Animal Bed Mouse Cryo

User Manual

Version 003

Innovation with Integrity

NMR

Fällanden, Switzerland

P/N: Z31858

DWG-Nr.: Z4D10825 003b

For further technical assistance on the Animal Bed Mouse Cryo unit, please do not hesitate to contact your nearest BRUKER sales representative or contact us directly at:

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1 About

1.1 This Manual

This manual is intended to be a reference guide for operators and service technicians. It provides detailed information about the user level maintenance and overall use of the Bruker device.

The figures shown in this manual are designed to be general and informative and may not represent the specific Bruker model, component or software/firmware version you are working with. Options and accessories may or may not be illustrated in each figure.

Carefully read all relevant chapters before working on the device!

1.2 Policy Statement

It is the policy of Bruker to improve products as new techniques and components become available. Bruker reserves the right to change specifications at any time.

Every effort has been made to avoid errors in text and figure presentation in this publication. In order to produce useful and appropriate documentation, we welcome your comments on this publication. Support engineers are advised to regularly check with Bruker for updated information.

Bruker is committed to provide customers with inventive, high quality products and services that are environmentally sound.

1.3 Symbols and Conventions

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

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

⚠ CAUTION

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

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

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

2 Introduction

2.1 General Purpose

The Animal Bed is suitable for magnetic resonance imaging (MRI) and magnetic resonance spectroscopy (MRS) examinations of mouse brains using an MRI CryoProbe. It can be used within BRUKER BioSpec®, PharmaScan® and ClinScan® systems. The Animal Bed provides a stereotactic fixation and a setup for gas anesthesia.

2.2 Disclaimer

The unit should only be used for its intended purpose, as described in this manual. Use of the unit for any purpose other than that for which it is intended is taken only at the users own risk and invalidates all manufacturer warranties.

Service or maintenance work on the unit must be carried out by qualified personnel. Only trained persons should operate the unit.

Read this manual before operating the unit. Pay particular attention to any safety related information.

When handling the animal, local regulations must be strictly adhered to.

2.3 Version 03.00

The manual is written for all ‘Bio Animal Bed Mouse Cryo‘ for BRUKER BioSpec®, PharmaScan® and ClinScan® systems.

2.4 Before You Begin

This user manual contains information that are necessary for a safe operation of the device. Consider all safety references!

2.5 The Bruker Service

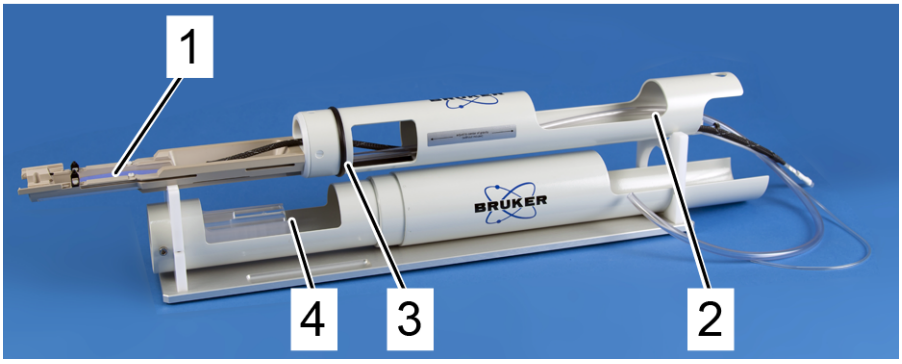
Our customer service division is available to provide technical information. For contact details see “Contact” on page 21.

Introduction

3 Product Overview

3.1 Bio Animal Bed Mouse Cryo and Mouse Position Gauge

The base of the Animal Bed system (Figure 3.1) consists of a half shell made of PEEK with a diameter of 68 millimeters (Figure 3.1 (1)).



[1] Animal support area of the Animal Bed where the animal is positioned

[2] Rear end to guide the Animal Bed into the magnet with lifting arm mechanism to position animal under the Coilhead

[3] Adjustable balancing ring

[4] Mouse Position Gauge for testing the correct position of the animal

Figure 3.1: Total view of the Animal Bed and Mouse Position Gauge.

3.2 Heating Cover

A heating cover (Figure 3.2 (1)) to stabilize the body temperature of the mouse during investigation is provided with the Animal Bed. The heating cover has to be connected to a conventional water heating system.

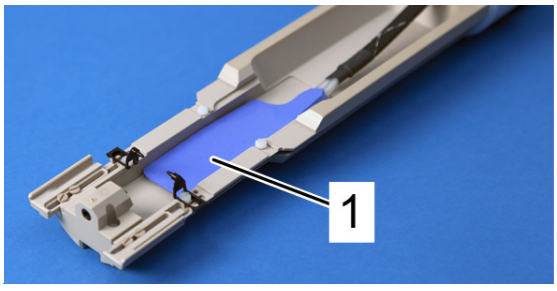


Figure 3.2: Animal Bed with heating cover (1).

The temperature of the water heating system has to be adjusted in order to stabilize the animals physiological body temperature.

4 Handling

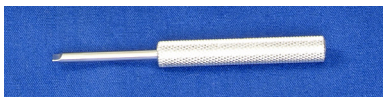
4.1 Provided Tools

⚠ CAUTION

Risk of injury!

Therefore:

- When tightening screws within the 0.5 mT line of the magnet only use the non-magnetic screw driver provided with the Animal Bed!



4.2 Anesthesia and Fixation

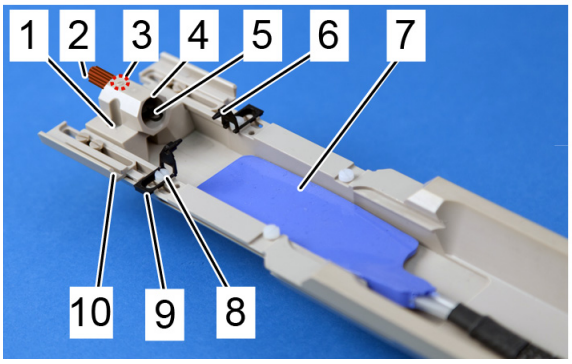


Figure 4.1: Animal support area.

[1] White fixation screw
[2] Red extension screw
[3] Slotted headless screw
[4] Respiration mask
[5] Tooth bar
[6] Ear plug
[7] Heating cover
[8] White screws
[9] Ear plug holder
[10] Mechanical stop

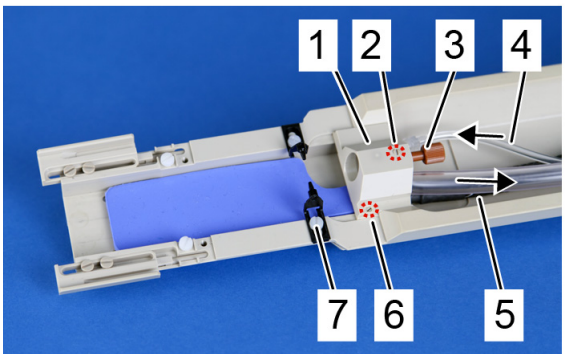
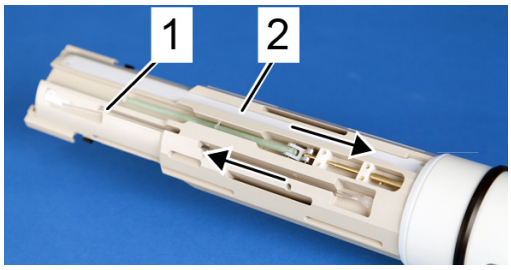


Figure 4.2: Animal support area - Reverse setup.

[1] Respiration mask reverse
[2] Slotted headless screw
[3] Red extension screw
[4] Silicon tube for narcotic gas supply
[5] Silicon tube for narcotic gas aspiration
[6] Headless screw for fixation
[7] White screws



[1] Silicon tube for narcotic gas supply

[2] Silicon tube for narcotic gas aspiration

Figure 4.3: Bottom view of the animal support area - gas supply.

The animal support area consists of the following parts:

- Anesthetic gas supply:
  A passive gas anesthesia including supply and aspiration is provided within the respiration mask. The respiration mask (Figure 4.1 (4)) is connected to the two silicon tubes (supply: Figure 4.3 (1), aspiration: Figure 4.3 (2)). While in the reverse setup, the respiration mask reverse (Figure 4.2 (1)) is connected via the two silicon tubes (supply: Figure 4.2 (4), aspiration: Figure 4.2 (5)).
- Respiration mask (Figure 4.1) / Respiration mask reverse (Figure 4.2):
  The respiration masks can be shifted within a certain range. To reposition the respiration masks (Figure 4.1 (4) & Figure 4.2 (1)) loosen the white fixation screw (Figure 4.1 (1)) or the headless screw (Figure 4.2 (6)), respectively.
  To use the reverse setup, it is recommended to remove the respiration mask (Figure 4.1 (4)). Place the respiration mask reverse (Figure 4.2 (1)) and connect the two silicon tubes for supply (Figure 4.2 (4)) and aspiration (Figure 4.2 (5)).
- Tooth bar:
  To adjust the position of the tooth bar (Figure 4.1 (5)) apply the red extension screw (Figure 4.1 (2)) and loosen the slotted headless screw (Figure 4.1 (3)). After positioning the tooth bar fix the slotted headless screw and remove the extension screw. This procedure applies also for the respiration mask reverse, the red extension screw (Figure 4.2 (3)) can be applied and the slotted headless screw (Figure 4.2 (2)) can be loosend to shift the mask.
- Stereotactic fixation:
  Figure 4.1 (8) shows the stereotactic fixation device which is realized by ear plugs fitting into the ear canals for the top end setup, while Figure 4.2 (7) shows it for the reverse setup.
  The position of the ear plug within the ear canal can be adjusted by moving the complete ear plug holder (Figure 4.1 (9)) and the ear plugs (Figure 4.1 (6)) independently. To move the complete ear plug holder loosen the white screw (Figure 4.1 (8)). The ear plugs do have a thread and can be moved by using the provided non-magnetic screw driver.
- Mechanical stop:
  To adjust the position of the object to be imaged in relation to the centre of the Coilhead the mechanical stop (Figure 4.1 (10)) can be moved. To do so, turn the screw (Figure 4.5 (2)) at the end of the Animal Bed. The correct position can be checked by using the Mouse Position Gauge ("Mouse Position Gauge" on page 14).

Connect the tube of the narcotic gas aspiration to the specific exhaust system within the lab. The specific exhaust system has to be adjusted with the appropriate flow in order to ensure a stable anesthesia of the animal.

NOTICE

Hazardous situation of damaging the Coilhead due to punctiform pressure! Mouse can freeze in.

Therefore:

- Remove the extension screw (Figure 4.1 (2)) whenever the bed is used in the Mouse Position Gauge or the MRI system.
- It is not allowed to position the respiration mask beyond the end of the Animal Bed otherwise the function cannot be guaranted.
- Place the Animal Bed in the Mouse Position Gauge to check for any possible collision with the Coilhead ("Mouse Position Gauge" on page 14).

4.3 Balancing Ring

The functionality of the lifting mechanism is only guaranteed if the Animal Bed is balanced. Therefore, the balancing has to be checked and probably adjusted for each measurement.

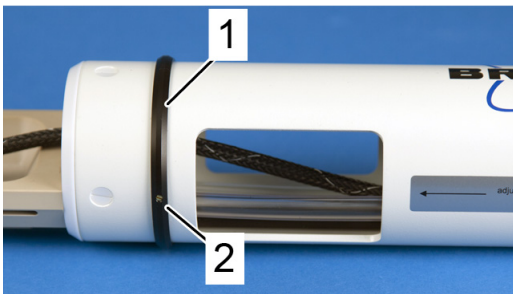


Figure 4.4: Balancing ring.

1. Position the fully equipped Animal Bed on a flat table and check for the balancing.
2. Loosen the screw (2) and move the ring (1) so that the Animal Bed is balanced.
3. Tight the screw again.

4.4 Lifting Mechanism

The lifting mechanism is controlled by the blue lever (Figure 4.5 (1)) at the end of the Animal Bed. When the blue lever is positioned in the ‘down‘ position the lifting arm (Figure 4.6 ((1)) is counter-sunk within the Animal Bed (Figure 4.6). Moving the blue lever into the ‘up‘ position (Figure 4.7 (1)) lifts the front end of the Animal Bed by pushing

out the lifting arm (Figure 4.8 (1)). The lifting mechanism is force limited.

NOTICE

The blue lever has to be in the ‘down‘ position when installing and removing the Animal Bed in/from the Mouse Position Gauge and the MRI system!

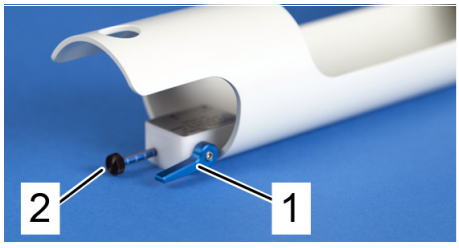


Figure 4.5: Blue lever (1) fixed in ‘down‘ position.

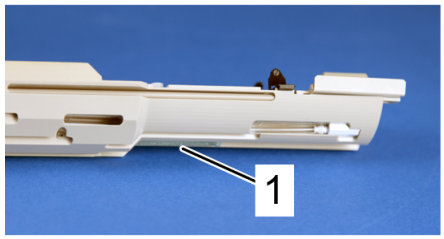


Figure 4.6: The lifting arm (1) counter-suck in the Animal Bed.

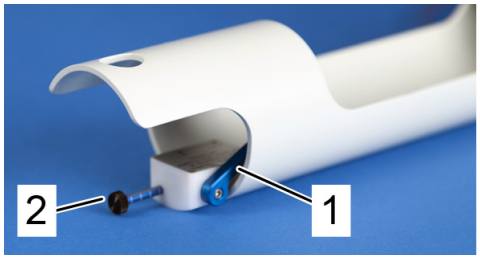


Figure 4.7: Blue lever (1) in ‘up‘ position.

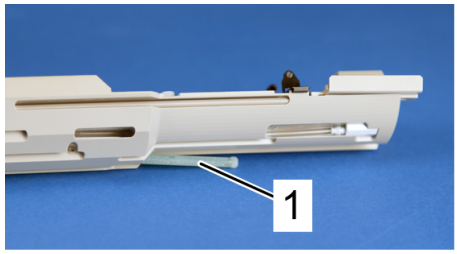


Figure 4.8: The lifting arm (1) is pushed out and the Animal Bed is lifted towards the Coilhead.

4.5 Mouse Position Gauge

The Mouse Position Gauge (Figure 4.9) displays the real situation of placing an imaging setup underneath the Coilhead. Therefore, it does have two functions. For safety reasons it has to be used to check for any possible collision of the imaging setup and the Coilhead. Furthermore, it can be used to check for the correct position of the imaging setup in relation to the Coilhead and the functionality of the lifting mechanism.

- Installing the Animal Bed into the Mouse Position Gauge has to be done without significant forces. If not possible the setup has to be checked for collisions.
- The cross on the acrylic glass marks the centre of the Coilhead (Figure 4.9 (1)). It can be used to check for the correct position of the subject to be imaged in relation to the Coilhead.

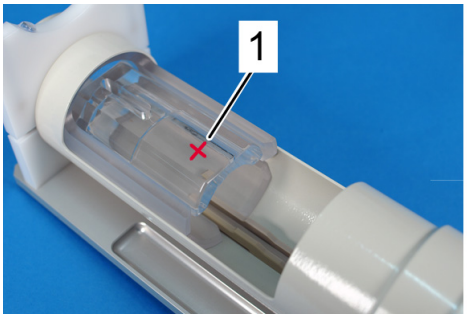


Figure 4.9: Mouse Position Gauge for testing the correct position of the mouse. The cross marks the center of the Coilhead.

4.6 Handling of the Bio Animal Bed Mouse Cryo on the MRI System

NOTICE

Before installing a new imaging setup into the MRI system, any possible collision of the setup with the Coilhead has to be checked by using the Mouse Position Gauge!

The CryoProbe has to be installed in the MRI system before the Animal Bed can be installed!

Installation and removal of the Animal Bed is only possible when the blue lever is in the ‘down‘ position!

Installation

1. Check for the correct installation of the CryoProbe in the MRI system before installing the Animal Bed.
2. To install the Animal Bed into the MRI system, move the blue lever into the ‘down‘ position.
3. The Animal Bed has to be moved into the MRI system from the patient end.
4. Constantly check for the correct rotation of the Animal Bed while moving it into the MRI system until the mechanical stop is reached.
5. Put the blue lever into the ‘up‘ position.

Removal

1. Put the blue lever into the ‘down‘ position.
2. Carefully remove the Animal Bed from the MRI system. Again check for the correct rotation of the Animal Bed.

5 Material & Cleaning

5.1 Material

The half shell of the Animal Bed system is made of PEEK. PEEK is normal fire-proof according to the guidelines of DIN 4102 B2. The maximum operating temperature should not exceed 75°C air temperature, also without mechanical load.

The Animal Bed is a highly complex and delicate accessory. It should be handled with great care. Do not drop or bend the Animal Bed and avoid impact with hard objects which may scratch or damage it.

5.2 Cleaning

For cleaning, neutral antistatic plastic cleaners or desinfection cleaners are recommended. Commercial household cleaners without polishing agents can be used.

Never use cleaners that contain organic solvents such as benzene, acetone or chlorinated hydrocarbons. Also, alcohol cleaners in high concentration must not be used, otherwise the Animal Bed system can be severely damaged.

NOTICE
Cleaner containing organic solvents or alcohol can damage the Animal Bed. Therefore: • Use only neutral antistatic plastic cleaners or disinfection cleaners. Commercial household cleaners without polishing agents can also be used.

6 Scope of Supply

6.1 Spare parts for Animal Bed Z114100, Z112268 and Z122287

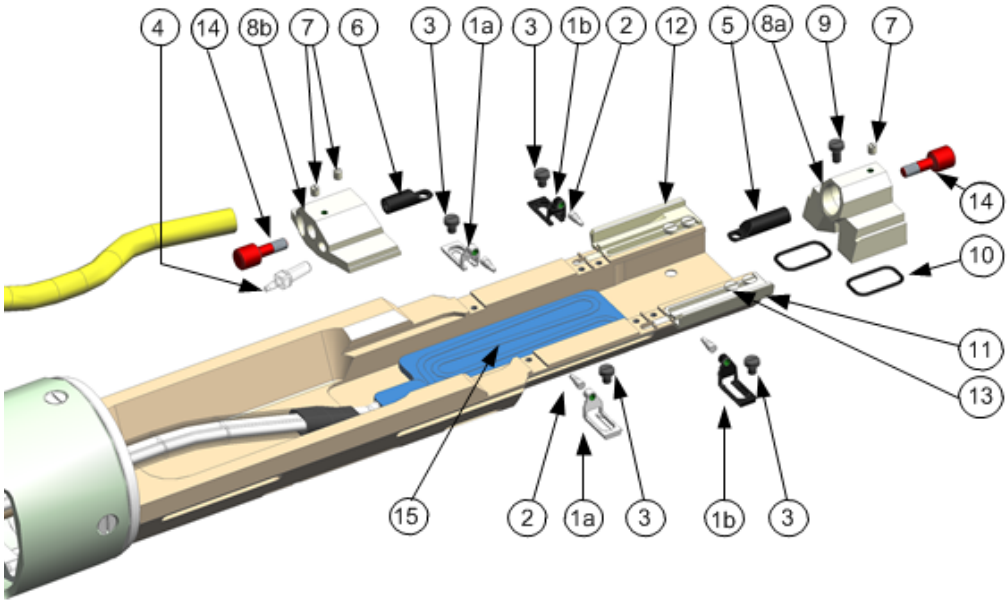


Figure 6.1: Explosion view of the Animal Bed showing the spare parts which can be separately ordered as listed in Table 6.1 on page 19 and Table 6.2 on page 20.

Scope of supply in Fig. 7.1	Part number	Description	Material
1a	Z142282	Ear plug holder Type 1 low	POM (acetal plaste) white
1b	Z142283	Ear plug holder Type 2	POM black
2	Z113768	Ear plug	POM black
3	28477	Screw M3 x 4	PA (polyamids)
4	24221	Connector Luer male 1.6mm	PP
5	Z113760	Toothbar long 24 mm	POM black
6	Z113761	Toothbar short 19 mm	POM black
7	Z113763	Headless screw M3	PEEK
8a	Z142284	Respiration mask mouse	PMMA
8b	Z142285	Respiration mask mouse reverse	PMMA
9	2014	Screw M3 x 6	PA

Table 6.1: Parts for Animal Bed are shown in Figure 6.1. Please check with Figure 6.1 and the table what has to be replaced or is missing.

Scope of supply in Fig. 7.1	Part number	Description	Material
10	23025	O-rings 15 x 1	PMMA
11	Z113765	Guide rail right 180° flex long	PEEK
12	Z113764	Guide rail left 180° flex long	PEEK
13	Z113766	Locking screw	PEEK
14	Z128975	Knurled screw red M4	PA
15	T151393	Heating cover	
	Z113800	Screw driver	CUBE2PB
	Z31858	A bed mouse cryo operation inst.	

Table 6.2: Parts for Animal Bed are shown in Figure 6.1. Please check with Figure 6.1 and the table what has to be replaced or is missing.

7 Contact

MRI CryoProbe Sales:

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http://www.bruker.com

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

Contact

Revision History List

Index:	Date:	Alteration Type:
01	15.06.2009	First Release of the Animal Mouse Bed Cryo Manual „Rev.:01“
02	28.03.2010	Second Release of the Animal Mouse Bed Cryo Manual „Rev.:02“ Two possibilities to place the animal within the bed
03	4.09.2014	Third Release of the Animal Mouse Bed Cryo Manual „Rev.:03“

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Order No: Z31858