SampleMail
SampleCase

Installation Guide

Version 02

NMR Spectroscopy

Innovation with Integrity

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Summary

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1 Introduction

1.1 General Description

The SampleMail products will make your daily work on NMR systems easier. No leader/ stairs climbing for tube submission is necessary anymore since users can operate the system very convenient from floor level. Versions for single tube submission or with a 24 holder storage for automation are available.

Figure 1.1: The SampleCase Version with the 24 Holders

1.2 SampleMail Products Benefits

Product	SampleMail	SampleCase
Very easy handling	X	X
System operation from floor level	X	X
Fits all shielded Bruker standard bore magnets from 300 – 900 MHz[a]	X	X
Immediate sample submission	X	X
Full integration in Topspin	X	X
Full integration in IconNMR	-	X
Number of holders for various type of NMR tubes	1	24

Table 1.1: Installation Overview

a. Contact Bruker for installation specifications on other magnets

Figure 1.2: Option Carousel or Hand Slider

1.3 The Different SampleMail Products

The SampleMail system has just one component either with a long or a short axis. For higher magnets starting from 750MHz an extra long vertical pipe has to be ordered.

Description	Number
SM SAMPLEMAIL 610 CPL.[a]	Z133066
SM SAMPLEMAIL 1030 CPL.[a]	Z116802
SM VERTICAL PIPE L=2450 [b]	Z117094

Table 1.2: The SampleMail AH0170

a. Either shorter or longer axis
b. Only required for Magnets > 700MHz

The SampleCase system has two components either a long or a short axis and the carousel with the 24 holders. For higher magnets starting from 750MHz an extra long vertical pipe has to be ordered.

Description	Number
SM SAMPLEMAIL PLUS 610 CPL.[a]	Z133067
SM SAMPLEMAIL PLUS 1030 CPL.[a]	Z123384
SACA SAMPLECASE CPL.	Z122633
SM VERTICAL PIPE L=2450 [b]	Z117094

Table 1.3: The SampleCase AH0171

a. Either short or long axis
b. Only required for Magnets > 700MHz

For details about the required parts please read ”Track Length” on page A-5-46.

1.4 SampleCase Overview

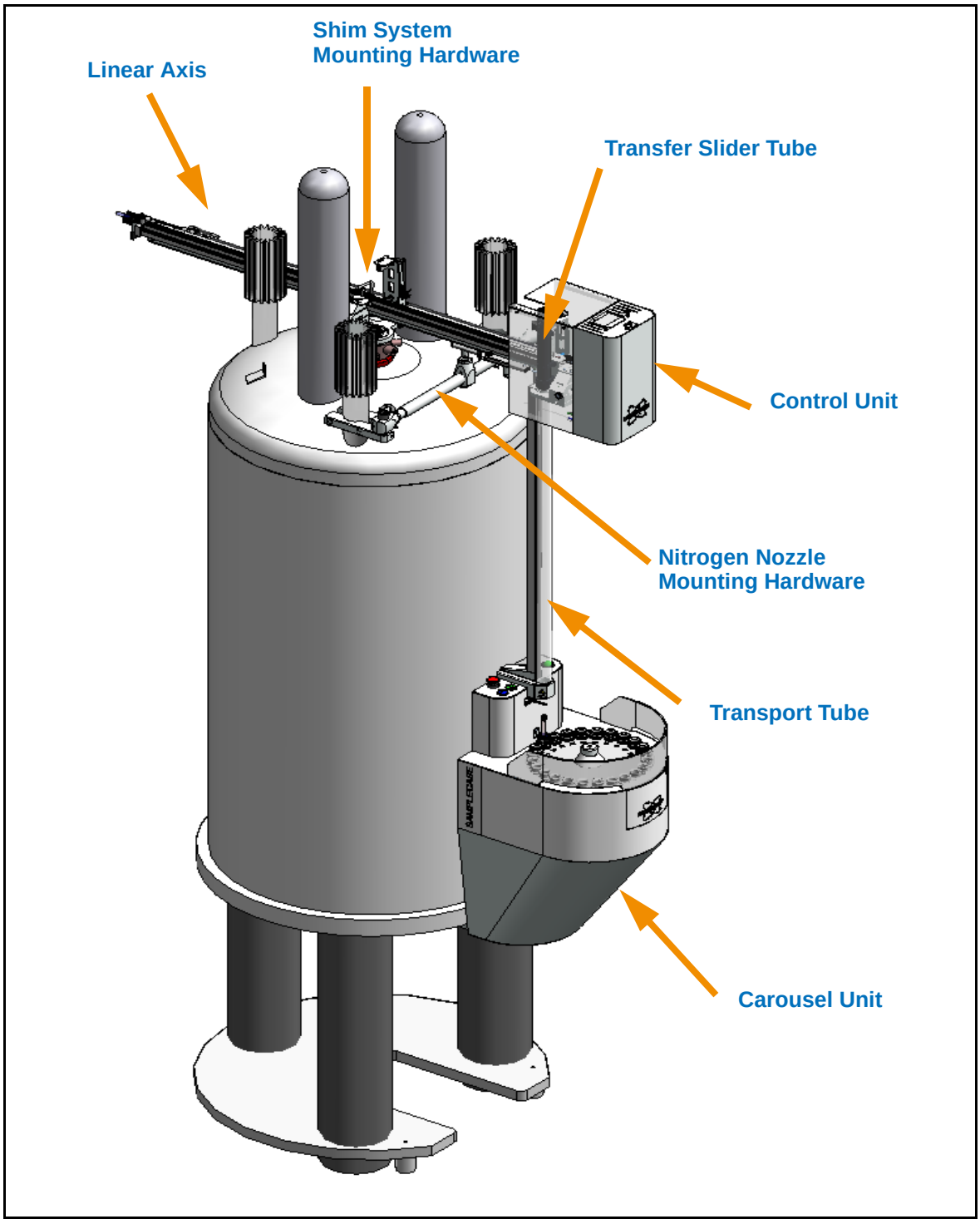

Figure 1.3: The SampleCase Mounted on a Magnet

2 About

2.1 This Manual

This manual is intended to be a reference guide for 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.

2.2 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.

2.3 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 SampleMail Products should operate them.
- Read this manual before operating the unit. Pay particular attention to any safety related information.

NOTICE

Disclaimer

Bruker is not responsible or liable for any injury or damage that occurs as a consequence of none-approved manipulations on the SampleMail Products.

► Read the manual carefully before working on/with the Sample Products.

2.4 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.

2.5 Safety Symbols on the Device

All safety symbols on the device are described in "Safety Symbols" on page 53.

3 Installation Notes

3.1 About the Installation

The installation of SampleMail products is simple as long as you follow the correct sequence. This is mostly given by the sequence of the instructions in this manual but has some exceptions.

- It is a good thing to read first the Users Manual ("References" in appendix E) to get an idea about the function of the system. Without this knowledge it is much harder to do a failure-free installation.
  In addition the software configuration is described also in the Users Manual and is therefore needed to finish the installation.

- It is important to know, that the system is pre-adjusted to a specific magnet and that the hardware has some fine adjustments done at the production. While the magnet specific adjustment could be wrong, the hardware adjustments could have be shifted during shipment. It is wise to check these adjustments prior to the installation even if they does not need to be touched normally. They are described in the chapter ”Presettings” on page 45.

There are two different axis length available. The long one can be installed on most magnets, but for some magnets the short axis is mandatory. With the standard transport tube the SampleMail products can be mounted on most magnets. Some few magnets are too high and need an extra long tube. Which hardware fits which magnet is also listed in the chapter ”Presettings” on page 45.

NOTICE

The hardware needs to fit on the magnet.

The SampleMail products are available in two different axis length to cover all the different magnets. For the biggest magnets an additional transport tube is needed.

- ► Check iff the length of the axis is fitting to the magnet.
- ► Check if a extra long plastic transport tube is needed.

Step	Action	See...
(1)	Read the users manual first.	"References" in appendix E
2	Find the best orientation for the axis	”Determine Axis Orientation” on page 22
3	Check the factory-set adjustments	”Presettings” on page 37
4	Install the N2 mounting hardware	”N2 Mounting Hardware” on page 26
5	Install the axis	”Axis Installation” on page 29
6a	Mount the hand slider and the tube	”SampleMail: The Hand Slider” on page 31
6b	Mount the carousel unit and the tube	”SampleCase: The Carousel Unit” on page 34
7	Connect the device to the console	”Connections” on page 41
8	Do the software configuration (Users Manual)	"References" in appendix E

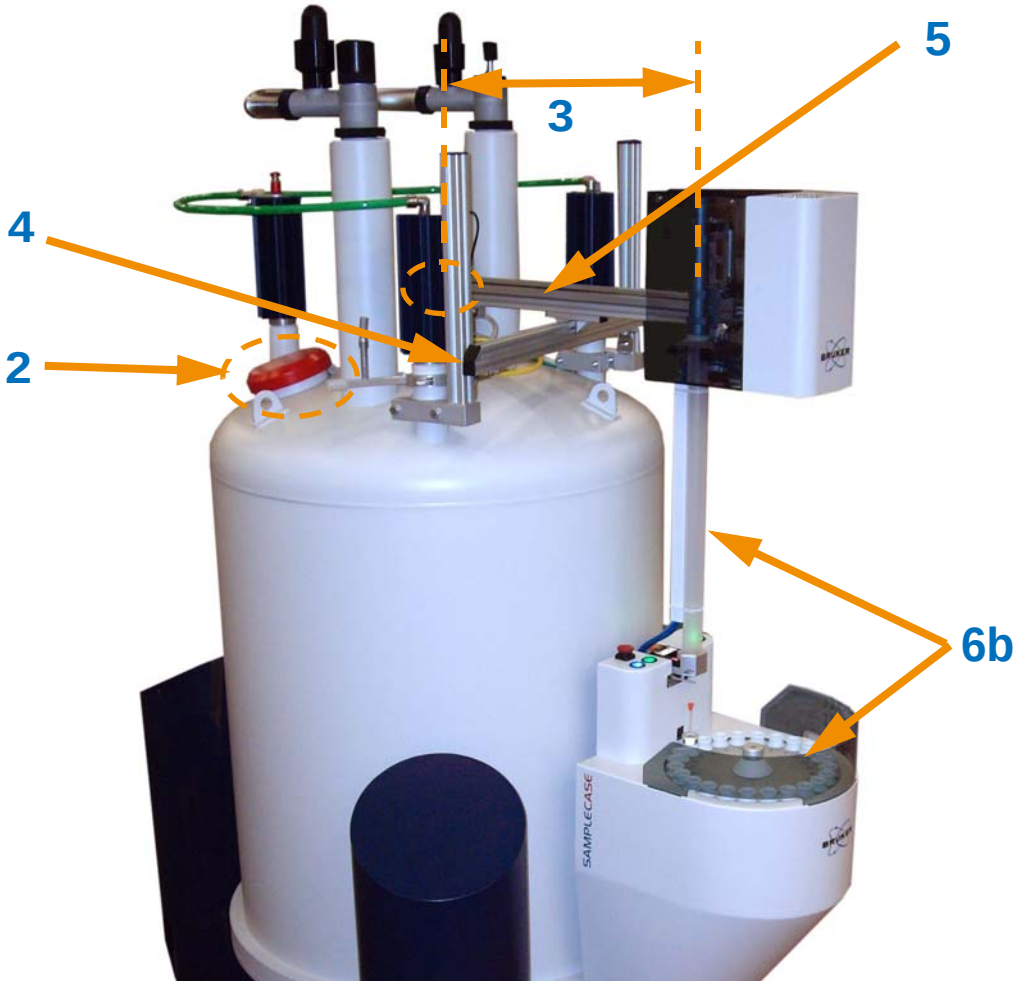

Table 3.1: Installation Sequence

3.2 Precautions

⚠ WARNING

Use suitable ladder or platform.

For bigger magnets one or more ladders or platforms are needed. Working at an elevated level above ground always bears the risk of falling.

- ▶ Do only use approved climbing aids.
- ▶ Wear non-slip shoes.

⚠ CAUTION

System may be 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 and head off the system when switching gas supply on.

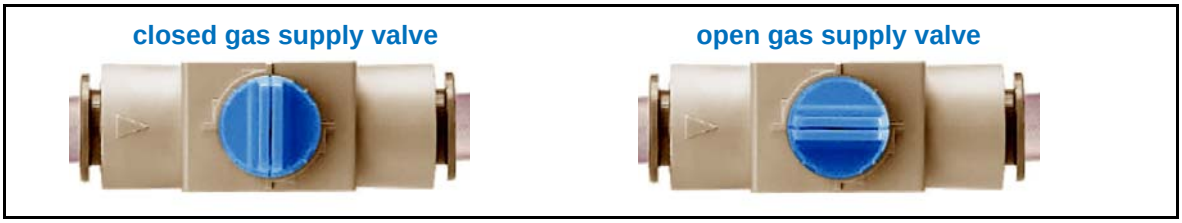

Figure 3.1: Switching on Gas Supply

⚠ CAUTION

De-energize the system for service.

Actuators could move without any warnings as long as the system is supplied with compressed gas.

- ▶ Switch off gas supply when doing service actions that are not require gas pressure.

NOTICE

Do not press in the sealing on the axis

The black sealing lips on the axis can be easily be pressed in when the axis is not under pressure. You may have problems to put the sealing back in place.

► Avoid touching the sealing while holding the axis in hands.

The black sealing lips on the pneumatic axis can be pushed inside when the axis is not on pressure. The axis will then leak when the system is set under pressure. For shipping the hoses on the axis needs to be disconnected, because pressure differences during flights or at different altitudes may also shift the sealing.
In some cases the sealing will pop back when the axis is connected to compressed gas. If this does not help, move the slider to bring the sealing back to its initial position. Depending on the location on the axis some hardware needs to be removed to bring the slider to the leaking area.

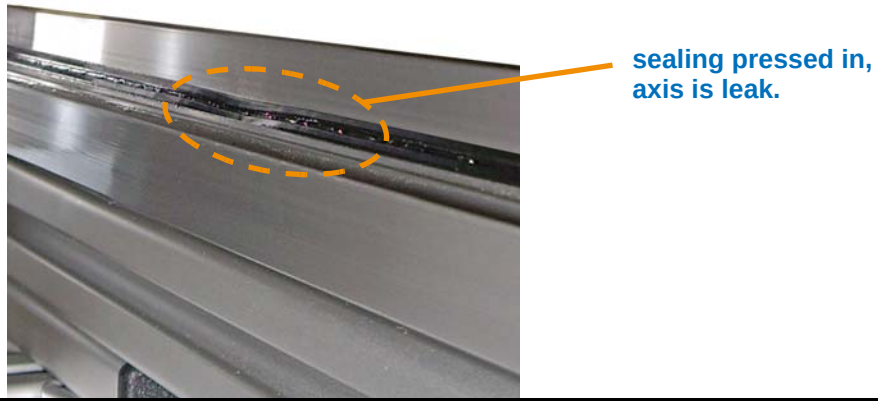

Figure 3.2: Pushed in Axis Sealing

3.3 Unlevelled Magnets

NOTICE

The magnet needs to be levelled.

All the mounted hardware will be tilted with respect to the BST if the magnet is not leveled prior to the installation. Levelling hardware on an unleveld magnet will cause problems.

- Check the tilting of the magnet (dampers off, as during the installation) with a level on the very top of the BST.
- If required and possible level the magnet before the installation.
- If a magnet is aslope and cannot be adjusted all the mounted hardware needs to be tilted according to the magnet.

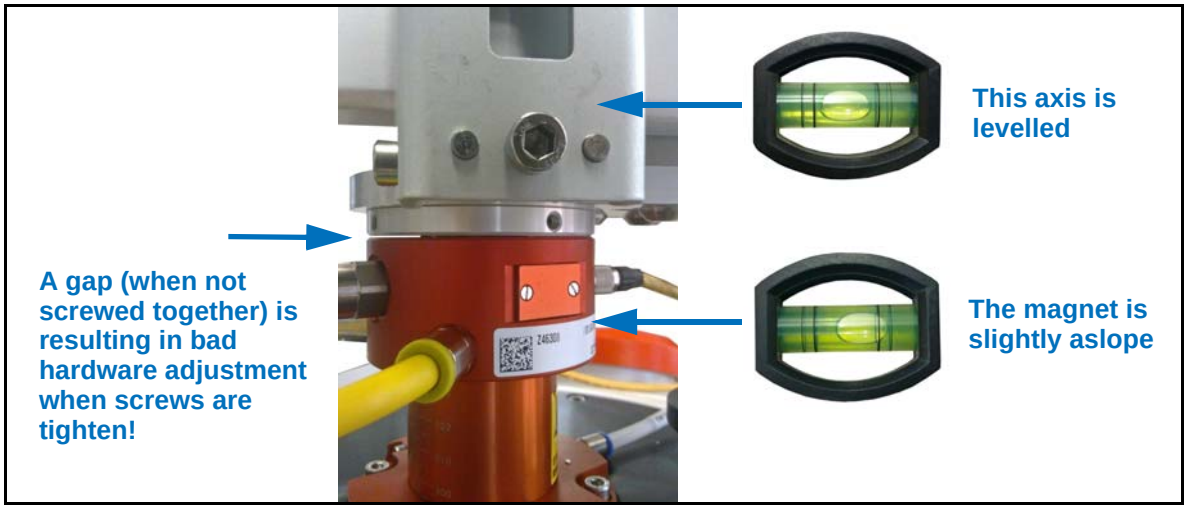

Figure 3.3: Consequences of Unlevelled Magnet I

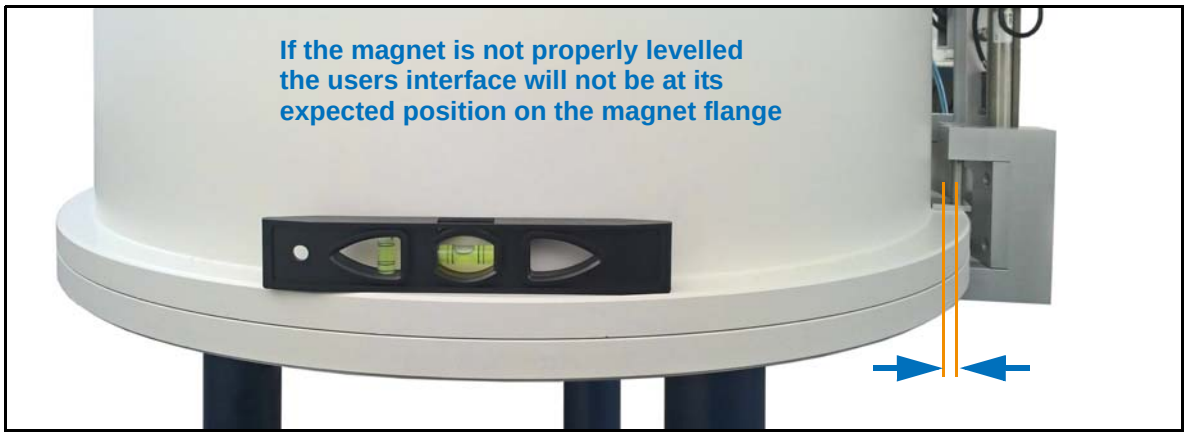

Figure 3.4: Consequences of Unlevellled Magnet II

3.4 Unpacking

For shipping the axes is screwed in the box. This transportation lock is needed because the heavy axis would otherwise damage the controller. Unscrew the transportation lock before lifting the axis out of the box.

Figure 3.5: The Axis in its Box

There are handles inside the box containing the carousel body. With these handles in the inner tray you can easily lift the carousel body out of its box.

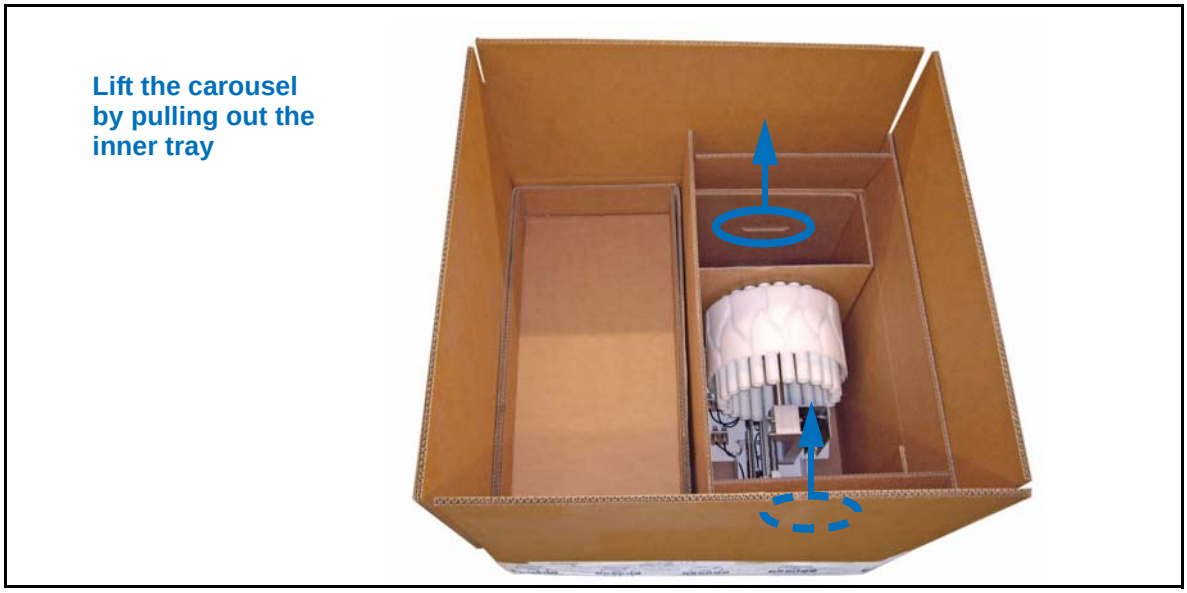

Figure 3.6: The Carousel Body in the Box

3.5 Required Equipment

Equipment	Sizes	Remark
Metric Allen keys	2, 2.5, 3, 4, 5	
Metric wrenches	8, 10, 13	
Slot screw diver	2 (middle size)	
Phillips screw driver	1 (small)	
Hose cutter	6mm / 8mm	
Level	200mm	Comes with the device
Tube cutter	30mm	Comes with the device
Tube cutting insert	25mm	Comes with the device
Sharp blade	small	Comes with the device
Cable ties (30pcs.)	200mm	Comes with the device
Velcro strap (2pcs.)	250mm	Comes with the device
Special grease	20ml	Comes with the device, for maintenance only

Table 3.2: Required Tools

Figure 3.7: Included Equipment (incomplete)

3.6 Cutting the Transport Tube

NOTICE

Carefully cut the transport tube.

The vertical transport tube needs to be cut to the proper length very accurate. If once the tube is too short, the installation cannot be completed. In addition it is difficult to cut away a short piece if the tube is too long.

- Make sure the previously installed hardware is aligned before cutting the tube
- In a first approach cut the tube some centimetres longer and measure then the offset for the final cut.
- Properly mark the distance for the final cut.
- Cut carefully by always rotating the tube and not the cutting tool.

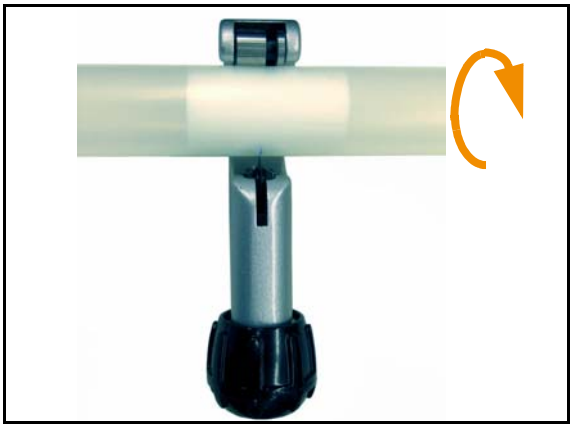

Figure 3.8: How to Cut the Tube with the Tool

To cut the tube use the cutter and the inlet that comes with the delivery. The inlet needs to be inside the tube to stabilize the soft tube when applying force with the cutter.
Do not rotate the cutting tool because this will produce no straight cut. To get a straight cut hold the tool in place and rotate the tube while slowly increasing cutting depth.
On the first approach cut the tube some centimetres longer than actually needed.

3.7 Ends of The Transport Tube

After cutting the tube both sides needs to be prepared with the scalpel blade that comes with the delivery. Cutting the tube will lead to end pieces pointing inwards. You have to cut away this inner edge in a steep angle as shown on the drawing and check the result with a spinner. The end pieces are prepared when the spinner cannot hang on the inner edge.

NOTICE

Prepare both sides of the transport tube.

After cutting the tube there is a disturbing edge on the inside of the tube. For a reliable spinner transport these edges needs to be removed.

- ► Both ends of the tube needs to be prepared with the scalpel blade.
- ► Check if a spinner can hang at the end positions.

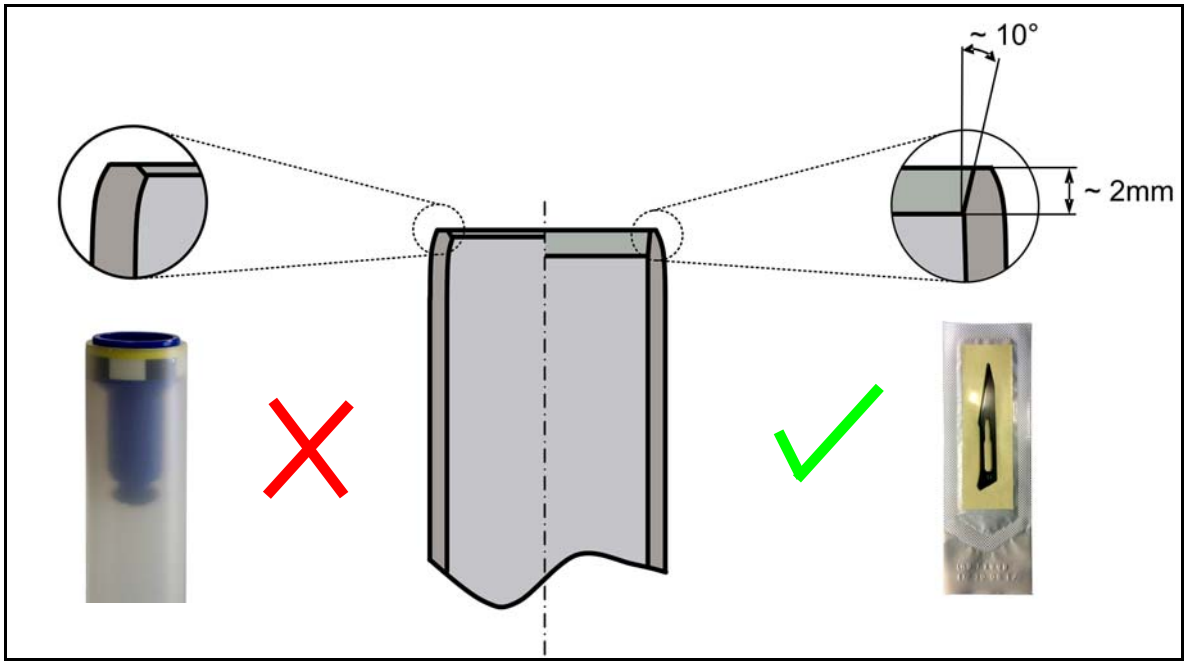

Figure 3.9: How to Prepare the End of the Transport Tube

3.8 Determine Axis Orientation

The best orientation for the axis needs to be found depending on the setup of the NMR system in the lab, the design of the magnet and other installed hardware.

⚠ WARNING

Do not cover the drop off plate.

Neither the axis nor the cables and hoses are allowed to cover the drop off plate since this serves as a over pressure valve for the magnet and is safety relevant.

- Consider the drop off plate when choosing the orientation of the axis.
- Use the velcro straps (included in the delivery) to fix the cables and hoses beside the drop off plate
- Use the safety sticker for the drop off pate (included in the delivery) to label this warning on the drop off plate itself (if sticker is not already there).

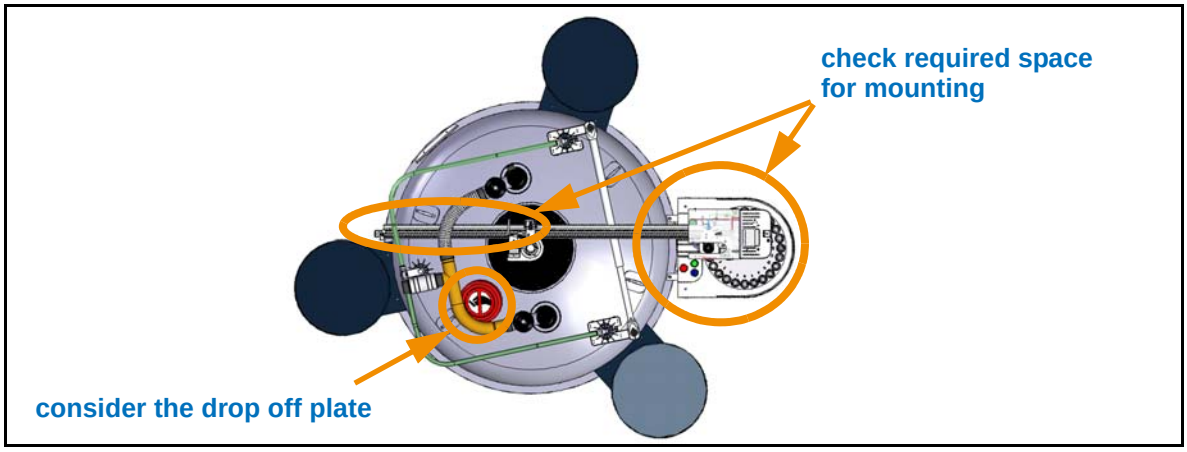

Figure 3.10: Orientation of the Axis

If the transfer slider is travelling underneath any helium or nitrogen connections a minimum clearance is needed for the NMR tube.

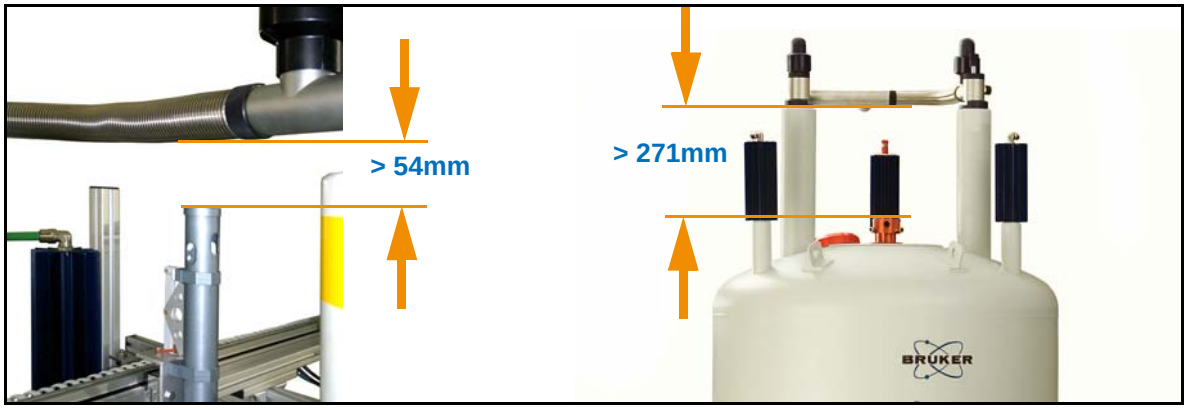

Figure 3.11: Clearance for the Slider

3.9 Determine Position of the User Interface

Determine the position for the user interface. While you can freely chose the position for the SampleMail hand slider the SampleCase carousel offers only two heights for the installation. Choose the position in a way that the user can comfortably access the tubes and keep in mind to leave space for other hardware (e.g. the transfer lines for cooled probes).
See the range for the SampleMail hand slider and the positions for the SampleCase carousel on the following two pictures. In addition you can also see the position of the port or carousel relative to the flange.

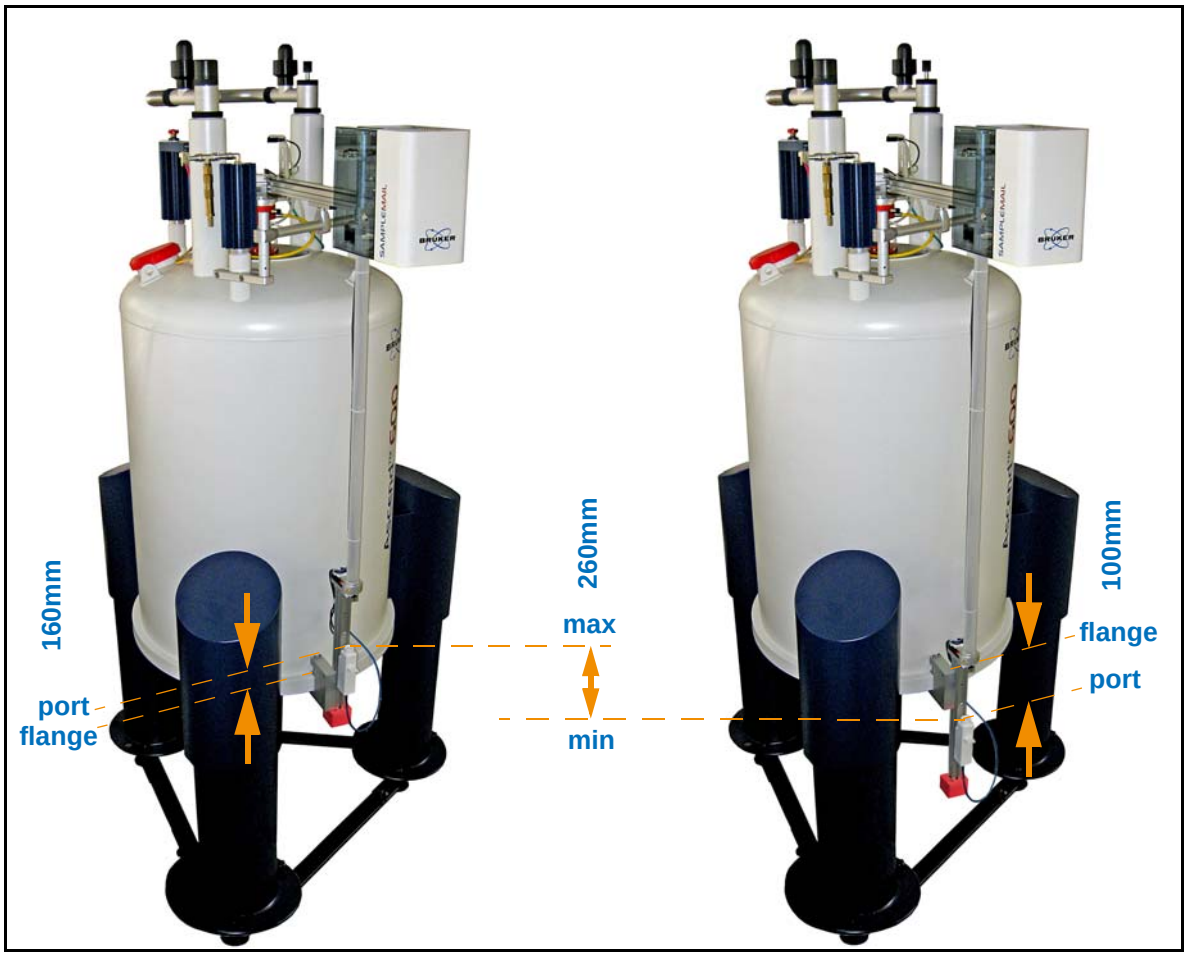

Figure 3.12: The Position of the Hand Slider can be Chosen in a Range.

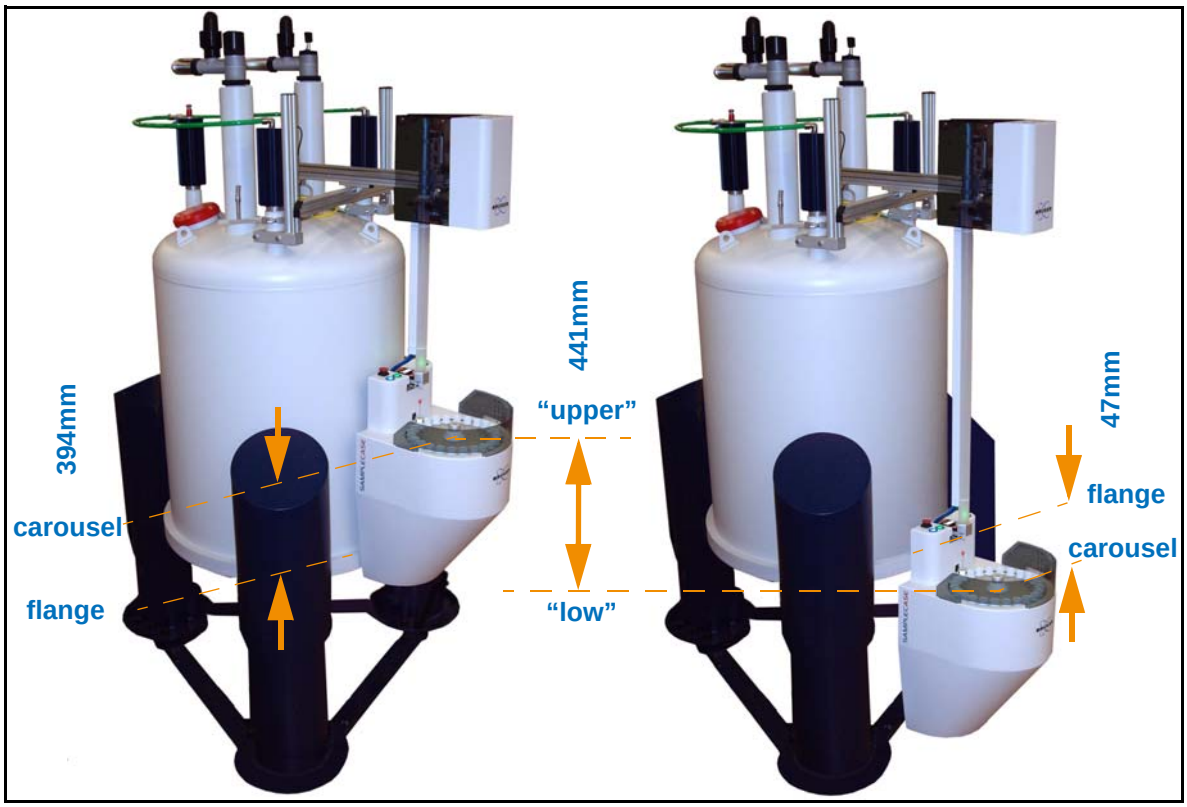

Figure 3.13: The two Possible Carousel Positions.

4 Mounting

4.1 Preparing the BST

NOTICE

Work carefully on the BST.

Screws needs to be placed and removed on top of the BST for this installation and may fall into the magnet.

- ► Close the hole to the magnet if possible.
- ► Work on the screws one after another.

[1] Remove the two special screws on the top of the BST and memorize the position of those two threads and the position of the lid switch.

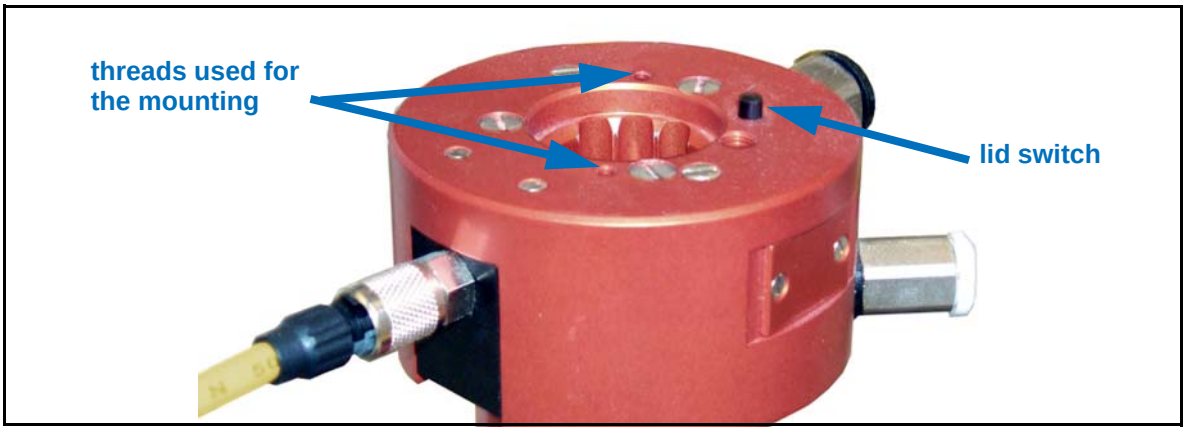

Figure 4.1: Prepare the BST top

4.2 N2 Mounting Hardware

[2] Start the installation by mounting the N2 mounting hardware to the nitrogen ports. This hardware is very flexible in order to fit on every magnet.
The horizontal connection bar and the vertical poles can be mounted in several different ways. Make sure the horizontal connection bar is as far as possible from the centre of the magnet in order to have then later a god support for the axis.

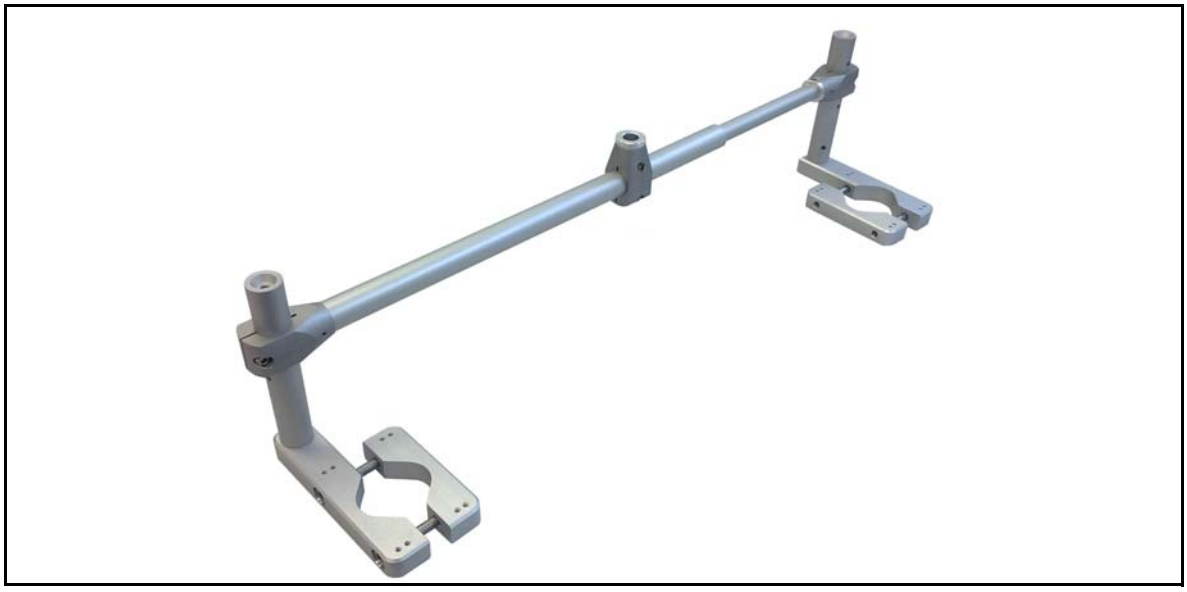

Figure 4.2: The Pre-Assembled N2 Mounting Hardware.

[3] The length of the horizontal bar can be adjusted by sliding the thinner bar in the thicker on. Rotate the two poles relatively to each other to loose or fix them. The support for the axis is always on the thicker bar. If it is on the wrong side just flip the whole bar.
Hide all the screws on the hardware by facing them to the back of the magnet as shown below.

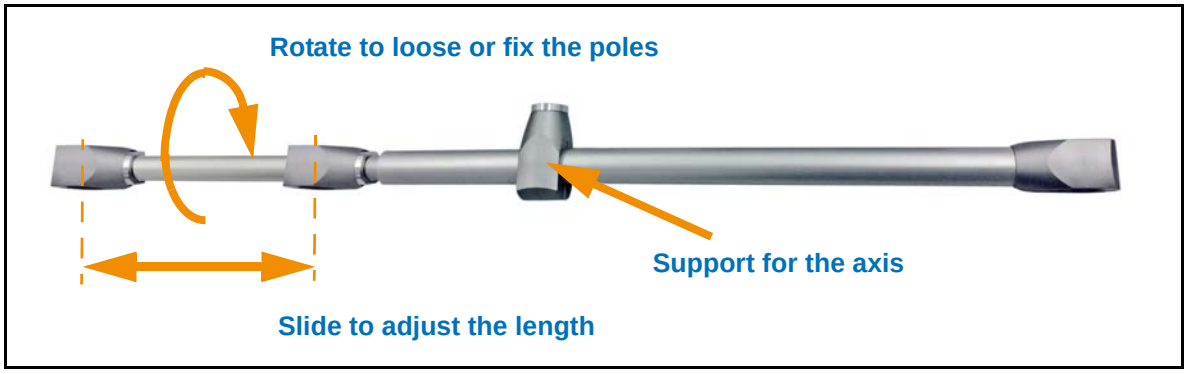

Figure 4.3: Adjusting the Length of the Bar.

[4] Start with screwing the claps on the two front N2 towers.

NOTICE

Set the clamp correctly on the N2 tower.

If the clamp is installed correctly it could be used also for the BNL (Bruker Nitrogen Liquefier) if the magnet will later be equipped with this system.

- ► The clamp should be mounted 55 to 60mm below the shoulder of the N2 tower.

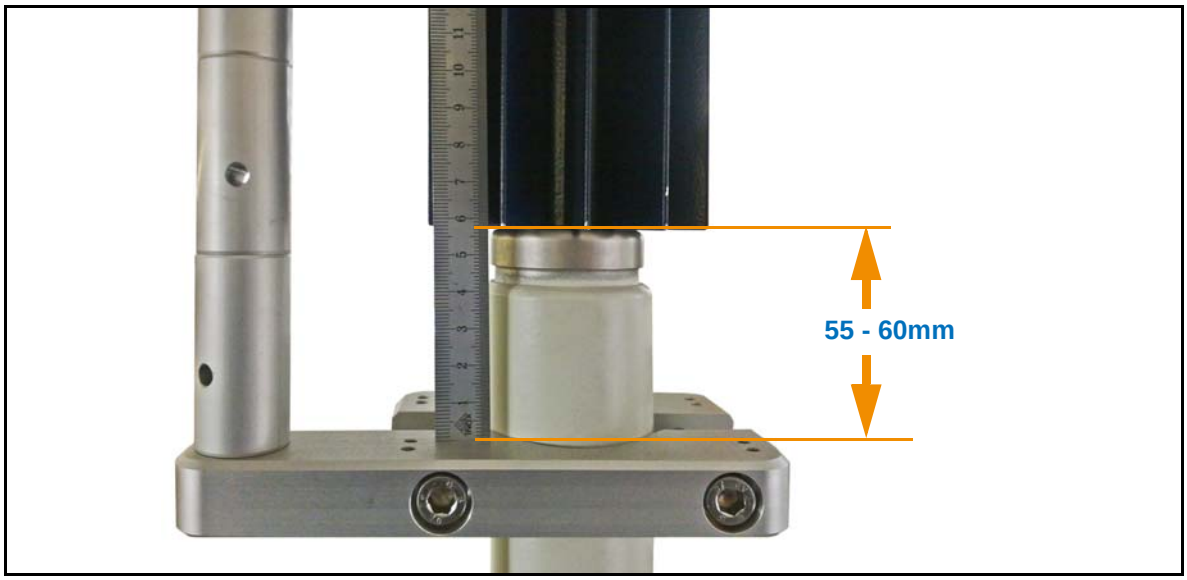

Figure 4.4: Setting the Clamp on the N2 Tower

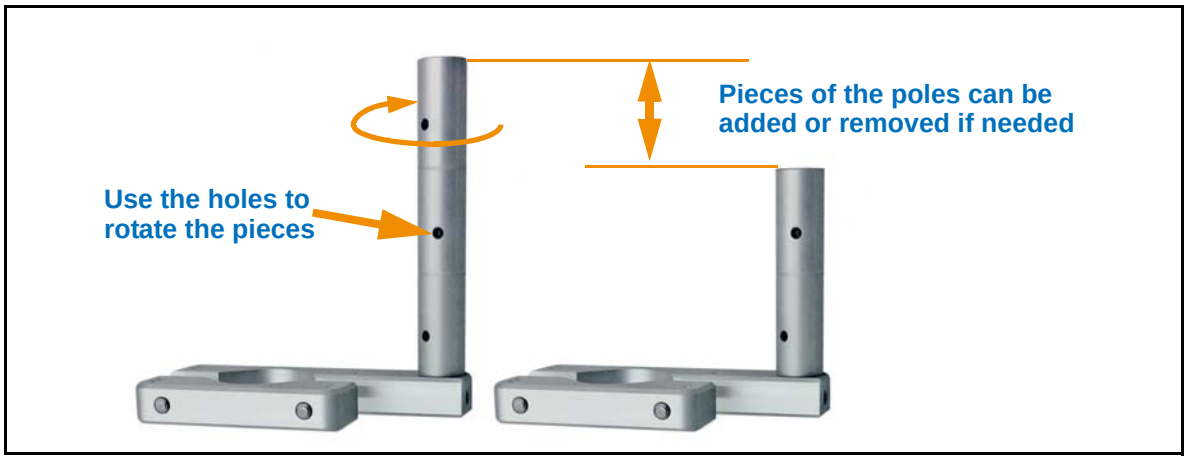

Figure 4.5: The Height of the Poles can be Adjusted

[5] Mount the horizontal bar on the poles of the clamps and rotate the inner bar to fix the length. If possible set all the screws facing to the rear of the magnet.

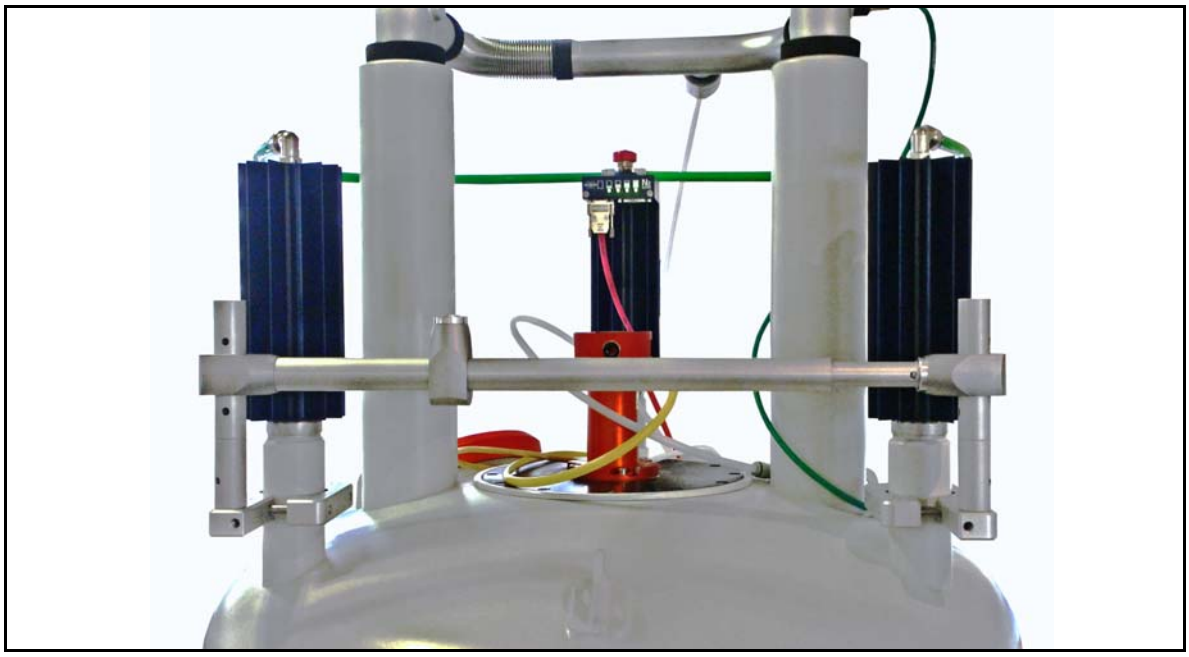

Figure 4.6: The N2 Mounting Hardware

[6] Set the adjustment tool on the hardware with the correct angel for the axis.

[7] Level and adjust the horizontal bar and the bar of the tool.

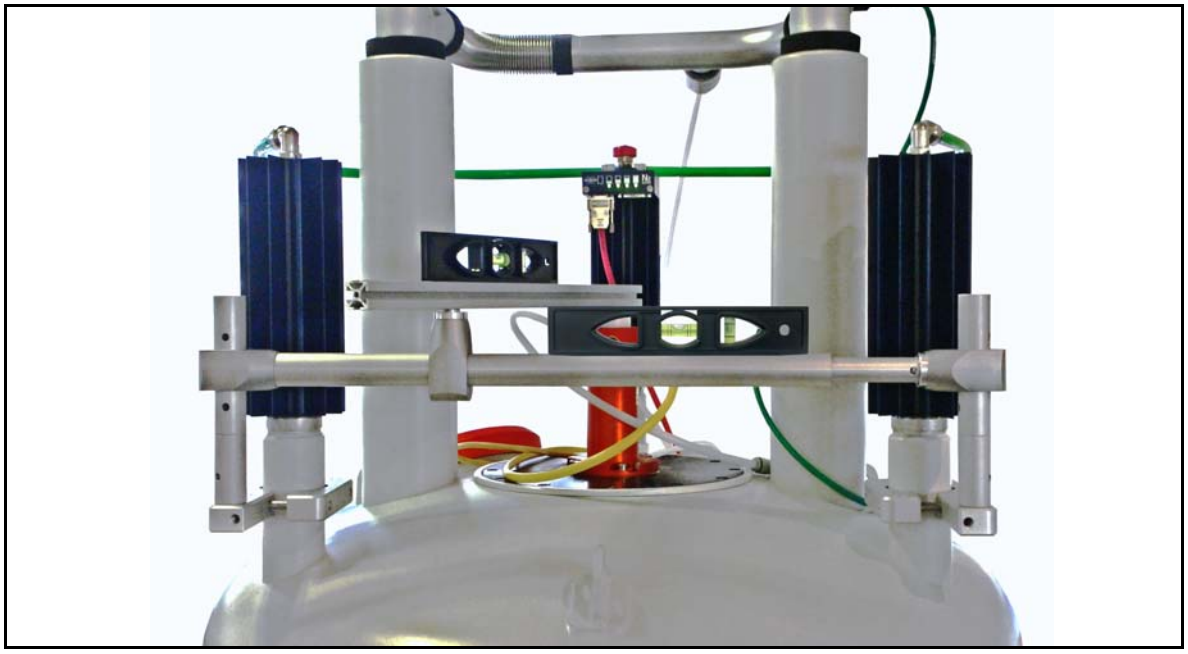

Figure 4.7: Levelling the N2 Mounting Hardware

4.3 Axis Installation

[8] Untighten the three outer screws on the BST mounting hardware so that the inner part can be rotated.

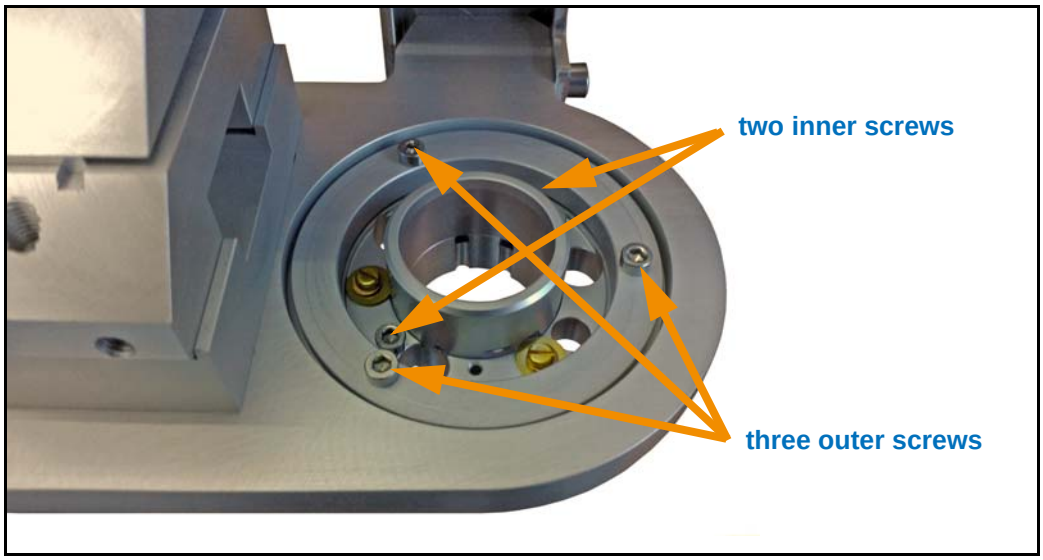

Figure 4.8: Prepare the BST Mounting Hardware

NOTICE

Do not force half-mounted axis

The axis has a leverage effect to the mounting points when mounted only on one side.

- ▶ Only screw the axis when the horizontal mounting bar is adjusted.
- ▶ Screw the axis on the BST while it is supported by the horizontal bar.
- ▶ Secure the axis with the screw on the support

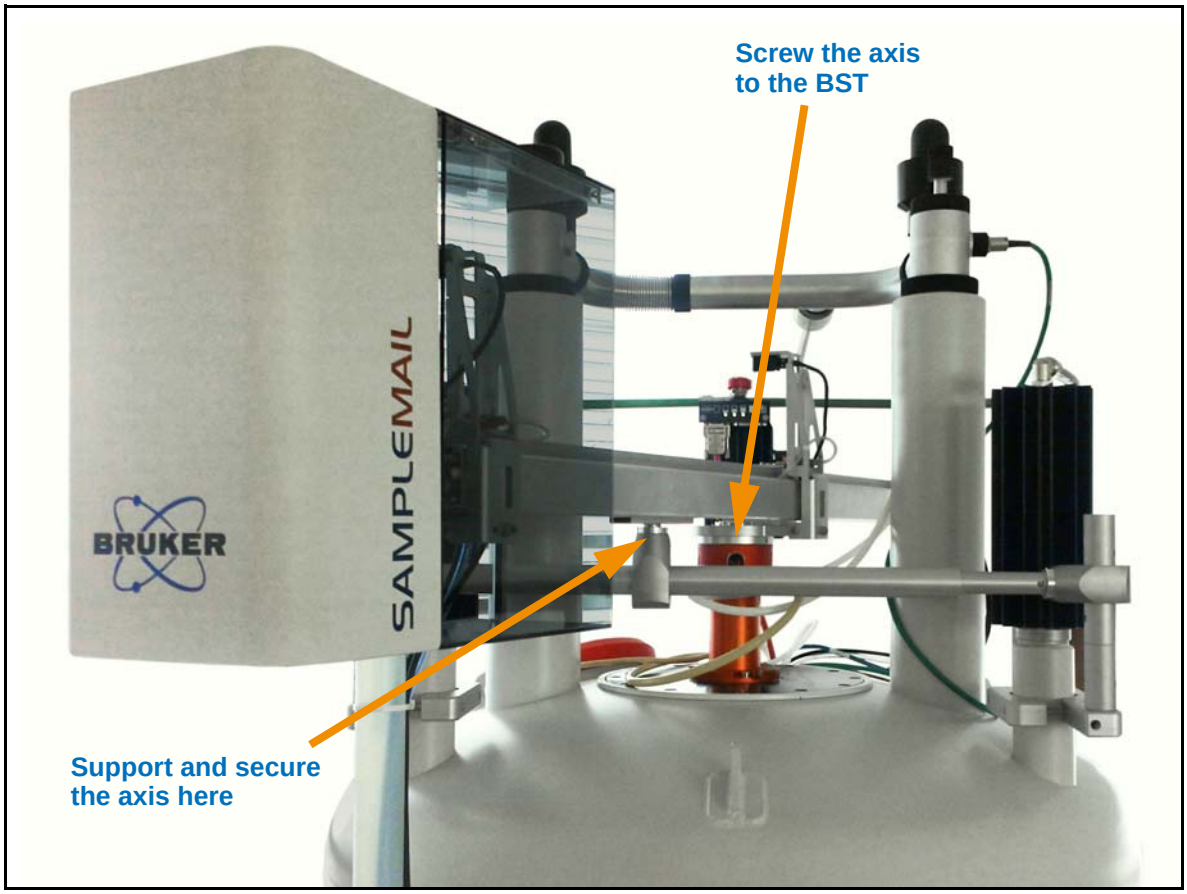

Figure 4.9: The Axis Mounted on the Magnet

4.4 SampleMail: The Hand Slider

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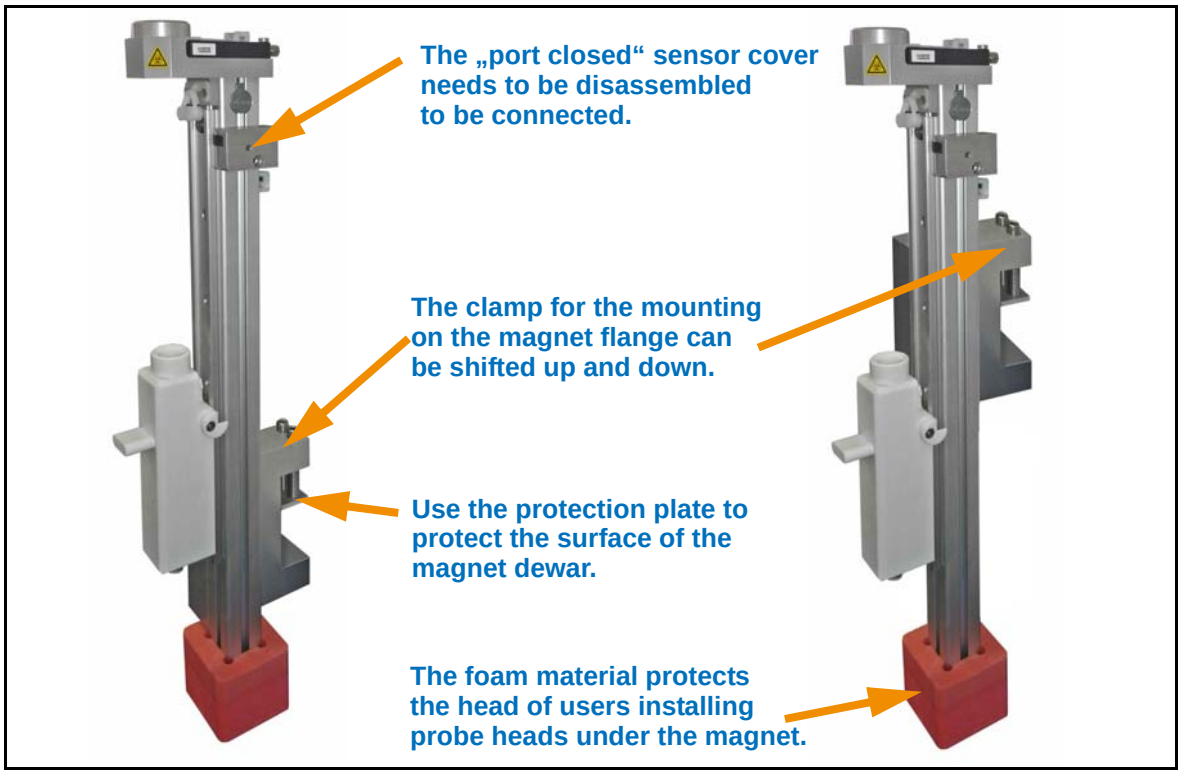


Figure 4.10: The Hand Slider

[9] Screw the hand slider to its position on the magnet flange just underneath the control box. The fine adjustment for the hand slider can be done later, when the transport tube is inserted. Use the protection plate to protect the surface of the magnet.

Figure 4.11: Set the Hand Slider to its Position

[10] Shift the hand slider to position but do not shift it on the very top. You may need to shift it some millimetres upwards to compensate the inaccuracy of the length of the transport tube.

[11] Cut the transport tube some centimetres longer than it is actually needed.

[12] Then insert the tube to the upper port at the axis and mark the final length. The reference is the flat surface of the port.

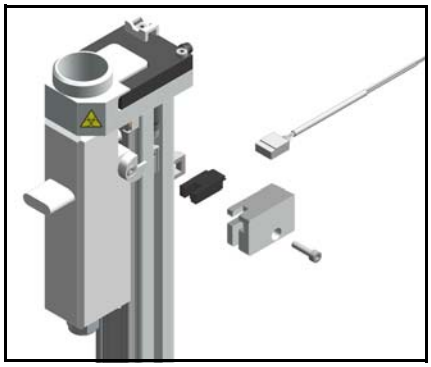
[13] Finally cut the tube to the correct length

Figure 4.12: Mark the Tube for Cutting

[14] Unscrew the hand slider from its clamp to insert the tube. Place the hand slider in a position that the tube is not squeezed but also cannot be moved up more then 1mm. **Do not hit the hand slider hardware and the tube against the axis on top.**

[15] Adjust the hand slider so that the transport tube is straight. Use the level for this but keep in mind that the transport tube is never 100% straight. Rotate the transport tube to see its bending.

Figure 4.13: Adjust the Hand Slider to its Final Position



[16] The sensor detecting that the hand slider is closed cannot be correctly plugged in when the sensor is captured in its aluminium holder. Dismount the holder to plug in the connector properly. Otherwise the sensor may not working reliably.

Figure 4.14: The Sensor for the Hand Slider

[17] Re-install the sensor and adjust it. Do not forget to check the adjustment as soon as the system is powered.

[18] Put the red foam protection cap on the lower end of the hand slider.

4.5 SampleCase: The Carousel Unit

[19] Set the mounting clamp to the lower or upper position to have the carousel at the chosen height. For the lower position the top part of the back plate needs to be broken away and swapped with the clamp.

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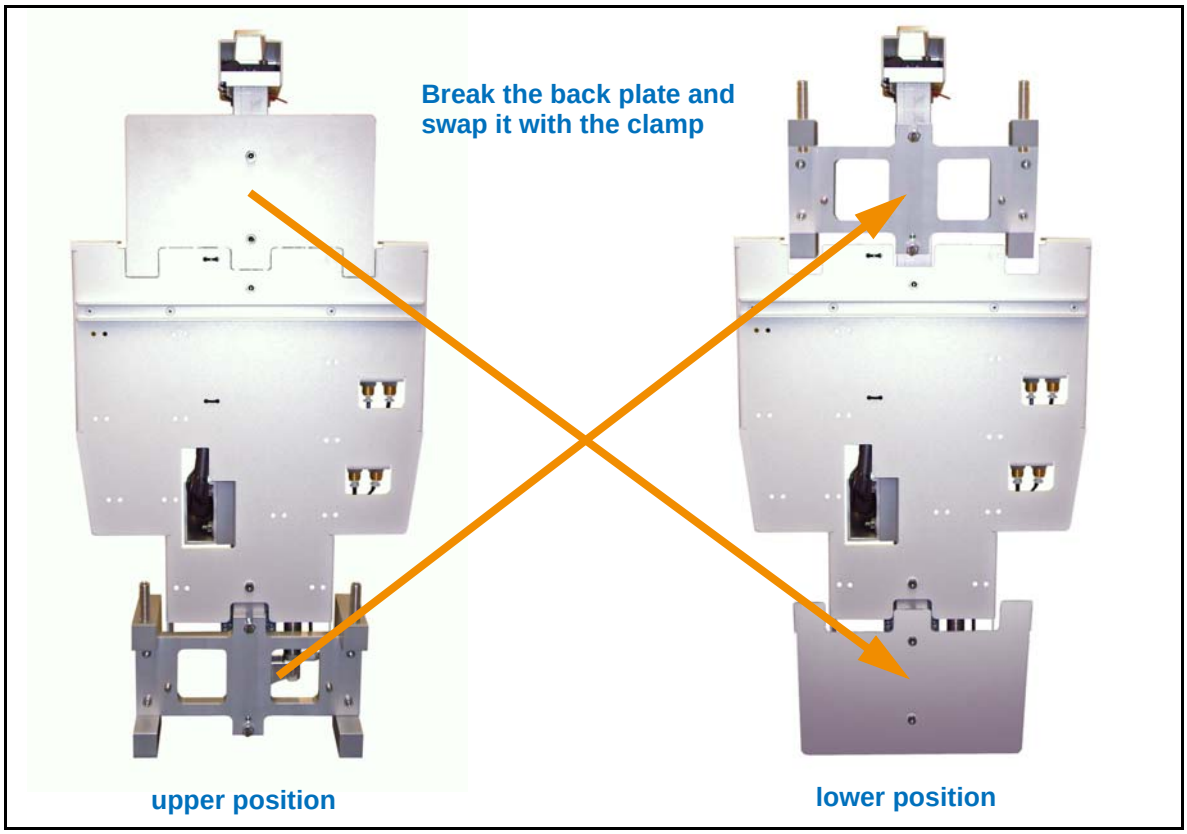
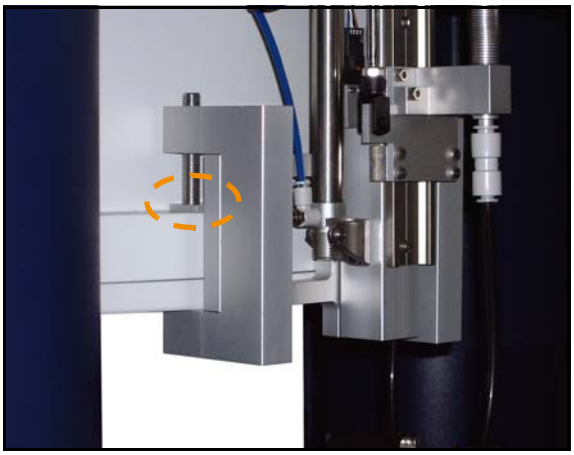


Figure 4.15: The Carousel and its Cover



[20] Clamp the carousel to the magnet flange. Use the protection plates on both top sides to protect the surface of the magnet dewar.

Figure 4.16: Clamping the Carousel on the Magnet

Figure 4.17: Set the Carousel to its Position

[21] Roughly adjust the carousel to have its port located underneath the port of the axis. The fine adjustment needs to be done later.

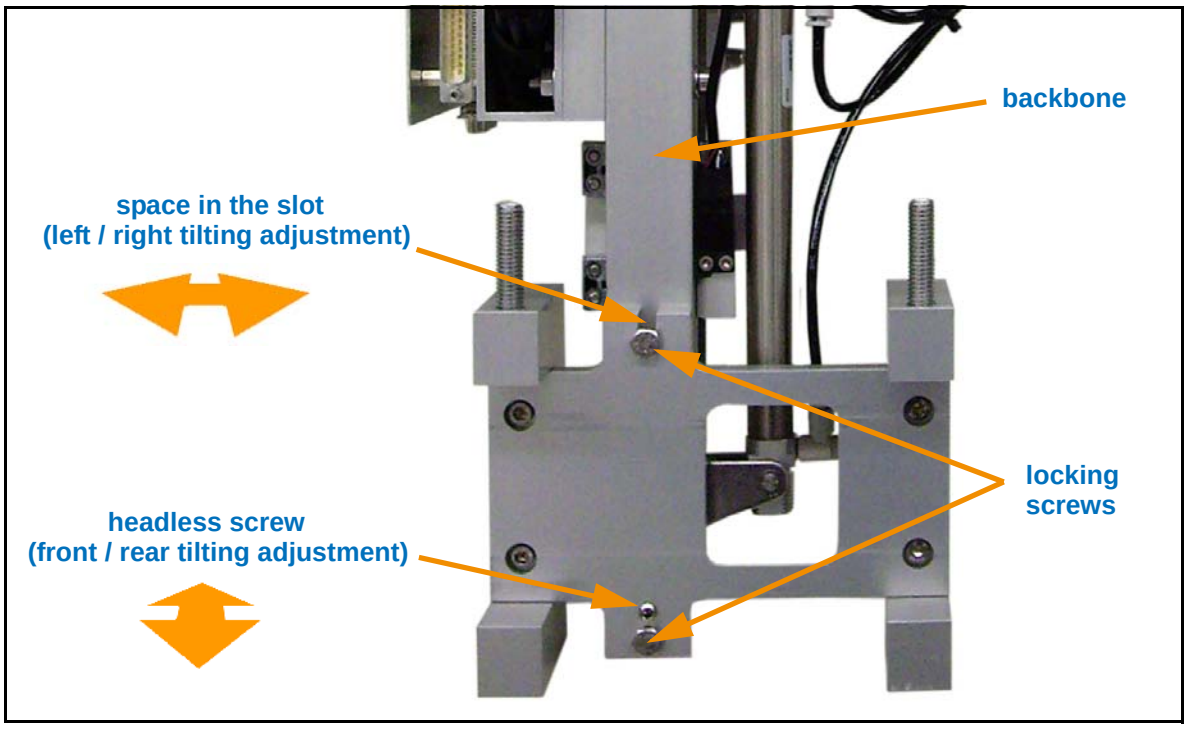


Figure 4.18: Carousel Tilting Adjustment

[22] Check the tilting of the carousel with the level and correct it in both directions. Use the headless screw to adjust tilting to front or rear and the space in the slot for left or right correction. Check the tilting with a level on the backbone.

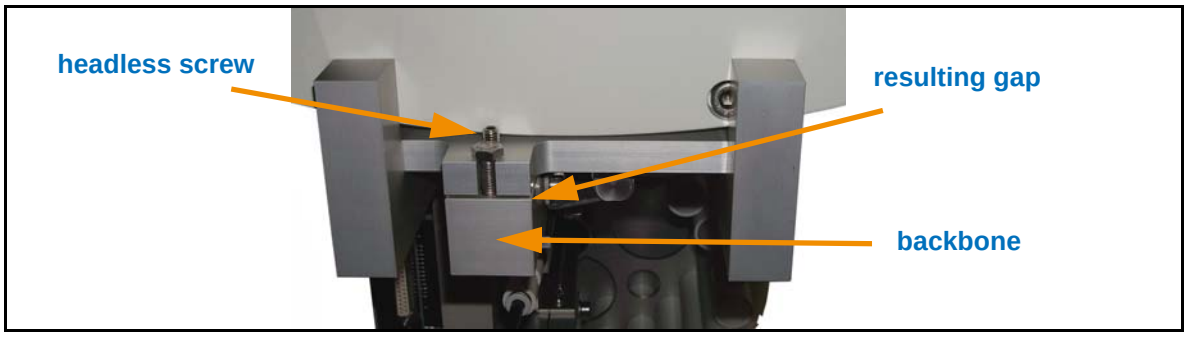
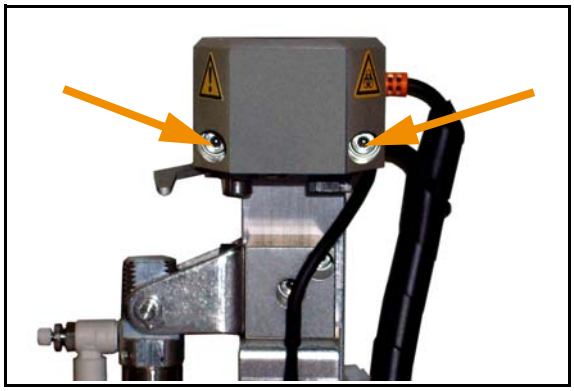
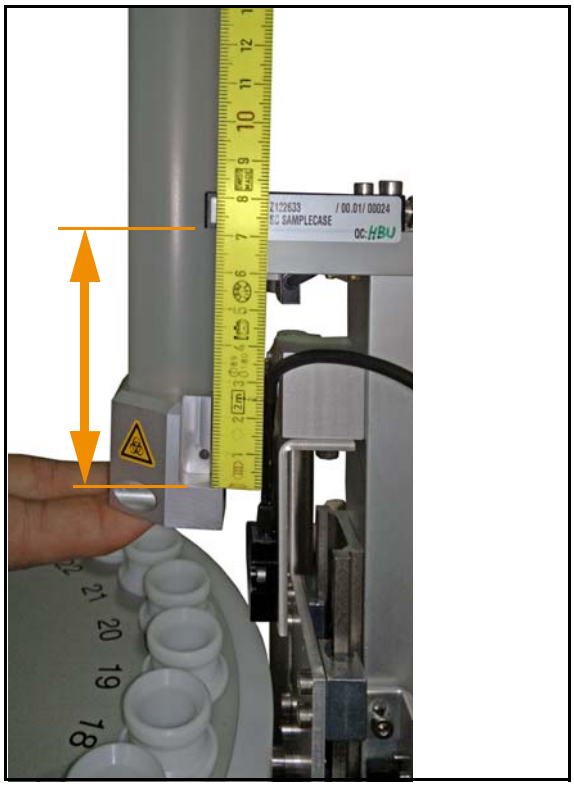


Figure 4.19: Bottom up View of the Carousel Adjusted with Headless Screw



[23] Unscrew the port for the tube with the two screws as shown and pull the port to the front.

Figure 4.20: Remove the Port

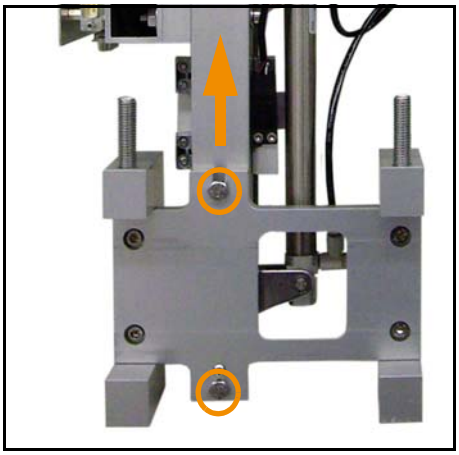


[24] Cut the transport tube some centimetres longer than it is actually needed.

[25] Once the tube is close to its final length the remaining offset can be measured as shown.

[26] Mark the offset on the tube and do the final cut. **The tolerance of the tube length is -1/ -3 mm.**

Figure 4.21: Measure the Offset to Cut



[27] Insert the tube and screw in the port. If the tube can be shifted slightly (1mm) up and down, the tube has the proper length.
If the tube is too long it will be squeezed and therefore needs to be shortened.
If the tube is too short you can lift the carousel unit a little as shown. Open the two locking screws and carefully (do not hit the carousel and tube against the horizontal axis) lift the backbone. Take care to preserve the tilting adjustment of the carousel unit.

Figure 4.22: Lift the Carousel if the Tube is a Little too Short

[28] Adjust the carousel so that the transport tube is straight. Use the level for this but keep in mind that the transport tube is never 100% straight. Rotate the transport tube to see its bending.

Figure 4.23: Adjust the Carousel to its Final Position

[29] Plug in the gray input/output cable into the controller.

[30] Cut the cable cover to the needed length.

[31] Feed all the cables and hoses from the controller into the cable cover and the port cover. Use some cable ties to attach the cable cover to the transport tube. Do not pull to much on the cable ties because this will squeeze the transfer tube.

[32] Connect the gray input/outputs cable to the carousel.

[33] Connect the lift hose to the carousel.

[34] Connect the four hoses for the cylinders to the carousel. The connectors on the control unit and the carousel are color coded.

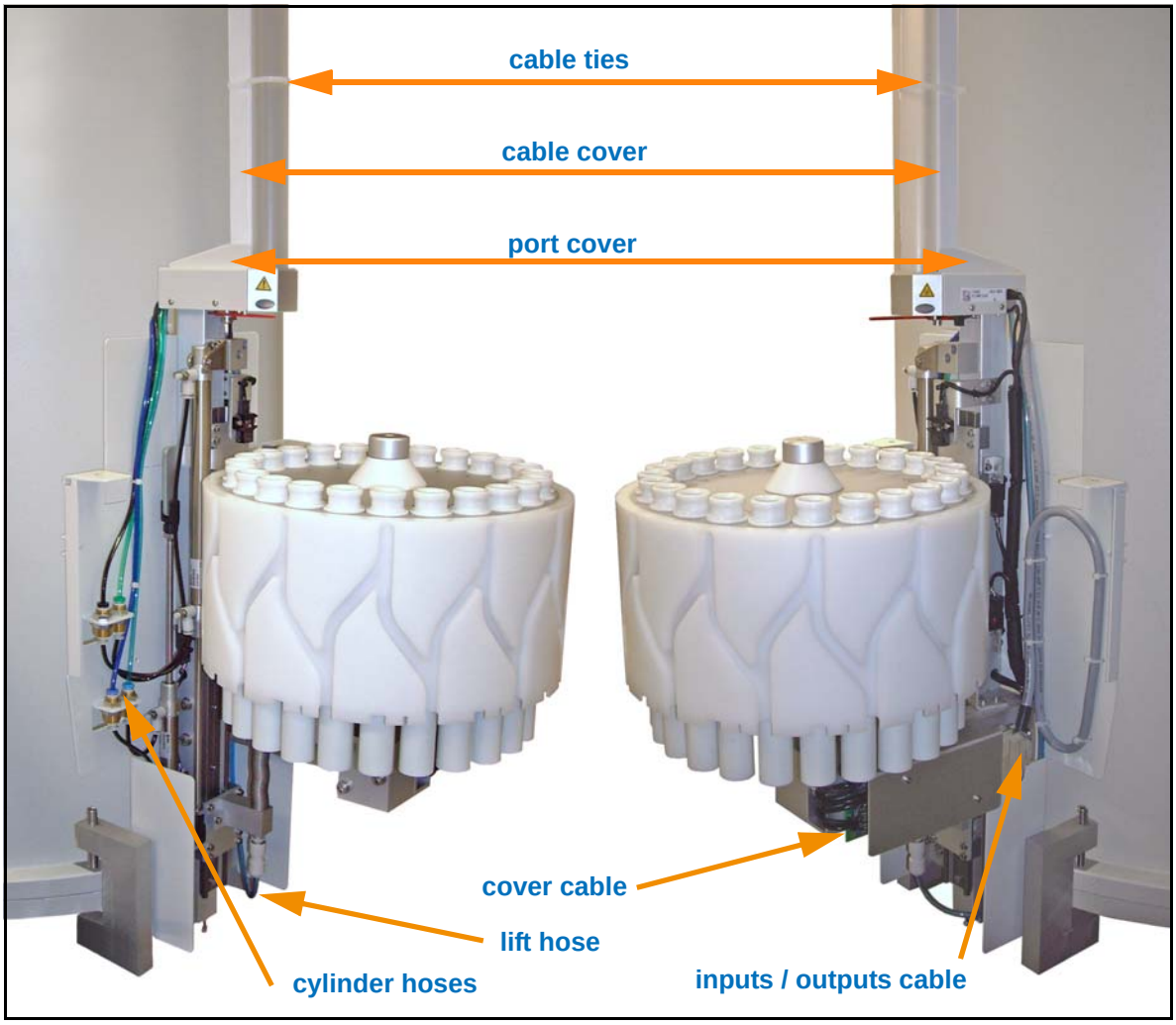


Figure 4.24: The Connectors on the Carousel

[35] Arrange all the cables and hoses and attach them to the back plate with some cable ties. Make sure that they cannot be squeezed by the moving parts.

[36] Plug in the cover cable and hang the cover in place with the two pins on the cover. Then snap in the screw to the hole in the bottom of the cover.

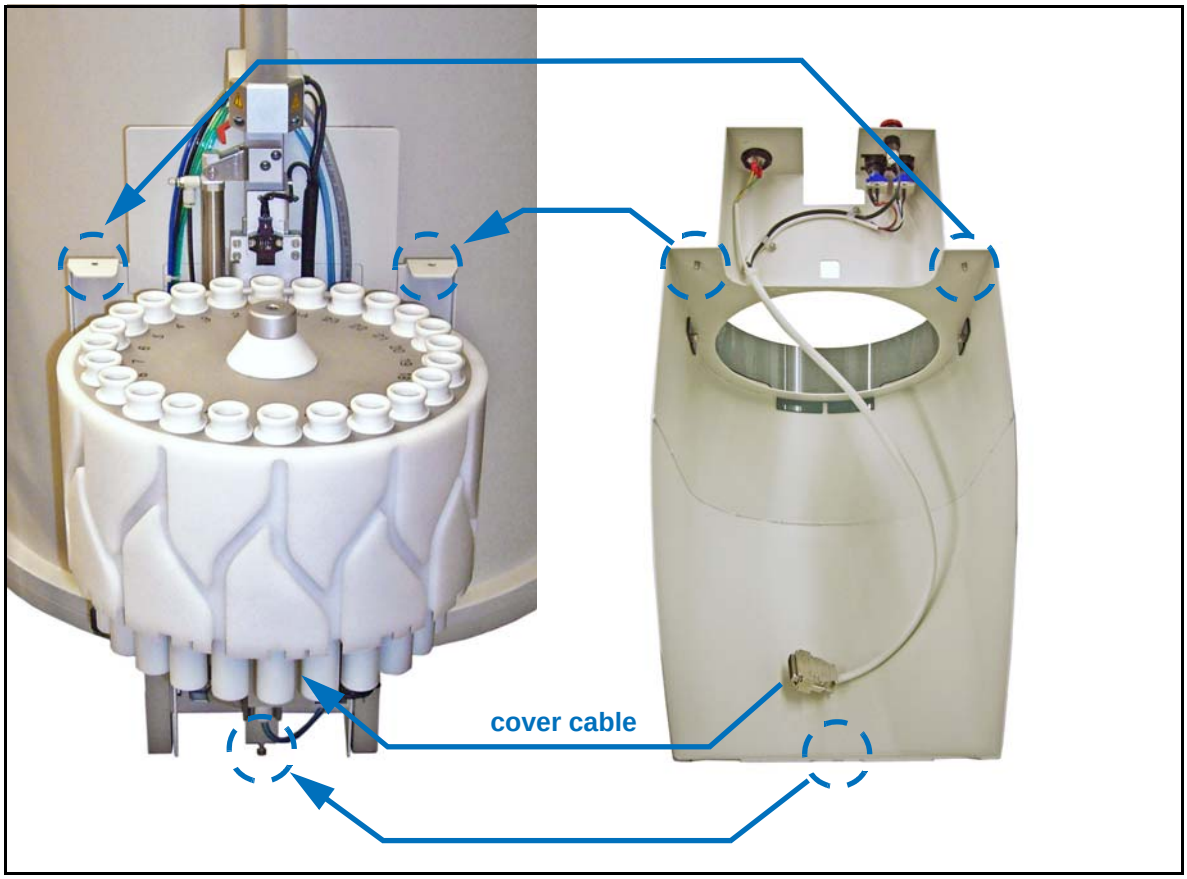
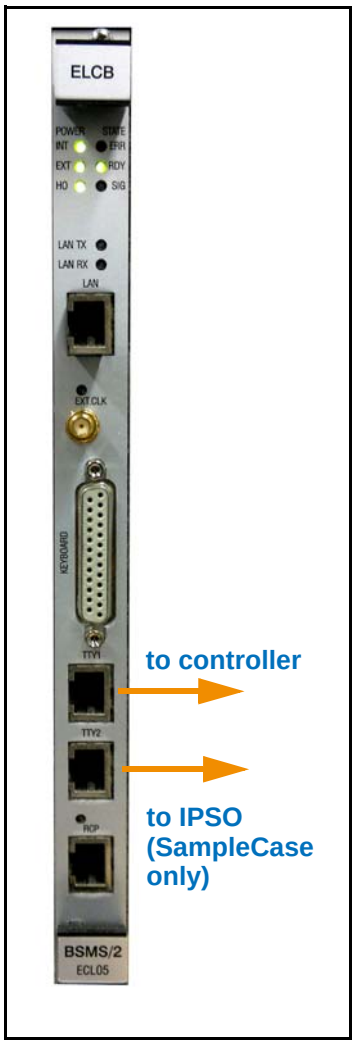


Figure 4.25: The Carousel Cover

4.6 Connections

[37] Connect the hoses on each end of the linear axis. Those hoses intentionally have been unplugged from production to avoid under pressure inside and resulting problems with the axis sealing. See ”Precautions” on page 15.

Figure 4.26: The Axis Gas Supply



[38] Connect the data cable from the end of the axis to the ELCB TTY1. The additional short data cable can be used, if the connection can be fed trough a connector on the back of the console.

[39] With a SampleCase: Connect the TTY2 on the ELCB to any free TTY port (except TTY0) on the IPSO.

Figure 4.27: Connections on the ELCB

[40] Connect the earth wire to the earth screw on the HPPR or the console.

[41] Connect the gas supply (transparent 6mm hose) to the gas switch. The switch should be placed in a height that it is easy reachable. Take care about the proper orientation (gas flow) of the switch.
.

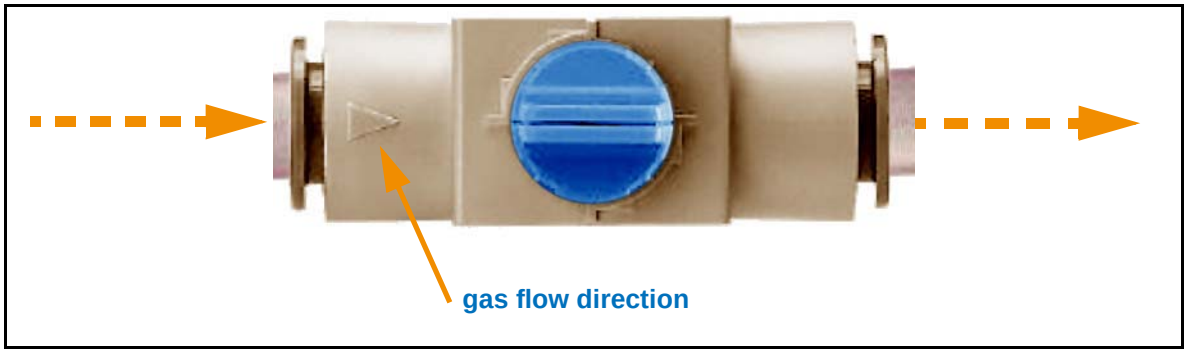


Figure 4.28: The Supply Gas Switch

[42] Connect the power cable to the power supply and the power supply to the console.

Figure 4.29: The Power Supply

[43] Connect the lift gas coming from the console to the controller and the gas returning from the controller to the BST.

The drawing below shows the lift hoses and the two paths for the gas flow switched by a valve inside the SampleCase control unit. The valve is either switching the lift gas to the shim stack or to the external transport tube.

.

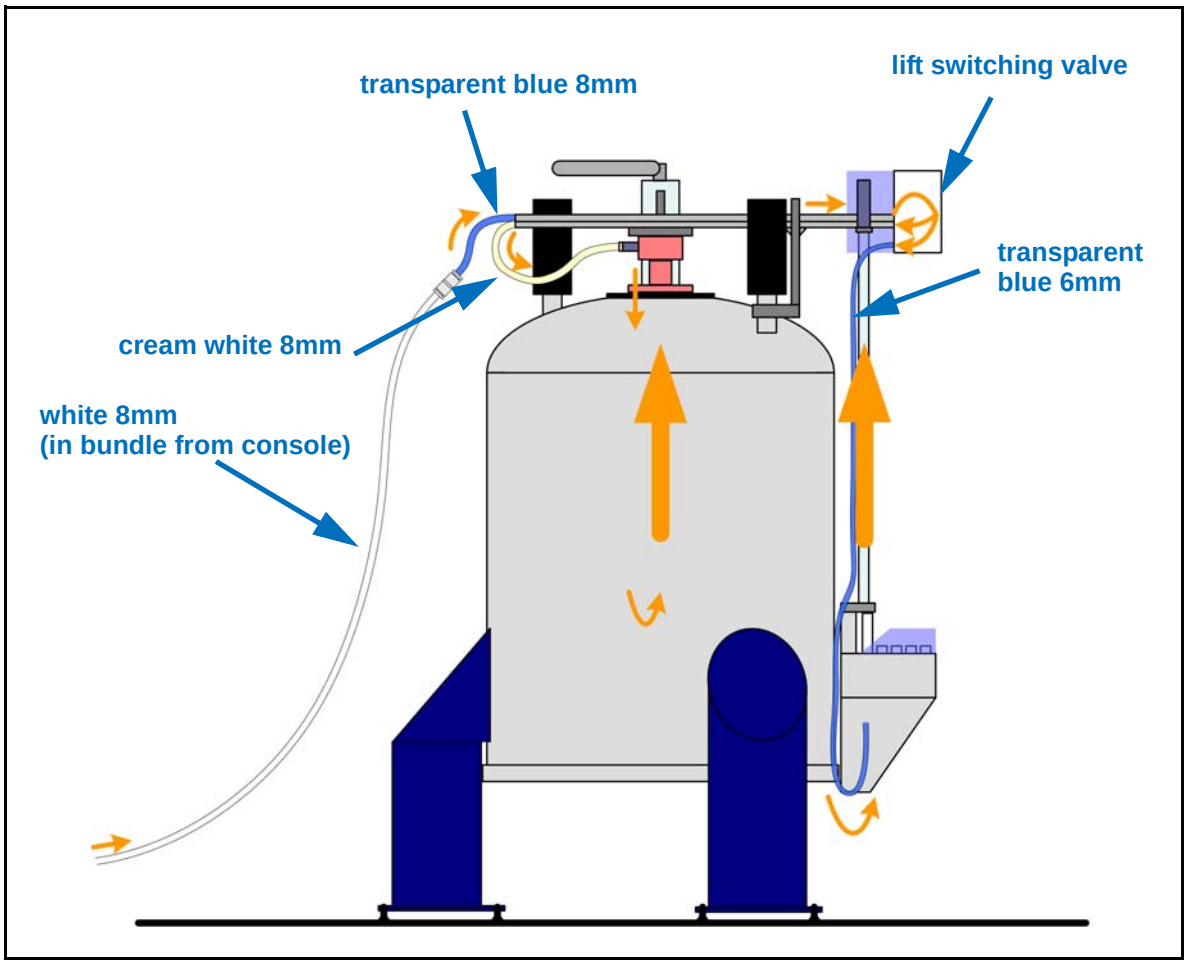


Figure 4.30: The two Paths of the Lift Gas

Mounting

5 Presettings

5.1 About the Presettings

The hardware, sensors and actuators on the linear axis are set from factory site according to the order depending on the magnet. Those settings can also be changed in the field if the intended magnet for the system has changed.

i Even if the settings had not to be changed they should be checked before and after the installation.

The factory presettings includes the following issues:

- Presetting of the axis track length
- Hardware adjustment
- Sensor and actuators adjustment

NOTICE

Bad adjustments causes failures

If the hardware is not properly adjusted this can decrease the lifetime of the hardware and lead to unreliable system stability even if the system is currently working fine.

- ▶ Carefully check the adjustments after the installation.
- ▶ Spend the time to adjust the hardware to get a failure-free system.

5.2 Track Length

The track length is the distance the transfer slider tube will run on the axis. This distance is not given by the axis but set with end stoppers at the hardware on both sides.
If the track length needs to be adjusted to a magnet it can either be looked up in the following tables or if the magnet is not listed in the tables it can be calculated with the formula below from the magnet dimensions.

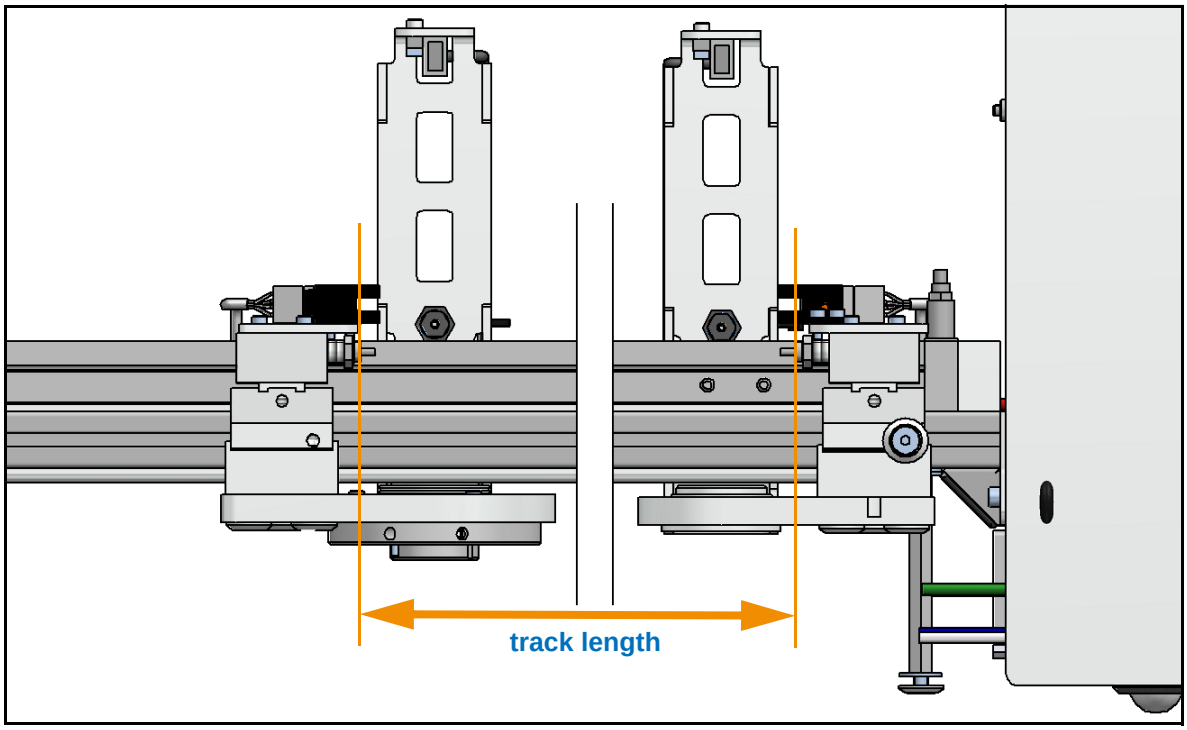


Figure 5.1: Definition of the Track Length

$$\text{length}_{\text{track}} = \text{radius}_{\text{magnetflange}} + 155\text{mm}$$

Equation 5.1: Calculate the Track Length

5.2.1 Changing the Track Length

To adjust the track length you have to open only one screw on the top of the end position that will be mounted on the BST. The hardware can then freely be positioned on the axis.
The cable and hoses for this hardware needs to be rearranged after changing the track length. The rest of the cables and hoses are wrapped inside the control box that needs to be opened for this purpose.

It is not recommended to adjust the track length on the magnet. It is much easier to set the track length with the axis on a table.

Figure 5.2: Shifting the End Position

Shift the transfer slider to one of the end positions to measure the track length. Then subtract the width of the slider from the total track length.

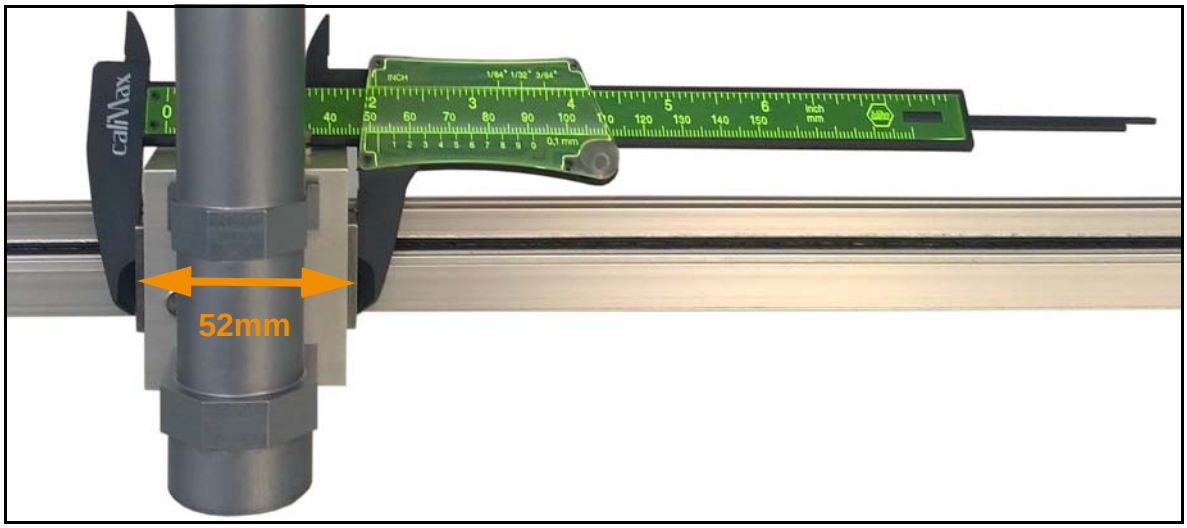


Figure 5.3: The Slider is 52mm Wide

5.2.2 List of the Track Lengths

The following lists containing the track lengths of the Bruker magnets. Some brand new or very old magnets may be missing and needs to be calculated from the formula above. Some of the magnets require either the long or the short axis. Most magnets can be equipped with both axis length.

Magnet dewar	Magnet flange radius [mm]	Track length [mm]	Axis 610 suitable	Axis 1030 suitable	Tube 2450 required[a]
D205	360	515	yes	yes	no
D207	360	515	yes	yes	no
D221	400	555	yes	yes	no
D222[b]	400	555	yes	no	no
D232	360	515	yes	yes	no
D241	360	515	yes	yes	no
D262[b]	455	610	yes	no	no
D315	398	553	yes	yes	no
D325	398	553	yes	yes	no
D335	425	580	yes	yes	no
D345	425	580	yes	yes	no
RS346[c]	425	580	yes	no	no
RS347[c]	425	580	yes	no	no
RS348[c]	425	580	yes	no	no
D350	475	630	no	yes	no
D355	475	630	no	yes	no
RS355[c]	475	630	no	no	no
D360	550	705	no	yes	no
D365	550	705	no	yes	no
D366	550	705	no	yes	no
D370	682	837	no	yes	no
D372	682	837	no	yes	no
D375	682	837	no	yes	no

Table 5.1: Track Length for Swiss Magnets

a. Higher magnets requires a longer transport tube (Z117094) with 2450mm length
b. Round bottom magnet
c. Refrigerated magnet

Magnet type	Magnet flange radius [mm]	Track length [mm]	Axis 610 suitable	Axis 1030 suitable	Tube 2450 required[a]
M1007500	640	795	no	yes	yes[b]
M1008000	640	795	no	yes	yes[b]
M1008020	844	999	no	yes	yes[b]
M1008040	640	795	no	yes	no
M1008520	844	999	no	yes	yes[b]
M1008540	640	795	no	yes	no
M1008560	844	999	no	yes	yes[b]
M1009000	844	999	no	yes	yes[b]
M1009020	844	999	no	yes	yes[b]
M1009060	844	999	no	yes	yes[b]
M1009520	844	999	no	yes	yes[b]
M1010000	850	1005	no	yes	yes

Table 5.2: Track Length for German Magnets

a. Higher magnets requires a longer transport tube (Z117094) with 2450mm length
b. The shorter standard tube 1830mm can be used if a SampleCase is mounted in the upper position.

5.2.3 Exceptions with Special Magnets

Round bottom magnets have a limited area on the magnet flange where the user interface can be mounted. The axis will therefore always point to the rear helium tower and will not pass on the left or the right. These magnets requires therefore the shorter axis that ends just after the BST.

Figure 5.4: SampleCase on a Round Bottom Magnet.

Refrigerated magnets do not have free space for the unused end of the axis since there is the cooler and additional connectors. On these magnets only the short axis can be installed.

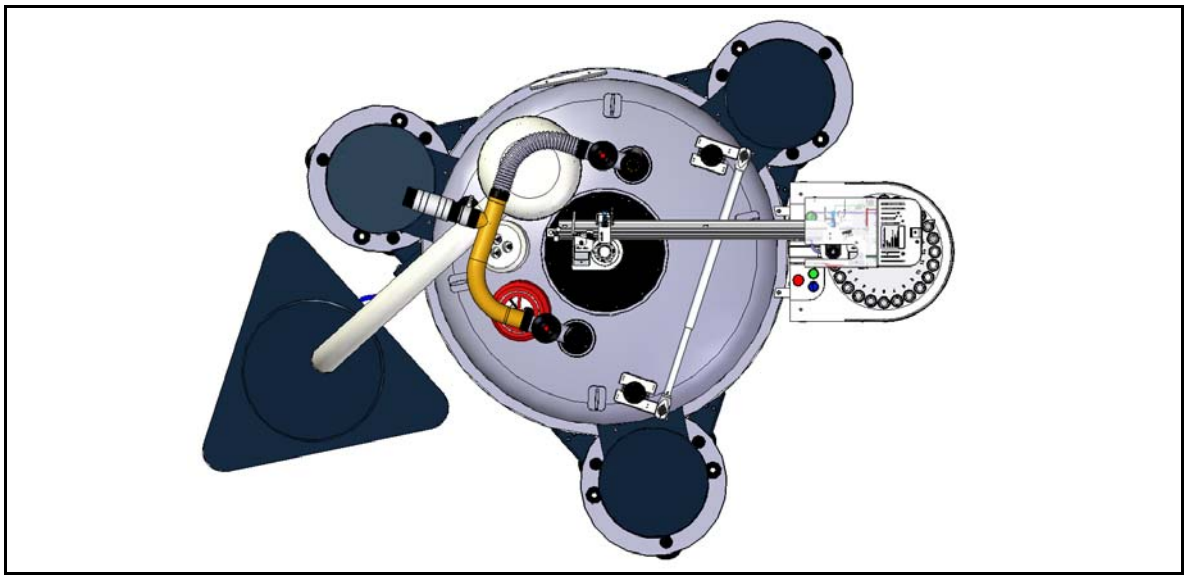


Figure 5.5: Short Axis on a Refrigerated Magnet.

5.3 Hardware Adjustment

When doing adjustments it is important to know, that the transfer slider tube has a big backlash to the axis. For adjusting the hardware, sensors and actuators on the linear axis the transfer slider tube needs to be in a defined position. Two criteria must be fulfilled to have similar conditions as if the system would be running:

- The transfer slider tube needs to be pressed completely against the end stop.
- There are no other forces allowed on the transfer slider tube than the force in the direction to the end stop and at the height of the end stop.The best thing to do is to let the axis itself press the transfer slider tube to the end stop.

i The transfer slider tube needs to be in its defined end position to do adjustments.

To adjust the end positions it is recommended to let the axis press the slider to the defined end position by supplying gas directly to the connectors at both ends of the track. Use the 6mm transparent hose intended for the main gas supply of the device and the hose adapter 4mm to 6mm to connect the axis. The supply pressure should not exceed the range defined in ”Pneumatic Specifications” on page A-7-59

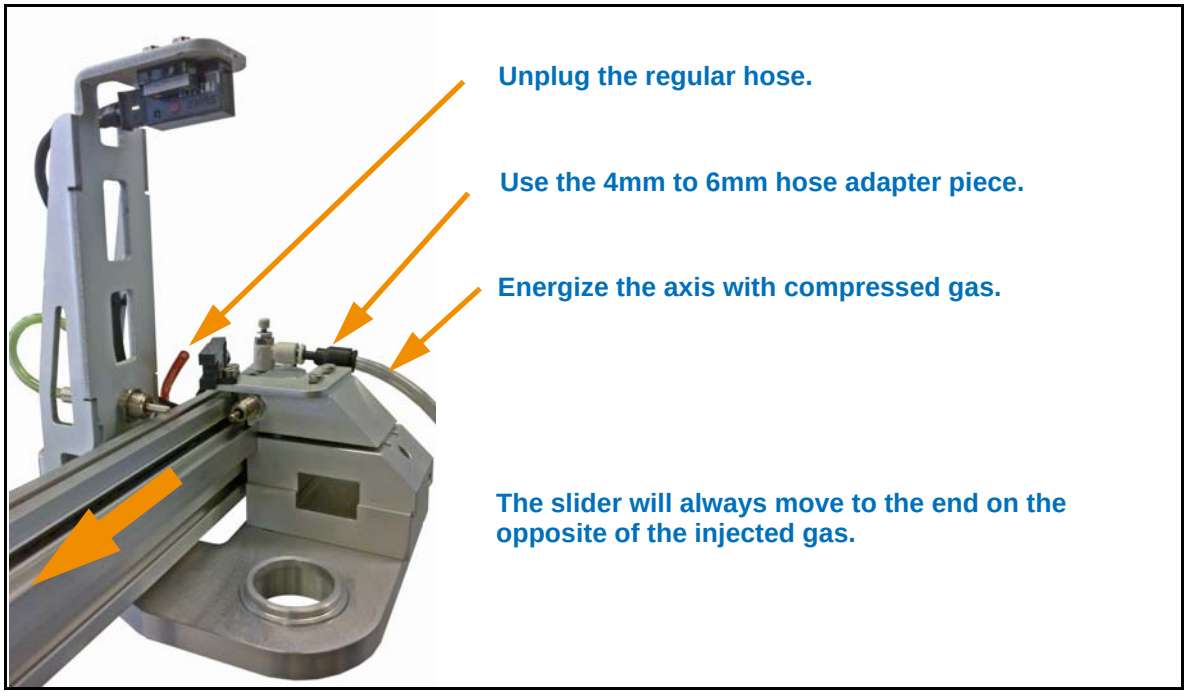


Figure 5.6: How to do Hardware Adjustment

5.3.1 How to Check Adjustments

Check the adjustment visually and with the adjustment ring on the both sides. If the adjustment is perfect the ring will fall down itself when lifted and between the two tubes will be a very small and even gap. **The gap tolerance is 0.1mm to 0.3mm (1 to 3 sheets of paper).**

Figure 5.7: The Adjustment Ring

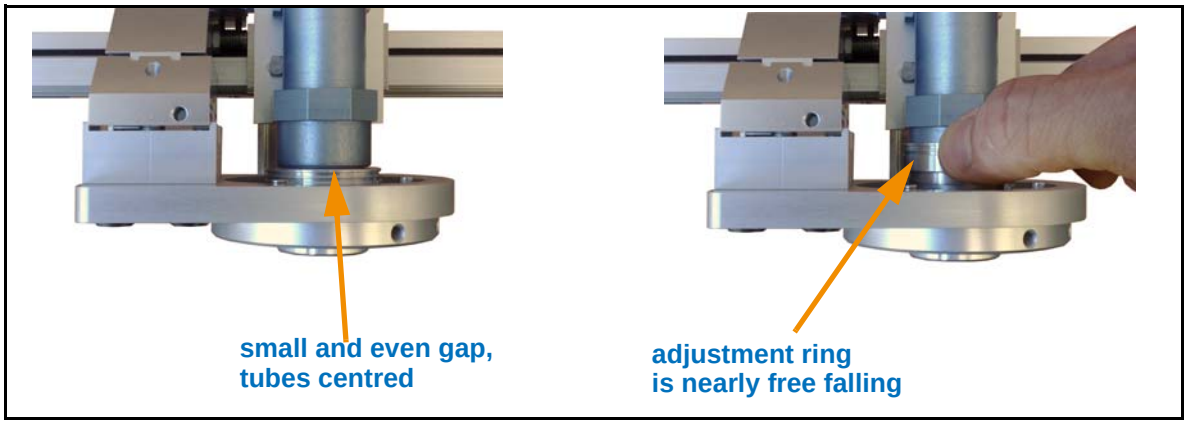


Figure 5.8: Check Alignment on Both Sides.

On the BSMS web interface there is an „Installation“ page where you can shift the slider to the end positions. This is the best way to check the adjustment, but works only if the system is fully installed and running.

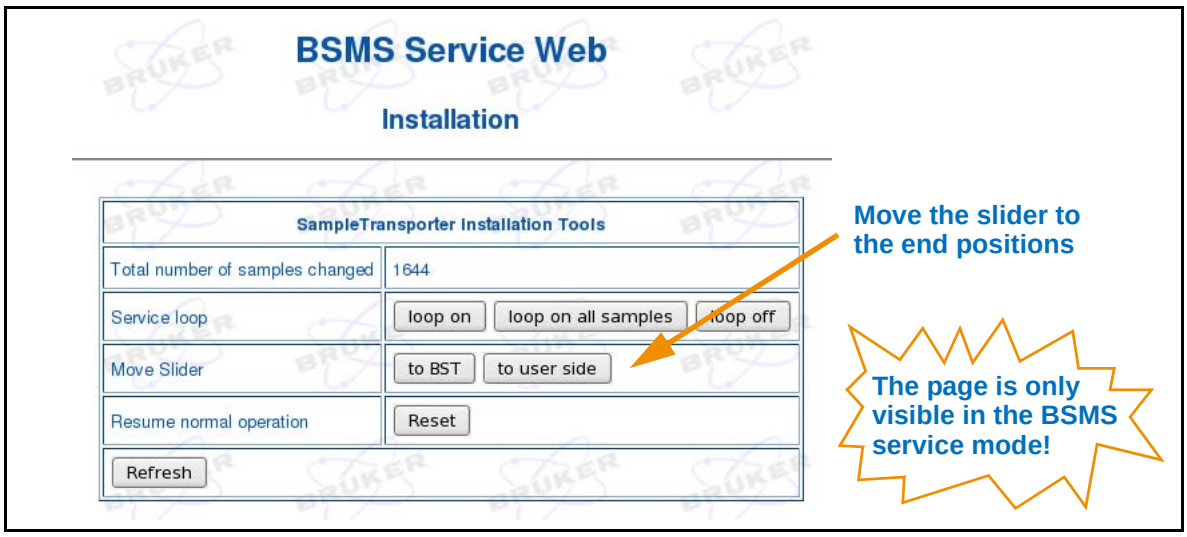


Figure 5.9: The BSMS Installation Web Page

5.3.2 Adjusting the Gap

Adjusting the gap between the end positions and the transfer slider tube is something that is done during production. Anyhow this can be corrected in the field if needed. The height of the gap is given by thin washers clamped in the hardware of the end positions. Disassemble the hardware to adjust the height by adding or removing washers. Spare washers with 0.1mm and 0.2mm thickness are included in the delivery.

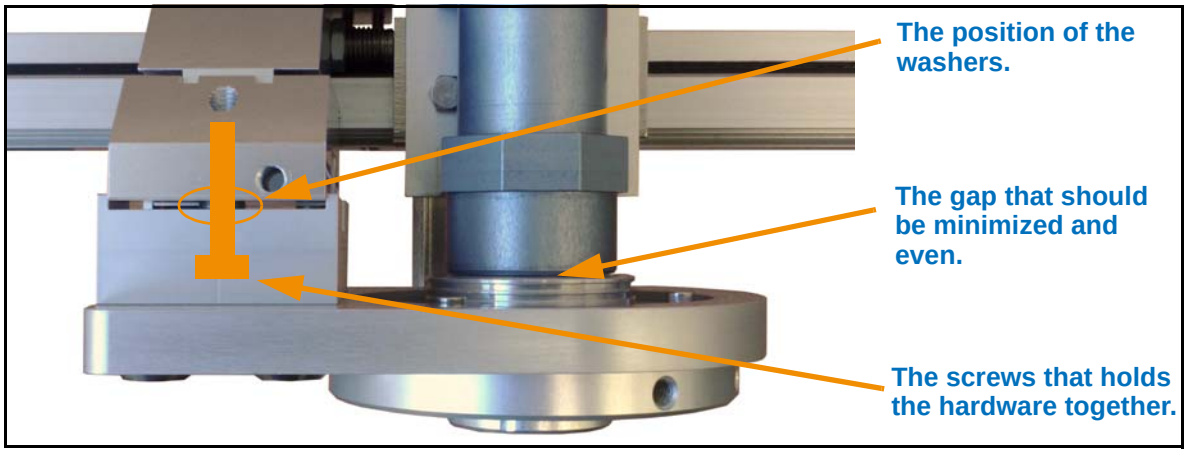


Figure 5.10: The Transfer Slider over the End Position

NOTICE

The thin adjustment washers are magnetic.

The washers used for the adjustment of the gap could be attracted by the magnet.

► Do the adjustment with the washers not close to the magnet.

5.3.3 Adjusting the Centre

At the end positions the transfer slider tube needs to be exactly centred to the hole in the hardware. This can be done by loosen three screws at the bottom of the end positions. Use the adjustment ring to centre the hardware while pressing the slider in its final position towards the oil damper. The tighten the screws firmly to preserve the adjustment.

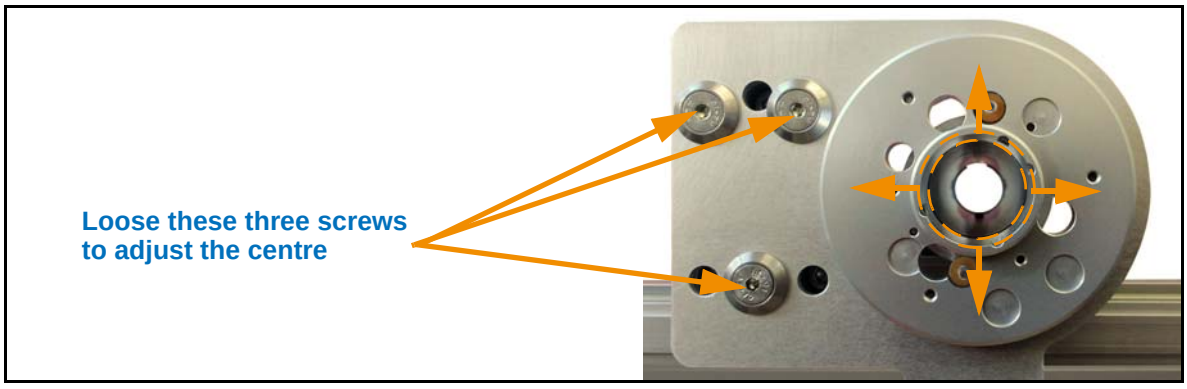


Figure 5.11: Bottom View of the Transfer Slider over the End Position

5.4 Sensors Adjustment

Hardware Situation	Spinner Sensor sees	Spinner Sensor LED
Spinner sitting in the transfer slider tube and tube slightly tilted towards and away from the sensor	Yellow reflector ring on the spinner	**on**
Spinner lifted to the top of the transfer slider tube and tube slightly tilted towards and away from the sensor	Lower part of the spinner	**off**

Table 5.3: How to Check the Adjustment of the Spinner Sensor

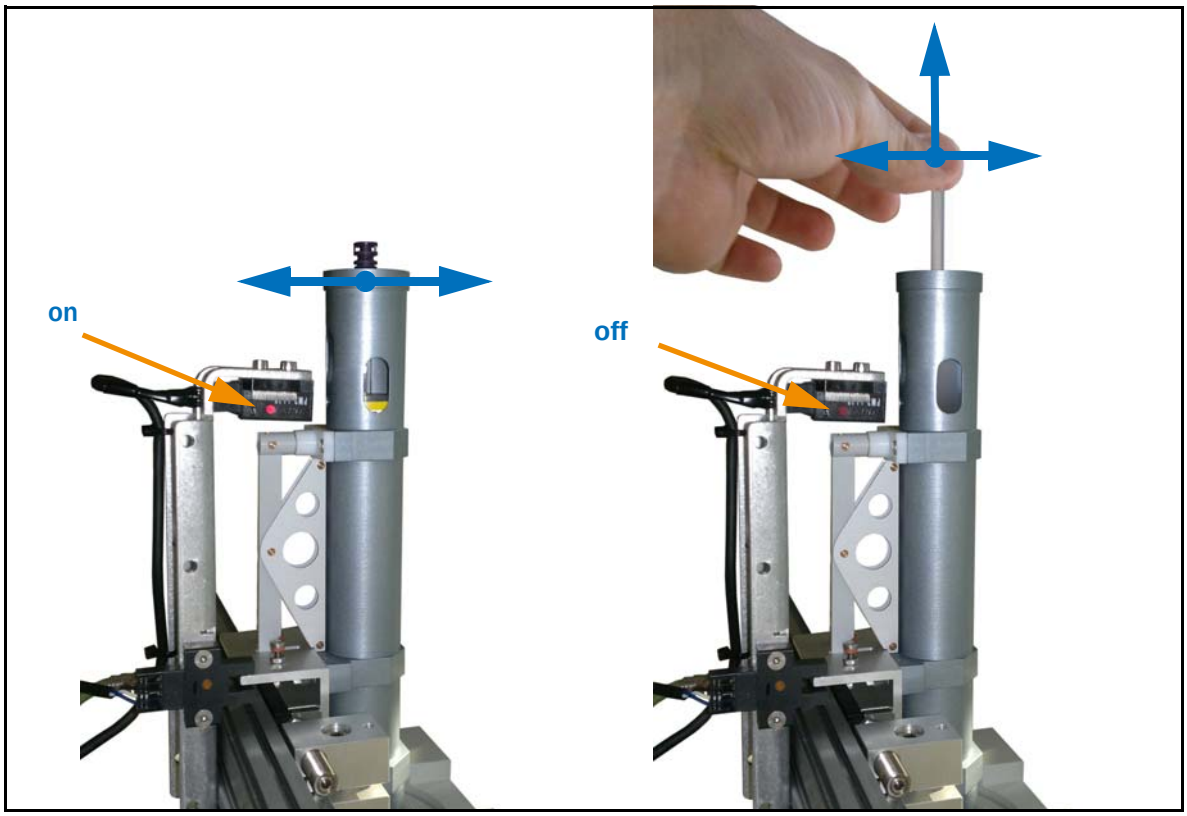


Figure 5.12: Check the Spinner Sensor Adjustment

6 Troubleshooting

6.1 Sensor and Actuators Overview

The current state of all the inputs and outputs can be checked on the BSMS service web page “PLC I/O”.

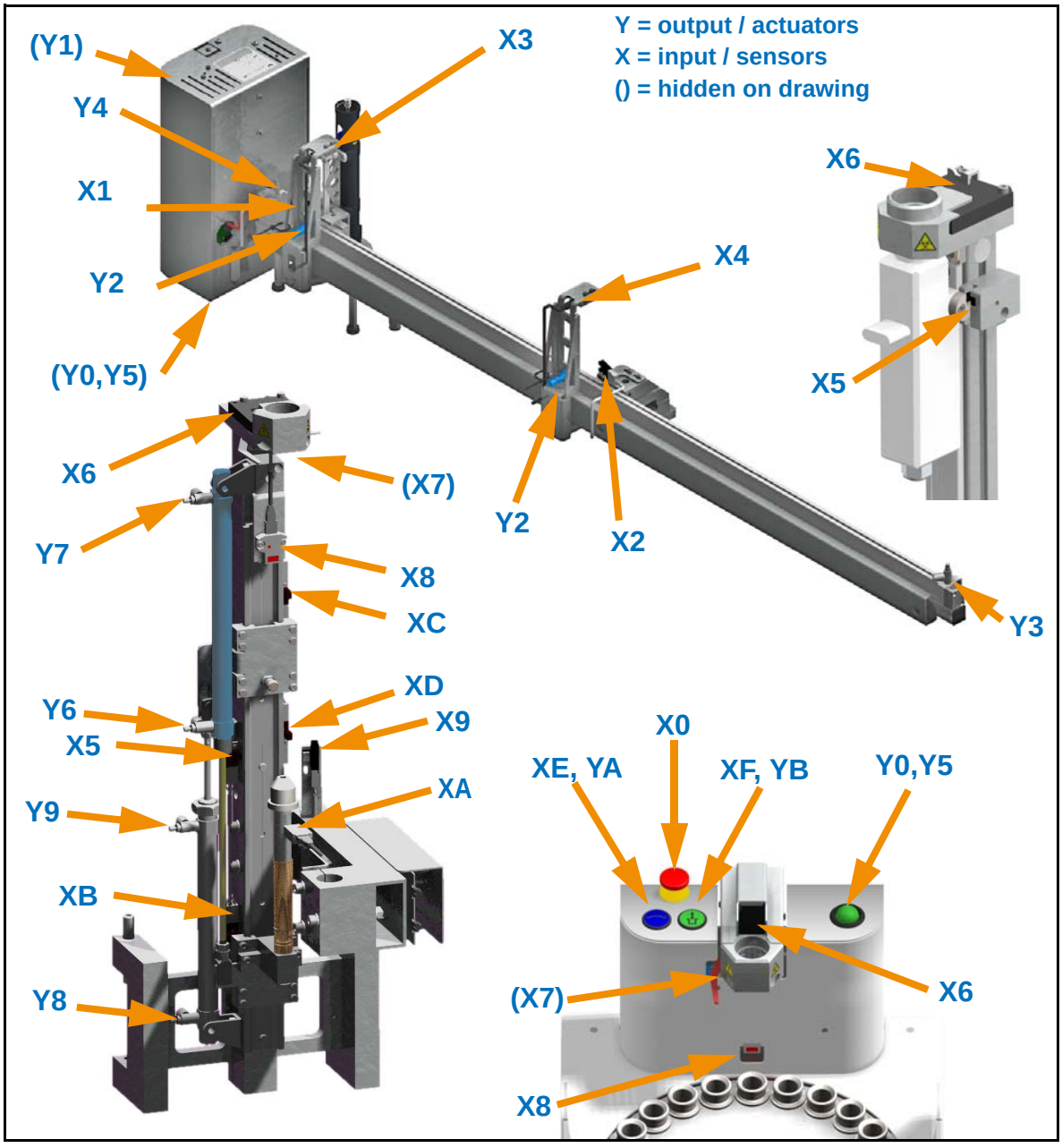
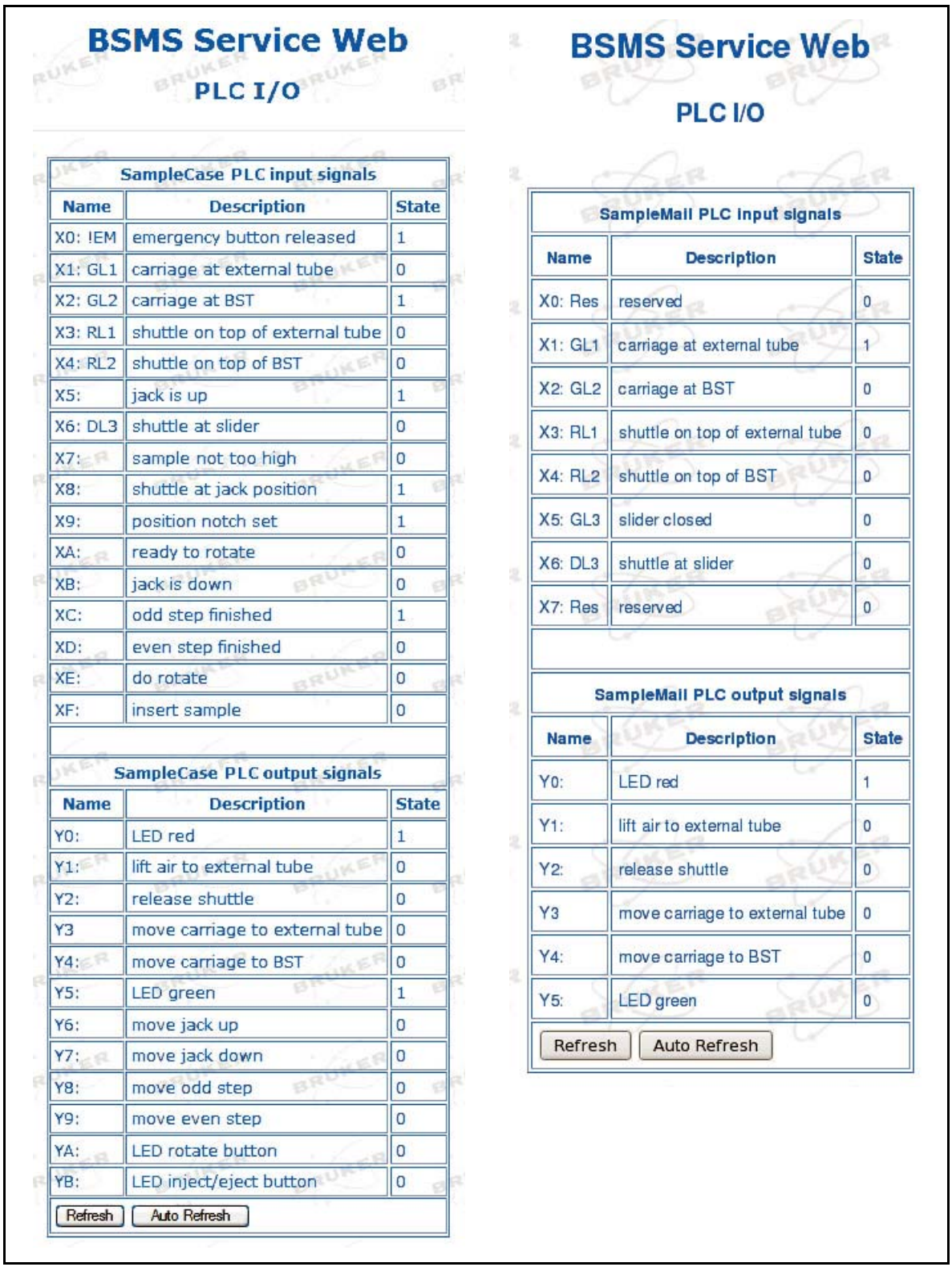


Figure 6.1: Actuators and Sensors Overview



BSMS Service Web

PLC I/O

SampleCase PLC input signals		
Name	**Description**	**State**
X0: !EM	emergency button released	1
X1: GL1	carriage at external tube	0
X2: GL2	carriage at BST	1
X3: RL1	shuttle on top of external tube	0
X4: RL2	shuttle on top of BST	0
X5:	jack is up	1
X6: DL3	shuttle at slider	0
X7:	sample not too high	0
X8:	shuttle at jack position	1
X9:	position notch set	1
XA:	ready to rotate	0
XB:	jack is down	0
XC:	odd step finished	1
XD:	even step finished	0
XE:	do rotate	0
XF:	insert sample	0

SampleCase PLC output signals		
Name	**Description**	**State**
Y0:	LED red	1
Y1:	lift air to external tube	0
Y2:	release shuttle	0
Y3	move carriage to external tube	0
Y4:	move carriage to BST	0
Y5:	LED green	1
Y6:	move jack up	0
Y7:	move jack down	0
Y8:	move odd step	0
Y9:	move even step	0
YA:	LED rotate button	0
YB:	LED inject/eject button	0

Refresh Auto Refresh

BSMS Service Web

PLC I/O

SampleMail PLC input signals		
Name	**Description**	**State**
X0: Res	reserved	0
X1: GL1	carriage at external tube	1
X2: GL2	carriage at BST	0
X3: RL1	shuttle on top of external tube	0
X4: RL2	shuttle on top of BST	0
X5: GL3	slider closed	0
X6: DL3	shuttle at slider	0
X7: Res	reserved	0

SampleMail PLC output signals		
Name	**Description**	**State**
Y0:	LED red	1
Y1:	lift air to external tube	0
Y2:	release shuttle	0
Y3	move carriage to external tube	0
Y4:	move carriage to BST	0
Y5:	LED green	0

Refresh Auto Refresh

Figure 6.2: The PLC I/O Page for SampleCase and SampleMail.

6.2 Statistics Counter

There is a statistics counter built in to see how stable a device is running. The software is repeating a step if not successful finished and the statistics shows these repetitions. If one of the actions has a lot of repetitions, then the hardware or lift adjustment needs to be improved.

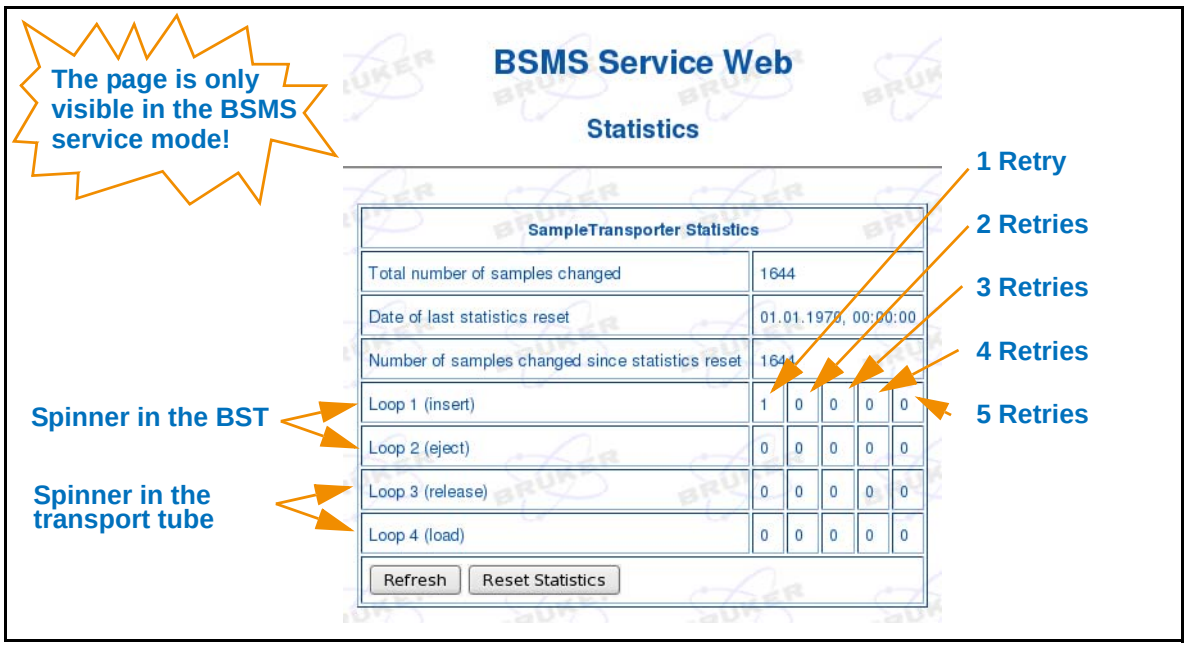


Figure 6.3: Statistics Counter Web Page

Troubleshooting

7 Technical Data

7.1 Site Considerations

The SampleCase / SampleMail 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.

7.2 Electrical Specifications

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

Table 7.1: Electrical Specifications

7.3 Pneumatic Specifications

Data	Value	Unit
Medium (dry, oil-free)	nitrogen, air	-
Pressure	6-8	Bar
Minimum gas flow	100	Nl/min [a] [b]

Table 7.2: 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)

7.4 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 7.3: Temperature Limitations

a. See Appendix: A.5 References
b. See Appendix: A.5 References

7.5 Shipping Dimensions

Data	Value	Unit
Package 1[a]: Dimensions (LxWxH)	1.89 x 0.52 x 0.27	m
Package 1[a]: Weight	15	kg
Package 2[b]: Dimensions (LxWxH)	0.75 x 0.75 x 0.65	m
Package 2[b]: Weight	15	kg

Table 7.4: Shipping Dimensions

a. Axis for SampleMail or SampleCase (Z133066, Z116802, Z133067 or Z123384)

b. Carousel for SampleCase only (Z122633)

7.6 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 7.5: Hardware Requirements

7.7 Software Requirements

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

Table 7.6: Software Requirements

8 Safety Symbols

There are two warning signs on the ports of the devices. If the warnings should be missing please contact Bruker and ask for replacement

.

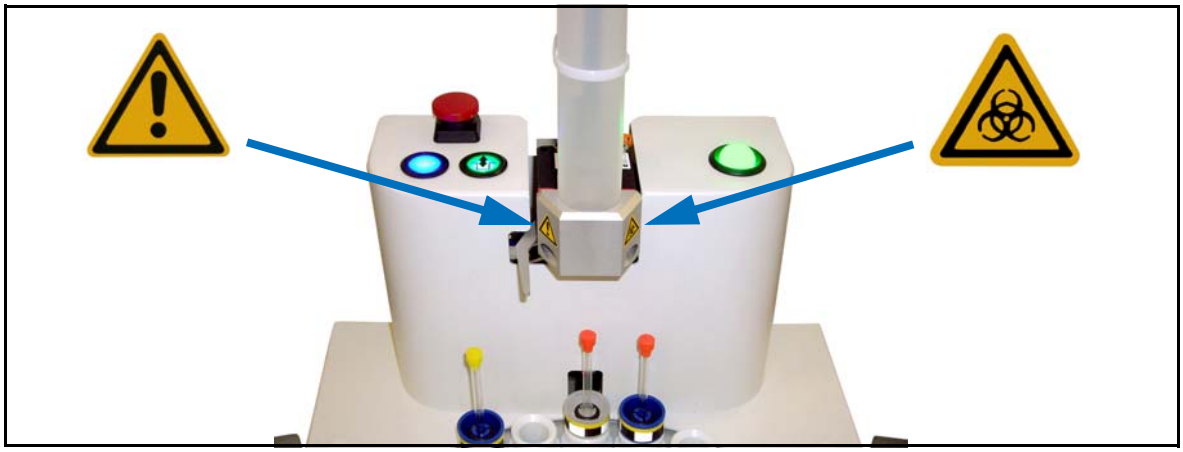


Figure 8.1: The Locations of the Warning Signs

Symbol	Explanation
	**⚠ WARNING** **Warning of biological hazards:** **The SampleCase / SampleMail itself generates no direct biological hazard.** Real danger can arise, however from substances whose hazardous biological content could endanger the operating personnel or other living beings through damage to its protective enclosure (for example, the breakage of a sealed sample glass). As is the case for the manual handling of biologically dangerous substances, no 100% guarantee against damage to the protective enclosure of these substances can be provided for their automatic handling. The operator himself must ensure that all the necessary safety precautions are taken for every NMR experiment in which biologically hazardous substances are used. In the case of the unit becoming contaminated with biologically hazardous substances, the operator must deal with this individually. Depending on the circumstances, this could lead to consequential damage to persons and machine components. It is not possible for BRUKER to draw up decontamination rules for all hazardous substances - and their combinations – that the operator could use in NMR experiments **In case of contamination of the device the customer is responsible for the decontamination before Bruker employes get access to the system according to chapter** **”Safety and Repair Declaration” on page 56****.**

Table 8.1: Explanation of the Safety Symbols on the Device

Symbol	Explanation
	**⚠ WARNING** **Warning of chemical hazards:** **The SampleCase / SampleMail itself generates no direct chemical hazard.** The operator himself must ensure that all the necessary safety precautions are taken for every NMR experiment in which substances are used that could represent a chemical and radioactive hazard or that are easily flammable. In the case of the unit becoming contaminated with hazardous substances, the operator must deal with this individually. Depending on the circumstances, this could lead to consequential damage to persons and machine components. It is not possible for BRUKER to draw up decontamination rules for all hazardous substances - and their combinations – that the operator could use in NMR experiments **In case of contamination of the device the customer is responsible for the decontamination before Bruker employes get access to the system according to chapter** **”Safety and Repair Declaration” on page 56****.** **⚠ CAUTION** **Warning of moving parts** **There are uncovered moving parts on the SampleCase / SampleMail.** Operators and bystanders must be aware of moving parts on the device. Specially hands, arms and eyes are in danger when they are close to those parts.

Table 8.1: Explanation of the Safety Symbols on the Device

9 Equipment Clearance

9.1 Information Regarding Service

After the complete NMR system or additional subcomponents has been installed and handed 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 (planed 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 66 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 66.
- ► If the product needs to be shipped, attach this declaration to the delivery note on the package exterior.

9.2 Safety and Repair Declaration[1]

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 FAILUER OCCURED:	SYSTEM ORDER NO. / DISPATCH NO.:

COMPANY/INSTITUTE:	SIGNATURE:
NAME:	.....
MAILING ADDRESS:	DATE:
CITY / POSTAL CODE:	.....
COUNTRY:	
EMAIL:	

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

10 Contact

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

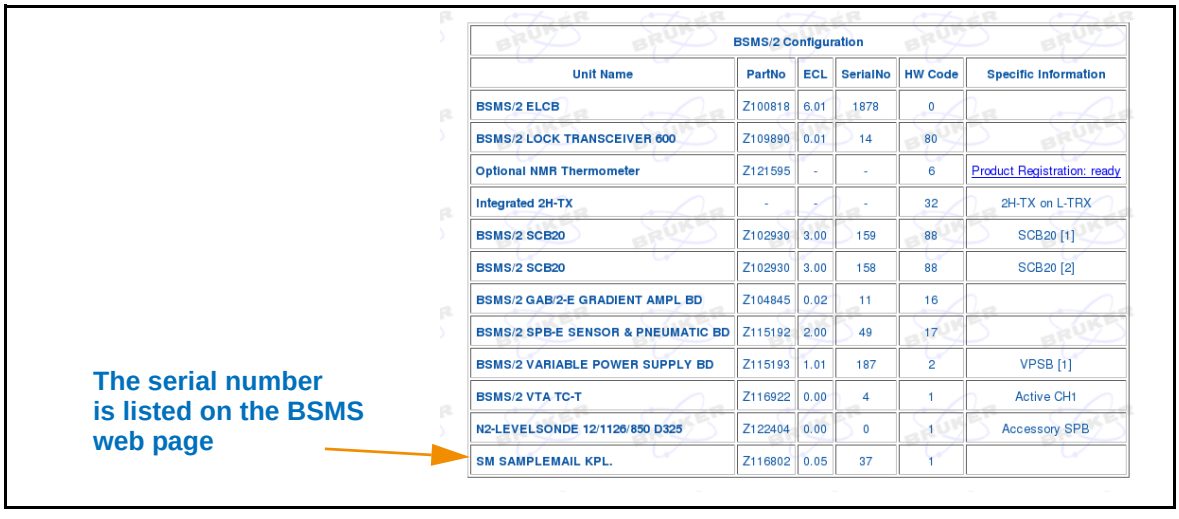
10.1 Manufacturer

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

10.2 Technical Hotline

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

Please refer to the Model No., Serial No. and Internal Order No. in all correspondence regarding the NMR system or components thereof. The serial number can be read on the BSMS „setup“ web page



BSMS/2 Configuration

Unit Name	PartNo	ECL	SerialNo	HW Code	Specific Information
BSMS/2 ELCB	Z100818	6.01	1878	0	
BSMS/2 LOCK TRANSCEIVER 600	Z109890	0.01	14	80	
Optional NMR Thermometer	Z121595	-	-	6	Product Registration: ready
Integrated 2H-TX	-	-	-	32	2H-TX on L-TRX
BSMS/2 SCB20	Z102930	3.00	159	88	SCB20 [1]
BSMS/2 SCB20	Z102930	3.00	158	88	SCB20 [2]
BSMS/2 GAB/2-E GRADIENT AMPL BD	Z104845	0.02	11	16	
BSMS/2 SPB-E SENSOR & PNEUMATIC BD	Z115192	2.00	49	17	
BSMS/2 VARIABLE POWER SUPPLY BD	Z115193	1.01	187	2	VPSB [1]
BSMS/2 VTA TC-T	Z116922	0.00	4	1	Active CH1
N2-LEVELSONDE 12/1126/850 D325	Z122404	0.00	0	1	Accessory SPB
SM SAMPLEMAIL KPL.	Z116802	0.05	37	1	

Figure 10.1 Read the Serial Number

Contact

Appendix

APPENDIX

A Warning Signs

Caution

Notice

Warning

APPENDIX

B Figures

C Tables

APPENDIX

D Glossary

BNL

Bruker Nitogen Liquefier

BSMS

Bruker Smart Magnet control System

ELCB

Extended Lock Control Board

HPPR

High Power Preamplifier

IPSO

Intelligent Pulse Sequence Organizer

PLC

programmable logic controller

TTY

Serial Interface

APPENDIX

E References

[1] BRUKER SampleCase Users Manual (Z31972)
Reto Schmid, December 2010
Bruker BioSpin AG, Fällanden, Switzerland

[2] BRUKER Site Planning AVANCE Systems 300-700MHz (Z31276)
Stanley J. Niles / Daniel B. Baumann, February 24, 2008
Bruker Biospin GmbH, Rheinstetten, Germany

[3] BRUKER Site Planning AVANCE Systems 750-950 MHz (Z31686)
Razvan Teodorescu, August 28, 2006
Bruker Biospin GmbH, Rheinstetten, Germany

[4] BRUKER Probes (Z31339)
D. Marek, R. Triebe, M. Waden, D. Wilhelm July 2, 2009
Bruker BioSpin AG, Fällanden, Switzerland

APPENDIX

F Certifications

IEC IECEE CB SCHEME

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
Luppmenstrasse 1,
CH-8320 Fehraltorf

electrosuisse

Signed by: Martin Plüss
2011-04-28

page 1 of 1

Figure F.1: The CE test certificate

APPENDIX

G Revision History

Version	Date	Who	Alteration Type
01	22.11.2011	SRE	First release / Product launch
02	30.03.2012	SRE	SampleMail added / Major design changes

Table G.1: The Revisions of this Manual

APPENDIX

H Index

APPENDIX

Bruker
your solution partner

Bruker provides a world class, market leading range of analytical solutions for your molecular and material research needs.

Bruker Corporation

info@bruker.com
www.bruker.com