# Installation Instructions Part 2 – Pendant system [en]

**Navigator Lift ™ 180 Air*Plus* – Single, Navigator Lift ™ 180 Air*Plus* – Dual, Navigator Lift ™ 180 Friction – Single, Navigator Lift ™ 180 Friction – Dual**

nuvo

A member of the
Medical Illumination International Group

## Dear assembly operator,

Please read these Installation Instructions very carefully, and in particular Chapter 2, “Safety Instructions“ which includes important safety information. Observe the safety instructions and requirements set out in these Installation Instructions.

Service technician qualification requirements

- These Installation Instructions are intended for trained service technicians.
- The pendant system may only be mounted by the Nuvo technical service team or trained and authorised service personnel.

Inspections to be performed prior to installation

- The load bearing capacity of the ceiling or wall must be checked by a structural analyst and confirmed by means of an acceptance certificate.
- The electrical installations in the corresponding room must comply with the requirements of the applicable national and international regulations.

Carrying out the installation

- The electrical connection of the device to the mains may only be performed by a qualified electrician whilst the device is disconnected at all poles.
- The steps described in these Installation Instructions must be followed for installation. In the event of damage to the device, installation work must be discontinued.
- The safety, reliability and performance of the device are only assured if genuine Nuvo parts are used.
- If you encounter specific problems not covered in sufficient detail by these Installation Instructions, please contact your supplier immediately for your own safety and the safety of your customers.

Unauthorised modifications or conversions

- Unauthorised modifications or conversions to the pendant system are not permitted for safety reasons. No modification or conversion may be performed without authorisation. Otherwise, the manufacturer's warranty for the pendant system will be void. The manufacturer hereby refutes any liability whatsoever for damage or injury resulting from unauthorised modifications or conversions or from using spare parts from other manufacturers.
- The use of parts which were not supplied by the manufacturer or its representatives will automatically cause the warranty for the pendant system to become void. USE GENUINE SPARE PARTS ONLY!

Qualified personnel

The following persons shall be considered as qualified personnel:

- persons who underwent special professional training in the field of medical engineering,
- persons who can assess their work and recognise the potential hazards involved on the basis of their professional experience and instruction in safety-relevant regulations.
- In states where job activities in the medical engineering sector are subject to certification, qualified personnel must have obtained the corresponding certificate.

## How to contact us

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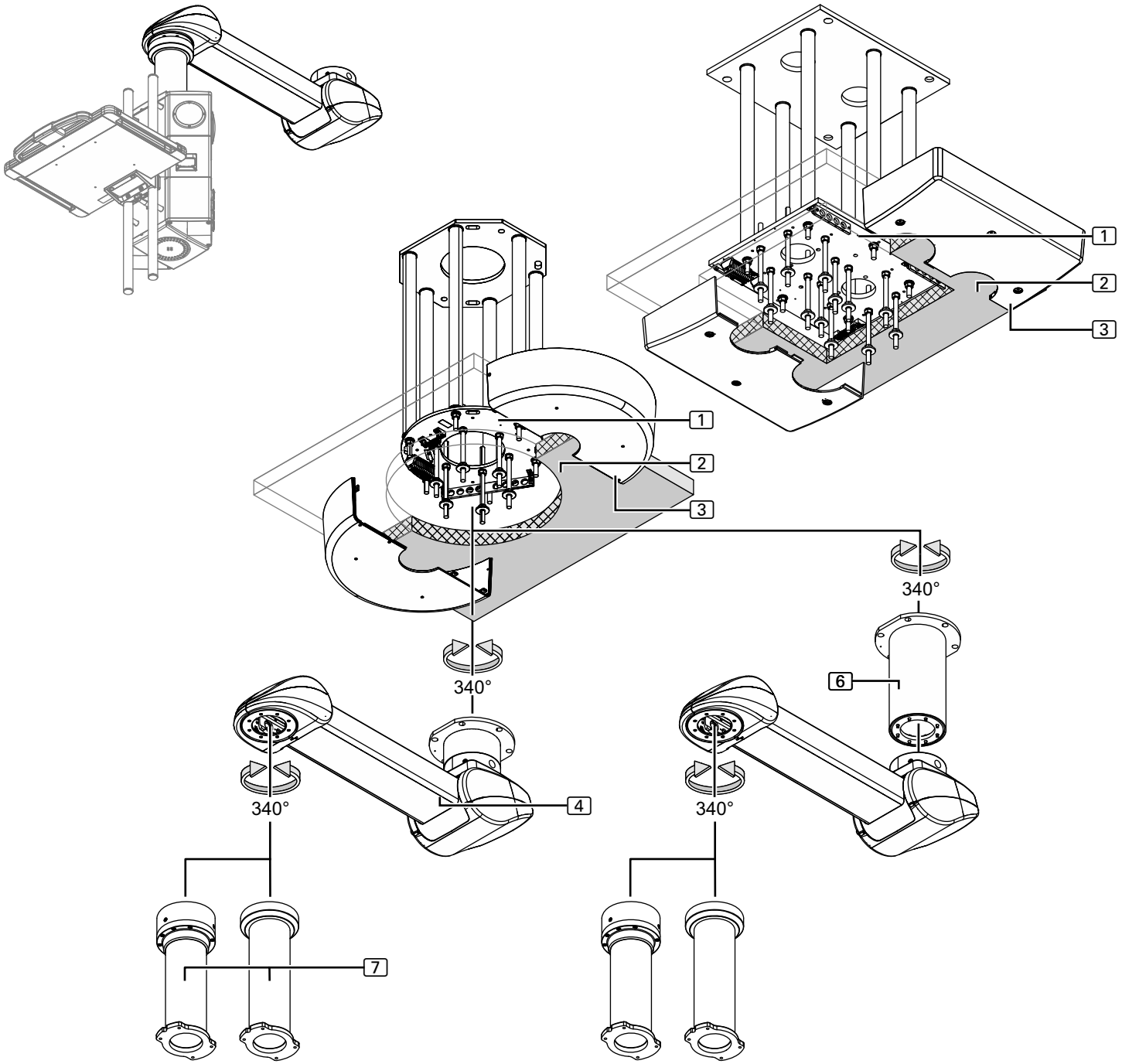
Figure 1: Scope of delivery of the spring arm, Navigator Lift ™ 180 Air*Plus* – Single arm

## 1.1 Overview of the pendant system Navigator Lift ™ 180 Air*Plus* – Single arm



See “Figure 1: on Page 8”

[1] Interface plate (Single / Dual) – pre-assembled
[2] Intermediate ceiling – installed by the customer on site

## 1.2 Scope of delivery of the spring arm, Navigator Lift™ 180 Air-*Plus* – Single arm

The scope of delivery can vary depending on the individual order.

[3] Canopy (Single / Dual) (Flat / High) (depending on the version)
Installation as described in Chapter 14, on Page 69
- 1 Single canopy Ø 600mm x 150mm, 1 canopy attachment 110mm high
- 1 Single canopy – 700mm x 700mm x 150mm high
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 50mm
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 150mm
- 1 canopy attachment – 700mm x 700mm x 120mm high

Canopy fixing elements
- 4 / 6 threaded bolts M10 x 360mm, 4 / 6 hexagonal nuts M10,
- 4 / 6 metal screws, 4 / 6 cover screws and 1 sectional strip

[4] Spring arm with ceiling tube (pre-assembled)
Installation as described in Chapter 8, on Page 41
- 1 spring arm with ceiling tube

Pre-assembled components
- 3 pneumatic pipes for pneumatic brake control
- 2 earthing cables, 4mm²

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.8, on Page 82)
- 1 setscrew M16 – DIN EN ISO 4028
- 2 ball stops Ø 12.7mm
- 2 side panels, front right / left joint for spring arm
- 1 cover, front joint for spring arm
- 2 cover straps, front joint for spring arm
- 2 side panels, rear right / left joint for spring arm
- 1 cover, rear joint for spring arm
- 2 cover straps, rear joint for spring arm

Spring arm fixing elements
- 12 hexagonal nuts M16 and 6 spring rings, 12 flat washers external Ø 34mm and 12 plastic insulating discs, 6 threaded bolts M16 x 330mm

[6] Extended spring arm ceiling tube
Pre-installation as described in Chapter 7, on Page 37
- 1 ceiling tube (order-specific length)
- 1 earthing cable, 4mm²

Loose components incl. in the scope of delivery
- 1 socket wrench extension (for 500 and 700mm ceiling tube lengths only)

Fixing elements for additional ceiling tube
- 8 Allen cylinder screws M10 x 25mm – 8.8 – DIN EN ISO 4762
- 8 lock washers S10

[7] Drop tube with Bearing Unit Friction (slide bearing / roller bearing)
Installation as described in Chapter 9, on Page 47
- 1 Drop tube (order-specific length)

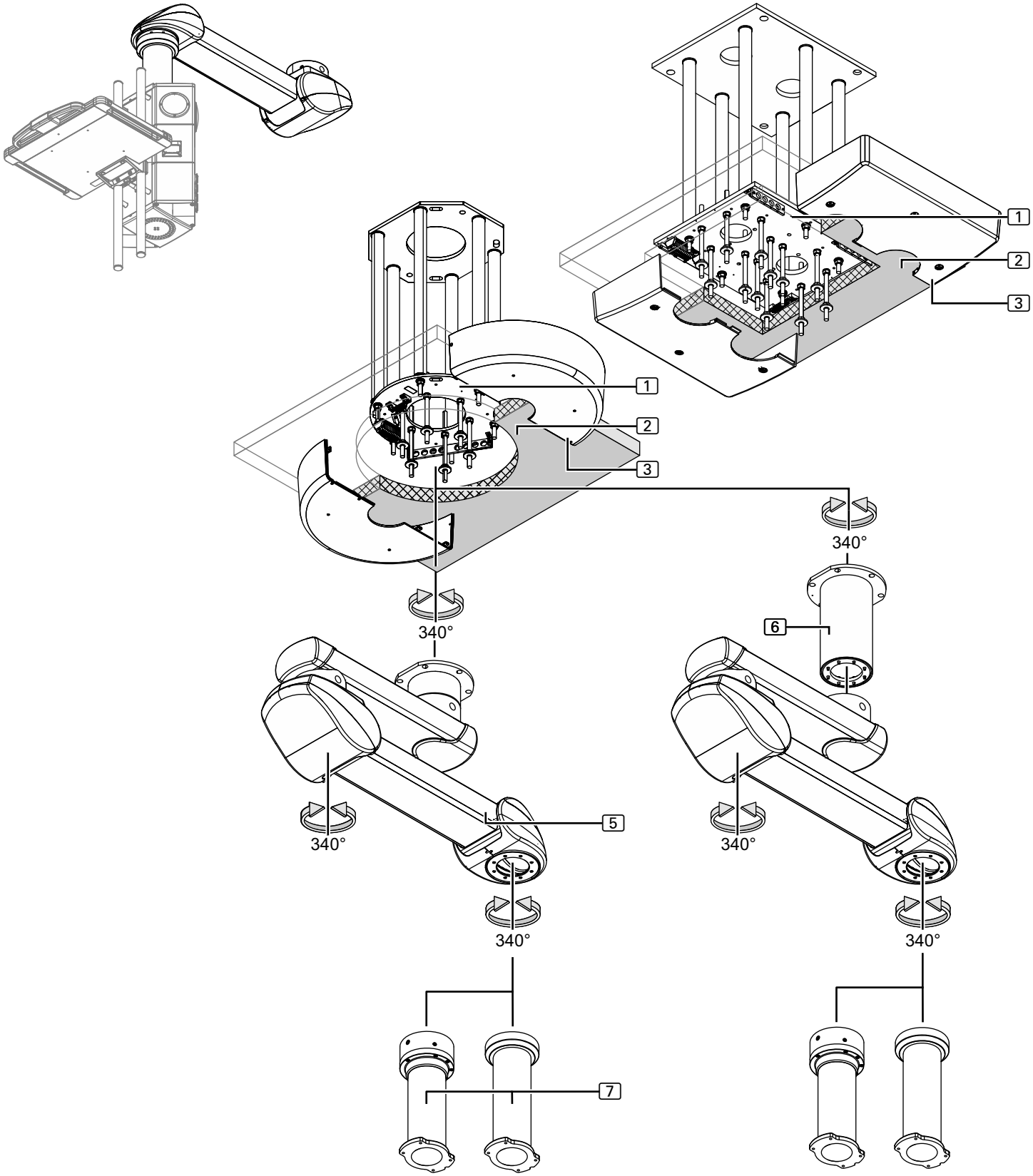
Pre-assembled components
- 1 earthing cable, 4mm²

Fixing elements
- 8 Allen countersunk screws M10 x 20mm – 10.9 – DIN EN ISO 10642

Drop tube fixing elements mounted to the Navigator M6
- included in the scope of delivery of the Navigator M6

Figure 2: Scope of delivery of the extension arm with spring arm, Navigator Lift ™ 180 Air*Plus* – Dual arm

## 1.3 Overview of the pendant system Navigator Lift ™ 180 Air*Plus* – Dual arm



See “Figure 2: on Page 10”

[1] Interface plate (Single / Dual) – pre-assembled
[2] Intermediate ceiling – installled by the customer on site

## 1.4 Scope of delivery of the extension arm with spring arm, Navigator Lift™ 180 Air*Plus* – Dual arm

The scope of delivery can vary depending on the individual order.

[3] Canopy (Single / Dual) (Flat / High) (depending on the version)
Installation as described in Chapter 14, on Page 69
- 1 Single canopy Ø 600mm x 150mm, 1 canopy attachment 110mm high
- 1 Single canopy – 700mm x 700mm x 150mm high
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 50mm
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 150mm
- 1 canopy attachment – 700mm x 700mm x 120mm high

Canopy fixing elements
- 4 / 6 threaded bolts M10 x 360mm, 4 / 6 hexagonal nuts M10,
- 4 / 6 metal screws, 4 / 6 cover screws and 1 sectional strip

[5] Extension arm with spring arm and ceiling tube (pre-assembled)
Installation as described in Chapter 8, on Page 41

Pre-assembled components
- 1 extension arm with spring arm and ceiling tube
- 3 pneumatic pipes for pneumatic brake control
- 3 earthing cables 4mm² (2 earthing cables for unassembled ceiling tube)

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.8, on Page 82)
- 2 setscrews M16 – DIN EN ISO 4028,
- 4 ball stops Ø 12.7mm
- 2 section end caps for the extension arm
- 2 side panels, front right / left joint for spring arm
- 1 cover, front joint for spring arm
- 2 cover straps, front joint for spring arm
- 2 side panels, rear right / left joint for spring arm
- 1 cover, rear joint for spring arm
- 2 cover straps, rear joint for spring arm

Fixing elements of the extension arm
- 12 hexagonal nuts M16 and 6 spring rings, 12 flat washers external Ø 34mm and 12 plastic insulating discs, 6 threaded bolts M16 x 330mm

[6] Extended ceiling tube
Pre-installation as described in Chapter 7, on Page 37
- 1 ceiling tube (order-specific length)
- 1 earthing cable, 4mm²

Loose components incl. in the scope of delivery
- 1 socket wrench extension (for 500 and 700mm ceiling tube lengths only)

Fixing elements for additional ceiling tube
- 8 Allen cylinder screws M10 x 25mm – 8.8 – DIN EN ISO 4762
- 8 lock washers S10

[7] Drop tube with Bearing Unit Friction (slide bearing / roller bearing)
Installation as described in Chapter 9, on Page 47

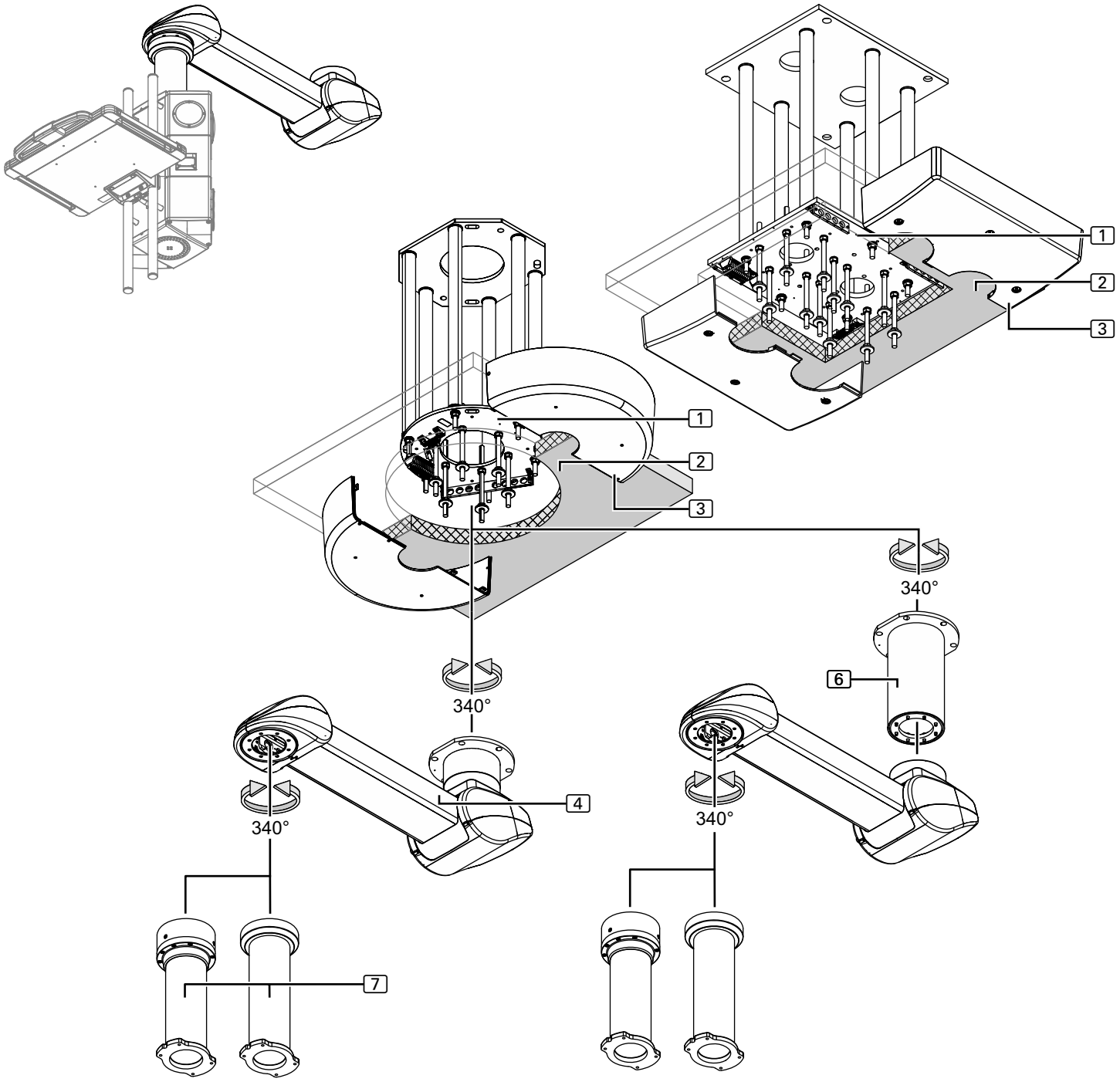
Pre-assembled components
- 1 Drop tube (order-specific length)
- 1 earthing cable, 4mm²

Fixing elements
- 8 Allen countersunk screws M10 x 20mm – 10.9 – DIN EN ISO 10642

Drop tube fixing elements mounted to the Navigator M6
- included in the scope of delivery of the Navigator M6

Figure 3: Scope of delivery of the spring arm, Navigator Lift ™ 180 Friction – Single arm

## 1.5 Overview of the pendant system Navigator Lift ™ 180 Friction – Single arm



See “Figure 3: on Page 12”

[1] Interface plate (Single / Dual) – pre-assembled
[2] Intermediate ceiling – installled by the customer on site

## 1.6 Scope of delivery of the spring arm, Navigator Lift ™ 180 Friction – Single arm

The scope of delivery can vary depending on the individual order.

[3] Canopy (Single / Dual) (Flat / High) (depending on the version)
Installation as described in Chapter 14, on Page 69
- 1 Single canopy Ø 600mm x 150mm, 1 canopy attachment 110mm high
- 1 Single canopy – 700mm x 700mm x 150mm high
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 50mm
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 150mm
- 1 canopy attachment – 700mm x 700mm x 120mm high

Canopy fixing elements
- 4 / 6 threaded bolts M10 x 360mm, 4 / 6 hexagonal nuts M10,
- 4 / 6 metal screws, 4 / 6 cover screws and 1 sectional strip

[4] Spring arm with ceiling tube (pre-assembled)
Installation as described in Chapter 8, on Page 41
- 1 spring arm with ceiling tube

Pre-assembled components
- 2 earthing cables, 4mm²

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.8, on Page 82)
- 1 setscrew M16 – DIN EN ISO 4028
- 2 ball stops Ø 10mm
- 2 side panels, front right / left joint for spring arm
- 1 cover, front joint for spring arm
- 2 cover straps, front joint for spring arm
- 2 side panels, rear right / left joint for spring arm
- 1 cover, rear joint for spring arm
- 2 cover straps, rear joint for spring arm

Spring arm fixing elements
- 12 hexagonal nuts M16 and 6 spring rings, 12 flat washers external Ø 34mm and 12 plastic insulating discs, 6 threaded bolts M16 x 330mm

[6] Extended spring arm ceiling tube
Pre-installation as described in Chapter 7, on Page 37
- 1 ceiling tube (order-specific length)
- 1 earthing cable, 4mm²

Loose components incl. in the scope of delivery
- 1 socket wrench extension (for 500 and 700mm ceiling tube lengths only)

Fixing elements for additional ceiling tube
- 8 Allen cylinder screws M10 x 25mm – 8.8 – DIN EN ISO 4762
- 8 lock washers S10

[7] Drop tube with Bearing Unit Friction (slide bearing / roller bearing)
Installation as described in Chapter 9, on Page 47
- 1 Drop tube (order-specific length)

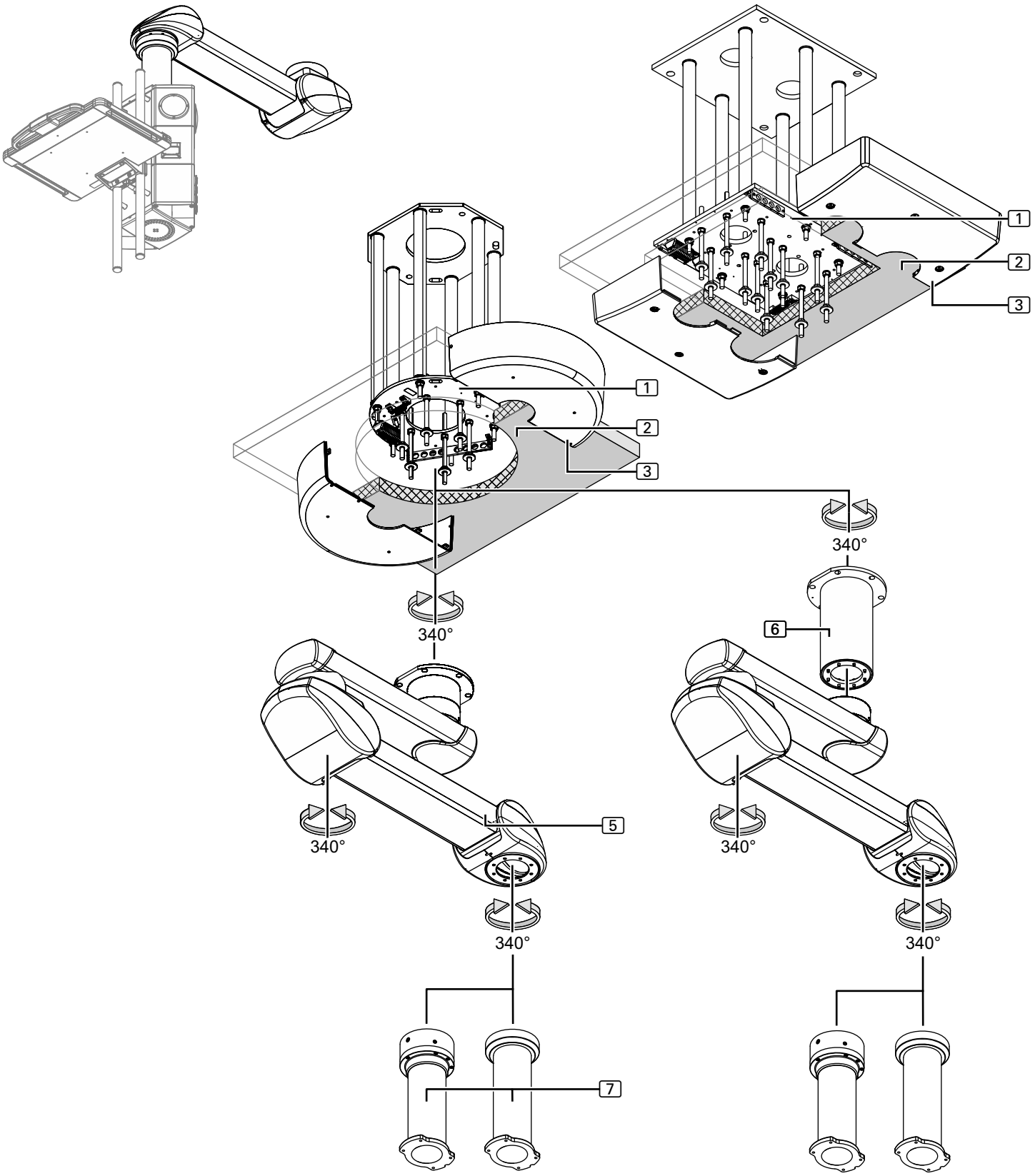
Pre-assembled components
- 1 earthing cable, 4mm²

Fixing elements
- 8 Allen countersunk screws M10 x 20mm – 10.9 – DIN EN ISO 10642

Drop tube fixing elements mounted to the Navigator M6
- included in the scope of delivery of the Navigator M6

Figure 4: Scope of delivery of the extension arm with spring arm, Navigator Lift ™ 180 Friction – Dual arm

## 1.7 Overview of the pendant system Navigator Lift ™ 180 Friction – Dual arm



See “Figure 4: on Page 14”

[1] Interface plate (Single / Dual) – pre-assembled
[2] Intermediate ceiling – installled by the customer on site

## 1.8 Scope of delivery of the extension arm with spring arm, Navigator Lift™ 180 Friction – Dual arm

The scope of delivery can vary depending on the individual order.

[3] Canopy (Single / Dual) (Flat / High) (depending on the version)
Installation as described in Chapter 14, on Page 69
- 1 Single canopy Ø 600mm x 150mm, 1 canopy attachment 110mm high
- 1 Single canopy – 700mm x 700mm x 150mm high
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 50mm
- 1 Dual canopy (installation with intermediate ceiling) – 700mm x 700mm x 150mm
- 1 canopy attachment – 700mm x 700mm x 120mm high

Canopy fixing elements
- 4 / 6 threaded bolts M10 x 360mm, 4 / 6 hexagonal nuts M10,
- 4 / 6 metal screws, 4 / 6 cover screws and 1 sectional strip

[5] Extension arm with spring arm and ceiling tube (pre-assembled)
Installation as described in Chapter 8, on Page 41
- 1 extension arm with spring arm and ceiling tube

Pre-assembled components
- 3 earthing cables 4mm² (2 earthing cables for unassembled ceiling tube)

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.8, on Page 82)
- 2 setscrews M16 – DIN EN ISO 4028,
- 4 ball stops Ø 10mm
- 2 section end caps for the extension arm
- 2 side panels, front right / left joint for spring arm
- 1 cover, front joint for spring arm
- 2 cover straps, front joint for spring arm
- 2 side panels, rear right / left joint for spring arm
- 1 cover, rear joint for spring arm
- 2 cover straps, rear joint for spring arm

Fixing elements of the extension arm
- 12 hexagonal nuts M16 and 6 spring rings, 12 flat washers external Ø 34mm and 12 plastic insulating discs, 6 threaded bolts M16 x 330mm

[6] Extended ceiling tube
Pre-installation as described in Chapter 7, on Page 37
- 1 ceiling tube (order-specific length)
- 1 earthing cable, 4mm²

Loose components incl. in the scope of delivery
- 1 socket wrench extension (for 500 and 700mm ceiling tube lengths only)

Fixing elements for additional ceiling tube
- 8 Allen cylinder screws M10 x 25mm – 8.8 – DIN EN ISO 4762
- 8 lock washers S10

[7] Drop tube with Bearing Unit Friction (slide bearing / roller bearing)
Installation as described in Chapter 9, on Page 47
- 1 Drop tube (order-specific length)

Pre-assembled components
- 1 earthing cable, 4mm²

Fixing elements
- 8 Allen countersunk screws M10 x 20mm – 10.9 – DIN EN ISO 10642

Drop tube fixing elements mounted to the Navigator M6
- included in the scope of delivery of the Navigator M6

## 1.9 Overview of optional accessories

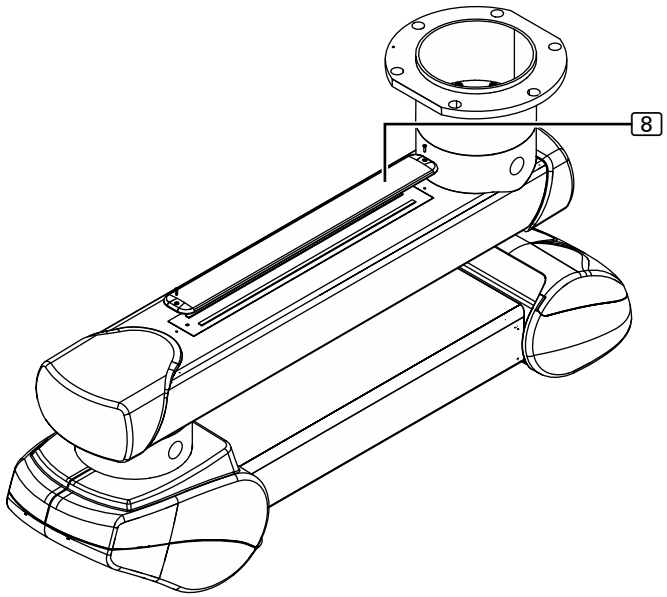



Figure 5: Scope of delivery of optional accessories

The Figure illustrates the pendant system Navigator Lift ™ 180 Air*Plus*. The optional accessories for the pendant system Navigator Lift ™ 180 Friction are identical.

See “Figure 5: on Page 16”

Upon delivery of the system from the factory the following optional accessories are already assembled:

## 1.10 Scope of delivery of optional accessories

[8] Indirect extension arm lighting (extension arm lengths 1000, 1200, 1400, or 1600 mm)
For a retrofit: Installation as described in Chapter 10, on Page 49

Pre-assembled components

- 1 extension arm lighting (600 mm long, input voltage 12 V DC)
- 3 sealing plugs on the top side of the extension arm
- 1 basic carrier with LED and connecting cable
- 1 electric signal cable, with connectors on both ends
- 1 cover

Extension arm lighting fixing elements

- 2 countersunk screws M4 x 16 mm – DIN EN ISO 10642

## 1.11 Further optional accessories

- 1 telescopic magnetic pick-up tool set

## 2.1 Approved Nuvo products

The following Nuvo products are approved for use on the pendant system:

- Nuvo products as described in Chapter 20, “Approved Nuvo Products”, on Page 97

## 2.2 Combination with products of other manufacturers

Read the Installation Instructions for combined products

- The pendant system is combined with the Navigator M6. To prevent dangerous overload, which can lead to a failure or collapse of the pendant system, the maximum load bearing capacity specified in Chapter 18, “Technical Data”, on Page 90 must be adhered to.
  - The party placing the device into operation is responsible for the validation of the overall system. A conformity assessment procedure shall be executed if required and a declaration in accordance with Article 12 of 93/42/EEC (Medical Device Directive, MDD) shall be provided.
  - For more detailed information on the installation of the Navigator M6, refer to the Installation Instructions of the Navigator M6 (Part 3: Installing the Navigator M6).
- Power packs intended for the supply of end devices must ensure electrical isolation and provide 2 protective measures in accordance with IEC 60601-1.

## 2.3 Structure of the safety instructions

### 2.3.1 Warnings of risk of injury

Important notes in this document are marked with graphic symbols and signal words. Signal words such as DANGER, WARNING or CAUTION describe the degree of risk of injury. The triangle symbols visually emphasise the degree of hazard.

⚠ DANGER

DANGER refers to a potential hazard with a high degree of risk which, if not avoided, will lead to death or severe injury.

⚠ WARNING

WARNING refers to a potential hazard with a medium degree of risk which, if not avoided, can lead to death or severe injury.

⚠ CAUTION

CAUTION refers to a potential hazard with a low degree of risk which, if not avoided, can lead to minor or moderate injury.

### 2.3.2 Warnings of damage to property

*NOTICE*

NOTICE refers to a potential hazard, which, if not avoided, will lead to damage to property.

### 2.3.3 Indication of additional information

NOTE

A NOTE provides additional information and useful tips for the safe and efficient use of the device.

## 2.4 Supplementary symbols used in the safety instructions

Explosion hazard: warns of the improper use of oxygen (see Chapter 2.11, “Proper use of oxygen”, on Page 24).

Danger of fire: warns of the improper use of oxygen (see Chapter 2.11, “Proper use of oxygen”, on Page 24).

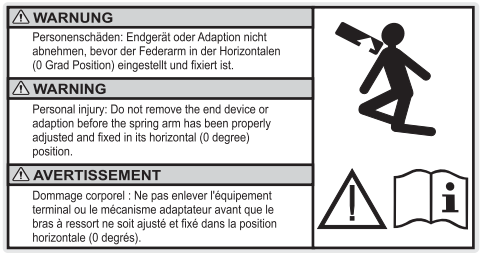
Electric shock hazard: warns of electric shock which can lead to severe injury or even death.

pendant system dropping: warns of the risk of the pendant system suddenly dropping due to incorrect installation.

Sudden release of the spring arm: warns that the spring arm may jump up suddenly whilst dismantling the end device (e.g. flat screen, medical device, etc.) from the Navigator M6.


Tightening torque: warns of the pendant system suddenly dropping because the fixing screws have not been sufficiently tightened or not tightened at all.

## 2.5 Description of graphic symbols possibly used on the device and the package




WARNING SIGN: warns that the spring arm may jump up suddenly.

Personenschäden: Endgerät oder Adaption nicht abnehmen, bevor der Federarm in der Horizontalen (0 Grad Position) eingestellt und fixiert ist.

Personal injury: Do not remove the end device or adaption before the spring arm has been properly adjusted and fixed in its horizontal (0 degree) position.

Dommage corporel : Ne pas enlever l'équipement terminal ou le mécanisme adaptateur avant que le bras à ressort ne soit ajusté et fixé dans la position horizontale (0 degrés).

Read the Installation Instructions: Read these Installation Instructions carefully prior to installation of the pendant system. This ensures that you benefit from all the advantages of the pendant system and prevents any risk of injury or damage.


Observe the maximum load bearing capacity or maximum loading capacity (payload): warns of the risk of the device suddenly dropping because the maximum load bearing capacity or maximum loading capacity (payload) has been exceeded. The maximum value is indicated in kg or Nm.

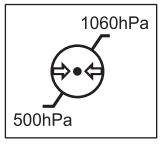
General note reminding the user to handle the pendant system with care.

Environmentally friendly disposal: warns of damage to the environment caused by improper disposal of the pendant system (must not be disposed of as normal household waste).

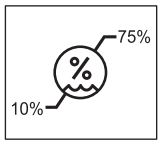
CE mark: Nuvo declares that the products comply with the relevant regulations set forth in the applicable European Directives.


CE mark with the ID number of the conformity assessment body indicated: Nuvo declares that the assessment of conformity in accordance with 93/42 EEC (Medical Device Directive) has been performed by the body indicated.

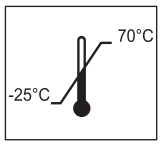

This symbol marks the product as a component approved by a "Nationally Recognized Testing Laboratory" which complies with both Canadian and US deviations from applicable standards.




Atmospheric pressure: indicates the permissible atmospheric pressure values in a range from 500 hPa to 1060 hPa for transport and storage.




Relative humidity: indicates the permissible humidity values in a range from 10 % to 75 % for transport and storage.




Ambient temperature: indicates the permissible ambient temperature values in a range from -25 °C to 70 °C for transport and storage.

## 2.6 Intended purpose

These Installation Instructions apply to this model

- Pendant systems Navigator Lift ™ 180 Air*Plus* – Single, Navigator Lift ™ 180 Air*Plus* – Dual, Navigator Lift ™ 180 Friction – Single and Navigator Lift ™ 180 Friction – Dual

- The pendant system is individually equipped; depending on the version and equipment, it serves for:
– carrying and positioning medical devices in OR or intensive care rooms and medical environments;
- the conveyance and extraction of e.g.:
– medical gases, vacuum and compressed air,
– electricity and data.

- The pendant system is suitable for continuous operation.

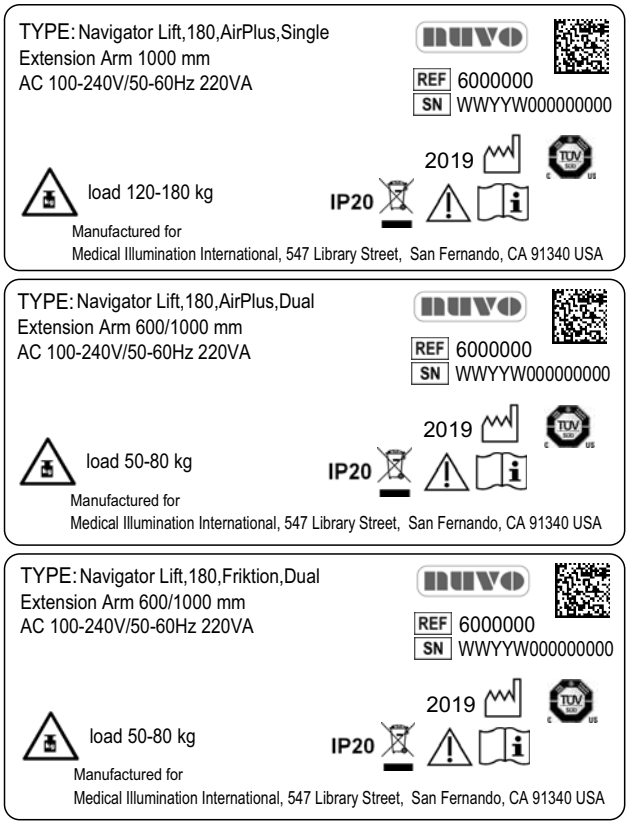
### 2.6.1 Incorrect use

- The maximum load bearing capacity of the pendant system and its components as specified in Chapter 18, “Technical Data”, on Page 90 must not be exceeded.

### 2.6.2 Contraindications

- The pendant system must not be used close to strong magnetic fields.
- No BF or CF application parts in accordance with IEC 60601-1 may be directly connected to the pendant system.

Figure 6: Information on the rating plate




## 2.7 Ambient conditions

### 2.7.1 Ambient conditions for storage and transport

The following conditions apply to storage:

- Ambient temperature: -25 °C – 70 °C
- Relative humidity: 10 % to 75 %
- Atmospheric pressure: 500 hPa to 1,060 hPa
  Store only in indoor rooms.

### 2.7.2 Ambient conditions for operation

- Ambient temperature: 10 °C – 40 °C
- Relative humidity: 30 % to 75 %
- Atmospheric pressure: 700 hPa to 1,060 hPa
  This corresponds to a maximum operating altitude of 3,000 m.

## 2.8 Information on the Rating Plate

(See Figure 6)

- The rating plates are attached to the top side of the extension arm and under the front cover of the spring arm.

Serial number

- The rating plate indicates the serial number (SN) of the pendant system.

Power supply

- The rating plate provides information on the power supply of the pendant system.

Load bearing capacity

- The value of e.g. 120 – 180 kg indicates the permissible weight range and the maximum load bearing capacity of the spring arm.

Date of manufacture

- The digits 1 to 4 of the serial number (SN) indicate the date of manufacture of the pendant system.
  – The first 2 digits indicate the week of manufacture, e.g. 14 = calendar week 14.
  – The following 2 digits indicate the year of manufacture, e.g. 15 = 2015.
  – The letter in the 5th position indicates the factory, e.g. H = Hünfeld.
  – The digits following the letter indicate the serial number.
- The information and illustrations serve as examples.
- The information and illustrations on the rating plate can vary.

## 2.9 Retrofit to an already installed ceiling mount

**⚠WARNING**

**Risk of the ceiling mount dropping**

**In the case of retrofits to an already installed ceiling mount the fixing elements used must be inspected by a structural analyst and approved for the new pendant system:**

- Retrofits are not permitted if this approval has not been granted.

## 2.10 Overview of the most important safety instructions

The safety instructions in the following chapters must be adhered to.

**⚠WARNING**

**Electric shock hazard**

**To prevent the risk of electric shock, the pendant system may only be connected to a power supply network equipped with a protective conductor:**

- The pendant system must be connected in such a way that it can be disconnected from the mains at all poles and at the same time.

**⚠WARNING**

**Risk of parts falling off**

**Make sure that no-one is standing underneath the components of the pendant system.**

**⚠WARNING**

**Electric shock hazard**

**Contact with energized components presents a danger to life from electric shock. Motor-driven, mobile device components can cause injury in the case of being switched on unintentionally.**
**Prior to any installation and setting up work, the pendant system must be disconnected from the mains:**

- Disconnect all the poles of the power supply source from the mains and prevent it from being reconnected accidentally.
- Check whether the appliance is de-energised.
- Earth and short-circuit the device.
- Cover and shield any adjacent energised parts.

**⚠WARNING**


**Pendant system dropping**

**The tightening torques are indicated in these Installation Instructions:**

- Observe the tightening torques indicated in these Installation Instructions.


**Risk of the pendant system dropping because the maximum load bearing capacity has been exceeded**

**If the maximum load bearing capacity has been exceeded, there is a risk that the pendant system or components of the pendant system may disengage from the fastening device and drop:**

- The maximum loading capacity on the pendant system must not be exceeded!
- Do not attach or mount any additional loads to the extension arm, spring arm, Navigator M6, and end devices.

**⚠WARNING**

**Sudden release of the spring arm**

**Warns of the spring arm suddenly jumping up whilst dismantling the end devices from the Navigator M6 or whilst dismantling the adaption device, such as the Navigator M6, from the spring arm:**

- Before dismantling an end device (e.g. flat screen, medical device, etc.) from the Navigator M6, or before dismantling the Navigator M6 from the spring arm, adjust the height adjustment mechanism on the spring arm to the horizontal (0 degree position) and then fix it in this position.
- Check the height adjustment of the spring arm. Once the height adjustment mechanism has been fixed in the horizontal (0 degree position), it must no longer be possible to move the spring arm upwards.
- The end device (e.g. flat screen, medical device, etc.) may only be removed in the horizontal (0 degree position), if the spring arm can no longer be moved upwards.

## 2.11 Proper use of oxygen

**⚠ DANGER**

**Oxygen explosion**

**Oxygen becomes explosive when in contact with oil, grease and lubricants. Compressed oxygen presents an explosion hazard:**

- Make sure that the oxygen and gas outlet points are free from oily, greasy and lubricating substances!
- Do not use any cleaning agents containing oil, grease or lubricants.

**Danger of fire**

**Escaping oxygen is highly combustible:**

- Open fires, red hot objects and naked flames are not permitted when working with oxygen!
- Do not smoke!

## 2.12 Warranty

**⚠WARNING**

**Pendant system dropping**

**The pendant system and the Navigator M6 are an adapted system with regard to the maximum load bearing capacity and maximum loading capacity (payload). Alterations to the pendant system can result in exceeding the permissible, total or maximum loading capacity of the individual components. In this case, there is a risk of the pendant system or components of the pendant system disengaging from the fastening device and dropping. Nuvo warrants the functional reliability of the pendant system only under the condition that:**

- No structural alterations are made to the pendant system. Unauthorised modifications or conversions to the pendant system are not permitted for safety reasons.
- Only genuine spare parts or accessories and those defined and approved by Nuvo are used. The use of other parts may involve unknown risks and must be avoided in all cases.
- Inspections and maintenance are carried out at the specified time intervals.
- Related documents for dismantling, mounting and adjustment work to be carried out on the pendant system and approved accessories are available from Nuvo on request.
- The party placing the device into operation is responsible for the validation of the overall system. A conformity assessment procedure shall be executed if required, and a declaration in accordance with Article 12 of 93/42/EEC (Medical Device Directive, MDD) shall be provided.

## 2.13 Disposal

**⚠WARNING**

**Sudden release of spring tension**

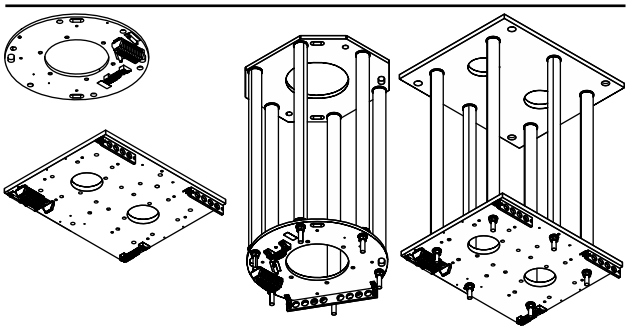
**The spring arm is equipped with a compression spring. When dismantling the spring arm, the compression spring suddenly releases its tension and can lead to severe injury:**

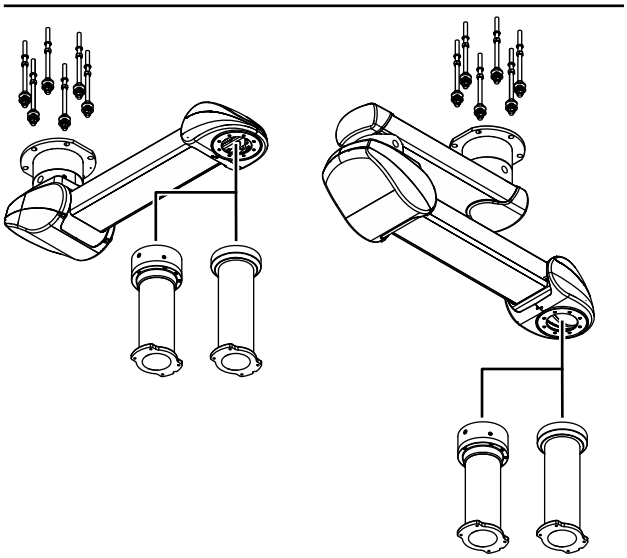
- Do not dismount the spring arm for disposal.

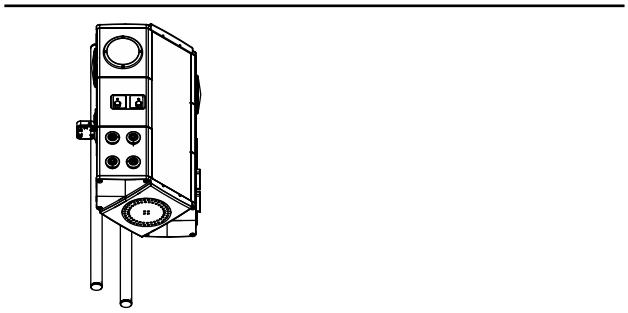
RoHS conformity

- The pendant system complies with the requirements of the 2011/65/EU RoHS Directive (on the restricted use of certain hazardous substances in electrical and electronic equipment).
- To prevent environmental damage and personal injury, we request you to contact us or your authorised service partner if you intend to take the pendant system out of operation for the purpose of disposal.
- The pendant system must be disposed of at a suitable collection point for recyclable waste in accordance with country-specific regulations.

Figure 7: Overview of the structure of these Installation Instructions







The Installation Instructions for the entire pendant system consist of separate documents. For this reason, these Installation Instructions are only valid and complete if all the documents are available at the place of installation.
The following parts must be available:

Part 01: Ceiling mount
Interface plate on the raw ceiling
Intermediate ceiling set and interface plate

Part 02: Pendant system Navigator Lift ™ 180 Air*Plus*
(Navigator Lift ™ 180 Friction not illustrated)

Part 03: Navigator M6

- Lifting device or forklift with a permitted payload of at least 250 kg Alternatively, a hoisting winch with a permissible payload of at least 250 kg can be used if space is limited:
  – Check that the pendant system is sufficiently secured before lifting it.
  – During the lifting motion, make sure you avoid collisions with other pendant systems, devices, ceilings or walls and other assemblies.

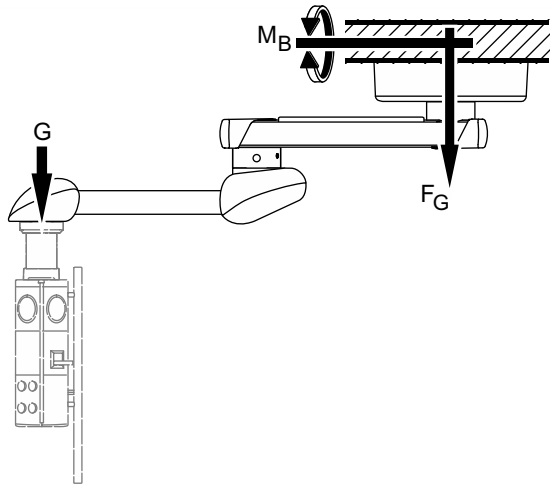
- Protective gloves

- Digital spirit level
- Torque wrench
- Multimeter
- Standard tool kit

- 1 telescopic magnetic pick-up tool set

- Working platform (e.g. platform ladder) in accordance with country-specific occupational health and safety regulations

Figure 8: Load data of the Navigator Lift ™ 180 Air*Plus* Version




## 5.1 Load data of the Navigator Lift ™ 180 Air*Plus*

### 5.1.1 Load data of the Single version

(See Figure 8)

The data required for calculating the ceiling load is indicated in the table below. When mounting the pendant system to the intermediate ceiling set, the vertical weight force of the intermediate ceiling set (the values correspond to the maximum load) must be added to the value of the pendant system in order to determine the ceiling load.
The table indicates the values for the maximum permissible load bearing capacity of the pendant system, Single version. The load data of a Dual version can be added.

**⚠WARNING**

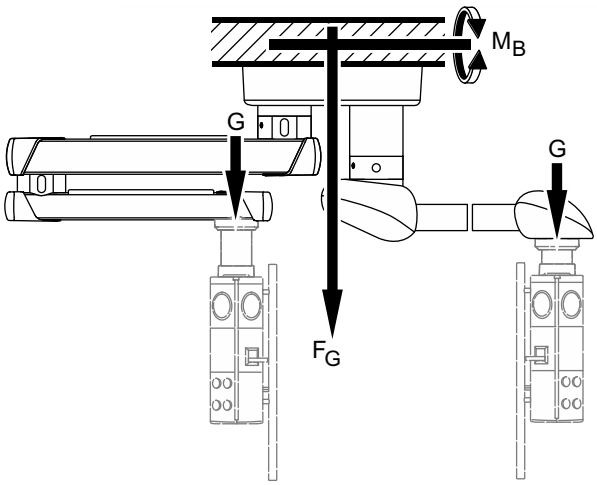
**Pendant system dropping**

**The safety factors prescribed in the individual regions must be taken into account for calculating the maximum load data!**

Table 01: Load data of the Navigator Lift ™ 180 Air*Plus*

| Navigator Lift ™ 180 Air*Plus* – Single version | Vertical weight force $F_G$ in N | Vertical weight force of the intermediate ceiling set $F_G$ in N | Maximum bending moment $M_B$ in Nm | Carrying loads G in kg |
|---|---|---|---|---|
| Spring arm 1015mm | 2578 | 1300 | 1900 | 180 |
| Navigator Lift ™ 180 Air*Plus* – Dual versions | Vertical weight force $F_G$ in N | Vertical weight force of the intermediate ceiling set $F_G$ in N | Maximum bending moment $M_B$ in Nm | Carrying loads G in kg |
| Extension arm 600mm / spring arm 1015mm | 2770 | 1300 | 3450 | 180 |
| Extension arm 800mm / spring arm 1015mm | 2701 | 1300 | 3800 | 170 |
| Extension arm 1000mm / spring arm 1015mm | 2535 | 1300 | 3900 | 150 |

Figure 9: Load data for support arm combinations (Navigator ™ XL / Navigator Lift ™ 180 Air*Plus*)




### 5.1.2 Load data for support arm combinations

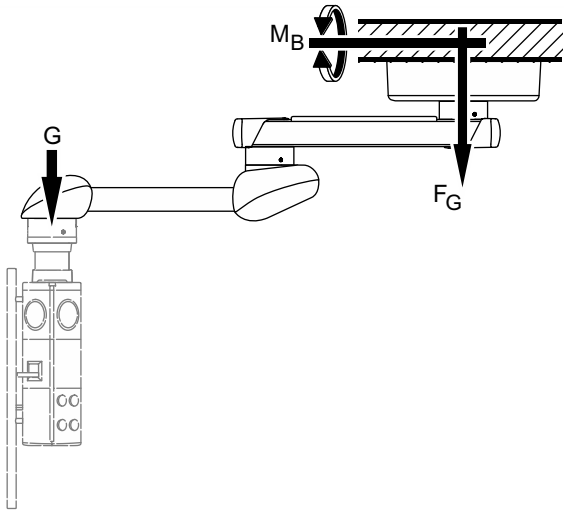
(See Figure 9)

The vertical weight forces and bending moments of the various pendant systems of Dual versions can be added.

Example:
Navigator Lift ™ 180 Air*Plus* (spring arm 1015mm) on the intermediate ceiling mount combined with
Navigator ™ XL (extension arm 1200/1000mm).
Sum of weight forces: 2578N + 3599N + 1300 N = 8478N.
Sum of bending moments: 1900Nm + 6502Nm = 8402Nm.

For the load data of the pendant system Navigator Lift ™ 180 Air*Plus* combined with the pendant system, e.g. Navigator ™ XL, refer to the corresponding Installation Instructions.

Figure 10: Load data of the Navigator Lift ™ 180 Friction Version




## 5.2 Load data of the Navigator Lift ™ 180 Friction

### 5.2.1 Load data of the Single version

(See Figure 10)

The data required for calculating the ceiling load is indicated in the table below. When mounting the pendant system to the intermediate ceiling set, the vertical weight force of the intermediate ceiling set (the values correspond to the maximum load) must be added to the value of the pendant system in order to determine the ceiling load.
The table indicates the values for the maximum permissible load bearing capacity of the pendant system, Single version. The load data of a Dual version can be added.

**⚠WARNING**

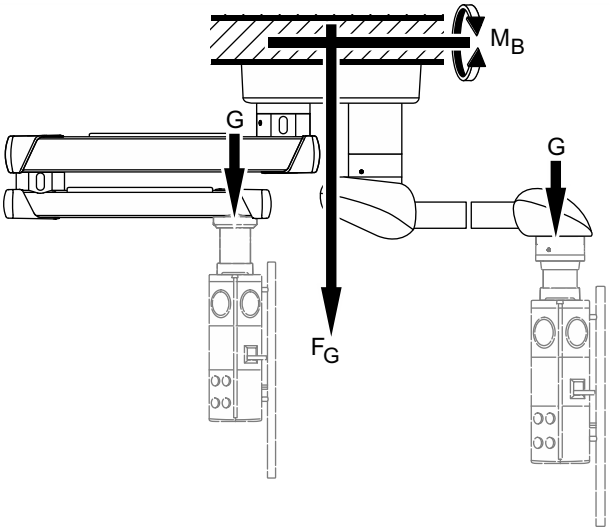
**Pendant system dropping**

**The safety factors prescribed in the individual regions must be taken into account for calculating the maximum load data!**

Table 02: Load data of the Navigator Lift ™ 180 Friction

| Navigator Lift ™ 180 Friction – Single version | Vertical weight force $F_G$ in N | Vertical weight force of the intermediate ceiling set $F_G$ in N | Maximum bending moment $M_B$ in Nm | Carrying loads G in kg |
|---|---|---|---|---|
| Spring arm 1015mm | 2578 | 1300 | 1900 | 180 |
| **Navigator Lift ™ 180 Friction – Dual versions** | **Vertical weight force $F_G$ in N** | **Vertical weight force of the intermediate ceiling set $F_G$ in N** | **Maximum bending moment $M_B$ in Nm** | **Carrying loads G in kg** |
| Extension arm 600mm / spring arm 1015mm | 2770 | 1300 | 3450 | 180 |
| Extension arm 800mm / spring arm 1015mm | 2701 | 1300 | 3800 | 170 |
| Extension arm 1000mm / spring arm 1015mm | 2535 | 1300 | 3900 | 150 |
| Extension arm 1200mm* / spring arm 1015mm (*Extension arm only in comb. with CEMOR) | 2368 | 1300 | 3950 | 130 |

Figure 11: Load data for support arm combinations (Navigator ™ XL / Navigator Lift ™ 180 Friction)




## 5.3 Load data for support arm combinations

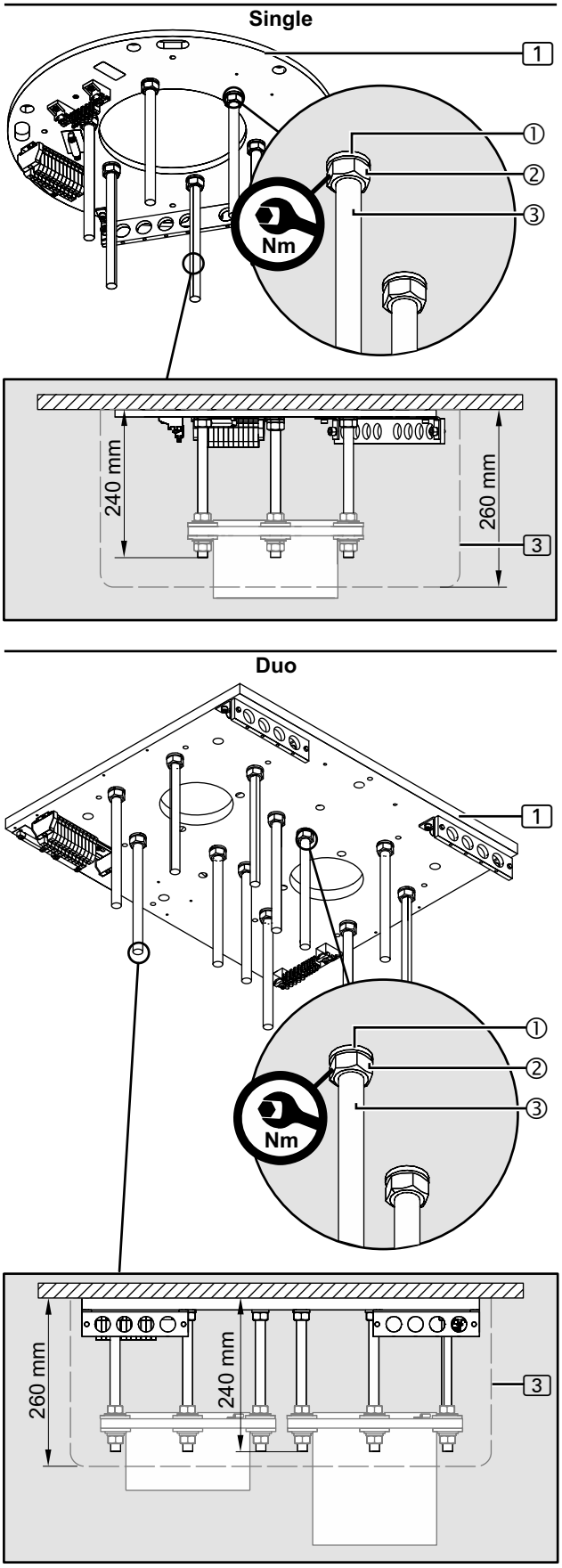
(See Figure 11)

The vertical weight forces and bending moments of the various pendant systems of Dual versions can be added.

Example:
Navigator Lift ™ 180 Friction (spring arm 1015mm) on the intermediate ceiling mount combined with
Navigator ™ XL (extension arm 1200/1000mm).
Sum of weight forces: 2578N + 3599N + 1300 N = 8478N.
Sum of bending moments: 1900Nm + 6502Nm = 8402Nm.

For the load data of the pendant system, e.g. Navigator ™ XL, combined with the pendant system Navigator Lift ™ 180 Friction, refer to the corresponding Installation Instructions.

Figure 12: Cutting and installing the threaded bolts for the Single / Dual interface plate on the raw ceiling




## 6.1 Mounting situation: Mounting the interface plate to the raw ceiling without intermediate ceiling

### 6.1.1 Cutting the threaded bolts to length

(See Figure 12)

If a Single / Dual interface plate [1] is mounted to the raw ceiling, the 6 (Single version) or 12 (Dual version) threaded bolts M16 x 330mm ③ must be cut to length.
The Single / Dual canopy [3] with attachment to be mounted later is flush with the raw ceiling and covers the ceiling tube flange.

1. For the canopy [3] which is 260mm high the 6/12 threaded bolts M16 x 330mm ③ must be cut to 240mm.

2. Slightly deburr the 6/12 threaded bolts M16 x 330mm ① in order to ensure maximum thread engagement into the interface plate [1].

### 6.1.2 Mounting the threaded bolts

(See Figure 12)

1. Screw 1 hexagonal nut M16 ② each onto the 6/12 threaded bolts M16 ③ and then place 1 spring ring ① each.

**⚠WARNING**

**Pendant system dropping**

**If the threaded bolts M16 ③ are not completely screwed in, they may break out of the interface plate [1] and cause the pendant system to drop:**

- Make sure that all shortened threaded bolts M16 ③ are completely screwed into the interface plate [1] up to the end stop on the raw ceiling.


**Pendant system dropping**

**The pendant system can drop if the fixing elements have not been properly tightened:**

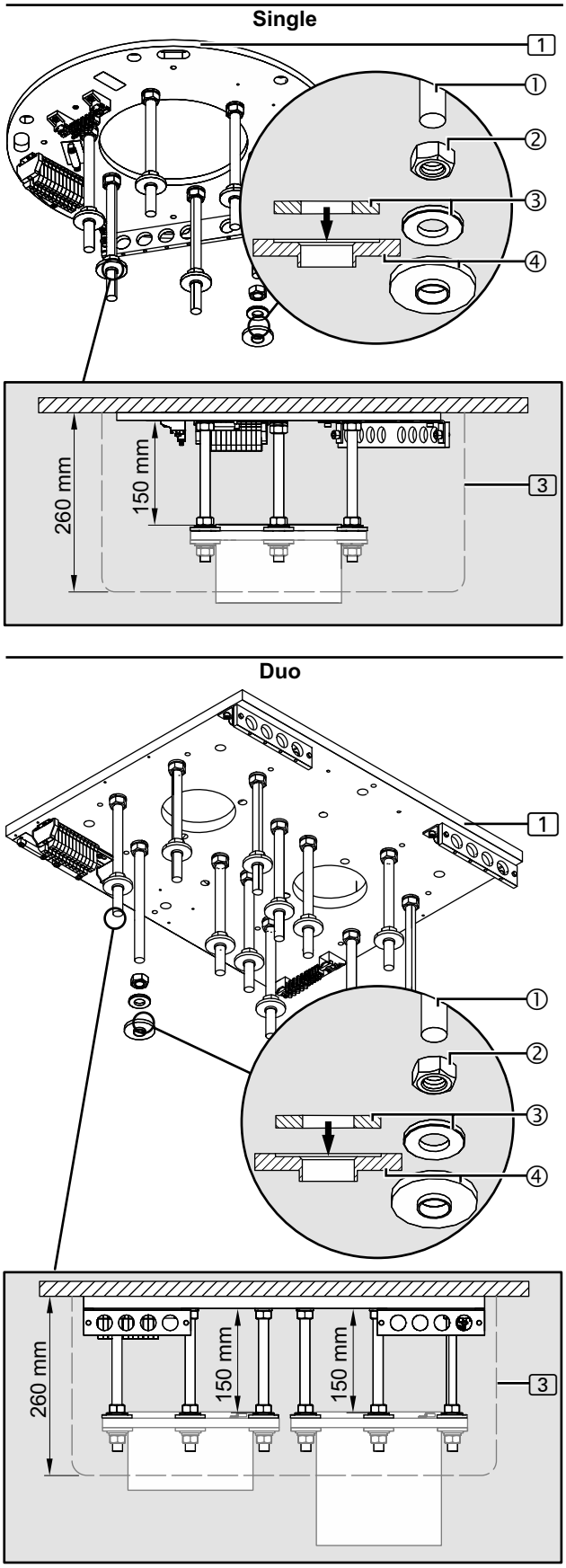
- Tighten all hexagonal nuts M16 ② with a tightening torque of 195Nm.

2. Check that the shortened threaded bolts M16 ③ are securely in place at the correct distances to each other:

- The threaded bolts M16 ③ must be completely screwed into the interface plate [1].
- The 6/12 hexagonal nuts M16 ② must be tightened to 195Nm.

3. Continue the installation as described in Chapter 6.1.3, on Page 31.

Figure 13: Mounting the upper insulations to the threaded bolts



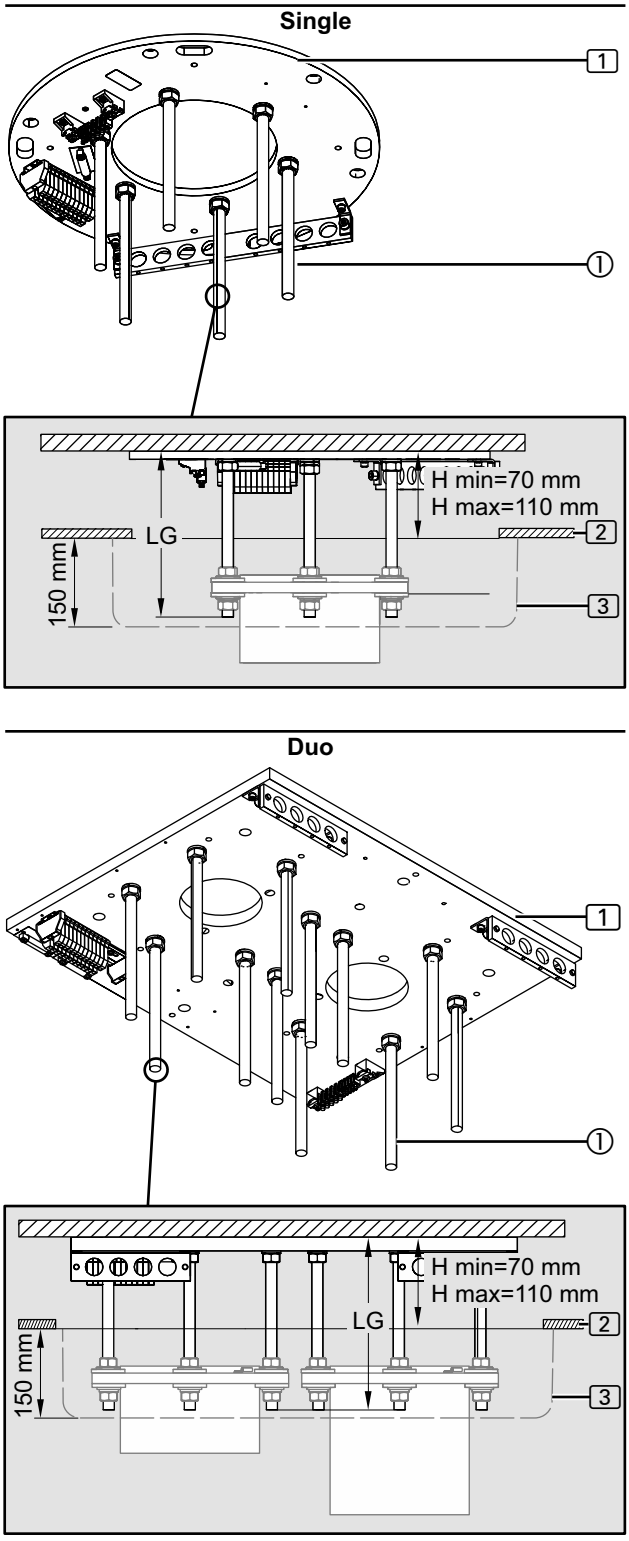

### 6.1.3 Mounting the upper insulations to the threaded bolts

(See Figure 13)

The 6 (Single version) or 12 (Dual version) hexagonal nuts M16② must be mounted to the threaded bolts M16① at an exact distance to each other.

1. For each threaded bolt M16① screw a hexagonal nut M16② onto the threaded bolts M16① .
2. Adjust the distance between the hexagonal nuts M16② and the interface plate [1] to 150mm.
3. Using a digital spirit level, align the hexagonal nuts M16② in a horizontal position.
4. Place 1 flat washer with an external diameter of 34mm③ .
5. Place 1 plastic insulating disc④ (as illustrated in the Figure) in such a way that the flat washer with an external diameter of 34mm③ (see arrow in the detailed representation in the Figure) sits in the plastic insulating disc④ .
6. Using an adhesive or elastic tape, attach the plastic insulating disc④ to the threaded bolts M16① .
7. Continue the installation as described in Chapter 7, on Page 37 or Chapter 8, on Page 41.

Figure 14: Cutting the threaded bolts for the Single / Dual interface plate on the raw ceiling to length




## 6.2 Mounting situation: Interface plate on the raw ceiling with intermediate ceiling

### 6.2.1 Cutting the threaded bolts to length

(See Figure 14)

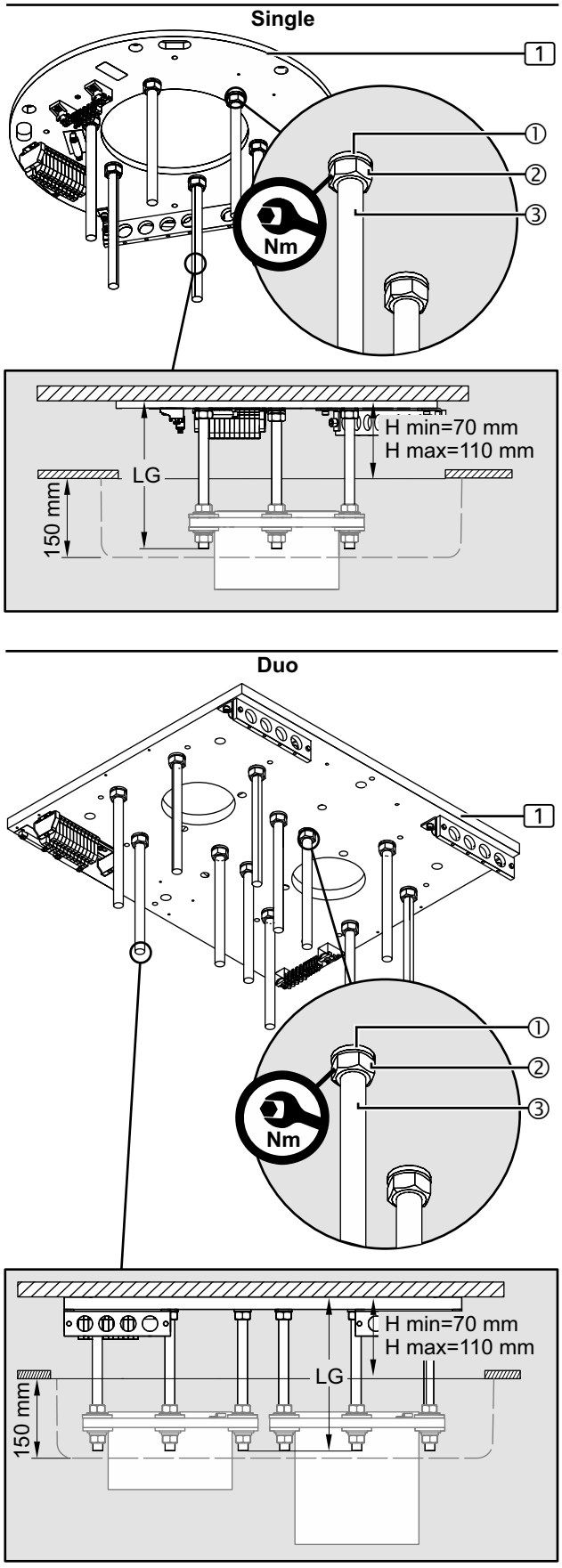
If a Single / Dual interface plate [1] is mounted to the raw ceiling with intermediate ceiling [2], the 6 (Single version) or 12 (Dual version) threaded bolts M16 x 330mm ① must be cut to length.
The Single / Dual canopy [3] to be mounted later is flush with the intermediate ceiling [2] and covers the ceiling tube flange.

**NOTE – Variable threaded bolt length**

- The necessary length of the threaded bolts M16 x 330mm ① depends on the distance H: from the raw ceiling to the bottom edge of the intermediate ceiling [2].
- Observe the minimum and maximum length of the threaded bolts M16 x 330mm ①.

1. For a Single canopy [3], 150mm, Dual canopy [3], 150mm, cut the 6/12 threaded bolts M16 x 330mm ① to length.
   - To determine the length LG of the threaded bolts ① : LG=H +135mm (min. 205mm / max. 245mm)
   - Please contact Nuvo in any doubt.
2. Slightly deburr the 6/12 threaded bolts M16 x 330mm ① in order to ensure maximum thread engagement into the interface plate [1].
3. Continue the installation as described in Chapter 6.2.2, on Page 33.

Figure 15: Mounting the upper insulations to the threaded bolts




### 6.2.2 Mounting the threaded bolts to the interface plate Single / Dual

(See Figure 15)

1. Screw 1 hexagonal nut M16② each onto the 6/12 threaded bolts M16③ and then place 1 spring ring① each.

**⚠WARNING**

**Pendant system dropping**

**If the threaded bolts M16③ are not completely screwed in, they may break out of the interface plate [1] and cause the pendant system to drop:**

- Make sure that all shortened threaded bolts M16③ are completely screwed into the interface plate [1] up to the end stop on the raw ceiling.

**Pendant system dropping**

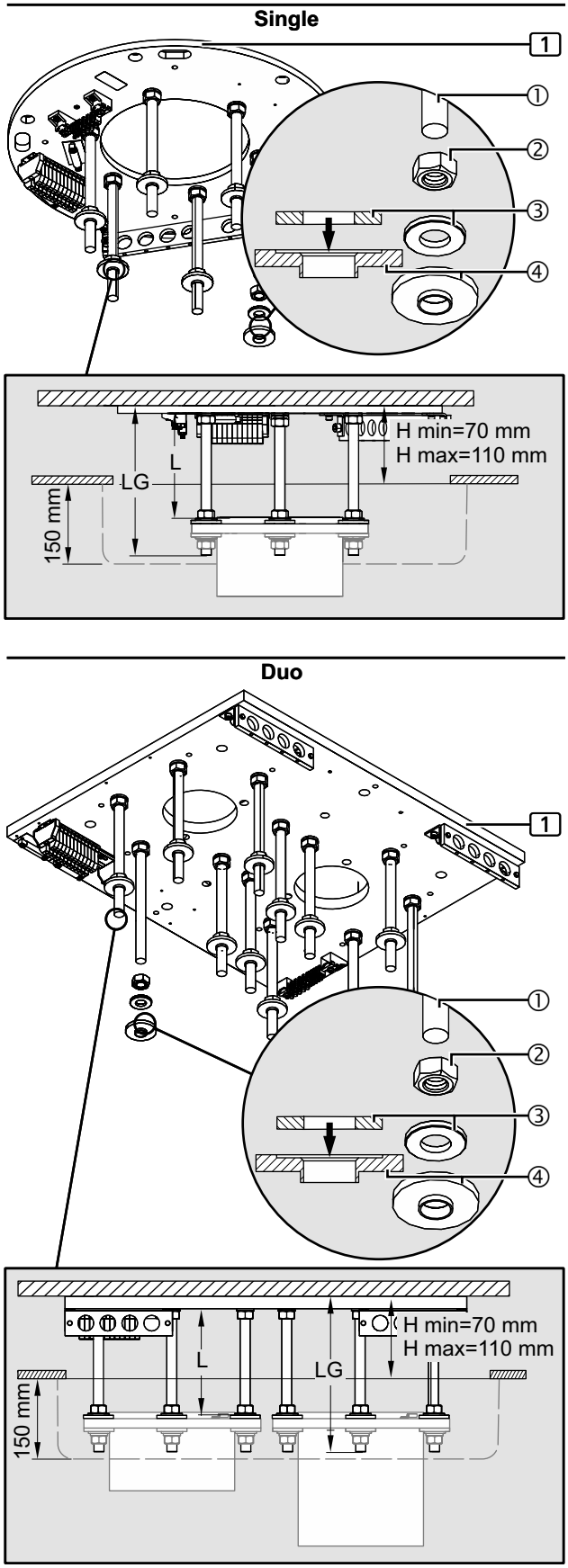
**The pendant system can drop if the fixing elements have not been properly tightened:**

- Tighten all hexagonal nuts M16② with a tightening torque of 195Nm.

2. Check that the shortened threaded bolts M16③ are securely in place at the correct distances to each other:
- The shortened threaded bolts M16③ must be completely screwed into the interface plate [1].
- The 6/12 hexagonal nuts M16② must be tightened to 195Nm.

3. Continue the installation as described in Chapter 6.2.3, on Page 34.

Figure 16: Mounting the upper insulations to the threaded bolts




### 6.2.3 Mounting the upper insulations to the threaded bolts

(See Figure 16)

1. For each threaded bolt M16① screw a hexagonal nut M16② onto the threaded bolts M16① .
2. Adjust the distance between the hexagonal nuts M16② and the interface plate [1]:
- L = LG – 95mm (min.110mm / 150mm)

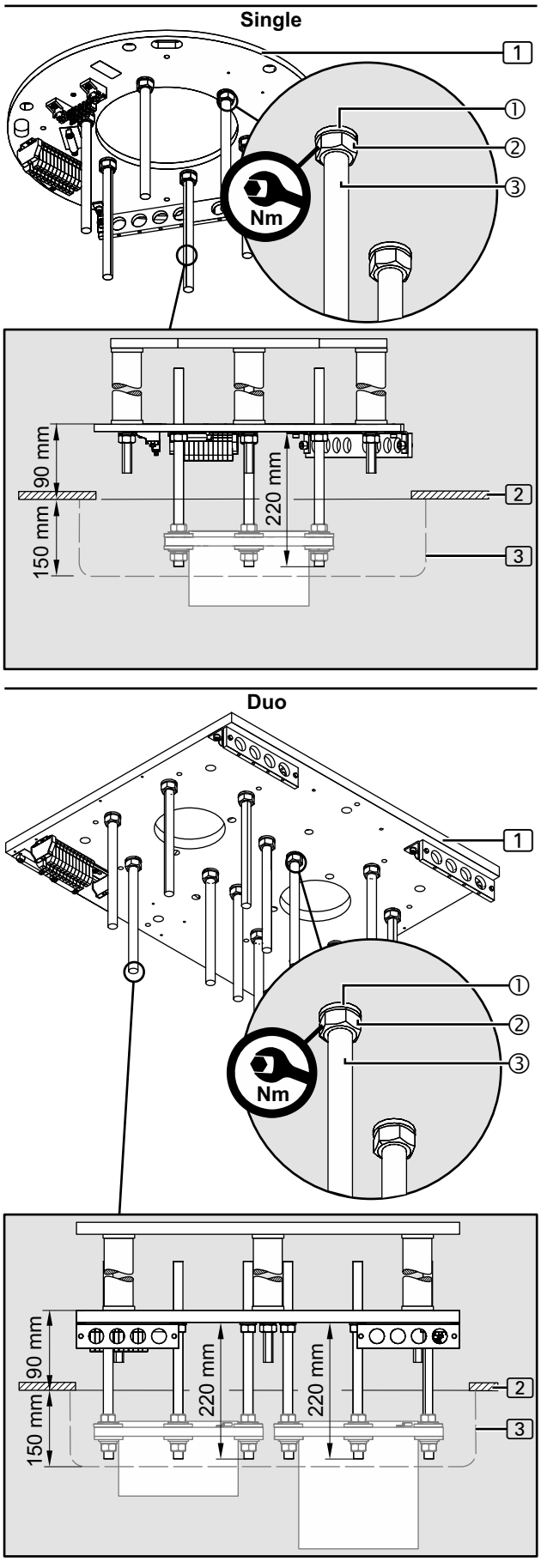
3. Screw the hexagonal nuts M16② onto the threaded bolts M16① at the calculated distance L.

4. Using a digital spirit level, align the hexagonal nuts M16② in a horizontal position.

5. Place 1 flat washer with an external diameter of 34mm③ .
6. Place 1 plastic insulating disc④ (as illustrated in the Figure) in such a way that the flat washer with an external diameter of 34mm③ (see arrow in the detailed representation in the Figure) sits in the plastic insulating disc④ .
7. Using an adhesive or elastic tape, attach the plastic insulating disc④ to the threaded bolts M16① .

8. Continue the installation as described in Chapter 7, on Page 37 or Chapter 8, on Page 41.

Figure 17: Mounting the threaded bolts




## 6.3 Mounting situation: Interface plate on the intermediate ceiling mount

### 6.3.1 Mounting the threaded bolts

(See Figure 17)

The 6 (Single version) or 12 (Dual version) threaded bolts M16 x 330mm③ must protrude from the interface plate [1].
The Single / Dual canopy [3] to be mounted later is flush with the intermediate ceiling [2] and covers the ceiling tube flange.

**⚠WARNING**

**Pendant system dropping**

**In order to ensure sufficient strength, the threaded bolts M16① must not exceed a maximum length of 330mm.**

1. Screw 1 hexagonal nut M16② each onto the 6/12 threaded bolts M16 x 330mm③ and then place 1 spring ring① each.

2. All threaded bolts M16 x 330mm③ must be completely screwed into the interface plate [1].
   The threaded bolts M16 x 330mm③ for the:
- Single version = 220mm
- Dual version = 220mm
  must protrude from the interface plate [1].

**⚠WARNING**

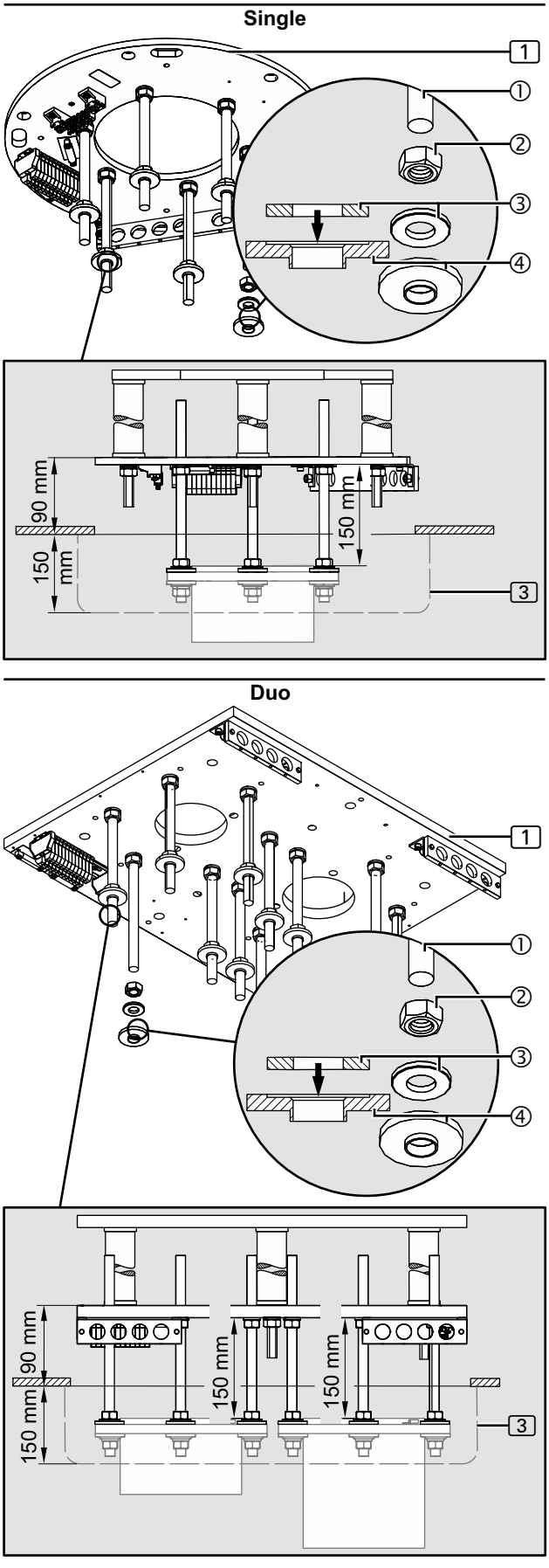
**Pendant system dropping**

**The pendant system can drop if the fixing elements have not been properly tightened:**
- Tighten all hexagonal nuts M16② with a tightening torque of 195Nm.

3. Check that the threaded bolts M16 x 330mm③ are securely in place at the correct distances.
- For the Single and Dual version 195mm the threaded bolts M16 x 330mm③ must protrude from the interface plate [1].
- The 6/12 hexagonal nuts M16② must be tightened to 195Nm.

4. Continue the installation as described in Chapter 6.3.2, on Page 36.

Figure 18: Mounting the upper insulations to the threaded bolts




### 6.3.2 Mounting the upper insulations to the threaded bolts

(See Figure 18)

The 6 (Single version) or 12 (Dual version) hexagonal nuts M16② must be mounted to the threaded bolts M16 x 330mm① at an exact distance to each other.

1. For each threaded bolt M16 x 330mm① screw a hexagonal nut M16② onto the threaded bolts M16 x 330mm① .

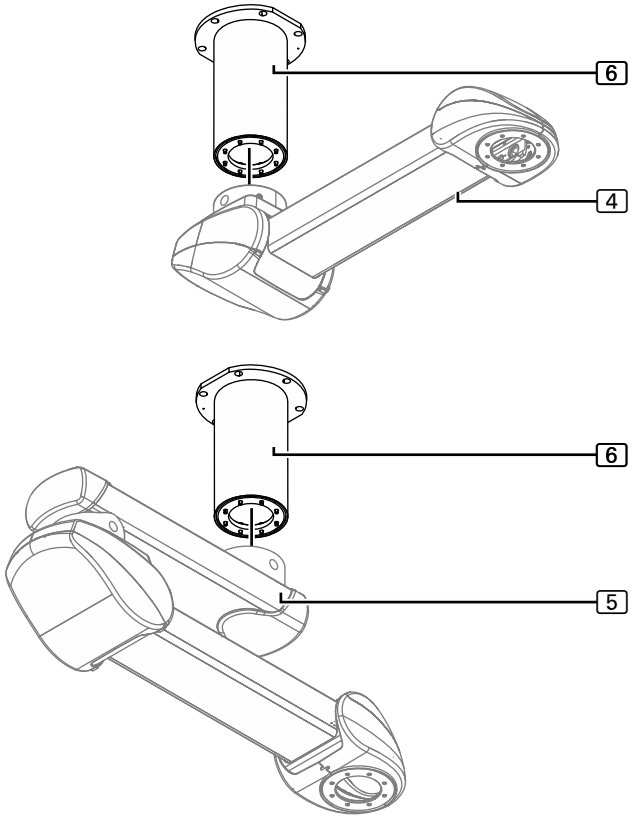
2. Adjust the distance between the hexagonal nuts M16② and the interface plate [1]:
- The distance between the hexagonal nuts M16② and the interface plate [1] must be 150mm.

3. Using a digital spirit level, align the hexagonal nuts M16② in a horizontal position.

4. Place 1 flat washer with an external diameter of 34mm③ .
5. Place 1 plastic insulating disc④ (as illustrated in the Figure) in such a way that the flat washer with an external diameter of 34mm③ (see arrow in the detailed representation in the Figure) sits in the plastic insulating disc④ .
- Using an adhesive or elastic tape, attach the plastic insulating disc④ to the threaded bolts M16① .

6. Continue the installation as described in Chapter 7, on Page 37 or Chapter 8, on Page 41.

Figure 19: Components described in this chapter

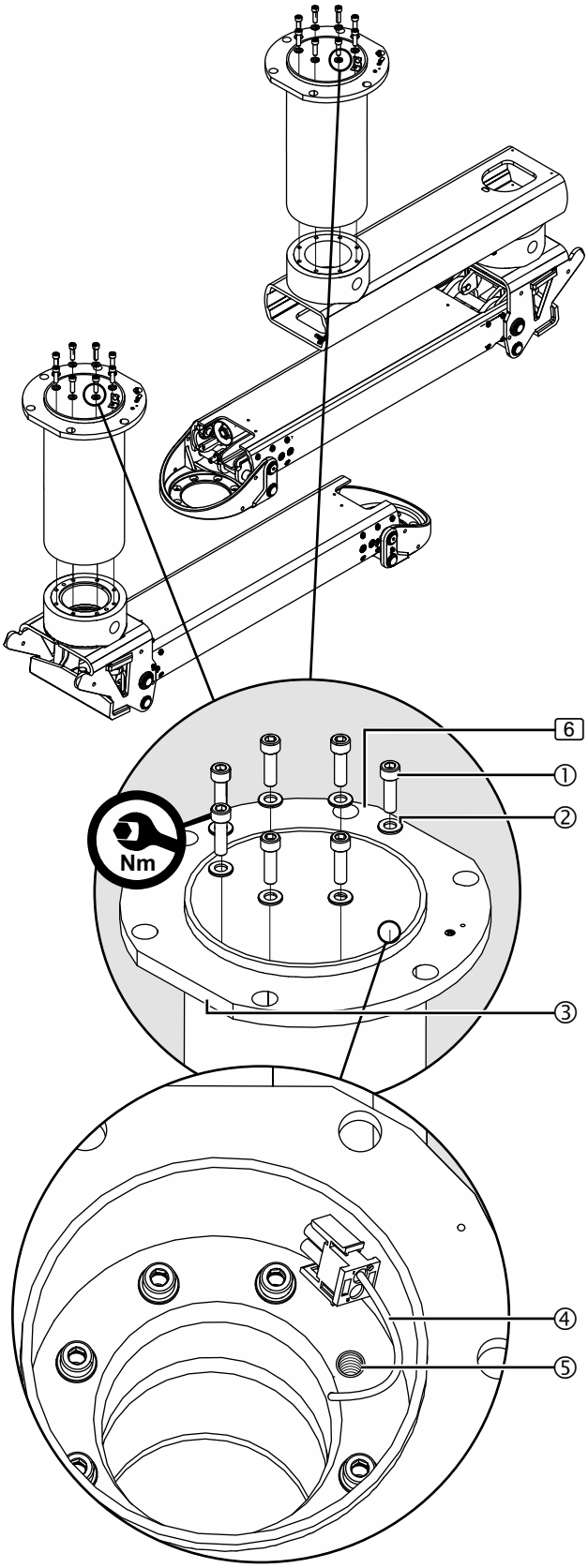



## 7.1 Components described in this chapter

(See Figure 19)

- The ceiling tube [6] illustrated in the Figure is mounted to the spring arm [4] or the extension arm with spring arm [5].
- The Figure shows a simplified representation with only the spring arm [4] or the extension arm with spring arm [5] without pre-assembled cables.
- The Figure illustrates the pendant system Navigator Lift ™ 180 Air-*Plus*.
  The steps required for installing the Navigator Lift™ 180 Friction variant are identical.

Figure 20: Mounting the ceiling tube




## 7.2 Mounting an extended ceiling tube

### 7.2.1 Mounting the ceiling tube

(See Figure 20)

The Figure shows a simplified representation with only the spring arm [4] or the extension arm with spring arm [5] without pre-assembled cables.

1. Place the ceiling tube [6] onto the spring arm [4] or extension arm with spring arm [5] and position it in such a way that the chamfered surface ③ is almost at right angles to the spring arm [4] or the extension arm with spring arm [5] as illustrated in the Figure.
2. Fit 8 Allen cylinder screws M10 x 25mm ① – 8.8 – DIN EN ISO 4762 with 8 lock washers S10 ② .
3. At the position of the pre-assembled cable ④ leave the threaded hole ⑤ free and do not screw in an Allen cylinder screw M10 x 25mm ① – 8.8 – DIN EN ISO 4762.

4. Screw the ceiling tube [6] onto the spring arm [4] or the extension arm with spring arm [5] using 7 Allen cylinder screws M10 x 25mm ① – 8.8 – DIN EN ISO 4762 and lock washers ② .
- Use an extension tool to tighten the 7 Allen cylinder screws M10 x 25mm ① – 8.8 – DIN EN ISO 4762.

**⚠WARNING**

Nm

**Pendant system dropping**

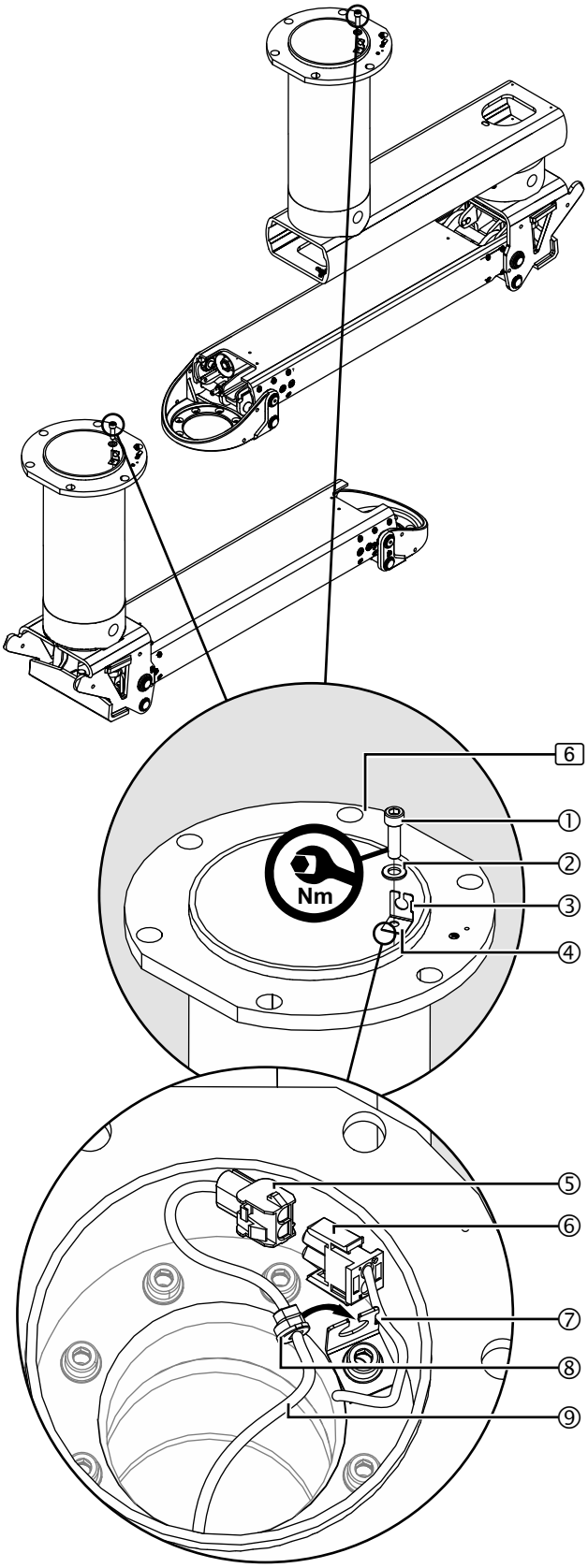
**The pendant system can drop if the fixing elements have not been properly tightened:**

- Tighten the 7 Allen cylinder screws M10 x 25mm ① – 8.8 – DIN EN ISO 4762 to 40Nm.

5. Check that the spring arm [4] or the extension arm with spring arm [5] is securely in place:
- The ceiling tube [6] must be level with the spring arm [4] or the extension arm with spring arm [5].
- The 7 Allen cylinder screws M10 x 25mm ① – 8.8 – DIN EN ISO 4762 must be fitted with lock washers ② .
- The 7 Allen cylinder screws M10 x 25mm ① – 8.8 – DIN EN ISO 4762 must be tightened to 40Nm.

6. Mount the strain relieving mechanism in the ceiling tube [6] as described in Chapter 7.2.2, on Page 39.

Figure 21: Mounting the strain relieving mechanism in the ceiling tube




### 7.2.2 Mounting the strain relieving mechanism in the ceiling tube

(See Figure 21)

The Figure shows a simplified representation with only the spring arm [4] or the extension arm with spring arm [5] without pre-assembled cables.

1. Insert an Allen cylinder screw M10 x 25mm ① – 8.8 – DIN EN ISO 4762 and the lock washer S10 ② into the strain relief holder ④ .
2. Position the strain relief holder ④ in the ceiling tube [6] in such a way that the cutout ③ of the strain relief holder ④ points towards the ceiling tube wall.
3. Place the pre-assembled cable ⑦ in the cutout ③ of the strain relief holder ④ .
4. Screw the strain relief holder ④ onto the spring arm [4] or the extension arm with spring arm [5] using 1 Allen cylinder screw M10 x 25mm ① – 8.8 – DIN EN ISO 4762 and 1 lock washer ② .

- Make sure that the cable is not ⑦ not squeezed.

5. Establish the plug connection ⑤ / ⑥ with the control cable included in the scope of delivery ⑨ and then push the strain relief mechanism ⑧ into the strain relief holder ④ .
6. Check that the strain relief mechanism ⑧ is securely in place:

- The control cable ⑨ must be securely strain-relieved in the strain relief mechanism ④ .

7. Route the control cable ⑨ through the ceiling tube [6] and the spring arm [4] or the extension arm with spring arm [5] towards the control board.

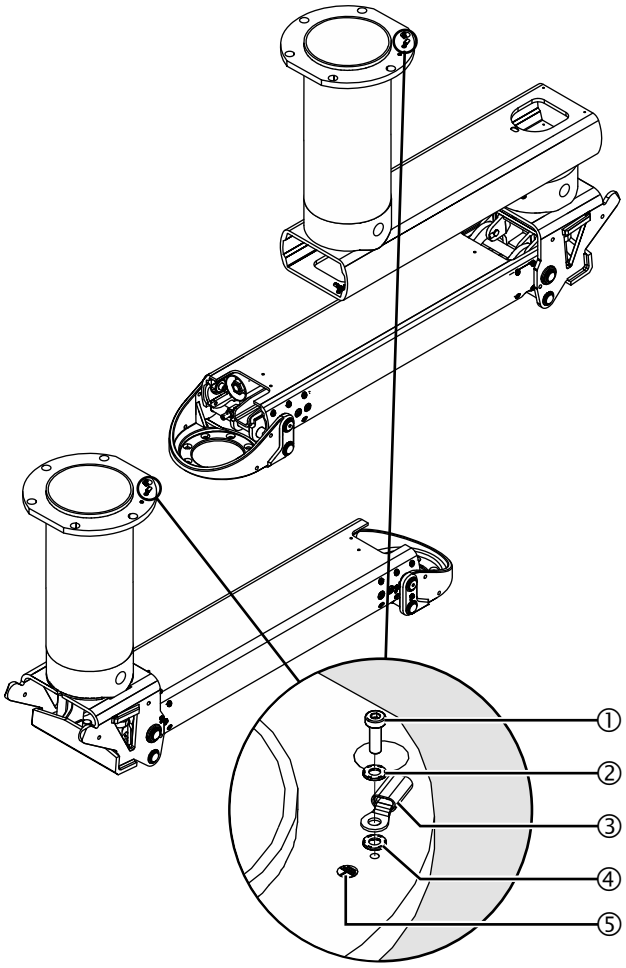
**⚠ WARNING**

**Pendant system dropping**

**The pendant system can drop if the fixing elements have not been properly tightened:**

- Tighten the Allen cylinder screw M10 x 25mm ① – 8.8 – DIN EN ISO 4762 to 40Nm.

Figure 22: Subsequently mounting the earthing cable to the ceiling tube



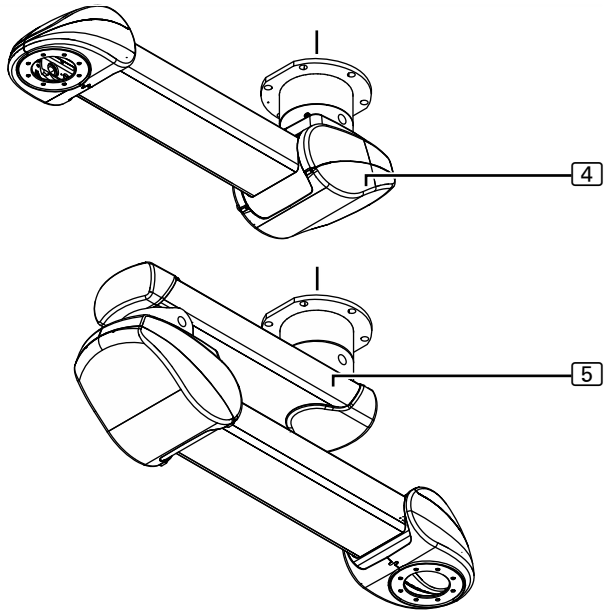

### 7.2.3 Subsequently mounting the earthing cable to the ceiling tube

(See Figure 22)

The system is delivered with the earthing cable pre-assembled!

1. Fit 1 lock washer S4 ②/④ each above and below the ring cable lug ③ of the earthing cable 4 mm² (approx. 1 m long) included in the scope of delivery.
2. Using 1 Allen cylinder screw M4 x 12 mm – DIN 912 ① screw the ring cable lug ③ and the lock washers S4 ②/④ onto the earthing point ⑤ .
3. Tighten the Allen cylinder screw M4 x 12 mm ① .
4. Continue the installation as described in Chapter 8, on Page 41.

Figure 23: Components described in this chapter

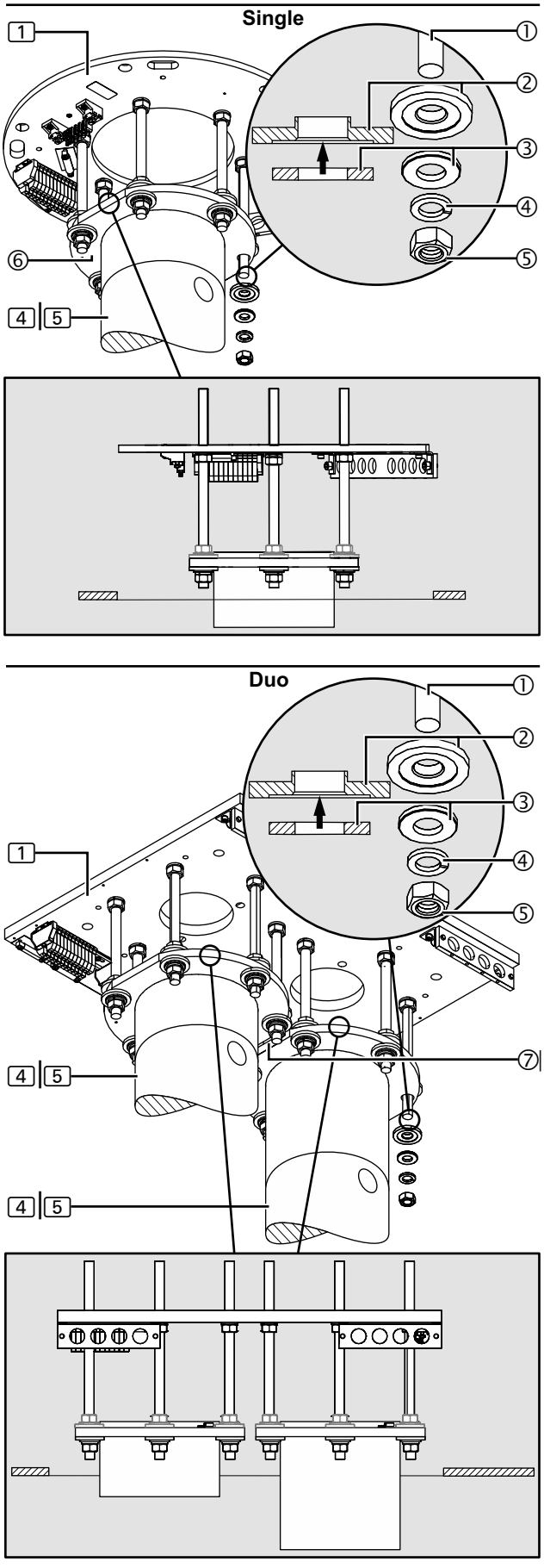



## 8.1 Components described in this chapter

(See Figure 23)

- The spring arm [4] or the extension arm with spring arm [5] illustrated in the Figure is mounted to the threaded bolts of the interface plate [1].
- The Figure shows a simplified representation with only the spring arm [4] or the extension arm with spring arm [5] without cables.
- The Figure illustrates the pendant system Navigator Lift ™ 180 Air-*Plus*.
  The steps required for installing the Navigator Lift™ 180 Friction variant are identical.

Figure 24: Mounting the ceiling tube




## 8.2 Mounting the ceiling tube

(See Figure 24)

The Figure only shows a simplified representation of the flange ⑥ with ceiling tube to be mounted to the threaded bolts. Further components pre-assembled to the flange ⑥ , such as the spring arm, extension arm, cables, etc. are not represented.

**⚠WARNING**

**Risk of parts falling off**

**Make sure that no-one is standing underneath the components of the pendant system.**

1. Securely fasten the flange ⑥ of the ceiling tube with the spring arm [4] or the extension arm with spring arm [5] to a suitable lifting device and position it under the threaded bolts M16 ① of the interface plate [1].

**NOTE – Position of the flanges of the Dual version**

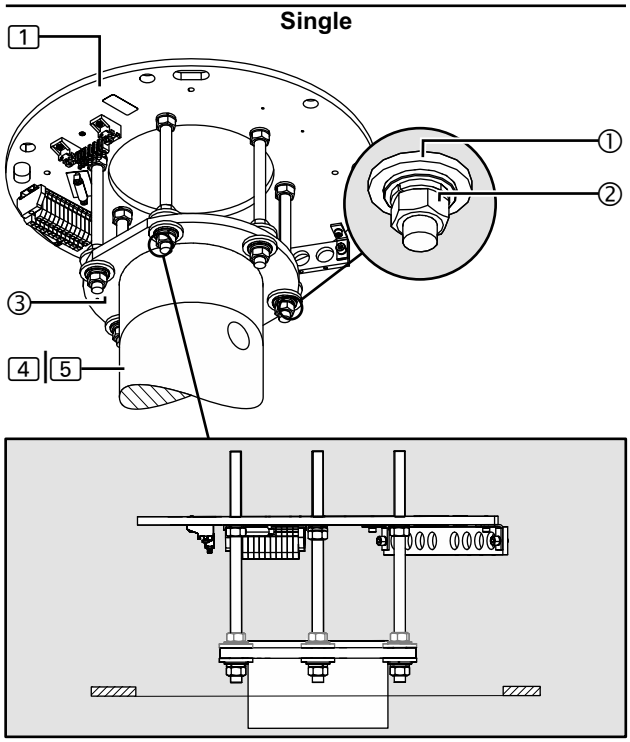
- The flanges have a chamfered surface ⑦ in order to ensure that they can be mounted at the same height.
- Mount the flanges such that the chamfered surfaces ⑦ are aligned towards each other as illustrated in the Figure.

2. Insert the flange ⑥ of the ceiling tube with the spring arm [4] or the extension arm with spring arm [5] into the 6 threaded bolts M16 ① of the interface plate [1].
3. Remove the previously attached adhesive or elastic tape from the threaded bolts ① .

4. For each threaded bolt M16 ①, place 1 plastic insulating disc ① (as illustrated in the Figure) in such a way that the flat washer with an external diameter of 34 mm ③ (see arrow in the detailed representation in the Figure) sits in the plastic insulating disc ① .
5. For each threaded bolt M16 ①, place 1 flat washer with an external diameter of 34 mm ③, 1 spring disc ④ and 1 hexagonal nut M16 ⑤ .

6. Component on the interface plate [1]:
- Align the Single version as described in Chapter 8.3, on Page 43.
- Align the Dual version as described in Chapter 8.4, on Page 45.

Figure 25: Aligning the spring arm / extension arm with the interface plate, Single




## 8.3 Aligning the spring arm / extension arm with the interface plate, Single

(See Figure 25)

The Figure only shows a simplified representation of the flange ③ with ceiling tube to be mounted to the threaded bolts. Further components pre-assembled to the flange ③ , such as the spring arm, extension arm, cables, etc., are not represented.

**NOTE – Positioning problems and inclination**

Precise horizontal alignment is essential in order to ensure that the pendant system can be freely moved and securely positioned, and to avoid inclination.

**⚠WARNING**

**Pendant system dropping**

**The pendant system can drop if the fixing elements have not been properly tightened:**

- Tighten all hexagonal nuts M16 ② on the flange with a tightening torque of 100 Nm.

1. Choose 1 of the 6 hexagonal nuts M16 ② as a reference point.
2. Screw the 6 hexagonal nuts M16 ② under the flange ③ crosswise onto the flange ③ and tighten them to 100 Nm.

*NOTICE*

**Destruction of the cables in the extension arm / spring arm**

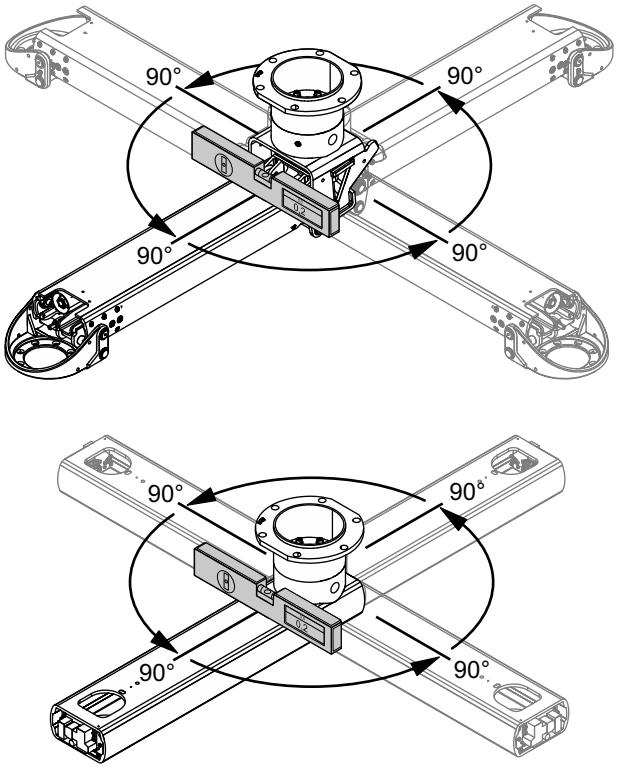
**There is a risk of destroying or damaging the cables in the extension arm / spring arm if an extension arm / spring arm is rotated more than 360 degrees:**

- Do not rotate the spring arm 4 or the extension arm with spring arm 5 more than 350 degrees.
- If required, restrict the swivel range of the spring arm 4 or the extension arm with spring arm 5 as described in Chapter 15.9, on Page 83.

3. For the extension arm with spring arm 5 – Dual arm variant, remove the transport lock (band) and dismantle the pre-assembled swivel stop as described in Chapter 15.9.4, on Page 86 if required. Next, turn the spring arm into the extension of the upper extension arm.

4. Continuation on the next page.

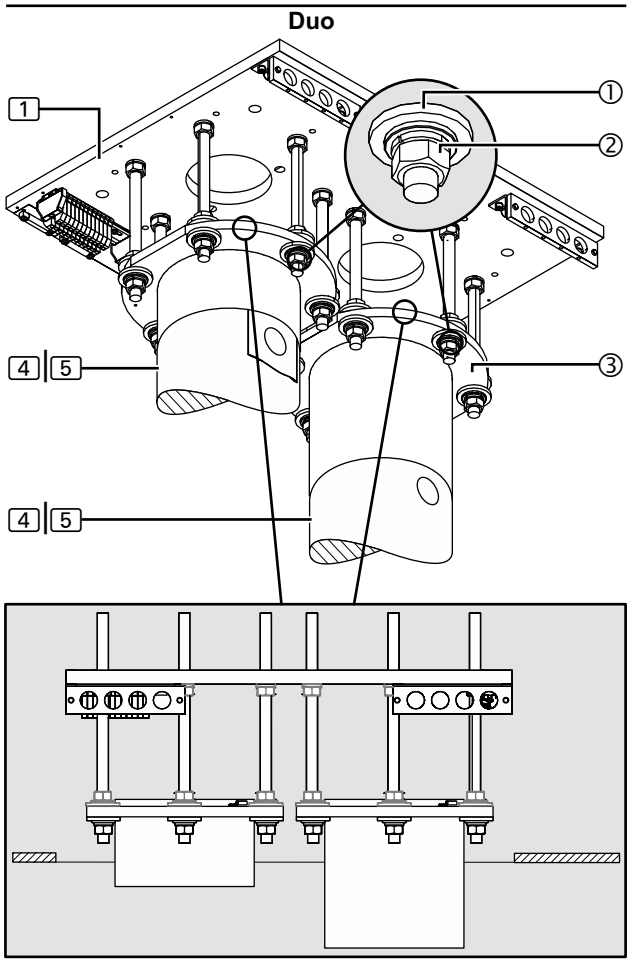
Figure 26: Checking the horizontal alignment of the spring arm / extension arm




5. Check the horizontal alignment of the spring arm / extension arm (see “Figure 26: on Page 44”):
- Place the digital spirit level at right angles to the spring arm or extension arm length on the spring arm or extension arm (near the flange ③).
- Rotate the spring arm or extension arm 90 degrees in various directions and check the horizontal alignment.
- The deviation from the horizontal must not exceed ±0.2 degrees.
- In case of deviations by more than ±0.2 degrees the spring arm or extension arm must be realigned. To do this, repeat the installation steps described above.

6. Check that all hexagonal nuts M16 ② are securely in place:
- The 12 hexagonal nuts M16 ② must be level with the flange ③ .
- The 12 plastic insulating discs ① above and below the flange ③ must sit in the flange ③ and must not be damaged.
- The 12 hexagonal nuts M16 ② must be tightened to 100 Nm.

Figure 27: Aligning the spring arm / extension arm with the interface plate, Dual




## 8.4 Aligning the spring arm / extension arm with the interface plate, Dual

(See Figure 27)

The Figure only shows a simplified representation of the flange ③ with ceiling tube to be mounted to the threaded bolts. Further components pre-assembled to the flange ③ , such as the spring arm, extension arm, cables, etc., are not represented.

**NOTE – Positioning problems and inclination**

Precise horizontal alignment is essential in order to ensure that the pendant system can be freely moved and securely positioned, and to avoid inclination.

**⚠WARNING**

**Pendant system dropping**

**The pendant system can drop if the fixing elements have not been properly tightened:**

- Tighten all hexagonal nuts M16 ① on the flange with a tightening torque of 100 Nm.

1. Choose 1 of the 6 hexagonal nuts M16 ② on the first flange as a reference point.
2. Screw the 6 hexagonal nuts M16 ② under the flange ③ crosswise onto the flange ③ and tighten them to 100 Nm.
3. Repeat the steps for the second flange.

*NOTICE*

**Destruction of the cables in the extension arm / spring arm**

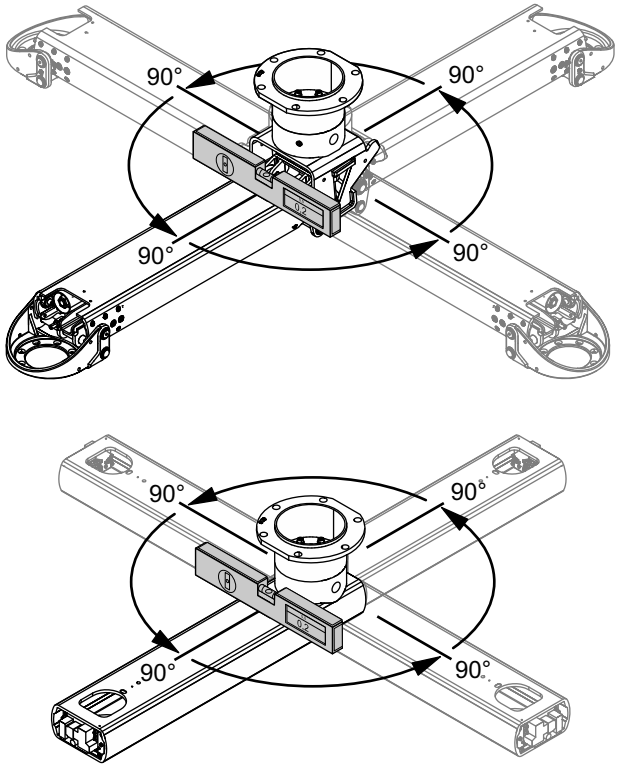
**There is a risk of destroying or damaging the cables in the extension arm / spring arm if an extension arm / spring arm is rotated more than 360 degrees:**

- Do not rotate the spring arm [4] or the extension arm with spring arm [5] more than 350 degrees.
- If required, restrict the swivel range of the spring arm [4] or the extension arm with spring arm [5] as described in Chapter 15.9, on Page 83.

4. For the extension arm with spring arm [5] – Dual arm variant, remove the transport lock (band) and dismantle the pre-assembled swivel stop as described in Chapter 15.9.4, on Page 86 if required. Next, turn the spring arm into the extension of the upper extension arm.

5. Continuation on the next page.

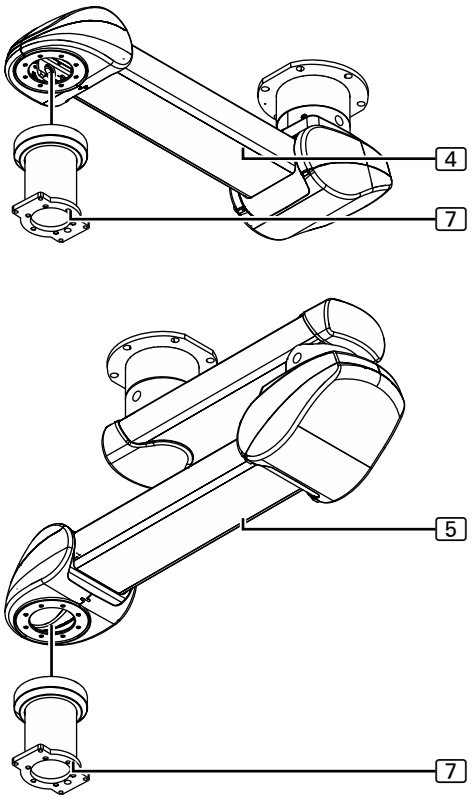
Figure 28: Checking the horizontal alignment of the spring arm / extension arm




6. Check the horizontal alignment of the spring arm / extension arm (see “Figure 28: on Page 46”):
- Place the digital spirit level at right angles to the spring arm or extension arm length on the spring arm or extension arm (near the flange ③).
- Rotate the spring arm or extension arm 90 degrees in various directions and check the horizontal alignment.
- The deviation from the horizontal must not exceed ±0.2 degrees.
- In case of deviations by more than ±0.2 degrees the spring arm or extension arm must be realigned. To do this, repeat the installation steps described above.

7. Check that all hexagonal nuts M16 ② are securely in place:
- The 24 hexagonal nuts M16 ② must be level with the flange ③ .
- The 24 plastic insulating discs ① above and below the flange ③ must sit in the flange ③ and must not be damaged.
- The 24 hexagonal nuts M16 ② must be tightened to 100 Nm.

Figure 29: Components described in this chapter

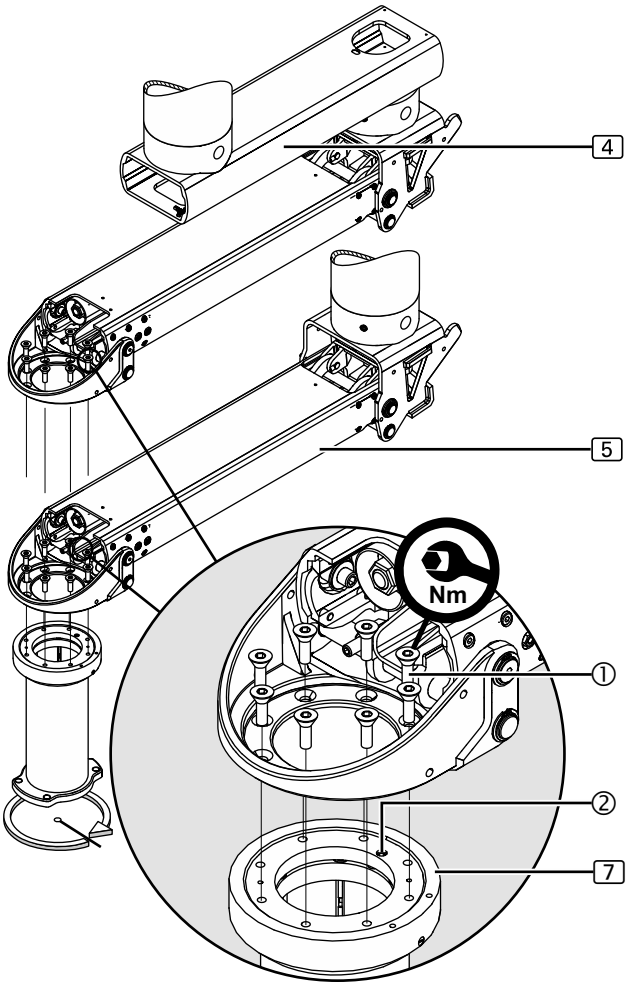



## 9.1 Components described in this chapter

(See Figure 29)

- The Drop tube [7] with Bearing Unit Friction (slide bearing) illustrated in the Figure is mounted onto the spring arm [4] or extension arm with spring arm [5].
- The steps required for mounting the Drop tube [7] with Bearing Unit Friction (roller bearing) are identical.
- The Figure shows a simplified representation with only the spring arm [4] or the extension arm with spring arm [5] without cables.

Figure 30: Mounting the Drop tube to the spring arm




## 9.2 Mounting the Drop tube to the spring arm

(See Figure 30)

1. Place the Drop tube [7] under the spring arm [4] or the extension arm with spring arm [5] such that the end stop ② in the Drop tube [7] points away from the spring arm and the fixing holes fall in line.

**NOTE – Defining the swivel range**

- In order to be able to swivel the Navigator M6 to the left (counter-clockwise), the Drop tube must be mounted with the end stop ② on the right-hand side as illustrated in the Figure.
- In order to be able to swivel the Navigator M6 to the right (clockwise), the Drop tube must be mounted with the end stop ② on the left-hand side.

2. Screw the Drop tube [7] onto the spring arm using 8 Allen countersunk screws M10 x 25 mm ① – 10.9 – DIN EN ISO 10642.

**⚠ WARNING**

Nm

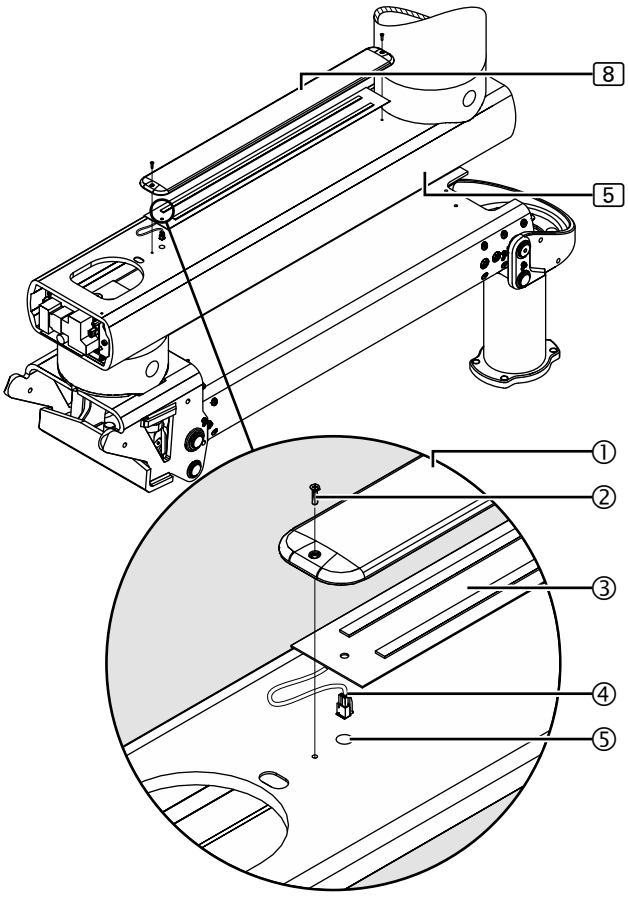
**Pendant system dropping**

**The pendant system can drop if the fixing elements have not been properly tightened:**

- Tighten the 8 Allen countersunk screws ① with a tightening torque of 40 Nm.

3. Check that the Drop tube [7] is securely in place:
- The Drop tube [7] must be level with the spring arm.
- The 8 Allen countersunk screws M10 x 25 mm ① – 10.9 – DIN EN ISO 10642 must be tightened to 40 Nm.

Figure 31: Mounting the extension arm lighting




(See Figure 31)

The Figure illustrates the extension arm with spring arm [5] of the Navigator Lift ™ 180 Air*Plus* system. The steps required for installing the pendant system Navigator Lift ™ 180 Friction are identical.
Upon delivery of the system from the factory the following optional accessories are pre-assembled.

The indirect extension arm lighting [8] (for extension arms from a length of 800 mm possible) is mounted to the top side of the extension arm. The Figure shows a simplified representation with only the extension arm with spring arm [5] without pre-assembled cables.

1. Dismantle the 3 sealing plugs (not illustrated) from the top side of the extension arm and dispose of them in compliance with statutory regulations.

2. Route the connecting cable ④ on the basic carrier with LED ③ through the mounting aperture ⑤ into the extension arm without bending it.

3. Place the cover ① onto the basic carrier with LED ③ and screw it on using 2 countersunk screws M4 x 16 mm ② – DIN EN ISO 10642.

4. Check that the extension arm lighting [8] is securely in place:

- The extension arm lighting [8] must be level with the extension arm.
- The connecting cable ④ on the basic carrier with LED ③ must sit in the extension arm.
- The 2 countersunk screws M4 x 16 mm ② – DIN EN ISO 10642 must be screwed on.

## 11.1 Safety instructions

**⚠WARNING**

**Electric shock hazard**

**Power cables may have been laid in the pendant system. Contact with energized components presents a danger to life from electric shock. Motor-driven, mobile device components can cause injury in the case of being switched on unintentionally. Prior to any installation and adjustment work, the pendant system must be disconnected from the mains:**

- Disconnect all the poles of the power supply source from the mains and prevent it from being reconnected accidentally.
- Check whether thependant system is de-energised.
- Earth and short-circuit the pendant system.
- Cover and shield any adjacent energised parts.

**Damaged power cables, gas hoses and compressed air hoses**

**Damaged power cables can carry an electric voltage of 230V (120V) which energises the pendant system, and supply gases can escape from damaged supply hoses:**

- Check all cables and hoses for damage. Make sure you carefully insert them without cables/hoses crossing each other, without loops and without twisting.
- The cables and tubes must be laid in the pendant system in such a way that they are not exposed to tensile stress.
- Cables and hoses must be routed straight upwards out of the flange in order to prevent damage (e.g. rubbing of the sheath) and enable their free rotation.
- Protruding cables and hoses must not be placed in the Navigator M6 or on the flanges but must be placed on the interface plate and secured against falling using cable retainers.
- Electric cables must be laid in accordance with regional regulations (in a spiral coiled tube if required).

**Leaking compressed air pipes for supplying the pneumatic brakes**

**Check the brake pipes, air supply ducts and brake valves for contamination and clean them if required.**

- Cut off the brake pipes, Ø 4mm, plane-parallel.
- Brake pipes and air supply ducts must not be bent.
- Replace damaged or bent brake pipes.
- The supply pressure of the air supply ducts at the installation site must be in a range from 4 to 6 bar. The optimum operating pressure is 5 bar.

## 11.2 Connecting cables to the extension arm with spring arm, Dual arm, with Navigator M6

The power cables, pneumatic pipes, earthing and control cables, as well as the gas hoses are pre-installed in the Navigator M6 and must be routed through the pendant system.

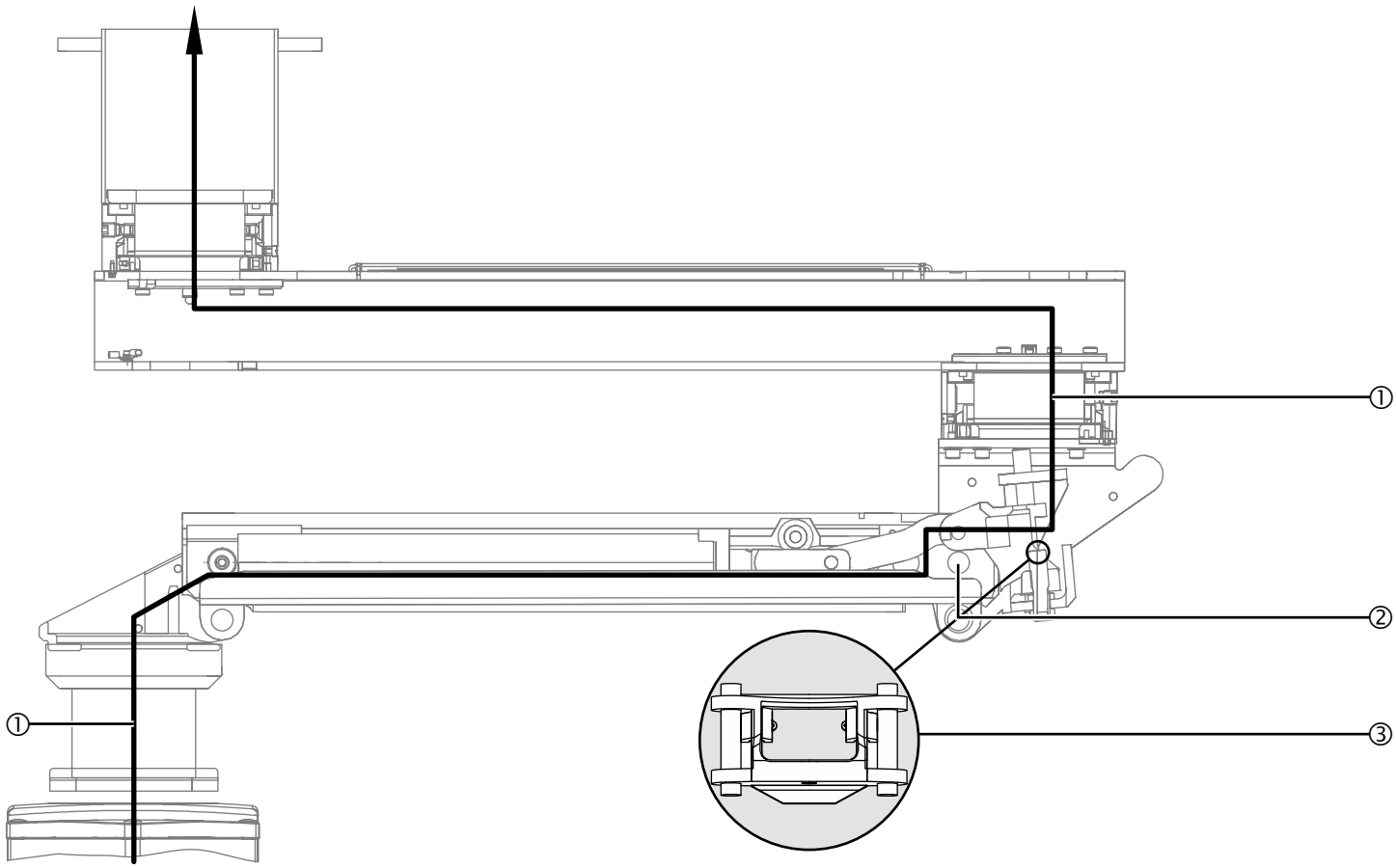
1. Observe the safety instructions in Chapter 11.1, on Page 50.

### 11.2.1 Routing the power cable

(See "Figure 32“)

2. Route the power cable① (laid in a spiral coiled tube if required) through the spring arm above the swivel axis (revolute joint)② and route it into the mounting aperture in the bearing support③ of the spring arm.
3. Route the power cable① through the extension arm and towards the interface plate.

Figure 32: Routing the power cable



### 11.2.2 Routing and connecting pneumatic brake pipes

(See "Figure 33“)

1. Observe the safety instructions in Chapter 11.1, on Page 50.

The pneumatic brake pipes ① are pre-assembled in the pendant system and plugged onto the brake connecting points **1** and **2**. The brake pipes ① are laid in a spiral coiled tube if required.

**NOTE – Installing and disengaging brake pipes**

The pneumatic supply pipe must not be under pressure:
- To install the brake pipes, push them into the brake connecting point. If the brake pipe is correctly positioned, it can no longer be withdrawn from the brake connecting point.
- To disengage the brake pipes on the plug connector ② push in the unlocking mechanism ③ and then remove the brake pipes.

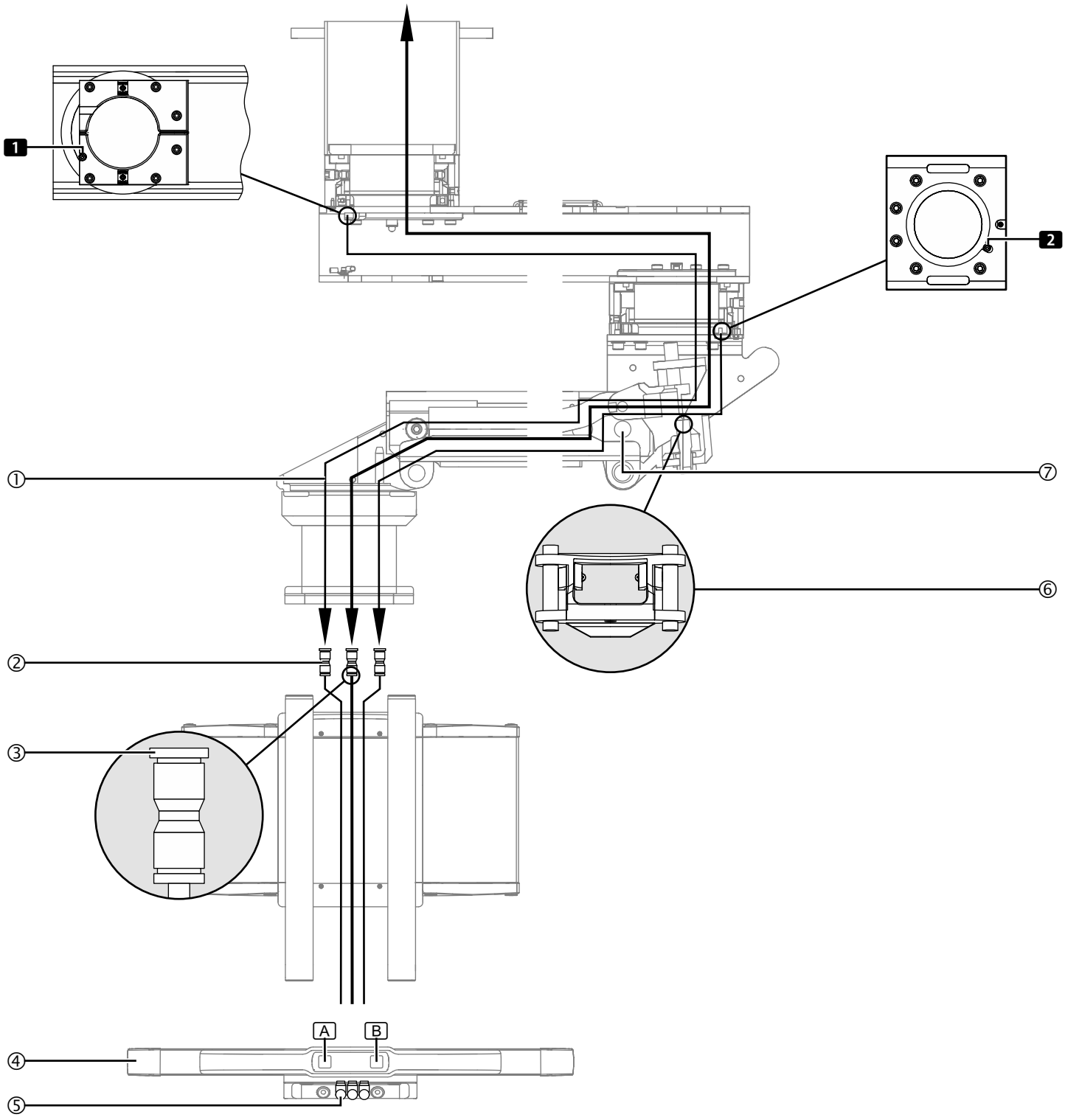
2. Insert the pneumatic brake pipes ① into the mounting aperture in the bearing support ⑥ of the spring arm and lay it above the swivel axis (revolute joint) ⑦ .

3. Plug the air supply hose (BLACK marking) onto the plug connector ② (BLACK marking).
4. Plug the brake pipe (GREEN marking) onto the plug connector ② (GREEN marking).
5. Plug the brake pipe (BLUE marking) onto the plug connector ② (BLUE marking).

6. Connect the air supply hose and the 2 brake pipes ① to the plug connector ⑤ on the shelf ④ as described in the Installation Instructions of the Navigator M6 .
- The brake pipes ① can be too long depending on the installation position of the shelf. If this is the case, cut the brake pipes ① to length.

7. Carry out a functional test as soon as the Navigator M6 has been completely installed:
- Push the green brake button [A]. The brake on the upper extension arm must release.
- Push the blue brake button [B]. The brake on the lower spring arm must release.

Figure 33: Routing and connecting pneumatic brake pipes



## 11.3 Connecting the optional extension arm lighting

(See "Figure 34“)

1. Observe the safety instructions in Chapter 11.1, on Page 50.

2. Insert the cable ① (extension arm lighting) into the mounting aperture of the spring arm bearing support ⑥ and lay it above the swivel axis (revolute joint) ⑦ .

3. Establish the assembly connection ② between the cable ① and the extension arm lighting using the extension cable ③ included in the scope of delivery.
4. Route the extension cable ③ through the extension arm and out of the Drop tube.
5. Establish the assembly connection ④ between the extension cable ③ and the control cable ⑤ routed out of the Navigator M6.

Figure 34: Connecting the optional extension arm lighting

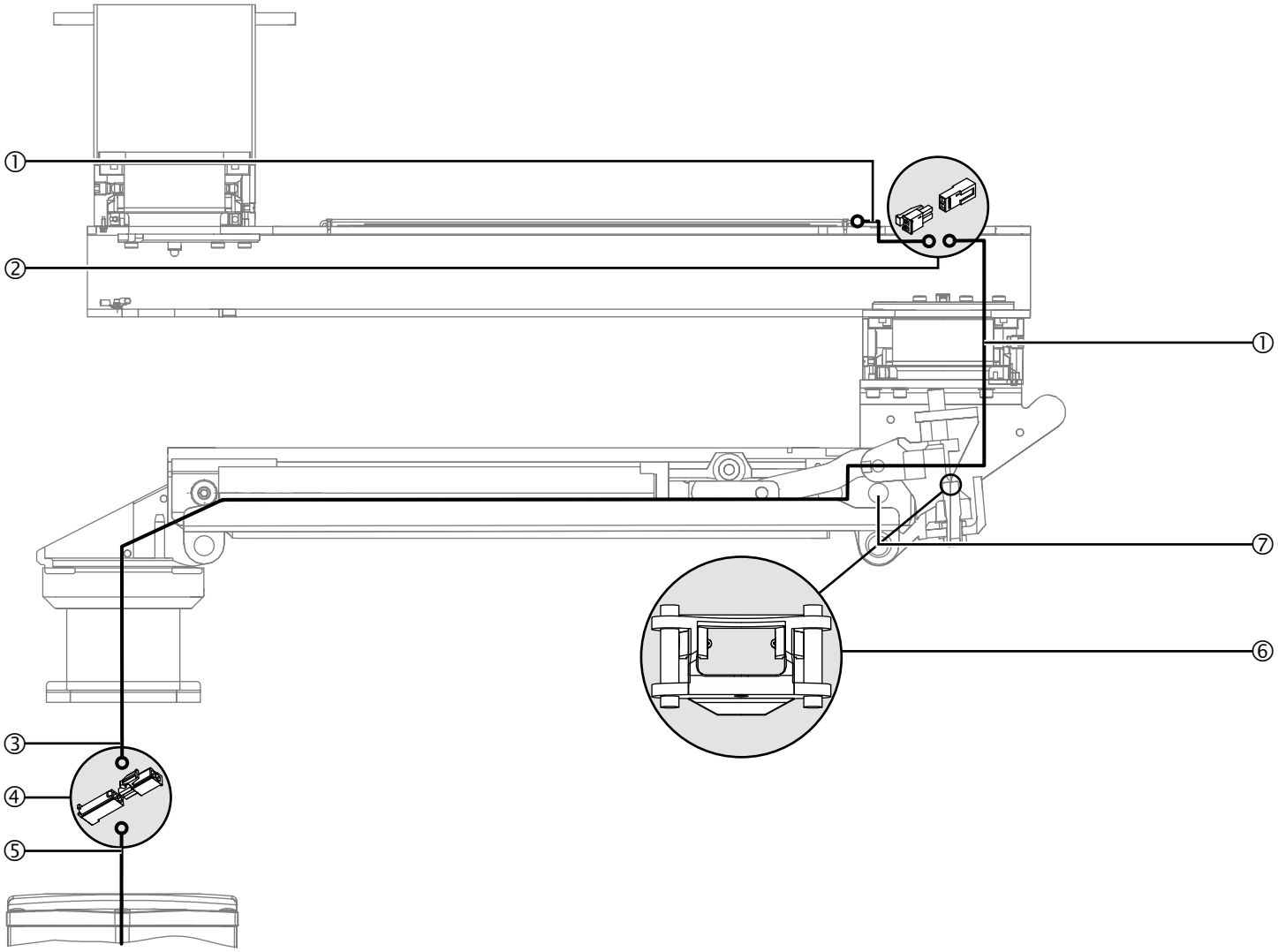



Table 03: Cable assignment – extension arm with spring arm, Dual arm, with Navigator M6 – options

| No. in Fig. 34 | From | To | Designation | Length [mm] | Remark |
|---|---|---|---|---|---|
| ① | Extension arm lighting | Cable ③ | - | 100 | Integrated into the extension arm lighting |
| ③ | Extension arm lighting | Navigator M6 | Extension arm lighting / Service head cable | 3000 | - |

## 11.4 Connecting the earthing cables to the extension arm with spring arm, Dual arm, with Navigator M6

(See "Figure 35“)

The earthing cables are pre-assembled in the extension arm and must be laid and connected in the direction of the arrow.

1. Observe the safety instructions in Chapter 11.1, on Page 50.

2. Lay and connect the earthing cables in the direction of the arrow illustrated in the Figure, and then route them towards the interface plate if required.
3. Insert the earthing cables into the mounting aperture in the spring arm bearing support ③ and lay them above the swivel axis (revolute joint) ② .

4. Route the mounted earthing cables ① from the flange along the ceiling tube towards the interface plate.

5. Route the earthing cables ④ out of the Navigator M6 through the spring arm above the swivel axis (revolute joint) ② and then route them into the mounting aperture in the bearing support ③ of the spring arm.
6. Route the earthing cables ④ through the extension arm and towards the interface plate.

## 11.5 Routing the supply cables and hoses through the extension arm with spring arm, Dual arm, with Navigator M6

(See "Figure 36“)

The power supply cables and gas hoses are pre-assembled in the Navigator M6. Order-specific cables, including nurse call and phone cables, must be separately routed through the pendant system.

1. Observe the safety instructions in Chapter 11.1, on Page 50.

2. Carefully route the supply cables and hoses ① through the pendant system and towards the interface plate:
3. Route the supply cables and hoses ① through the spring arm above the swivel axis (revolute joint) ② and then insert them into the mounting aperture in the bearing support ③ of the spring arm:

- Next, route the Navigator M6 without exerting tensile stress on the supply cables and hoses ① .
- Make sure that the cables laid are not damaged or torn off.

4. Route order-specific cables (nurse call, phone, etc.) through the pendant system.
5. Mount the Navigator M6 onto the pendant system as described in the Installation Instructions of the Navigator M6.

Figure 35: Connecting the earthing cables to the extension arm with spring arm, Dual arm, Navigator M6

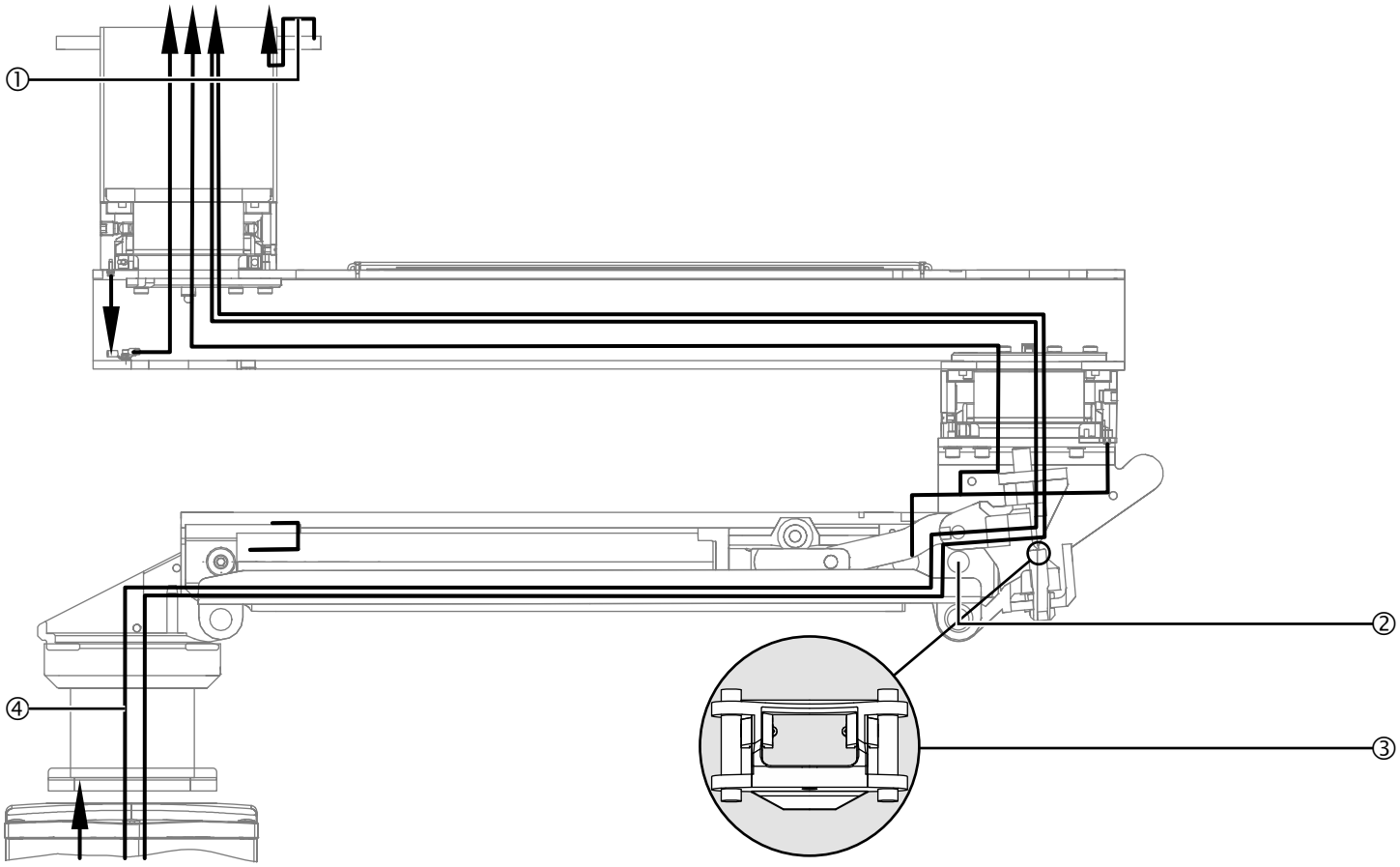
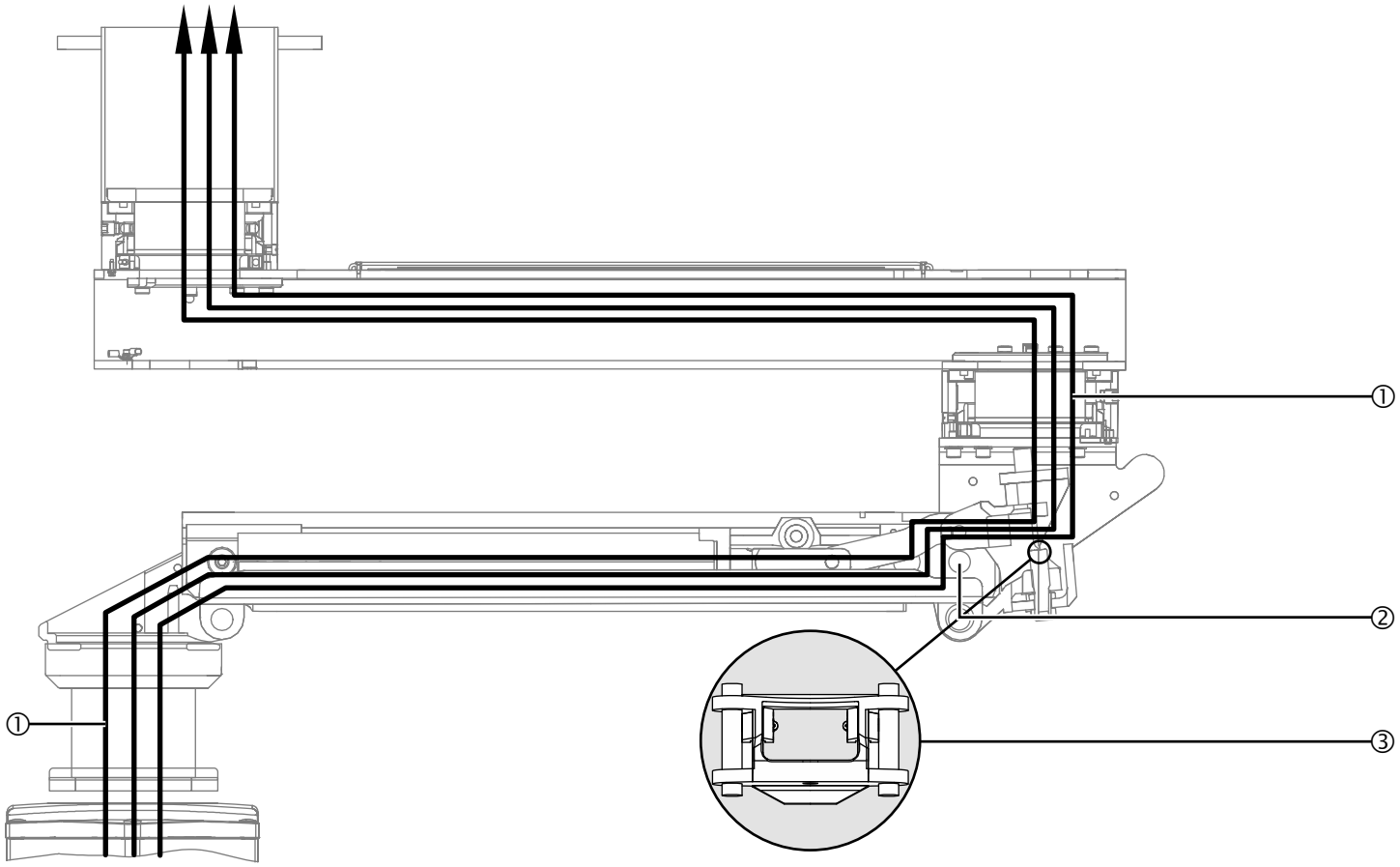



Figure 36: Routing the supply cables and hoses through the extension arm with spring arm, Dual arm, with Navigator M6



## 11.6 Connecting the cables and hoses to the spring arm, Single arm, with Navigator M6

The power cables, pneumatic pipes, earthing and control cables, as well as the gas hoses are pre-installed in the Navigator M6 and must be routed through the pendant system.

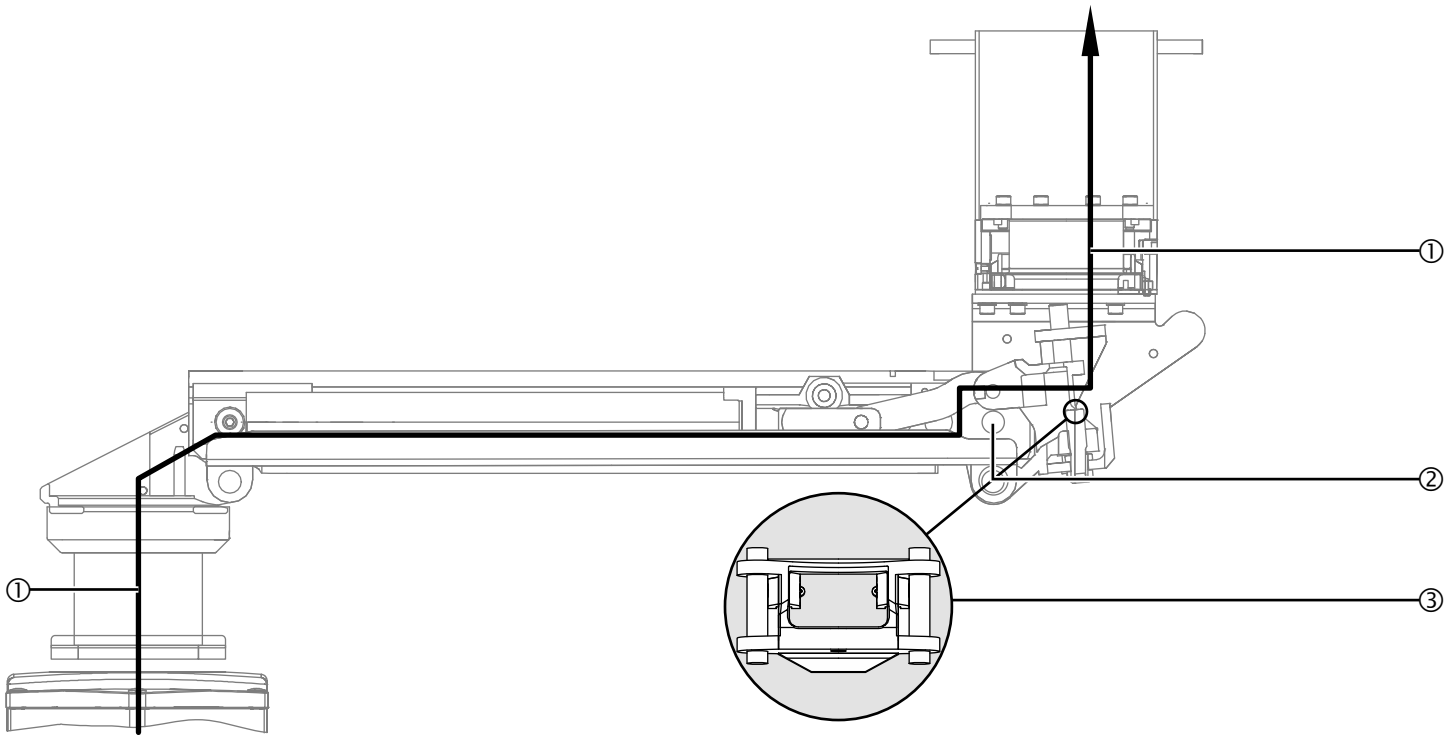
1. Observe the safety instructions in Chapter 11.1, on Page 50.

### 11.6.1 Routing the power cable

(See "Figure 37“)

2. Route the power cable① (laid in a spiral coiled tube if required) through the spring arm above the swivel axis (revolute joint)② and route it into the mounting aperture in the bearing support③ of the spring arm.
3. Route the power supply cable① towards the interface plate.

Figure 37: Connecting the cables and hoses to the spring arm, Single arm, with Navigator M6



### 11.6.2 Routing and connecting pneumatic brake pipes

(See "Figure 38“)

1. Observe the safety instructions in Chapter 11.1, on Page 50.

The pneumatic brake pipes ① in the pendant system are pre-assembled and plugged onto brake connecting point **1**. The brake pipes ① are laid in a spiral coiled tube if required.

**NOTE – Installing and disengaging brake pipes**

The pneumatic supply pipe must not be under pressure:
- To install the brake pipes, push them into the brake connecting point. If the brake pipe is correctly positioned, it can no longer be withdrawn from the brake connecting point.
- To disengage the brake pipes on the plug connector ② push in the unlocking mechanism ③ and then remove the brake pipes.

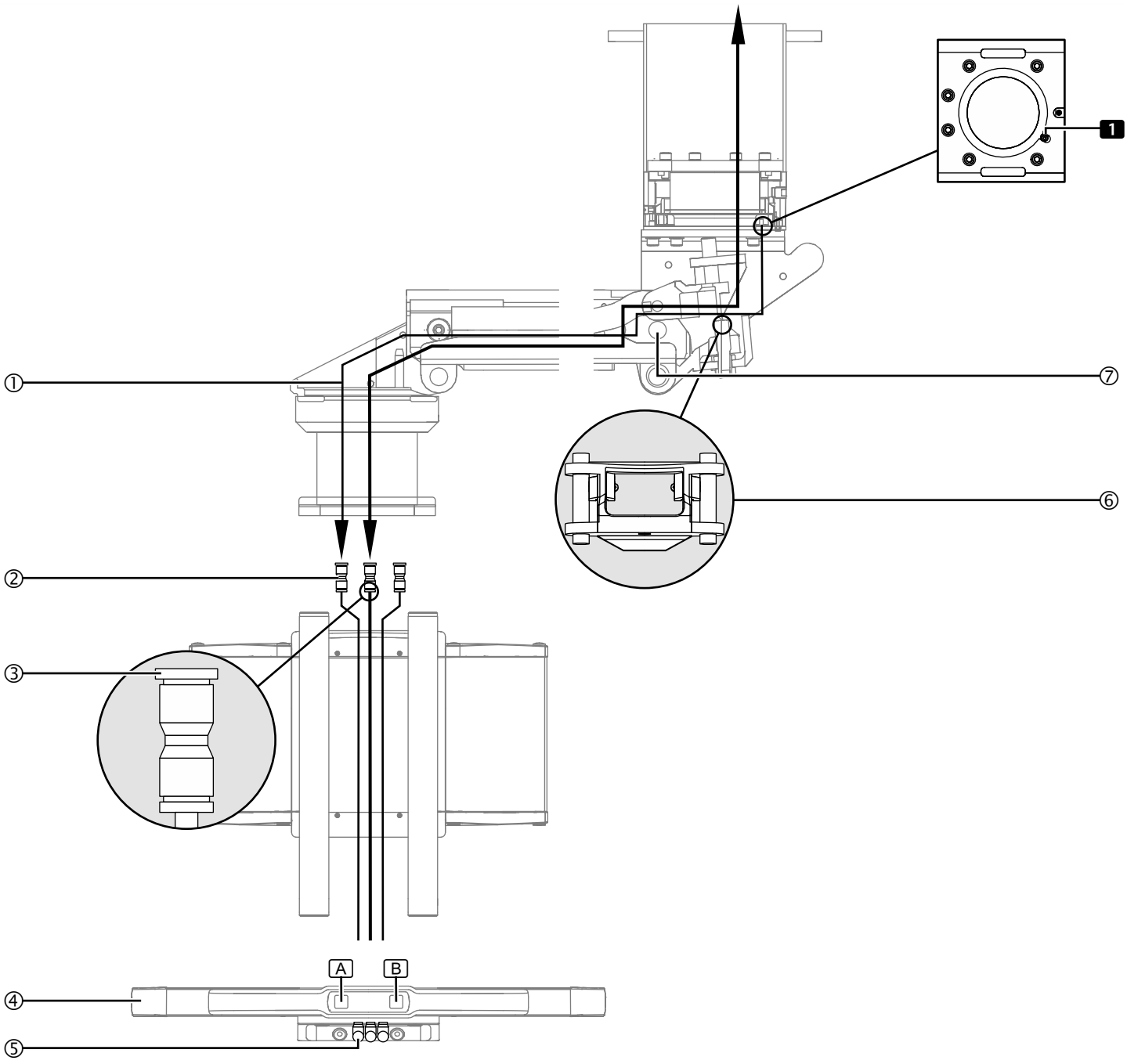
2. Insert the pneumatic brake pipe ① into the mounting aperture in the bearing support ⑥ of the spring arm and lay it above the swivel axis (revolute joint) ⑦ .

3. Plug the air supply hose (BLACK marking) onto the plug connector ② (BLACK marking).
4. Plug the brake pipe (GREEN marking) onto the plug connector ② (GREEN marking).
5. Seal the brake pipe (BLUE marking) using a dummy plug (included in the scope of delivery).

6. Connect the air supply hose and the 2 brake pipes ① to the plug connector ⑤ on the shelf ④ as described in the Installation Instructions of the Navigator M6 .
- The brake pipes ① can be too long depending on the installation position of the shelf. If this is the case, cut the brake pipes ① to length.

7. Carry out a functional test as soon as the Navigator M6 has been completely installed:
- Push the green brake button A. The brake on the spring arm must release.

Figure 38: Routing and connecting pneumatic brake pipes



## 11.7 Connecting the earthing cables to the spring arm, Single arm, with Navigator M6

(See "Figure 39“)

The earthing cables are pre-assembled in the spring arm and must be laid and connected in the direction of the arrow.

1. Observe the safety instructions in Chapter 11.1, on Page 50.

2. Lay and connect the earthing cables in the direction of the arrow illustrated in the Figure, and then route them towards the interface plate if required.
3. Insert the earthing cables into the mounting aperture in the spring arm bearing support ③ and lay them above the swivel axis (revolute joint) ② .

4. Route the mounted earthing cables ① from the flange along the ceiling tube towards the interface plate.

5. Route the earthing cables ④ out of the Navigator M6 through the spring arm above the swivel axis (revolute joint) ② and then route them into the mounting aperture in the bearing support ③ of the spring arm.
6. Route the earthing cables ④ towards the interface plate.

## 11.8 Routing the supply cables and hoses through the spring arm, Single arm, with Navigator M6

(See "Figure 40“)

The power supply cables and gas hoses are pre-assembled in the Navigator M6. Order-specific cables, including nurse call and phone cables, must be separately routed through the pendant system.

1. Observe the safety instructions in Chapter 11.1, on Page 50.

2. Carefully route the supply cables and hoses ① through the pendant system and towards the interface plate:
3. Route the supply cables and hoses ① through the spring arm above the swivel axis (revolute joint) ② and then insert them into the mounting aperture in the bearing support ③ of the spring arm:
- Next, route the Navigator M6 without exerting tensile stress on the supply cables and hoses ① .
- Make sure that the cables laid are not damaged or torn off.
4. Route order-specific cables (nurse call, phone, etc.) through the pendant system.
5. Mount the Navigator M6 onto the pendant system as described in the Installation Instructions of the Navigator M6.

Figure 39: Connecting the earthing cables to the spring arm, Single arm, with Navigator M6

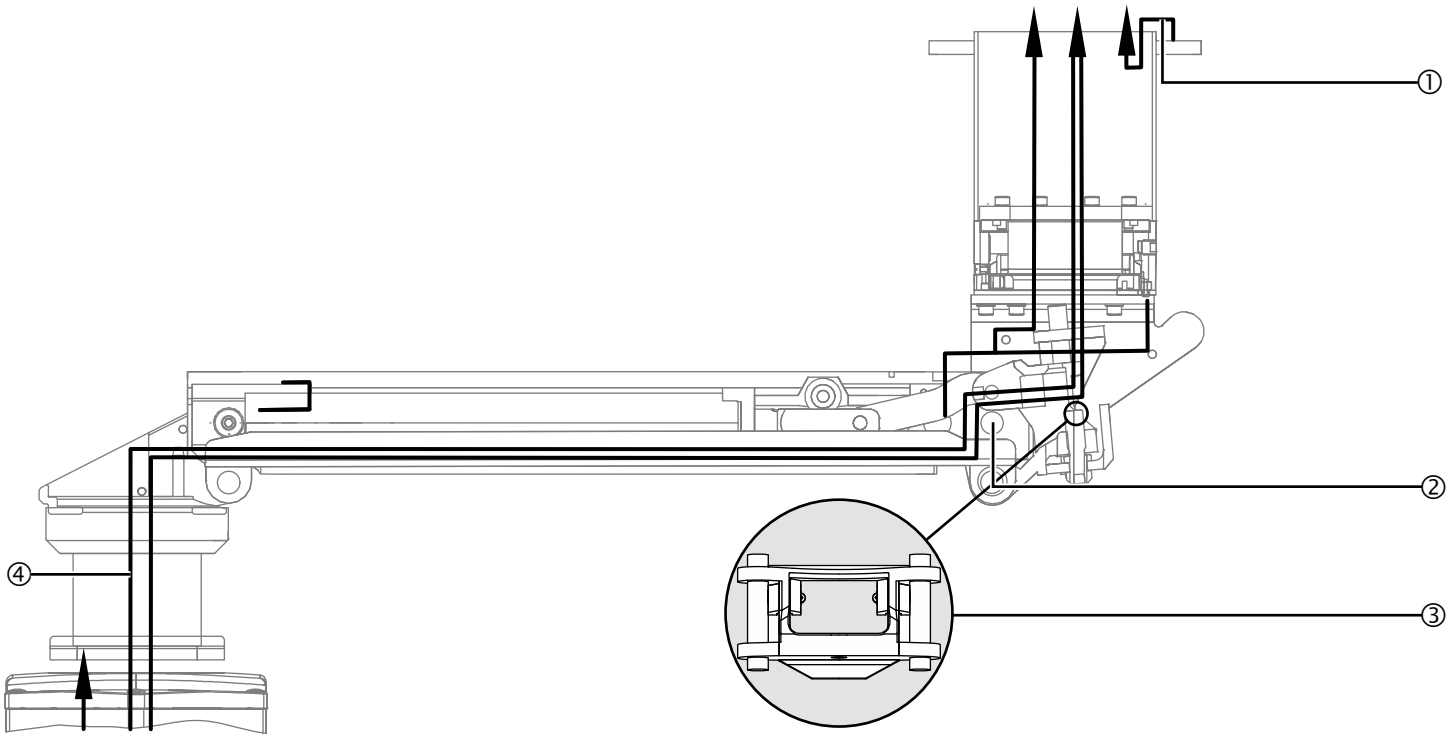
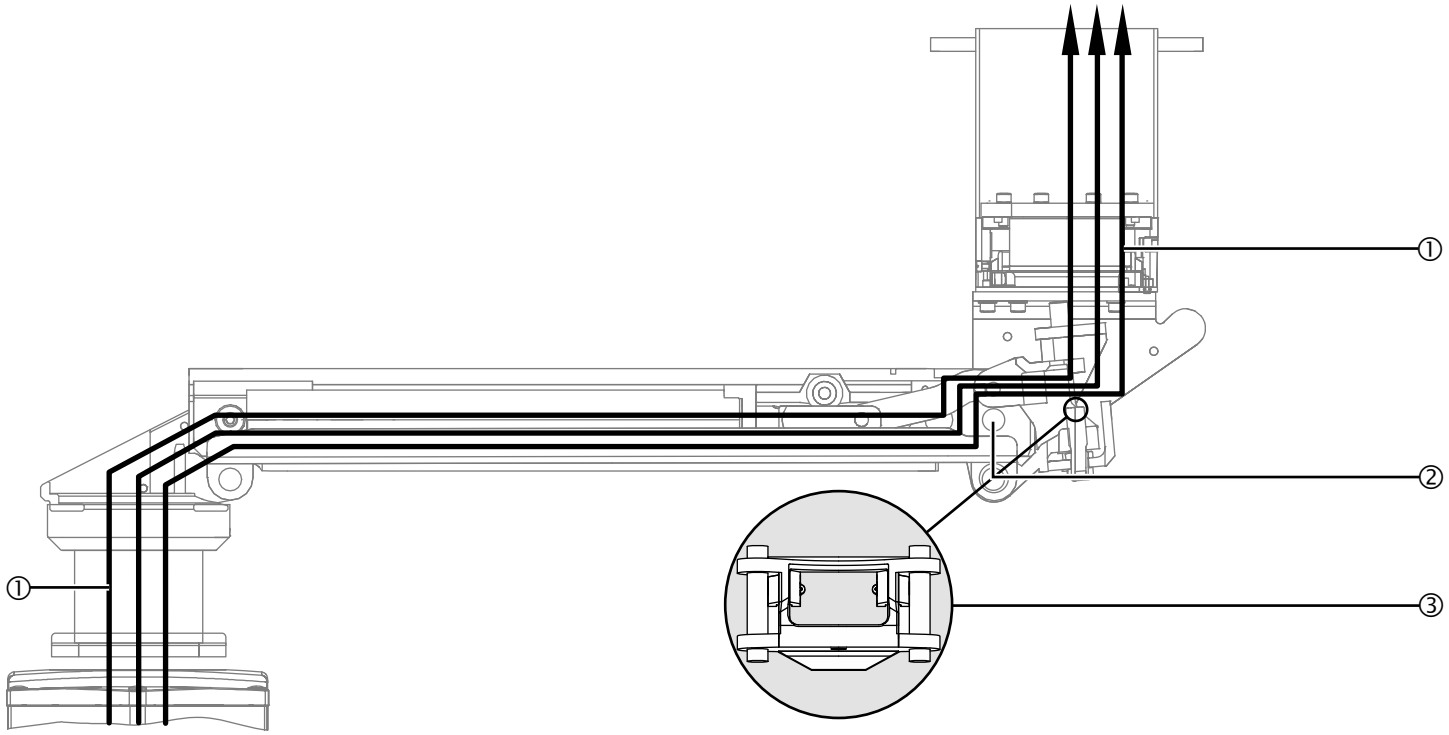



Figure 40: Routing the supply cables and hoses through the spring arm, Single arm, with Navigator M6



## 12.1 Safety Instructions

**⚠WARNING**

**Qualification of installation personnel**

**The electrical connection of the pendant system and the Navigator M6 may only be performed by a qualified electrician:**

- Observe the safety instructions set out in the Installation Instructions Part 1 – Ceiling Mount, Chapter "Power Supply".

**The gas supply connection of the Navigator M6 may only be performed by the supplier of the central gas system:**

- The supplier of the central gas supply system is responsible for carrying out leak tightness, pressure, flow, contamination and gas type tests.

**Electric shock hazard**

**Contact with energized components presents a danger to life from electric shock. Motor-driven, mobile device components can cause injury in the case of being switched on unintentionally. Prior to any installation and setting up work, the device must be disconnected from the mains:**

- Disconnect all the poles of the power supply source / device from the mains and prevent it from being reconnected accidentally.
- Check whether the device is de-energised.
- Earth and short-circuit the device.
- Cover and shield any adjacent energised parts.

**Electric shock hazard through defective insulation**

**The pendant system or the Navigator M6 can be energised if the insulation is defective:**

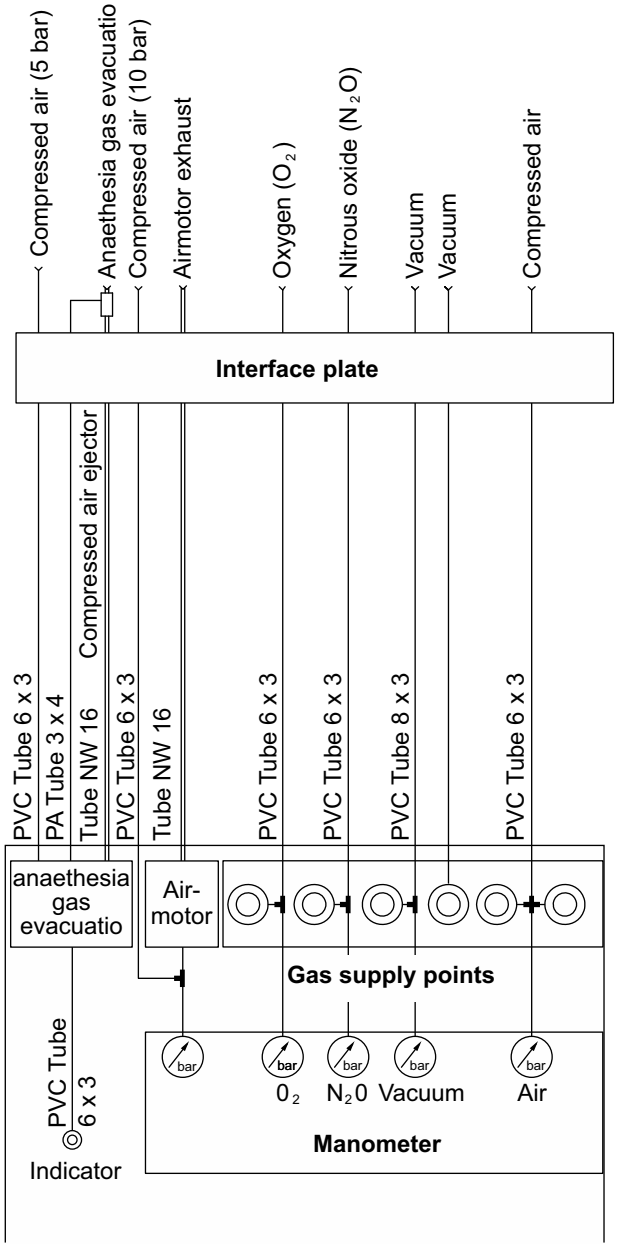
- Always earth the pendant system and the Navigator M6.
- The power supply and earthing cables must be connected to the strain relieving mechanisms of the interface plate.

**Damaged power cables, gas hoses and compressed air hoses**

**Damaged power cables can carry an electric voltage of 230V (120V) which energises the pendant system, and supply gases can escape from damaged supply hoses:**

- Check all cables and hoses for damage. Make sure you carefully insert them without cables/hoses crossing each other, without loops and without twisting.
- Lay the cables and hoses in the extension arm and spring arm in such a way that they are not exposed to tensile stress in any position.
- Cables and hoses must be routed straight upwards out of the flange in order to prevent damage (e.g. rubbing of the sheath) and enable their free rotation.
- Protruding cables and hoses must not be placed in the Navigator M6 or on the flanges but must be placed on the interface plate and secured against falling using cable retainers.
- Electric cables must be laid in accordance with regional regulations (in a spiral coiled tube if required).

Figure 41: Installing gas supply hoses and exhaust air ducts




Navigator M6

## 12.2 Installing gas supply hoses and exhaust air ducts

(See Figure 41)

1. Observe the safety instructions in Chapter 12.1, on Page 65.

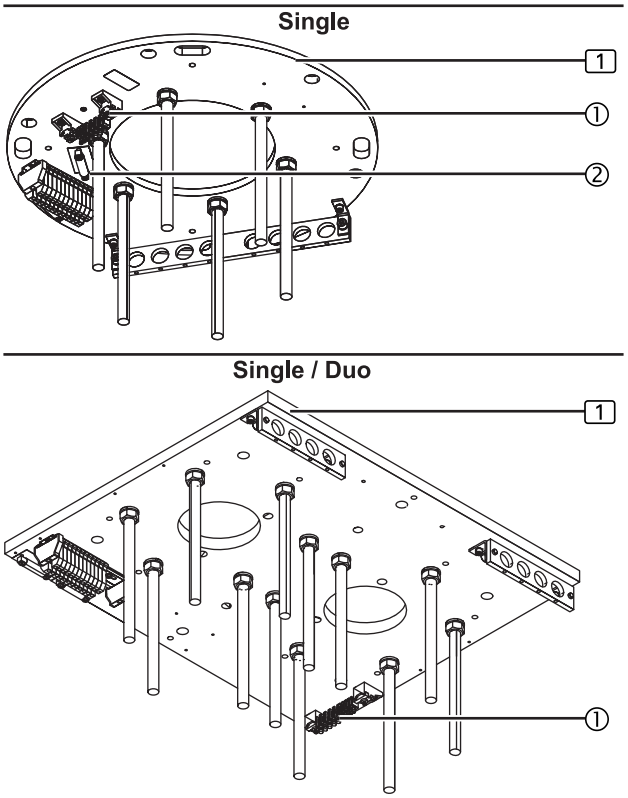
**NOTE – Make sure that the gas types are correctly assigned**

- The gas type is indicated on a label attached to the gas supply hoses equipped with a sealing plug.
- The sealing plugs may only be removed during installation.
- Check the hoses and ducts for contamination and clean them with oil-free air.

The illustration shows the example of a gas supply hose. Make sure that the cables, hoses and ducts are assigned to the correct supply outlet points.

1. Check the gas supply hoses for contamination and clean them with oil-free air.
2. Fit a hose clamp to the gas supply hose, remove the sealing plug and push the hose onto the correct gas supply outlet point.
- Up to 3 gas supply hoses and up to 2 vacuum hoses may be connected to a gas valve using Y connectors.
3. Press on the hose clamp and check that it is securely in place.
4. Connect and secure the anaesthetic gas suction hoses and the air motor exhaust air hoses.
5. Perform a gas type test as described in Chapter 13.1, on Page 68.

Figure 42: Connecting the earthing cables




## 12.3 Connecting the earthing cables

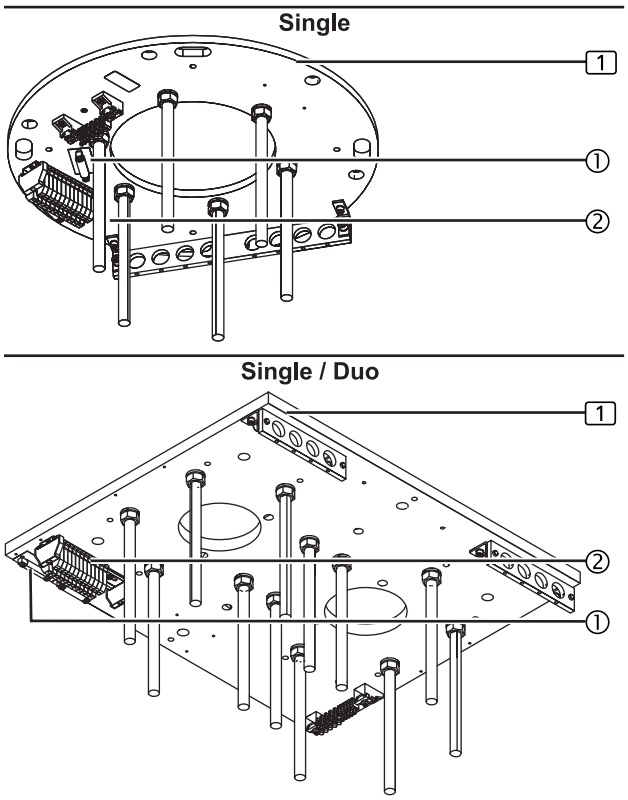
(See Figure 42)

The Figure shows a simplified illustration of the interface plate [1] without extension arm and cables, etc.

1. Observe the safety instructions in Chapter 12.1, on Page 65.
2. Cut all green/yellow earthing cables (2.5mm² and 10mm²) to the correct length.
3. Route the earthing cables through the strain relieving mechanism and connect them to the series terminals 4mm² or 10mm² on the earthing terminal block ① on the interface plate [1].
4. Check that the earthing cables are securely in place in the strain relieving mechanisms ② :

- All earthing cables must be securely installed in the strain relieving mechanisms ② .

Figure 43: Connecting power cables




## 12.4 Connecting power cables

(See Figure 43)

The Figure shows a simplified illustration of the interface plate [1] without extension arm and cables, etc.

1. Observe the safety instructions in Chapter 12.1, on Page 65.
2. Route all power cables through the strain relieving mechanism ① and connect them to the terminal block ② as illustrated in the wiring diagram provided at the installation site.
3. Check that the power cables are securely in place in the strain relieving mechanisms ① :

- All power cables must be securely installed in the strain relieving mechanisms ① .

## 12.5 Checking the supply cables and hoses

Carefully check that the supply cables and hoses are not trapped or bent across the entire rotating motion of the extension arm and spring arm.

## 13.1 Gas inspection

1. Gas outlets and markings in accordance with DIN EN ISO 9170-1 or DIN EN ISO 9170-2
2. Leakage in accordance with DIN EN ISO 11197
3. Congestion in accordance with DIN EN ISO 7396-1 or DIN EN ISO 7396-2
4. Solid contamination in accordance with DIN EN ISO 7396-1 or DIN EN ISO 7396-2
5. Gas type in accordance with DIN EN ISO 7396-1 or DIN EN ISO 7396-2

## 13.2 Mechanical Collision Test

When swivelling the pendant system, check that no collisions can occur with:

- other pendant systems,
- ceilings or walls,
- other assembly units.

Figure 44: Preparing the installation of the canopy

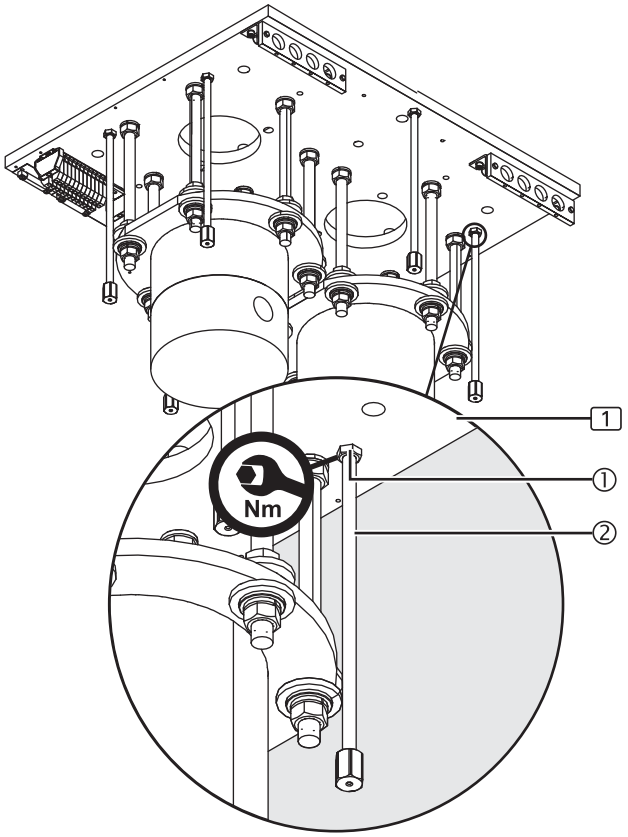
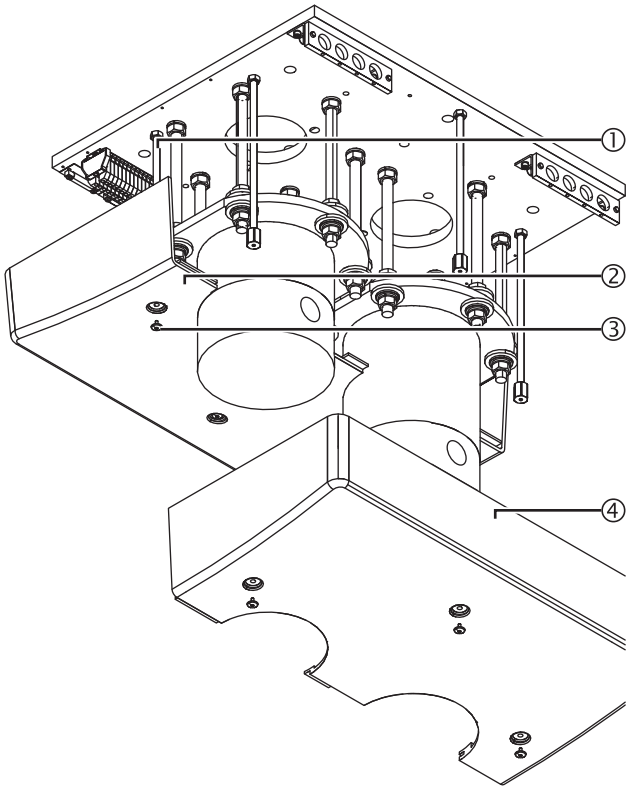



Figure 45: Mounting the canopy halves




## 14.1 Mounting a Single / Dual canopy

### 14.1.1 Preparing the installation of the canopy

(See Figure 44)

The Figure shows a simplified illustration of the interface plate without cables and without the extension arm or spring arm.

1. Screw the hexagonal nuts M10 ① onto the threaded bolts M10 x 360 mm ② .
2. Screw the threaded bolts M10 x 360 mm ② into the interface plate [1] in such a way that the canopy halves mounted afterwards are flush with the intermediate ceiling / prefabricated ceiling.

- If an interface plate [1] is mounted to the raw ceiling, the threaded bolts M10 x 360 mm ② must be cut to length accordingly.

**⚠ WARNING**

**Risk of the canopy dropping**

**The canopy can drop if the fixing elements have not been properly tightened:**

- Tighten the 4 hexagonal nuts M10 ① to 46 Nm.

3. Check that the threaded bolts M10 x 360 mm ② are securely in place:

- The threaded bolts M10 x 360 mm ② must be mounted at the same distance to the interface plate [1].
- The 4 hexagonal nuts M10 ① must be tightened to 46 Nm.

### 14.1.2 Mounting the canopy halves

(See Figure 45)

The Figure shows a simplified illustration of the interface plate without cables and without the extension arm or spring arm.

1. Place the sectional strip (not illustrated in the Figure) onto the first canopy half ② (the canopy can be optionally sealed with silicone).
2. Place the first canopy half ② onto the threaded bolts M10 x 360 mm ① and then screw in and tighten the 3 cover screws ③ .
3. Check that the canopy half ② is flush with the intermediate ceiling / prefabricated ceiling.

- If required, readjust the 6 threaded bolts M10 x 360 mm ① as described in Chapter 14.1.1, on Page 69.

4. Place the sectional strip (not illustrated) onto the second canopy half ④ and push it into the first canopy half ① in such a way that they engage tightly with each other.
5. Place the second canopy half ④ onto the threaded bolts M10 x 360 mm ① and then screw in and tighten the 3 cover screws ③ .
6. Check that the canopy halves ② / ④ are securely in place:

- The canopy halves ② / ④ must engage tightly with each other.
- The canopy must be fully flush with the intermediate ceiling / prefabricated ceiling.
- The 6 cover screws ③ must be tightened.

Figure 46: Preparing the installation of the canopy

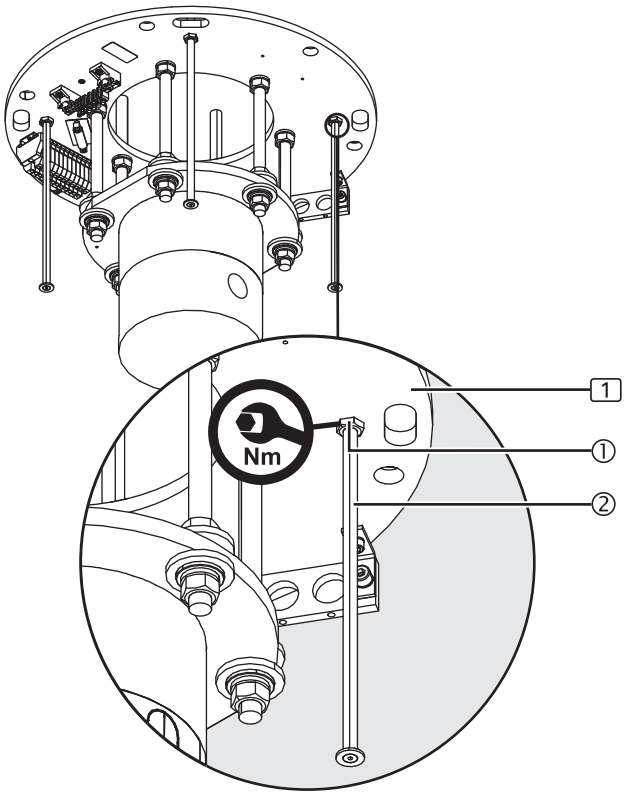
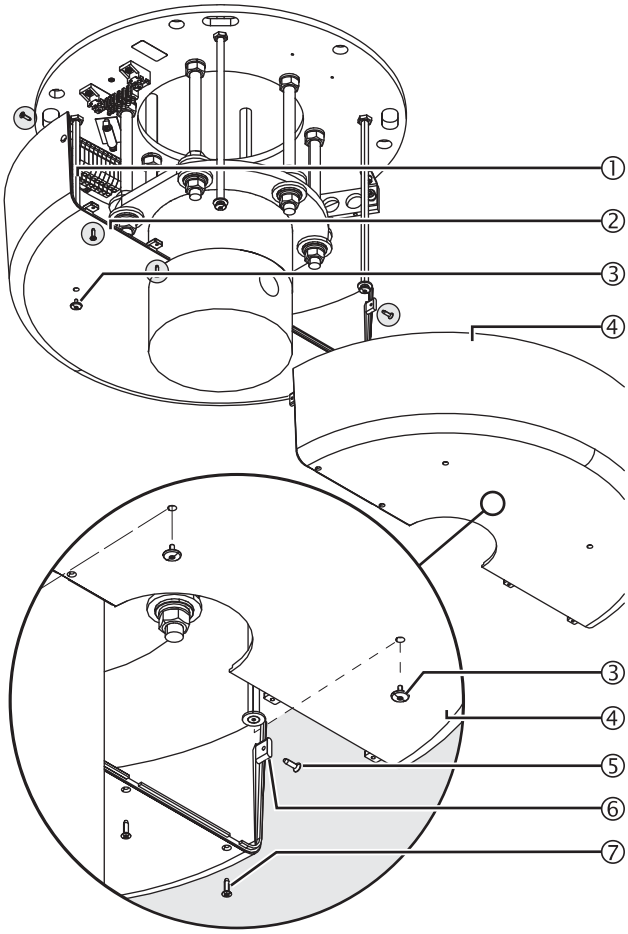



Figure 47: Mounting the canopy halves




## 14.2 Mounting the Single canopy

### 14.2.1 Preparing the installation of the canopy

(See Figure 46)

The Figure shows a simplified illustration of the interface plate without cables and without the extension arm or spring arm.

1. Screw the hexagonal nuts M10 ① onto the threaded bolts M10 x 360 mm ② .
2. Screw the threaded bolts M10 x 360 mm ② into the interface plate [1] in such a way that the canopy halves mounted afterwards are flush with the intermediate ceiling / prefabricated ceiling (see “Figure 18: on Page 36”).

• If an interface plate [1] is mounted to the raw ceiling, the threaded bolts M10 x 360 mm ② must be cut to length accordingly.

**⚠WARNING**

**Risk of the canopy dropping**

**The canopy can drop if the fixing elements have not been properly tightened:**

• Tighten the 4 hexagonal nuts M10 ① to 46 Nm.

3. Check that the threaded bolts M10 x 360 mm ② are securely in place:

• The threaded bolts M10 x 360 mm ② must be mounted at the same distance to the interface plate [1].
• The 4 hexagonal nuts M10 ① must be tightened to 46 Nm.

### 14.2.2 Mounting the canopy halves

(See Figure 47)

The Figure shows a simplified illustration of the interface plate without cables and without the extension arm or spring arm.

1. Place the sectional strip (not illustrated in the Figure) onto the first canopy half ② (the canopy can be optionally sealed with silicone).
2. Place the first canopy half ② onto the threaded bolts M10 x 360 mm ① and then screw in and tighten the 2 cover screws ③ .
3. Check that the canopy half ② is flush with the intermediate ceiling / prefabricated ceiling.

• If required, readjust the 4 threaded bolts M10 x 360 mm as described in Chapter 14.2.1, on Page 70.

4. Place the sectional strip (not illustrated) onto the second canopy half ④ and push it into the first canopy half ② in such a way that they engage tightly with each other.
5. Place the second canopy half ④ onto the threaded bolts M10 x 360 mm ① and then screw in and tighten the 2 cover screws ③ .
6. Screw 1 sheet metal screw each ⑤ into the 2 straps ⑥ on the opposite outer faces of the canopy halves ② / ④ .
7. Screw in and tighten 4 sheet metal screws each ⑦ to the bottom ends of the canopy halves ② / ④ .
8. Check that the canopy halves ① are securely in place:

• The canopy halves ② / ④ must engage tightly with each other.
• The canopy must be fully flush with the intermediate ceiling / prefabricated ceiling.
• All fixing screws ③ / ⑤ / ⑦ must be tightened.

Figure 48: Mounting the cover caps

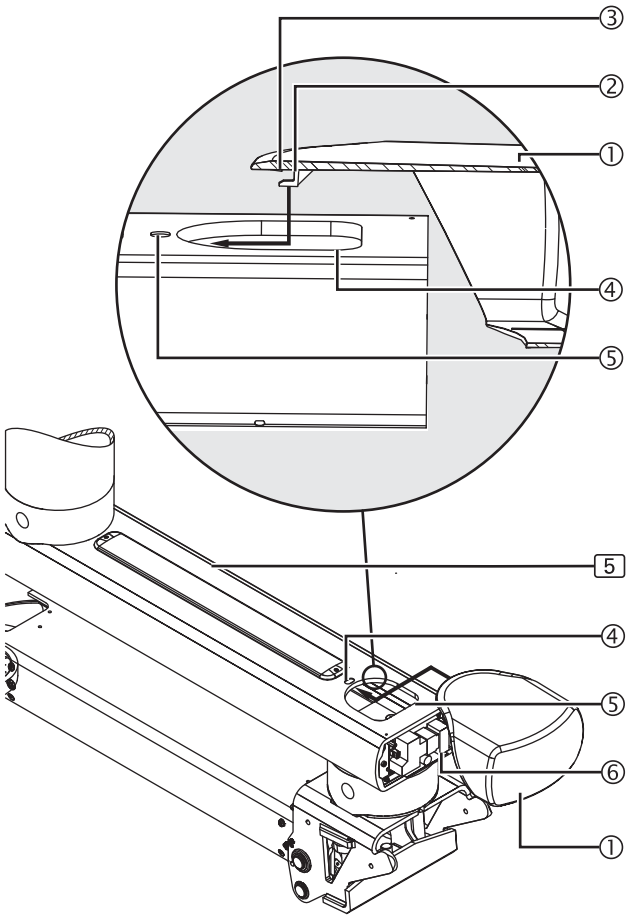
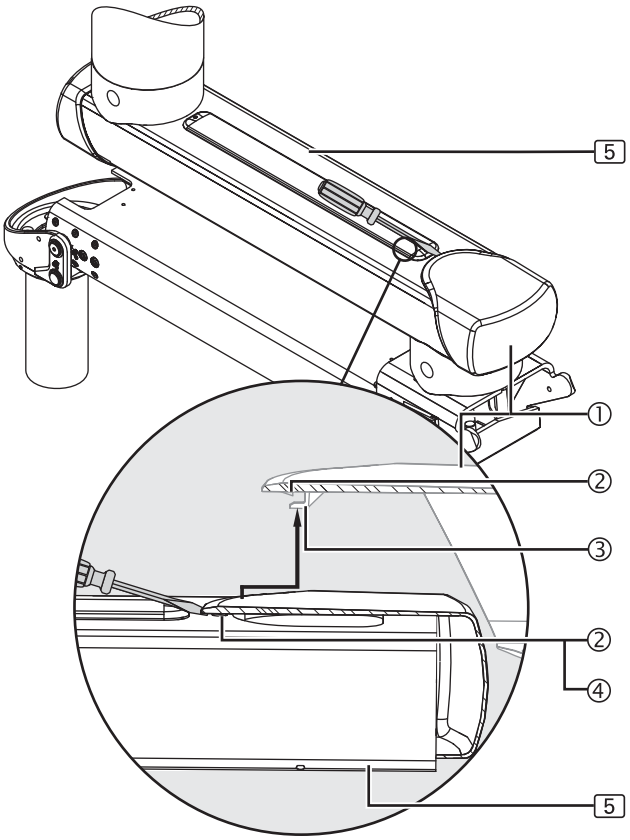



Figure 49: Dismantling the cover caps




## 14.3 Mounting/dismantling the cover caps to/from the extension arm

### 14.3.1 Mounting the cover caps

(See Figure 48)

The Figure shows a simplified representation with only the extension arm with spring arm [5] without cables. The detailed representation shows a sectional view of the cover cap ① .

1. When placing the cover cap ① onto the extension arm end, make sure that the holding down clamp ② sits in the aperture ④ .
2. Push the cover cap ① onto the extension arm with spring arm [5] as far as it will go and make sure that the latch ③ snaps into place in the groove ⑤ :

- Make sure that the power pack ⑥ and the cables in the extension arm with spring arm [5] are not damaged.
- If properly mounted, the cover cap ① can no longer be withdrawn from the extension arm with spring arm [5].

3. Check that the cover cap ① is securely in place:

- The cover cap ① must be absolutely level with the contours of the extension arm with spring arm [5].

### 14.3.2 Dismantling the cover caps

(See Figure 49)

The Figure shows a simplified representation with only the extension arm with spring arm [5] without cables. The detailed representation shows a sectional view of the cover cap ① .

1. To dismantle the cover cap ① push a small, flat screwdriver between the cover cap ① and the extension arm with spring arm [5] and gently push the latch ② out of the groove ④ .

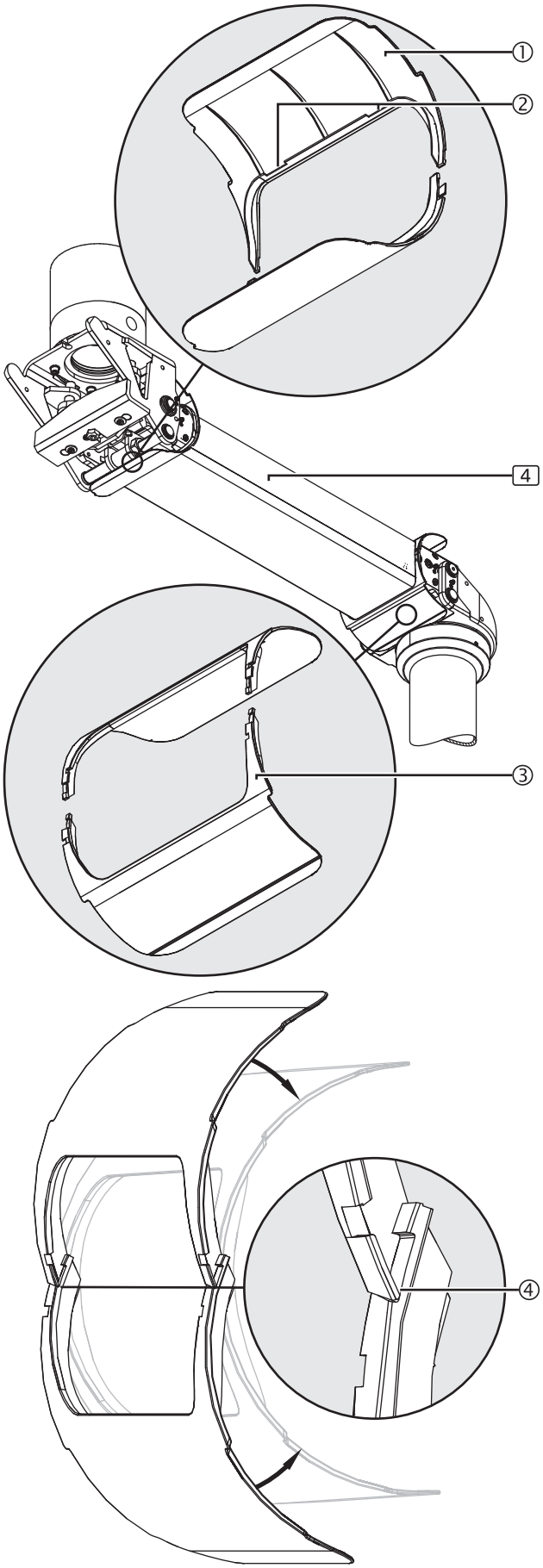
- Make sure you do not damage the latch ② .
- Make sure that the cover cap ① neither breaks nor bends.

2. Pull the cover cap ① backwards until the holding down clamp ③ no longer engages and the cover cap ① can be freely moved.

- Do not twist the cover cap ① and do not remove it with force.

3. Remove the cover cap ① towards the top and keep it in a safe place.

Figure 50: Mounting the cover plates to the spring arm




## 14.4 Mounting the cover plates to the spring arm

(See Figure 50)

The Figure shows the spring arm [4]. The installation procedure for the extension arm with spring arm [5] version is identical.

The Figure shows a simplified representation with only the spring arm [4] without cables.

### 14.4.1 Inserting the rear cover plates

1. Place the 2 rear cover plate halves ① (identifiable by the 2 cutouts ② ) around the spring arm.

2. To make sure that the cover plate halves securely snap into place, put them inside each other in the correct position ④ illustrated in the Figure and then stick them together in the direction of the arrow.

å The cover plate halves engage with each other and are connected.

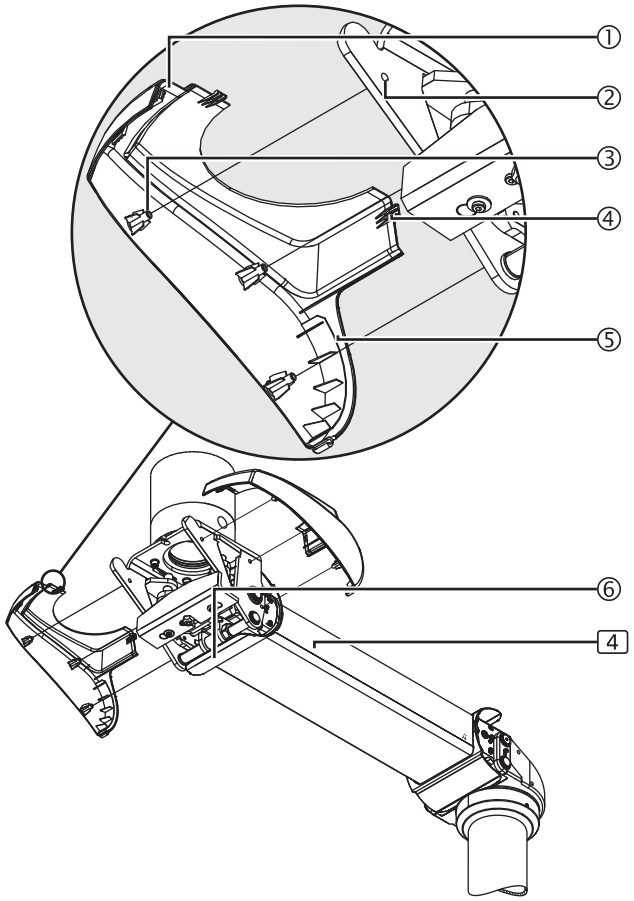
3. Check that the cover plate halves ① are securely in place:

• All the latches on the cover plate halves ① must be securely engaged with each other.

### 14.4.2 Mounting the front cover plates

4. Repeat procedure for the 2 front cover plate halves ③ .

Figure 51: Mounting the rear side panels to the spring arm




## 14.5 Mounting the rear side panels to the spring arm

(See Figure 51)

The Figure shows the spring arm [4]. The installation procedure for the extension arm with spring arm [5] version is identical.

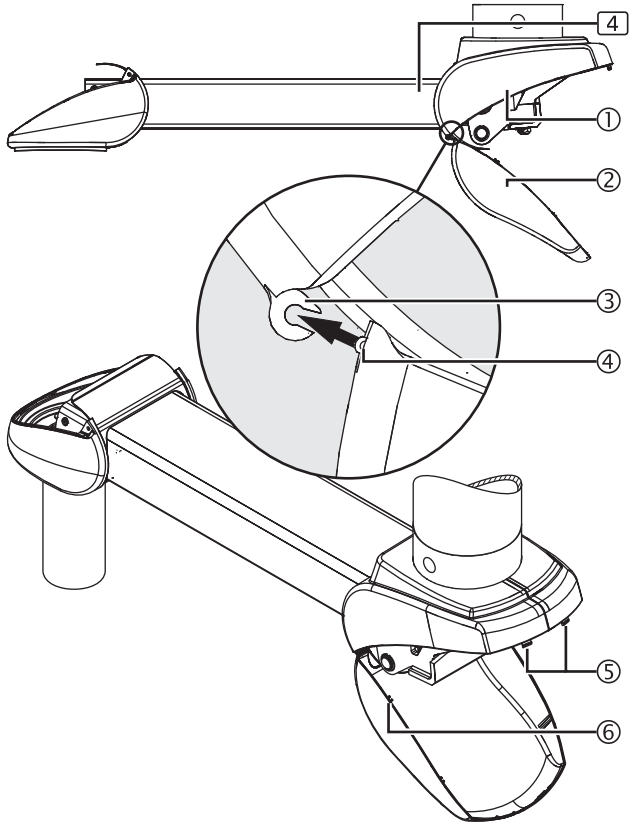
The Figure shows a simplified representation with only the spring arm [4] without cables.

1. Place the first side cover panel ① and insert 3 plastic pins ③ into the holes ② in the spring arm.
- Make sure that the cover plate ⑥ protrudes into the guide ⑤ of the side cover panel ① .

2. Place the second side cover panel and insert 3 plastic pins ③ into the holes ② in the spring arm.
- The cover plate ⑥ must protrude into the guide ⑤ of the side cover panel ① and the locking devices ④ on the 2 side cover panels must engage with each other.

3. Check that the side cover panels are securely in place:
- The locking devices ④ must be connected to each other.
- The cover plate ⑥ must slide in the guides ⑤ of the side cover panels.
- The side cover panels must engage tightly with each other without gaps.

Figure 52: Mounting the lower, rear covers to the spring arm




## 14.6 Mounting the lower, rear covers to the spring arm

(See Figure 52)

The Figure shows the spring arm [4]. The installation procedure for the extension arm with spring arm [5] version is identical.

The Figure shows a simplified representation with only the spring arm [4] without cables.

1. Hold the cover ② in the angle illustrated in the Figure.
2. Insert the joint ④ of the rear, lower cover ② into the 2 mounting fixtures ③ in the upper side cover panels ① .

3. Fold up the cover ② such that the 2 latches ⑤ snap into place.

4. Check that the cover ② is securely in place:
- The guides ⑥ of the cover ② must sit in the side cover panels ① .
- The cover ② must sit in the side cover panels ① without gaps.

Figure 53: Mounting the front side cover panels to the spring arm

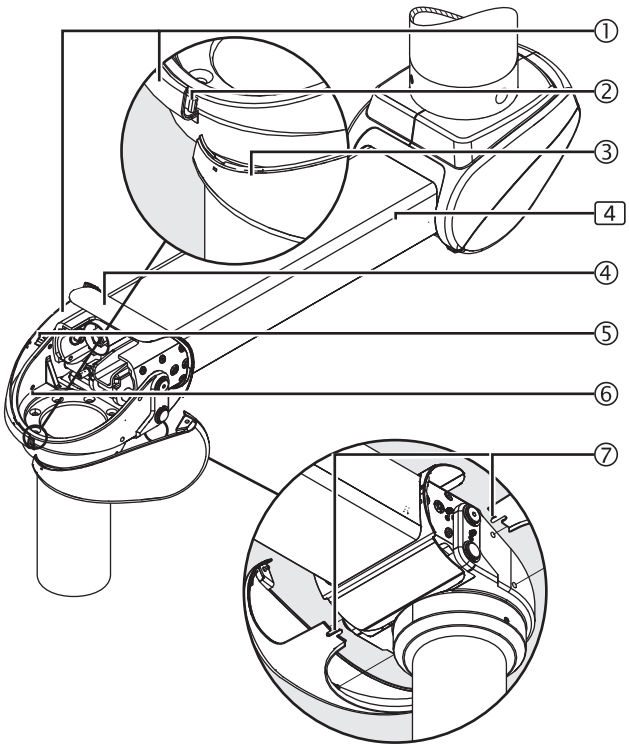
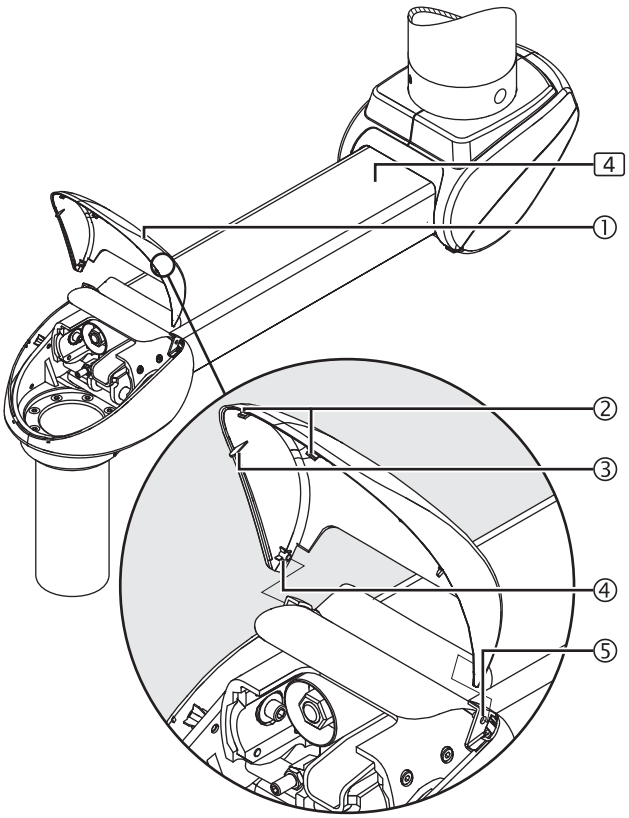



Figure 54: Mounting the front upper cover to the spring arm




## 14.7 Mounting the front side cover panels to the spring arm

(See Figure 53)

The Figure shows the spring arm [4]. The installation procedure for the extension arm with spring arm [5] version is identical.

The Figure shows a simplified representation with only the spring arm [4] without cables.

1. Place the left-hand side cover panel ① and then insert 2 plastic pins ④ into the holes ⑤ in the spring arm.
- Make sure that the cover plate ④ protrudes into the guide (not illustrated in the Figure) of the side cover panel ① .

2. Attach the right-hand side cover panel ③ to the mounting fixture ② on the front of the left-hand side cover panel ①, route it to the spring arm and then insert 2 plastic pins ④ into the holes ⑤ in the spring arm.
3. Make sure that the cover plate ④ protrudes into the guide (not illustrated in the Figure) of the side cover panel ③ .
4. Gently push the 2 straps ⑦ at the bottom of the side cover panels into each other and engage them with each other.

5. Check that the side cover panels are securely in place:
- The cover plate must slide in the guides (not illustrated in the Figure) of the side cover panels.
- The side cover panels must engage tightly with each other without gaps.

## 14.8 Mounting the front upper cover to the spring arm

(See Figure 54)

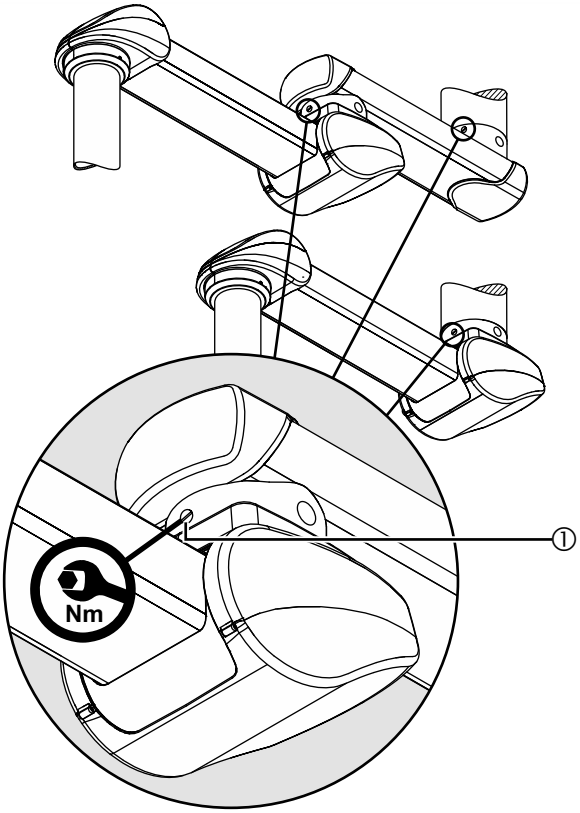
The Figure shows the spring arm [4]. The installation procedure for the extension arm with spring arm [5] version is identical.

The Figure shows a simplified representation with only the spring arm [4] without cables.

1. Place the cover ① from above and attach one of the 2 axes ④ to the mounting fixture ⑤ of the side cover panel.
2. Gently pull the front upper cover ① apart and attach the second axis ④ to the mounting fixture ⑤ of the side cover panel.

3. Fold down the cover ① until the 2 latches ② snap into place.
4. Check that the cover ① is securely in place:
- The guides ③ of the cover ① must sit in the side cover panels.
- The cover ① must sit on the side panels without gaps.

Figure 55: Adjusting the brake on the bearing unit (only Navigator Lift ™ 180 Air*Plus*)




## 15.1 General safety instructions

**⚠ WARNING**

**Electric shock hazard**

**Electrical supply cables are laid in the pendant system. Contact with energized components presents a danger to life from electric shock. Disconnect the device from the mains before any adjustment work:**

- Disconnect all poles of the pendant system from the mains and prevent it from being switched back on again.
- Make sure that all the devices connected via the Navigator M6 are de-energised.

## 15.2 Adjusting the mechanical brake for the extension arm and spring arm

### 15.2.1 Adjusting the brake on the bearing unit (only Navigator Lift ™ 180 Air*Plus*)

(See Figure 55)

In the case of a failure of the pneumatic (compressed air operated) brakes, the additional mechanical brakes (friction brakes) of the Navigator Lift ™ 180 Air*Plus* version keep the extension arm and spring arm stable in any set position. Adjust the braking force in such a way that the spring arm or extension arm remains stable in any position and can still be conveniently adjusted.

Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.

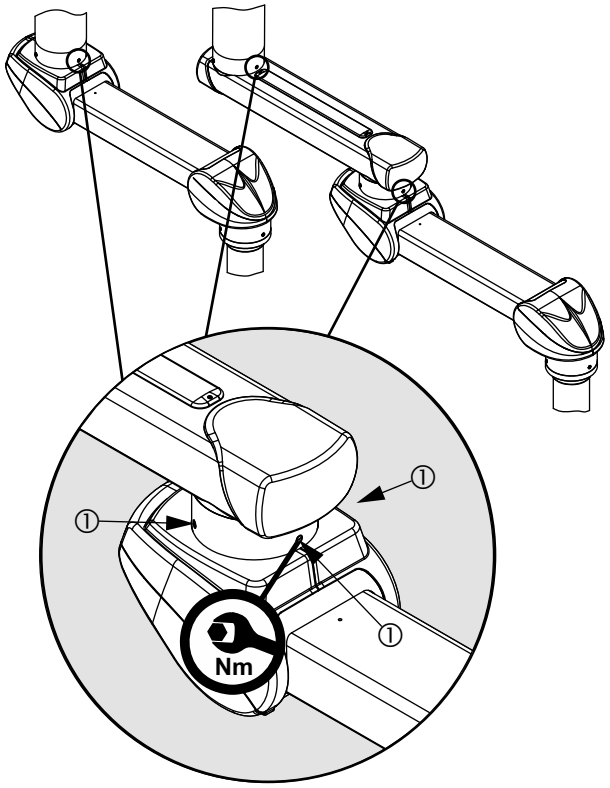
- Tool to be used
  - Use a suitable torque spanner.

- To increase the braking force
  - Screw the slotted brake screw ① by uniformly rotating it to the right (clockwise).
  - Tighten the brake screw ① to up to 1.6 Nm.

- To reduce the brake force
  - Screw the slotted brake screw ① by uniformly rotating it to the left (counter-clockwise).

- Perform a function test.

Figure 56: Adjusting the brake on the Bearing Unit Friction (only Navigator Lift ™ 180 Friction)




### 15.2.2 Adjusting the brake on the Bearing Unit Friction (Navigator Lift ™ 180 Friction)

(See Figure 56)

For the pendant system Navigator Lift ™ 180 Friction, the mechanical brakes (friction brakes) keep the extension arm or spring arm in any adjusted position. Adjust the braking force in such a way that the spring arm or extension arm remains stable in any position and can still be conveniently adjusted. If the brakes are not adjusted correctly, the extension arm or spring arm can move automatically in an uncontrolled manner.

**NOTE: Adjusting the brakes for the Navigator Lift ™ 180 Friction – Dual**

Observe the end stop recommendation in Chapter 15.9.2, on Page 84 and make sure that you turn the brake screws of the Bearing Unit Friction on the ceiling tube tighter than on the bearing point of the spring arm. This facilitates the bending of the spring arm and allows the bearing unit on the spring arm to rotate freely.

Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.

- Tool to be used
  - Use a suitable torque spanner.

- To increase the braking force
  - Screw the slotted brake screws ① by uniformly rotating them to the right (clockwise).
  - All 3 brake screws must be tightened with the same tightening torque which must, however, not exceed 1.6 Nm.

- To reduce the brake force
  - Screw the slotted brake screws ① by uniformly rotating them to the left (counter-clockwise).

- Perform a function test.

Figure 57: Adjusting the brake on the Drop tube Friction (slide bearing)

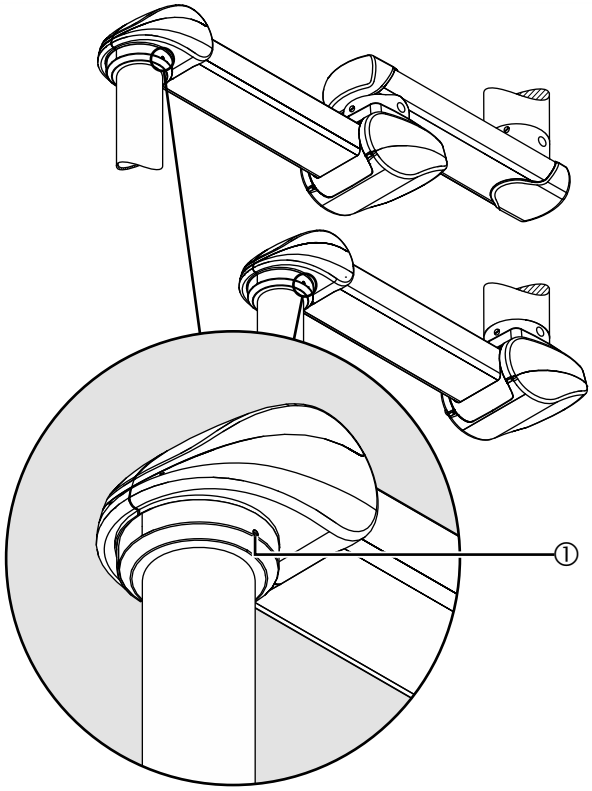
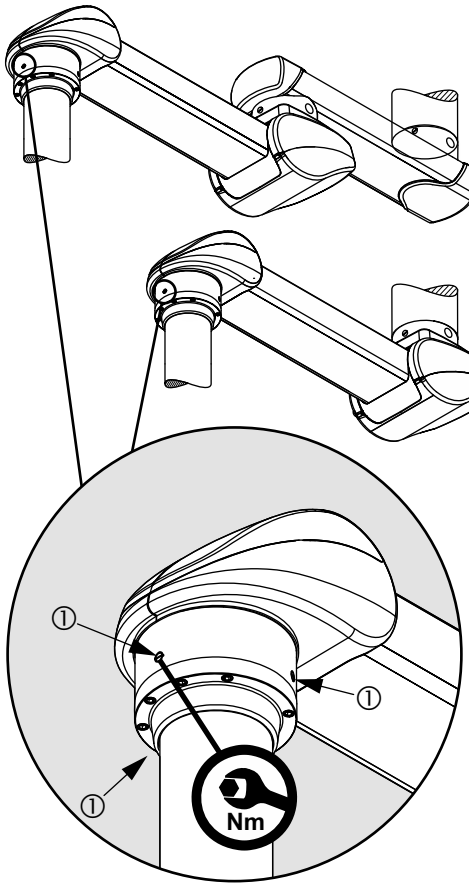



Figure 58: Adjusting the brake on the Drop tube Friction (roller bearing)




## 15.3 Adjusting the brake on the Drop tube Friction (slide bearing)

(See Figure 57)

For all pendant system versions, the mechanical brake (friction brake) on the Drop tube keeps the adaption (e.g. the Navigator M6) in the adjusted position.
Adjust the brake force of the corresponding end device (e.g. Navigator M6) such that the end device remains stable in any set position and can still be conveniently adjusted.

Follow the safety instructions
Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.

Tool to be used
Use a suitable slotted screwdriver.

To increase the braking force
- Insert the slotted screwdriver into the brake screw ① and turn in the clockwise direction.

To reduce the braking force
- Insert the slotted screwdriver into the brake screw ① and turn it to the left (counter-clockwise).

- Perform a function test.

## 15.4 Adjusting the brake on the Drop tube Friction (roller bearing)

(See Figure 58)

The brake screws (friction brakes) are adjusted in the same way for all the different pendant system versions.
In the case of the Drop tube with friction bearing unit, the mechanical brakes ① (3 friction brakes) maintain the end device (e.g. Navigator M6) in the adjusted position.
Adjust the braking force in such a way that the corresponding end device (e.g. Navigator M6) remains stable in any set position and can still be conveniently adjusted.

Follow the safety instructions
Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.

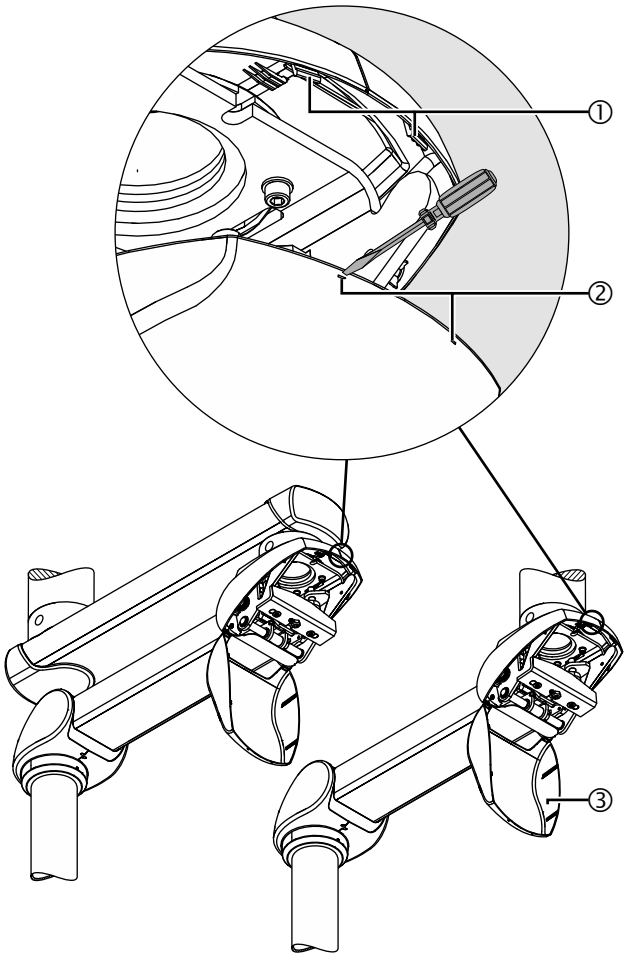
- Tool to be used
  - Use a suitable torque spanner.

- To increase the braking force
  - Screw the slotted brake screws ① by uniformly rotating them to the right (clockwise).
  - All 3 brake screws must be tightened with the same tightening torque which must, however, not exceed 1.6 Nm.

- To reduce the brake force
  - Screw the slotted brake screws ① by uniformly rotating them to the left (counter-clockwise).

- Perform a function test

Figure 59: Opening the lower, rear cover panel




## 15.5 Adjusting the load bearing capacity on the spring arm

(See Figure 59)

The simplified representation illustrates the extension arm and spring arm without the cables mounted. The adjustment is identical for all versions.

The spring arm is equipped with 1 or 2 springs which compensate the weight of the Navigator M6 with the end device (e.g. flat screen, medical device, etc.).
Adjust the load bearing capacity on the spring arm such that the spring arm with the Navigator M6 and the end device (e.g. flat screen, medical device, etc.) remains stationary in any set position.

If the spring arm does not remain in position after adjusting the spring tension, the spring arm must be replaced by a service technician.

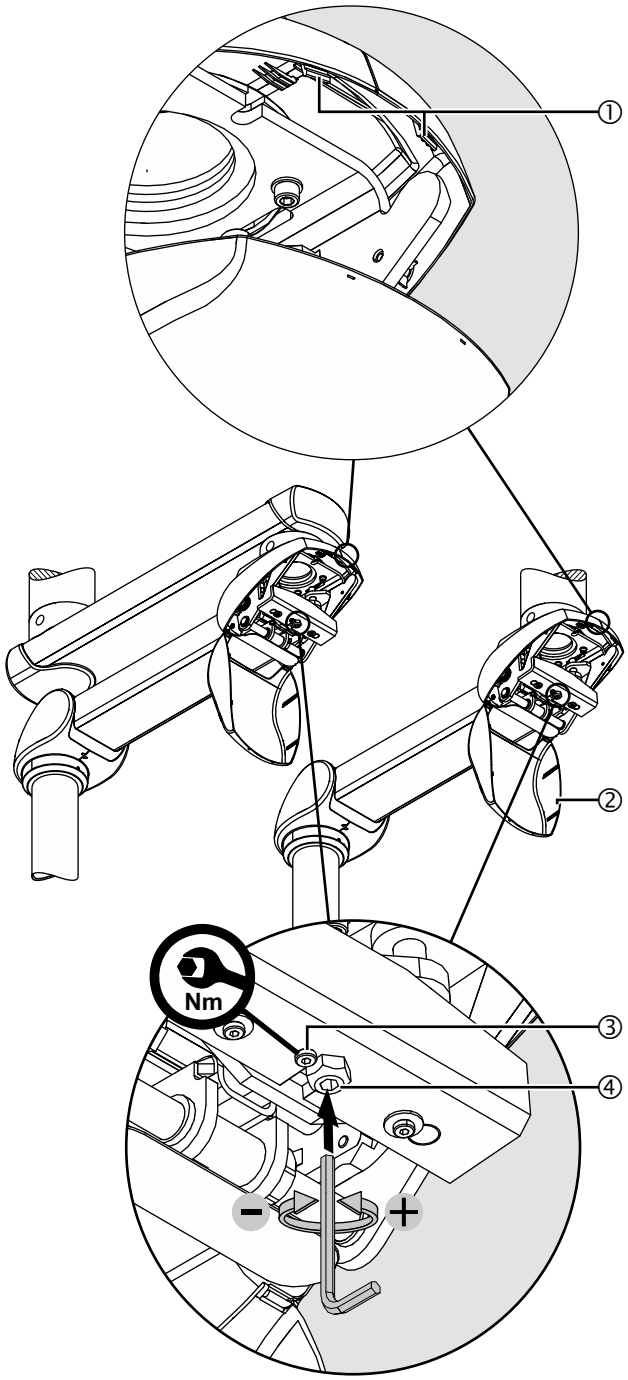
Possible spring equipment versions
30 – 60, 50 – 80, 70- 110, 80 – 135, 120 – 180 kg. The load bearing capacity ranges and the maximum load bearing capacity are indicated on the rating plate of the spring arm.

### 15.5.1 Opening the lower, rear cover panel

(See Figure 59)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.
2. Insert a suitable screwdriver into the 2 openings ① one after the other and then disengage the 2 latches ② .
3. Fold down the upper, rear cover panel ③ .

Figure 60: Adjusting the load bearing capacity and closing the lower, rear cover panel




### 15.5.2 Adjusting the load bearing capacity

(See Figure 60)

Tool to be used
Use an Allen key (size 10) or a ring spanner (size 24).

4. Unscrew the Allen cylinder screw M8 x 16mm③ – DIN 7984.
5. Insert the Allen key into the adjustment screw④ .

- Lift the spring arm approx. 10 degrees above the horizontal (0 degree position) in order to relieve the tension on the adjustment screw④ .

If the spring arm moves down, the load bearing capacity is too low

- Turn the Allen key to the left (counter-clockwise) as illustrated in the Figure.

If the spring arm moves up, the load bearing capacity is too high

- Turn the Allen key to the right (clockwise) as illustrated in the Figure.

6. Perform a function test.
7. Screw in and tighten the Allen cylinder screw M8 x 16mm③ – DIN 7984.

**NOTE – Load bearing capacity changing**

**The load bearing capacity adjustment can change progressively during operation if the Allen cylinder screw M8 x 16mm③ – DIN 7984 has not been properly tightened:**

**If this is the case, the spring arm no longer remains stable in its adjusted position:**

- Tighten the Allen cylinder screw M8 x 16mm③ – DIN 7984 with a tightening torque of 12Nm.

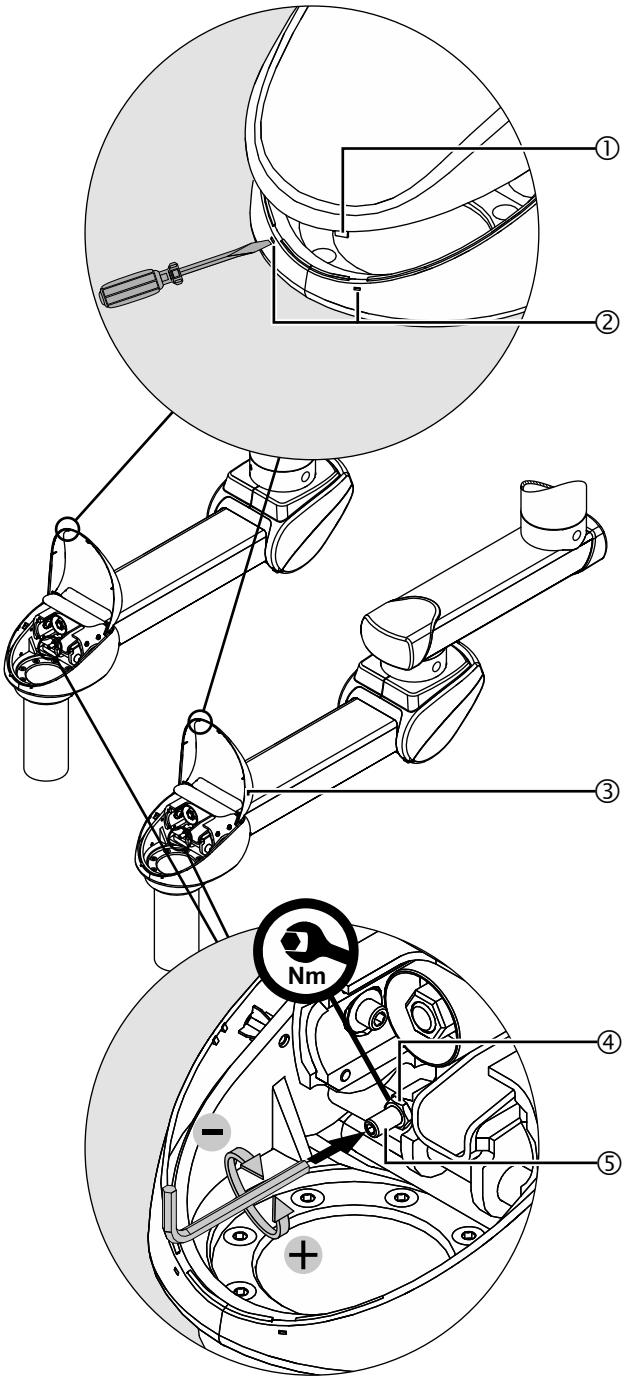
### 15.5.3 Closing the lower, rear cover panel

(See Figure 60)

8. Fold up the lower, rear cover panel② until the 2 latches ① snap into place.
9. Check that the cover ② is securely in place:

- The guides (not illustrated in the Figure) of the cover② must sit in the side panels.
- The cover② must sit on the side panels without gaps.

Figure 61: Adjusting the vertical lift on the spring arm




## 15.6 Adjusting the vertical lift on the spring arm

(See Figure 61)

When replacing an end device (e.g. flat screen, medical device, etc.) the spring arm must be adjusted to the horizontal (0 degree position).

### 15.6.1 Opening the front, upper cover panel

(See Figure 61)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.
2. Insert a suitable screwdriver into the 2 openings ② one after the other and then disengage the 2 latches ① .
3. Fold up the front, upper cover ③ until it snaps into place.

### 15.6.2 Adjusting the vertical lift

(See Figure 61)

Tool to be used
Use an Allen key (size 10) and a ring spanner (size 18).

4. Loosen and turn back the hexagonal nut M12 ④ – ISO 4035.
5. Insert the Allen key into the adjustment screw ⑤ .

To reduce the vertical lift
- Turn the Allen key to the left (counter-clockwise) as illustrated in the Figure.

To extend the vertical lift
- Turn the Allen key to the right (clockwise) as illustrated in the Figure.

6. Perform a function test.
7. Tighten the hexagonal nut M12 ④ – ISO 4035.

**NOTE – Vertical lift changing**

**The vertical lift can change progressively during operation if the hexagonal nut M12 ④ – ISO 4035 has not been properly tightened:**

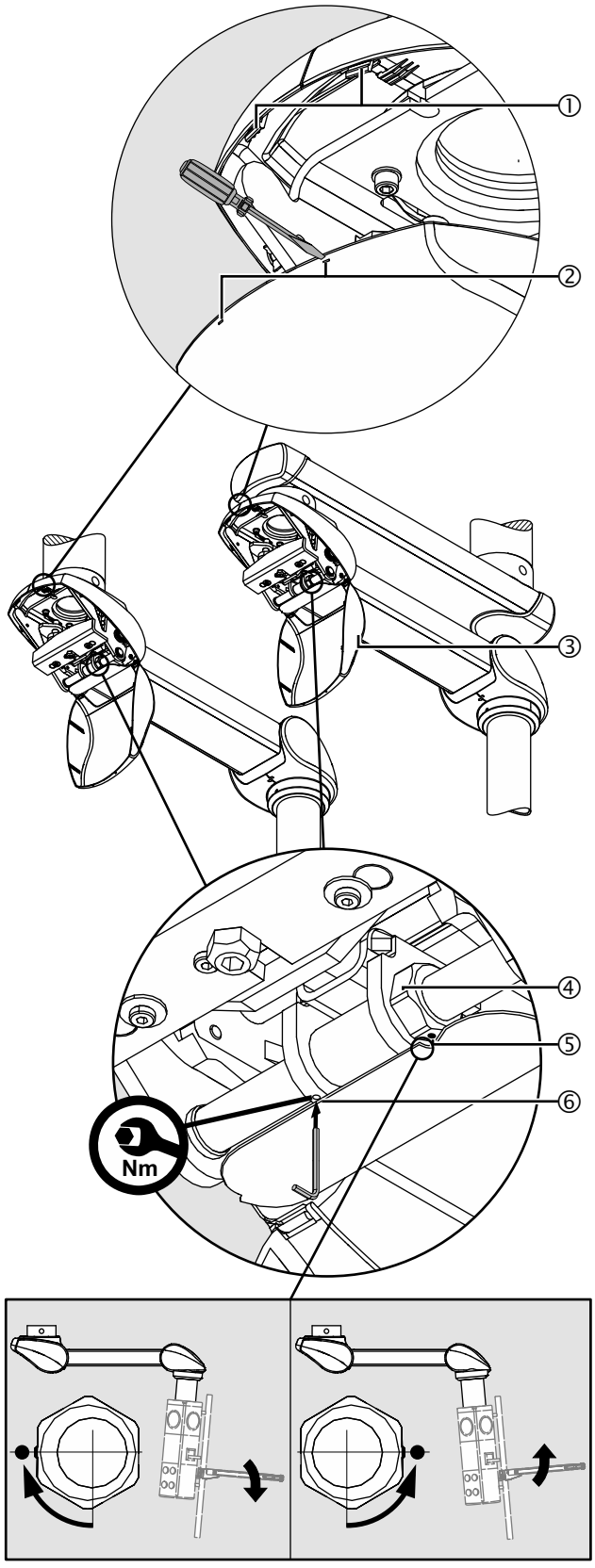
**In this case there is a risk of the spring arm hitting the ceiling or another pendant system:**
- Tighten the hexagonal nut M12 ④ – ISO 4035 with a tightening torque of 30 Nm.

### 15.6.3 Closing the front, upper panel

8. Fold down the front, upper cover ③ such that the 2 latches ① snap into place.
9. Check that the cover ③ is securely in place:

- The guides (not illustrated) of the cover ③ must sit in the side panels.
- The cover ③ must sit on the side panels without gaps.

Figure 62: Correcting the vertical alignment of the Navigator M6




## 15.7 Correcting the vertical alignment of the Navigator M6

(See Figure 62)

After mounting a end device (e.g. flat screen, medical device, etc.) there is a risk that the Navigator M6 is no longer in a precisely vertical position due to the weight of the end device.

### 15.7.1 Opening the lower, rear cover panel

(See Figure 62)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.
2. Insert a suitable screwdriver into the 2 openings ② one after the other and then disengage the 2 latches ① .
3. Fold down the upper, rear cover panel ③ .

### 15.7.2 Correcting the vertical alignment

(See Figure 62)

Tool to be used
Use an Allen key (size 4) and a spanner wrench (size 36).

4. Loosen the setscrew M4 ⑥ – DIN 914.
5. Place the spanner wrench onto the hexagonal bolt ④ .
- The indicator screw ⑤ points downwards (do not loosen this screw).

To lower e.g. the shelf:
- Rotate the hexagonal bolt ④ such that the indicator screw ⑤ points forwards (towards you).

To lift e.g. the shelf:
- Turn the hexagonal bolt ④ such that the indicator screw ⑤ points backwards (away from you).

6. Perform a function test.
7. Tighten the setscrew M4 ⑥ – DIN 914.

**NOTE – Vertical alignment changing**

**The vertical alignment can change progressively during operation if the setscrew M4 ⑥ – DIN 914 has not been properly tightened:**

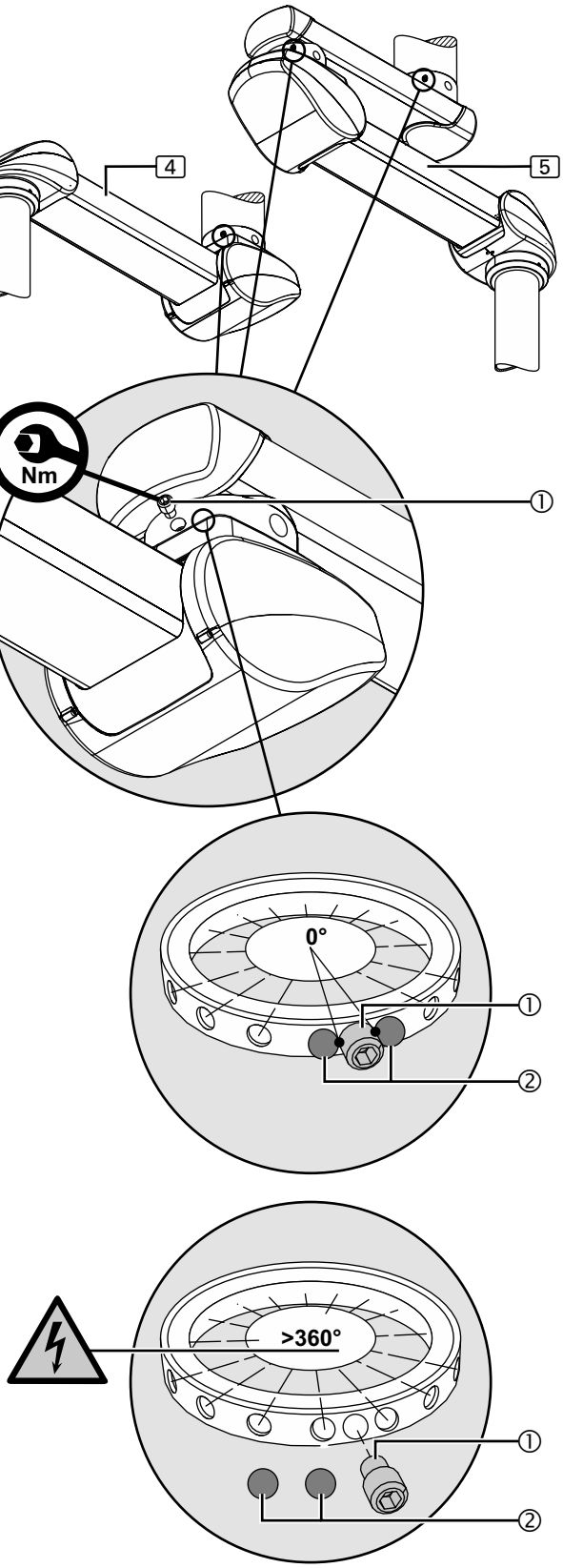
**The Navigator M6 no longer remains stable in its adjusted position:**
- Tighten the setscrew M4 ⑥ – DIN 914 with a tightening torque of 2 Nm.

### 15.7.3 Closing the lower, rear cover panel

(See Figure 62)

8. Fold up the lower, rear cover ③ until the 2 latches ① snap into place.
9. Check that the cover ③ is securely in place:
- The guides (not illustrated) of the cover ③ must sit in the side panels.
- The cover ③ must sit on the side panels without gaps.

Figure 63: Condition of the swivel stop on the extension arm and spring arm as supplied by Nuvo




## 15.8 Condition of the swivel stop on the extension arm and spring arm as supplied by Nuvo

The Figure illustrates the pendant system Navigator Lift ™ 180 Air*Plus*. The swivel stop delivered for the pendant system Navigator Lift ™ 180 Friction is identical.

### 15.8.1 Extension arm and spring arm with pre-assembled swivel stop

(See Figure 63)

The 2 ball stops ② and the setscrew ① are pre-assembled by Nuvo. The swivel range of the spring arm [4] or the extension arm with spring arm [5] is thus restricted to 0 degrees. This ensures that the extension arm and the spring arm cannot be rotated and no internal supply cables can tear off.

To adjust the swivel stops

- Change or dismantle the swivel stops as described in Chapter 15.9.4, on Page 86.

### 15.8.2 Extension arm and spring arm without pre-assembled swivel stop

(See Figure 63)

In exceptional cases the 2 ball stops ② and the setscrew ① are delivered as separate components, which means that the spring arm [4] or the extension arm with spring arm [5] can be rotated infinitely beyond 360 degrees.

**⚠WARNING**

**Electric shock hazard**

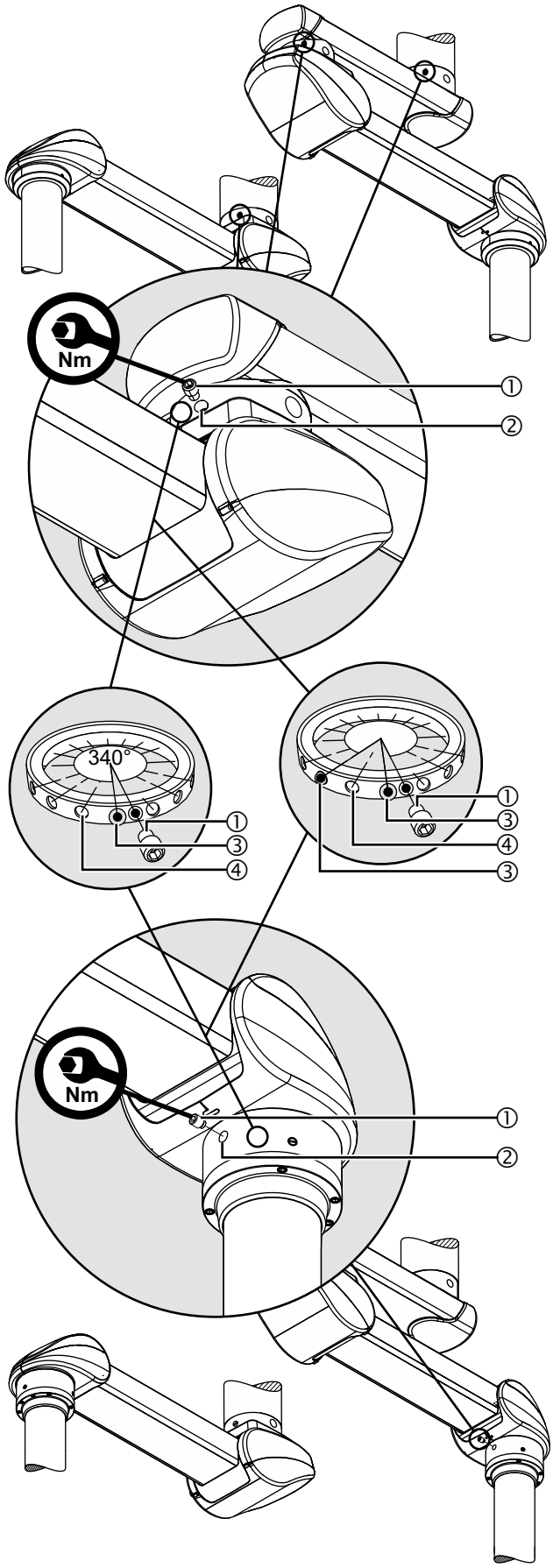
**In order to prevent the internal supply cables twisting off, at least 1 ball stop must be mounted. This ball stop serves as twist protection:**

- If no swivel stops have been pre-assembled, the extension arm and the spring arm must not be rotated before the swivel stops have been mounted.
- To restrict the angle of rotation of the extension arm and spring arm to 340 degrees, mount at least 1 ball stop as described in Chapter 15.9.3, on Page 85.

To adjust the swivel stops

- Mount the swivel stops as described in Chapter 15.9.2, on Page 84 and Chapter 15.9.3, on Page 85.

Figure 64: Adjusting the swivel stop on the extension arm, spring arm and Drop tube




## 15.9 Adjusting the swivel stop on the extension arm, spring arm and Drop tube

(See Figure 64)

The swivel stops must be adjusted during installation independently of the system and application. At least 1 swivel stop must be mounted in order to prevent the supply cables being damaged or torn off. The swivel stops must be adapted to the specific characteristics of the room during installation.

With 1 ball stop installed, the swivel range is restricted to a maximum of 340 degrees. With 2 ball stops installed, the swivel range can be restricted in intervals of 15 degrees.

**⚠WARNING**

**Electric shock hazard**

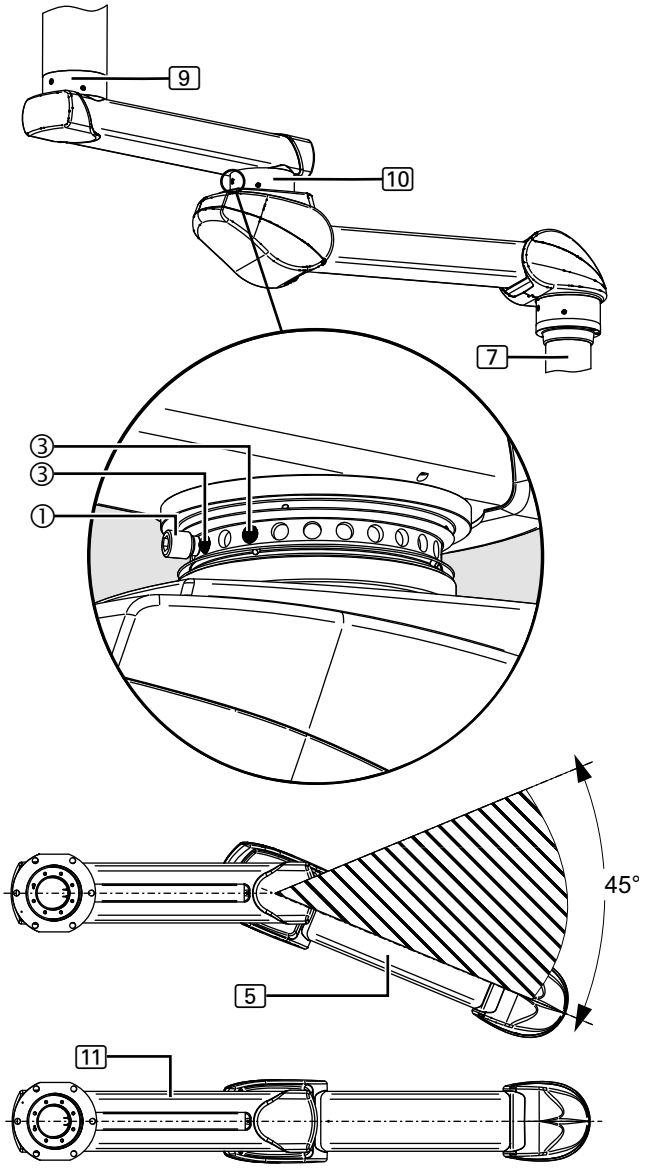
**In order to prevent the internal supply cables twisting off, at least 1 ball stop must be mounted. This ball stop serves as twist protection:**

- To restrict the angle of rotation of the extension arm, spring arm or Drop tube to 340 degrees, mount at least 1 ball stop as described in Chapter 15.9.3, on Page 85.

### 15.9.1 Tool to be used

A magnetic pin or a similar tool is required in order to offset the ball stop. The telescopic magnetic pick-up tool set is available from Nuvo as an option.

Figure 65: Stop recommendation: Dual-arm pendant system with Bearing Unit Friction (roller bearing)




### 15.9.2 Stop recommendation: Dual-arm pendant system with Bearing Unit Friction (roller bearing)

(See Figure 65)

For all dual-arm pendant systems with a Bearing Unit Friction as intermediate bearing [10], Nuvo recommends that you mount 2 ball stops ③ (position illustrated in the Figure).

The detailed representation illustrates the intermediate bearing [10] (without external bearing ring) and the position of the stop screw ① to the ball stops ③ .

**NOTE: Movement range of the spring arm**

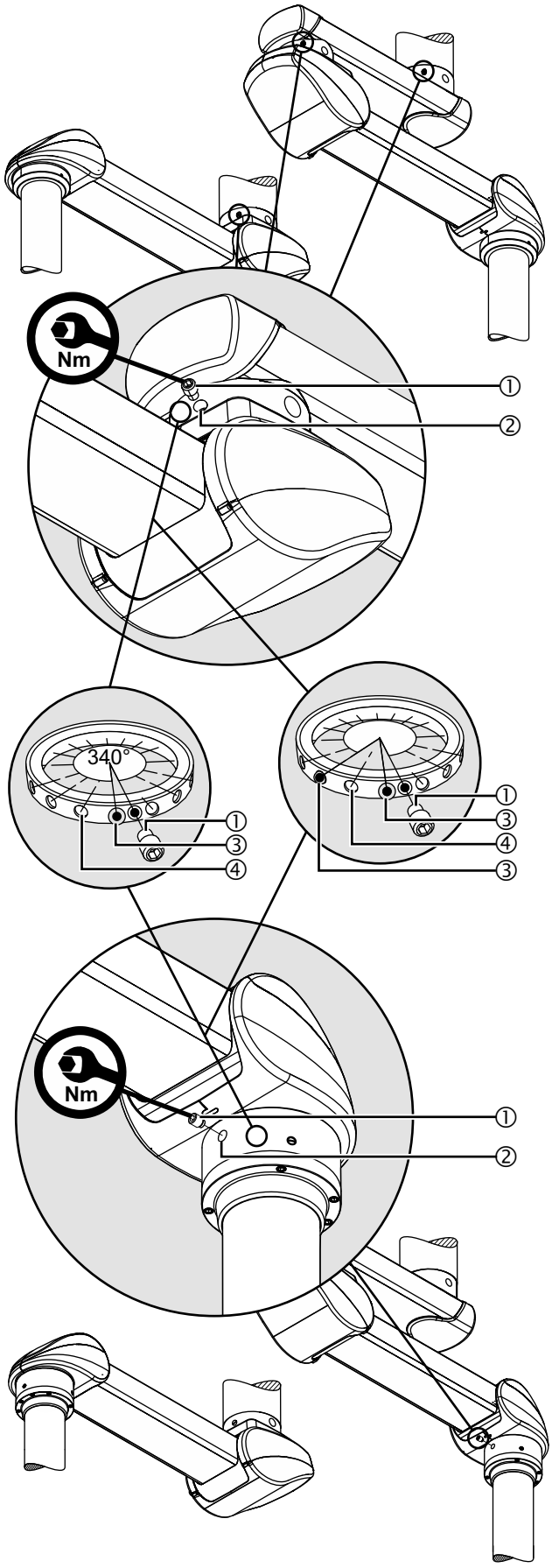
When adjusting the end stop as illustrated in Figure 65, the dead centre area is 45°. This means that the spring arm of the pendant system extension arm with spring arm [5] has a maximum movement range of approx. 315°.

If the minimum adjustment on the end stop is not defined whereas the brakes on the intermediate bearing [10]and the ceiling bearing [9] are adjusted, it is rather difficult to bend the pendant system from the stretched position [11] and rotate it on the intermediate bearing [10] of the pendant system.

When moving the adaption on the Drop tube [7] from the stretched position [11], there is a risk that the extension arm and the spring arm rotate around the ceiling bearing [9] even though bending in the area of the intermediate bearing [10] would be desired.

For more details on how to mount the swivel stop refer to Chapter 15.9.3, on Page 85.

Figure 66: Mounting the swivel stop




### 15.9.3 Mounting the swivel stop

(See Figure 66)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.

2. Unscrew a setscrew ① from the threaded hole ② .

3. Rotate the extension arm, spring arm or Drop tube towards the desired end stop position and then insert 1 ball stop ③ into the threaded hole ② .

**NOTE – Make sure that the ball stop is securely in place**

The extension arm, spring arm or the Drop tube can be rotated once the ball stop ③ has been completely inserted into one of the mounting fixtures ④ . Otherwise, these are blocked and the ball stop ③ must be pushed into one of the mounting fixtures ④ whilst gently rotating the extension arm, spring arm or Drop tube using a screwdriver.

4. Rotate the extension arm, spring arm or Drop tube towards the desired second end stop position and then insert 1 additional ball stop ③ into the threaded hole ② .
5. Slightly rotate the extension arm, spring arm or Drop tube and then screw the setscrew ① into the threaded hole ② as far as it will go.

- The setscrew ① now serves as an end stop for the ball stop ③ mounted and restricts the swivel range of the extension arm, spring arm or Drop tube.

**⚠ WARNING**

**Risk of internal supply cables twisting off**

**The swivel stop can fail if the fixing elements have not been properly tightened, and the supply cables can twist off:**

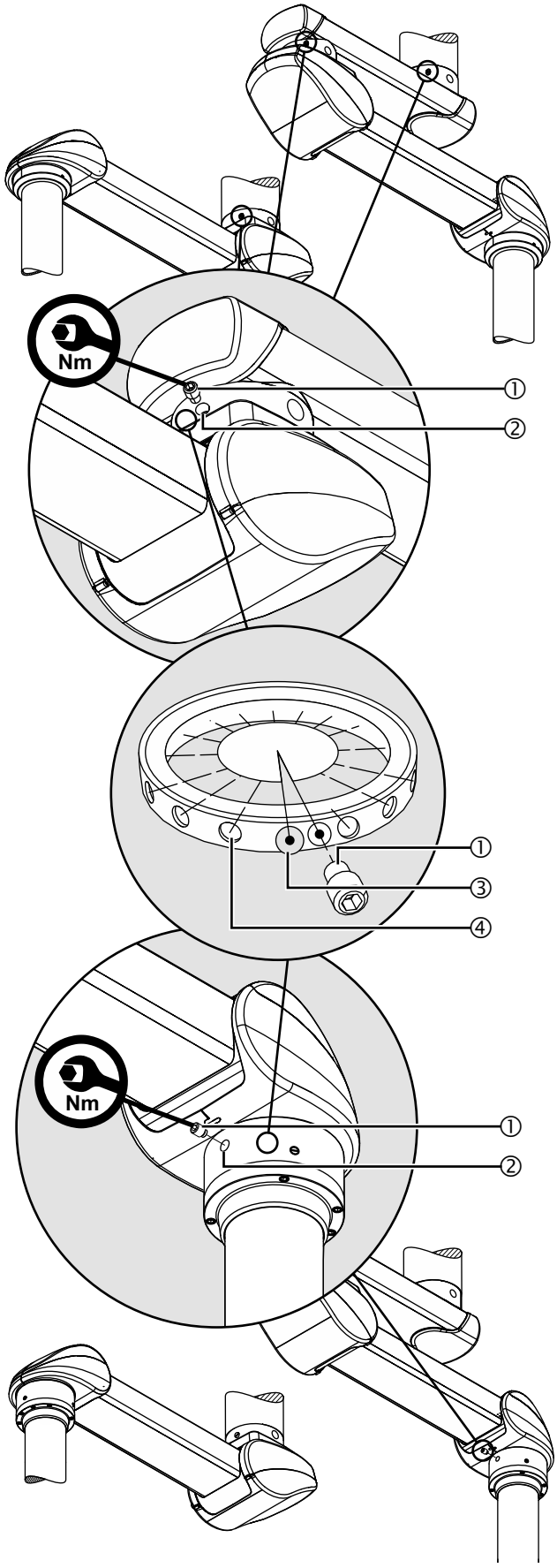
- Tighten the setscrew ① to 40 Nm.

6. Tighten the setscrew ① to 40 Nm.
7. To check that the swivel stop operates securely:

- The swivel range of the extension arm, spring arm or Drop tube must be restricted to less than 360 degrees.

8. To change a mounted ball stop ③ , refer to Chapter 15.9.4, “Changing or dismantling the swivel stop”, on Page 86.

Figure 67: Changing or dismantling the swivel stop




### 15.9.4 Changing or dismantling the swivel stop

(See Figure 67)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 75.
2. Unscrew a setscrew ① from the threaded hole ② .
3. Rotate the extension arm, spring arm or Drop tube until the ball stop ③ in the threaded hole ② is visible.
4. Using a telescopic magnetic pick-up tool, remove the ball stop ③ from the threaded hole ② and keep it in a safe place.

**⚠WARNING**

**Electric shock hazard**

**In order to prevent the internal supply cables twisting off, at least 1 ball stop must be mounted. This ball stop serves as twist protection:**

- Mount the swivel stop directly afterwards.
- To restrict the angle of rotation of the extension arm, spring arm or Drop tube to 340 degrees, mount at least 1 ball stop as described in Chapter 15.9.3, on Page 85.

5. Mount the swivel stop as described in Chapter 15.9.2, on Page 84 and Chapter 15.9.3, on Page 85.

Initial commissioning

1. The pendant system must be properly installed. Instructions for installation are included in the scope of delivery of the product.
2. For commissioning following installation, proper initial commissioning must be carried out for the entire pendant system.

Functional test

Prior to using the pendant system and the Navigator M6 on a patient for the first time, a functional test must take place at the installation site. This functional test must be carried out by the operator or a person authorised by the operator, and the persons authorised by the operator must be duly instructed.
This requirement is considered fulfilled if:

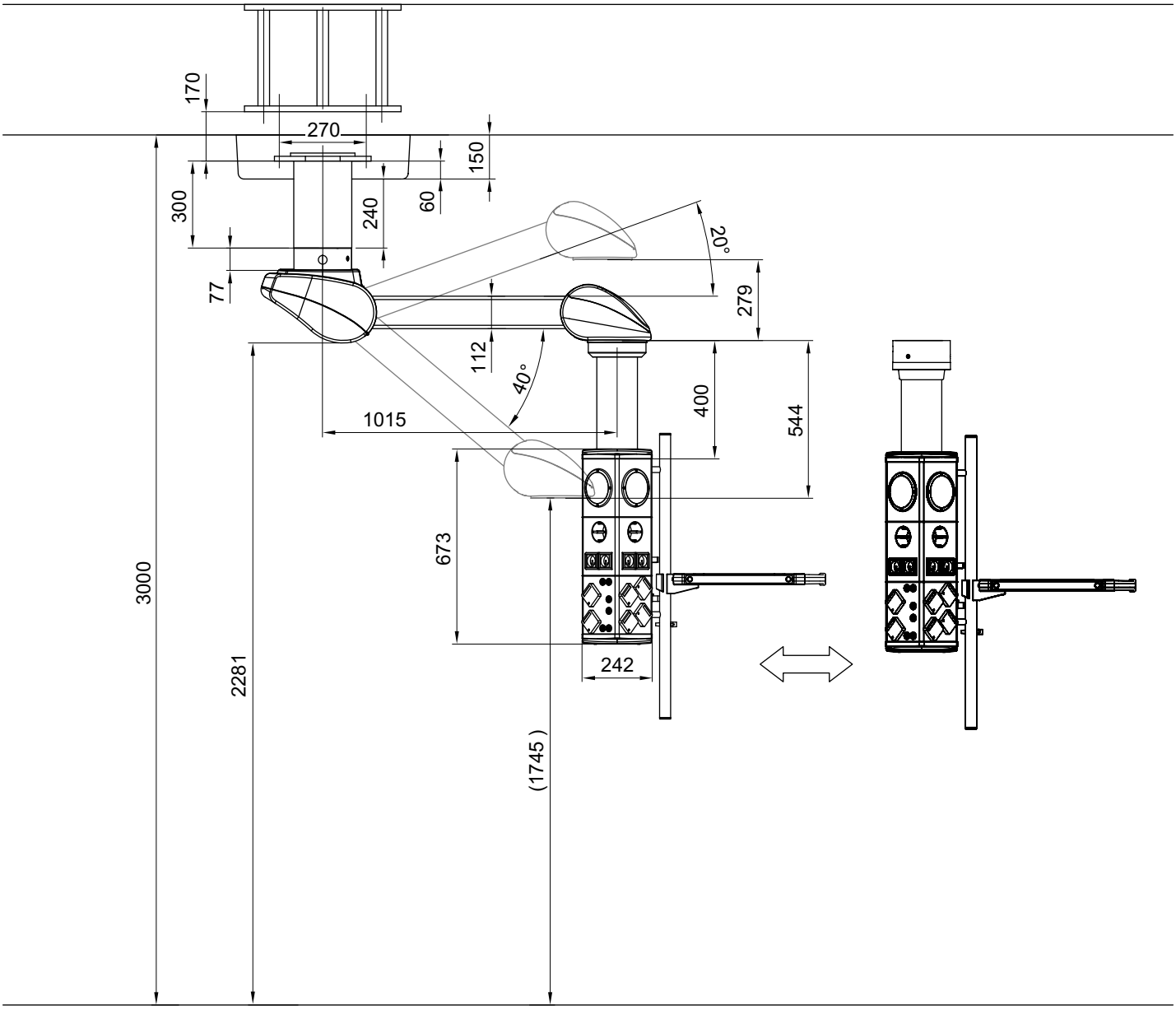
1. the functional reliability of the pendant system and the Navigator M6 is ensured.
2. the maximum permissible loading capacity (payload) has been safely determined and is indicated on a label attached to the Navigator M6.
3. the proper functioning of the device has been approved by the operator during initial commissioning and documented by signing a declaration of acceptance.

The following points must be observed during handover to the operator:

1. The pendant system and the Navigator M6 must not be handed over to the operator until they have been tested.
2. Handover must be documented in writing including confirmation by the operator.
3. On handover, the operator must be instructed in the functioning and effect of the maximum loading capacity (payload).
4. In addition, the operator must be instructed in the functioning, operation, cleaning and disinfection of the pendant system and the Navigator M6 during the handover procedure.
5. Furthermore, on handover, the operator must be instructed in the adjustments permitted according to the Operating Instructions included in the scope of delivery.
6. On completion of the instruction, an instruction certificate must be created and signed in order to document that the operator/user has understood the special operator control actions required for normal use.

Figure 68: Spring arm Navigator Lift ™ 180 Air*Plus* – Single / Navigator Lift ™ 180 Friction – Single-arm variant with Navigator M6

The Figure illustrates the extension arm with spring arm Navigator Lift ™ 180 Air*Plus* with Navigator M6 as an example. Please note that your individual pendant system configuration can differ from the illustration. The round canopy can only be mounted with the round interface plate. The rectangular canopy 700 x 700 mm can only be mounted with the rectangular interface plate.



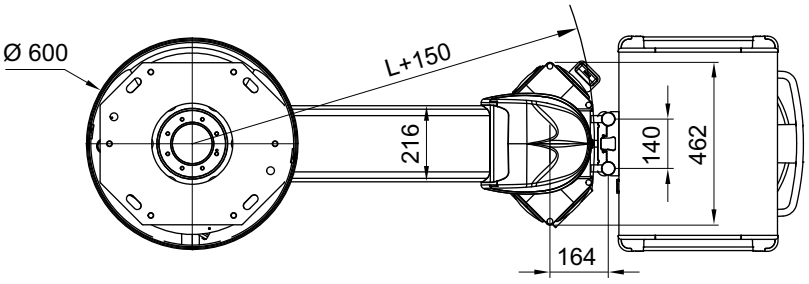
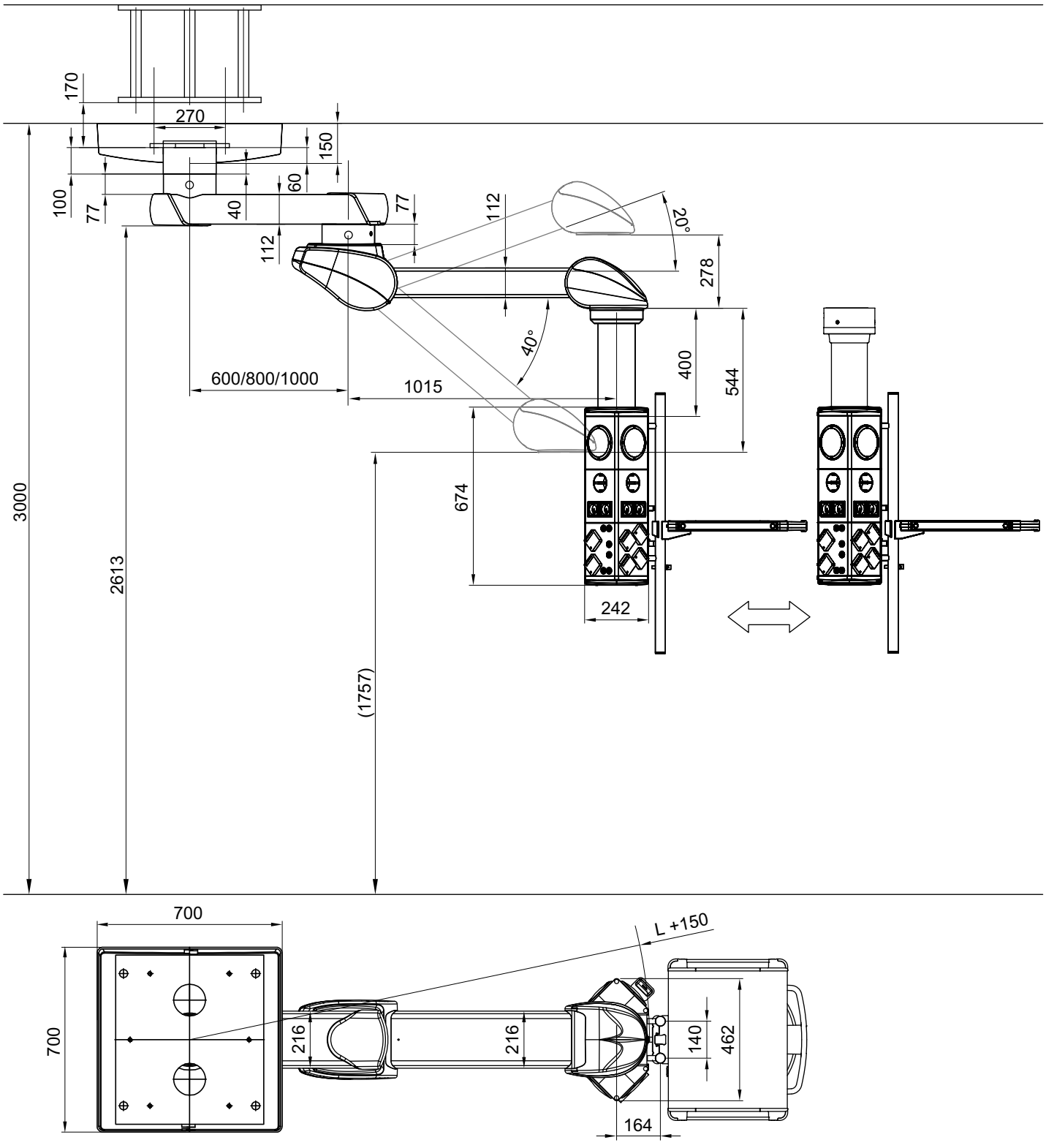



Figure 69: Extension arm with spring arm Navigator Lift ™ 180 Air*Plus* – Dual / Navigator Lift ™ 180 Friction – Dual-arm variant with Navigator M6

The Figure illustrates the extension arm with spring arm Navigator Lift ™ 180 Air*Plus* with Navigator M6 as an example. Please note that your individual pendant system configuration can differ from the illustration. The round canopy can only be mounted with the round interface plate. The rectangular canopy 700 x 700 mm can only be mounted with the rectangular interface plate.



| | |
|---|---|
| Modes of operation | • The pendant systems Navigator Lift ™ 180 Air*Plus* – Single, Navigator Lift ™ 180 Air-*Plus* – Dual, Navigator Lift ™ 180 Friction – Single and Navigator Lift ™ 180 Friction – Dual are suitable for continuous operation. |
| Rating plate | • The rating plates are attached to the top side of the extension arm and under the front cover of the spring arm (see Chapter 2.8, on Page 22). |
| Dead weight of the pendant system* | Spring arm 1015mm ..... 71kg<br><br>Extension arm 600mm with spring arm 1015mm ..... 96kg<br>Extension arm 800mm with spring arm 1015mm ..... 99kg<br>Extension arm 1000mm with spring arm 1015mm ..... 102kg<br>Extension arm 1200mm with spring arm 1015mm ..... 105kg<br><br>* Without gas hoses and supply cables inserted, without ceiling or Drop tube and without optional accessories. |
| Dead weight of the ceiling tube for the extension arm | Flange ..... 6kg<br>Steel tube ..... 24kg/m |
| Dead weights of the bearing units on the Drop tube | Bearing Unit Friction (slide bearing) ..... 5kg<br>Bearing Unit Friction (roller bearing) ..... 13kg |
| Dead weight of the Drop tube | Drop tube ..... 8kg/m |
| Maximum load bearing capacity of the pendant system | Spring arm, 1015mm ..... 180kg<br><br>Extension arm 600mm with spring arm 1015mm ..... 180kg<br>Extension arm 800mm with spring arm 1015mm ..... 170kg<br>Extension arm 1000mm with spring arm 1015mm ..... 150kg<br>Extension arm 1200mm with spring arm 1015mm ..... 130kg |
| Maximum loading capacity with different spring equipment versions | Possible spring equipment versions: ..... 22 – 40, 30 – 60, 50 – 80, 70 – 110, 80 – 135, 120 – 180kg |
| Electrical data | Rated voltage .....AC 100-240V<br>Rated frequency ..... 60 / 50Hz<br>Rated output.....220W<br>Indirect extension arm lighting .....DC 12V<br>2 / 4 lighting boards (supply voltage 12 V DC, 2 lighting boards, each connected in series to 24V DC) |
| Noise level | Sound energy level .....65dB(A) (EN ISO 3746) not exceeded |

| | |
|---|---|
| Brake torque | Brake torque with the pneumatic brake actuated on the spring arm..... approx. 50 Nm<br>Brake torque with the pneumatic brake actuated on the extension arm and spring arm ..... approx. 50 Nm / approx. 50 Nm |
| Manual forces | Dynamic torque with the electromagnetic brake released depending on the position and payload ..... 3.5 to 40 Nm |
| Protection class / type | Protection class in accordance with IEC 60601-1..... I<br>IP classification in accordance with IEC 60529 ..... IP 20 |
| Medical Device Directive 93/42/EEC | Classification..... I |
| Applicable standards, laws and directives | • Medical Devices Act (MPG)<br>• 93/42 EEC (Medical Device Directive)<br>• IEC 60601-1 – Medical Electrical Equipment – Part 1: General Requirements for Basic Safety and Essential Performance. |
| Approvals of the standard equipment | • Recognised NRTL component. |
| Approved adaptions | The following Nuvo products are approved as adaptions to the pendant system:<br>• Chapter 20, “Approved Nuvo Products”, on Page 97,<br>• Chapter 21, “Optional Accessories”, on Page 97,<br>• Chapter 22, “Possible Combination with Third-Party Products”, on Page 97:<br>– The components have been adapted to each other and are safe to operate. Any other type of installation, and in particular the use of components from third-party manufacturers, is strictly prohibited because these components can be potential sources of danger.<br>– The combination of any other Nuvo product with the pendant system must be approved by Nuvo Surgical. If applicable, the conformity assessment must be repeated. |
| Read the Installation Instructions for combined products | • The pendant system can be equipped with adaptions and end devices from third-party manufacturers. To prevent dangerous overload, which can damage or lead to a collapse of the pendant system, the maximum load bearing capacity specified in Chapter 18, “Technical Data”, on Page 90 must be adhered to:<br>– The party placing the device into operation is responsible for the validation of the overall system. A conformity assessment procedure shall be executed if required and a declaration in accordance with Article 12 of 93/42/EEC (Medical Device Directive, MDD) shall be provided.<br>– Read the Operating Instructions provided by the third-party manufacturer and in particular the relevant pages with information on the operation of the end device. |

## 19.1 Guidelines and manufacturer's declarations

### 19.1.1 Electromagnetic emissions

The Navigator Lift ™ is intended for use in the ELECTROMAGNETIC ENVIRONMENT specified below. The customer or the user of the Navigator Lift™ must ensure that it is used in such an environment.

| Emission tests | Compliance | ELECTROMAGNETIC ENVIRONMENT – Guideline |
|---|---|---|
| RF emissions in accordance with CISPR 11 | Group 1 | The Navigator Lift ™ uses RF energy only for its internal FUNCTIONING. Therefore, its RF emissions are very low and are not likely to cause any interference with electronic equipment nearby. |
| RF emissions in accordance with CISPR 11 | Class A | The Navigator Lift ™ is suitable for operation in professional healthcare facilities. |
| Harmonic emissions in accordance with IEC 61000-3-2 | Class A | |
| Voltage fluctuations/flicker emissions in accordance with IEC 61000-3-3 | Complies | |

### 19.1.2 Electromagnetic immunity

The Navigator Lift ™ is intended for use in the ELECTROMAGNETIC environment specified below. The customer or the user of the Navigator Lift ™ should ensure that it is used in such an environment.

| Interference immunity test | Test level in accordance with IEC 60601 | Test result |
|---|---|---|
| Electrostatic discharge in accordance with IEC 61000-4-2 | ±8kV contact<br><br>±2kV, ±4kV, ±8kV, ±15kV air | passed |
| Electrical fast transients / bursts in accordance with IEC 61000-4-4 | ±2kV<br>100kHz repetition rate | passed |
| Surges<br>Line-to-line in accordance with IEC 61000-4-5 | ±0.5kV, ±1kV | passed |
| Surges<br>Line-to-earth in accordance with IEC 61000-4-5 | ±0.5kV, ±1kV, ±2kV | passed |
| Voltage dips in accordance with IEC 61000-4-11 | 0% $U_T$; 1/2 period<br>at 0, 45, 90, 135, 180, 225, 270 and 315 degrees | passed |
| | 0% $U_T$; 1 period<br>and<br>70% $U_T$; 25/30 periods<br>Single phase: at 0 degrees | passed |
| Voltage interruptions in accordance with IEC 61000-4-11 | 0% $U_T$; 250/300 periods | passed |
| Power frequency magnetic field immunity in accordance with IEC 61000-4-8 | 30A/m<br><br>50Hz or 60Hz | passed |

Please note:
$U_T$ is the a.c. mains voltage prior to application of the test level.

**Cont.**

The Navigator Lift ™ is intended for use in the ELECTROMAGNETIC environment specified below. The customer or the user of the Navigator Lift ™ should ensure that it is used in such an environment.

| Interference immunity test | Test level in accordance with IEC 60601 | Compliance level |
|---|---|---|
| Immunity to conducted disturbances, induced by radiofrequency fields IEC 61000-4-6 | 3V<br>0.15MHz to 80MHz<br>6V in ISM frequency bands from 0.15MHz to 80MHz<br>80% AM at 1kHz | passed |
| High-frequency electromagnetic fields in accordance with IEC 61000-4-3 | 3V/m<br>80MHz to 2.7GHz<br>80% AM at 1kHz | passed |

NOTE 1
At 80 MHz and 800 MHz, the higher value applies.

NOTE 2
These guidelines may not apply in all cases. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] The field strength of stationary transmitters, including the base stations of mobile phones and mobile land mobile radios, amateur radio stations, AM and FM radio and TV broadcasting transmitters, cannot be precisely predetermined theoretically. To assess the electromagnetic environment due to stationary RF transmitters, an electromagnetic site survey should be considered. If the field strength measured in the location in which the Navigator Lift ™ is used exceeds the applicable RF compliance level above, the Navigator Lift ™ should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the Navigator Lift ™ .

[b] Field strengths over the 150 kHz to 80 MHz frequency range should be less than 3 V/m.

### 19.1.3 Test specifications

Test specifications for the INTERFERENCE IMMUNITY of ENCLOSURES against high-frequency wireless communication facilities

| Test frequency MHz | Frequency band [a] MHz | Radio service [a] | Modulation [b] | Maximum power W | Distance m | IMMUNITY TEST LEVEL V/m |
|---|---|---|---|---|---|---|
| 385 | 380 to 390 | TETRA 400 | Pulse modulation [b] 18 Hz | 1.8 | 0.3 | 27 |
| 450 | 430 to 470 | GMRS 460, FRS 460 | FM [c] ± 5 kHz stroke 1 kHz sine | 2 | 0.3 | 28 |
| 710 | 704 to 787 | LTE Band 13, 17 | Pulse modulation [b] 217 Hz | 0.2 | 0.3 | 9 |
| 745 | | | | | | |
| 780 | | | | | | |
| 810 | 800 to 960 | GSM 800/900, TETRA 800, iDEN 820, CDMA 850, LTE Band 5 | Pulse modulation [b] 18 Hz | 2 | 0.3 | 28 |
| 870 | | | | | | |
| 930 | | | | | | |
| 1720 | 1700 to 1998 | GSM 1800; CDMA 1900; GSM 1900; DECT; LTE Band 1, 3, 4, 25; UMTS | Pulse modulation [b] 217 Hz | 2 | 0.3 | 28 |
| 1845 | | | | | | |
| 1970 | | | | | | |
| 2450 | 2400 to 2570 | Bluetooth, WLAN 802.11 b/g/n, RFID 2450, LTE Band 7 | Pulse modulation [b] 217 Hz | 2 | 0.3 | 28 |
| 5240 | 5100 to 5800 | WLAN 802.11 a/n | Pulse modulation [b] 217 Hz | 0.2 | 0.3 | 9 |
| 5500 | | | | | | |
| 5785 | | | | | | |

NOTE
To reach the IMMUNITY TEST LEVELS, the distance between the transmitting antenna and the ME DEVICE or ME SYSTEM can be reduced to 1 m if required. The 1 m test distance is permitted in accordance with IEC 61000-4-3.

[a] For certain radio services only the frequencies for the radio connection from the mobile communication device to the base station ("up-link") are indicated in the table.
[b] The carrier must be modulated with a square wave signal with a 50 % duty cycle.
[c] As an alternative to frequency modulation (FM), pulse modulation with a 50 % duty cycle at 18 Hz can be used because pulse modulation would also represent the worst case (but not the actual modulation).

**⚠WARNING**

Do not operate this device immediately next to or together with other devices stacked on top of each other because this could result in improper operation. If operation in the described manner is unavoidable, this device and all other devices should be monitored in order to ensure proper operation."

**⚠WARNING**

The use of other ACCESSORIES, other converters and other cables than those prescribed or provided by the MANUFACTURER of this device can lead to increased ELECTROMAGNETIC INTERFERENCE EMISSIONS or reduced electromagnetic immunity of the device, and thus improper operation.

**⚠WARNING**

PORTABLE RF communication devices (radio equipment, including ACCESSORIES such as antenna cables and external antennas) should not be used at a distance of less than 30cm (12inches) from the Navigator Lift™ components and cables specified by the MANUFACTURER. Be aware that the performance of the device can be reduced if this safety rule is not observed.

| Designation |
|---|
| Navigator M6 and approved end devices in accordance with the current Operating Instructions of the Navigator M6 |
| CEMOR and approved Nuvo products in accordance with the current Operating Instructions of the CEMOR. |
| 1946015 integration kit, MCS Slimline, Navigator Lift ™ |
| 1946792 integration kit, MCS Smartsuite, Navigator Lift ™ |

## 21 Optional Accessories

| Designation | Dead weight | Maximum payload |
|---|---|---|
| Indirect extension arm lighting | 2.0 kg | --- |
| Brake indicator lighting board | 0.1 kg | --- |
| Adapter Acrobat Swing 3p, L360* | 2.2 kg | 10 kg / 113 Nm |
| * The accessories can only be used if the extension arm has been supplied with preparation for adapter.<br>This option can be selected for the dual-arm variant on the upper extension arm:<br>Navigator ™ Air / Navigator ™ Air*Plus* in lengths of 800 mm and 1000 mm | | |

## 22 Possible Combination with Third-Party Products

| Approved third-party products with CE mark |
|---|
| For more detailed information on the requirements for the interface towards the pendant system please contact Nuvo customer service so as to prevent damage to persons or property:<br>• Phone: +1 (800) 663-1152 (USA and CANADA)<br>• Phone: +1 (814) 899-4220 (INTERNATIONAL) |
| The party placing the device into operation is responsible for the validation of the overall system. A conformity assessment procedure shall be executed if required and a declaration in accordance with Article 12 of 93/42/EEC (Medical Device Directive, MDD) shall be provided. |

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