CryoFIT

- CryoProbe Flow Conversion System

Installation Manual

Version 003

Innovation with Integrity

NMR

This manual was written by

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P/N: H12214

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1 About This Manual

This manual enables safe and efficient handling of the device.

This manual is an integral part of the device, and must be kept in close proximity to the device where it is permanently accessible to personnel. In addition, instructions concerning labor protection laws, operator regulations tools and supplies must be available and adhered to.

Before starting any work, personnel must read the manual thoroughly and understand its contents. Compliance with all specified safety and operating instructions, as well as local work safety regulations, are vital to ensure safe operation.

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.

1.1 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.

1.2 Symbols and Conventions

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

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

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

This is the consequence of not following the warning.

1. This is the safety condition.

▶ This is the safety instruction.

⚠ WARNING

WARNING indicates a hazardous situation, which, if not avoided, could result in death or serious injury.

This is the consequence of not following the warning.

1. This is the safety condition.

▶ This is the safety instruction.

⚠ CAUTION

CAUTION indicates a hazardous situation, which, if not avoided, may result in minor or moderate injury or severe material or property damage.

This is the consequence of not following the warning.

1. This is the safety condition.

▶ This is the safety instruction.

NOTICE

NOTICE indicates a property damage message.

This is the consequence of not following the notice.

1. This is a safety condition.

▶ This is a safety instruction.

SAFETY INSTRUCTIONS

SAFETY INSTRUCTIONS are used for control flow and shutdowns in the event of an error or emergency.

This is the consequence of not following the safety instructions.

1. This is a safety condition.

▶ This is a safety instruction.

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

2 Introduction

This document describes the installation of the CryoFIT™ accessory, including the insertion and removal of the flow cell.

Important Information

NOTICE
Risk of Material Damage Due to Improper Usage Failure to observe the following safety warnings may result in material damage. ▶ Never try to spin the flow cell. ▶ Never use the sample lift if the flow cell is installed. ▶ Do not try to insert NMR sample tubes. ▶ Do not use the sample changer. ▶ Do not use the device with a BCU05 (freezing). ▶ Make sure the sample changer is not used during the flow application.

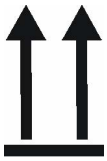
Introduction

3 Transport, Packaging and Storage

Retrofitting, repairs, adjustments or dismantling of the device must only be carried out by Bruker Service or personnel authorized by Bruker. Damage due to servicing that is not authorized by Bruker is not covered by your warranty.

3.1 Symbols on the Packaging

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

Top		The arrow tips on the sign mark the top of the package. They must always point upwards; otherwise the content may be damaged.
Fragile		Marks packages with fragile or sensitive contents. Handle the package with care; do not allow the package to fall and do not allow it to be impacted.
Protect Against Moisture		Protect packages against moisture and keep dry.
Attach Here		Lifting gear (lifting chain, lifting strap) must only be attached to points bearing this symbol.
Center of Gravity		Marks the center of gravity of packages. Note the location of the center of gravity when lifting and transporting.
Weight, Attached Load		Indicates the weight of packages. Handle the marked package in accordance with its weight.
Permitted Stacking Load		Indicates packages which are partially stackable. Do not exceed the maximum load-bearing capacity specified on the symbol in order to avoid damaging or destroying the content.

Do not Damage Air-tight Packaging		The packaging is air-tight. Damage to the barrier layer may render the contents unusable. Do not pierce. Do not use sharp objects to open.
Component Sensitive to Electrostatic Discharge		The packaging contains components which are sensitive to an electrostatic discharge. Only allow packaging to be opened by trained personnel. Establish potential equalization before opening.
Protect from Heat		Protect packages against heat and direct sunlight.
Protect from Heat and Radioactive Sources		Protect packages against heat, direct sunlight and radioactive sources.

Table 3.1: Symbols on the Packaging

3.2 Inspection at Delivery

Upon receipt, immediately inspect the delivery for completeness and transport damage.

Proceed as follows in the event of externally apparent transport damage:

- Do not accept the delivery, or only accept it subject to reservation.
- Note the extent of the damage on the transport documentation or the shipper's delivery note.
- Initiate complaint procedures.

Note:

Issue a complaint in respect to each defect immediately following detection. Damage compensation claims can only be asserted within the applicable complaint deadlines.

3.3 Packaging

About Packaging

The individual packages are packaged in accordance with anticipated transport conditions. Only environmentally friendly materials have been used in the packaging.

The packaging is intended to protect the individual components from transport damage, corrosion and other damage prior to assembly. Therefore do not destroy the packaging and only remove it shortly before assembly.

Handling Packaging Materials

Keep the original container and packing assembly, at least as long the warranty is valid, in case the unit has to be returned to the factory. When the packaging material is no longer needed dispose of in accordance with the relevant applicable legal requirements and local regulations.

3.4 Storage

Storage of the Packages

Store the packages under the following conditions:

- Do not store outdoors.
- Store in dry and dust-free conditions.
- Do not expose to aggressive media.
- Protect against direct sunlight.
- Avoid mechanical shocks.
- Storage temperature: 15 to 35 °C.
- Relative humidity: max. 60%.
- If stored for longer than 3 months, regularly check the general condition of all parts and the packaging. If necessary, top-up or replace preservatives.

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

Transport, Packaging and Storage

4 Flow Hardware

For protection during transport the flow cell is shipped together with the CryoFIT, inside the CryoFIT box, but is not mounted. For instructions for installing the flow cell refer to the User Guide *Handling of Flow Cell and Capillaries*.

Figure 4.1: The CryoFIT Accessory Box

NOTICE

Material damage from improper handling of the CryoFIT

Removing the screws from the spinner adapter at the end of the CryoFIT may result in misalignment of the flow cell.

▶ Do not remove the screws from the spinner adapter at the end of the CryoFIT.

NOTICE

Material damage to the CryoFIT flow cell

The flow cell is very fragile and may be damaged when sliding the lift down when the CryoFIT is not installed.

▶ Slide the lift down very slowy and carefully.

NOTICE

Material damage to the flow cell during storage and handling.

Storing and handling the assembly with the flow cell extended may result to damage or misalignment of the flow cell.

▶ Do not handle the assembly when the flow cell is extended.

▶ Do not store the assembly with the flow cell extended.

4.1 CryoFIT Accessory (PZ H13485)

The CryoFIT accessory includes the following parts:

Figure 4.2: Fittings, Sleeves and Capillaries

HZ14201	PH CRYOFIT HOLDER CPL
H13563	CRYOFIT VALVE
H12214	PH CRYOFIT MANUAL
Z74395	CRP CRYOFIT LOCATING SPINNER CPL.
Z74385	CRP CRYOFIT AIR CONNECTOR T-PIECE CPL.
85988	FITTING LONG PEEK NUTS 10/32 WITHOUT FERRUL
85936	TUBING SLEEVES 785-825U
88385	TOOL HEX SCR KEY- T-HANDLE 3MM
84510	HOSE PTFE ID=0.8 AD=1.6
84584	PACKING CORRUGATED CARDBOARD-CARTON 2.3
HZ14633	PH CRYOFIT ANTI-ROTATION PROTECTION UNIT
HZ13395	LOGO AVANCE ONE&TWO BAY BRUKER EMBLE
88650	WZ DOUBLE OPEN ENDED WRENCH 2.5X3.2
86637	CAPILLARY HOSE-CUTTER

5 Installation

The installation of the CryoProbe for NMR applications with standard sample and flow cell varies depending on whether the CryoProbe is warm or cold:

- *Installation with a Warm CryoProbe [▶ 15]*
- *Installation with a Cold CryoProbe [▶ 16]*

Assembling the CryoFIT Accessory [▶ 16] is the same for either case.

5.1 Installation with a Warm CryoProbe

- Insert the CryoProbe into the magnet.
- Plug in the T-piece for the VT gas and capillary and connect the CABLE BVT-CRP (P/N Z14278).

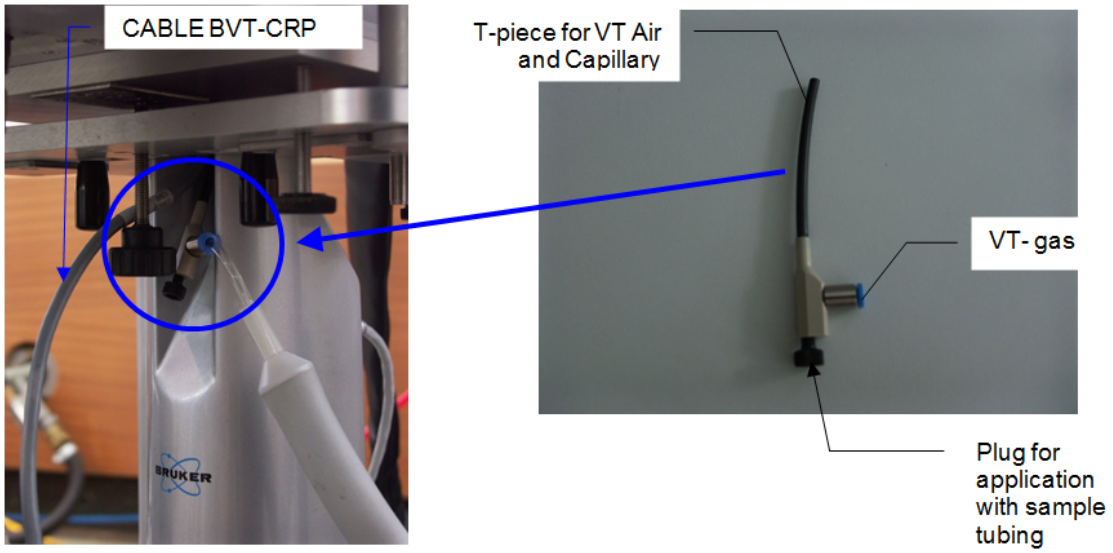


Figure 5.1: Bottom of CryoProbe (left) and T-Piece (right)

- Mount the ATM unit or the mechanical Tuning & Matching adapter.

5.2 Installation with a Cold CryoProbe

Make sure firmware version **crcoah** or higher is installed before installation.

- Dismount the mechanical Tuning & Matching adapter or the ATM.

  The error message: **(152) Temp. controller #3 sensor missing** will appear on the display.

  NOTICE! Proceed to the next steps without delay!
- Dismount the VT – gas tube from the CryoProbe.
- Plug in the T – piece for the VT gas and capillary on the CryoProbe.
- Mount the ATM unit or the mechanical Tuning & Matching adapter.

The CryoProbe is now ready again for use with NMR sample tubes. To use the flow cell, follow the instructions in the following chapters of this manual.

5.3 Assembling the CryoFIT Accessory

Before using the CryoFIT Accessory the valve, bracket and holder unit must be mounted.

- Mount of the valve used to disable the spinning flow on the hose leading to the Shim Upper Part:

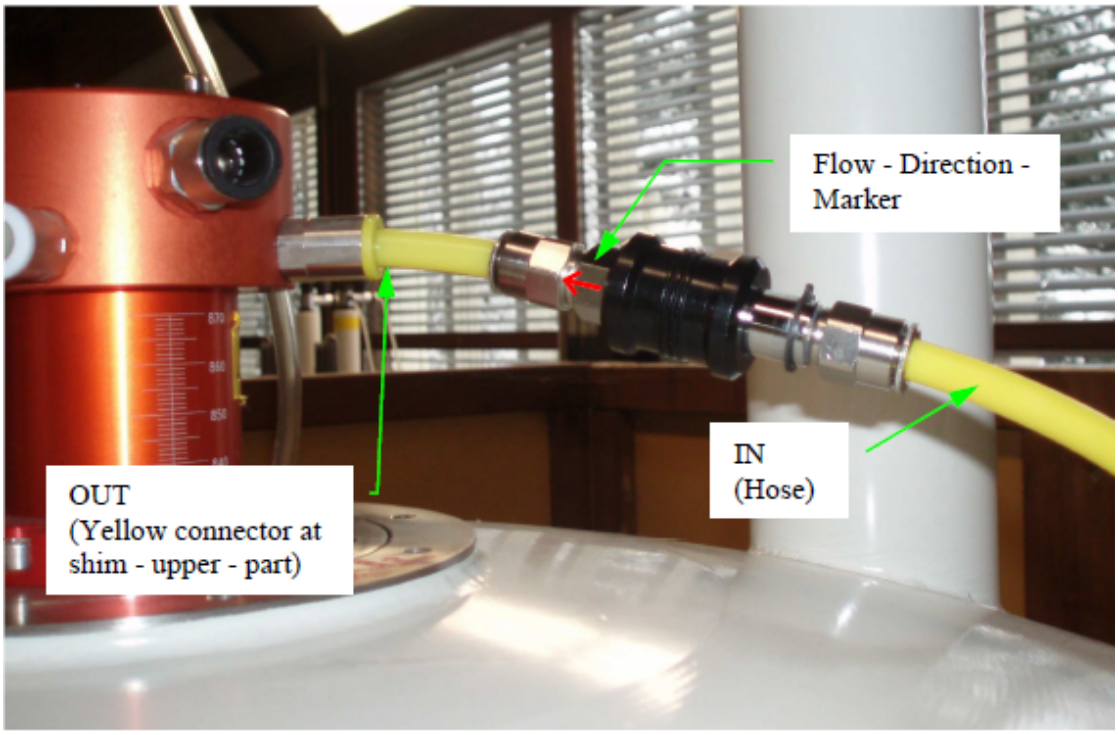


Figure 5.2: Valve Mounting

- Mount the HOLDER BRACKET on the shim upper part as shown:

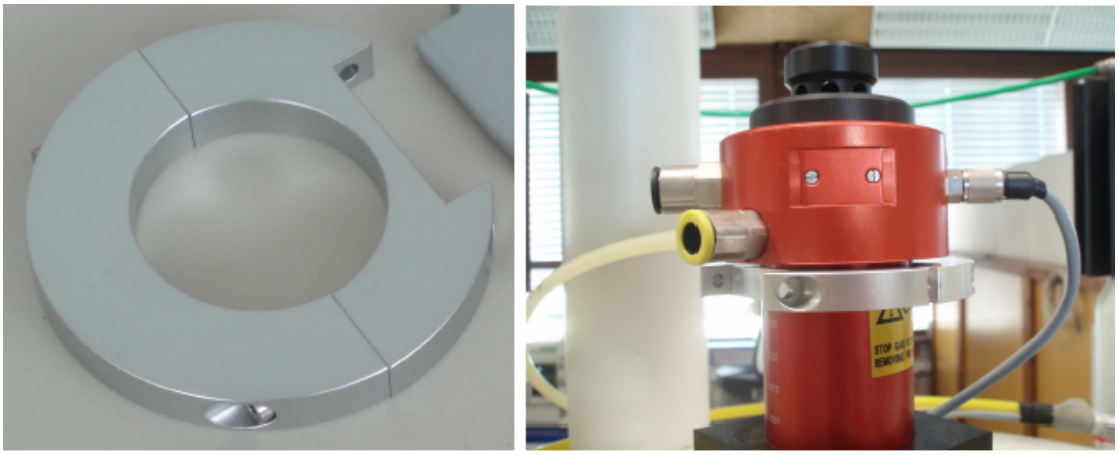


Figure 5.3: Bracket Mounting on the Shim Upper Part

- Assemble of the CryoFIT Holder Unit as shown:

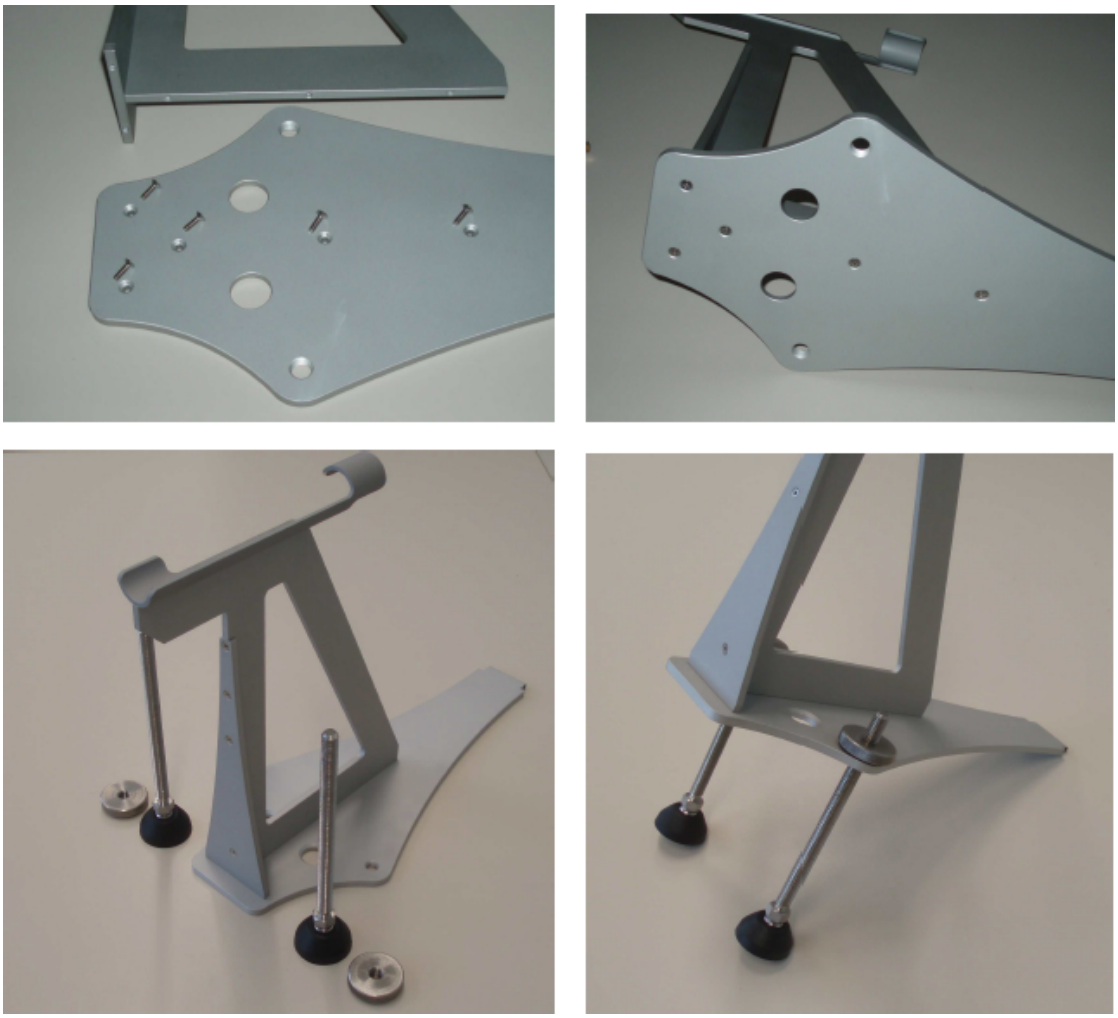


Figure 5.4: The CryoFIT Holder Unit

- Mount of the CryoFIT Holder Unit to Holder Bracket on the upper part of the shim system:

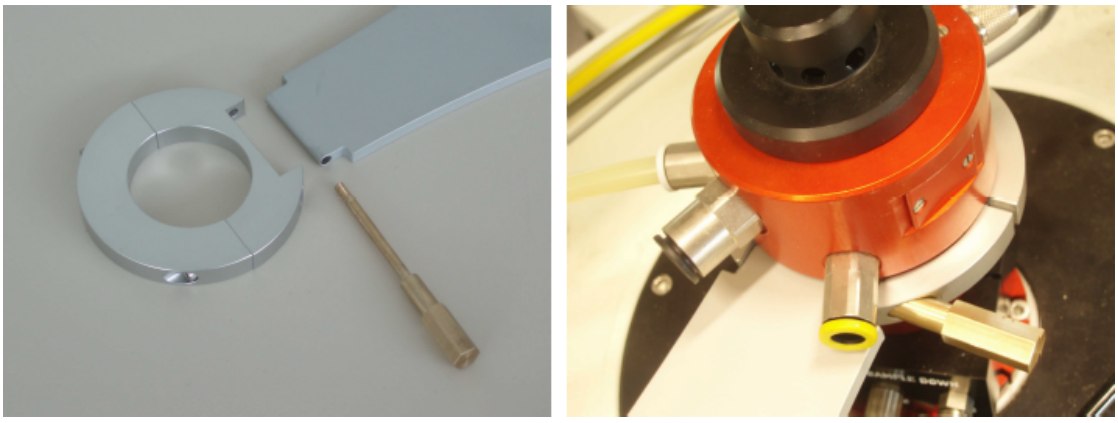


Figure 5.5: Mounting the CryoFIT Holder on the Upper Part of the Shim System

- Adjust the length of the bracing holder on the magnet until the plate is horizontal.

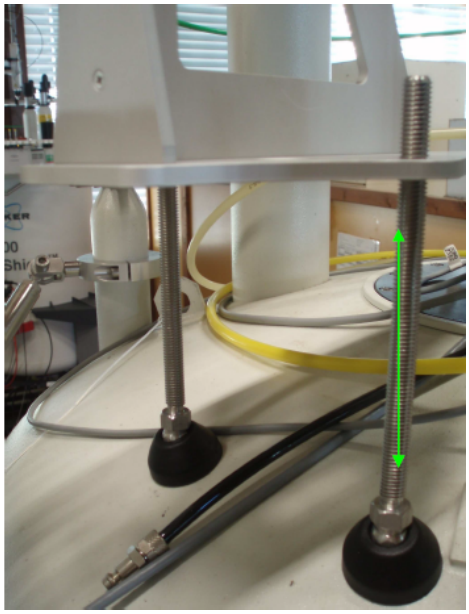


Figure 5.6: Height of the Bracing Holder

6 Inserting the Flow Cell

Before inserting the Flow Cell make sure the CryoFIT Accessory has been assembled correctly as described in the section *Assembling the CryoFIT Accessory [▶ 16]*.

- Switch off the BCU05 to prevent freezing.
- Close the valve to disable the spinning flow. Move the slider to the closed position.

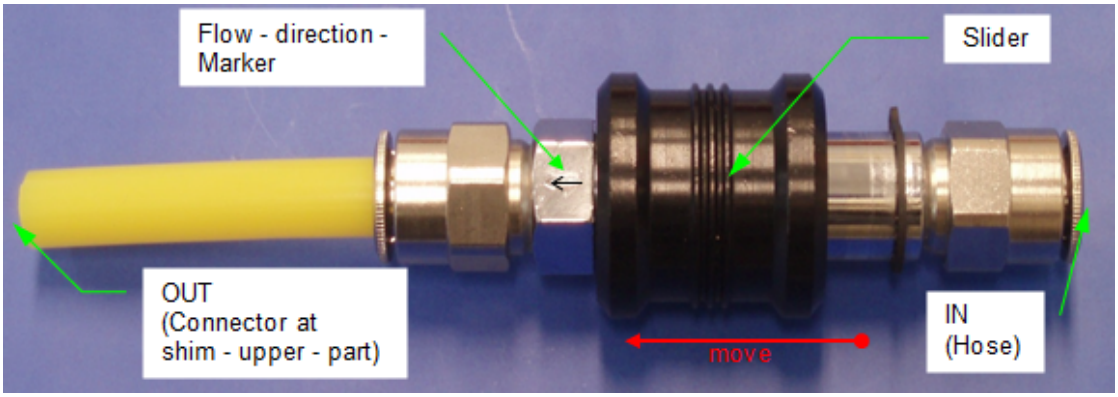


Figure 6.1: Valve Parts

- Activate the sample lift.

⚠ **CAUTION! Make sure the sample changer is not used during the flow application.**

Figure 6.2: Activating the Sample List

Note: The insert guide is needed to insert the capillary properly into the probe. The insert guide looks similar to a classical sample spinner, nevertheless, never try to spin it!

- The insert guide slots have to be rotated circa 90° relative to each other, as shown in the figure below. Insert the insert guide into the magnet.

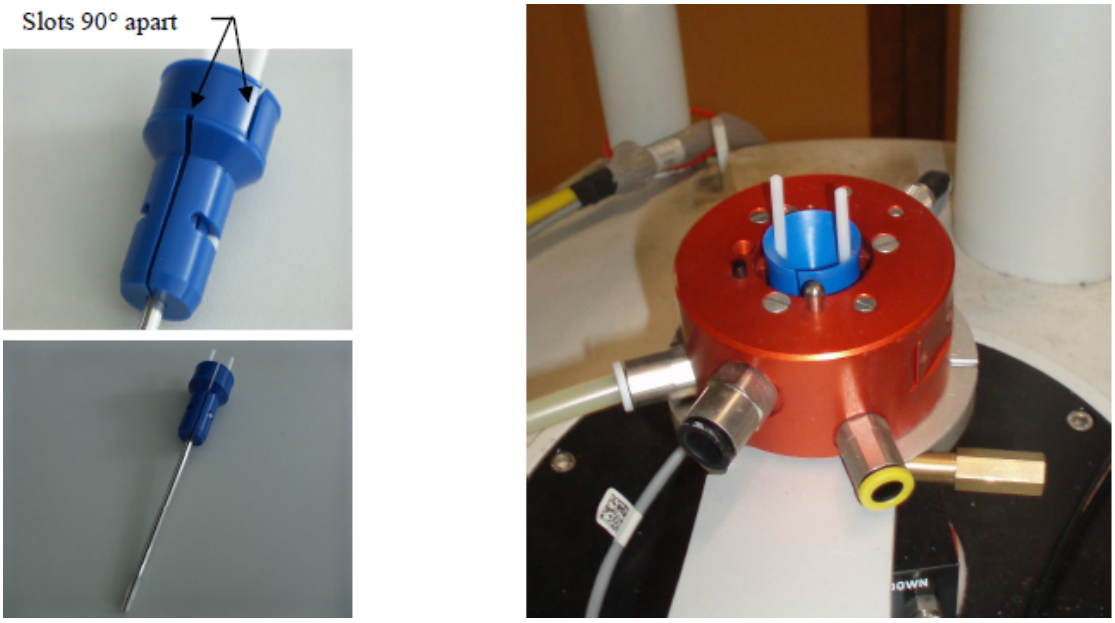


Figure 6.3: Inserting the Guide into the Shim Upper Part

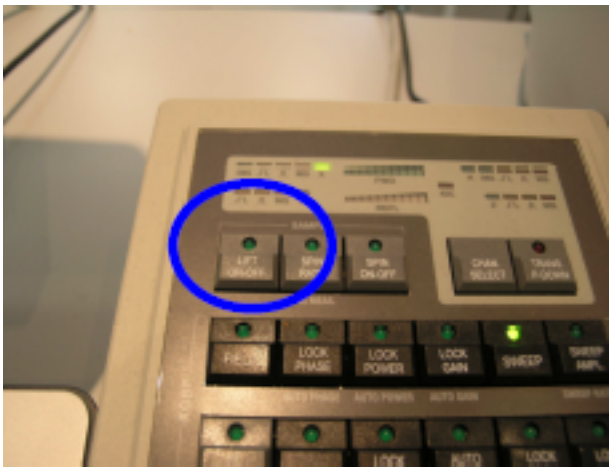


Figure 6.4: Switching Off the Sample Lift

- Unscrew the plug on the T – piece of the VT gas at the bottom of the probe.
  Do not leave it open for more than 10 minutes.
  Do not disconnect the VT gas hose.
  Some VT gas will escape from the opened T-piece.

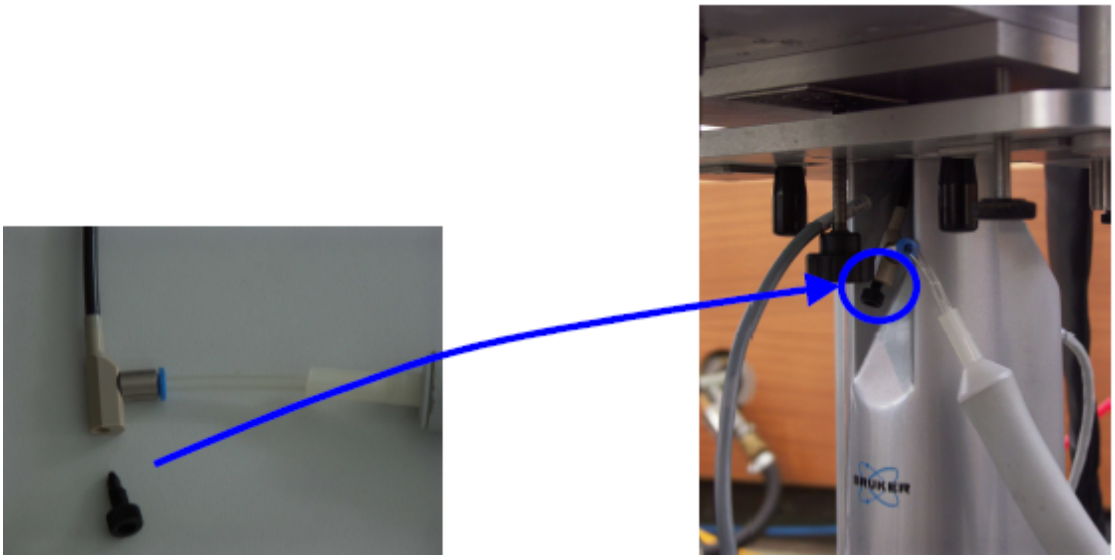


Figure 6.5: Unplugging the T-Piece

- Keep the plug in a safe place, it will be needed when the Flow Cell is removed (see *Removing the Flow Cell [▶ 29]*).
- To prepare the CryoFIT, take the CryoFIT out of the box and bend the rod at the frame joint.

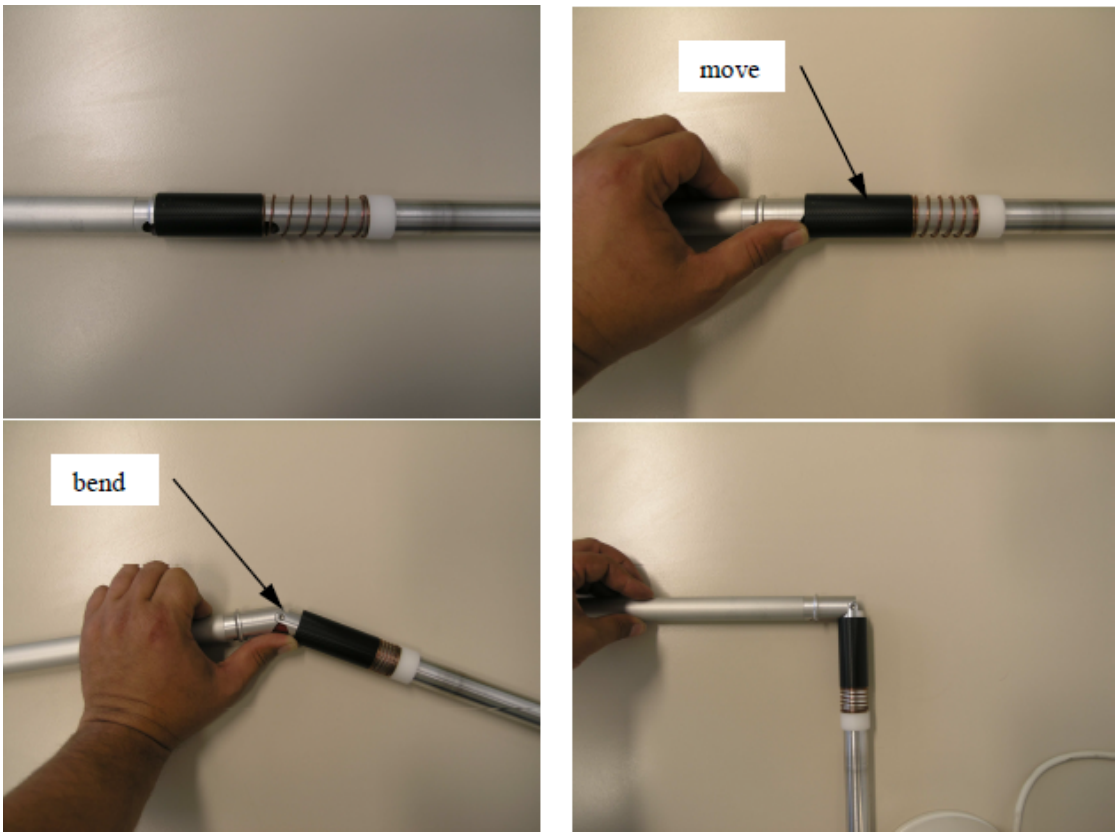


Figure 6.6: Bending the Frame Joint

NOTICE! Before installation be sure that the inlet capillary is clean and free of dirt particles on the surface.

- Hold the CryoFIT and insert it into the holder.
- Carefully insert the inlet capillary into the shim system.

  The capillary will glide smoothly into the probe and come out through the T-piece of the VT gas adapter.

  If you feel some slight resistance when the capillary hits the T-piece at the probe bottom, cautiously increase the force slightly to push the capillary through.
- Put the CryoFIT into the CryoFIT Mounting Unit. If the capillary gets stuck:
  - Make sure the insert guide is in the shim system.
  - Ask someone else to move the T-piece back and forth while you insert the capillary.

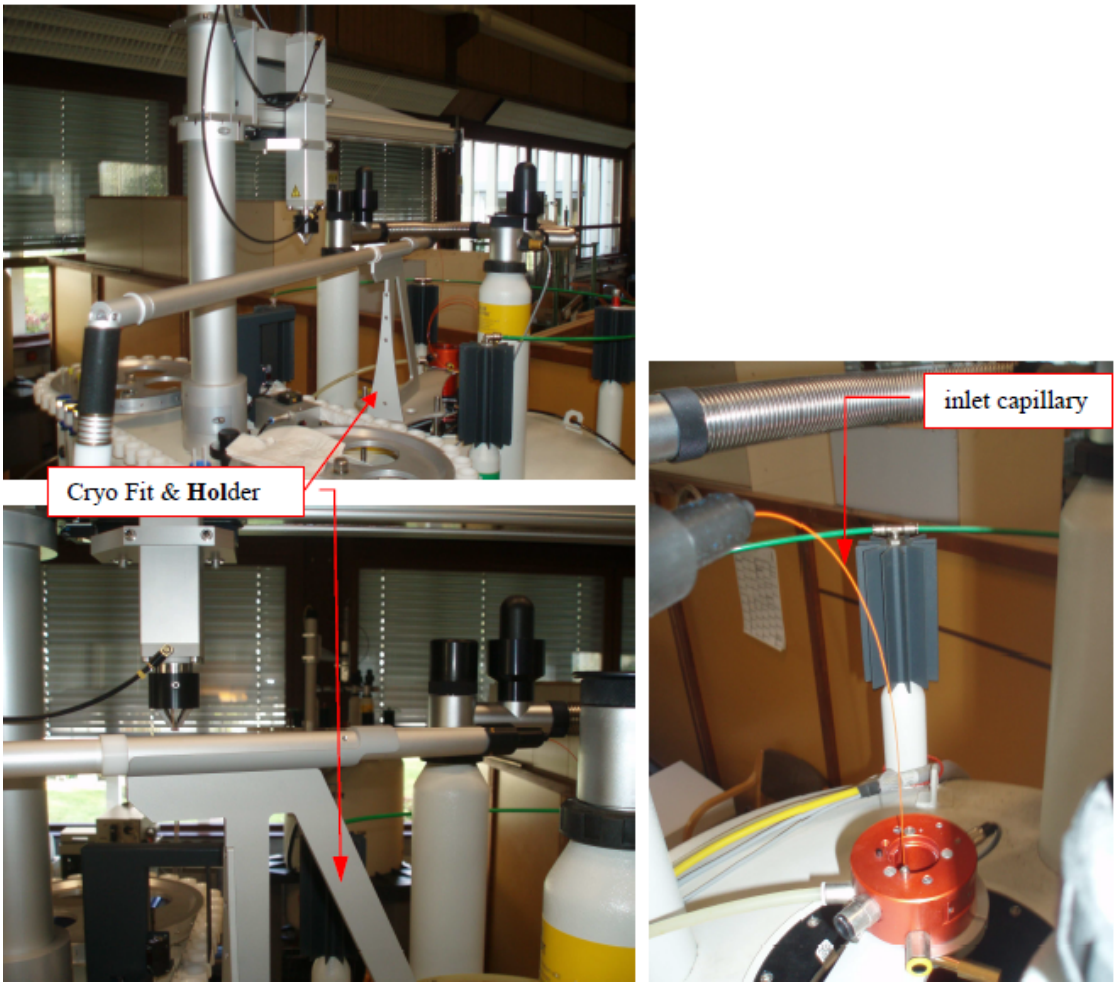


Figure 6.7: Inserting the Capillary

Activate the sample lift so that the insert guide is lifted:

Figure 6.8: Activating the Sample Lift

- Take the insert guide and rotate the two pieces against each other until the two slots are in-line. Carefully weave out the capillary.

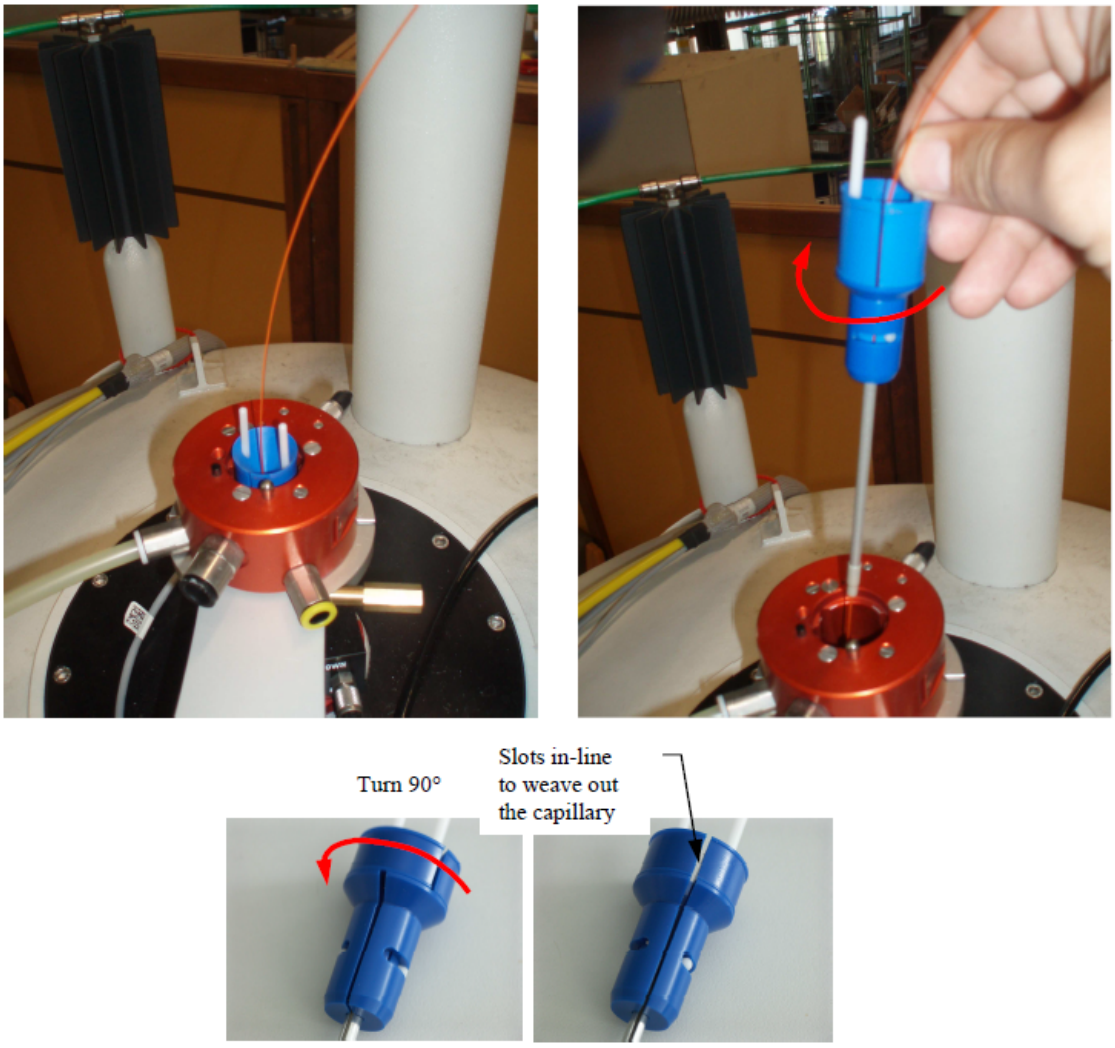


Figure 6.9: Removing the Insert Guide

- Switch off the sample lift:

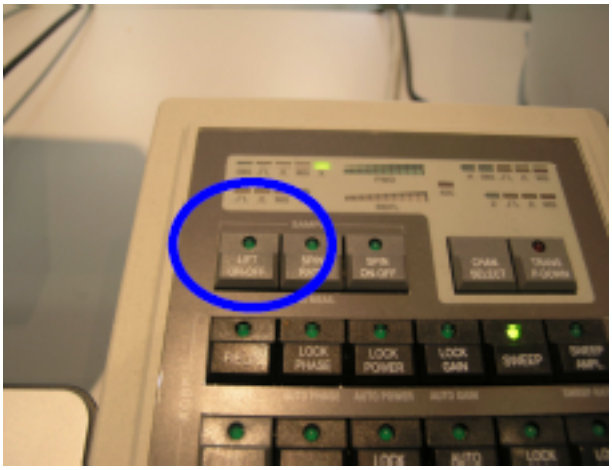


Figure 6.10: Switching Off the Sample Lift

- Lift the CryoFIT, and let the CryoFIT glide all the way down into the magnet. Hold the CryoFIT to control the lowering motion.
- At the frame joint bend the CryoFIT straight and glide it until to a stop.

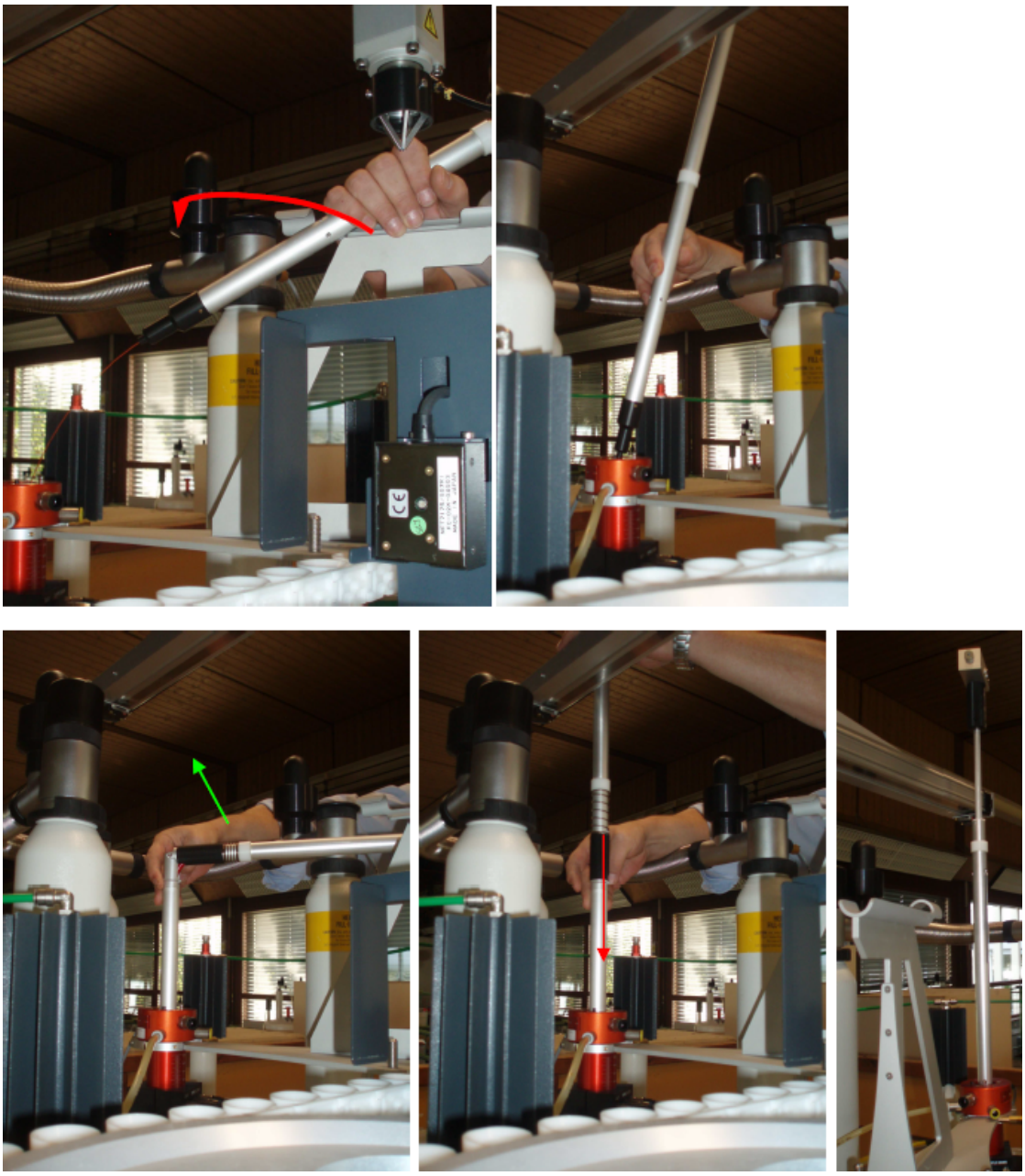


Figure 6.11: Inserting the CryoFIT

- Hold the CryoFIT with one hand, and with the other hand take the lift and pull it up. Turn the lift and then move it down carefully.

  Now the flow cell is inserted into the probe and the outlet capillary can be connected.

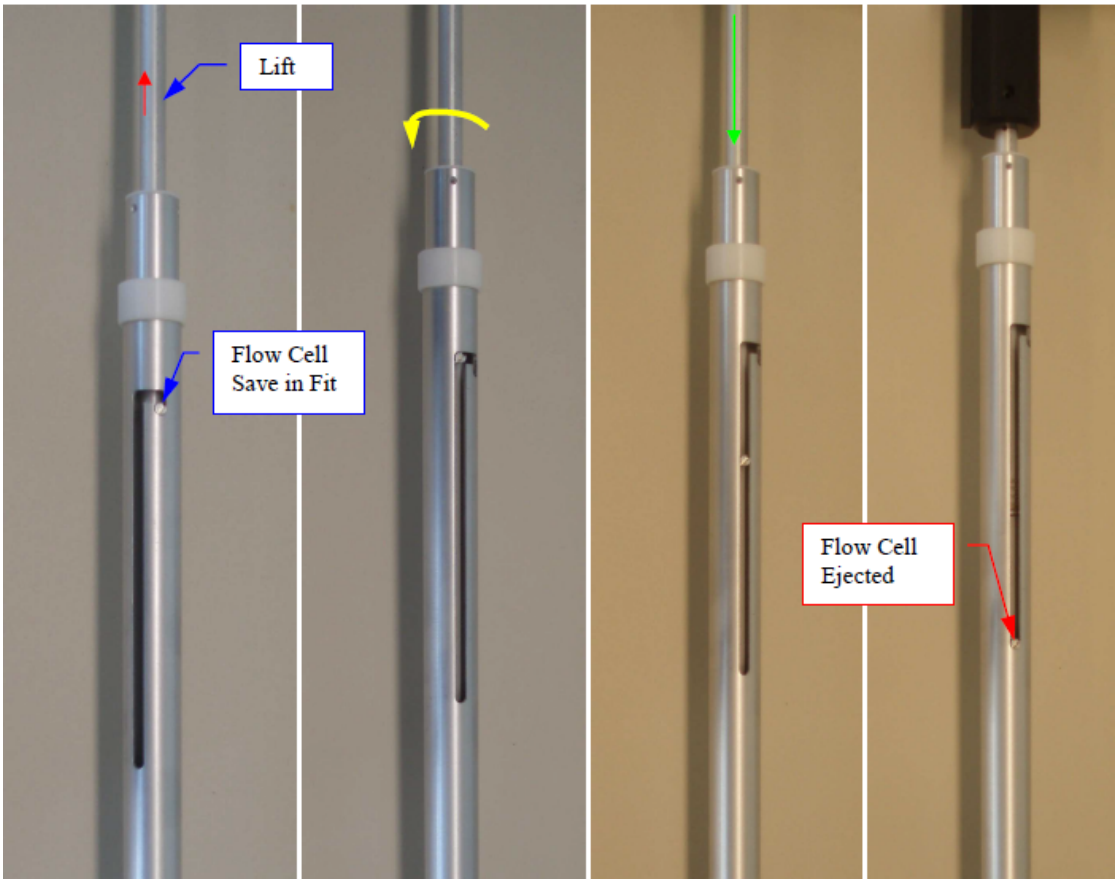


Figure 6.12: Inserting the Flow Cell

- At the bottom of the probe, take the nut with the green sleeve and put it over the inlet capillary just below the T-piece of the VT gas. Screw the nut tight on the T-piece of the VT gas.

  The VT gas will no longer escape from the T-Piece.

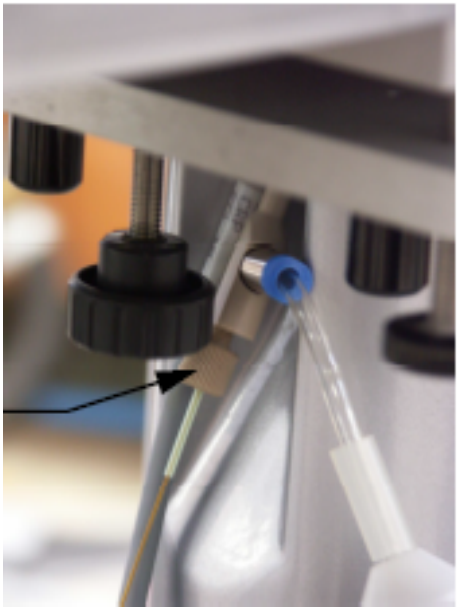


Figure 6.13: Nut Screwed on the T-Piece

The system is now ready to be connected to the external flow equipment.

Connecting the CryoFIT to the LC-NMR or BEST

When you connect the Inlet capillary with a 1/16“ capillary to the LC-NMR interface (Prospekt2, BPSU-36, BPSU-12, BSFU) make sure that the capillary does NOT extrude out of the end of the sleeve. Ensure that the capillary ends at the end of the sleeve.

Inserting the Flow Cell

7 Removing the Flow Cell

Before you remove the flow cell you have to remove any solvent and sample!

- Wash the flow cell with clean liquid. If the LC-NMR or BEST equipment allows it, do a *Wash and Dry Probe.* Otherwise use a syringe to blow air through the CryoFIT to remove any liquid.
- Unscrew the nut with the green sleeve at the bottom of the probe and the outlet capillary at the top of the magnet.

Figure 7.1: T-piece and Disconnected Outlet Capillary

NOTICE! Be sure the capillary is clean and free of dirt particles on the surface.

- Carefully pull out the lift of the CryoFIT.
- Lock the lift with a turn.

Removing the Flow Cell

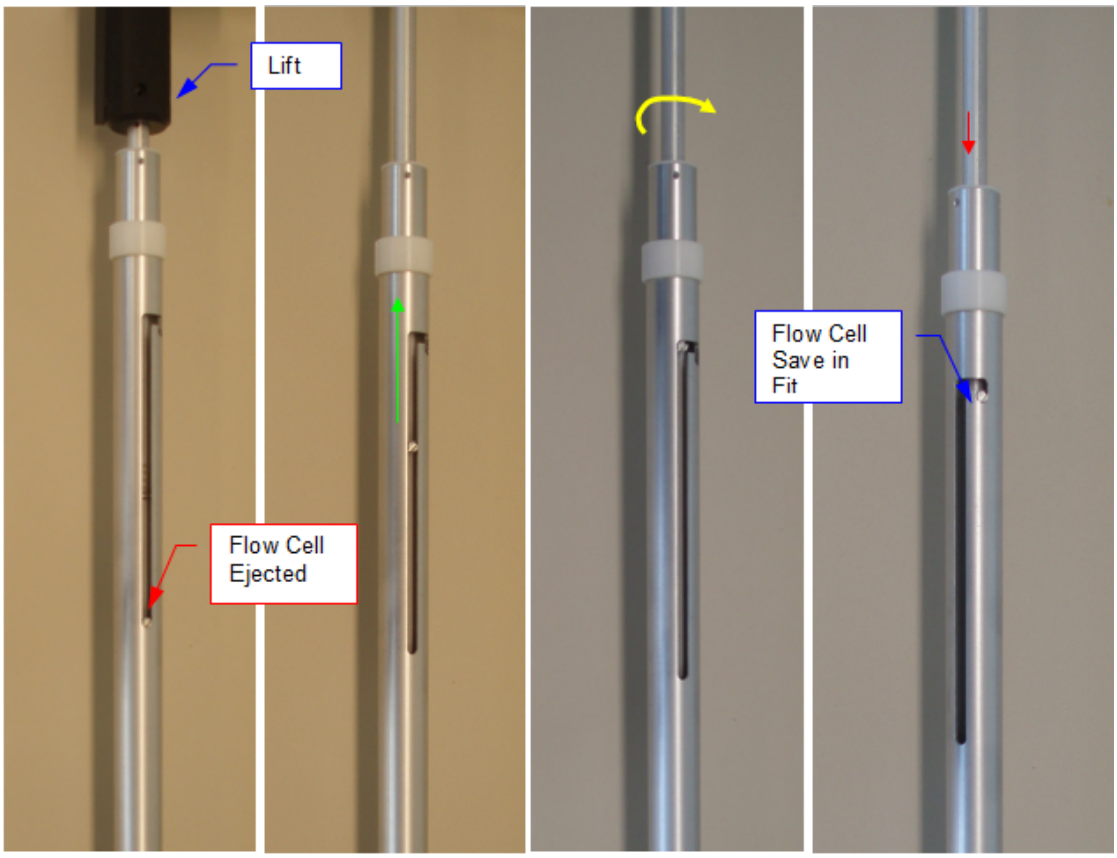


Figure 7.2: Removing the Flow Cell

- Carefully pull out the CryoFIT to the frame joint.
- At the frame joint push the ring and bend the CryoFIT.
- Pull out the CryoFIT and inlet capillary.
- Put the CryoFIT back in its package with straight bended frame joint.

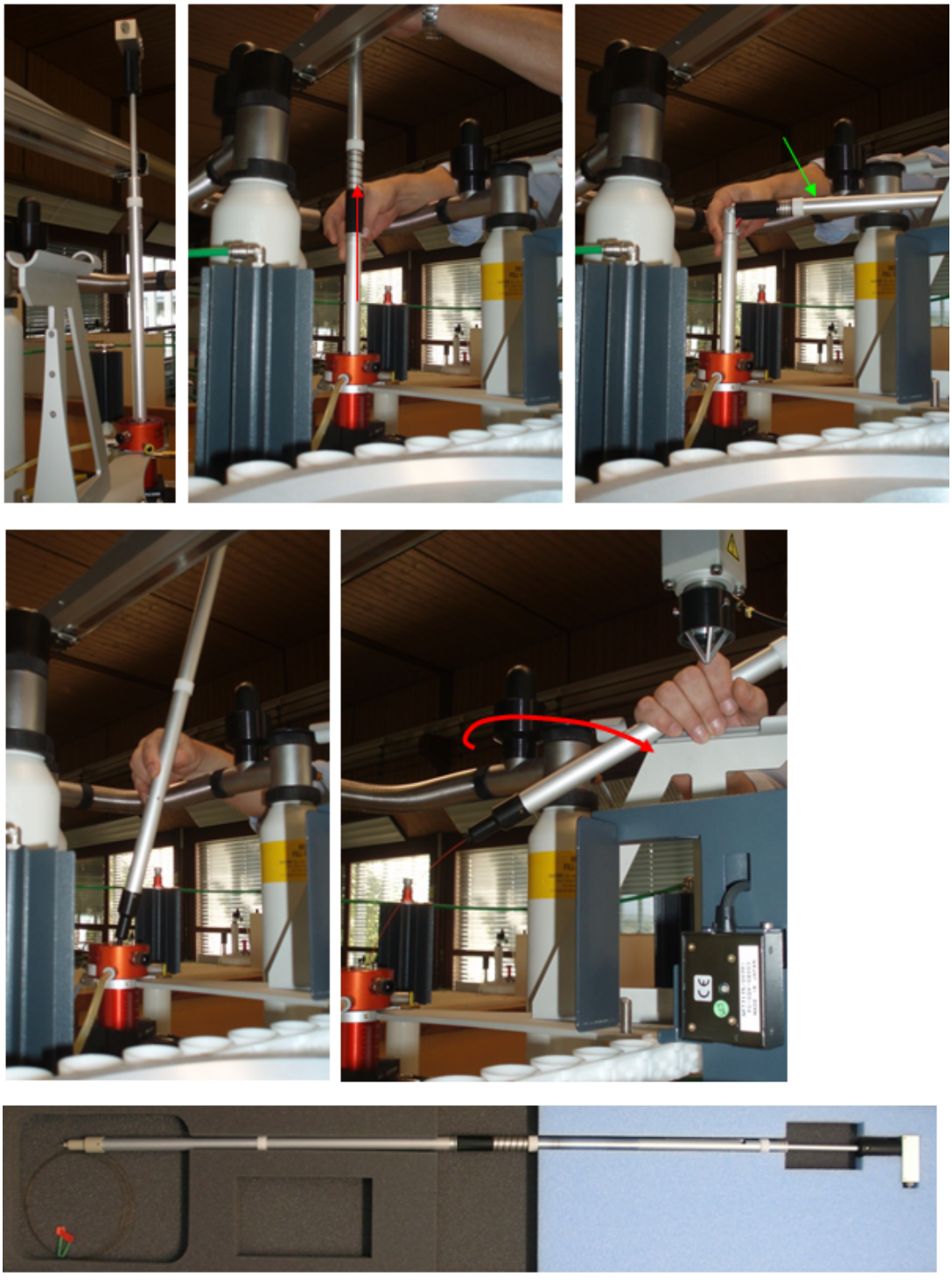


Figure 7.3: Removing the CryoFIT

- Screw the regular plug onto the T-piece of the VT gas.

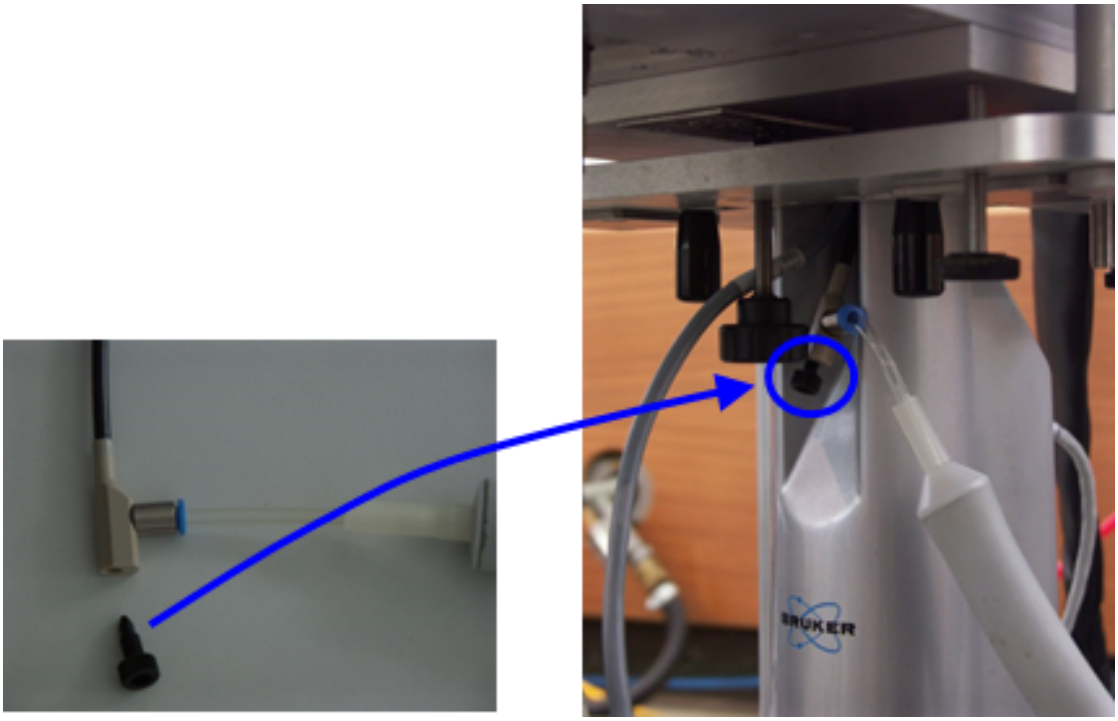


Figure 7.4: Plugging in the T-Piece

- Open the valve to enable the spinning flow.
- Move the slider to the OPEN position.

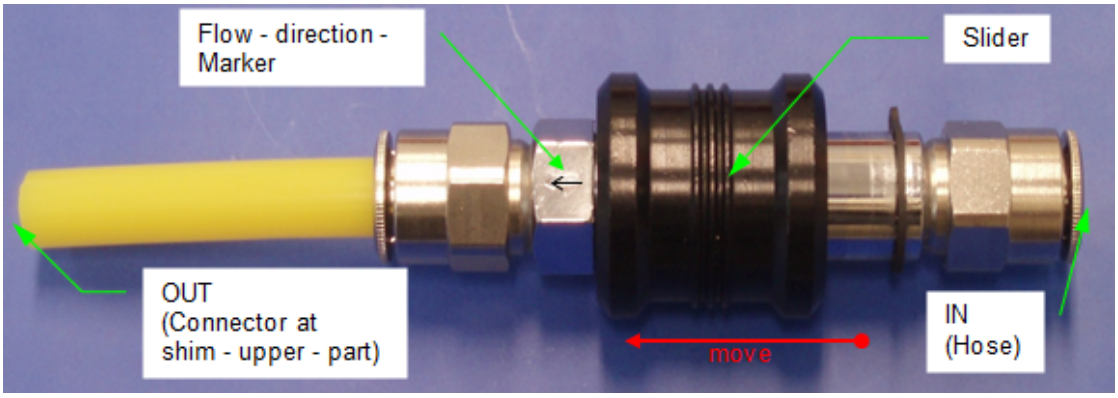


Figure 7.5: Valve Parts

The CryoProbe is now ready again for using NMR sample tubes with or without a sample changer.

8 Dismantling and Disposal

Retrofitting, repairs, adjustments or dismantling of the device must only be carried out by Bruker Service or personnel authorized by Bruker. Damage due to servicing that is not authorized by Bruker is not covered by your warranty.

8.1 Dismantling

Before starting dismantling:

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

8.2 Disposal

After the lifespan of the product, Bruker takes responsibility for disassembly and disposal in accordance with the European Directive WEEE 2012/19/EC. Bruker BioSpin will take back the components free of charge upon request by the customer. If the customer wants to arrange disposal on their own, then this must be stated when the product is ordered.

European Waste Electrical and Electronic Equipment Directive (WEEE 2012/19/EC)

Do not dispose in domestic household waste.

The affixed label indicates that it is prohibited to discard this electrical/electronic product in domestic household waste, in compliance with the European Waste Electrical and Electronic Equipment Directive (WEEE 2012/19/EC).

Dismantling and Disposal

For instructions on how to return end-of-life equipment, producer-supplied electrical accessories or auxiliary items for proper disposal contact the supplier or importer. If the supplier cannot be reached, contact the manufacturer.

NOTICE

Danger to the environment from incorrect handling of pollutants!

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

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

9 Contact

Manufacturer:

Bruker BioSpin NMR
Silberstreifen
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Phone: +49 721-5161-6155
http://www.bruker.com

WEEE DE43181702

NMR Hotlines

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Contact

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Order No: H12214