


# Magnet Stand F

- Service Manual

Version 04



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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.



# 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.

This manual is for approved Bruker Service Personnel only. It should not be kept at customer sites. For applicable information about safety and operation for the customer refer to the supplied manual of the magnet system. Read the manual carefully before handling the magnet system or its components.

## 1.2 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.

## 1.3 Customer Service

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Technical support is provided by Bruker Service via telephone or e-mail. For contact information [see page 9](#) of this document.

## 1.4 Warranty

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

## 1.5 Copyright

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## 1.6 General View

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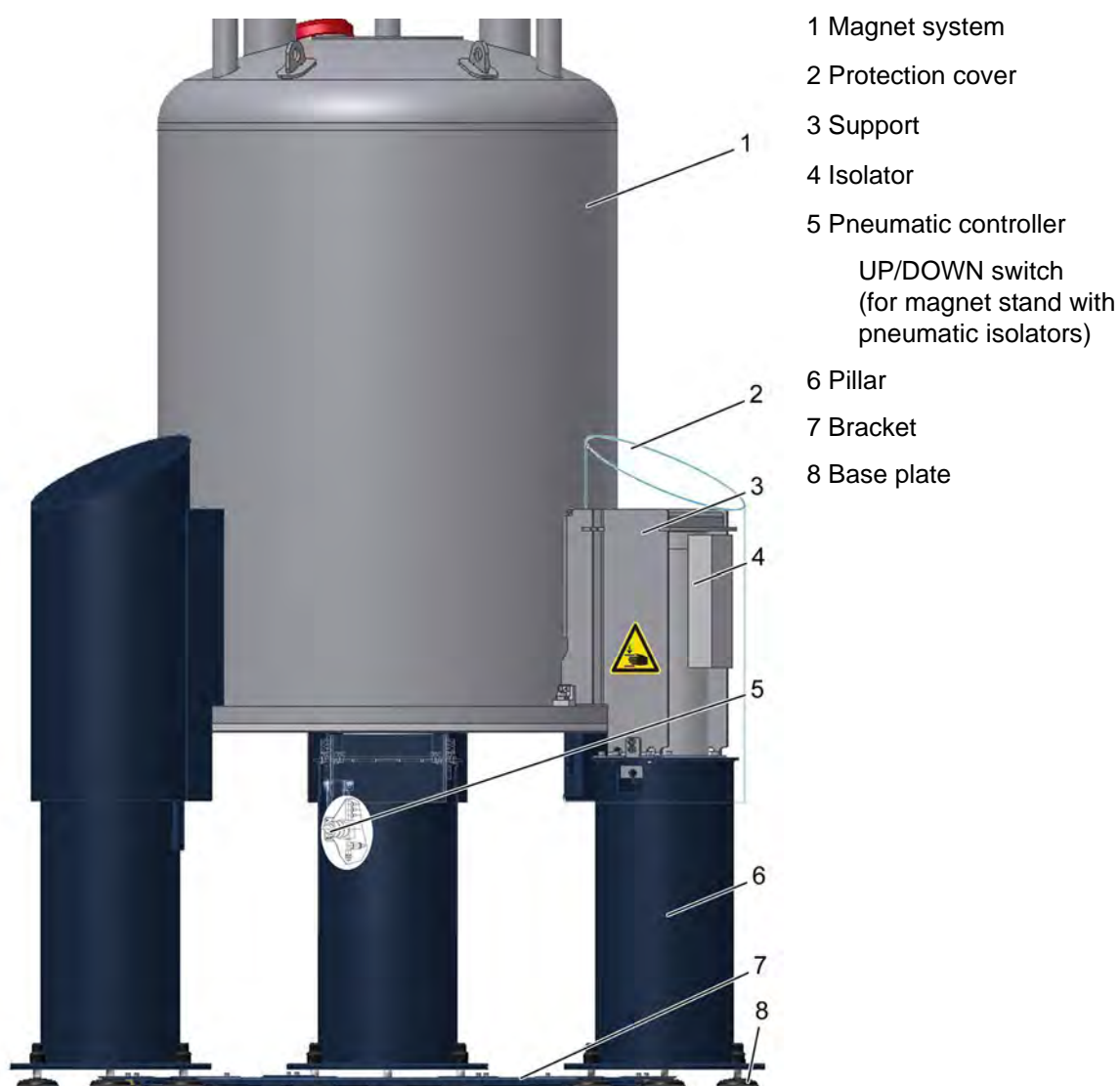


Figure 1.1: General view of the magnet system with Magnet Stand F

## 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 adsorb the transmission of floor vibrations towards the magnet system.

Depending on the specific need of the customer different isolators are available optionally. In order to increase the adsorbing level, EMI can be replaced by ADI, ADI can be replaced by API.

### Pneumatic Controller

(for magnet stand with pneumatic isolators only)

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.



## 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 identify additional dangers resulting from the working conditions at the site of the magnet system and for the magnet stand as a part of it and provide applicable safety measures.
- The customer must ensure that the site plan meets the specified conditions according to the site planning document for operating the magnet system and the magnet stand as a part of it.
- 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

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### **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

### Magnetic Fields

#### WARNING

##### **Risk of damage to life and limb due to high magnetic fields.**

A magnetic field of more than 0.5 mT (5 Gauss) is life-threatening for people with pacemakers or active metal implants. Exposure to more than 8 T can cause damage to health. Duration of exposure (8 h/day) above the limit of 200 mT can cause damage to health. Ferromagnetic tools in the magnetic field are significantly hazardous. Disks and electronic devices may be damaged.

Thus:

- Consider the marked magnetic field of more than 0.5 mT (5 Gauss) before start up.
- Keep people with active medical implants away from the 0.5 mT (5 Gauss) area.
- Do not stay or work at magnetic fields of more than 8 T.
- Prevent exposure of more than 200 mT for more than 8 h/day.
- Keep disks, credit cards and electronic devices away from the identified area.
- Do not use ferromagnetic tools or items within the identified area.
- Only use non-ferromagnetic ladders or steps.



### 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 climb onto the magnet system.
- Do not lean items against the magnet system.
- Do not lean against the magnet system.
- Do not move the magnet system on your own.
- Do not move the magnet system arbitrarily.

### 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 in use must be approved to carry the weight.
- Do not use damaged lifting equipment.
- Do not use lifting equipment without updated check tag.
- Lifting only with approved qualification.
- Obey ergonomic guidelines while lifting heavy parts.
- Protect parts against falling.
- Always wear safety shoes with approved toe caps.

## Assembling / Disassembling

### **WARNING**

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

Installation of the magnet stand requires approved personnel 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.

## 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 pressurized gas 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 contents 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 contents 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 further equipment to prevent health hazards.



### **Protective Gloves**

Used to protect the hands from injury caused by rough edges.



### **Safety Shoes**

Used to protect the feet from injury from falling of heavy objects. An anti-slip sole protects 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 immediate 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

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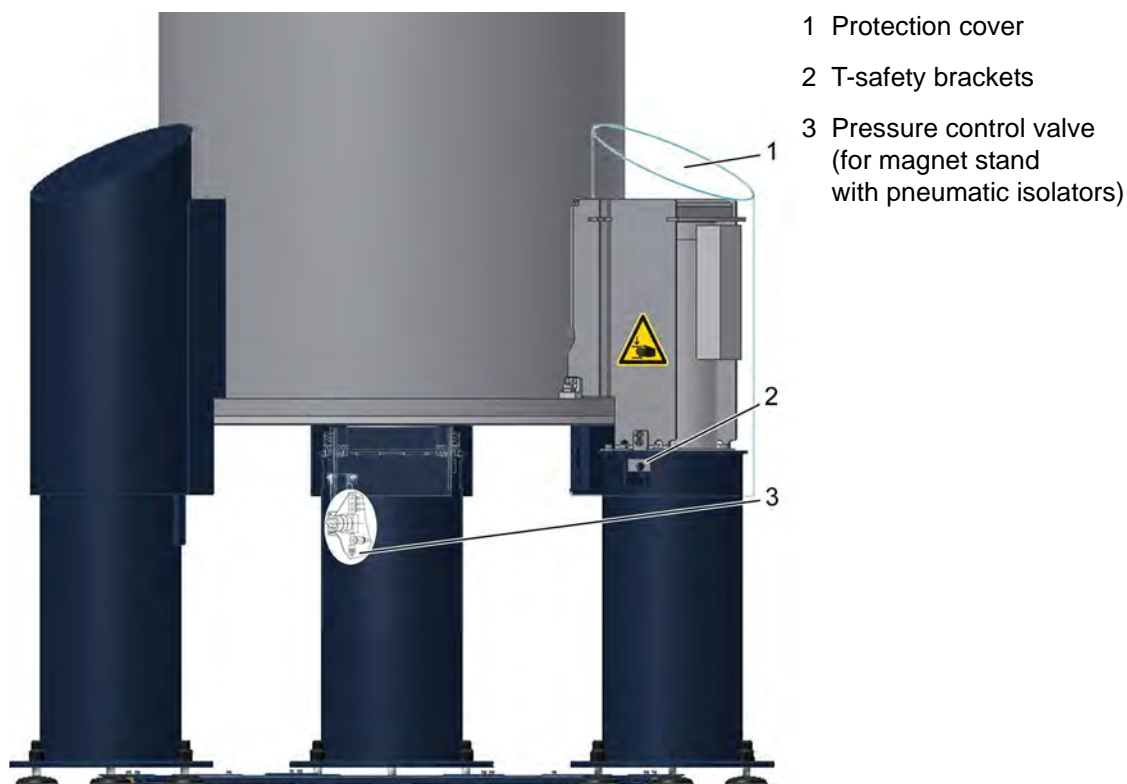


Figure 2.1: Location of the safety devices of the magnet stand F

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

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## 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 9](#) of this document for contact information).

## 3 Transportation

### 3.1 Safety

---

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.



#### **WARNING**

**Heavy Weights** (see [page 24](#))



#### **CAUTION**

**Transportation** (see [page 25](#))

### 3.2 Packaging

---

The magnet stand is packed in a wooden box.

#### 3.2.1 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.

## 3.3 Transportation Inspection

---

Investigate the delivery with regard to visible damage and completeness of delivery.

### Transport control systems

The shipping and handling monitors (“Shock Watch“, “Tilt Watch“) on the boxes show if the boxes were kicked or tilted during transportation.

### Checks

Shock Watch: Follow instructions on the label.

Tilt Watch: Follow instructions on the label.

### In case of damage

- Accept delivery with reservation.
- Make a documentation of all observable damage and add it to the transportation documents.
- Start complaint process.
- Contact Bruker Service before installation.

---

**i** The claim for damage expires after the fixed period.

Thus:

Report damages to Bruker Service immediately after detection of damage. For contact information [see page 9](#) of this document.

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## 3.4 Transportation by Forklift / Pallet Jack

---

A fork lift is recommended for transporting the boxes to the installation site.

**Approved Persons:** Approved forklift / pallet jack operator

**Precondition:** The fork lift / pallet jack must be approved for the transportation weight (refer to the supplied Sales Information).

### TransportTransport



Figure 3.1: Transportation by Forklift - front side

1. Check the route of transport for the minimal height and width.
2. Check sufficient floor capacity on the route of transport. In case of doubt ask a stress analyst.
3. Check sufficient carrying capacity while using an elevator.
4. Position the forks between the bars of the box as shown in the figure. Make sure the side towards the operator is the one with the labels on it.



Figure 3.2: Transportation by Forklift - rear side

6. Make sure the forks of the fork lift are longer than the box and projects out of the back of the box as shown in the figure.
7. Now lift the fork and move the box to the site.

## 3.5 Transportation with a Crane

---

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

## 3.6 Storing

---

If it is necessary to store the magnet stand before installation obey the following instructions:

- 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.

## 3.7 Disposal

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For disposal after the life cycle please contact Bruker Service for further information.  
For contact information [see page 9](#) of this document.

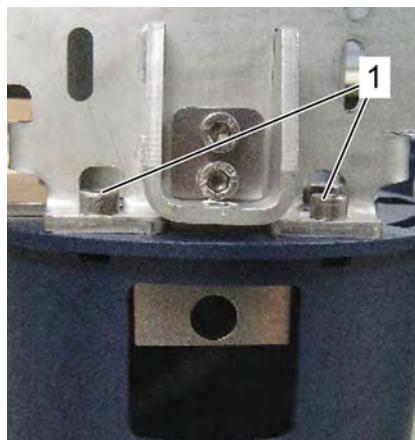
## 3.8 Relocation

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



### ⚠ WARNING

**Risk of Tilting** (see [page 21](#))



1. For magnet stand with pneumatic isolators only: deactivate the pneumatic isolators.
2. Fix the support to the pillar using the four transportation lock screws M6 x 16 (1).

Figure 3.3: Mounting the transportation lock screws



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

Figure 3.4: Special transportation device D3xx



# 4 Assembling

## 4.1 Safety

---

Approved Persons: Bruker Service only



### **WARNING**

**Heavy Weights** (see [page 21](#))

**Assembling / Disassembling** (see [page 22](#))

#### **Personal Protective Equipment**

- Protective goggles
- Protective gloves
- Protective clothes
- Safety shoes

## 4.2 Installation Workflow

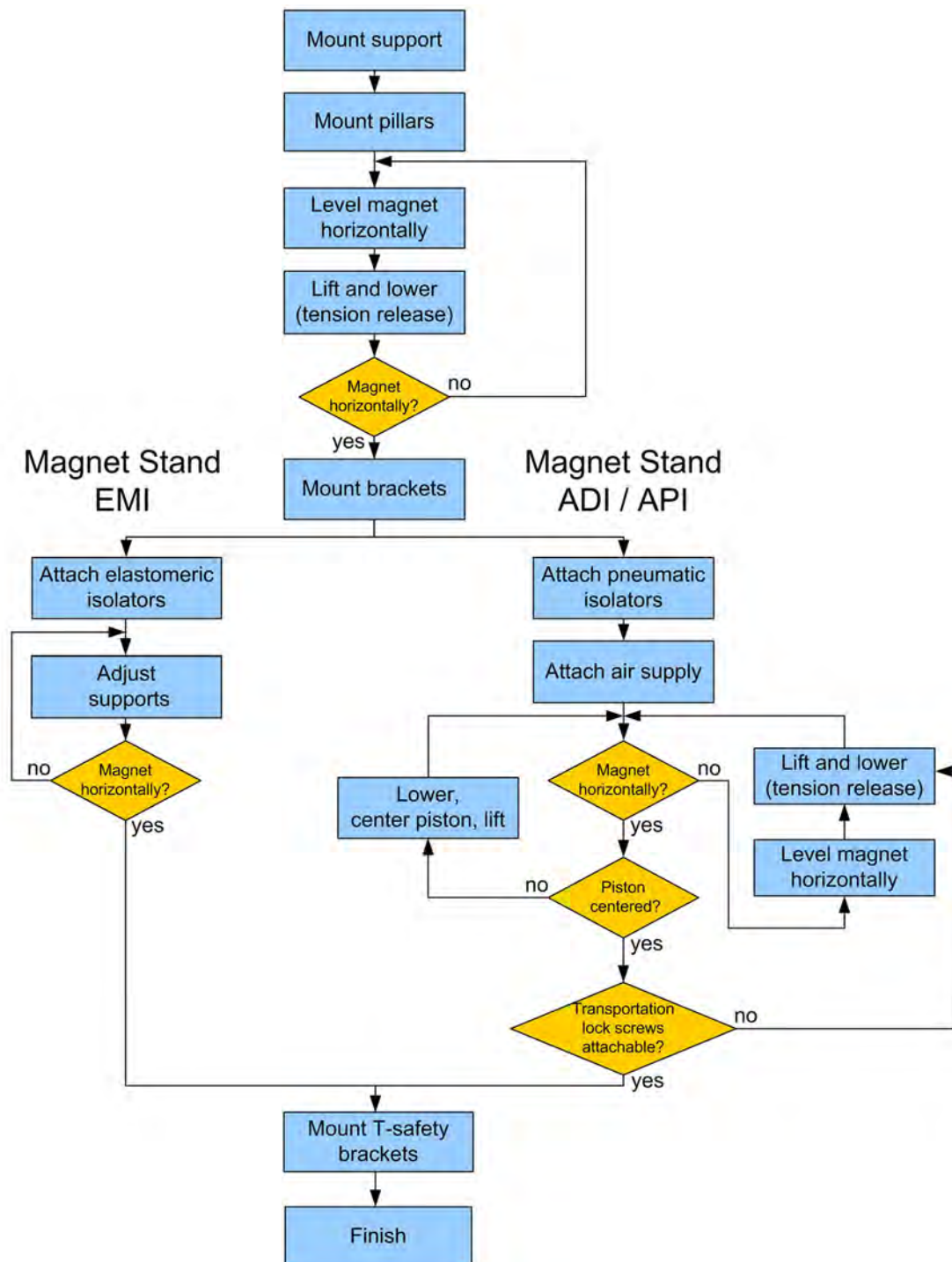


Figure 4.1: Installation workflow

## 4.3 Installation Work

### 4.3.1 Mounting the Support



#### ⚠ WARNING

**Heavy Weights** (see [page 21](#))



Figure 4.2: Mounting the support – step 1

1. Remove the top and side panels of the box.
2. Unpack the three supports.



Figure 4.3: Mounting the support – step 2

3. For each pillar get the following set of screws ready:
  - 1 screw M8 x 20 with washer (1).
  - 4 screws M8 x 35 (2) (for F80, F85 and F95 magnet stand).
  - 4 screws M10 x 35 (2) (for F110 and F136 magnet stand).

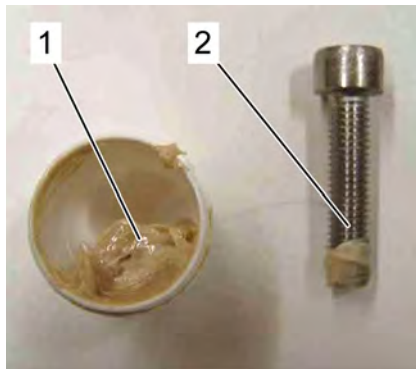


Figure 4.4: Mounting the support – step 3

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

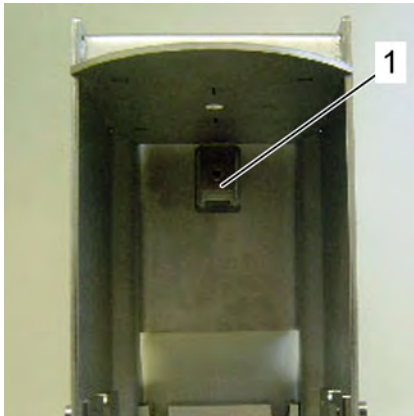


Figure 4.5: Mounting the support – step 4

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

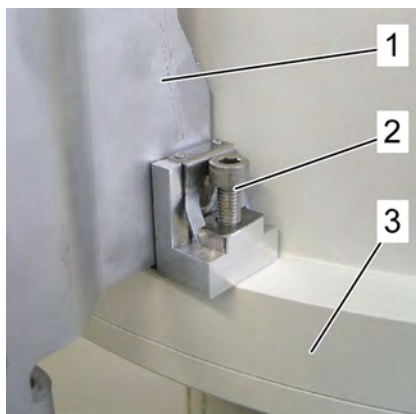


Figure 4.6: Mounting the support – step 5

7. Mount 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 tighten the screws yet.

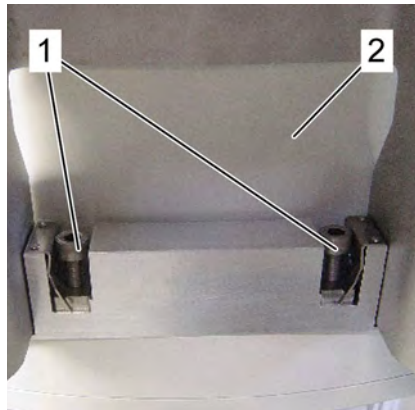


Figure 4.7: Mounting the support – step 6

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

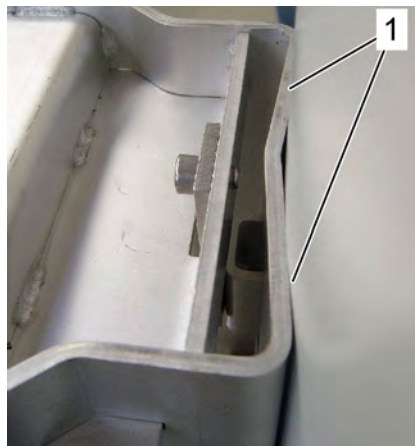


Figure 4.8: Mounting the support – step 7

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

## 4.3.2 Mounting and Leveling the Pillars



Figure 4.9: Mounting and leveling the pillars – step 1

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.

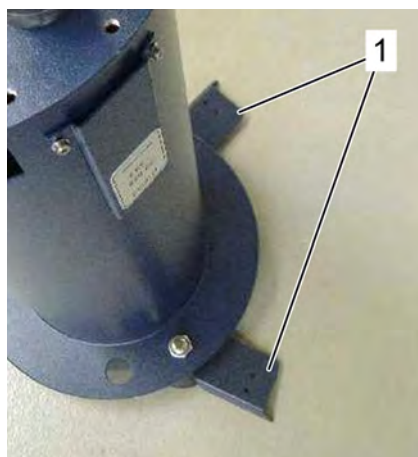


Figure 4.10: Mounting and leveling the pillars – step 2

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 4.11: Mounting and leveling the pillars – step 3

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

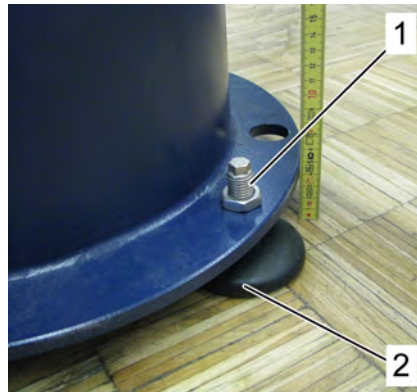


Figure 4.12: Mounting and leveling the pillars – step 4

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 of the cryostat.

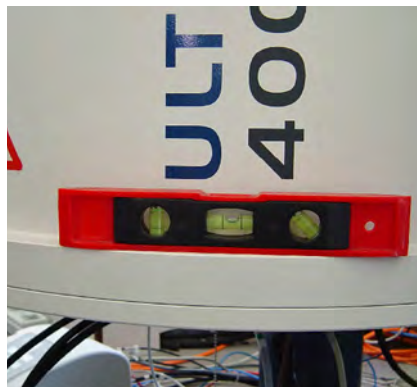


Figure 4.13: Mounting and leveling the pillars – step 5

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](#)).

---

**i** Use only a hexagon ring wrench for the following steps.

---

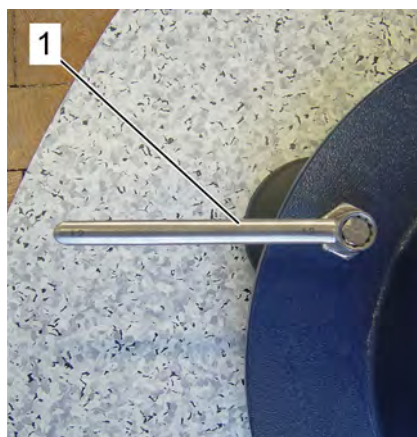


Figure 4.14: Information on required tools

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

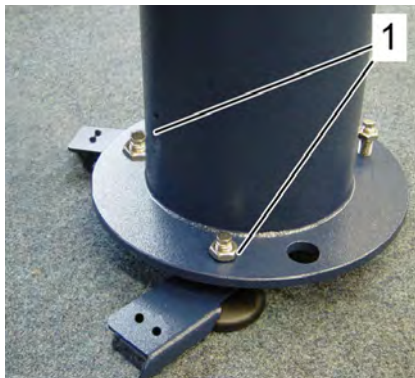


Figure 4.15: Mounting and leveling the pillars – step 6

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](#)).

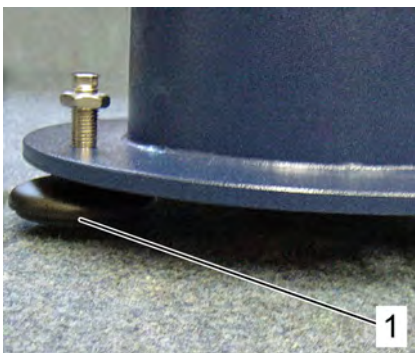


Figure 4.16: Mounting and leveling the pillars – step 7

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.

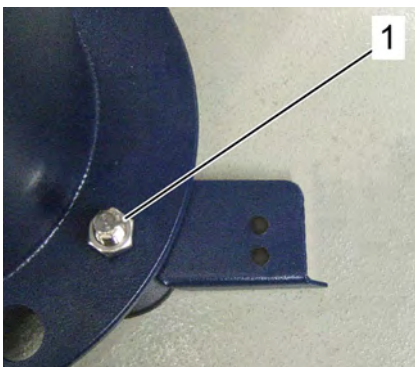


Figure 4.17: Mounting and leveling the pillars – step 8

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



Do not yet release the lifting equipment.

---

## 4.3.3 Mounting the Brackets

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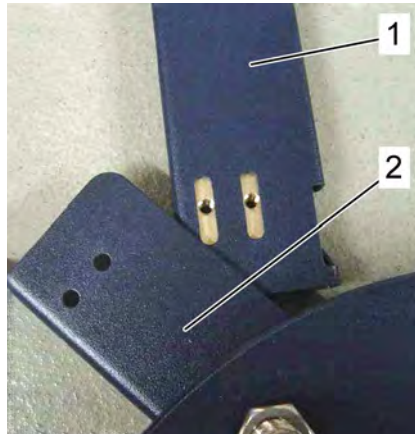
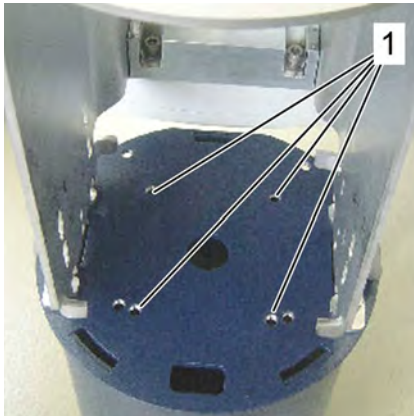


Figure 4.18: Mounting the brackets

1. Attach the brackets (1) at the mounting wings (2) like shown.
2. Consider the channel inside the brackets is towards the triangle of the three pillars.
3. Do not yet attach the screws before assembling is completed.

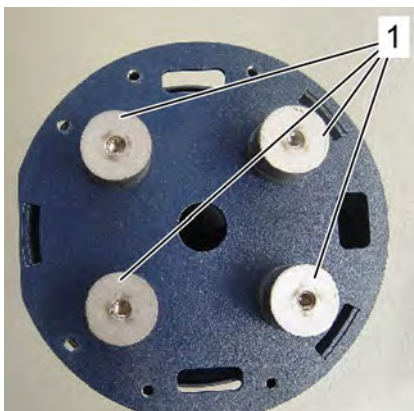
## 4.3.4 Assembling the Elastomeric Isolation System (EMI)

---



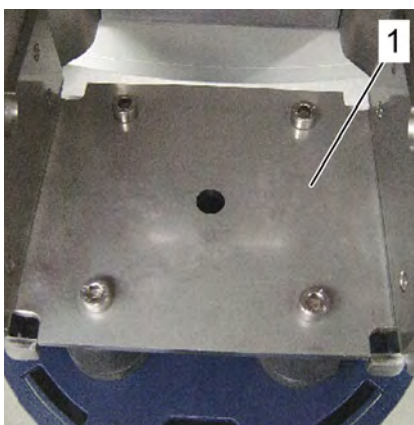
1. Use the inner threads (1) of the pillars to mount four elastomeric isolators on each pillar.

Figure 4.19: Assembling the elastomeric isolation system – step 1



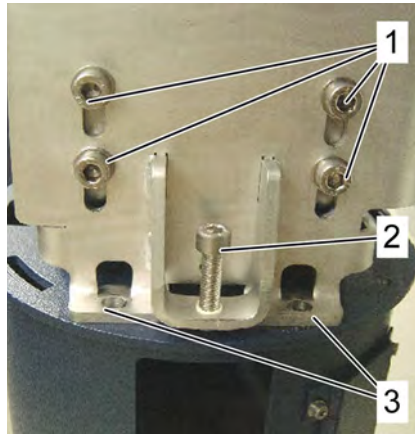
2. Mount the elastomeric isolators (1) with their threaded pins into the inner holes of the pillars.

Figure 4.20: Assembling the elastomeric isolation system – step 2



3. Mount 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

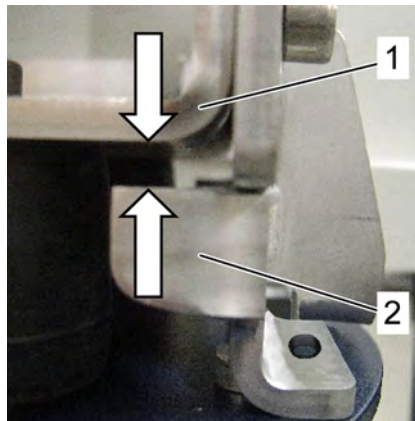


4. Mount the four screws (1) on both sides of the support. Do not tighten these screws yet.
5. Remove the safety screws (3).
6. Slightly grease the lifting screws (2).
7. Attach and tighten the two lifting screws (2) on both sides of each support. The magnet system will be lifted by turning the lifting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

Figure 4.22: Assembling the elastomeric isolation system – step 4

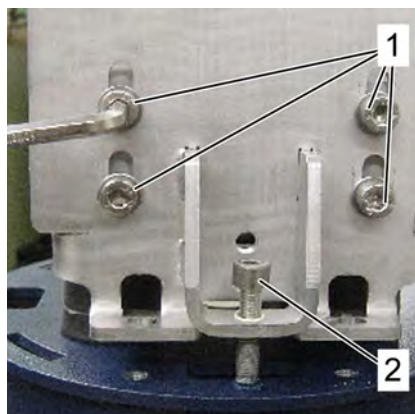


Use the lifting equipment to assist in lifting and lowering the cryostat.



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 (torque 15 Nm).
10. Release but not remove the lifting screw (2).
11. Check the levelled position of the magnet system (see ["Mounting and Leveling the Pillars" on page 38](#)).
12. Continue with the instructions given in chapter ["Mounting the T-Safety Bracket" on page 52](#).

Figure 4.24: Assembling the elastomeric isolation system – step 6

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

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### 4.3.5.1 Preparation of the Isolators

---

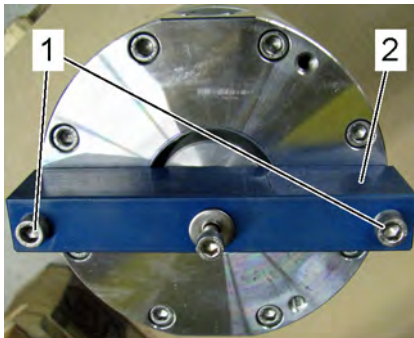
**i** Illustrations in the following section are intended for basic understanding of assembling the pneumatic isolation system. Some illustrations may differ from the actual design. However, this does not affect the assembly or the function.

---

#### IDE Isolators

**i** 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.

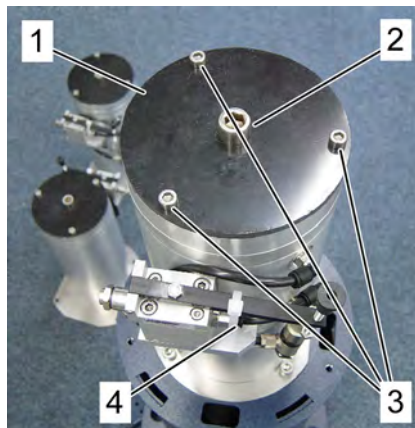
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1. Release the screws of the transportation lock (1).
2. Remove the transportation lock (2).

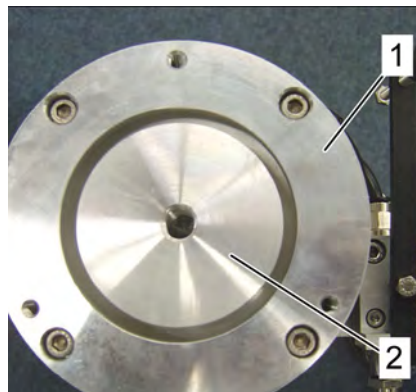
Figure 4.25: Release the transportation lock

## 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 if the piston (2) is centered inside the isolator (1).

Figure 4.27: Check the piston position

## TMC Isolators

- 
- i** 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.
- 



Figure 4.28: Preparing the TMC isolator – step 1

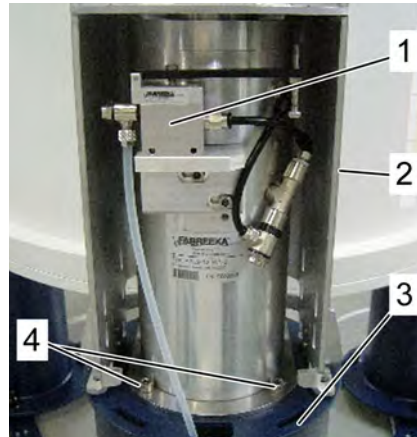
1. Lift the piston (1) of the isolator.



Figure 4.29: Preparing the TMC isolator – step 2

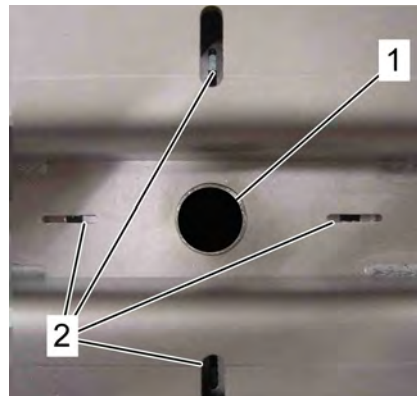
2. Remove the flexible foam (2) under the piston.
3. Put the piston to its original position in the isolator.
4. Check that the piston is concentric to the outer cylinder of the isolator.

## 4.3.5.2 Mounting the Isolator



1. Insert the isolator into the support (2) on the pillar (3) as shown in the figure.
2. Attach the screws M8 x 16 (4). Do not tighten these screws yet.
3. Make sure that the pneumatic controller (1) is placed in the correct position as shown in the figure.

Figure 4.30: Mounting 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) of the support.
5. Tighten the four M8 x 16 screws (see (2) in [Figure 4.30](#)) of the isolator (torque 15 Nm).

Figure 4.31: Mounting the isolator – step 2

## 4.3.5.3 Connecting the Gas Supply



### WARNING

**Pneumatic Energy** (see [page 21](#))

- i** Pressure fluctuations in the gas supply affect the functioning of the isolators. To prevent pressure fluctuation a reducing valve is recommended. In case of a single compressor for gas supply a buffer tank is recommended. The diameter of the gas supply tubing should be minimum  $\varnothing$  8 mm.

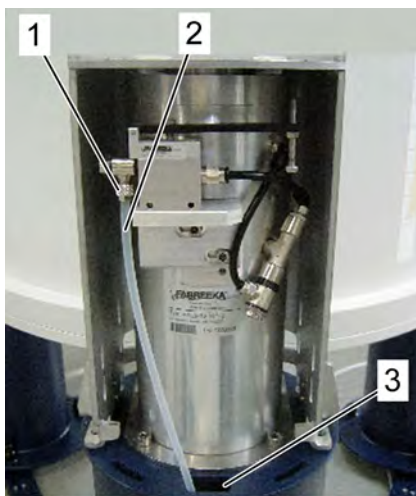


Figure 4.32: Connecting the gas supply – step 1

1. Set 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  $\varnothing$  6 mm pneumatic pipe into three pieces of 1 m, 4 m and 5 m length.
3. Connect the short  $\varnothing$  6 mm pneumatic pipe (2) (1 m length) with the control valve (1) of the isolator.
4. Connect the two long  $\varnothing$  6 mm pneumatic pipes (4 m and 5 m length) with the control valves of the two other isolators.
5. Push the pneumatic pipes (2) through the squared opening of the top plates (3).

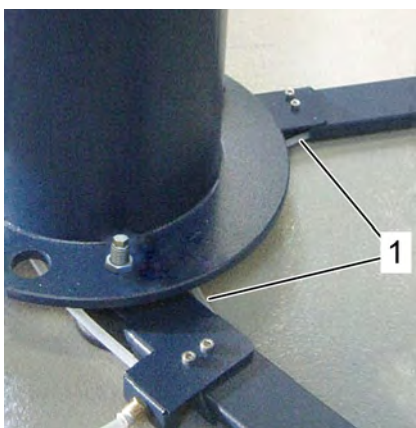


Figure 4.33: Connecting the gas supply – step 2

6. Guide the two long  $\varnothing$  6 mm pneumatic pipes through the pillars from the top to the bottom.
7. Pull the two long  $\varnothing$  6 mm pneumatic pipes out at the bottom of the pillars towards the triangle of the three pillars.
8. Guide the two long  $\varnothing$  6 mm pneumatic pipes through the channels inside the brackets towards the pillar with the pneumatic controller (1).



Figure 4.34: Connecting the gas supply – step 3

9. Remove the cover plate from the pillar that was set to mount the pneumatic controller.

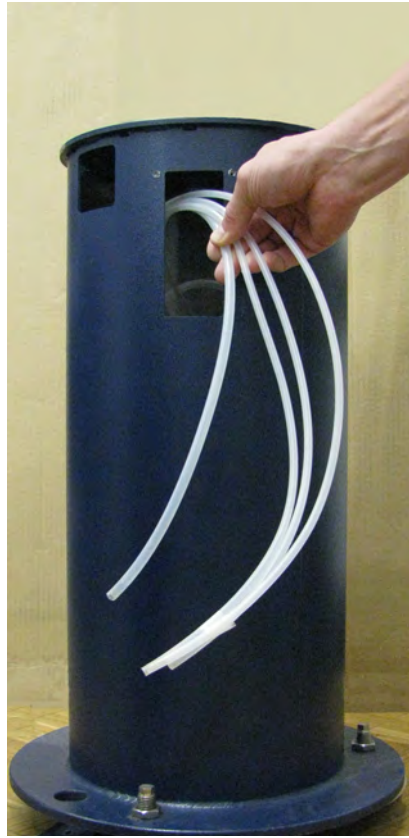


Figure 4.35: Connecting the gas supply – step 4

10. Guide the two long  $\varnothing$  6 mm pneumatic pipes inside the pillar with the pneumatic controller through the opening.
11. Guide the short  $\varnothing$  6 mm pneumatic pipe downward through the opening of the top plate of the pillar.
12. Guide the pneumatic pipe ( $\varnothing$  8 mm) for the air supply through the opening downward the pillar and pull it out towards outside of the triangle of the pillars.
13. Cut off the remainder of the pneumatic pipes to the same length like shown. Avoid any strain on the pneumatic pipes.



Figure 4.36: Connecting the gas supply – step 5

14. Connect the three  $\varnothing$  6 mm pneumatic pipes with the connectors (1) at the pneumatic controller (2).
15. Connect the  $\varnothing$  8 mm pneumatic pipe for the air supply with the one way valve (3).



Figure 4.37: Connecting the gas supply – step 6

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

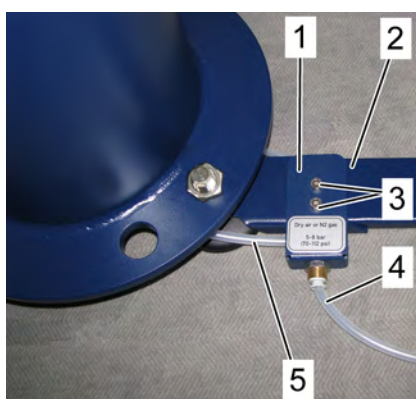


Figure 4.38: Connecting the gas supply – step 7

18. Connect the Ø 8 mm pneumatic pipe (5) from the pneumatic controller to the strain relief (1).
19. Connect the strain relief (1) to the gas supply with the Ø 8 mm pneumatic pipe (4).
20. Mount the strain relief (1) with two screws M6x16 (3) onto the right or left mounting wing (2) of the pillar.

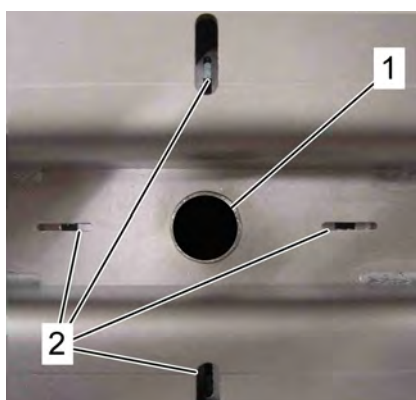
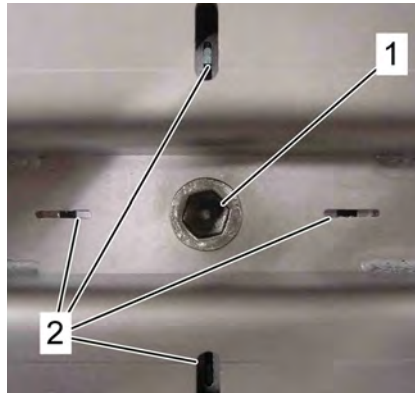


Figure 4.39: Connecting the gas supply – step 8

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



23. Insert the piston screw (1), but do not tighten the screw yet.
24. Switch the pneumatic controller to the UP position. The piston of the pneumatic isolator will be pushed up.
25. Wait until it is possible to tighten the piston screw without turning the piston.
26. If the piston is centered via the four slots (2), tighten the piston screw (1) (torque 20 Nm).
27. Switch the pneumatic controller to the DOWN position.

Figure 4.40: Connecting the gas supply – step 9



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

---

## 4.3.6 Mounting the T-Safety Bracket

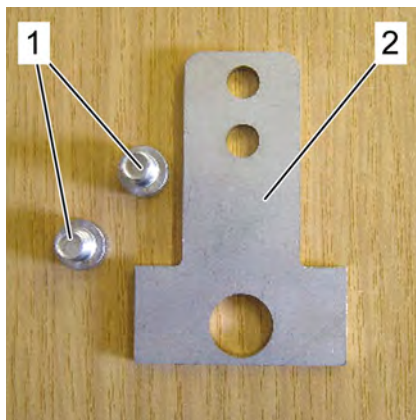


Figure 4.41: Mounting the T-safety bracket – step 1

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

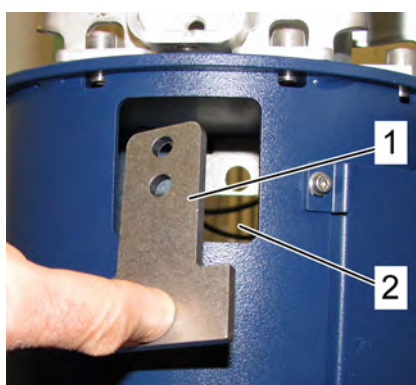


Figure 4.42: Mounting the T-safety bracket – step 2

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.

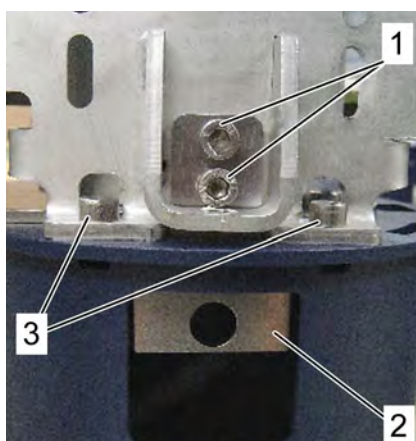


Figure 4.43: Mounting the T-safety bracket – step 3

4. Use the two screws M8 x 16 (1) to mount the T-safety bracket (2) at the support.
5. Tighten the two screws (1) (torque 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.

## 4.3.7 Adjusting the piston travel



Figure 4.44: Adjusting the piston travel – step 1

9. Switch the pneumatic controller to the UP position.

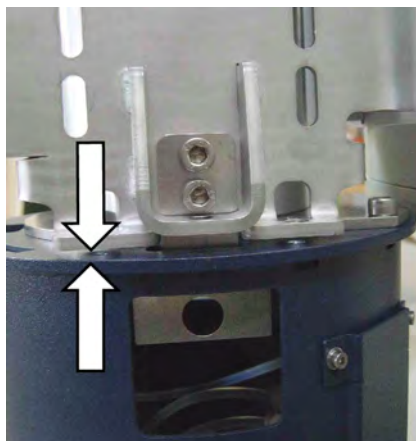


Figure 4.45: Adjusting the piston travel – step 2

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.



Figure 4.46: Adjusting the piston travel – step 3

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 4.47: Adjusting the piston travel – step 4

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](#).

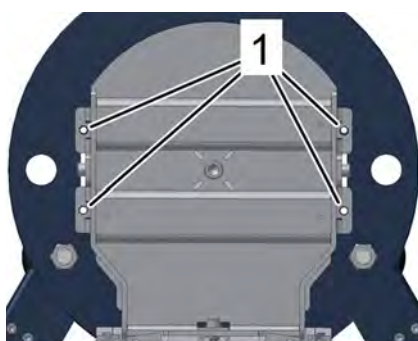


Figure 4.48: Adjusting the piston travel – step 5

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 (refer to ["Mounting and Leveling the Pillars" on page 38](#)).



Figure 4.49: Adjusting the piston travel – step 6

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

## 4.3.8 Finishing

- i** For magnet stand with pneumatic isolation system only:  
Check the pneumatic pipes for audible leaks while the pneumatic controller is in the UP position. Check the pipe connections for visible damage and strain.

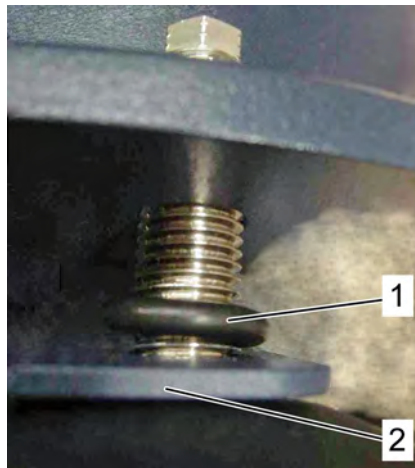


Figure 4.50: Finishing – step 1

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

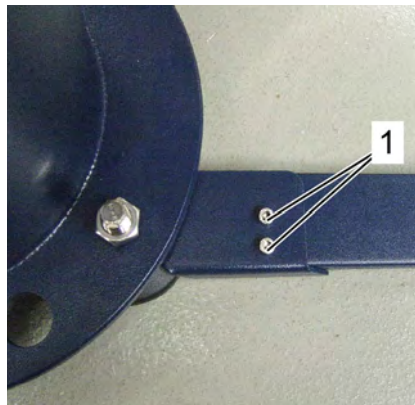


Figure 4.51: Finishing – step 2

2. Mount the four M6 x 16 screws (1) on each bracket (torque 5 Nm).

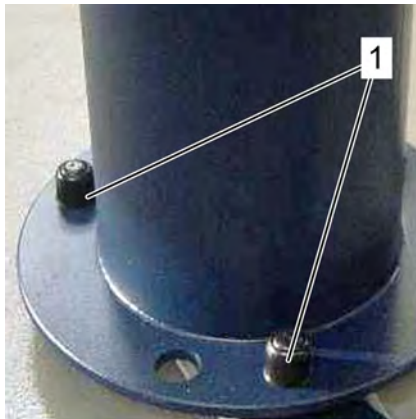


Figure 4.52: Finishing – step 3

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

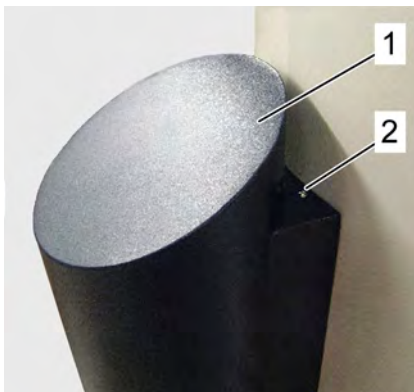


Figure 4.53: Finishing – step 4

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



Figure 4.54: Finishing – step 5

6. Plug-in the cover plates as shown.



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 covers and the cover plates do not contact the pillars.



# 5 Operation

## 5.1 Safety

---

### Approved Persons

Bruker Service, Approved Customer Personnel

### WARNING



**Magnetic Fields** (see [page 20](#))

**Risk of Tilting** (see [page 21](#))

**Pneumatic Energy** (see [page 22](#))

### Elastomeric Isolators (EMI)

There is no procedure 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.

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

---



Switch the pneumatic controller to the UP position.

Figure 5.1: Activating the pneumatic isolation system

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

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



Switch the pneumatic controller to the DOWN position.

Figure 5.2: Deactivating the pneumatic isolation system

## 6 Troubleshooting

Troubleshooting must be performed only with approved qualification.

In case of doubts or problems not specified in the following list contact Bruker Service immediately. For contact information [see page 9](#) of this document.

### 6.1 Safety

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#### Approved Persons:

Bruker Service, Approved Customer Personnel

#### WARNING



**Magnetic Fields** (see [page 20](#))

**Risk of Slippage** (see [page 20](#))

**Risk of Tilting** (see [page 21](#))

**Heavy Weights** (see [page 21](#))

**Assembling / Disassembling** (see [page 22](#))

**Pneumatic Energy** (see [page 22](#))

## 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 <a href="#">"Alignment and Repair" on page 64</a> ).	Bruker Service
	T-safety bracket touches the pillar.	Align the magnet stand.	Bruker Service
	Floor vibrations in vertical direction.	Replace elastomeric isolators with ADI isolators.	Bruker Service
	Floor vibrations in horizontal and vertical direction.	Replace ADI isolators with API 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 <a href="#">"Replacing the Pneumatic Isolator (ADI / API)" on page 67</a> ).	Bruker Service
	Defective membrane of an isolator.	Replace the leveling valve or the isolator (refer to <a href="#">"Replacing the Pneumatic Isolator (ADI / API)" on page 67</a> ).	Bruker Service
Magnet system achieves working position jerkily.	Piston is not centric or touching its casing.	Align the magnet stand (refer to <a href="#">"Alignment and Repair" on page 64</a> ).	Bruker Service
Audible loss of gas.	Defective membrane or defective leveling valve of an isolator.	Replace the leveling valve or the isolator (refer to <a href="#">"Replacing the Pneumatic Isolator (ADI / API)" on page 67</a> ).	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

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### 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 38](#)).
5. Mount the brackets (refer to [“Mounting the Brackets” on page 41](#)).
6. Remove the safety screws.
7. Set up the vibration isolation system.
8. Finish (refer to [“Finishing” on page 55](#)).

---

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

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## 6.3.2 Replacing the Elastomeric Isolators



### ⚠ WARNING

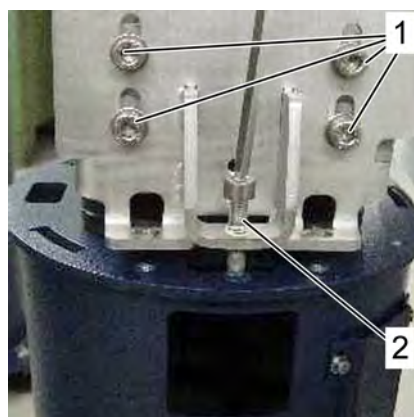
**Magnetic Fields** (see [page 20](#))

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



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

Figure 6.2: Replacing the Elastomeric Isolators – step 1



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 6.3: Replacing the Elastomeric Isolators – step 2

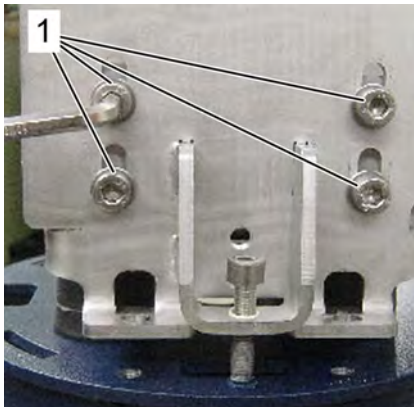


Figure 6.4: Replacing the Elastomeric Isolators – step 3

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

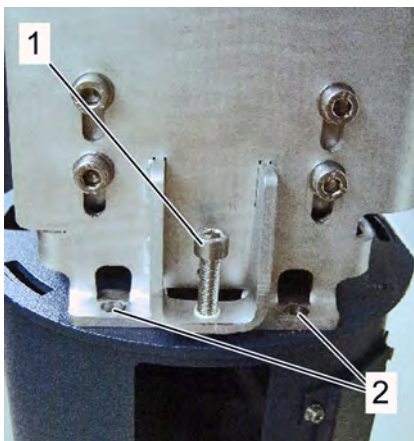


Figure 6.5: Replacing the Elastomeric Isolators – step 4

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).

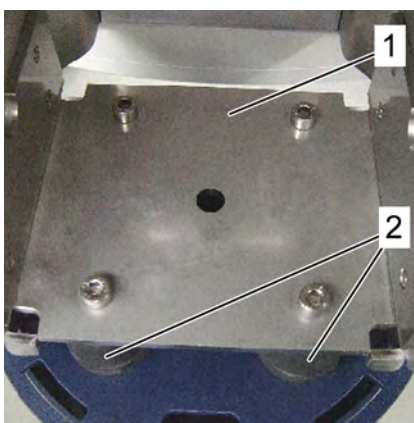


Figure 6.6: Replacing the Elastomeric Isolators – step 5

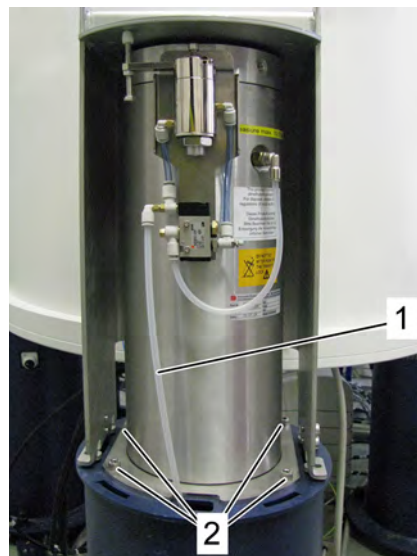
10. Remove the screws M8 x 12.
11. Remove the inner mounting plate (1).
12. Remove the elastomeric isolators (2).
13. Continue according to the procedure described in ["Assembling the Pneumatic Isolation System \(ADI / API\)"](#) on page 44.

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



### **WARNING**

**Magnetic Fields** (see [page 20](#))



1. Remove the cover plate.
2. Remove the protection cover.
3. Remove the piston screw.
4. Deactivate the magnet stand (refer to ["Deactivation of the Magnet Stand \(ADI / API\)"](#) on page 60).
5. Remove the four screws (2) 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 44.

Figure 6.7: Replacing the Pneumatic Isolator

## 6.3.4 Tilting Protection

---

In seismic hazardous regions it is recommended:

- to fix the magnet system to the room ceiling with robes and / or
- to bolt it to the floor with the Bruker Tilting Protection (Material No. Z143640).

Local safety standards and regulations have to be considered from the customer.

Contact Bruker Service for more information about site restrictions and purchase options. For contact information [see page 9](#) of this document.



Bruker Tilting Protection

Material No. Z143640

Figure 6.8: Bruker Tilting Protection

# 7 Maintenance

Maintenance must be performed only with approved qualification.

In case of doubt contact Bruker Service. For contact information [see page 9](#) of this document.

## 7.1 Safety

---

### Approved Persons:

Bruker Service, Approved Customer Personnel



### WARNING

**Heavy Weights** (see [page 24](#))

**Pneumatic Energy** (see [page 22](#))

### Personal protective equipment

Protective goggles

Protective gloves

Safety shoes

## 7.2 Cleaning

---

### Procedure

- Clean the covers of the magnet stand with a dry or slightly damp cloth.
- Only use water and neutral detergents.
- Do not use volatile cleaning solvents.

No further maintenance work is required.



# 8 Disassembling

## 8.1 Safety

---

Approved Persons:

Bruker Service only



### **WARNING**

**Magnetic Fields** (see [page 20](#))

**Assembling / Disassembling** (see [page 22](#))

**Pneumatic Energy** (see [page 22](#))

**Heavy Weights** (see [page 21](#))

#### Personal Protective Equipment

- Safety shoes
- Protective gloves

## 8.2 Disassembling Work

---

#### Precondition

- Magnet system de-energized.
- Pneumatic controller deactivated (switch in DOWN position)
- Pneumatic supply OFF, pressure released

For disassembling the magnet stand refer to chapter **“Assembling”** on [page 33](#) in reverse order.



# A Appendix

## A.1 Warning Signs

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## 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
NI	No Isolator
RT	Room Temperature; used as prefix of parts at room temperature (e.g. RT bore)

Table A.2: Abbreviations

## A.5 Technical Data

---

### A.5.1 Environmental conditions

---

	Value	Unit
Minimum surrounding temperature	7	°C
Maximum surrounding temperature	38	°C
Maximum relative humidity up to 31°C	80	%
Maximum relative humidity between 31°C and 40°C linear decreasing	80-50	%

Table A.1: Environmental conditions

### A.5.2 Supply

---

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

Table A.2: Supply for pneumatic isolation systems (ADI / API)

## A.5.3 Options

Type	Isolator	Cryostat			
		diameter bottom plate	Unit	height floor to bottom plate	Unit
F80 - 570	NI, EMI, ADI, API	570	mm	795	mm
F80 - 700	ADI, API	700	mm	795	mm
F80 - 770	ADI, API	770	mm	795	mm
F80 - 950	ADI, API	950	mm	795	mm
F85 - 850	ADI, API	850	mm	850	mm
F95 - 700	ADI, API	950	mm	700	mm
F95 - 880	ADI, API	950	mm	880	mm
F95 - 950	ADI, API	950	mm	950	mm
F110 - 800	ADI, API	1100	mm	800	mm
F110 - 950	API	1100	mm	950	mm
F110 - 1050	ADI	1100	mm	1050	mm
F136 - 950	ADI, API	1364	mm	950	mm

Table A.3: Options

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## Revision History List

<b>Index:</b>	<b>Date:</b>	<b>Alteration Type:</b>
00	December 2007	First 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.
04	June 2013	Update and new front and rear page.

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