# Magnet Stand F

Service Manual


Version 03

Accessories

Innovation with Integrity

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This manual was written by

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© May 17, 2011: Bruker Corporation

Faellanden, Switzerland

ZTKS0117 / Z31833 / Rev.: 03

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

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# 0 Contact

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Please refer to the model No., serial No. and internal order No. in all correspondence regarding the NMR system or components thereof.

# Contact

# 1 Introduction

## 1.1 General Information

This manual contains important information about the handling of the supplied magnet stand as a part of the magnet system used for NMR analyses. The compliance with all safety and handling instructions, the applicable local accident prevention and general safety regulations are necessary for safe work.

The manual is part of the product. It must be kept in the immediate vicinity of the magnet system and unimpeded access must be ensured at any time.

Read the manual carefully before handling the magnet system or its components.

### 1.1.1 Limitation of Liability

The information in this manual will take into account the current state of the technology.

The manufacturer assumes no liability for damages resulting from:

- non-compliance with the instructions and all applicable documentation,
- use for purposes not intended,
- not sufficiently approved persons,
- arbitrary changes or modifications and
- use of unauthorized spare parts or accessories.

### 1.1.2 Customer Service

Technical support is provided by Bruker Service via telephone or e-mail. For contact information see page 5 of this document.

### 1.1.3 Warranty

The warranty terms can be found in the sales documents of the magnet system and in the Terms and Conditions of Bruker Corporation.

### 1.1.4 Copyright

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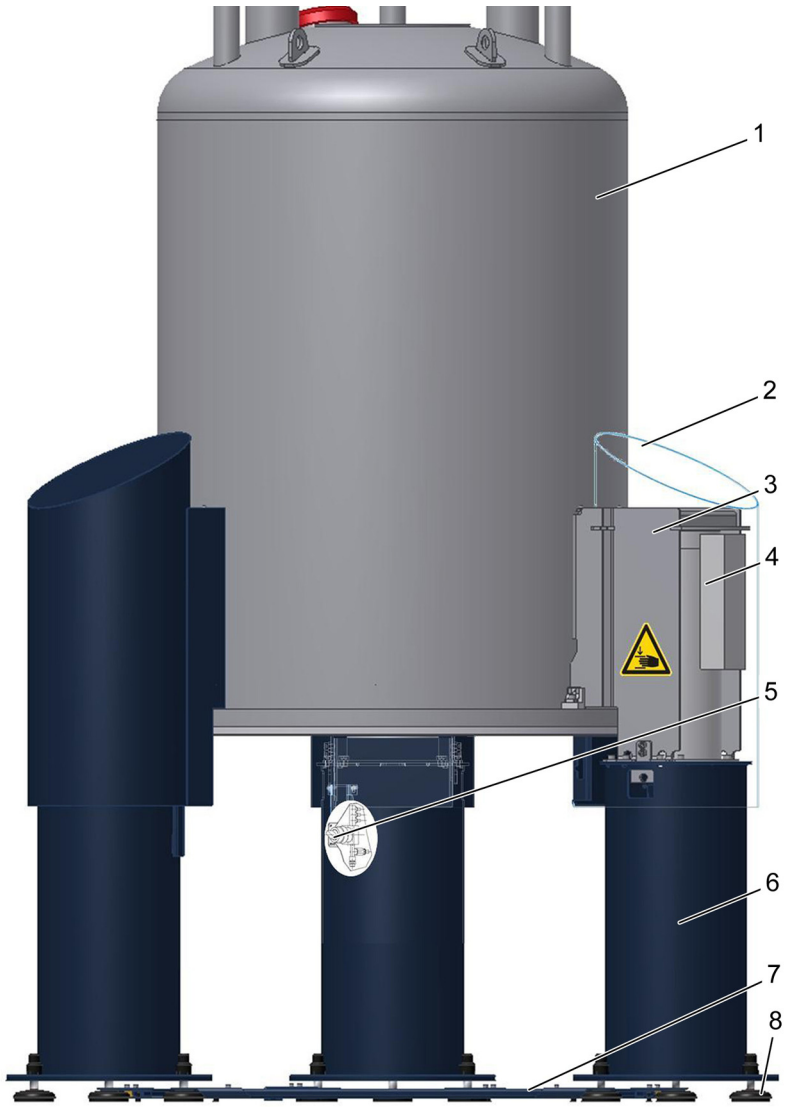
## 1.2 General View




1 Magnet system

2 Protection cover

3 Support

4 Isolator

5 Pneumatic controller

UP/DOWN switch
(for magnet stand with pneumatic isolators

6 Pillar

7 Bracket

8 Base plate

Figure 1.1: General view of the magnet system with magnet stand F

**Description**

The magnet stand allows access to the RT bore from the bottom side and protects the magnet system (1) from floor vibrations.

**Components**

**Pillars**

Three pillars (6) carry the magnet stand and provide the correct distance from the ground.

**Base Plates**

Each pillar has three base plates (8) for levelling the magnet stand.

**Brackets**

Three brackets (7) connect the three pillars. They add stability to the pillars and protect the pneumatic pipes (for magnet stand with pneumatic isolators).

**Protection Cover**

The protection cover (2) protects against unintended contact with the support or the isolators. It also protects the support and isolators against dirt and dust.

**Support**

The support (3) connects the magnet system and the magnet stand. The isolators (4) are located inside the support.

**Isolators (EMI, ADI, API)**

The isolators reduce the transmission of floor vibration towards the magnet system.

Depending on the need of the customer different isolators are available as option.

**Pneumatic Controller**

(for magnet stand with pneumatic isolators)

With the pneumatic controller (5) the pneumatic isolators may be activated and deactivated.

- In the activated mode the magnet system is lifted by ~ 5 mm.
- In the deactivated mode the magnet system is lowered to the top of the pillars, thus allowing maintenance work to be done.

# Introduction

# 2 Safety

The supplied magnet stand was designed and manufactured according to best available technical knowledge and practice, archived in over 50 years of experience of Bruker Corporation. The magnet stand provides a free operation space between the bottom plate of the magnet system and the floor. For further safety instructions refer to the manual of the supplied magnet system.

Nevertheless non-compliance with the following instructions and safety advice may cause serious hazards and property damage.

## 2.1 Approved Persons

Bruker BiosSpin AG identifies the following qualifications for personnel performing tasks on the magnet system or its components:

**Approved Customer Personnel**

As a result of professional training by Bruker Service Personnel, experience and knowledge of applicable regulations these persons are qualified to perform the specific tasks on the magnet system and its components assigned to them in this manual. Approved Customer Personnel are qualified to identify possible hazards and risks associated with the tasks assigned to them and to perform all possible steps to eliminate or minimize these risks.

**Bruker Service Personnel**

These persons are qualified by appropriate qualification and professional training and experience (including all necessary knowledge of applicable regulations and regulatory requirements) to perform specific tasks on the magnet system and its components. Bruker Service Personnel are qualified to identify possible hazards and risks and to perform all possible steps to eliminate or minimize these risks.

## 2.2 Customer Responsibilities

The customer must obey the security advice and the rules for safety, accident prevention and environmental protection correctly for the magnet systems and for the magnet stand as a part of it. Furthermore, the customer is responsible for keeping the magnet system in good technical condition.

**In particular:**

- The customer must determine additional dangers resulting from the working conditions at the site of the magnet system and provide applicable safety measures.
- The customer must ensure that the site plan meets the specified conditions for operating the magnet system and supplied site planning document.
- The customer must clearly define the responsibilities for operation and maintenance.
- The customer must ensure that all employees working with the magnet stand have read and understood the manual.
- The customer has to provide the necessary personal protective equipment for his employees.

## 2.3 Key Words

**DANGER**

**Indicates a hazardous situation which, if not prevented, will result in death or serious injury.**

**WARNING**

**Indicates a hazardous situation which, if not prevented, could result in death or serious injury.**

**CAUTION**

**Indicates a hazardous situation which, if not prevented, may result in minor or moderate injury.**

***NOTICE***

**Hazard, which could result in property damage.**

Information and links for efficient and trouble-free handling and operation.

## 2.4 Residual Risks

In the following chapter, the residual risks from the risk analysis according to ISO 14971 are summarized. To prevent health hazards and hazardous situations obey all safety instructions and warnings in the manual.

### 2.4.1 Persons

**⚠ WARNING**

**Risk of injury and property damage due to handling by not approved persons.**

Incorrect handling of the magnet system by not approved persons may result in significant bodily injury and property damage.

Thus:

- Work must only be carried out by approved persons with applicable qualifications. The necessary qualifications are specified in the beginning of the relevant chapters.
- In case of doubt, contact Bruker Service.

### 2.4.2 Intended Use

**⚠ WARNING**

**Risk of damage to life and limb by incorrect use of the magnet system.**

Incorrect use of the magnet system can lead to life-threatening situations and destruction of the magnet system.

Thus:

- Only use the magnet system as intended.
- Do not change the magnet system.
- Do not use the magnet system to demonstrate strong magnetic fields.
- Do not exceed specified values for operating the magnet system.

Damage claims from damages caused by other than the intended use of the magnet system are excluded and the customer is held liable.

### 2.4.3 Safety Devices

**⚠ WARNING**

**Risk of damage to life and limb due to not sufficient safety devices.**

Several safety devices ensure safe operation of the magnet system. They must always be in correct working condition.

Thus:

- Do not block safety devices.
- Do not remove safety devices.
- Check the operational reliability of the safety devices before working on the magnet system.

### 2.4.4 Spare Parts

**⚠ WARNING**

**Risk of injury and property damage from using incorrect or defective spare parts and accessories.**

Incorrect or defective spare parts can cause serious injuries. They may cause damaging, malfunctioning and the destruction of the magnet system.

Thus:

- Use only original equipment manufacturer spare parts.
- Use only original equipment manufacturer accessories.

### 2.4.5 Signs and Labels

**⚠ WARNING**

**Risk of damage to persons and property due to not readable signs and labels.**

Signs and labels with advice may become not readable.

Thus:

- Maintain signs and labels in a readable state.
- Replace damaged or not readable signs and labels immediately. New signs and labels can be obtained from Bruker Service.

## 2.4.6 Technical Risks

**Assembly / Disassembly**

**⚠ WARNING**

**Risk of damage to life and limb due to incorrect assembly/disassembly of the magnet stand.**

Installation of the magnet stand requires approved persons with sufficient experience. Mistakes during assembly/disassembly cause life-threatening situations and property damage. Thus:

- Do not install and move the magnet stand arbitrarily after attaching it to the magnet system. Contact Bruker Service for subsequent transportation.
- Ensure sufficient free space for assembly/disassembly.
- Never stay or work under a lifted magnet system.
- Keep the site of the magnet stand tidy. Oily clothes or magnetic tools and items are hazardous.
- Ensure sufficient free space for troubleshooting.

**Magnetic Fields**

**⚠ WARNING**

**Risk of injury due to large magnetic forces.**

Ferromagnetic parts and tools near the energized magnet system are attracted uncontrollably towards the magnet. Thus:

- Only use non-magnetic tools.

**Risk of Slippage**

**⚠ WARNING**

**Risk of injury due to slippage.**

The accumulation of condensed water on the floor and ladders causes slippery surfaces. Thus:

- Always wear safety shoes with an anti slip sole.
- Be careful using ladders.
- Clean floor and ladders regularly.

### Risk of Tilting

**⚠ WARNING**

**Risk of injury due to tilting of the magnet system.**

The magnet system with attached magnet stand is very sensitive against lateral forces. It may tilt.

Thus:

- Do not move the magnet system arbitrarily.
- Moving the magnet system must only be performed by Bruker Service.
- The magnet system must be deenergized and properly prepared for the relocation.

### Heavy Weights

**⚠ WARNING**

**Risk of damage to life and limb caused from moving heavy weights.**

Lifting and moving heavy weights is life-threatening due to falling or moving parts.

Thus:

- Do not stay or work under a lifted magnet system.
- All lifting equipment used must be applicable to carry the weight (see “Technical Data” on page 65).
- Do not use damaged lifting equipment.
- Use lifting equipment only with updated check tag.
- Lifting only with approved qualification.
- Protect parts against falling.

### Pneumatic Energy (ADI / API isolators only)

**⚠ WARNING**

**Risk of injury and property damage due to pneumatic energy.**

Pneumatic energy may cause uncontrolled movement of parts. In case of leakage of the pneumatic system pressured air may cause injury.

Thus:

- Deactivate the magnet stand before carrying out work on the pneumatic system.
- Discharge pressure reservoirs before carrying out work on the magnet stand.
- Do not exceed the maximum allowed pressure.

**Incorrect Transportation**

**⚠ CAUTION**

**Risk of injury and property damage due to incorrect transportation.**

The box may tilt, movement may get out of control. Thus persons may get injured and the cryostat or further equipment may be damaged.

Thus:

- Do not move arbitrarily.
- Be careful while unloading and moving the boxes.
- Pay attention to any symbols on the boxes.
- Move the box in an upright position.
- Do not tilt the box.
- Prevent crossing thresholds, even if they are only a few millimeters high.
- Clean the transportation way before transporting the box.
- Unpack shortly before assembling.
- Only use the provided attachment points.
- Transportation only with transportation locks attached.
- The cryostat or further equipment must be protected from rain and other bad weather conditions during transportation.

## 2.5 Personal Protective Equipment

The personal protective equipment must be worn at any time while working on the magnet system and to avoid health hazards.

**Protective Gloves**

Used to protect the hands from injury caused by contact with extremely cold liquids or surfaces and for protection from injury caused by rough edges.

**Safety Shoes**

Used to protect the feet from injury from falling of heavy objects. An anti-slip sole protect from injury caused by slipping and falling on slippery floor and steps. Only use safety shoes with non-ferromagnetic toe caps.

## 2.6 Description of Signs and Labels

Signs and labels are always related to their immediately vicinity. The following signs and labels are found on the magnet system and in the vicinity.

**Prohibition sign: No person with pacemakers!**

People with pacemakers are endangered in the identified area of 0.5 mT (5 Gauss) and are not allowed to enter these areas.

**Prohibition sign: No person with implants!**

People with metallic implants are endangered in the identified area of 0.5 mT (5 Gauss) and are not allowed to enter these areas.

**Prohibition sign: No watches or electronic devices!**

Watches and electronic devices may be damaged in the identified area of 0.5 mT (5 Gauss).

**Prohibition sign: No credit cards or other magnetic memory!**

Credit cards and magnetic memory may be damaged in the identified area of 0.5 mT (5 Gauss).

**Prohibition sign: Do not touch! Do not block!**

Do not touch or block identified area.

**Hazard warning sign: Strong magnetic field!**

- No magnetic memory.
- No jewelry.
- No metallic items.

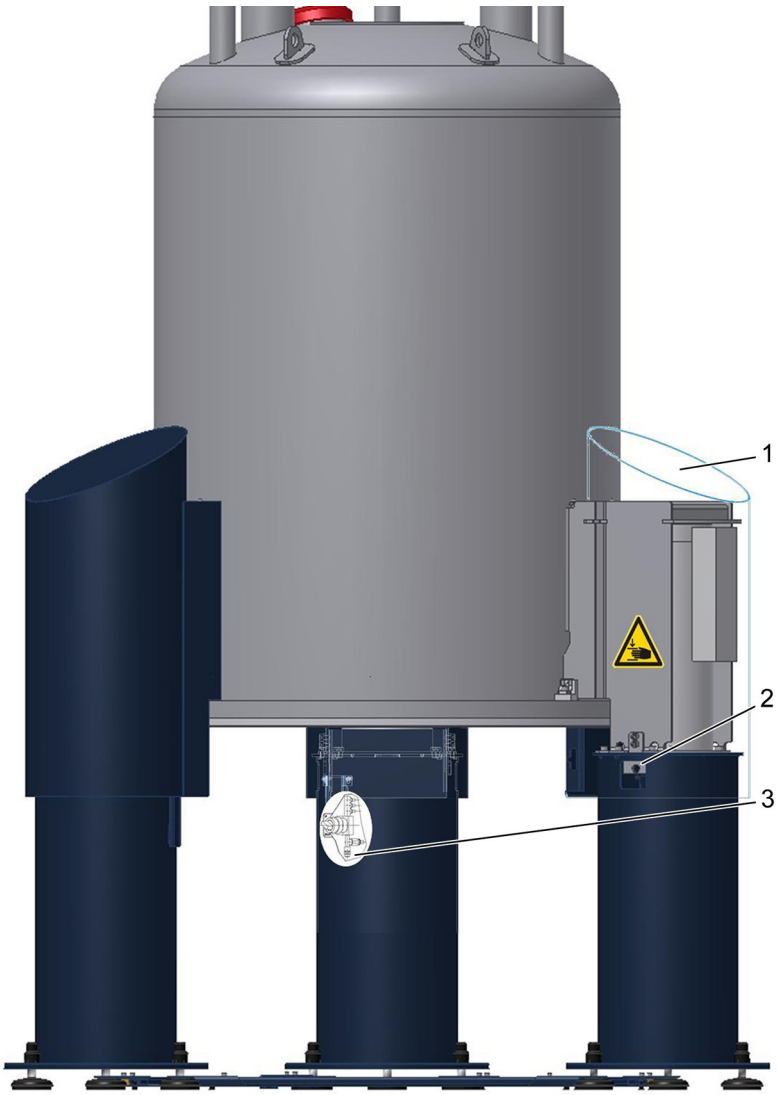
**Hazard warning sign: Risk of hand injury!**

In the identified area hands may get squashed.

**Emergency exit!**

- Always keep the emergency exit clear.
- Follow the arrows if necessary.
- Doors should push open in escape direction.

## 2.7 Safety Devices




1 Protection cover

2 T-safety brackets

3 Pressure control valve (for magnet stand with pneumatic isolators)

Figure 2.1: Location of the safety devices of the magnet stand F

For behavior in danger and emergency situations concerning the magnet system refer to the supplied manual of the magnet system.

## 2.8 Accessories

The magnet stand with elastomeric isolators (EMI) may be upgraded with pneumatic isolators (ADI / API), if the requirements of vibration reduction increase. For more information contact Bruker Service (see page 5 of this document for contact information).

# 3 Transportation

The transportation is carried out by Bruker Service or approved persons. However, it may happen that other persons have to receive the delivery of the shipping boxes. In this case it is essential to obey the instructions in this chapter and to inform these persons before.

## 3.1 Packaging

The magnet stand is packed in a wooden box.

**Disposal**

Keep the original box and further packaging material for future transportation. If no further transportation is planned, dispose of the box and the packaging according to environmentally friendly regulations.

## 3.2 Transportation Inspection

Investigate the delivery and pay regard to visible damage and completeness of packaging.

**In case of damage**

- Accept the delivery with reservation.
- Make a note of the extent of damage in the transportation documents.
- Start the complaint process.
- Contact Bruker Service before installation.

The claim of damage expires after the fixed period.
Thus:
Report damages immediately after detection (see page 5 of this document for contact information).

## 3.3 Transportation with a Crane

The box of the magnet stand must not be moved with a crane.

## 3.4 Transportation by Forklift / Pallet Jack

Use a forklift / pallet jack to move the box to the site.

**Persons**

Approved forklift / pallet jack operator

**Precondition**

The forklift / pallet jack must be approved for the transportation weight (see “Technical Data” on page 65).

**Transport**

1. Position the forks between the bars of the box as shown in the figure.
2. Check the projection of the fork at the back of the box.
3. Then lift the fork and move the box to the site.

Figure 3.1: Transportation of the box of the magnet stand F

## 3.5 Storage

If it is necessary to store the magnet stand, prior to assembly, consider the following restrictions:

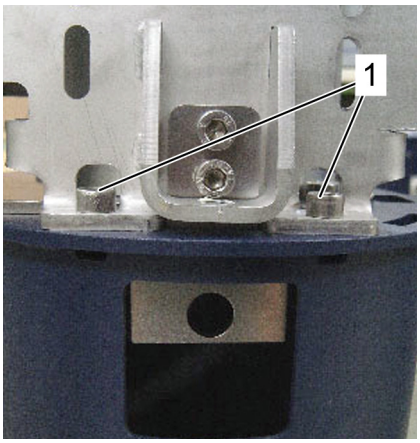
- Store the box in a closed, dry and dust-free room.
- Store the box upright.
- Do not tilt the box.
- Do not unpack the box.
- Prevent mechanical vibrations to the box.
- Storage temperature: 5 – 40 °C.
- Storage humidity: less than 50% @ 23 °C.

## 3.6 Relocation

In case of necessary relocation of the magnet system with attached magnet stand obey the following instructions:

**⚠ WARNING**

**Risk of Tilting** (see page 17)




1. Fix the support to the pillar using the four transportation lock screws (1).

Figure 3.2: Attaching the transportation lock screws


2. For moving the magnet system with attached magnet stand exclusively use the special transportation device D3xx (1) (Material No. Z101306).
3. Moving the magnet system must only be performed by Bruker Service. For further information see the manual “Transport-system D3xx”.

Figure 3.3: Special transportation device D3xx

# Transportation

# 4 Assembling

## 4.1 Installation Workflow

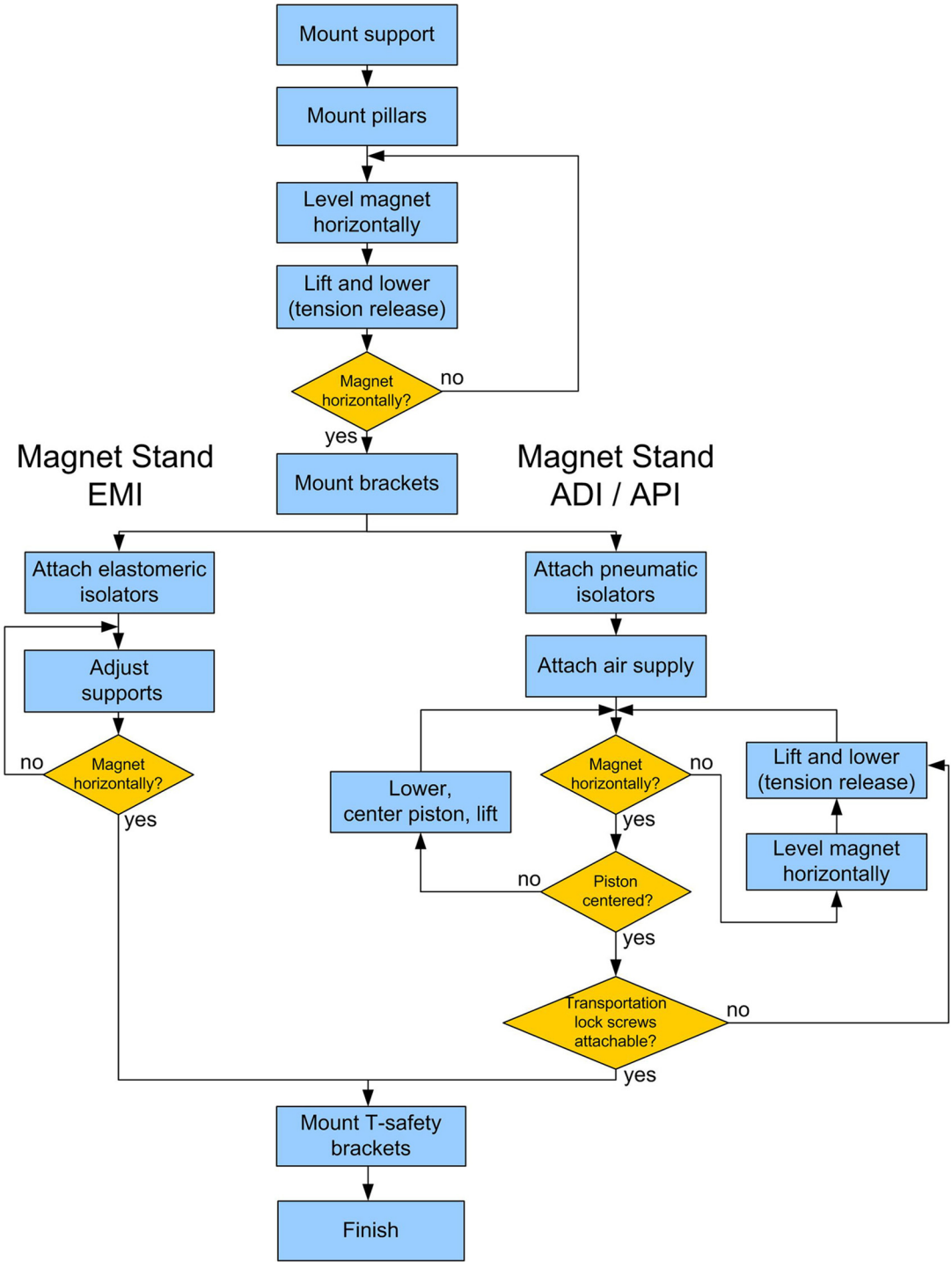



Figure 4.1: Installation workflow

## 4.2 Installation Work

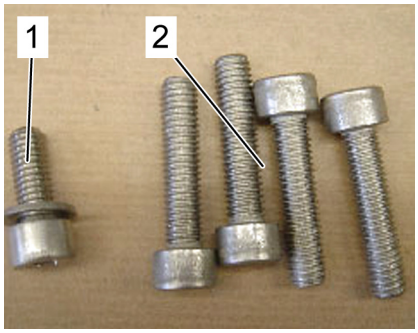
### 4.2.1 Attaching the Support

**WARNING**

**Heavy Weights** (see page 17)

1. Unpack the three supports.

Figure 4.2: Attaching the support – step 1



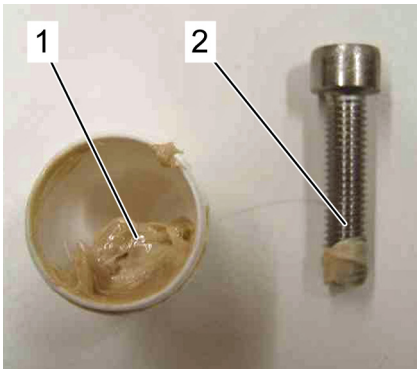

2. For each pillar get the following set of screws ready:

   1 screw M8 x 20 with washer (1)

   4 screws M8 x 35 (for F85 and F95 magnet stand) (2)

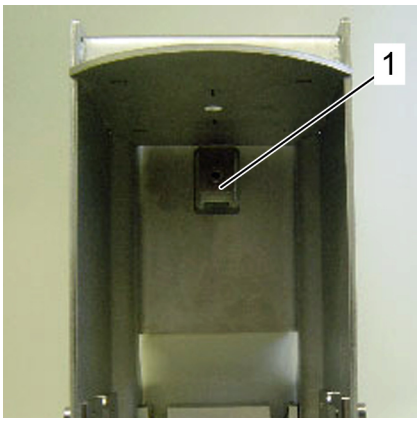
   4 screws M10 x 35 (for F110 and F136 magnet stand) (2)

Figure 4.3: Attaching the support – step 2



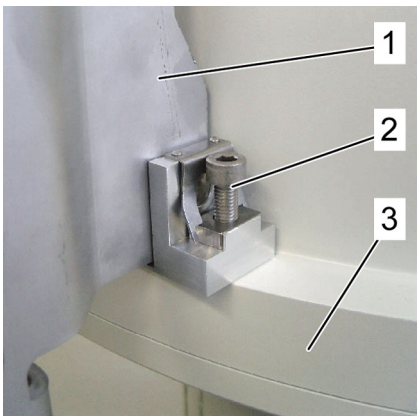

3. Slightly grease the screws (2) with the supplied Molykote® (1) before use.

Figure 4.4: Attaching the support – step 3



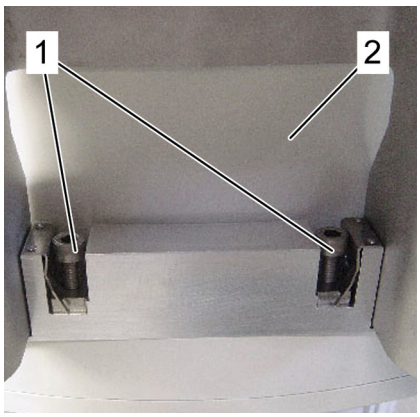

4. Lift the cryostat with approved lifting equipment at least 100 mm above the floor.
5. Attach the three supports to the cryostat using the screws M8 x 20 with washers (1). Do not yet tighten the screws.

Figure 4.5: Attaching the support – step 4



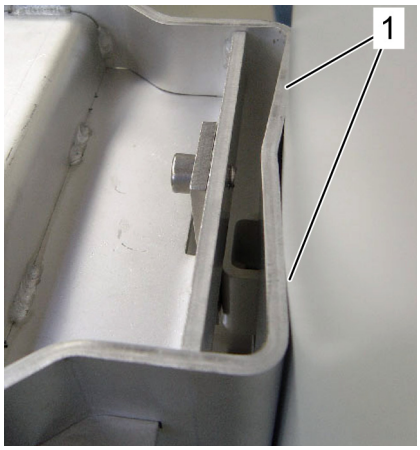

6. Attach the three supports (1) to the bottom flange of the cryostat (3) with the outer two screws M8 x 35 (M10 x 35) (2). Do not yet tighten the screws.

Figure 4.6: Attaching the support – step 5




7. Attach the screws M8 x 35 (M10 x 35) (1) inside the support (2). Do not yet tighten the screws.

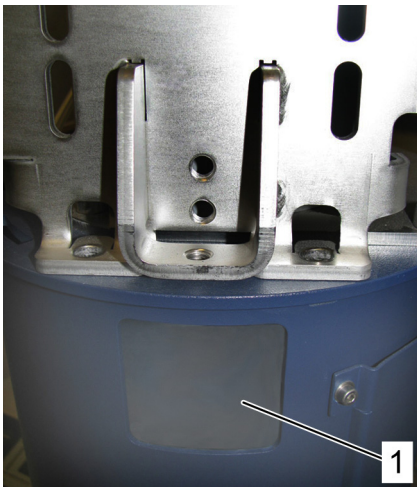
Figure 4.7: Attaching the support – step 6




8. Tighten the upper screw M8 x 20 using a torque of 10 – 15 Nm. The supports must have a tight contact (1) to the cryostat.
9. Tighten the lower screws M8 x 35 (M10 x 35) of the supports using a torque of 10 – 15 Nm.

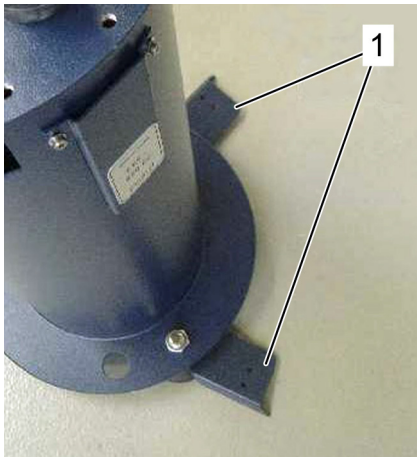
Figure 4.8: Attaching the support – step 7

### 4.2.2 Mounting and Leveling the Pillars



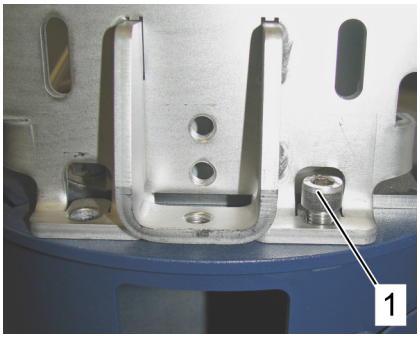

1. Lift the cryostat until the three supports are a few millimeters above the three pillars.
2. Place the pillars below the supports at the cryostat. To prevent finger clamping only use the two opposing square holes (1) for moving the pillars.

Figure 4.9: Mounting and leveling the pillars – step 1



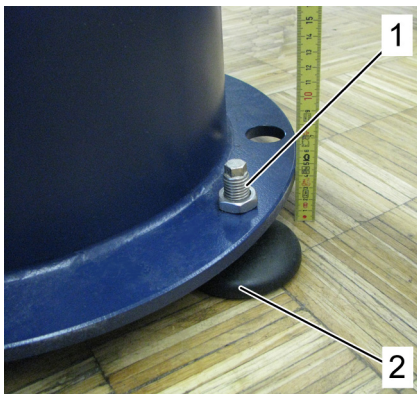

3. Ensure the correct position of the mounting wings (1), each looking to the adjacent pillar. The mounting wings are used to fix the brackets.

Figure 4.10: Mounting and leveling the pillars – step 2



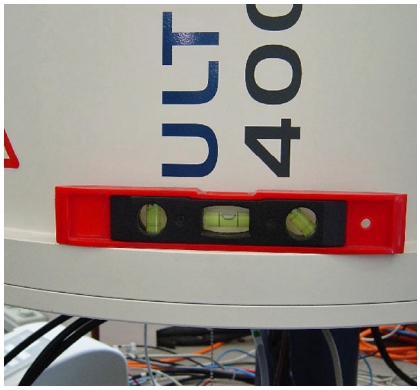

4. Attach the four screws M8 x 16 (1) on each support.
5. Tighten all screws M8 x 16 on the pillars using a torque of 5 – 10 Nm.

Figure 4.11: Mounting and leveling the pillars – step 3




6. The base plates (2) are preset to a height of 40 mm. Check this distance and adjust the base plate screws (1) if necessary.
7. Reduce the height of the outer base plate screw to 30 mm to force the pillar to stand only on the two inner base plates.
8. Lower the cryostat slowly until the lifting equipment is released.
9. Keep the crane in its position and do not remove the lifting equipment from the attachment points.

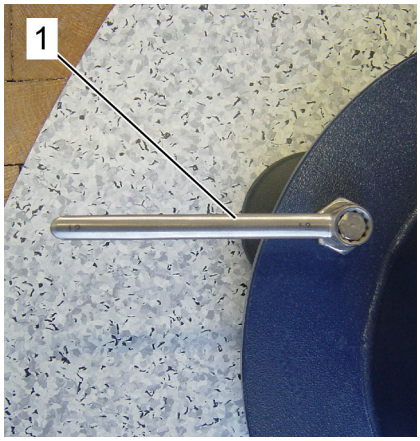
Figure 4.12: Mounting and leveling the pillars – step 4



10. Check the leveling of the cryostat by placing a spirit level on the RT bottom flange.
11. Repeat the leveling check on each section between the three pillars. In case the leveling is not correct obey the following instructions (see Figure 4.15).

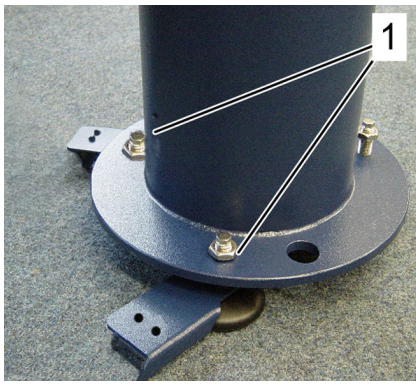
Figure 4.13: Mounting and leveling the pillars – step 5

Use only a hexagon ring wrench for the following steps.




Hexagon ring wrench (1) to tighten the base plate screws.

Figure 4.14: Information on required tools




12. Adjust the two inner base plates (1) of each pillar.
13. Ensure an equal torque on the two base plate screws of all three pillars.
14. Check the leveling of the cryostat (see Figure 4.13).

Figure 4.15: Mounting and leveling the pillars – step 6

15. Lower the outer base plate (1) until the torque is the same on all three screws of one pillar.
16. Lift the magnet system together with the magnet stand to release any tension of the pillars or of the supports.
17. Lower the magnet system.
18. Check again for equal torque on all base plate screws of all three pillars. Adjust, if necessary, without changing the height setting.
19. Check the leveling of the magnet system again (see step 9 and 10 in Figure 4.13) Repeat the leveling of the pillars, if necessary.

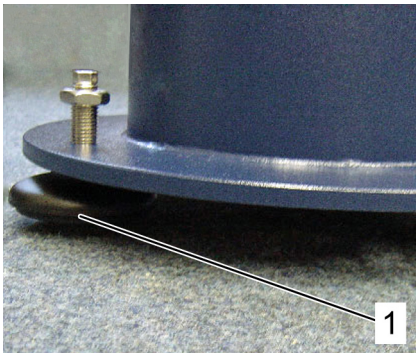



Figure 4.16: Mounting and leveling the pillars – step 7

20. Use the nuts (1) to tighten the three base plate screws at each pillar.

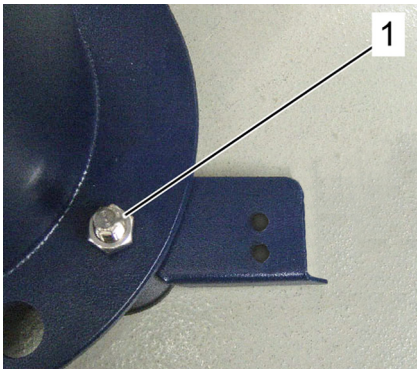



Figure 4.17: Mounting and leveling the pillars – step 8

Do not yet release the lifting equipment.

### 4.2.3 Mounting the Brackets

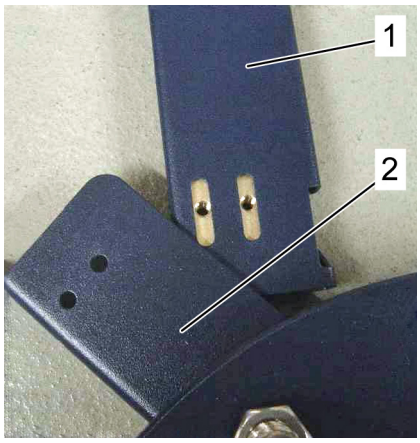



Figure 4.18: Mounting the brackets

1. Attach the brackets (1) at the mounting wings (2). Do not tighten the screws before assembling is completed.

For the magnet stand with pneumatic isolation continue in chapter "Assembling the Pneumatic Isolation System (ADI / API)" on page 35.

### 4.2.4 Assembling the Elastomeric Isolation System (EMI)

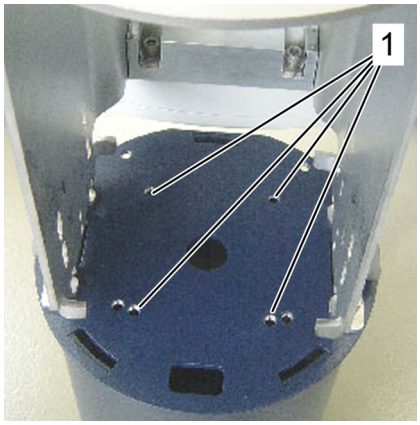
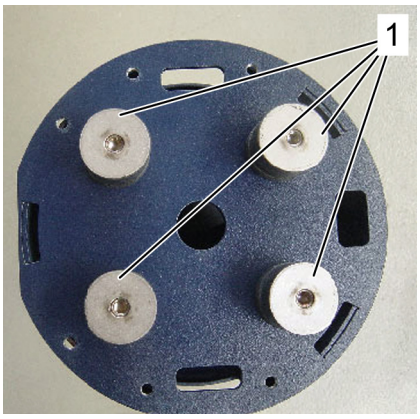


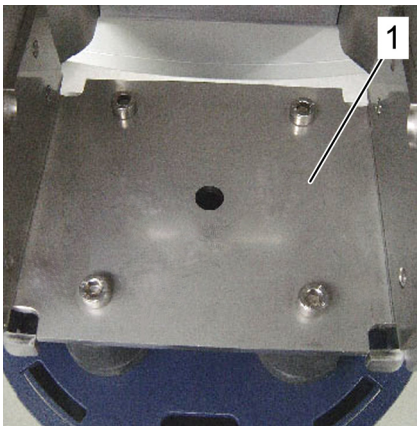

Figure 4.19: Assembling the elastomeric isolation system – step 1

1. Use the inner threads (1) to attach four elastomeric isolators in each pillar.



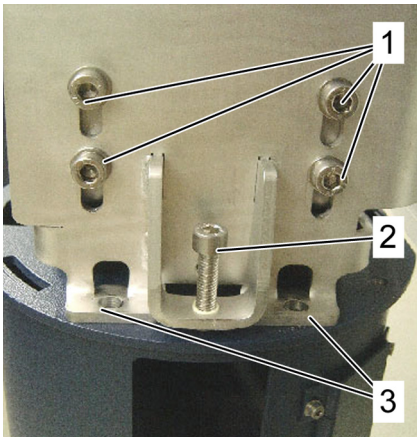

2. Attach the elastomeric isolators (1) with their threaded pins into the inner holes of the pillar.

Figure 4.20: Assembling the elastomeric isolation system – step 2




3. Attach the inner mounting plate (1) with four M8 x 12 screws to the elastomeric isolators.

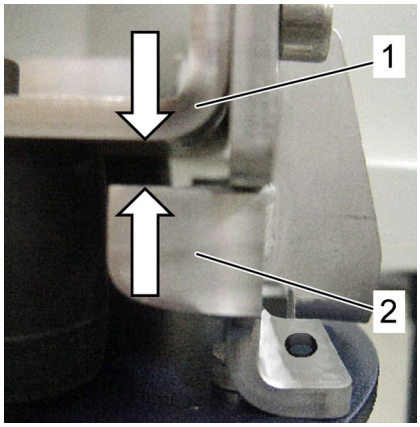
Figure 4.21: Assembling the elastomeric isolation system – step 3




4. Attach the four screws (1) on both sides of the support. Do not yet tighten these screws.
5. Remove the safety screws (3).
6. Slightly grease the lifting screws (2).
7. Attach and tighten the two lifting screws (2) on both sides of the three supports. The magnet system will be lifted by turning the lifting screws.

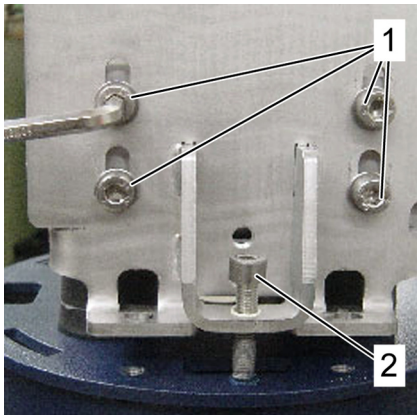
Figure 4.22: Assembling the elastomeric isolation system – step 4

**i** Use the lifting equipment to assist in lifting and lowering the cryostat.




8. Check the distance between the dead stop of the support (2) and the inner mounting plate (1). Lift the magnet system until the support and the inner mounting plate are in contact (no gap!).

Figure 4.23: Assembling the elastomeric isolation system – step 5




9. Tighten the four screws (1) on both sides of the support using a torque of 10 – 15 Nm.
10. Remove the lifting screw (2).
11. Check the levelled position of the magnet system (see “Mounting and Leveling the Pillars” on page 29).
12. Continue with the instructions given in chapter “Mounting the T-Safety Bracket” on page 42.

Figure 4.24: Assembling the elastomeric isolation system – step 6

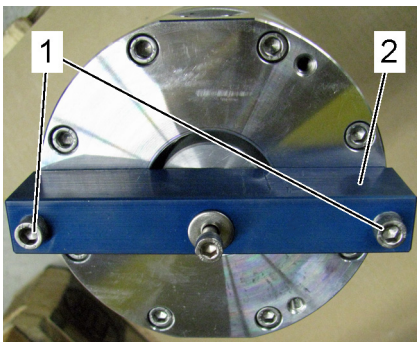
## 4.2.5 Assembling the Pneumatic Isolation System (ADI / API)

### 4.2.5.1 Preparation of the Isolators

Illustrations in the following section are intended for basic understanding of assembling the pneumatic isolation system. Some illustrations may differ from the actual design. However, this does not affect the assembly or the function.

**IDE Isolators**

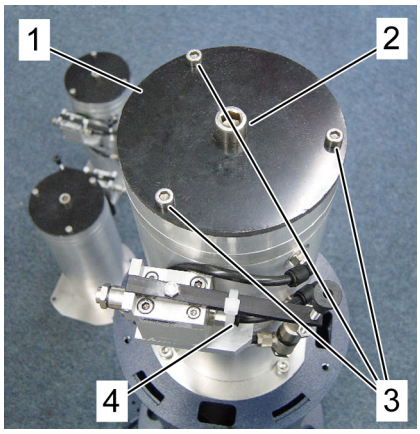
The IDE isolators are filled with a shock absorber fluid. It may leak and restrain the vibration isolation function of the IDE isolators.
Thus:
Do not tilt the IDE isolator more than 30° after the transportation lock is removed.




1. Release the screws of the transportation lock (1).
2. Remove the transportation lock (2).

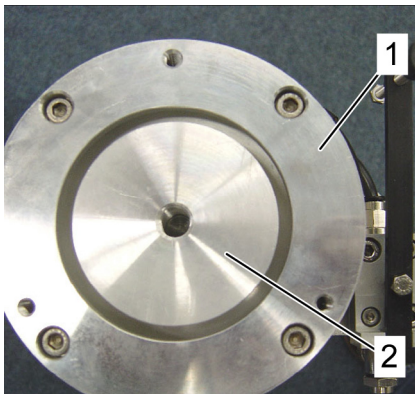
Figure 4.25: Release the transportation lock

### Fabreeka Isolators




1. Remove the inner screw (2) and the three outer screws (3) from the isolator.
2. Remove the protective cap (1) from the isolator.
3. Open and remove the plastic clip (4).

Figure 4.26: Preparing the Fabreeka isolators




4. Check whether the piston (2) is centered inside the isolator (1).

Figure 4.27: Check the piston position

### TMC Isolators

The TMC isolators are filled with a shock absorber fluid. It may leak and restrain the vibration isolation function of the TMC isolators.
Thus:
Only move the TMC isolator in an upright position.

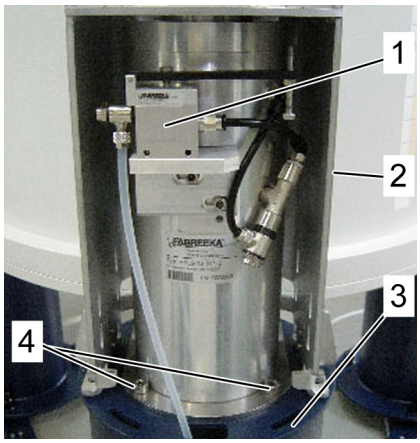

1. Lift the piston (1) of the isolator.

Figure 4.28: Preparing the TMC isolator – step 1


2. Remove the flexible foam (2) under the piston.
3. Put the piston to its original position in the isolator.
4. Check that the piston is concentric to the outer cylinder of the isolator.

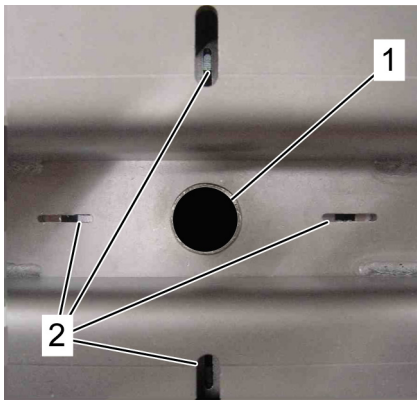
Figure 4.29: Preparing the TMC isolator – step 2

### 4.2.5.2 Attaching the Isolator




1. Insert the isolator into the support (2) on the pillar (3) as shown in the figure.
2. Attach the screws (4). Do not yet tighten these screws.
3. Make sure that the pneumatic controller (1) is placed in the correct position as shown in the figure.

Figure 4.30: Attaching the isolator – step 1




For IDE and Fabreeka only:

4. Check and align the piston position through the hole (1) in the middle and through the four slots (2).
5. Tighten the screws of the isolator using a torque of 10 – 15 Nm (see (4) in Figure 4.30).

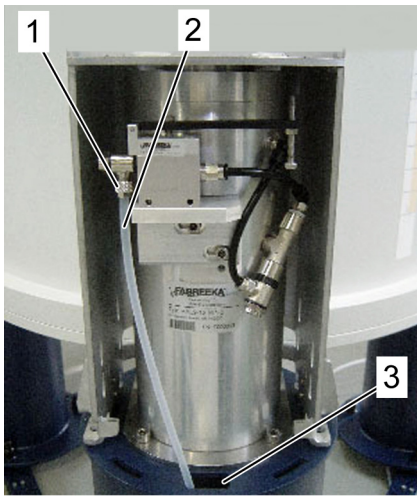
Figure 4.31: Attaching the isolator – step 2

### 4.2.5.3 Connecting the Air Supply

**⚠ WARNING**

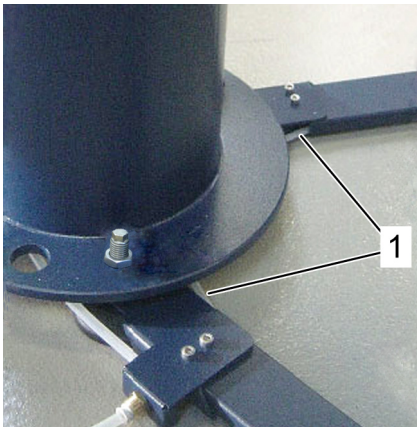
**Pneumatic Energy** (see page 17)

Pressure fluctuations in the air supply affect the functioning of the isolators. To prevent pressure fluctuation a reducing valve is recommended.
In case of a single compressor for air supply a buffer tank is recommended.
The diameter of the air supply tubing should be minimum Ø 8 mm.




1. Choose one of the pillars for mounting the switch of the pneumatic controller. The switch should be placed in an easily accessible position.
2. Cut the supplied pneumatic pipe (Ø 6 mm) in three pieces of 1 m, 4 m and 5 m length.
3. Connect the pneumatic pipe (2) with the control valve (1).
4. Connect the two long pneumatic pipes (4 m and 5 m length) with the control valves of the two other isolators.
5. Push the pneumatic pipe (2) through the squared opening of the top plate (3).

Figure 4.32: Connecting the air supply – step 1

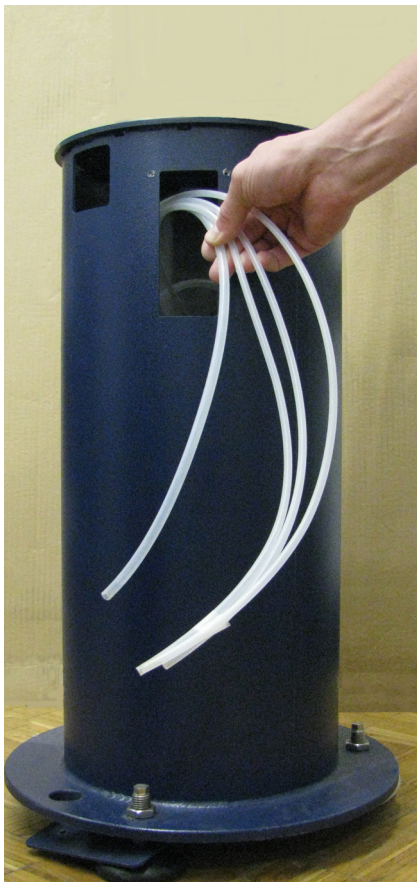



6. Guide the two long pneumatic pipes through the pillars from the top to the bottom. Pull the pneumatic pipes out at the bottom of the pillars towards the triangle of the three pillars.
7. Guide the pneumatic pipes through the bracket towards the pillar with the pneumatic controller (1).

Figure 4.33: Connecting the air supply – step 2

8. Remove the cover plate from the pillar that was selected to carry the switch of the pneumatic controller.

Figure 4.34: Connecting the air supply – step 3



9. Guide the two long pneumatic pipes (Ø 6 mm) inside the pillar with the pneumatic controller through the opening.
10. Guide the short pneumatic pipe downward through the opening of the top plate of the pillar.
11. Guide the pneumatic pipe (Ø 8 mm) out from the triangle of the pillars into the pillar with the pneumatic controller.
12. Cut off the remainder of the pneumatic pipes. Avoid any strain on the pneumatic pipes.

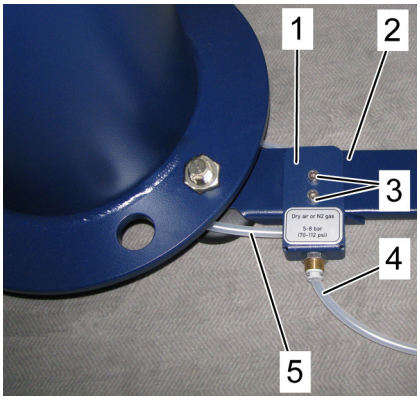
Figure 4.35: Connecting the air supply – step 4


13. Connect the three pneumatic pipes (Ø 6 mm) with the connectors (1) at the pneumatic controller (2).
14. Connect the pneumatic pipe (Ø 8 mm) with the one way valve (3).

Figure 4.36: Connecting the air supply – step 5

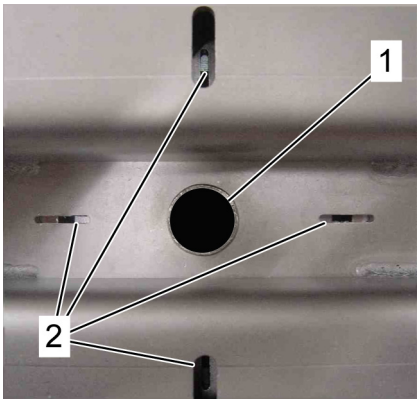

15. Attach the pneumatic controller with the two screws M4 x 12 (1) as shown in the figure.
16. Mount the cover plates to the two other pillars.

Figure 4.37: Connecting the air supply – step 6



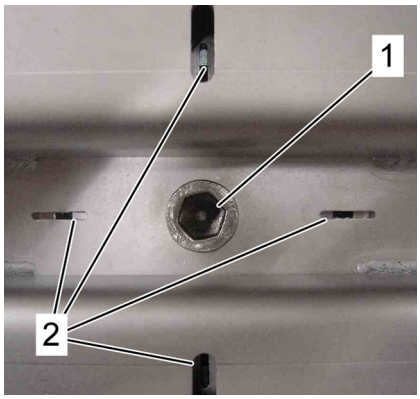

17. Connect the pneumatic controller to the strain relief (1) with the Ø 8 mm pneumatic pipe (5).
18. Connect the strain relief (1) to the air supply with the Ø 8 mm pneumatic pipe (4).
19. Mount the strain relief (1) with two screws (3) onto the right or left mounting wing (2) of the pillar where the switch of the pneumatic controller was attached. Choose the shortest distance to the pneumatic controller.

Figure 4.38: Connecting the air supply – step 7




20. Check the piston position through the opening on top of the support (1) and through the four adjacent slots (2).
21. Adjust the piston position to the center if necessary.

Figure 4.39: Connecting the air supply – step 8

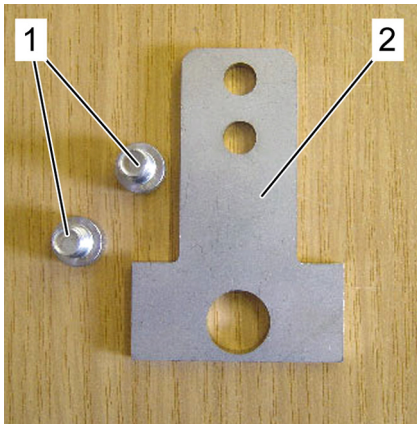



22. Insert the piston screw (1), but do not yet tighten the screw.
23. Switch the pneumatic controller to the UP position. The piston of the pneumatic isolator will be pushed up.
24. Wait until it is possible to tighten the piston screw without turning the piston.
25. If the piston is centered via the four slots (2), tighten the piston screw (1) using a torque of 10 – 15 Nm.
26. Switch the pneumatic controller to the DOWN position.

Figure 4.40: Connecting the air supply – step 9

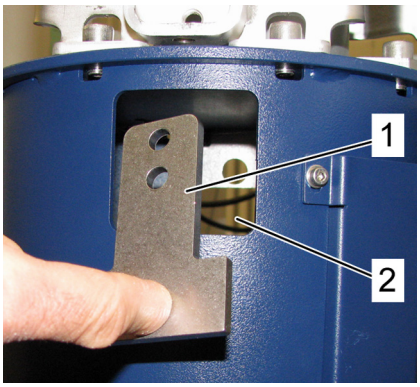
The pneumatic isolators must be pressurized for tightening the piston screw.

### 4.2.6 Mounting the T-Safety Bracket



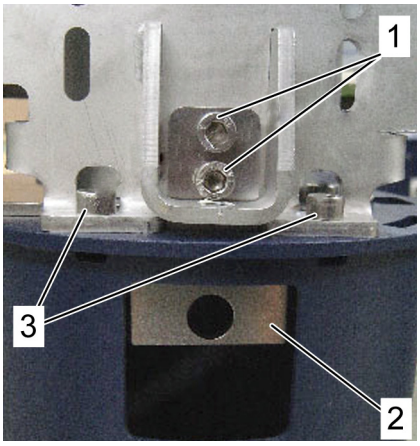

1. Get the T-safety bracket (2) and two M8 x 16 screws (1) ready for the following steps.

Figure 4.41: Mounting the T-safety bracket – step 1




2. Put the T-safety bracket (1) on one finger.
3. Shift the T-safety bracket (1) in upward direction through the squared hole (2) of the pillar and through the slot of the support.

Figure 4.42: Mounting the T-safety bracket – step 2

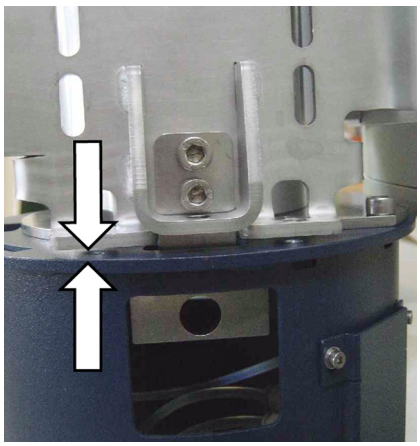



4. Use the two screws M8 x 16 (1) to attach the T-safety bracket (2) at the support.
5. Tighten the two screws (1) using a torque of 10 – 15 Nm.
6. Repeat this on all T-safety brackets.
7. Remove the safety screws (3) between the support and the pillar.
8. Store the safety screws (3) in the supplied accessories box of the magnet stand.

Figure 4.43: Mounting the T-safety bracket – step 3


9. Switch the pneumatic controller to the UP position.

Figure 4.44: Mounting the T-safety bracket – step 4

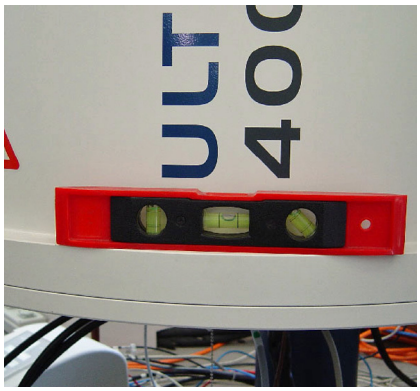


10. Check the distance between the pillar and the support is 5 mm at each pillar.
11. If necessary adjust the magnet system with the leveling screw (see (1) in Figure 4.46) according to the following instructions (given in Figure 4.46):

Figure 4.45: Mounting the T-safety bracket – step 5

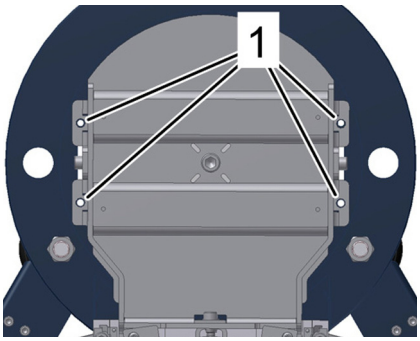

12. Adjust the distance between the support and the pillar to 5 mm at each pillar.
13. Turning the leveling screw clockwise will lower the magnet system.
14. Turning the leveling screw counterclockwise will lift the magnet system.

Figure 4.46: Mounting the T-safety bracket – step 6



15. Check the leveling of the cryostat by placing a spirit level on the RT bottom flange in each section between the pillars.
16. If necessary adjust the leveling of the magnet system according to the instructions given in Figure 4.46.

Figure 4.47: Mounting the T-safety bracket – step 7




17. Deactivate the magnet stand and check the position.
18. The four M8 x 16 screws to fix the support to the pillar (1) have to be attachable on all three pillars. Adjust the alignment if necessary.

Figure 4.48: Mounting the T-safety bracket – step 9


19. Fix the leveling screw in this position with the counternut (1).

Figure 4.49: Mounting the T-safety bracket – step 10

### 4.2.7 Finishing

For magnet stand with pneumatic isolation system only:
Check the pneumatic pipes acoustically for leaks while the pneumatic controller is in the UP position. Check the pipe connections.

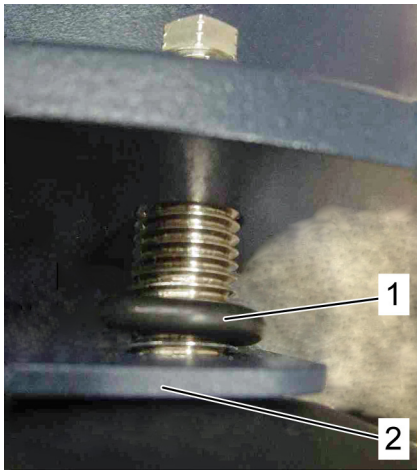



Figure 4.50: Finishing – step 1

1. Press the O-ring (1) together with the mounting wings (2) down to the floor on the two inner base plates.

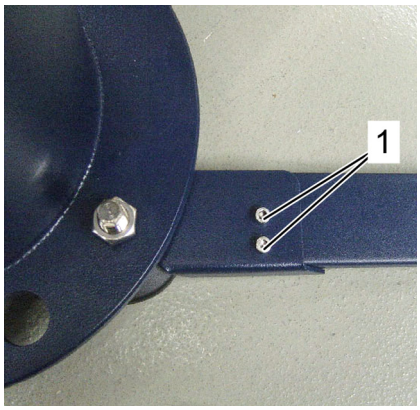



Figure 4.51: Finishing – step 2

2. Tighten the screws (1) on each bracket using a torque of 5 – 8 Nm.

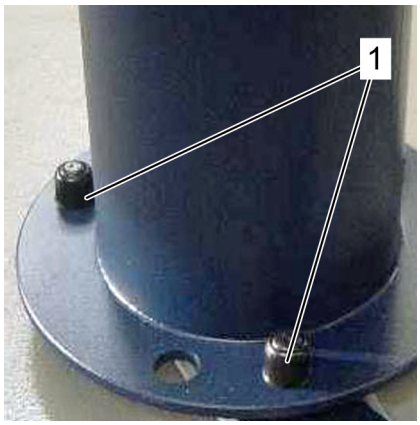



Figure 4.52: Finishing – step 3

3. Attach the black caps (1) on the base plate screws.

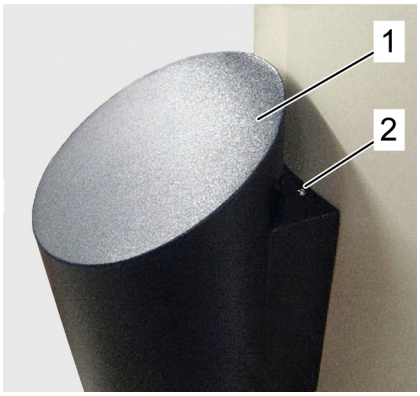



Figure 4.53: Finishing – step 4

4. Attach the protection cover (1).
5. Attach and tighten the screws (2).

Figure 4.54: Finishing – step 5

6. Snap in the cover plate as shown in the figure.


Figure 4.55: Finishing – step 6

For magnet stand ADI / API only:

7. Switch the pneumatic controller to the UP position.
8. Check that the cover and the cover plate do not contact the pillars.

# 5 Operation

**Elastomeric Isolators (EMI)**

There is no manipulation required on the magnet stand during standard operation.

**Pneumatic Isolators (ADI / API)**

The following instructions have to be considered for the magnet stand with pneumatic isolators.

## 5.1 Activation of the Magnet Stand (ADI / API)


Switch the pneumatic controller to the UP position.

Figure 5.1: Activating the pneumatic isolation system

## 5.2 Deactivation of the Magnet Stand (ADI / API)

Deactivate the vibration isolation system for any work at the magnet system like installation, troubleshooting and maintenance.


Switch the pneumatic controller to the DOWN position.

Figure 5.2: Deactivating the pneumatic isolation system

# 6 Troubleshooting

There is no troubleshooting required for the magnet stand with elastomeric isolators (EMI).

The problems described in this chapter may occur for magnet stand with pneumatic isolators (ADI / API).

Contact Bruker Service in case of problems not described in this chapter (for contact information see page 5 of this document).

## 6.1 Safety

**Persons**

Denoted in the troubleshooting table.

**⚠ WARNING**

**Assembly / Disassembly** (see page 16)

**Risk of Slippage** (see page 16)

**Magnetic Fields** (see page 16)

**Risk of Tilting** (see page 17)

**Heavy Weights** (see page 17)

**Pneumatic Energy** (see page 17)

## 6.2 Troubleshooting Table

| Indicator | Possible Reason | Solution | By |
|---|---|---|---|
| The NMR spectrum shows massive disturbances. | The pneumatic controller is in the DOWN position. | Switch the pneumatic controller to the UP position. | Approved Customer Personnel |
| | Magnet system has direct mechanical contact with the floor via accessories or cables. | Identify and eliminate the contact point. Arrange cables in loose S- or U-shapes. | Approved Customer Personnel |
| | | If the problem is still not solved, contact Bruker Service. | Approved Customer Personnel |
| | Magnet system has physical contact to the magnet stand. | Check the leveling: adjust if necessary. | Bruker Service |
| | Piston of the isolator is not centric or touches its casing. | Align the magnet stand (refer to “Alignment and Repair” on page 54). | Bruker Service |
| | T-safety bracket touches the pillar. | Align the magnet stand. | Bruker Service |
| | Floor vibrations in vertical direction. | Replace elastomeric isolators with air damped isolators. | Bruker Service |
| | Floor vibrations in horizontal and vertical direction. | Replace air damped isolators with air piston isolators. | Bruker Service |
| The isolator of the magnet stand does not reach the operating position. | Pneumatic controller is in DOWN position. | Switch the pneumatic controller to the UP position. | Approved Customer Personnel |
| | The pressure of the pneumatic supply is too low. | Check the pressure of the pneumatic supply. It must be in the range of 5 bar to 8 bar (70 psi to 112 psi) | Approved Customer Personnel |
| | | If the problem is still not solved, contact Bruker Service. | Approved Customer Personnel |
| | The magnet system is not leveled correctly. | Stop the pneumatic isolators. Check the leveling of the cryostat. | Bruker Service |

Continued on next page

Continued from page before

| Indicator | Possible Reason | Solution | By |
|---|---|---|---|
| The isolator of the magnet stand does not reach the operation position. | Defective leveling valve. | Replace the leveling valve or the isolator (refer to “Replacing the Pneumatic Isolator (ADI / API)” on page 57). | Bruker Service |
| | Defective membrane of an isolator. | Replace the leveling valve or the isolator (refer to “Replacing the Pneumatic Isolator (ADI / API)” on page 57). | Bruker Service |
| Magnet system achieves working position jerkily. | Piston is not centric or touching its casing. | Align the magnet stand (refer to “Alignment and Repair” on page 54). | Bruker Service |
| Audible loss of air. | Defective membrane or defective leveling valve of an isolator. | Replace the leveling valve or the isolator (refer to “Replacing the Pneumatic Isolator (ADI / API)” on page 57). | Bruker Service |
| | Hose connector is defective or loose. | Insert hoses correctly and tighten the screws. | Bruker Service |
| Velocity of lifting or lowering too high. | Wrong adjustment of the flow control valve. | Close restrictor of the flow control valve completely; then open it a half turn. | Bruker Service |

## 6.3 Troubleshooting Work

### 6.3.1 Alignment and Repair

If a crane is not available for repair, an auxiliary repair column D3xx (Material No. Z69532) must be used for lowering and lifting the magnet system.

Figure 6.1: Non-ferromagnetic auxiliary repair column

For further instructions refer to the manual “Work Instructions for Non-Magnetic Auxiliary Repair Column D3xx”.

1. Deactivate the magnet stand.
2. Secure the support and the pillar with the safety screws.
3. Loosen the brackets; remove the brackets if necessary.
4. Adjust the magnet stand (refer to “Mounting and Leveling the Pillars” on page 29).
5. Mount the brackets (refer to “Mounting the Brackets” on page 32).
6. Remove the safety screws.
7. Set up the vibration isolation system.
8. Finish (refer to “Finishing” on page 45).

The same procedure can be used for changing the complete piston or any part of it.

### 6.3.2 Replacing the Elastomeric Isolators

**⚠ WARNING**

**Magnetic Fields** (see page 16)

The upgrade from elastomeric isolation system (EMI) to pneumatic isolation system (ADI / API) can be done while the magnet system is energized.


Figure 6.2: Upgrading work – step 1

1. Remove the screws (1) from the T-safety bracket.
2. Remove the T-safety bracket through the square holes of the pillar.

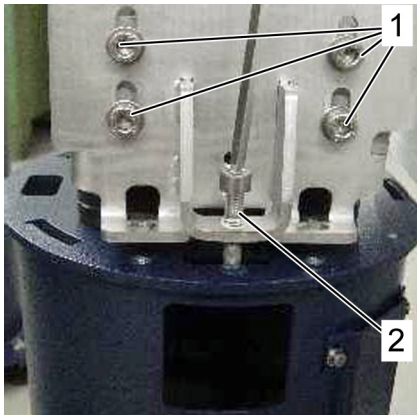



Figure 6.3: Upgrading work – step 2

3. Attach the two lifting screws M8 x 35 (2) on both sides of the support.
4. Tighten the lifting screw using a torque of 10 – 15 Nm. This is necessary to release the four fixing screws (1).

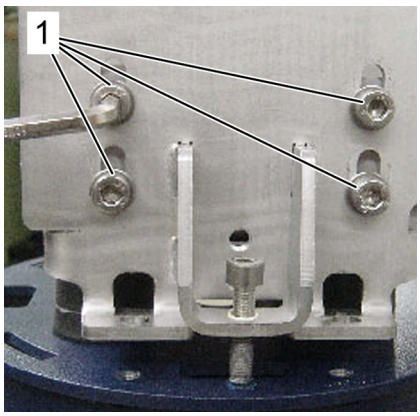



Figure 6.4: Upgrading work – step 3

5. Release the four fixing screws (1) on each side of the support.
6. Repeat step 3 to step 5 on each support.

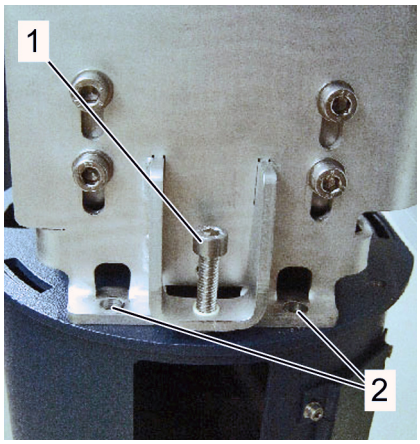



Figure 6.5: Upgrading work – step 4

7. Lower the magnet system by turning the lifting screw (1) counterclockwise in small steps on all three pillars. Take care that the magnet system always remains in its upright position.
8. Continue until the support is lowered down completely on the pillar.
9. Attach the transportation lock screws to the pillar (2).

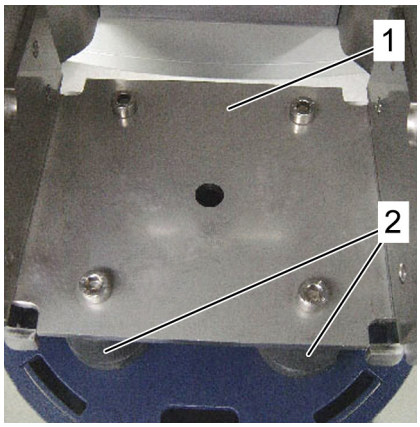
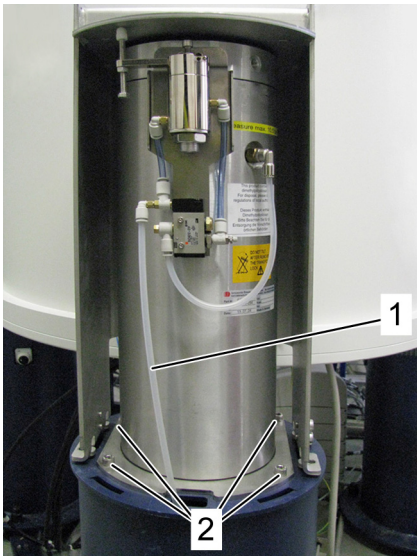



Figure 6.6: Upgrading work – step 5

10. Remove the screws M8 x 12.
11. Remove the inner mounting plate (1).
12. Remove the elastomeric isolators (2).
13. Continue according to the procedure described in ”Assembling the Pneumatic Isolation System (ADI / API)” on page 35.

### 6.3.3 Replacing the Pneumatic Isolator (ADI / API)




1. Deactivate the magnet stand (refer to “Deactivation of the Magnet Stand (ADI / API)” on page 50).
2. Remove the cover plate.
3. Remove the protection cover.
4. Remove the piston screw.
5. Remove the screws (1) of the isolator.
6. Disconnect the pneumatic pipe (1).
7. Remove the isolator.
8. Insert the new isolator.
9. Connect the pneumatic pipe (1).
10. Continue according to the procedure described in “Assembling the Pneumatic Isolation System (ADI / API)” on page 35.

Figure 6.7: Instructions for replacement of the isolator

# 7 Maintenance

No maintenance work is required.

# 8 Disassembling

**Personal Protective Equipment**

- Safety shoes
- Protective gloves

For disassembling the magnet stand refer to ”Assembling” on page 25 in reverse order.

# A Appendix

## A.1 Warning Signs

### Danger



### Warning



### Caution

## A.2 Figures

# Figures

## A.3 Tables

## A.4 Glossary

| Used term | Description |
|---|---|
| Box | Any kind of package used to protect sensitive parts during transportation. |
| Cryostat | The collective of all parts providing a temperature of 4 K inside for the superconducting magnet. The cryostat also provides the safety devices and the access ports for the cryogenic agents and electricity. The superconducting magnet inside the cryostat is not energized. |
| Magnet System | The collective of all parts necessary for the intended use. The superconducting magnet inside the cryostat is energized. |

Table A.1: Glossary

| Abbreviations | Description |
|---|---|
| ADI | Air Damped Isolator |
| API | Air Piston Isolator |
| EMI | Elastomeric Isolator |
| RT | Room Temperature;<br>used as prefix of parts at room temperature (e.g. RT bore) |

Table A.2: Abbreviations

# A.5 Technical Data

## A.5.1 Vibration Isolation System

**Elastomeric Isolator (EMI)**

Four elastomeric isolators per pillar.

**Pneumatic Isolator (ADI / API)**

The magnet stand reduces the transmission of floor vibration to the magnet system. In case the elastomeric isolators (EMI) do not sufficiently reduce the effects of floor vibrations to the NMR signal, the more effective pneumatic isolators (ADI / API) will provide an adequate solution.

## A.5.2 Supply

| | Value | Unit |
|---|---|---|
| Compressed air, dry and clean | 5 – 8 (70 – 112) | bar (psi) |

Table A.3: Supply for pneumatic isolation systems (ADI / API)

## A.5.3 Weight and Dimensions

| Magnet Stand (Elastomeric Isolator, EMI) | | | Cryostat | | Transport | |
|---|---|---|---|---|---|---|
| Type | Height [mm] | Weight [kg] | Type | Ø Magnet Bottom Plate [mm] | Dimension H / W / D [mm/mm/mm] | Weight [kg] |
| F85–620 | 620 | 98 | D335 / D345 | 850 | 1200/760/790 | 155 |
| F85–770 | 770 | 102 | D335 / D345 | 850 | 1200/760/790 | 159 |
| F85–840 | 840 | 108 | D335 / D345 | 850 | 1200/760/790 | 165 |
| F85–1050 | 1050 | 115 | D335 / D345 | 850 | 1470/760/790 | 182 |

Table A.4: Weight and dimensions (EMI)

| Magnet Stand (Pneumatic Isolator, ADI) | | | | Cryostat | | Transport | |
|---|---|---|---|---|---|---|---|
| **Type** | **Isolator** | **Height [mm]** | **Weight [kg]** | **Type** | **Ø [mm]** | **H / W / D [mm/mm/mm]** | **Weight [kg]** |
| F80-550 | Fabreeka PAL9-12-BR | 550 | 110 | D315 | 795 | 1200/760/790 | 167 |
| F80-700 | Fabreeka PAL9-12-BR | 700 | 119 | D325 | 795 | 1200/760/790 | 176 |
| F85-620 | Fabreeka PAL9-12-BR | 620 | 113 | D335 D345 | 850 | 1200/760/790 | 170 |
| F85-700 | Fabreeka PAL9-12-BR | 700 | 119 | D335 D345 | 850 | 1200/760/790 | 176 |
| F85-770 | Fabreeka PAL9-12-BR | 770 | 124 | D335 D345 | 850 | 1200/760/790 | 181 |
| F85-840 | Fabreeka PAL9-12-BR | 840 | 129 | D335 D345 | 850 | 1200/760/790 | 186 |
| F85-1050 | Fabreeka PAL9-12-BR | 1050 | 132 | D335 D345 | 850 | 1470/760/790 | 198 |
| F95-700 | IDE 100XD | 700 | 181 | D355 | 950 | 1310/740/1320 | 270 |
| F95-880 | IDE 100XD | 880 | 191 | D355 | 950 | 1310/740/1320 | 280 |
| F95-950 | IDE 100XD | 950 | 194 | D355 | 950 | 1310/740/1320 | 283 |
| F110-800 | IDE 300XD | 800 | 200 | D365 | 1100 | 1300/780/1320 | 295 |
| F110-880 | IDE 300XD | 880 | 207 | D365 | 1100 | 1300/780/1320 | 302 |
| F110-950 | IDE 300XD | 950 | 213 | D365 | 1100 | 1300/780/1320 | 307 |
| F136-820 | IDE 500XD | 820 | 240 | D375 | 1364 | 1470/830/1400 | 350 |
| F136-950 | IDE 500XD | 950 | 258 | D375 | 1364 | 1470/830/1400 | 368 |
| F136-1050 | IDE 500XD | 1050 | 270 | D375 | 1364 | 1470/830/1400 | 380 |

Table A.5: Weight and dimensions, Fabreeka and IDE (ADI)

| Magnet Stand (Pneumatic Isolator, API) | | | | Cryostat | | Transport | |
|---|---|---|---|---|---|---|---|
| **Type** | **Isolator** | **Height [mm]** | **Weight [kg]** | **Type** | **Ø [mm]** | **H / W / D [mm/mm/mm]** | **Weight [kg]** |
| F80-550 | TMC Gimbal 1000 | 550 | 110 | D315 | 795 | 1200/760/790 | 167 |
| F80-700 | TMC Gimbal 1000 | 700 | 119 | D325 | 795 | 1200/760/790 | 176 |
| F85-620 | TMC Gimbal 1000 | 620 | 113 | D335 D345 | 850 | 1200/760/790 | 170 |
| F85-700 | TMC Gimbal 1000 | 700 | 119 | D335 D345 | 850 | 1200/760/790 | 176 |
| F85-770 | TMC Gimbal 1000 | 770 | 124 | D335 D345 | 850 | 1200/760/790 | 181 |
| F85-840 | TMC Gimbal 1000 | 840 | 129 | D335 D345 | 850 | 1200/760/790 | 186 |
| F85-1050 | TMC Gimbal 1000 | 1050 | 132 | D335 D345 | 850 | 1200/760/790 | 198 |
| F95-700 | TMC Gimbal 2500 | 700 | 181 | D355 | 950 | 1310/740/1320 | 270 |
| F95-880 | TMC Gimbal 2500 | 880 | 191 | D355 | 950 | 1310/740/1320 | 280 |
| F95-950 | TMC Gimbal 2500 | 950 | 194 | D355 | 950 | 1310/740/1320 | 283 |
| F110-800 | TMC Gimbal 2500 | 800 | 200 | D365 | 1100 | 1300/780/1320 | 295 |
| F110-880 | TMC Gimbal 2500 | 880 | 207 | D365 | 1100 | 1300/780/1320 | 302 |
| F110-950 | TMC Gimbal 2500 | 950 | 213 | D365 | 1100 | 1300/780/1320 | 307 |
| F136-820 | Fabreeka PAL36-18P | 820 | 240 | D375 | 1364 | 1470/830/1400 | 350 |
| F136-950 | Fabreeka PAL36-18P | 950 | 258 | D375 | 1364 | 1470/830/1400 | 368 |
| F136-1050 | Fabreeka PAL36-18P | 1050 | 270 | D375 | 1364 | 1470/830/1400 | 380 |

Table A.6: Weight and dimensions, TMC and Fabreeka (API)

## A.6 Index

## W

# Revision History List

| Index: | Date: | Alteration Type: |
|---|---|---|
| 00 | December 2007 | First manual release. |
| 01 | January 2008 | Added pneumatic controller. |
| 02 | October 2008 | Complete revision of the former manual. |
| 03 | May 2011 | Updated document layout according to latest Bruker Corporate Guidelines; removed floor fixing solution. |
| | | |
| | | |

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