on the base main board by an LED next to each connector. If the sensors recognizes an active actor state, the green LED lights; if the sensors recognizes an inactive actor state, the blue LED lights.

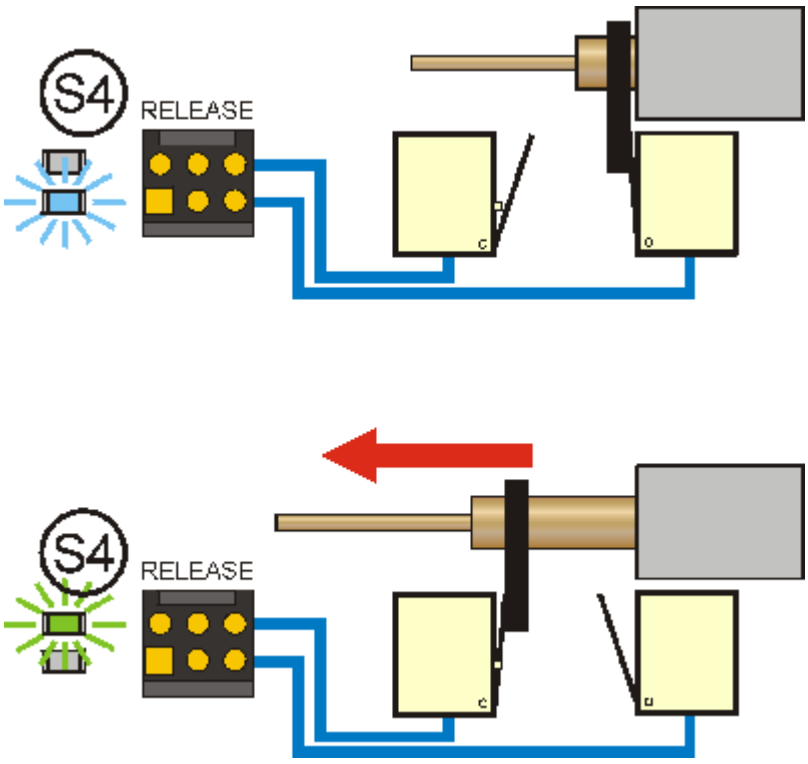


Figure 6.9 Microswitch Sensor States

By using these 2 microswitches the following 4 states can be indicated through the software:

Left Switch	Right Switch	LED	State	Remark
Pressed	Not pressed	Top LED: Green	Active/On	Control valve is on
Not pressed	Not pressed	None	Undefined	Cylinder is moving
Not pressed	Pressed	Bottom LED: Blue or Green	Inactive/Off	Control valve is off
Pressed	Pressed	Both	Error	mechanically not possible damage has occurred!

Table 6.1 Microswitch States

The state of each pair of microswitches is also display on the service pages.

6.3.3 Carousel Positioning Sensors

In the carousel base (double bottom below the carousel) are two fork light barriers which point to a disc containing a long hole.

When the conveyor chain moves, these 2 sensors create the following signals which can be observed on 2 LED‘s mounted on the electronic board inside the carousel:

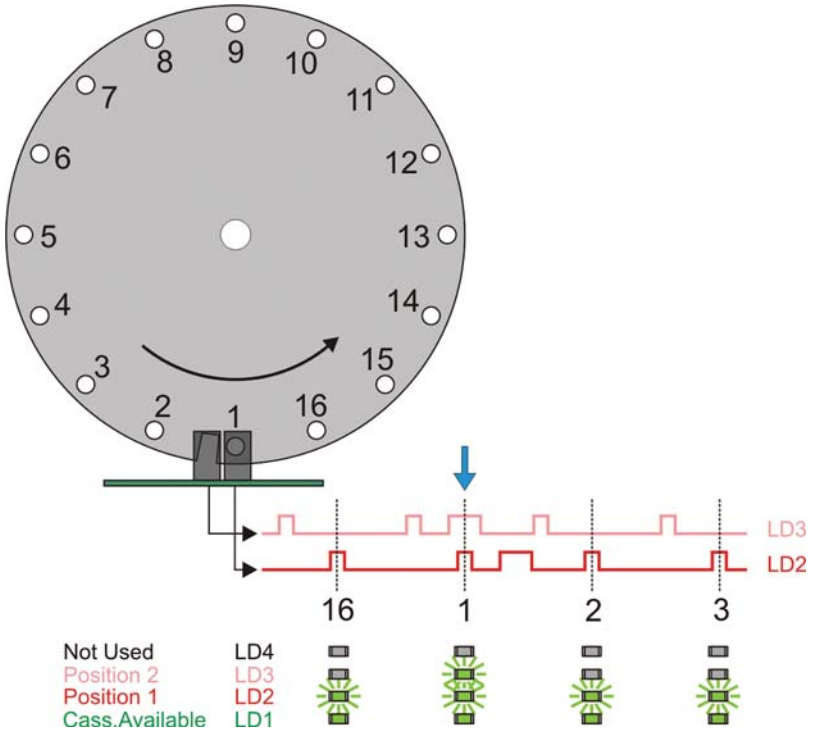


Figure 6.10 Signals Created During Carousel Motion

If light barrier 1 sees the hole in the disc, a carousel position is positioned near the NMR access position with a tolerance of about ± 2 mm. This position is then close enough enough for the movable guide half shell to pull the chain link directly above the BST.

Light barrier 2 is used to detect if position #1 is above (in combination with light barrier 1) the NMR access position.

6.3.4 Sample Hovering Sensor

Whenever a sample is ejected from the magnet, it must be detected by the sample hovering sensor before the sample release cylinder is deactivated (this avoids unintended blockage of the sample on its way up back into the carousel position).

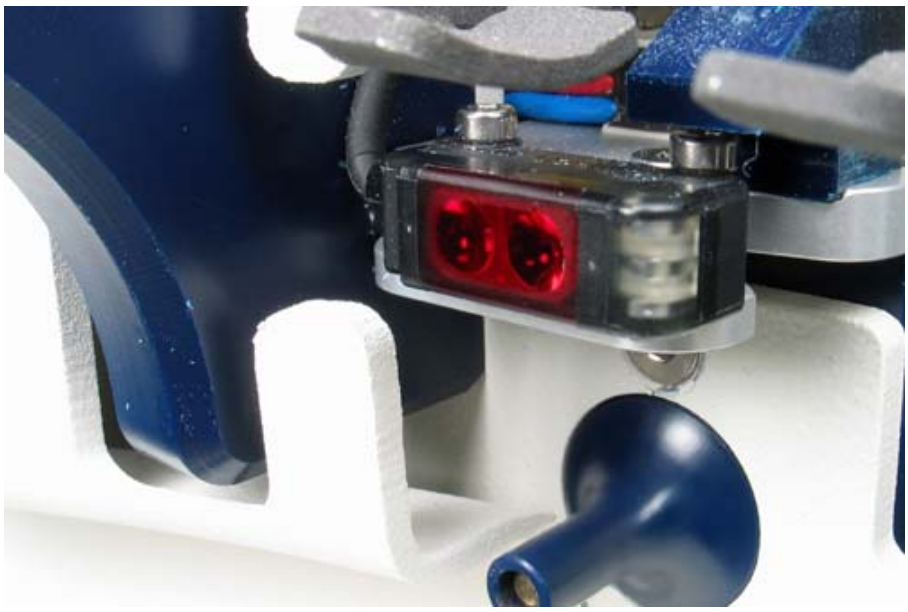


Figure 6.11 Sample Hovering Sensor

6.4 Pneumatics

The pneumatics are placed on the left of the base unit. They contain an overpressure valve which will be activated to prevent the pneumatic valves from being damaged if the incoming air supply pressure is above 7 bar.

A pressure regulator establishes the main supply air pressure for the SampleXpress Lite and the current pressure level is indicated on a pressure gauge.

The SampleXpress Lite uses 3 electro-pneumatic valves:

- Lift Control
- Sample Release Lever
- Carousel Block

All pneumatic parts are located on a so called pneumatic chip, which can be found on the rear on the left side of the SampleXpress Lite base unit. This is a highly integrated pneumatic circuit.

The 4 electro-pneumatic valves will be discussed in detail in the following sections.

The following is a wiring diagram of the pneumatic chip with its environmental pneumatic cylinders:

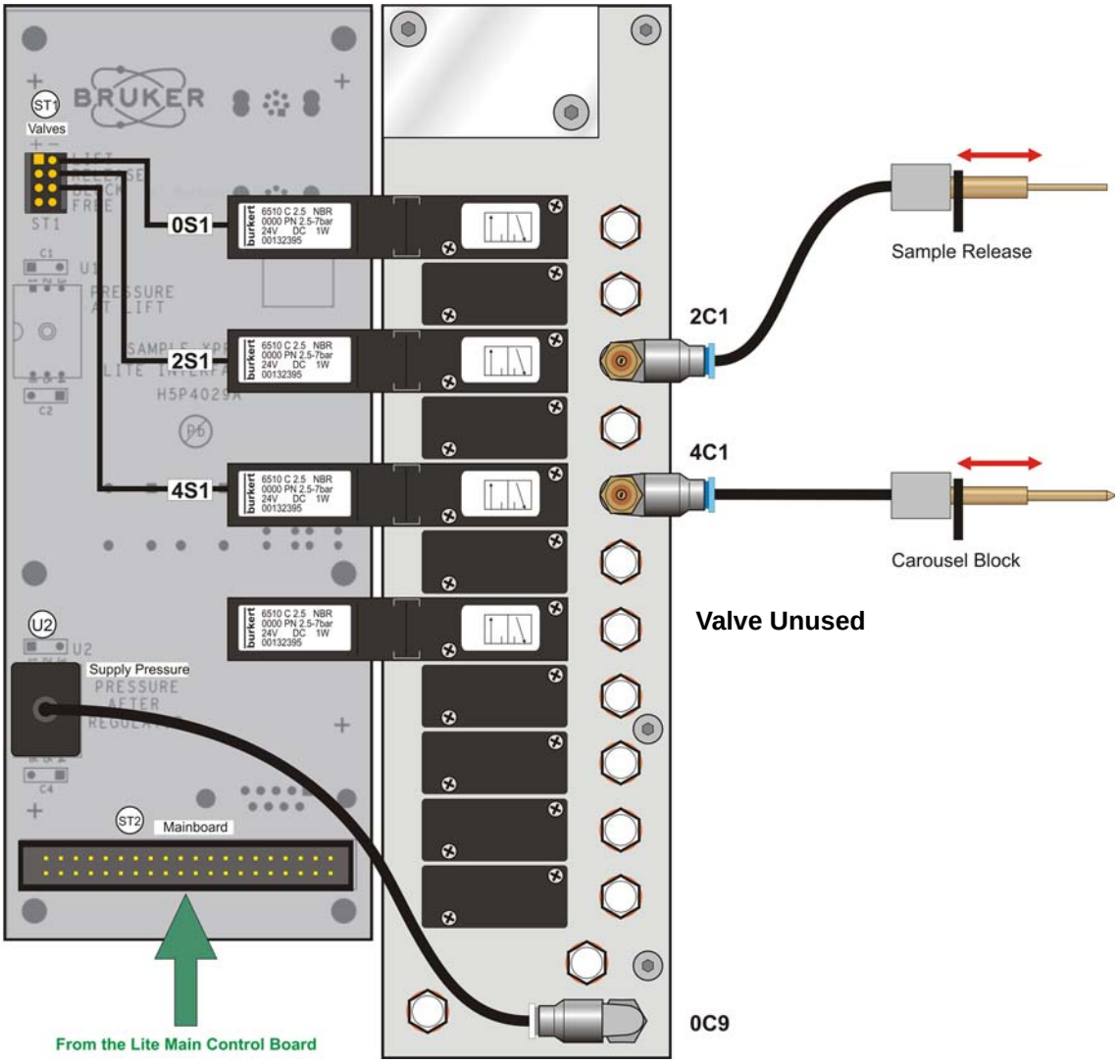


Figure 6.12 Wiring Diagram of the Pneumatic Chip

Figure 6.13 Pneumatic Chip (top)

Figure 6.14 Pneumatic Chip (bottom)

As a future option for high frequency magnet systems with strong magnetic fields, the electro-pneumatic valves may be replaced with Piezo valves, which are not affected by magnetic fields.

6.4.1 Lift Control

The sample lift in the BST can be controlled either by the SampleXpress Lite or the SLCB/BSMS unit. For lift control, the air supply supplied by the main air supply line is unlimited, i.e. is not reduced by a pressure limiter. An internal needle valve is used to limit the air supply for adjusting the speed for ejecting sample from the magnet.

The lift air of the SampleXpress Lite is logically “OR”ed with the lift air of the SLCB. Thus, it must be configured which of these units controls the sample lift (see "BACS Lift Configuration" on page 42).

The spectrometer software does not recognize that a SampleXpress Lite is mounted above the BST, thus ejecting a sample may cause it to break when placed in the carousel position directly above the BST.

Likewise, configuring the lift control by the BSMS will create an error message when starting an ICON-NMR run.

To avoid this, the sample changer must control the lift operation:

1. Execute the spectrometer software **cf** command and answer the question “Should the Sample Changer control the lift” with “**Yes**”.

- This will set the lift control to “BACS lift” and as a result the SampleXpress Lite will simulate a mounted overpressure cap on top of the BST. This avoids starting the eject air at the BSMS and triggers the error message “Lid is closed”.

To adjust the lift air needle valve, see "Sample Lift" on page 43.

6.4.2 Pressure Adjustment

The pneumatic chip contains a pressure limiter and a corresponding pressure gauge. The normal adjustment is 4 bar, which is the nominal pressure where all cylinders should work correctly. Do not change this adjustment unnecessarily!

6.4.3 Sample Release Lever

This valve's working output is connected directly to the single-acting pneumatic cylinder for activating the sample release lever.

The motion speed of the cylinder can be adjusted by a small needle valve on the pneumatic chip.

6.4.4 Carousel Block

This valve's working output is connected directly to the single-acting pneumatic cylinder for activating the carousel block rod.

6.5 Electronic Boards & Controller

6.5.1 Electronic Boards

The SampleXpress Lite uses 4 electronic boards:

- Main Control Board
- WinCE Main Controller
- The Interface Board
- The Carousel Board

6.5.1.1 Main Control Board

This electronic board is located behind the front plate of the base unit, and:

- creates the +5V board supply voltage and the standby voltage
- monitors the main power switch at the front of the SampleXpress Lite
- provides connectors for all pneumatic cylinder end position microswitches
- provides connectors for the optical sensors at the NMR access position
- controls the carousel motor speed and torque
- provides connectors to the carousel base board
- provides all interface circuits for the interfaces provided on the interface board (RS232 communication, BST interface, 7-segment display, and valve control for the pneumatic chip next to the interface board).

Figure 6.15 Main Control Board

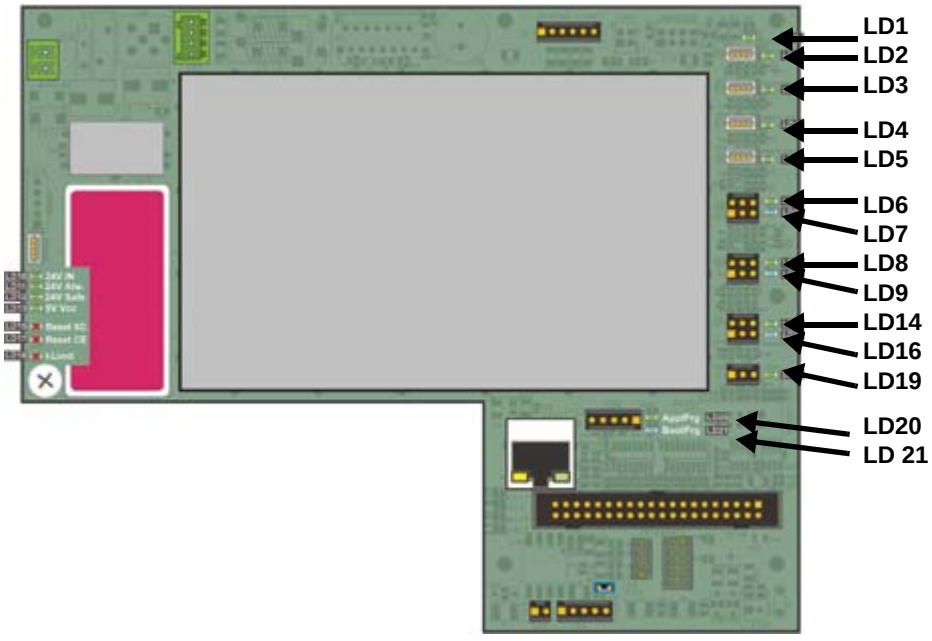
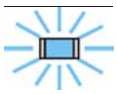
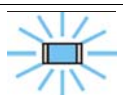
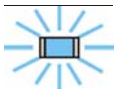
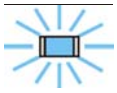
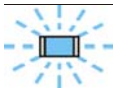
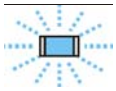


Figure 6.16 Main Control Board LED Status

The normal operation status is displayed in **BOLD**.

LD1 Sensor Power		**ON: Sensors are ON.**
		OFF: Sensors are OFF.
LD2 Sample at BSR		**Not used in standard configuration.**
		Not used.
LD3 Hovering		**ON: Ejected sample detected.**
		OFF: Sample not hovering.
LD4 Sample at BST		**ON: Sample detected at NMR access position.**
		OFF: No sample detected at NMR access position.
LD5 Sample Down		Not used in standard configuration.
		Not used in standard configuration.
LD6 Nozzle		Not used in standard configuration.
		Not used in standard configuration.
LD7 Nozzle		Not used in standard configuration.
		Not used in standard configuration.
LD8 Sample Release		ON: Sample release lever active.
		
LD9 Sample Release		Sample release lever inactive.
		

LD14 Carousel Block		Carousel block active.
		
LD16 Carousel Block		Carousel block inactive.
		
LD19 Free		Not used.
		
LD20 Appl.Prg		**Application program started.**
		Application program didn't start.
LD21 Boot Prg		Illuminates: Boot program is running.
		**Slowly blinks: Application program is running, CAN Bus is OK.**
		Quickly blinks (twice a second): CAN error.
		Boot program is not running.

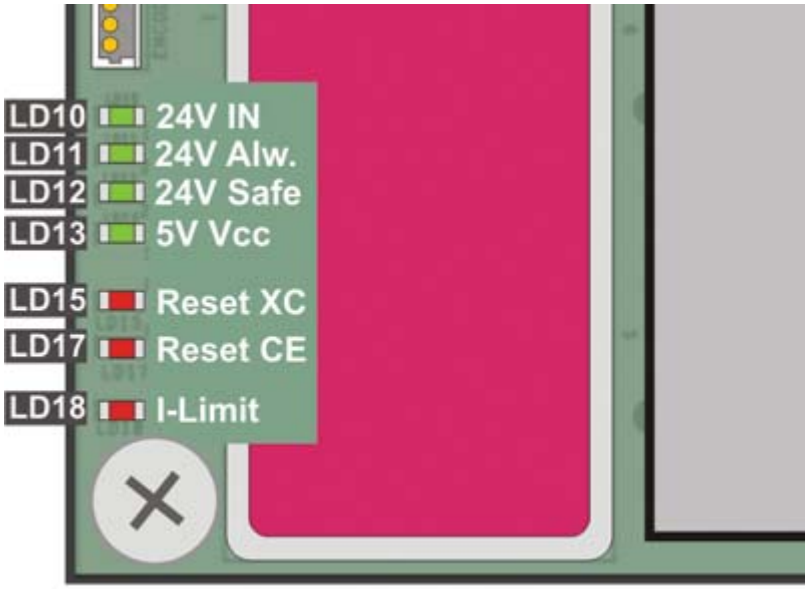


Figure 6.17 Main Control Board LED Supply

LD10 24V IN		24V Input ON.
		24V Input OFF.
LD11 24V Alw.		24V Always ON (SampleXpress Lite switched ON).
		24V Always OFF (SampleXpress Lite switched OFF).
LD12 24V Safe		24V Safe ON (power supply for valves and motor).
		24V Safe OFF (power supply for valves and motor).
LD13 5V Vcc		5V for micro-controller and logic ON.
		5V for micro-controller and logic OFF.
LD15 Reset XC		XC Reset (Vcc < 4.5 V, Vcore < 2.4 V)
		No Reset or no power supply.

LD17 Reset CE		Win CE or main controller module reset.
		
LD18 I-Limit		Motor current is limited.
		

6.5.1.2 WinCE Main Controller

This controller is placed on the main control board and controls and monitors all the actions the SampleXpress Lite is carrying out.

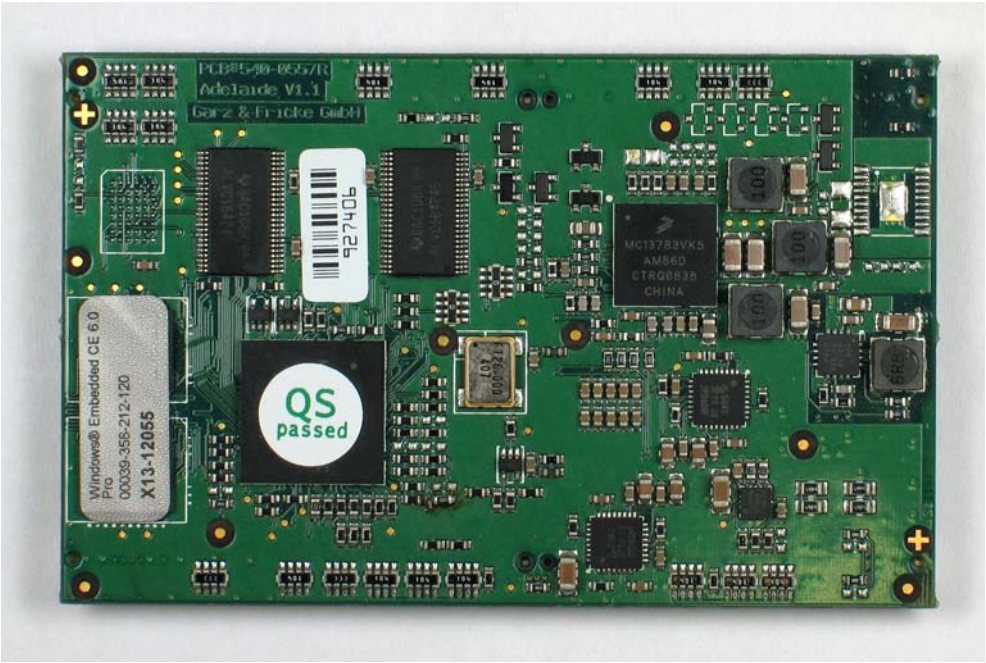


Figure 6.18 WinCE Main Controller

6.5.1.3 Interface Board

This board has no controller and routes all external signals from the main control board to the peripherals.

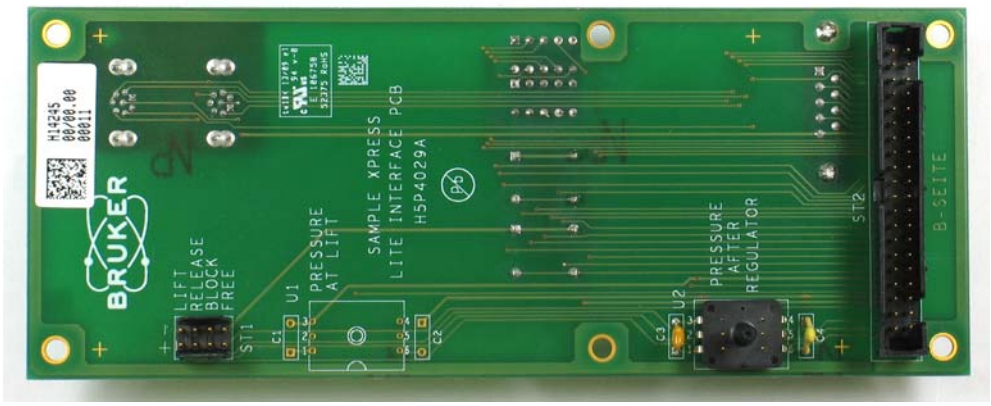


Figure 6.19 Interface Board (back)

Figure 6.20 Interface Board (front)

6.5.1.4 Carousel Base Board

This board does not have a micro-controller, rather has some fork light barriers and provides connectors to the carousel available sensor. It is designed as a “slave” board to the main control board.

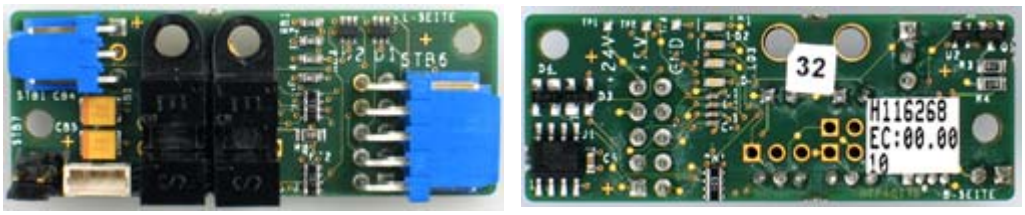


Figure 6.21 Carousel Board

6.5.1.5 Status Light Board

This is also a “slave” board to the main control board. It consists of rows of LED‘s with 4 different colors: red, green, white and blue. Using these 4 colors, all necessary status light information can be displayed.

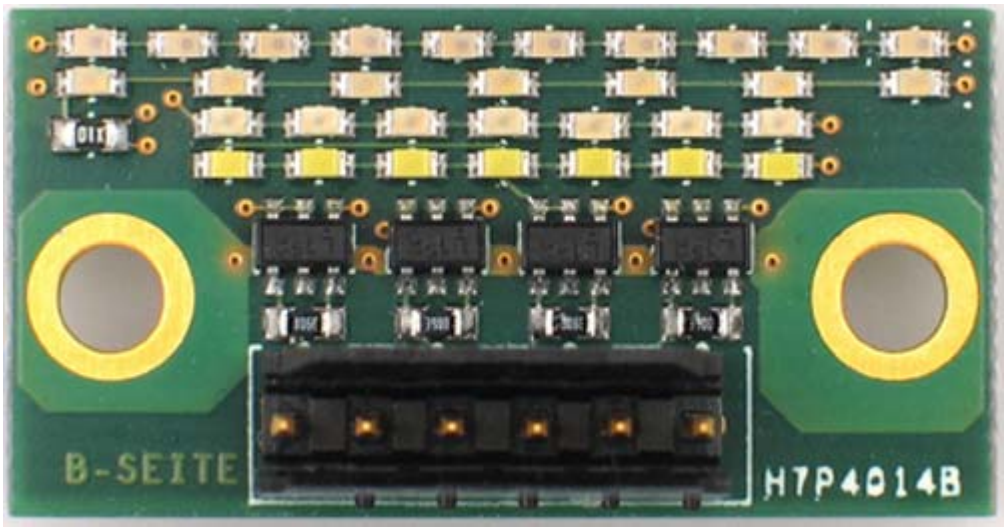


Figure 6.22 Status Light Board

6.6 Standby and Power Supply

The SampleXpress Lite is supplied by a 230/115V supply from a wall socket. The following power supplies are generated on the main control board.

- Standby Voltage
- Board Supply
- 24 V Always/24 V Safe

6.6.1 Power Button

When the power button is pressed, a flip flop is toggled enabling power to be supplied to all other internal components.

When the power button is pressed after the initial power on, the circuit will prohibit shutting down the system. Instead, a signal is transferred to the WinCE main computer indicating the user wants to shut down the SampleXpress Lite.

The WinCE will then determine if it is safe to shut the system down, e.g. if a sample is in route.

When the power button is pressed more than about 5 seconds without any interruption, the SampleXpress Lite will shut down immediately.

6.6.2 Standby Voltage

The +5V standby supply voltage is galvanically isolated from all other +5V supplies, so is also used for powering circuits which are connected to the spectrometer, including the galvanically isolated RS232 to the spectrometer CCU and the sample down detection circuit.

6.6.3 Board Supply

All electronic boards in the base unit need a +5V supply, e.g. for the micro-controller and other integrated circuits on the boards. This +5V supply is only used inside the SampleXpress Lite, not externally. Every supply voltage leading outside the SampleXpress Lite is galvanically isolated from this supply to reduce electromagnetic interference (EMI).

7 Internal Connections

7.1 Overview

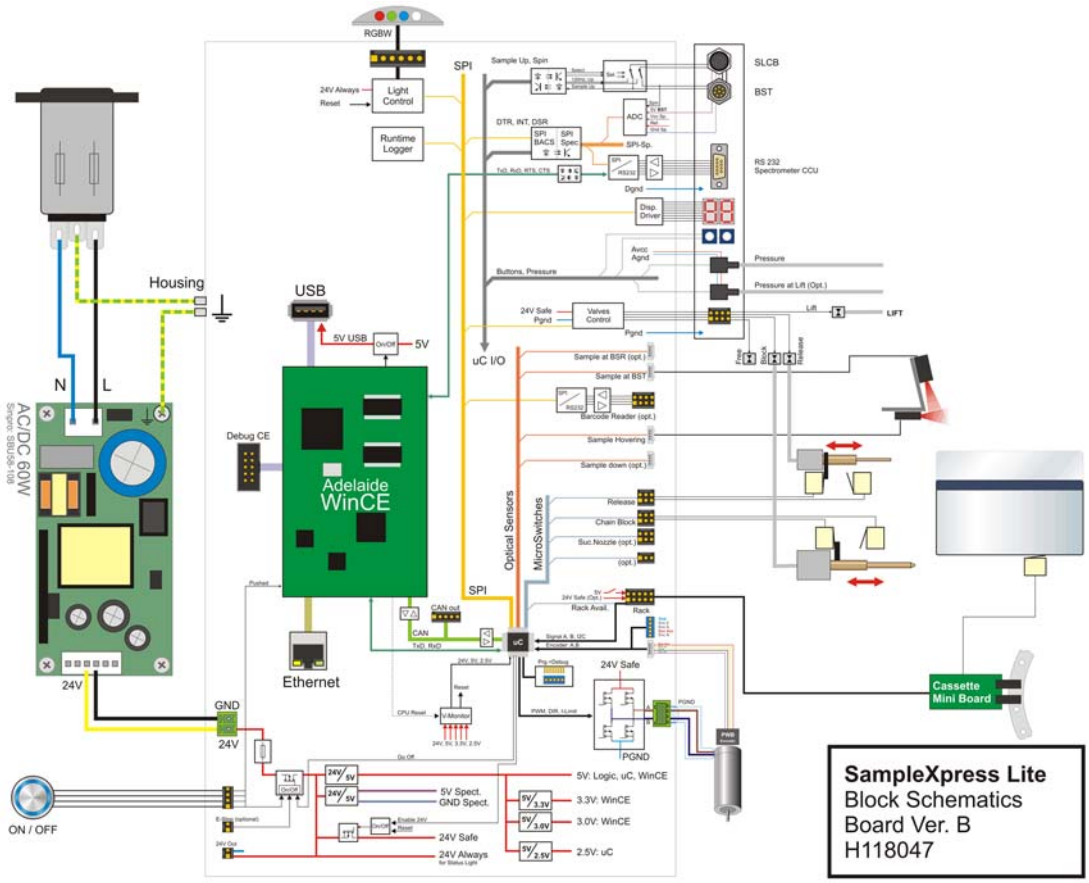


Figure 7.1 Connection Overview

7.2 Pneumatic Cylinder to the Pneumatic Chip Wiring

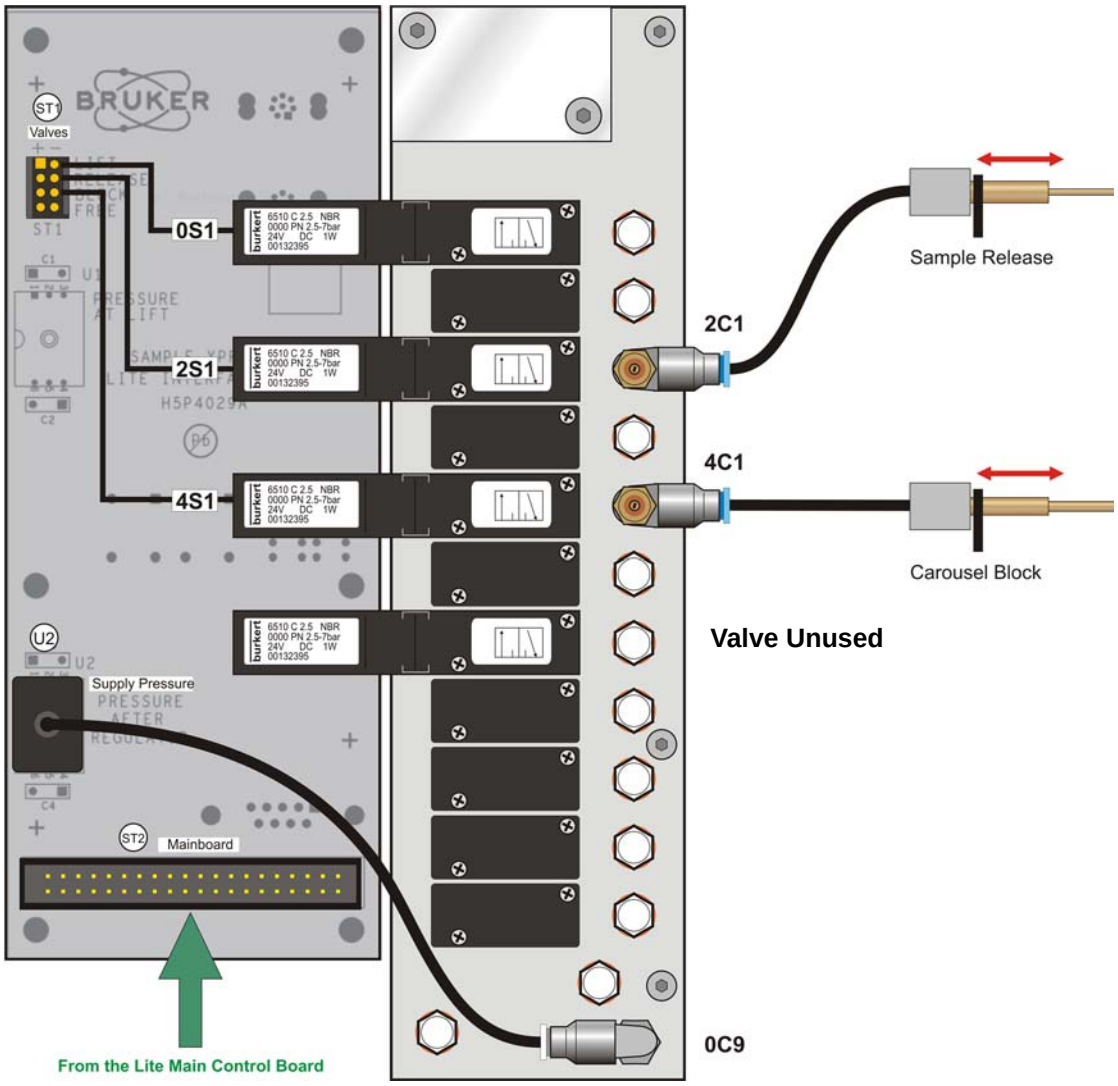
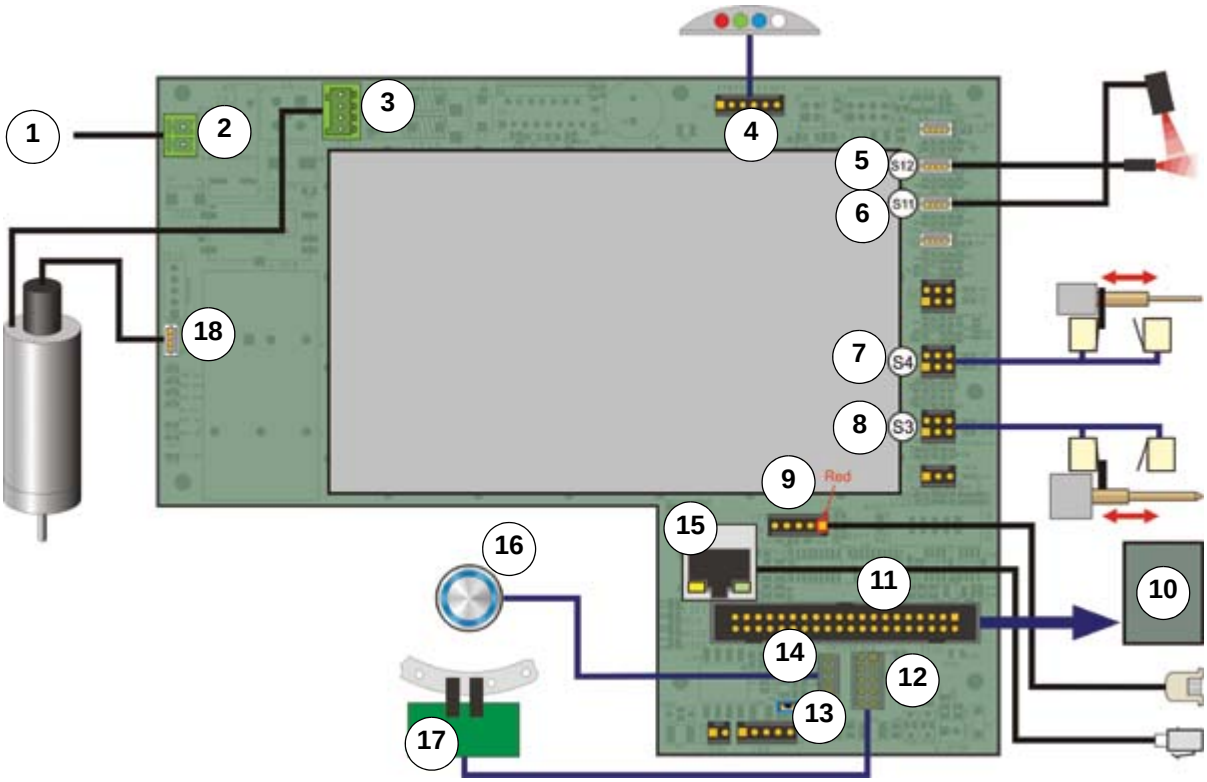


Figure 7.2 Wiring from the Pneumatic Cylinders to the Pneumatic Chip

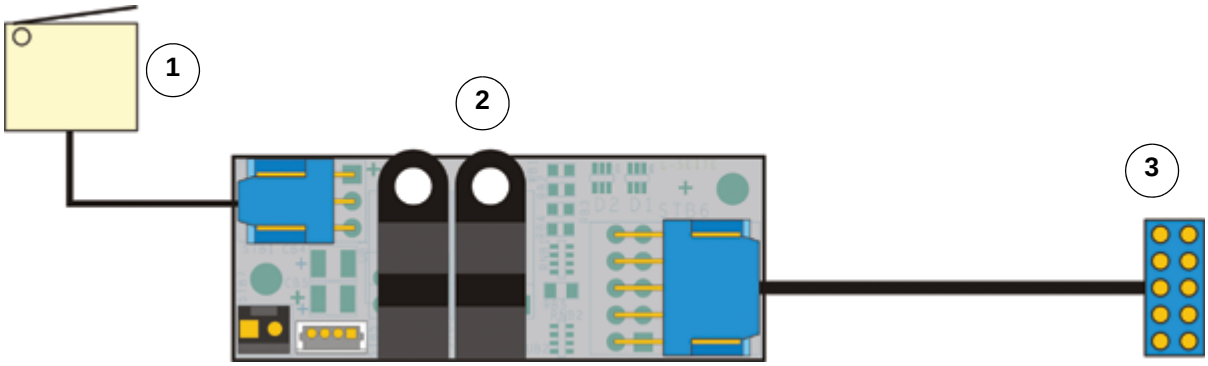
7.3 Sensor Wiring on the Base Main Board



1. To Power Supply 24V
2. Power Supply
3. Motor
4. Status Light
5. Hovering
6. Sample BST (NMR access position)
7. Release
8. Carousel Block
9. USB
10. Interface Board
11. Interface Board Connector
12. Carousel BaseBoard Connector
13. CAN Termination
14. Button
15. Ethernet
16. ON/OFF Button
17. Carousel Base Board
18. Motor Encoder

Figure 7.3 Sensor Wiring on the Base Main Board

7.4 Carousel Board Wiring



1. Carousel available sensor
2. Carousel position fork light barrier sensors
3. Connection to the main control board

Figure 7.4 carousel Board Wiring

7.5 Status Light Board Wiring

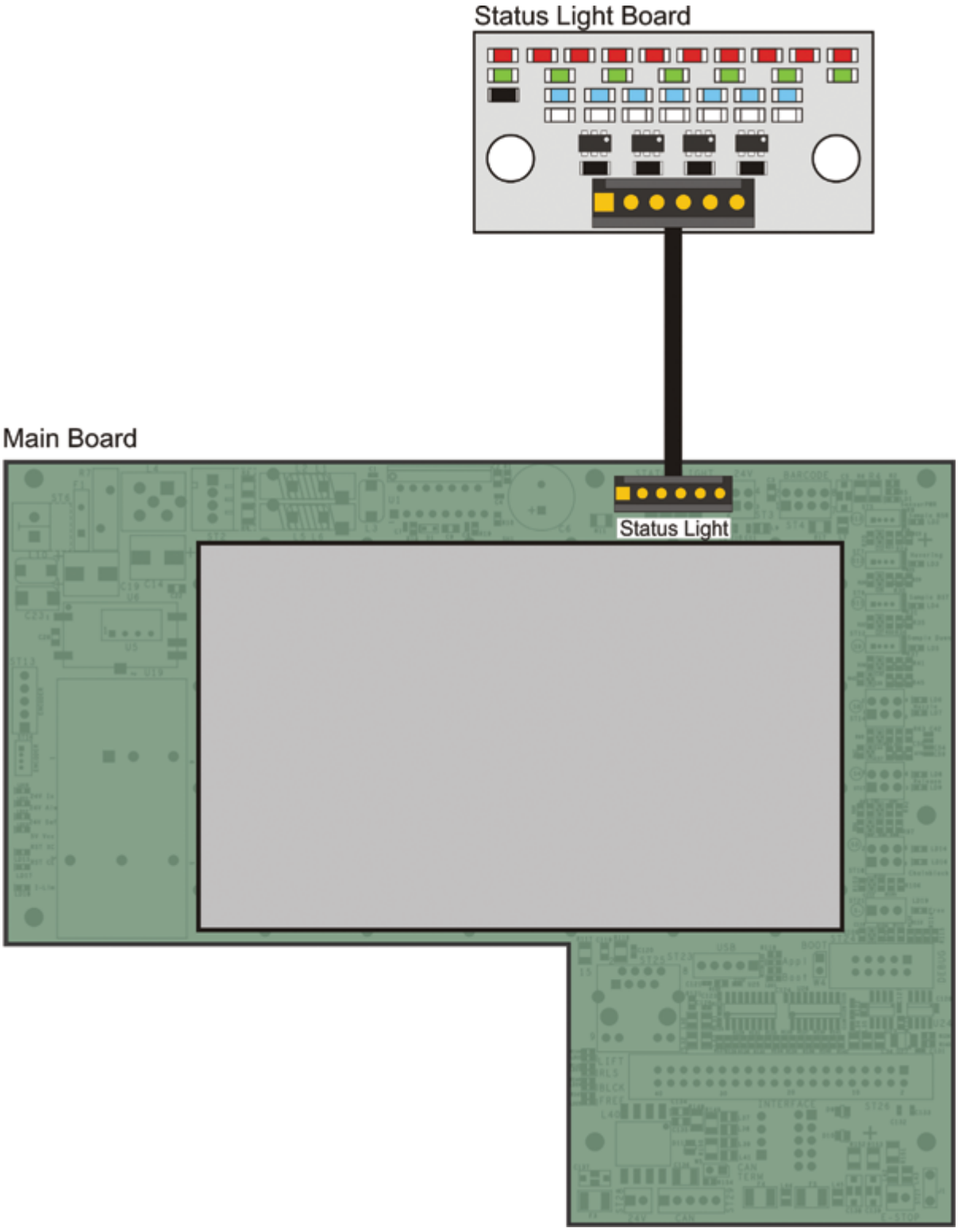


Figure 7.5 Status Light Board Wiring

Internal Connections

8 Interfaces

All air and electrical supplies, as well as all electrical interfaces, are arranged on the rear left hand side of the SampleXpress Lite base unit. These interfaces are described in the following sections.

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

Figure 8.1 Base Unit Right Side Electrical Connections

8.1 Electrical Supply

The electrical mains supply of the SampleXpress Lite is clearly marked with the text “Mains”.

1. Lift Adjustment Knob
2. BST Interface Cable from SLCB BSMS
3. BST Interface Cable to BST
4. Gas Interrupt (future feature)
5. Status and Control
6. Console RS232
7. USB
8. Ethernet
9. Overpressure Exhaust
10. Air Supply Inlet
11. Air Supply Adjustment Knob
12. Pressure Gauge

Figure 8.2 Base Unit Left Side Connections

8.2 Air Supply

The connector “Inlet” supplies the SampleXpress Lite with compressed air or nitrogen. If too much pressure is supplied it will be exhausted via the overpressure protection valve named “Overpressure Exhaust”.

The working pressure can be adjusted at the pressure regulator; current setting is displayed at the pressure gauge.

8.3 Communication Interface

Ethernet link

The Ethernet link cable is included in the SampleXpress Lite supply cable set and is available in two different lengths:

- P/N: HZ16796 (length 7 m), or,
- P/N HZ16797 (length 15 m)

RS232

A crossover cable is used to connect the SampleXpress Lite to the CCU TTY08. With this cable, the SampleXpress Lite behaves like the old B-ACS sample changer. The following are examples of cables that can be used:

- P/N: HZ15425 (length = 5 m)
- P/N HZ10019 (length = 9.5 m)
- P/N HZ10034 (length = 10m)
- P/N HZ12674 (length = 15 m)

8.4 Lift Interface

The SampleXpress Lite is able to control the lift, just as the old B-ACS did. However, it is necessary to disconnect the pneumatic hose from the SLCB to the BST, and to reroute it to the lift input of the SampleXpress Lite. A short pneumatic hose must then be routed from the SampleXpress Lite lift output to the BST.

This hose is included in the cable set P/N HZ16836 for the BST. Adjusting the air flow to the BST is done using the throttle valve named “Lift Adjust”.

8.5 BST interface

The cable connection between the SLCB and BST must be rerouted to the SampleXpress Lite BST input. A short cable is used to connect the SampleXpress Lite BST output connector to the BST.

With this connection, the SampleXpress Lite can detect if a sample has moved down into the magnet.

8.6 Two Digit 7 Segment Display

This display is used to show the operational state of the entire system. The status of this display helps the Bruker service desk to identify the reason for the fault or error.

Display		Meaning
Left	Right	
Off	Off	SampleXpress Lite is powered down (and thus the Lite main board).
Off	1	Lite main board started boot program.
Off	2	Lite main board initializes CAN bus.
Off	3	Lite main board valid application program detected, switching to application program now.
Off	4	Lite main board boot jumper is set.
Off	5 - 8	Lite main board prepared for download of new firmware.
Off	9	No application program available on Lite main board.
1	0	Download data programming error.
2	1	Lite main board started application program.
2	2	Lite main board started software initialization procedure part 1.
2	3	Sending CAN wake-up message.
2	4	Lite main board started software initialization procedure part 2.
2	5	Lite main board initialization completed. At this point the Lite main board is waiting until the WinCE controller takes control over the CAN bus.

Table 8.1 Lite Main Board Bootup

Display		Meaning
Left	Right	
3	0	Windows application program finished initialization and is waiting in idle loop.
7	0	Initializing Lite main board.
7	7	Reading BIS from the Lite main board.

Table 8.2 Windows Application Bootup

Display		Meaning
Left	Right	
A	2	Release Sample: activate / deactivate
A	3	Carousel Block: open/close
A	4	Lift: on/off

Table 8.3 Actions Started; Activation / Deactivation of Pneumatic Actuators

Display		Meaning
Left	Right	
B	1	BST sample present.
B	2	BST sample hovering.

Table 8.4 Sensor Plausibility Checks

Display		Meaning
Left	Right	
C	2	carousel motion: Fine positioning.
C	3	carousel motion: Go to destination position.
C	4	carousel motion: Searching.
C	5	carousel motion: Scan all positions.
C	6	carousel motion: Other motion.

Table 8.5 carousel Motion

Display		Meaning
Left	Right	
E	0	No CAN bus available on the Lite main board.
E	1	Sample not present but expected (in carousel).
E	2	Sample present but not expected (in carousel).
E	3	Sample hovering but not expected.
E	4	Sample not hovering but expected.
E	5	Sample not down but expected.
E	6	Emergency stop active.
E	7	Sample down but not expected.
E	F	Device failure.
A	P	Insufficient air pressure.

Table 8.6 Errors

Display		Meaning
Left	Right	
U	b	Working on the USB stick.
S	E	Service mode active.

Table 8.7 Others

Patterns displayed during a firmware download:

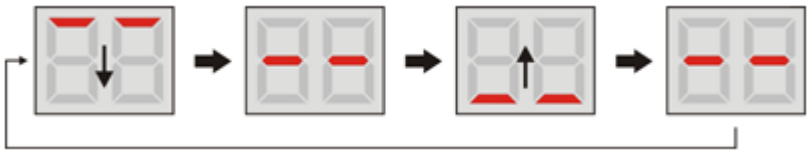


Figure 8.3 Firmware Download Pattern Part 1

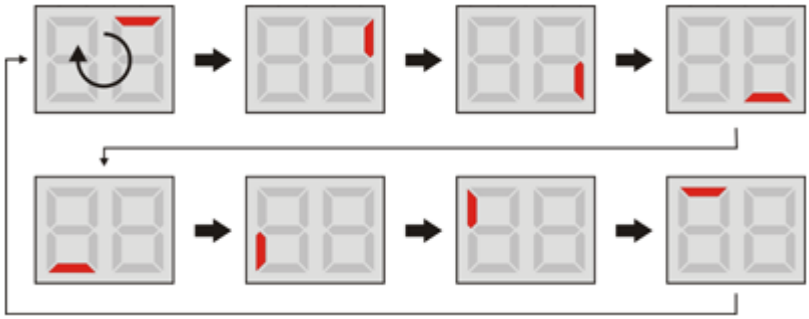


Figure 8.4 Firmware Download Pattern Part 2

8.7 Options

All the other connectors are reserved for future options and are currently not populated.

9 Service Page Interface

The service pages can be accessed via the Ethernet connection and a Web Browser.

The SampleXpress Lite automatically receives its local IP address from the DHCP server of the spectrometer.

1. Enter the command „HA“ in the TopSpin command line.

➨ This will search for connected devices.

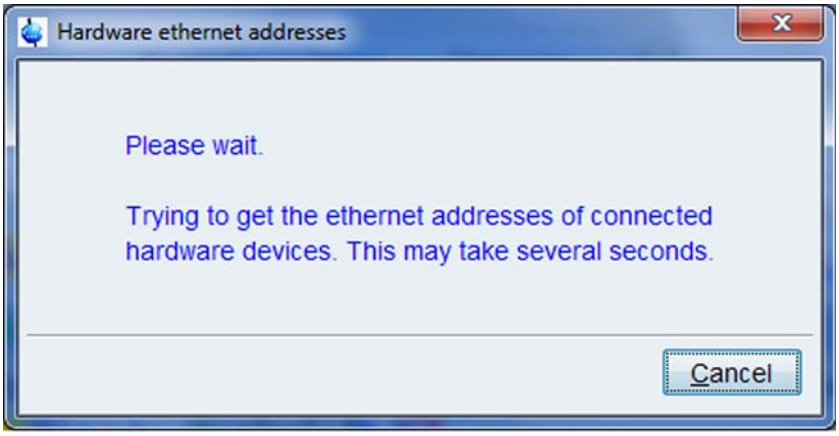


Figure 9.1 Searching for Hardware Ethernet Addresses

➨ The SampleXpress Lite will be identified automatically as „BACS2_H15200“.

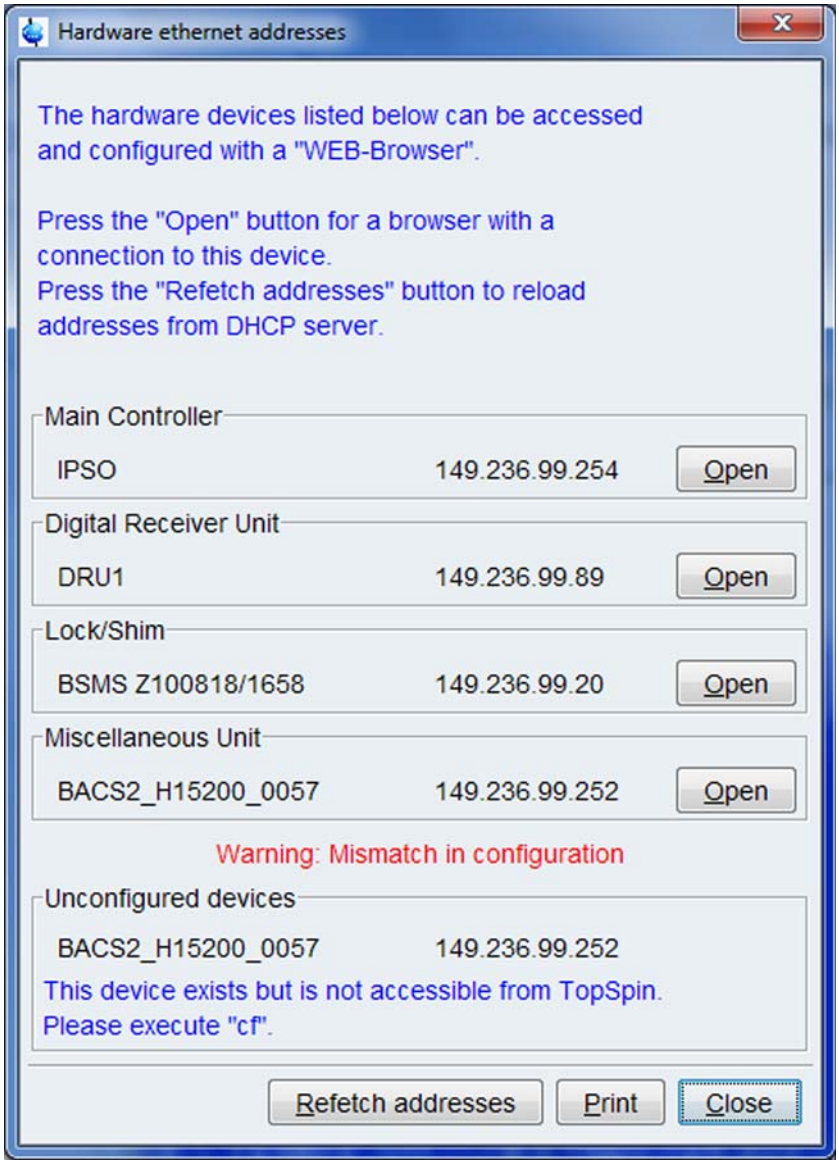


Figure 9.2 Hardware Ethernet Addresses Found

2. Press the „open“-button next to the device‘s IP address.

➥ A web browser window will open with the Main Web Page

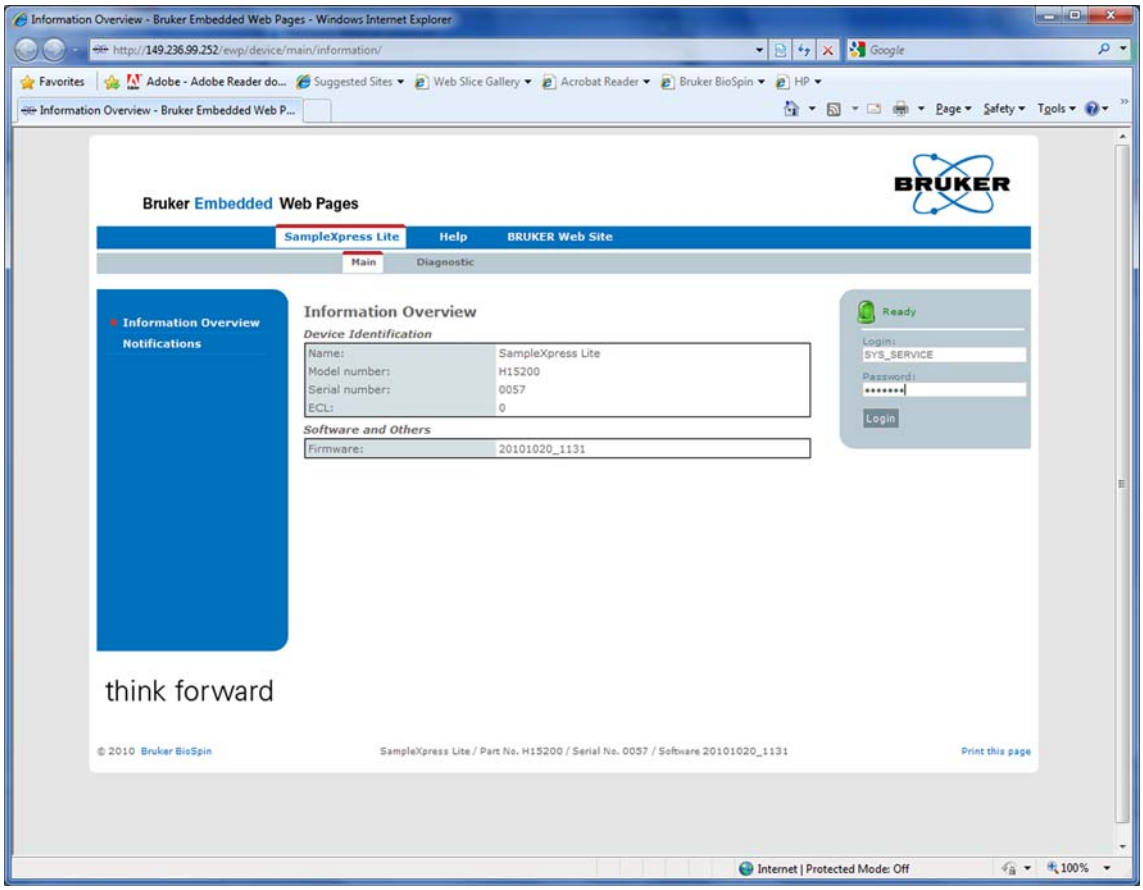


Figure 9.3 Main Web Site

From this web page you can view general information about the device, like part number, serial number, ECL, firmware version, etc.

3. Log-in on the right side of the service page to enter Service Mode.
   - Log-in Name: **SYS_SERVICE**
   - Password: **service**

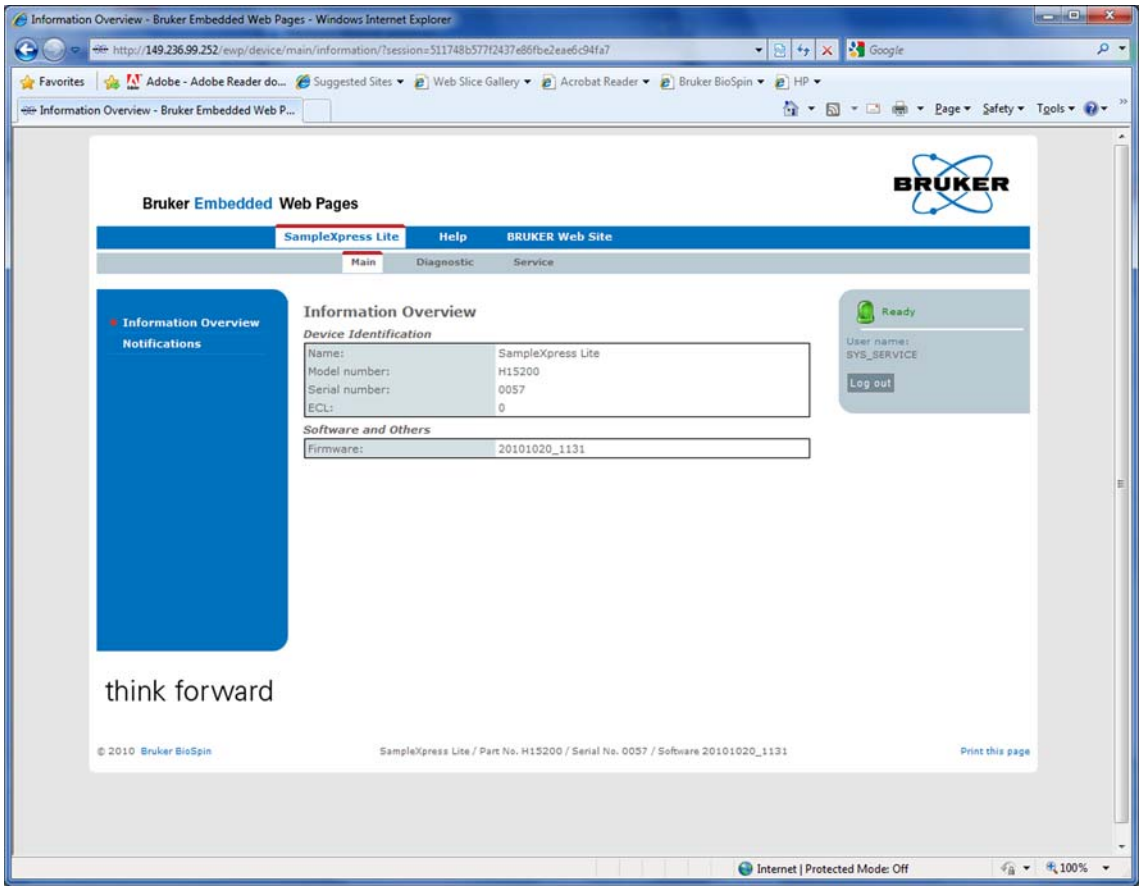


Figure 9.4 Main Web Site Logged In

The additional Menu option „Service“ will be enabled and shown.

4. Click on „Service“.
5. Click on the button „Enter Service Mode“

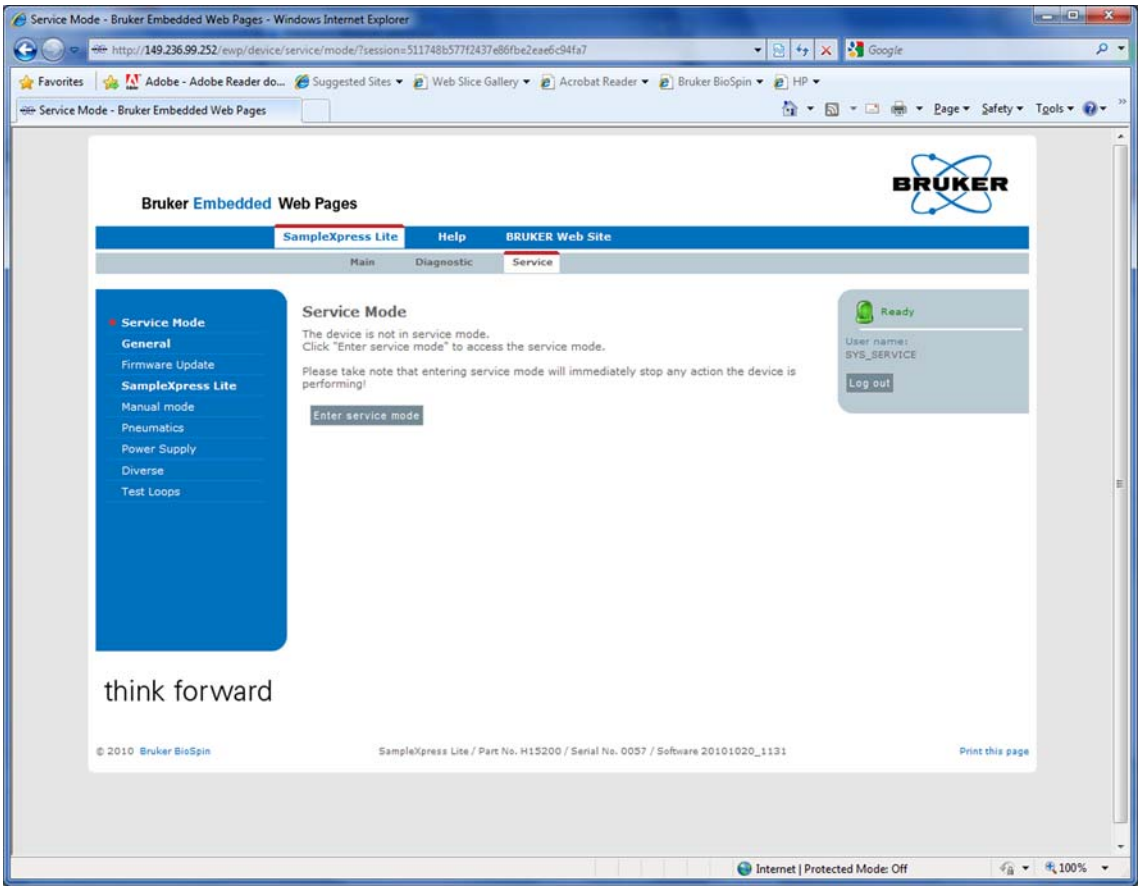


Figure 9.5 Main Web Site Enter Service Mode

➨ The status light of the device and the colors of the web page will switch to yellow.

ATTENTION: You can start any actor or action from the SampleXpress Lite, even if it should be avoided (e.g. insert a second sample into the BST). There are no software precautions taken to avoid such unallowed calls, thus service is able debug the system without restriction.

IMPORTANT: Use only dummy samples when adjusting the system or if you are working within these service pages!

9.1 Manual Mode

In manual mode most actions can be started.

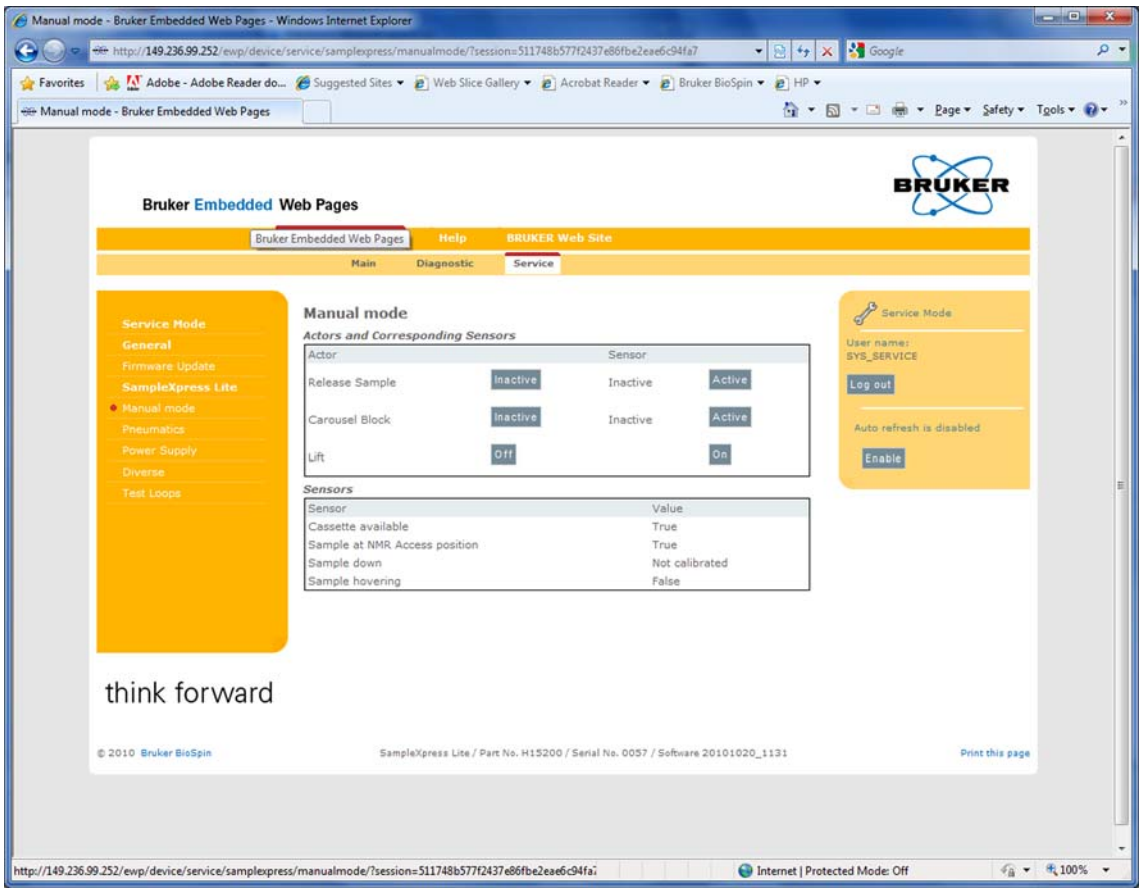


Figure 9.6 Service Page Manual Mode

In the upper part of the screen, you will find the pneumatic actors and the corresponding sensors.

In the lower left part of the screen you will find additional sensor information.

9.2 Pneumatics

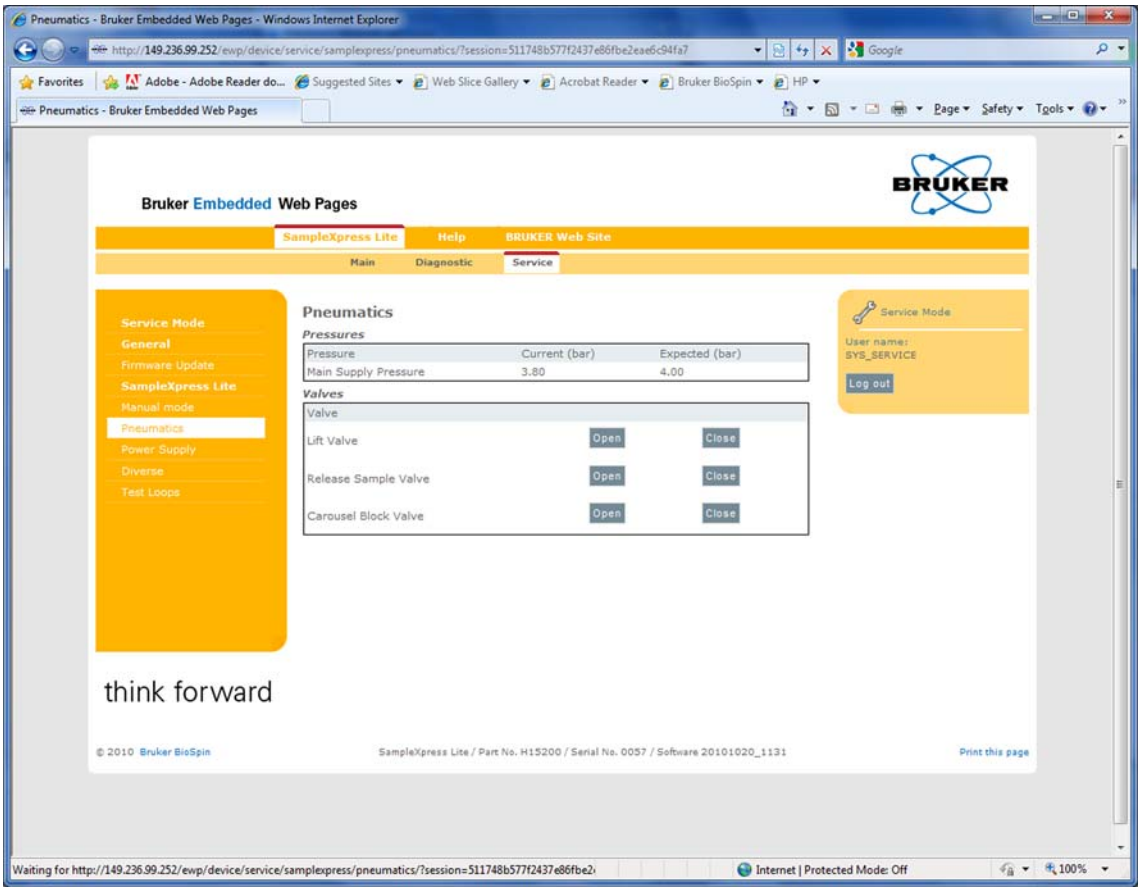


Figure 9.7 Service Page: Pneumatics

The pneumatic window displays the pneumatic supply pressure level. The pneumatic valves can be activated from this window.

9.3 Power Supply

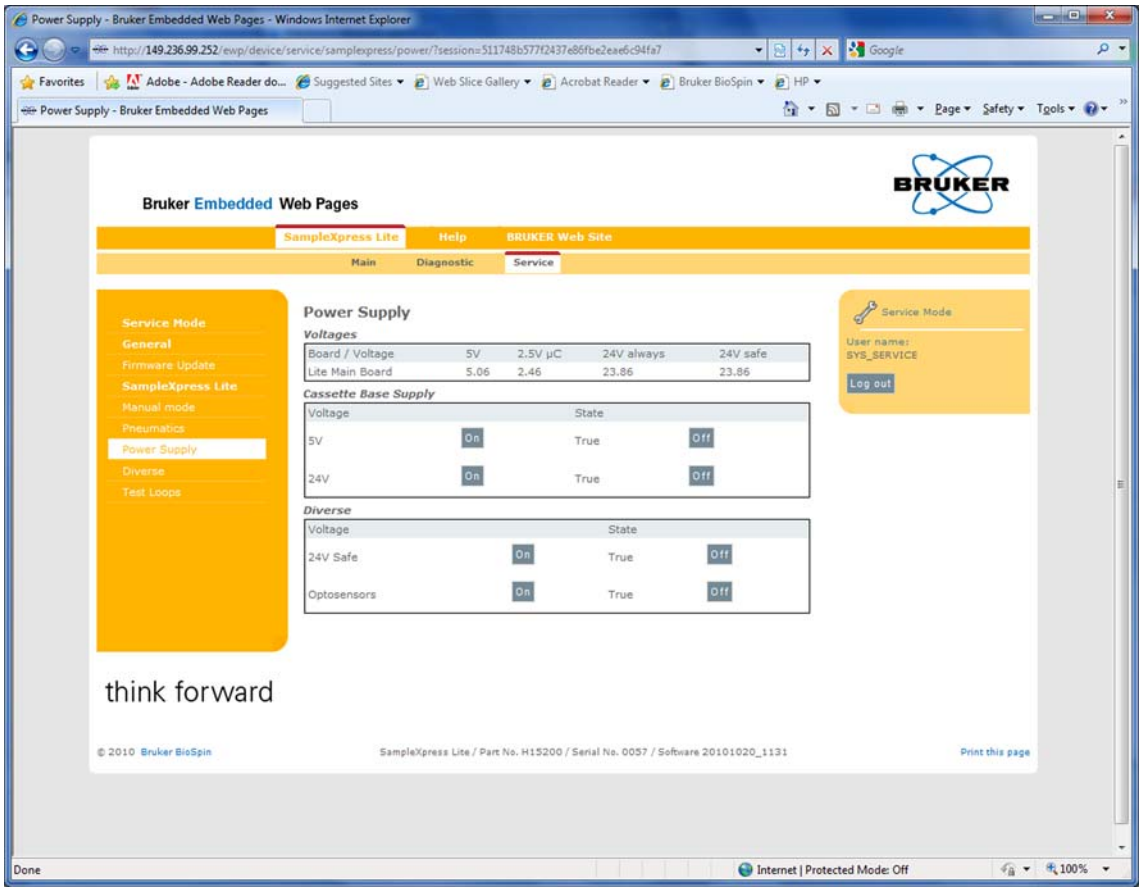


Figure 9.8 Service Page: Power Supply

In this window information about all the power supply of the Lite Main Control board is displayed. You can turn the following supply voltages off and on:

- Carousel base (5V and 24V).
- 24V safe (necessary for the valves and the carousel motor).
- Opto-sensors (at the NMR access position).

9.4 Misc (Miscellaneous)

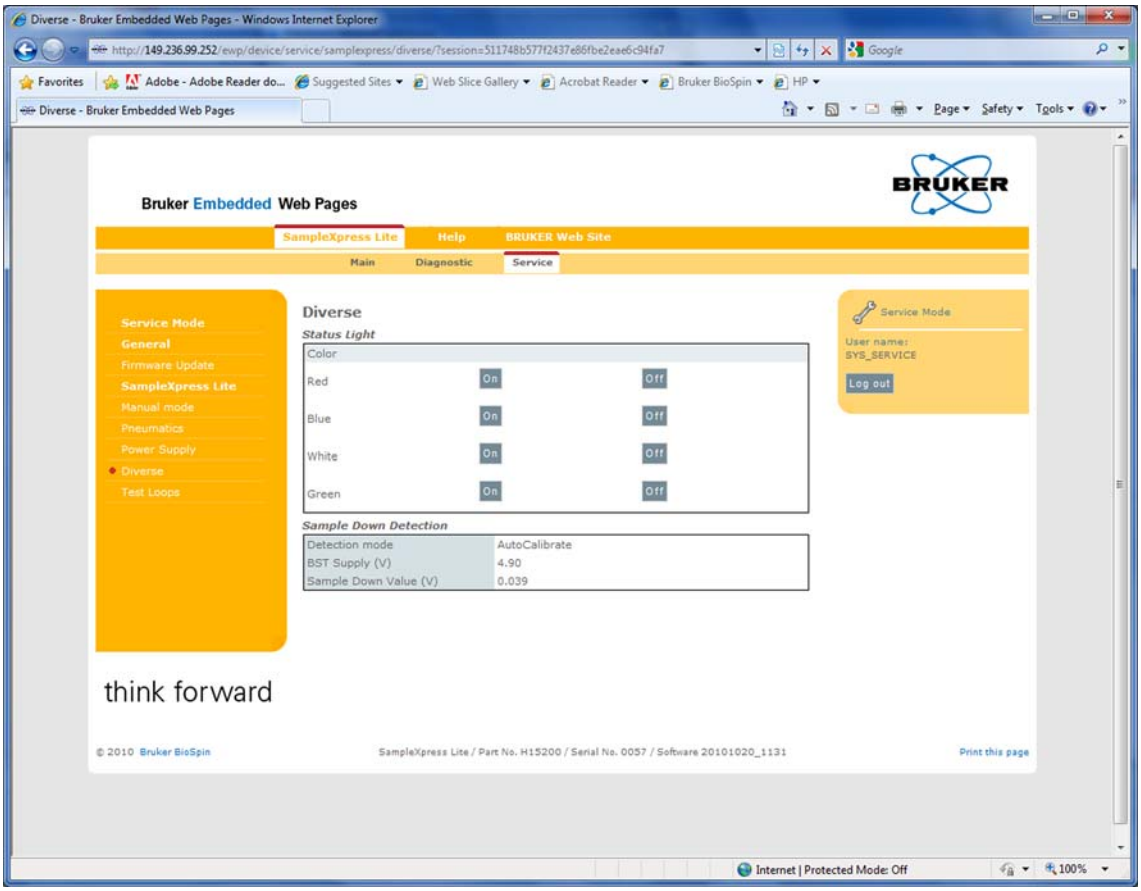


Figure 9.9 Service Page: Diverse

From this window you can set the status light colors. This window also displays information about the sample down detection mode and voltage.

9.5 Test Loops

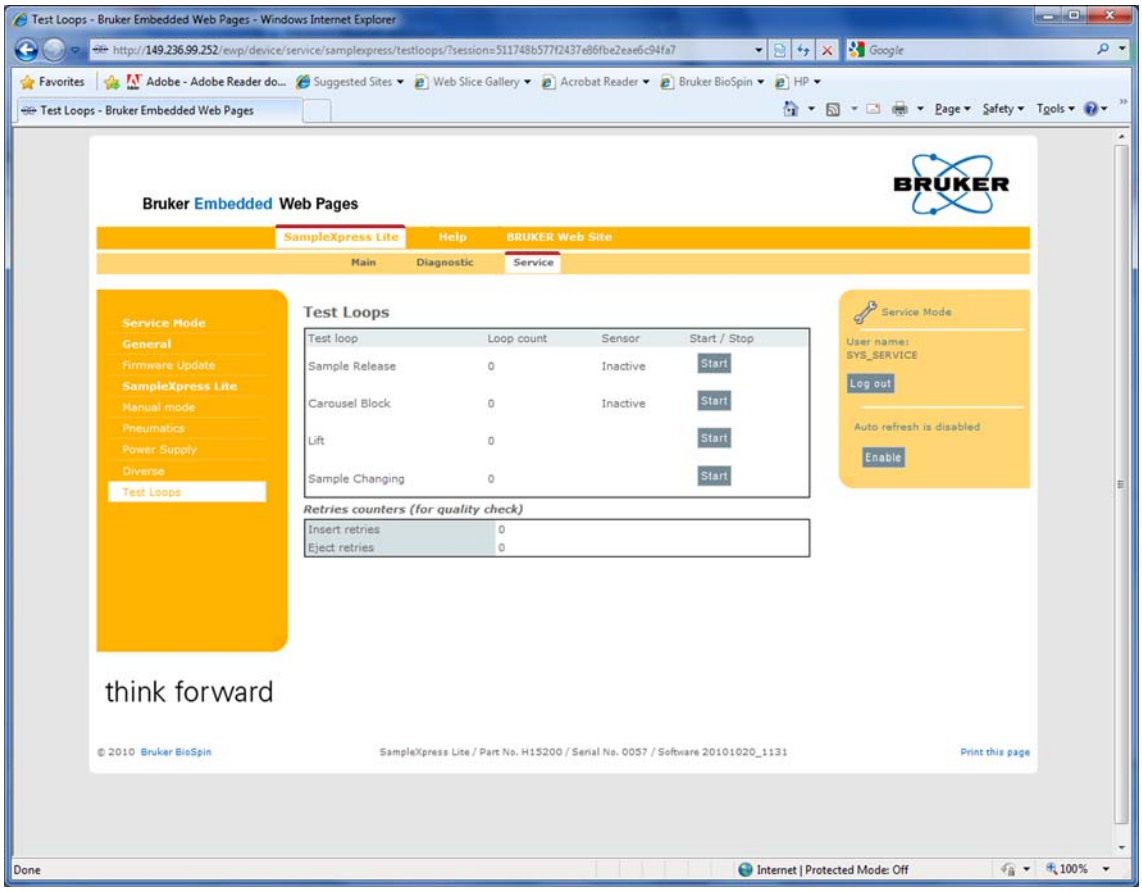


Figure 9.10 Service Page: Test Loops

The Test Loops window allows different test loops to be started, e.g. to adjust the pneumatic throttle valves. Be sure that the following requirements for each test loop are met:

Test Loop	Requirements
Sample Release	The carousel must be: 1. Removed, or, 2. In place, and • Correctly positioned • No sample in the NMR access position, or a sample in the NMR access position, and, - No sample down in the magnet, and - Carousel block active.
Carousel Block	• No carousel in place, or, • Carousel in place AND correctly positioned.
Lift	• Carousel in place, correctly positioned, and locked by carousel block. • Sample in the NMR access position. • No sample down in the magnet. • Opto-sensors are turned on.
Complete Sample Changing	• Carousel in place • At least 1 sample in the carousel. • At least 1 empty position available in the carousel. • Opto-sensors are turned on.

Table 9.1 Test Loop Requirements

Service Page Interface

10 List of Errors

The SampleXpress Lite will display the current action that has been started using the 7 segment display on the rear left side of the device.

In case of an error:

1. The status light lamp will turn red.
2. Note the status of the 7 segment display to identify the reason for the fault.
3. Go to the service page in the Web browser.

➨ In the upper right part of the service page an error number (format xxx.xxx.xxx) and a detailed error description will be displayed.

10.1 List of Error Codes

Error Code	Description
103.310.001 103.310.005 117.310.021	Carousel is missing.

➨ The carousel is missing.

1. Check the carousel sensor, see "Detecting the Carousel" on page 52.

Error Code	Description
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.

1. Check if there is really no sample in the magnet.

Error Code	Description
103.310.107 117.310.126	Missing empty position for security eject.

➨ The carousel was searched for an empty position for executing a security eject attempt. But the carousel is completely filled.

1. Activate Sample Down Detection Mode (Bruker service only).

   This allows a completely filled carousel to be added to the SampleXpress. Otherwise at least 1 empty position is needed in the carousel to execute a Security Eject of a potential sample in the magnet.

Error Code	Description
103.310.012 103.310.032	Missing empty position.

➨ The carousel was searched for an empty position for executing a security eject attempt. But the carousel is completely filled.

1. Allow at least 1 empty position in the carousel.
2. If the carousel is not filled completely, then clean the sensor surfaces.
3. Adjust sample detection sensor threshold (Bruker service only).

Error Code	Description
103.310.063	Sample Detect at magnet failed.

➨ A sample was not detected in the magnet for the requested eject.

1. Check if there is really no sample in the magnet (or the sample down detection sensor threshold is set up not correctly).
2. Check if the lift air flow is strong enough to eject the sample back into the magazine.
3. Check if the sample detection sensors work well.

Error Code	Description
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 carousel.

1. Check if there is really a sample.
2. Clean sensor surfaces.
3. Adjust sample detection threshold (Bruker service only).

Error Code	Description
103.310.097	Sample from magnet was placed in position XX.

➨ The source position of the sample in the magnet was unknown.

Error Code	Description
103.310.099	Source position not empty.
103.310.100	
103.310.101	

➨ The position in the carousel from where the sample was inserted into the magnet is occupied.

1. Do not fill the position from the sample down into the magnet.

Error Code	Description
103.310.103	Source position not empty, no other empty position found.

➨ The position in the carousel from where the sample was inserted into the magnet is occupied and there is no other empty position available.

1. Do not fill the position from the sample down into the magnet.

Error Code	Description
103.310.131	Missing empty position.
103.310.134	
103.310.136	

➨ There is no empty position in the carousel for the operation requested.

1. Allow at least 1 empty position in the carousel.
2. If the carousel is not filled completely, then clean the sensor surfaces.
3. Adjust sample detection threshold (Bruker service only).

Error Code	Description
103.310.123	Missing Carousel.
103.310.124	
103.310.125	
103.310.126	
103.310.127	
103.310.128	

➨ There is no carousel available to execute the requested operation.

1. Insert a carousel into the SampleXpress to allow full functionality of the device.

Error Code	Description
103.310.143 103.310.144	Magnet already occupied.

➥ There is already a sample down in the magnet. Inserting further samples is prohibited.

1. Check if there is really no sample in the magnet.
2. Adjust sample detection sensor threshold (Bruker service only).

Error Code	Description
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.

1. Check the main air pressure supply.

Error Code	Description
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.

1. Check if something (e.g. broken glass tubes) blocks the carousel motion.

Error Code	Description
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.

1. Check the sensor operation and clean the sensor detection surface.

Error Code	Description
117.310.029	Open Guide failed.

➥ The carousel block did not reach its open position.

1. Check carousel block operation manually.

Error Code	Description
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.

1. Check the sensor operation.
2. Clean the sensor detection surface.

Error Code	Description
117.310.032 117.310.033	Security Eject failed.

➨ A sample was detected in the magazine but was expected to be in the magnet.

1. Check sensors working.
2. Adjust sample detection sensor threshold (Bruker service only).

Error Code	Description
117.310.034	Activate Release failed.

➨ The sample release lever could not be activated to insert the sample into the magnet.

1. Check if sample conveyor chain link release lever at this position is working correctly.

Error Code	Description
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.

1. Check if sample gets stuck somewhere on its way down into the magnet.
2. Adjust the sample down detection sensor (Bruker service only).

Error Code	Description
117.310.039	Sample Detect at Magazine failed.

➥ The sample was ejected from the magnet, but was not detected up in the magazine.

1. Check if there was really a sample in the magnet.
2. Adjust the sample down detection sensor threshold (Bruker service only).
3. Clean the sensor detection surfaces; Adjust sensor detection threshold (Bruker service only).

Error Code	Description
117.310.067	No more measured samples available.

➥ There are no more samples in the sample pool which are marked as „measured“.

Error Code	Description
117.310.111	Adapting carousel failed.

➥ The carousel could not be adapted successfully.

1. Try again.

Error Code	Description
117.310.112	Closing Clutch failed.

➥ The mechanical adaptation of the driving unit failed. The clutch could not be closed.

1. Try again. Use another carousel.

Error Code	Description
117.310.118	Close Guide failed.

➥ Thecarousel block of the guide did not reach its closed position.

1. Check carousel block operation manually.
2. Check if chain position is really correct.
3. Check if something (e.g. broken samples) prevents smooth carousel block motion.

Error Code	Description
117.310.122	Deactivate Release failed.

➥ The sample release lever could not be deactivated.

1. Check if sample conveyor chain link release lever at this position is working correctly.

Error Code	Description
103.310.145 117.310.123	Sample missing at Insert Position.

➨ The requested insert position is empty.

1. Check if there is really no sample.
2. Clean sensor surfaces.
3. Adjust sample detection sensor threshold (Bruker service only).

Error Code	Description
117.410.014	Sensor Error: Carousel block: both sensors active!
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.

1. Contact Bruker for replacing the defective parts.

Error Code	Description
122.310.001	BIS informations not found
101.410.148	Missing BIS

➨ The device could not read it's BIS (Board Information System) information successfully. System halted as this information is essential.

Error Code	Description
101.310.015	Bad BIS contents, missing $BIS.
101.310.016	Bad BIS contents, missing $PRD or $PRODUCTION.
101.310.017	Bad BIS contents, missing $NAM or $NAME.
101.310.143	Bad BIS contents, missing $UPG or $UPGRADE.
101.310.409	Bad BIS contents, missing $REP or $REPAIR.

➨ BIS content is not valid, essential entries are missing The device cannot be used any more because some of its components could not be identified correctly.

Error Code	Description
101.310.403	Invalid BIS identifier.
101.310.404	Invalid BIS data.

➨ BIS information is corrupt. The device cannot be used any more because some of its components cannot be identified correctly.

Error Code	Description
101.310.028	The firmware file you have downloaded has internal errors or is corrupt. Get another copy of the firmware and try again.

Error Code	Description
101.410.146	Firmware is not compatible with Part No. XX.

➥ The firmware found on the device is not compatible with this device part number. Device has been halted.

1. Download correct firmware to this device.
2. Check if the device BIS information is correct.

Error Code	Description
101.310.018	Devices running on Windows Desktop (2000, XP, Vista...) cannot be updated with the firmware updater.
101.310.407	Firmware update is not supported on desktop systems.

➥ Firmware update not possible. Devices running on Windows Desktop (2000, XP, Vista...) cannot be updated in this way.

Error Code	Description
101.310.147	Cannot communicate with sub device <NAME>.
101.310.227	CAN open protocol time-out.
101.310.299	CAN open protocol time-out.
101.310.179	CAN open protocol time-out.
101.310.181	CAN open protocol time-out by upload.
101.310.182	CAN open protocol time-out by upload.
101.310.184	Invalid SCS.
101.310.185	Toggle bit not alternated.
101.310.186	SDO protocol timed out.
101.310.214	CAN open protocol time-out.
101.310.216	CAN open protocol time-out.
101.310.218	CAN open protocol time-out.
101.310.220	CAN open protocol time-out.
101.310.222	CAN open protocol time-out.
101.310.224	CAN open protocol time-out.
101.310.414	Cannot communicate with sub device <NAME> after pre-operational firmware upgrade.
101.410.044	General protocol or communication error.

➥ A sub-component (e.g. slave board) did not answer a request from the master in the accepted time or the answer contained an error.

1. Check internal communication cable connections to the sub-device.
2. Check if the sub-device is active.
3. Send the log file to the Bruker help desk and restart device.

Error Code	Description
101.310.474	Touch screen calibration failed.

➥ The touch screen calibration could not be terminated successfully.

1. Try again.

Error Code	Description
101.310.600	General Firmware Update Error.

➥ An unknown error occurred during the firmware update.

1. Do not restart.
2. Try firmware update again.
3. Otherwise, reprogram using service tools or exchange CPU module.

10.2 Unknown Errors

When an error occurs that cannot be identified:

1. Insert an USB memory stick into the USB port of the device.
2. Wait until the log file is copied to the USB stick (refer to "Service and Maintenance" on page 101 for details).
3. Remove the USB stick and send the log file to Bruker service center to receive further information.

List of Errors

11 Service and Maintenance

The SampleXpress Lite logs all information in a file. With the help of this file Bruker customer service can diagnose the system. In case of troubleshooting as a result of an unknown error, Bruker 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.

Information exchange is accomplished via a USB memory stick which has sufficient free space and is FAT32 formatted.

11.1 Device Report File

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

1. Stop all automatic actions.
2. Plug the USB memory stick into the USB port on the rear left side of the device.

➨ The 7-segment display will show „UB“

➨ The application software searches service files on the USB memory stick. This may take several minutes. Normally there is no service file available (see "Service File" on page 101).

➨ The Device Report File is copied to the memory stick.

➨ When the device is ready, the indicator lamp switches to green or blue and the 7 segment display will show „30“.

3. Disconnect the USB memory stick from the device.
4. Send the memory stick containing the service file to Bruker customer service.

---

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\SampleXpressLite_modelno_serialno_YYYYMMDD_hhmmss.log.

---

i The log file is written only if no service file (see "Service File" on page 101) is available for this device on the USB memory stick.

11.1.1 Service File

Bruker customer service can send a service file to carry out maintenance automatically. The service file is valid only once for a specific device (based on the P/N and serial num-

ber).

1. Stop all automatic actions.
2. Plug the USB memory stick into the USB port on the rear left side of the device.

➨ The 7-segment display will show „UB“.

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

➨ The indicator lamp switches to „yellow“. The processes written in the service file will be executed. Be patient, this may take some time, do NOT disconnect the USB memory stick.

➨ When the device is ready, the indicator lamp switches to green or blue and the 7 segment display will show „30“.

3. Disconnect the USB memory stick from the device.

11.2 Firmware Upgrade

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

The firmware update is done using a service file.

1. Stop all automatic actions.
2. Plug the USB memory stick in the USB port on the rear left side of the device.

➨ The 7-segment display will show „UB“.

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

➨ The indicator lamp switches to „yellow“. Be patient, the download sequence may take some time, do NOT disconnect the USB memory stick.

➨ While the firmware is being downloaded, the following patterns will occur on the 7-segment display:

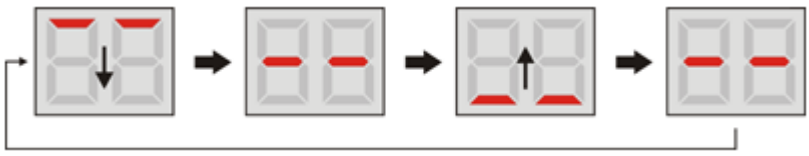


Figure 11.1 Firmware Download Pattern Part 1

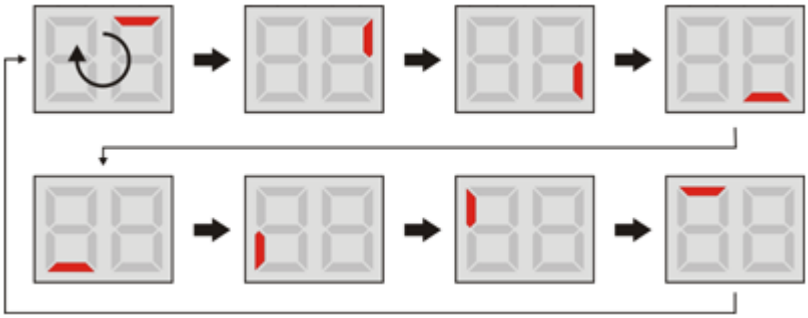


Figure 11.2 Firmware Download Pattern Part 2

➨ When the device is ready, the indicator lamp switches to green or blue and the 7-segment display will show „30“.

3. Disconnect the USB memory stick from the device.

12 Technical Data

12.1 General Information

Data	Value	Unit
Weight without carousel	9.7	kg
Weight with 16 sample carousel (without any sample)	12.6	kg
Carousel	2.9	kg
Length	31	cm
Width	40	cm
Height	38	cm

Table 12.1 Technical Data: General Information

12.2 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 12.2 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 12.3 Bruker Site Planning Guides

12.3 Connection Values

Electrical

Data	Value	Unit
Voltage	208 - 230	V C
Apparent power consumption, maximum	40	VA
Circuit protection	2 x 1.0 Slow Blow	A
Frequency	50/60	Hz

Table 12.4 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 12.5 Pneumatic Connection Values

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

12.4 Rating Plate

Figure 12.1 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

12.5 Sample Usage

SampleXpress Lite 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, and 5 mm).
- Shuttle POM for sample tubes 1-1.7 mm.
- Dummy samples.

Figure 12.2 Example of Samples That Can be Used with SampleXpress Lite

Samples with or without horizontal barcode labels can be used.

The maximum allowed sample height is 7“ (180 mm).

The sample is handled at the spinner only!

The long probe (exceeding 180 mm) shown in the following figure can not be used in the SampleXpress Lite!:

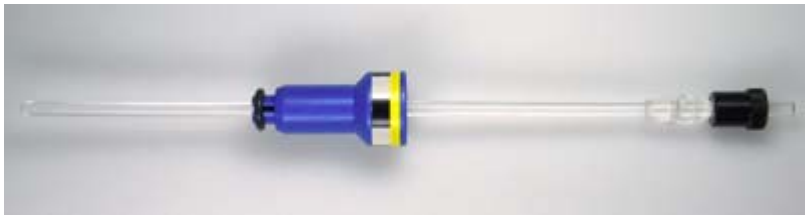


Figure 12.3 Example of a Sample That Cannot be Used in SampleXpress Lite

13 Parts List

13.1 Replacement Parts

Part Number	Description
H15240	BACS2 Lite Main Unit Complete
H15250	BACS2 Lite Carousel 16 Standard Complete
H15260	Carousel Base with Gearbox and Position Detection Unit

Table 13.1 Bruker Replacement Parts

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

Only original parts from Bruker are to be used for the SampleXpress Lite. 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 (refer to the user manual for the correct form).

Parts List

14 Cleaning and Disposal

14.1 Cleaning

14.1.1 Before Cleaning

Personnel: Laboratory personnel

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

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

Figure 14.1 Base Unit Right Side Electrical Connections

14.1.2 Outside of the SampleXpress Lite Chassis and Units

Do not use any detergent or other cleaning solvents. Only use 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 Lite chassis and units with a soft, lint-free cloth dampened in water.

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

14.1.3 Outer Shell of the Device

- Do not use acetone for cleaning.
- 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.

14.1.4 Magazine Light Barrier

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

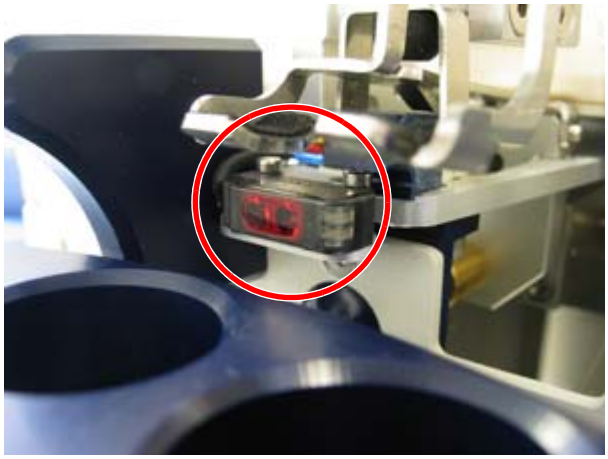


Figure 14.2 Keep the Magazine Light Barrier Clean

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

14.1.5 Carousel

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

i Let the carousel dry before using.

14.1.6 Other Cleaning Operations

For all other cleaning operations contact your authorized Bruker service station 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 Lite 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 station for advice and support.

Note that in serious cases it may be necessary for the owner to properly dispose of the device and replace it with a new one.

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.

14.2 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.

14.3 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.

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.
- ▶ Dismantle the components properly.
- ▶ Secure components so that they cannot fall down or topple over.
- ▶ Consult the manufacturer if in doubt.

14.4 Dismantling

Before starting dismantling:

- Shut down the device and secure to prevent restarting.
- Physically disconnect the power supply from the device; discharge stored residual energy.
- Remove consumables, auxiliary materials and other processing materials and dispose of in accordance with the environmental regulations.
- Dismantle the device by following the installation instructions in reverse.

Clean assemblies and parts properly and dismantle in compliance with applicable local occupational safety and environmental protection regulations.

14.5 Disposal Instructions

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.

Cleaning and Disposal

15 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

SampleXpress Lite Installation Acceptance Form

Fill out this form completely and sign it together with the customer!

Spectrometer Order Number: _____

Magnet Type (e.g. 600 MHz unshielded): _____

Dewar Type (e.g. D345): _____

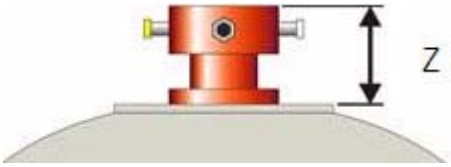
Does the magnet have a Drop-Off Plate on top? Yes □ No □

BST Part Number (e.g. Z9234) _____

BST Serial Number: _____

BST ECL: _____

Distance Z from the BST upper level to the magnet upper level (mm): _____



If the magnet has a Drop-Off Plate in the area of the SampleXpress Lite, make sure that this Drop-Off Plate can open up to at least 45° to a horizontal line. If you are unsure, use the 50 mm level extension column between the SampleXpress Lite and the BST.

50 mm level extension column P/N: H121852 installed? Yes □ No □

Can the Drop-Off Plate open at least up to 45° to a horizontal line? Yes □ No □
If no, the installation must be aborted and the SampleXpress Lite must be demounted. Take some photos and contact Bruker Germany for further help!

Lift adjusted for smooth sample transport? Yes □ No □

User Manual P/N Z31900 given to the customer? Yes □ No □
Note: The user manual contains important safety information about running the SampleXpress Lite in your lab!

Control Panel pivot adjustment lever installed? Yes □ No □
Note: Changing the pivot might change the shim.

Functionality check:	OK	□	Not OK	□
Adding samples to the carousel:	OK	□	Not OK	□
Inserting a sample into the magnet using command “sx”:	OK	□	Not OK	□
Replacing a sample in the magnet using command “sx”:	OK	□	Not OK	□
Ejecting a sample from the NMR magnet using command “sx ej”:	OK	□	Not OK	□
Removing samples from the carousel:	OK	□	Not OK	□
The installation is complete and the SampleXpress Lite is running well:	Yes	□	No	□

Lines for remarks:

Signatures:

Installation Engineer Name: _____ Date: _____ Signature: _____

Customer name: _____ Date: _____ Signature: _____

Appendix A

A.1 Warning Signs

Warning Signs

A.2 Figures

Figures

A.3 Tables

Tables

A.4 Glossary

BSMS
Bruker Smart Magnet Control System

BST
Bruker Sample Transport

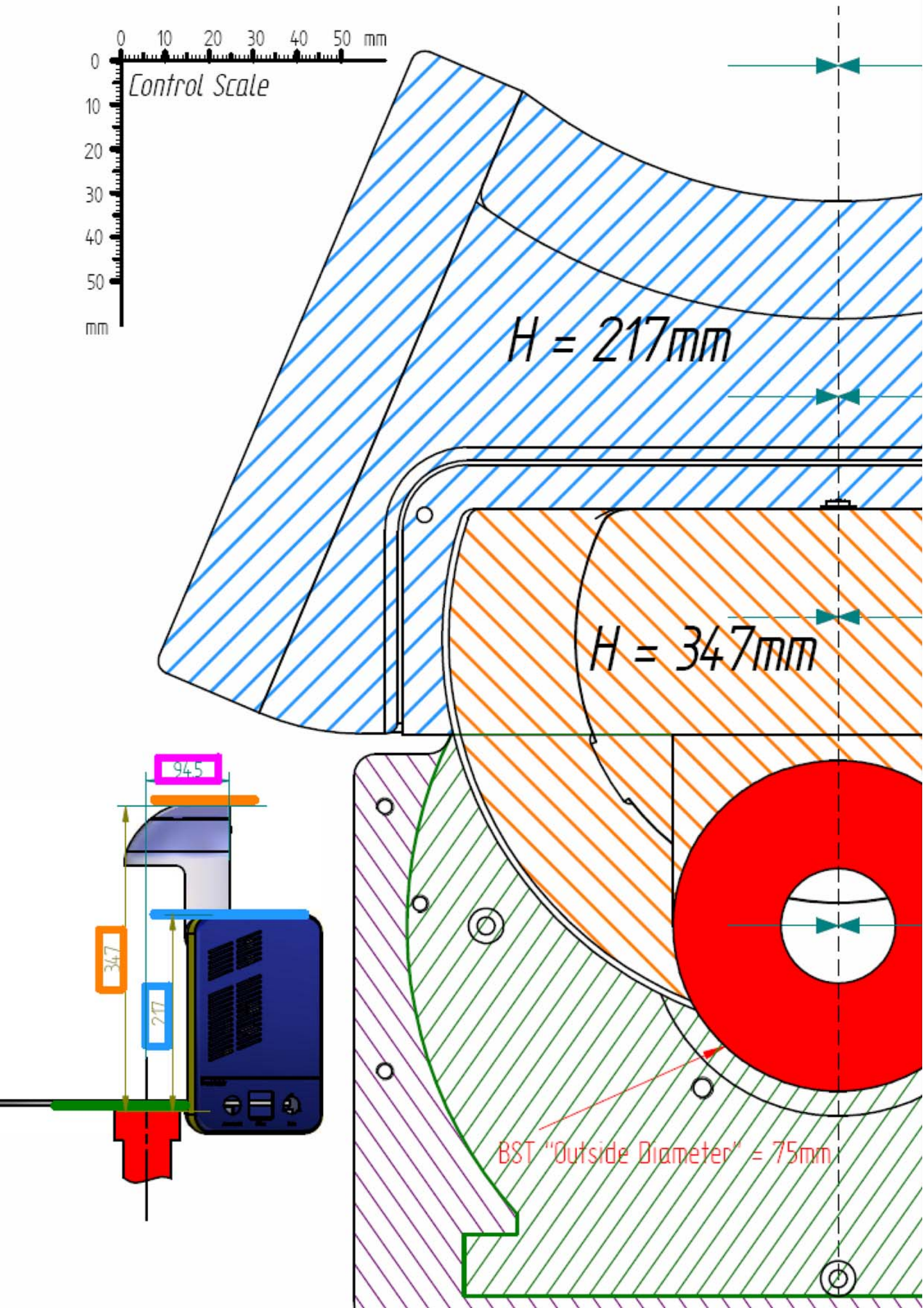
NMR
Nuclear Magnetic Resonance

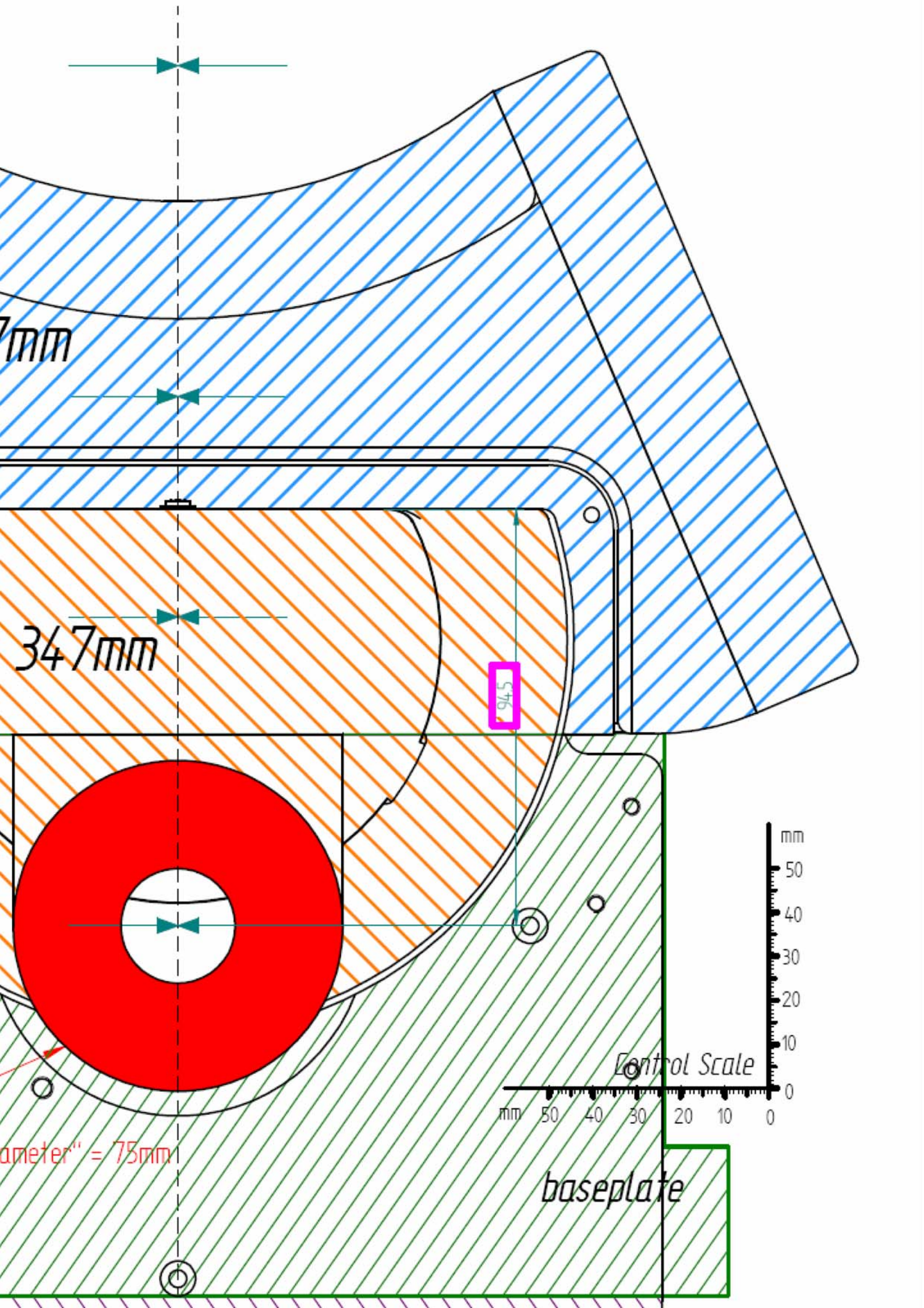
SLCB
Sample Level Control Board

Glossary

A.5 Index

Index


0 10 20 30 40 50 mm
Control Scale
H = 217mm
H = 347mm
94.5
347
217
BST "Outside Diameter" = 75mm


7mm
347mm
546
mm
50
40
30
20
10
0
Control Scale
mm 50 40 30 20 10 0
ameter" = 75mm
baseplate

Bruker,
your solution partner

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

Our ongoing efforts and considerable investment in research and development domonstrates our longterm commitment to technological innovation on behalf of our customers. With more than 50 years of experience in meeting the needs of the scientific community across a range of disciplines, Bruker has built a sound rapport with professionals from the community through understand ing their specific requirements.

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

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