


SampleCase

- User Manual
Revision 01



This manual was written by

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Summary

	Summary	3
	Contents	5
1	About	7
2	Introduction.....	9
3	Using the SampleCase.....	13
4	Configuration	23
5	User Service.....	31
6	Technical Data	35
7	Equipment Clearance	39
8	Contact	41
	Appendix	I

Contents

Summary	3
Contents	5
1 About	7
1.1 This Manual	7
1.2 Policy Statement	7
1.3 Disclaimer of liability	7
1.4 Symbols and Conventions	8
2 Introduction.....	9
2.1 General Description.....	9
2.2 SampleCase Benefits.....	10
2.3 SampleCase Overview.....	11
3 Using the SampleCase.....	13
3.1 General Use	13
3.1.1 Determine the States.....	13
3.2 Operating on the Device.....	15
3.2.1 Hardware Interface Overview.....	15
3.2.2 Lighted Push Buttons	16
3.2.3 Emergency Stop	16
3.2.4 Sample Overlength Latch.....	17
3.2.5 Allowed Spinners and Shuttles.....	18
3.2.6 Topspin.....	18
3.2.7 IconNMR	18
3.3 Bypassing the SampleCase	19
3.3.1 Inserting tubes manually	20
3.3.2 Usage of MAS Hardware.....	21
4 Configuration	23
4.1 Setting up Topspin	23
4.2 Using the Web Interface.....	25
4.3 SampleMail Control Page.....	26
4.4 Lift Calibration	27
4.4.1 Hardware Lift Presetting.....	27
4.4.2 Software Lift Calibration	28
4.4.3 Compatibility Workaround Timeout	28
4.5 IconNMR setup.....	29

5	User Service	31
5.1	Periodical Maintenance	31
5.1.1	Linear Axis Lubrication	32
5.1.2	Service of the Red O-Ring.....	33
6	Technical Data	35
6.1	Site Considerations	35
6.2	Electrical Specifications.....	35
6.3	Pneumatic Specifications	35
6.4	Temperature Limitations.....	36
6.5	Shipping Dimensions.....	36
6.6	Hardware Requirements.....	37
6.7	Software Requirements.....	37
7	Equipment Clearance	39
7.1	Information Regarding Service.....	39
7.2	Safety and Repair Declaration.....	40
8	Contact	41
8.1	Manufacturer	41
8.2	Technical Hotline	41
	Appendix	I
A	Warning Signs	III
B	Figures.....	V
C	Tables.....	VII
D	Glossary	IX
E	References	XI
F	Certifications.....	XIII
G	Revision History.....	XV
H	Index.....	XVII

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.

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 Disclaimer of liability

- The unit should only be used for its intended purpose as described in this manual.
- Use of the unit for any purpose other than that for which it is intended is done so at the users own risk and invalidates any and all manufacturers warranties.
- Service or maintenance work on the unit must be carried out by qualified personnel.
- Only those persons trained in the operation of the SampleCase should operate it.
- Read this manual before operating the unit. Pay particular attention to any safety related information.

NOTICE

Disclaimer

BRUKER BIOSPIN is not responsible or liable for any injury or damage that occurs as a consequence of none-approved manipulations on the SampleCase.

- ▶ Read the manual carefully before working with the SampleCase.

1.4 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. See an index of the safety instructions in the chapter "[Warning Signs](#)" on page III in the appendix.



DANGER

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



WARNING

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



CAUTION

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

NOTICE

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



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

2 Introduction

2.1 General Description

The SampleCase is an easy to use sample changer for standard NMR applications. No leader/stairs climbing for tube submission is necessary anymore since users can operate the system very convenient from floor level.



2.2 SampleCase Benefits

- 24 holders for various type of NMR tubes
- Very easy handling
- System operation from floor level
- Easy integration in Topspin / IconNMR
- Manual sample submission possible
- System can be mounted on almost every Bruker magnet



Figure 2.1: The carousel with the 24 holders

2.3 SampleCase Overview

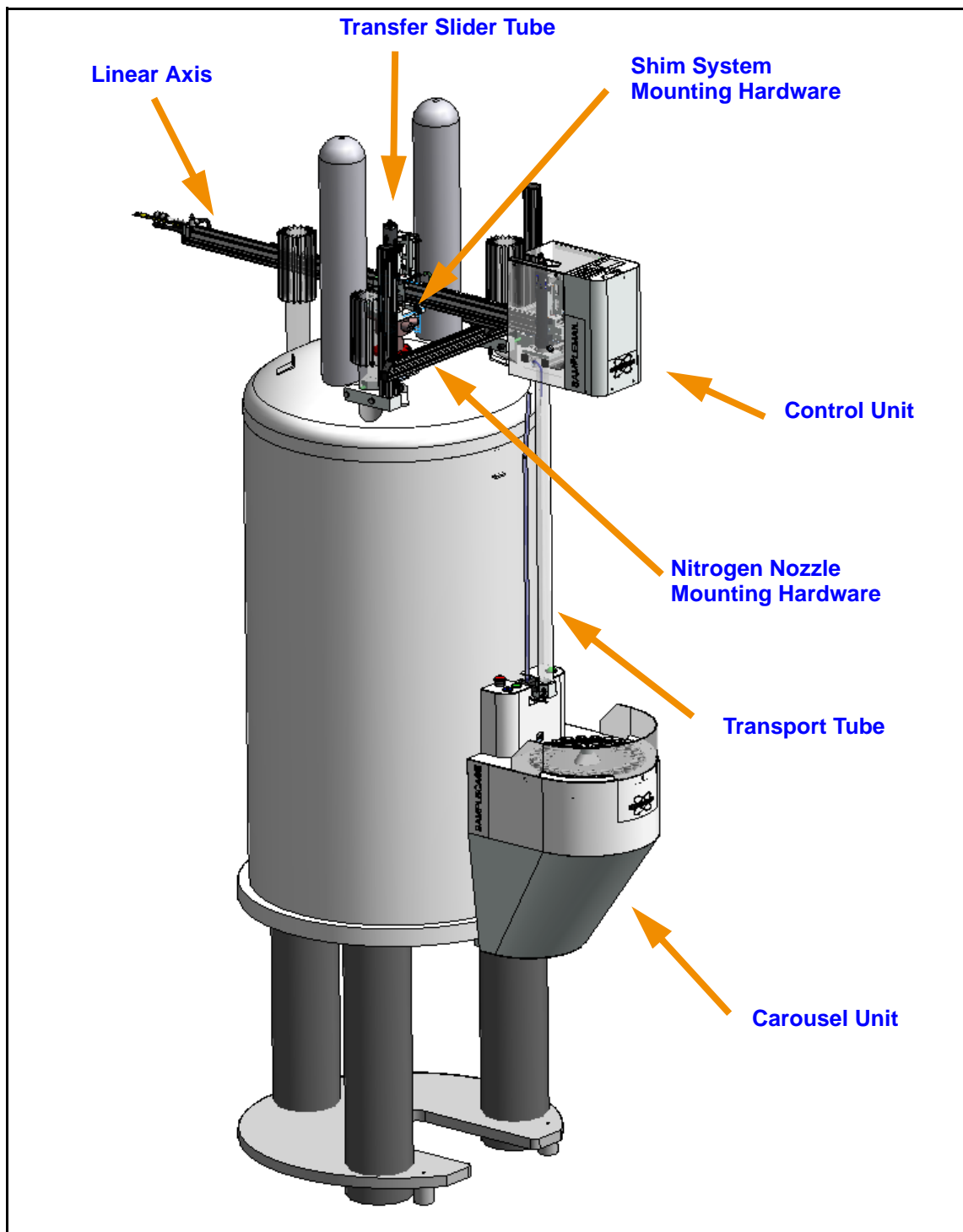


Figure 2.2: The SampleCase mounted on a Magnet

3 Using the SampleCase

3.1 General Use

The SampleCase can be operated stand alone or with the Bruker TopSpin and IconNMR software. This chapter describes both and some general knowledge. Read this chapter to understand the general functionality of the system. Actions beside the normal operation are described in the following chapters.

3.1.1 Determine the States

The SampleCase has two very good visible LED lights to indicate its current state. The two LED lights are redundant and are located as shown below.

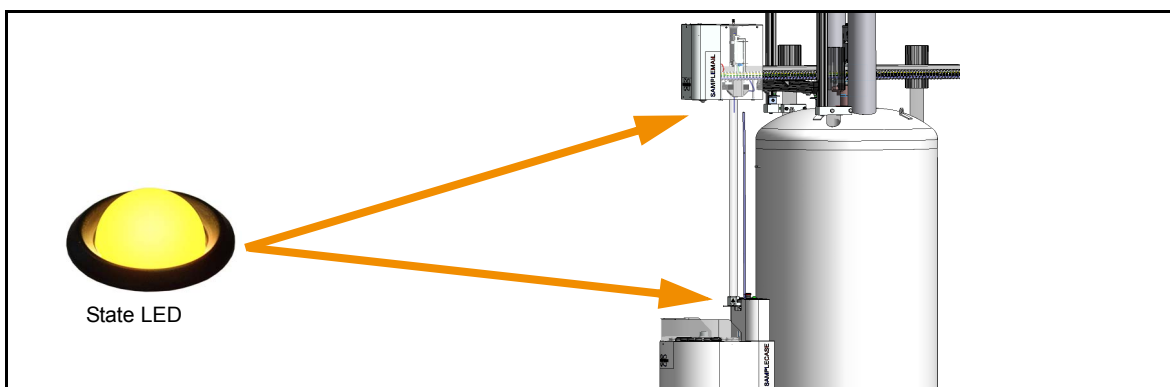


Figure 3.1: The two State LED's

LED	State Type	Meaning
————	Stable	System is in a stable state with no actions pending
— — —	Transient	System is in the middle of an action
- - - - -	Urgent	System is in a time-critical state with actions pending

Table 3.1: Type of SampleCase States

⚠ CAUTION

System state not stable

Do never access the system when not in a stable state.

- ▶ Always wait until a action is finished and the LED's stops blinking.








LED	State	Meaning
	Idle	System is idle with no sample in magnet
	Busy	System is busy transporting a sample
	Measure	System is Idle with a sample in magnet
	Warning	Check BSMS service web page for more information.
	Attention	System will start soon. Keep hands off.
	Check	System is checking for errors
	Error / Startup	System has detected an error or is starting up

Table 3.2: Specific SampleCase States

⚠ CAUTION



Sudden motion

The SampleCase is remote controlled and can start with an action at any time. Before a sudden action starts remote controlled the SampleCase will warn you with the “Attention” or “Busy” state. There is no “Attention” state after a user action on the system itself.

- ▶ Please keep then your hands off the system immediately on “Attention”, “Busy” or if you see or hear an action starting.
- ▶ Keep you hands off the carousel before pushing one of the push buttons.

NOTICE

Do not force the carousel

Do never force the carousel. When rotating the carousel can be forced to rotate to the wrong direction.

- ▶ The SampleCase will try to correct the position by continuing rotating.

3.2 Operating on the Device

3.2.1 Hardware Interface Overview

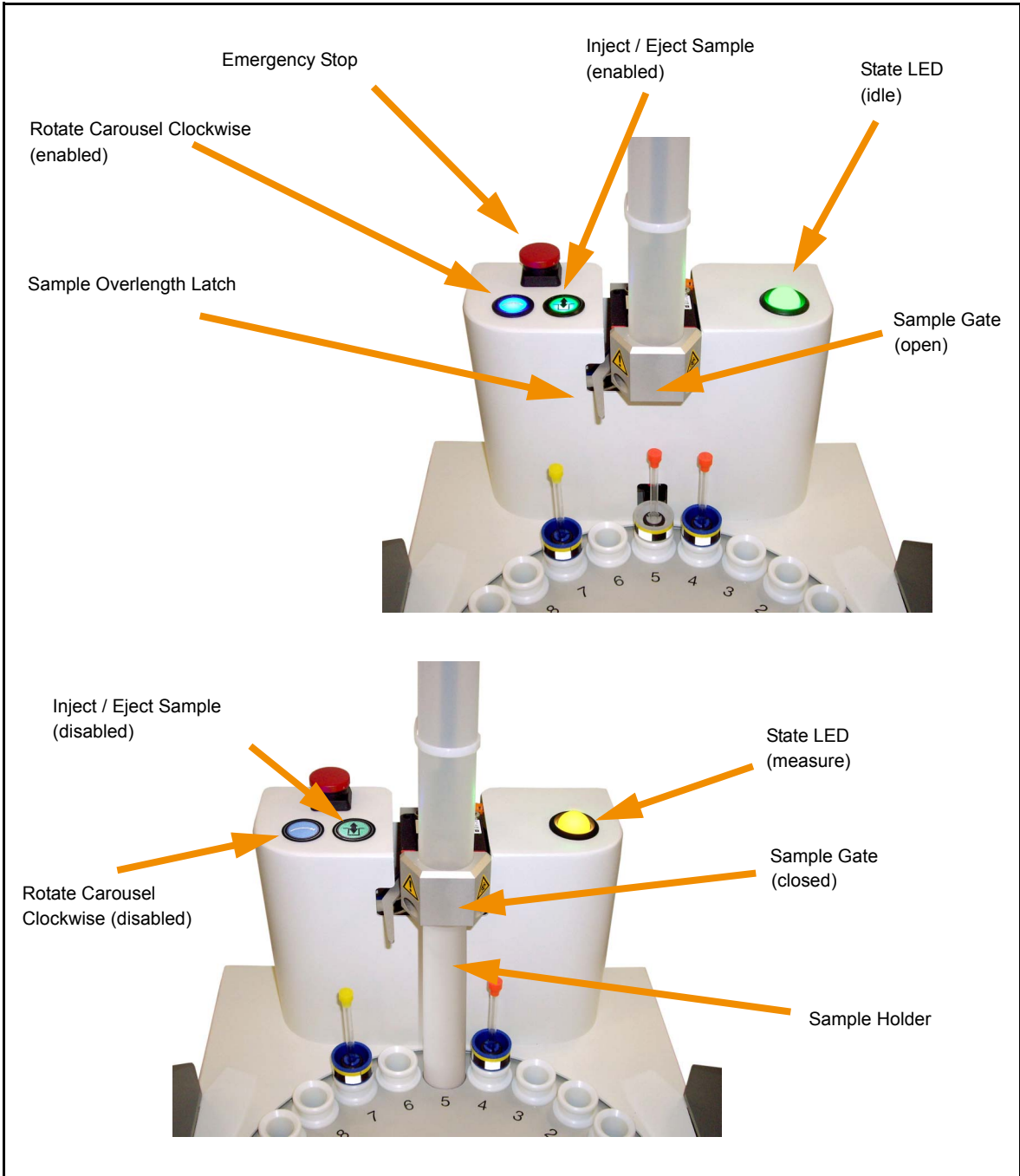


Figure 3.2: The hardware interface “idle” and “measure”

3.2.2 Lighted Push Buttons

There are two push buttons on the left side of the system. The light is on if you can trigger their functionality.

i If the push buttons are not illuminated then they are not active. Pressing a dark push button will have no effect.



- **Rotate Carousel Clockwise**
This button will rotate the carousel one holder when pressed or continuously when held down. The carousel can rotate only clockwise due to its design. It cannot be rotated if a tube is in the magnet and the sample gate is closed with a holder.



- **Inject / Eject Sample**
If there is a sample in the current position underneath the sample gate or in the magnet this button is active and will either inject or eject the current sample.

i Ejecting a sample with the “Inject/Eject” button will only work when the spinning of the sample is off. Otherwise the SampleCase assume a running measurement.

3.2.3 Emergency Stop



The emergency stop will not power off the system but will exhaust the compressed gas in the SampleCase. The actors on the system, all pneumatic driven, will stop immediately and the system indicates an “Error” state. Releasing the emergency button will pressurise the system and reset the firmware. The system will go through the “Check” state first.

i As long as the emergency button is pressed the system will be in error state and the SampleCase system is disabled. “ij” and “ej” commands from Topspin will then only switch on the BSMS lift for manual sample handling.

i Releasing the emergency button will perform a firmware reset.

3.2.4 Sample Overlength Latch

There is an absolute limitation of the sample length in this System given by the distance between the carousel holders and the transport tube inlet. The sample overlength latch will detect those tubes while the carousel is rotating and will bring the system to a standstill.

NOTICE

Overlength samples

Do not insert too long samples into the carousel.

- ▶ The system will detect this and stop. Nevertheless tubes may break.

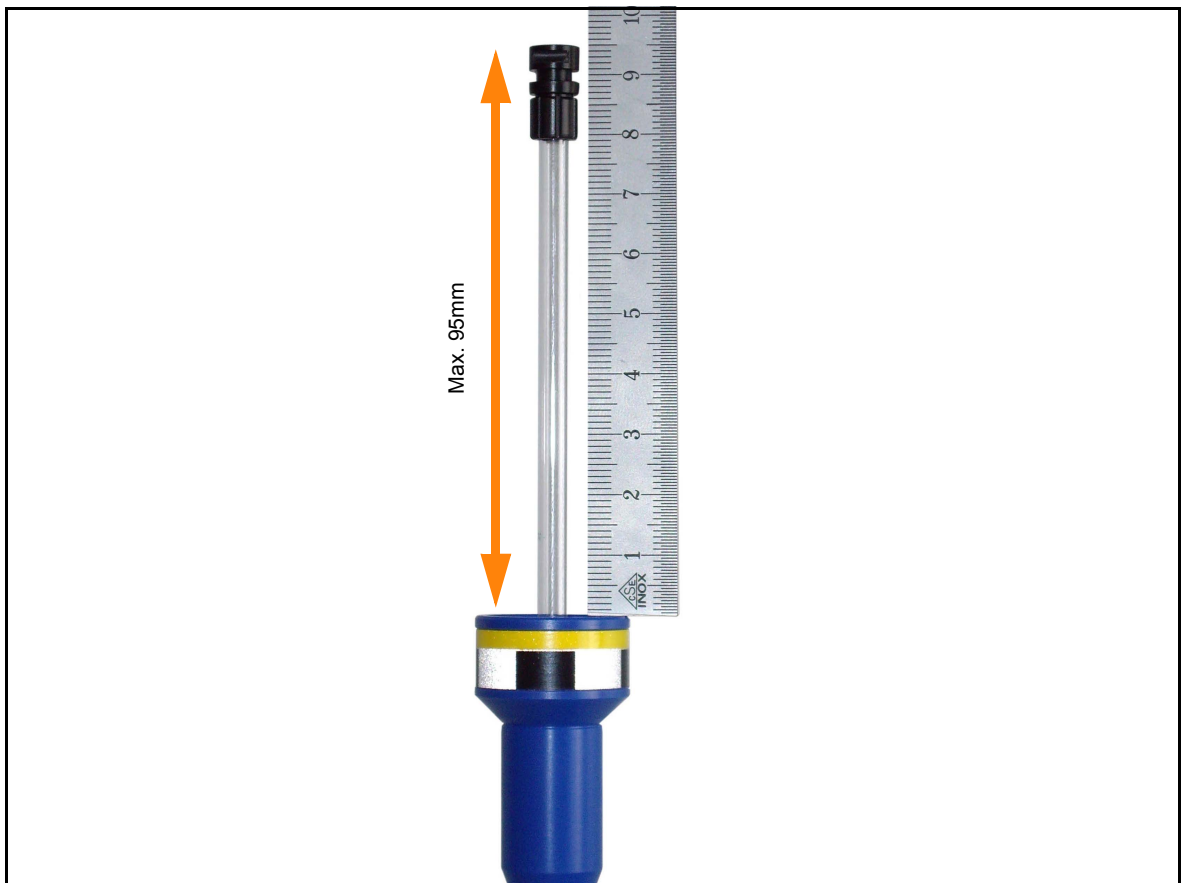


Figure 3.3: The Tube Length Limitation

Remove the Sample manually if the SampleCase stops due to a long tube.

3.2.5 Allowed Spinners and Shuttles

The SampleCase can transport almost every Bruker Spinner and Shuttle except the older types with no yellow ring on the reflector foil.

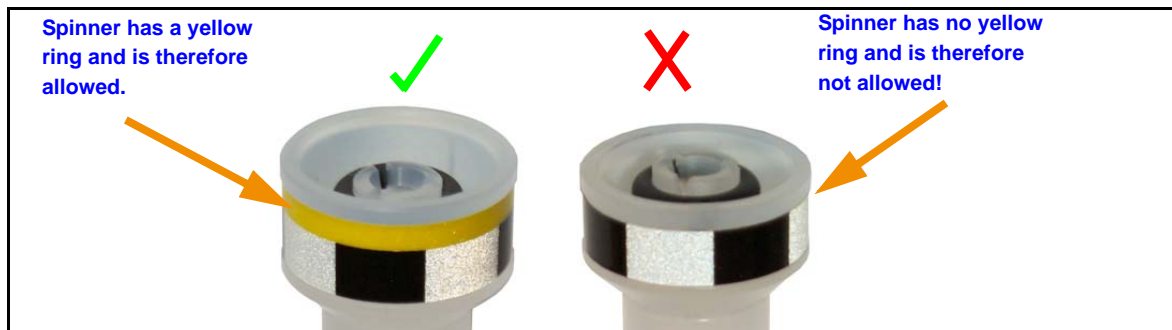


Figure 3.4: Allowed spinners

3.2.6 Topspin

You can easily operate the SampleCase from Topspin by using “sx” commands in the command line or with the “lift” button in the BSMS display started with “bsmsdisp”. while “sx” commands will insert a specific sample the “lift” button will always insert the sample underneath the gate.

Command	Meaning
sx 1, sx 2, ..., sx 24	Remove the current sample if there is one in the magnet. Then insert the sample in the selected position 12.
sx ej	Eject the sample from the magnet and place it back in the carousel.
ij	Insert the sample in the current holder into magnet.
ej	Eject the sample from the magnet and place it back in the carousel.
bsmsdisp	Opens the graphical interface showing a button to switch on or off the lift. This will have the same effect as the “ij” and “ej” commands.

Table 3.3: Topspin commands for the SampleCase

3.2.7 IconNMR

There are no special functions for the SampleCase in IconNMR. If IconNMR has been configured correctly (“[IconNMR setup](#)” on page 29) you can just set up any runs on the 24 holders.

3.3 Bypassing the SampleCase

Depending on the application there may be situations where the SampleCase is not needed or cannot be used. In these cases follow the 3 steps listed here:

1. Interrupt the gas supply.
2. If the transfer slider tube is on the magnet side then move the tube away from the magnet bore manually. Always hold the tube close to the linear guide when moving it to prevent tilting the tube.
3. Read the subsequent chapters for application depending information.

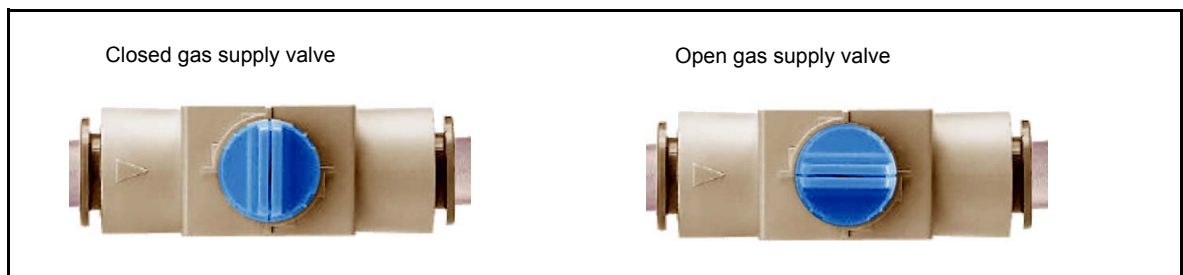


Figure 3.5: Interrupting the gas supply



CAUTION

System is moving after switching on gas supply

As soon as the gas supply is switched on and the system is under pressure parts may start moving immediately.

- ▶ Keep hands off the system when switching gas supply on.

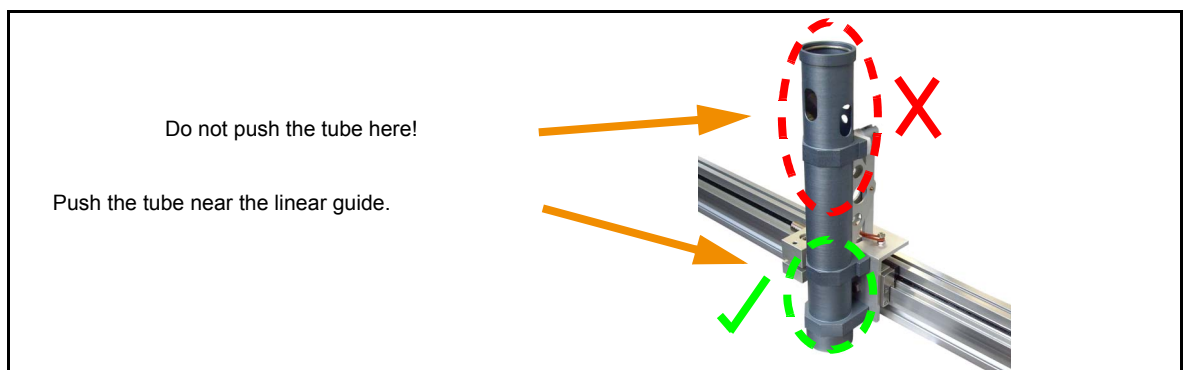


Figure 3.6: Moving transfer slider tube manually

NOTICE

Moving the transfer slider tube manually

The transfer slider tube will not withstand forces away from the linear guide.

- ▶ You may void the adjusting of the transfer slider tube.

3.3.1 Inserting tubes manually

A system with a SampleCase installed can still be operated by manually inserting tubes. Bypass the SampleCase as described in ["Bypassing the SampleCase" on page 19](#) and set the lift mode to "BSMS lift" in the configuration. See details in ["SampleMail Control Page" on page 26](#).

3.3.2 Usage of MAS Hardware

The SampleCase will provide access for the MAS hardware. Check on the picture below if your MAS hardware is compatible with the SampleCase.



Figure 3.7: Operating on the Carousel Unit

Bypass the SampleCase as described in "[Bypassing the SampleCase](#)" on page 19 and remove the two rings from the shim system mounting hardware.

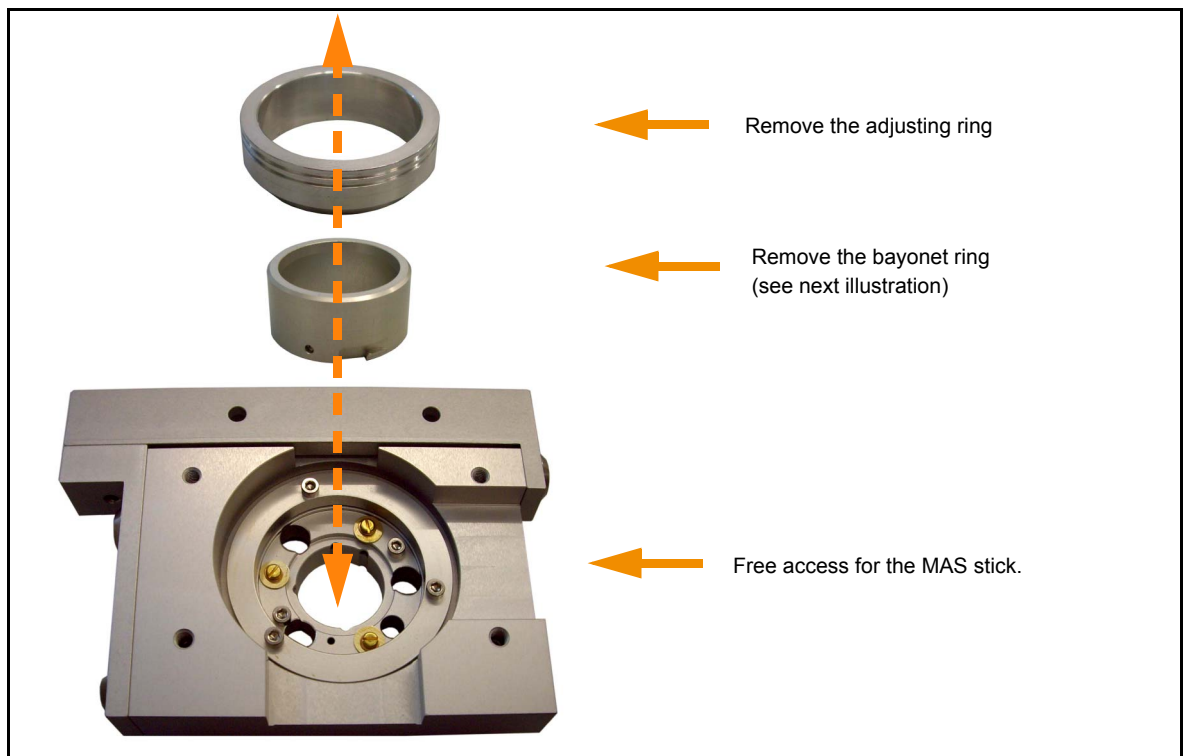


Figure 3.8: Removing the rings

The the bayonet ring need to be rotated to loose. Check the index holes in the ring and the mounting hardware to see if the ring is loose or tight.

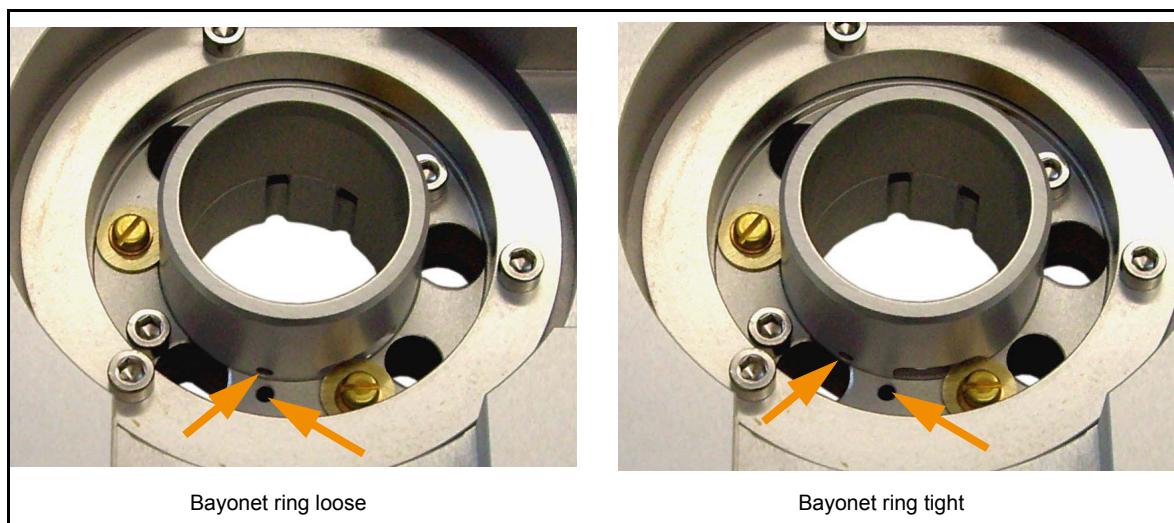


Figure 3.9: The bayonet ring

NOTICE

Check the rings before switching on the gas supply

Do never switch on the gas supply when the bayonet ring is not tighten correctly.

Do never run the device if the bayonet ring is not inserted.

Do never switch on the gas supply when the adjustment ring is only partially inserted.

- ▶ The transfer slider tube may collide with one of the rings.
- ▶ The sample cannot be transported.

4 Configuration

4.1 Setting up Topspin

Two Topspin commands can be used for setting up the SampleCase in Topspin. Start with the “cf” first before using “ha” to configure the device on the BSMS service web page.

Command	Meaning
cf	Used to configure a SampleCase in Topspin
ha	Shows a link to the BSMS service web page

Table 4.1: Topspin commands for configuration

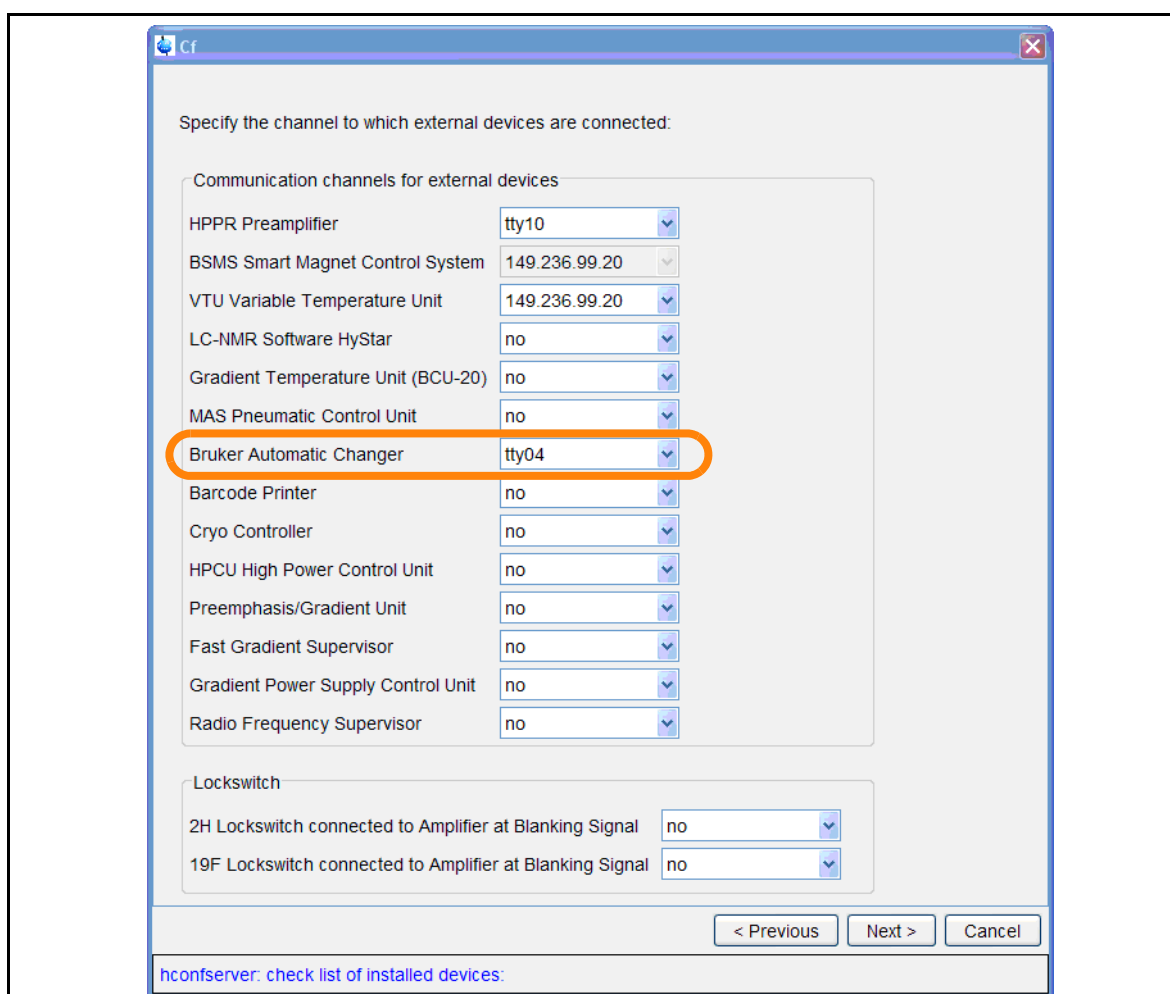


Figure 4.1: SampleCase TTY settings in “cf”

After setting the correct TTY port during “cf” set the settings for sample changers as shown below.

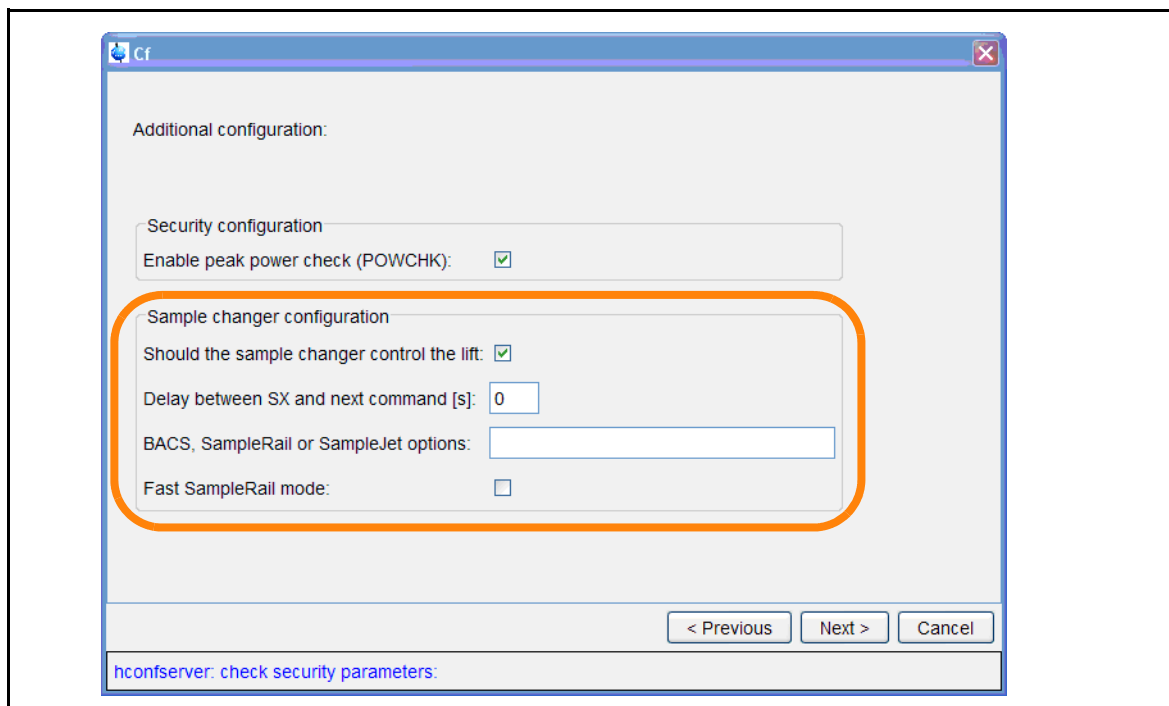


Figure 4.2: SampleCase “cf Configuration”

If the SampleCase was detected you will get the entry in the “cf” summary.



Figure 4.3: SampleCase “cf” Result

4.2 Using the Web Interface

For setup and service action you need to access the SampleCase web pages on the BSMS service web interface. To access these pages use the “ha” command in Topspin to collect all the available ethernet addresses. The BSMS service web interface is then listed and can be opened in a browser.

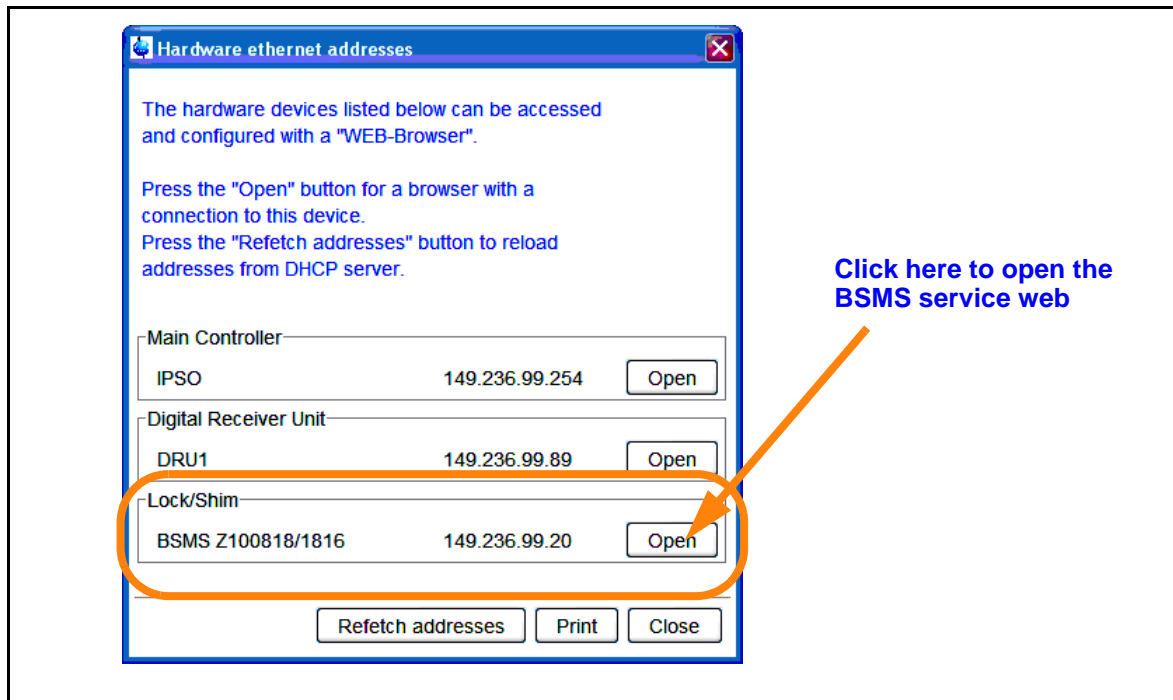


Figure 4.4: Access the BSMS Service Web

4.3 SampleMail Control Page

Switching on and off the SampleCase is done by selecting the lift mode.

Table 4.2: The "Lift Mode"

Lift Mode	Meaning
BSMS Lift	The SampleCase is bypassed.
SampleMail	The SampleCase will be used.

SampleMail Control

Commands

Lift:

Lift Service Loop:

Reset SampleMail:
Please verify that there is no Shuttle stuck in a position where it can't be detected by the SampleMail.

Configuration

Lift Mode: SampleMail: SPS on TTY1 1)

Closing the Handslider automatically Injects the Shuttle:

Status

FSM State	measurement pos
SPS State	idle at BST
Sample Position	sample down
SPS Firmware Version	samplecase_firmware_v5.hex
Hardware Type	SampleCase
Hardware Code	1
Counter: Samples Changed	39
SampleCase: Tray Position	21

1) TTY-Lockdisplay will be disabled

Figure 4.5: The SampleMail Control Page

4.4 Lift Calibration

The gas flow of the lift needs to be calibrated to ensure failure free operation of the system. This needs to be done to get along with different gas supplies in the lab, different length of the shim systems and various mechanical tolerances.

The calibration of the lift has three layers:

1. The lift presetting on the mounting hardware.
2. Lift setup of the BSMS lift.
3. The software lift calibration for the SampleCase.

NOTICE

Repeat the lift calibration when exchanging the probe head

A different probe head may require a new lift calibration.

- ▶ The sample transport may fail with a different probe head.

In the following chapters describes these lift settings and also a workaround to guaranty compatibility for systems with older hardware.

4.4.1 Hardware Lift Presetting

The gas used to blow out a spinner needs to exhaust at the top end of the shim system to decelerate the spinner. Therefore the SampleCase mounting hardware has some bypass holes in it. But if the gas supply is not strong enough those holes needs to be closed with screws to have enough gas to blow the spinners up. Those inserted screws in the bypass holes serves as a presetting for the lift calibration. If the setting of the screws does not match the existing gas supply in the lab the lift calibration will not give any good results and the spinner will not be handled smoothly.

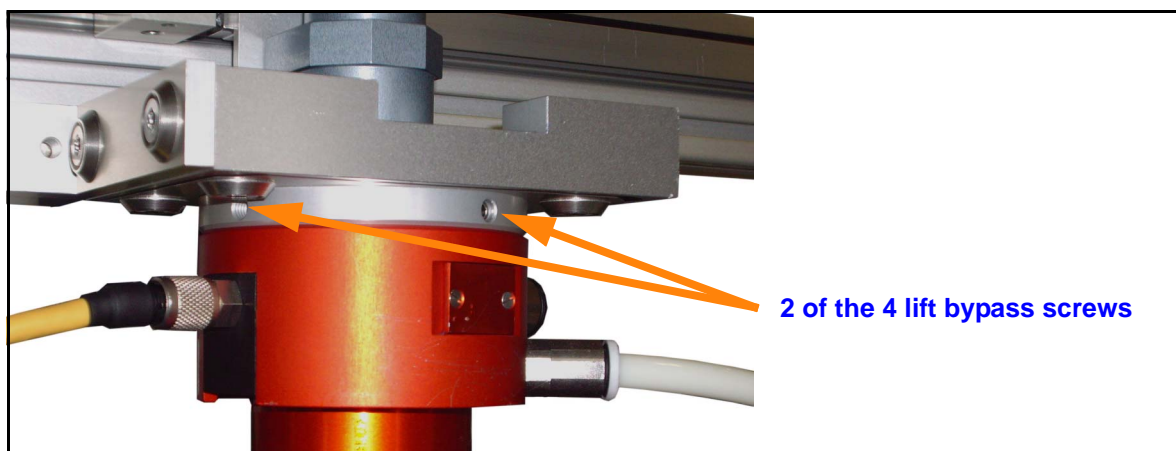


Figure 4.6: SampleCase Lift Calibration

4.4.2 Software Lift Calibration

The ELCB firmware is able to run the lift calibration fully automated. This will be done on the BSMS service web on the SampleCase calibration page. Open the page and follow the instructions to calibrate the lift.

As described on the web page you have to do the BSMS lift setup first since this calibration depends on the BSMS lift setup.

SampleCase Calibration

This Calibration method relies on a good Lift setup. Please verify that the Lift setup procedure has been properly done. [see Sample Handling -> Lift Control](#) For Lift Calibration, "Lift Mode" must be set to "BSMS Lift".

Calibration Procedure:

- Set "Lift Mode" to SampleCase
- Place a shuttle with a sample in position 1 of the carousel.
- Click "Calibrate" and wait for about 2 minutes until the signal light on the SampleCase changes back to steady green

Status

FSM State	measurement pos
Controller State	idle
Last Bacs IF response	[P000]
Measured valve offset	323‰

Timeout

Maximum time to wait for the Spinner to settle in the BST after the lift air has been turned off. An old type SLCB (SLCB/2 with ECL00 and ECL01) or a bad BST light barrier can turn SampleMail/Case unable to detect the arrival of the Spinner in the BST. If so, you can hear the spinner settle in the BST long before the signal light switches to steady yellow. Only in such a case, you can decrease the sample transportation time by decreasing this timeout. Test any non default timeout with the lightest spinner and the highest VT gas flow that will be used with the system.
Minimum 3s, Default 20s, Maximum 60s

s

Software calibration section

Compatibility workaround timeout (see next chapter)

Figure 4.7: SampleCase Lift Calibration

4.4.3 Compatibility Workaround Timeout

If the detection for a sample inside the magnet is not working caused by older hardware or a bad light barrier a timeout will occur. After this timeout the SampleCase will assume that the sample will be down in the magnet. In most cases this timeout will be too long an can be decreased when the SampleCase depends on the timeout only without seeing the spinner with a sensor. See also the detailed description on the SampleCase calibration web page.

4.5 IconNMR setup

There are two settings to set in the IconNMR configuration before the SampleCase can be used. In the menu “Automation” on the page “Master Switches” you have to set the proper device and in the same menu on the page “Automation Window” the number of holders needs to be set to 24.

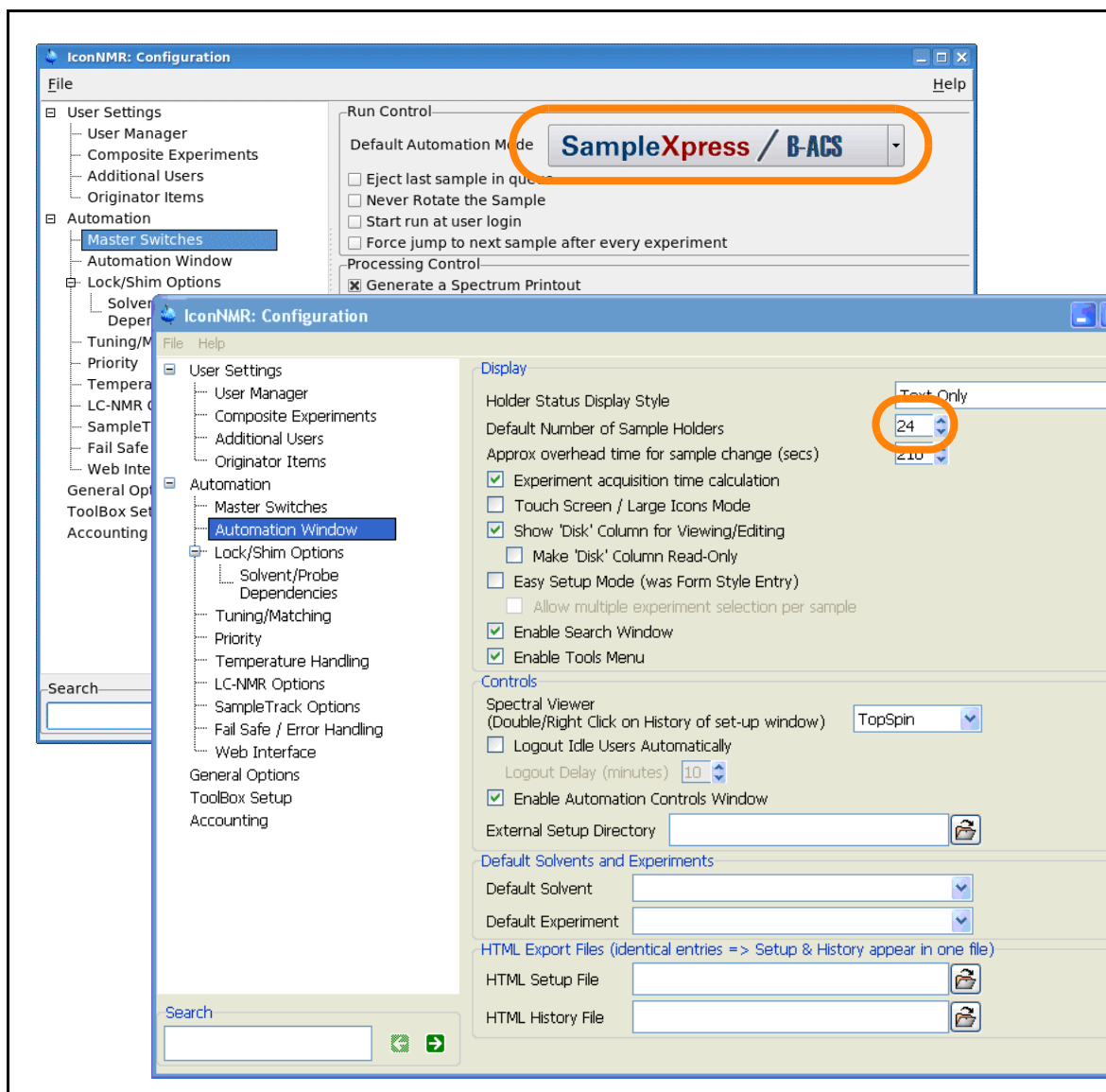


Figure 4.8: IconNMR Setup

5 User Service

5.1 Periodical Maintenance

The SampleCase systems needs very few maintenance. The customer can do this on its own or ask the Bruker service for assistance. Proper service will increase the lifetime of the system and prevents form failures during operation. These are the two things to do:

- Axis lubrication
- O-ring exchange

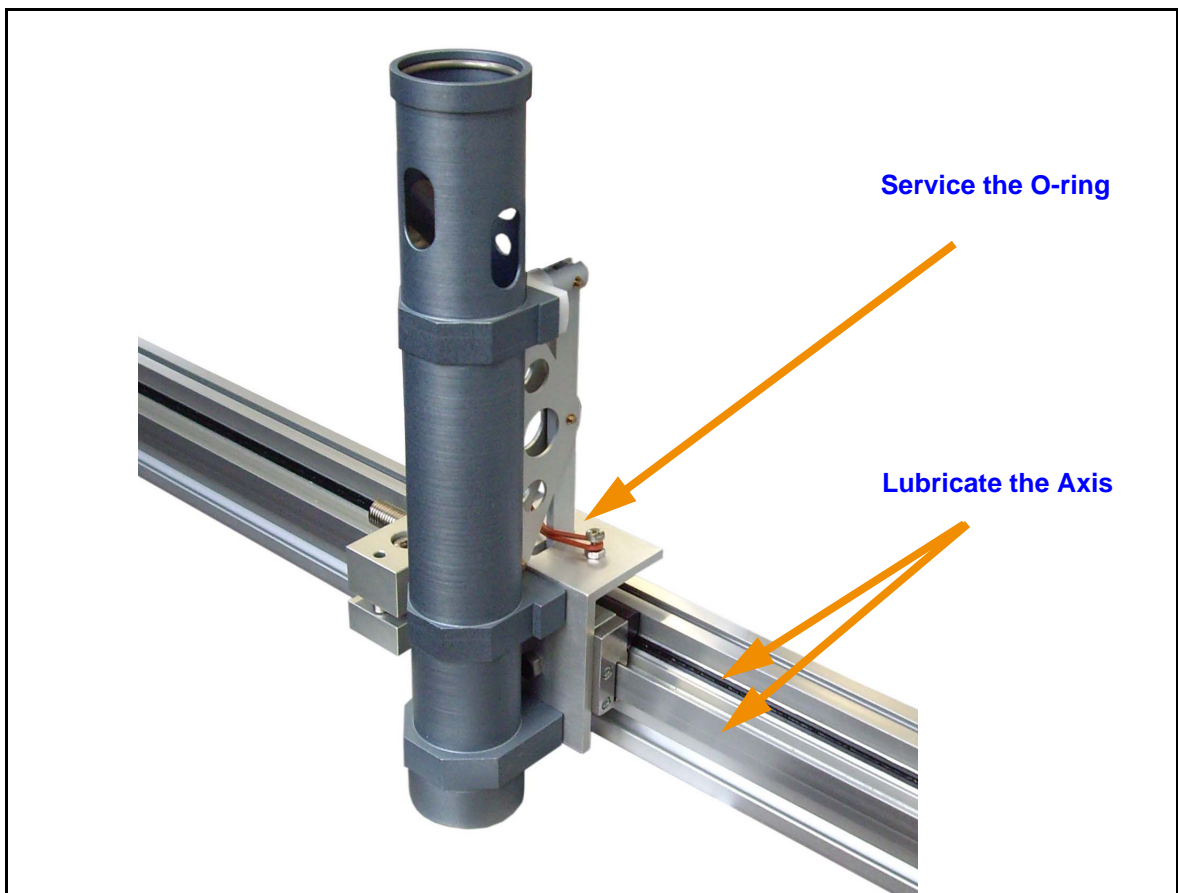


Figure 5.1: Maintenance to do

5.1.1 Linear Axis Lubrication

The linear axis has some friction areas which needs to be lubricated. This will prevent form wearing out of the axis. Please use only the silicone free grease that comes with the SampleCase. If the grease is missing please ask Bruker service for a replacement.

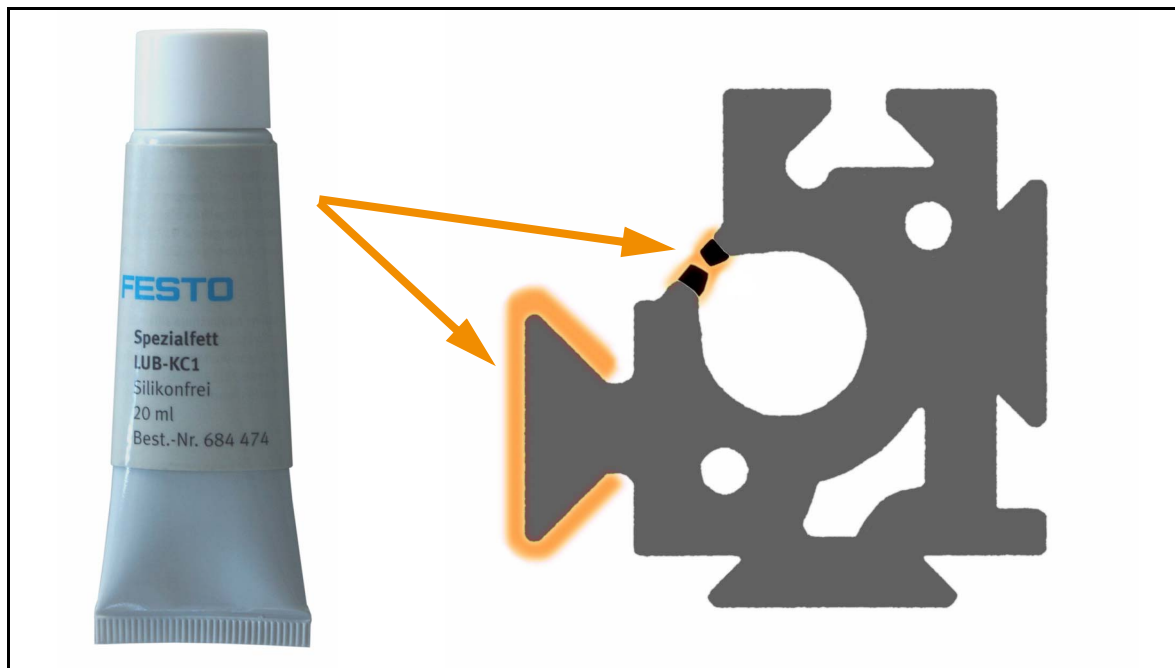


Figure 5.2: Lubricating the Axis

NOTICE

Lubricate the linear axis

The linear axis needs lubrication from time to time or anytime if the axis is starting to make noise while moving.

- ▶ If the axis is running dry the lifetime of the axis will be reduced dramatically.

5.1.2 Service of the Red O-Ring

The O-ring will wear out if the system is in use or not. If the rubber rips the tube cannot be captured in the slider. Spare O-rings are delivered with each SampleCase.

NOTICE

Exchange the red O- ring on the slider twice a year

Preventive replace the O-ring on the slider to ensure a failure-free operation.

- ▶ If the O-ring breaks the system will fail to transport tubes.
- ▶ The tube is not safe anymore and may be destroyed.

6 Technical Data

6.1 Site Considerations

The SampleCase should be setup in a standard laboratory environment. For more information refer to the Avance spectrometer manual on site planning (see [appendix E "References"](#)) available from Bruker.

6.2 Electrical Specifications

Data	Value	Unit
Mains supply	90-240	VAC
Mains frequency	50-60	Hz
Power consumption	20	W
Device voltage	24V	VDC

Table 6.1: Electrical specifications

6.3 Pneumatic Specifications

Data	Value	Unit
Medium (dry, oil-free)	nitrogen, air	-
Pressure	6-8	Bar
Minimum gas flow	100	NI/min ^{a b}

Table 6.2: Pneumatic specifications

a. Standard conditions for gas: 20°C, 101.3kPa, 65%rH (ANR norm litres after ISO R558 2.3 and ISO R554 2.2)

b. Work pressure = supply pressure -1bar (Gas flow at work pressure after ISO 1217)

6.4 Temperature Limitations

Data	Value	Unit
Ambient temperature.	See Avance spectrometer manuals on site planning ^a .	-
Max. temperature for standard spinners.	Read the limitations in the probe head manual ^b .	-
Max. temperature of sample tubes.	Limitations given by the spinners.	-

Table 6.3: Temperature limitations

a. See Appendix: A.5 References

b. See Appendix: A.5 References

6.5 Shipping Dimensions

Data	Value	Unit
Number of packages	2	-
Length (Package 1 / Package 2)	1.89 / 0.75	m
Width (Package 1 / Package 2)	0.52 / 0.43	m
Height (Package 1 / Package 2)	0.27 / 0.49	m
Weight (Package 1 / Package 2)	15 / 15	kg

Table 6.4: Shipping dimensions

6.6 Hardware Requirements

Name		Version
ELCB		ECL 05.01 or more recent (ECL 05.00 and below on request, ECL 02.00 and below are not compatible)
Either or	SLCB	With PNK variant 3, 3s or 5
	BSVT	SPB or SPB-E

Table 6.5: Hardware requirements

6.7 Software Requirements

Name		Version
Topspin		2.0 or more recent
ELCB firmware		101206 or more recent
SampleCase firmware		v6 or more recent
Either or	SLCB firmware	090206 or more recent
	BSVT firmware	all

Table 6.6: Software requirements

7 Equipment Clearance

7.1 Information Regarding Service

After the complete NMR system or additional sub components has been installed and hand over to the customer they are potentially contaminated. This has to be considered whenever Bruker employees are working on NMR systems after the initial installation. Here some examples:

- Service (planned or unplanned)
- Repair (customer or factory site)
- Disposal
- Transfer
- Upgrade (NMR system or its sub components)
- Exchange (egg. loan return)

It is strongly recommended to all Bruker employees to get an equipment clearance through the form "[Safety and Repair Declaration](#)" on [page 40](#) for work at the customer site. For any hardware leaving the customer this form must be used.

WARNING



Hardware exposed to hazardous substances

The product could be contaminated by hazardous substances by customers.

- ▶ The customers safety representative needs to declare that product is absolutely free of any hazardous substances with the "[Safety and Repair Declaration](#)" on [page 40](#).
- ▶ If the product needs to be shipped, attach this declaration to the delivery note on the package exterior.

7.2 Safety and Repair Declaration¹

Equipment Clearance Form for Service, Repair, Disposal or Transfer:

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

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

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

I ACCEPT THIS OBLIGATION

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

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

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

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

1. This form is a corrected copy of the original form ZFQS0083 version 03

8 Contact

Submit your inquiries regarding SampleCase sales and service to your local Bruker BioSpin representative. Use the following address to acquire further information.

8.1 Manufacturer

Bruker BioSpin
Industriestrasse 26
CH-8117 Fällanden
Schweiz
Phone: +41-44-825-91-11
Fax: +41-44-825-96-96
<http://www.bruker.com>

8.2 Technical Hotline

Phone: +41-44-825-98-90
samplecase-servcie@bruker.ch

Please refer to the Model No., Serial No. and Internal Order No. in all correspondence regarding the MR system or components thereof.

Appendix

A	Warning Signs	III
B	Figures	V
C	Tables	VII
D	Glossary	IX
E	References	XI
F	Certifications	XIII
G	Revision History	XV
H	Index	XVII

A Warning Signs

Caution

Sudden motion	14
System is moving after switching on gas supply.	19
System state not stable	13

Info

Dark push buttons are disabled	16
Eject is disabled when spinning is on	16
Emergency button pressed	16
Emergency stop reset	16

Notice

Check the rings before switching n the gas supply	20, 22
Disclaimer	7
Do not force the carousel	14
Exchange the red O- ring on the slider twice a year	33
Lubricate the linear axis	32
Overlength Samples	17
Repeat the lift calibration when exchanging the probe head	27

Warning

Hardware exposed to hazardous substances	39
------------------------------------------------	----

B Figures

Figure 2.1:	The carousel with the 24 holders	10
Figure 2.2:	The SampleCase mounted on a Magnet	11
Figure 3.1:	The two State LED's	13
Figure 3.2:	The hardware interface "idle" and "measure"	15
Figure 3.3:	The Tube Length Limitation	17
Figure 3.4:	Allowed spinners.....	18
Figure 3.5:	Interrupting the gas supply.....	19
Figure 3.6:	Moving transfer slider tube manually	19
Figure 3.7:	Operating on the Carousel Unit	21
Figure 3.8:	Removing the rings	21
Figure 3.9:	The bayonet ring	22
Figure 4.1:	SampleCase TTY settings in "cf"	23
Figure 4.2:	SampleCase "cf Configuration"	24
Figure 4.3:	SampleCase "cf" Result	24
Figure 4.4:	Access the BSMS Service Web.....	25
Figure 4.5:	The SampleMail Control Page	26
Figure 4.6:	SampleCase Lift Calibration	27
Figure 4.7:	SampleCase Lift Calibration	28
Figure 4.8:	IconNMR Setup.....	29
Figure 5.1:	Maintenace to do	31
Figure 5.2:	Lubricating the Axis.....	32

C Tables

Table 3.1:	Type of SampleCase States.....	13
Table 3.2:	Specific SampleCase States	14
Table 3.3:	Topspin commands for the SampleCase	18
Table 4.1:	Topspin commands for configuration	23
Table 4.2:	The “Lift Mode”.....	26
Table 6.1:	Electrical specifications	35
Table 6.2:	Pneumatic specifications	35
Table 6.3:	Temperature limitations	36
Table 6.4:	Shipping dimensions	36
Table 6.5:	Hardware requirements	37
Table 6.6:	Software requirements	37
Table G.1:	The Revisions of this Manual	XV

D Glossary

BSMS

Bruker Smart Magnet control System

IconNMR

Bruker software module for automation

LED

Light Emitting Diode

Topspin

Bruker software for acquisition, processing and analysis

E References

- [1] BRUKER Site Planning AVANCE Systems 300-700MHz (Z31276)
Stanley J. Niles / Daniel B. Baumann, February 24, 2008
Bruker Biospin GmbH, Rheinstetten, Germany
- [2] BRUKER Site Planning AVANCE Systems 750-950 MHz (Z31686)
Razvan Teodorescu, August 28, 2006
Bruker Biospin GmbH, Rheinstetten, Germany
- [3] BRUKER Probes (Z31339)
D. Marek, R. Triebe, M. Waden, D. Wilhelm July 2, 2009
Bruker BioSpin AG, Fällanden, Switzerland

F Certifications

		CB TEST CERTIFICATE		Ref. Certificate No. CH-6162
IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT (IECEE) CB SCHEME				
Issued by:	Electrosuisse			
Product:	Probe transporter			
Applicant:	Bruker BioSpin AG	Industriestrasse 26 CH-8117 Fällanden	Switzerland	
Manufacturer:	Bruker BioSpin AG	Industriestrasse 26 CH-8117 Fällanden	Switzerland	
Factory:	Bruker BioSpin AG	Industriestrasse 26 CH-8117 Fällanden	Switzerland	
Rating and principal characteristics:	24VDC, 0.7A, IP20			
Trade mark (if any):	BRUKER			
Model/Type reference:	SAMPLEMAIL PLUS			
Additional information:	—			
Sample of product tested to be in conformity with IEC:	61010-1(ed.2) 61010-2-081(ed.1);am1	National differences: EU Group Differences; EU Special National Conditions; EU A-Deviations; CA; US		
Test Report Ref. No.:	11-EL-0015.01 + .02			
This CB Test Certificate is issued by the National Certification Body:				
Electrosuisse Luppenstrasse 1, CH-8320 Fehraltorf				
Signed by:	Martin Plüss			page 1 of 1
	2011-04-28			

G Revision History

Index	Date	Who	Alteration Type
001	15.11.2011	SRE	First release / Product launch

Table G.1: The Revisions of this Manual

H Index

B

Buttons 16

C

cf 24

Commands 18

E

Eject 16

Emergency Stop 16

G

Gas supply 19

H

Hazardous substances 39

Hotline 41

I

IconNMR 29

Inject 16

L

LED 13

Lift 27

M

MAS 21

O

O-ring 31

Overlength 17

R

Rotate 16

S

Spinners 18

States 13



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