Installation instructions Part 2 – Pendant system [EN]

Navigator ™ Air, Navigator ™ Air*Plus*, Navigator ™ Friction

A member of the
Medical Illumination International Group

Dear assembly operator,

Please read these Installation Instructions very carefully, and in particular Chapter 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 parts from NUVO 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 rejects 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

Published by

NUVO Surgical • 1565 West 12th Street • Erie, PA 16501 • USA
Phone: +1 (800) 663-1152 (USA and CANADA)
Phone: +1 (814) 899-4220 (INTERNATIONAL)

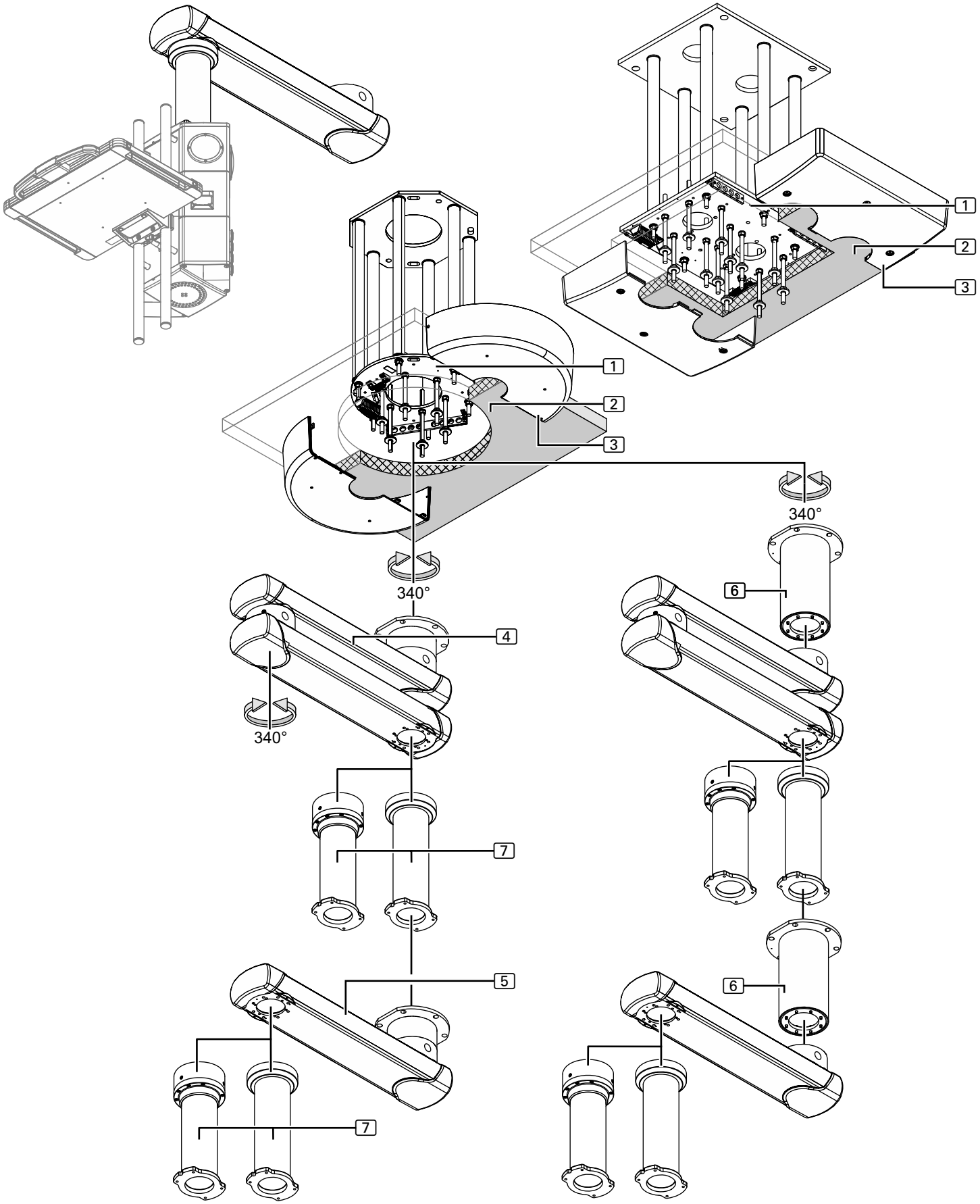
1568883, Edition 2019-04, Version 0

Visit us on the Internet
E-mail address

www.nuvosurgical.com
sales@nuvosurgical.com

Figure 1: Scope of delivery of the Navigator™ Air / Navigator™ Air*Plus*

1.1 Overview of the pendant system Navigator™ Air, Navigator™ Air*Plus*



See Figure 1: on Page 7”

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

1.2 Scope of delivery of the Navigator ™ Air / Navigator ™ Air*Plus*

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

3 Canopy (Single / Duo) (Flat / High) (depending on the version)
Installation as described in Chapter 14, on Page 62
- 1 Single canopy Ø 600 mm x 150 mm, 1 canopy attachment 110 mm high
- 1 Single canopy – 700 mm x 700 mm x 150 mm high
- 1 Duo canopy (installation with intermediate ceiling) – 700 mm x 700 mm x 50 mm
- 1 Duo canopy (installation with intermediate ceiling) – 700 mm x 700 mm x 150 mm
- 1 canopy attachment – 700 mm x 700 mm x 120 mm high

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

4 Extension arm with pre-assembled ceiling tube – dual-arm variant
Installation as described in Chapter 8.2, on Page 35
- 2 Navigator ™ Air / Navigator ™ Air*Plus* extension arm with ceiling tube

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

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.2, on Page 66)
- 2 setscrews M16 – DIN EN ISO 4028
- 4 ball stops Ø10 mm – DIN 5401, ISO 3290
- 4 section end caps for the extension arm

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

5 Extension arm with pre-assembled ceiling tube – single-arm variant
Installation as described in Chapter 8.2, on Page 35
- 1 Navigator ™ Air / Navigator ™ Air*Plus* extension arm with ceiling tube

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

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.2, on Page 66)
- 1 setscrew M16 – DIN EN ISO 4028,
- 2 ball stops Ø10 mm – DIN 5401, ISO 3290
- 2 section end caps for the extension arm
- 1 pneumatic pipe dummy plug (BLUE marking)

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

6 Ceiling tube Navigator ™ Air / Navigator ™ Air*Plus* (for long ceiling tube lengths)
Pre-installation as described in Chapter 7.2, on Page 31
- 1 ceiling tube (length as specified in the order)
- 1 earthing cable, 4 mm²

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

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

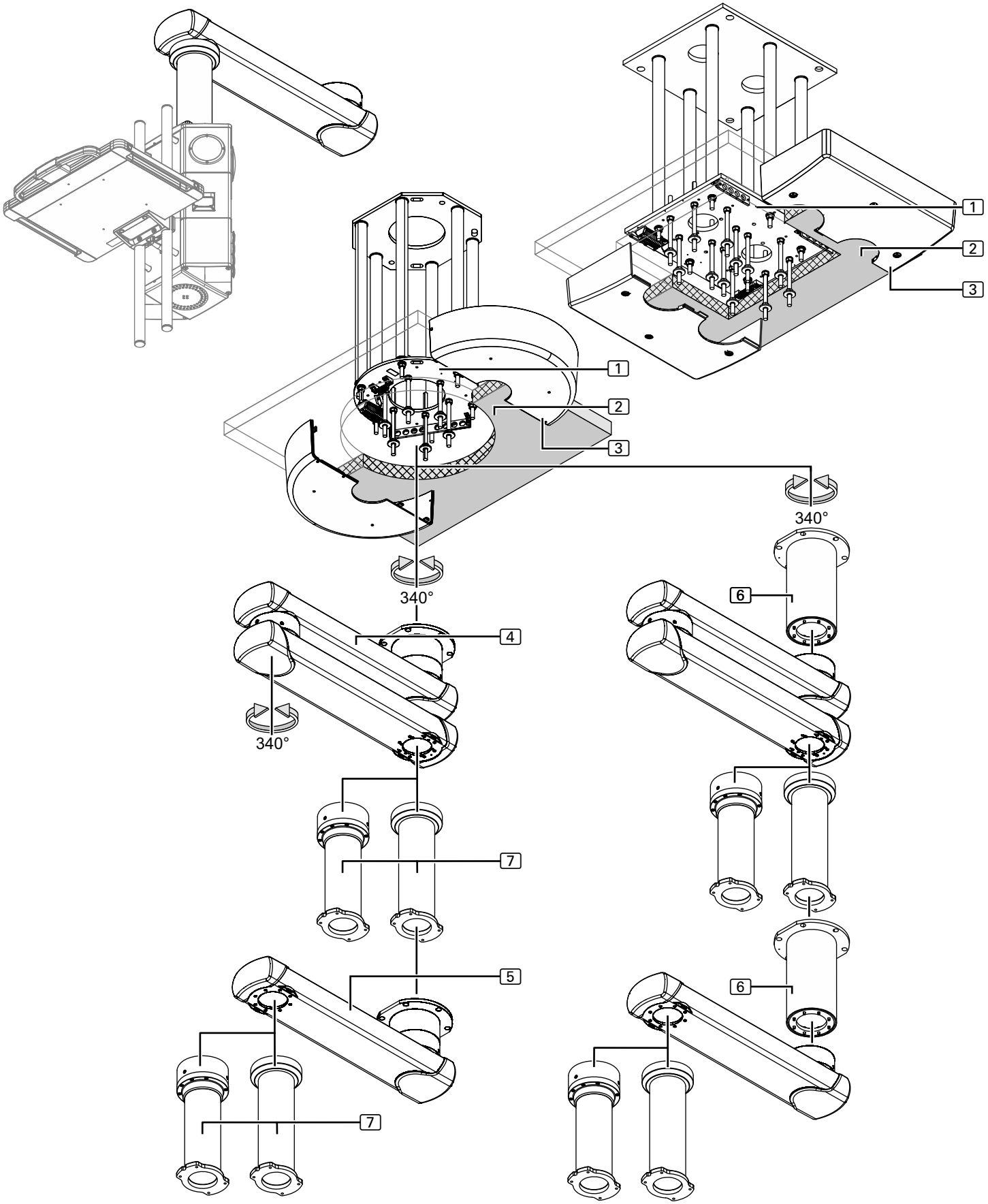
7 Drop tube with Bearing Unit Friction (slide bearing / roller bearing)
Installation as described in Chapter 9.2, on Page 39
- 1 Drop tube (in order-specific length)

Pre-assembled components
- 1 earthing cable, 4 mm²

Drop tube fixing elements
- 1 fastening plate 8 x M10
- 8 Allen countersunk screws M10 x 25 mm – 8.8 – DIN EN ISO 10642

Figure 2: Scope of delivery of Navigator ™ Friction

1.3 Overview of the pendant system Navigator ™ Friction



See Figure 2: on Page 9”

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

1.4 Scope of delivery of Navigator ™ Friction

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

3 Canopy (Single / Duo) (Flat / High) (depending on the version)
Installation as described in Chapter 14, on Page 62
- 1 Single canopy Ø 600mm x 150mm, 1 canopy attachment 110mm high
- 1 Single canopy – 700mm x 700mm x 150mm high
- 1 Duo canopy (installation with intermediate ceiling) – 700mm x 700mm x 50mm
- 1 Duo 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 Extension arm with pre-assembled ceiling tube – dual-arm variant
Installation as described in Chapter 8.2, on Page 35
- 2 Navigator ™ Friction extension arm with ceiling tube

Pre-assembled components
- 3 earthing cables, 4mm²

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.2, on Page 66)
- 2 setscrews M16 – DIN EN ISO 4028
- 4 ball stops Ø10mm – DIN 5401, ISO 3290
- 4 section end caps for the extension arm

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

5 Extension arm with pre-assembled ceiling tube – single-arm variant
Installation as described in Chapter 8.2, on Page 35
- 1 Navigator ™ Friction extension arm with ceiling tube

Pre-assembled components
- 2 earthing cables, 4mm²

Pre-assembled components or components incl. in the scope of delivery (see Chapter 15.2, on Page 66)
- 1 setscrew M16 – DIN EN ISO 4028,
- 2 ball stops Ø10mm – DIN 5401, ISO 3290
- 2 section end caps for the extension arm

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

6 Ceiling tube Navigator ™ Friction (for long ceiling tube lengths)
Pre-installation as described in Chapter 7.2, on Page 31
- 1 ceiling tube (length as specified in the order)
- 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 9.2, on Page 39
- 1 Drop tube (in order-specific length)

Pre-assembled components
- 1 earthing cable, 4mm²

Drop tube fixing elements
- 1 fastening plate 8 x M10
- 8 Allen countersunk screws M10 x 25mm – 8.8 – DIN EN ISO 10642

1.5 Overview of optional accessories

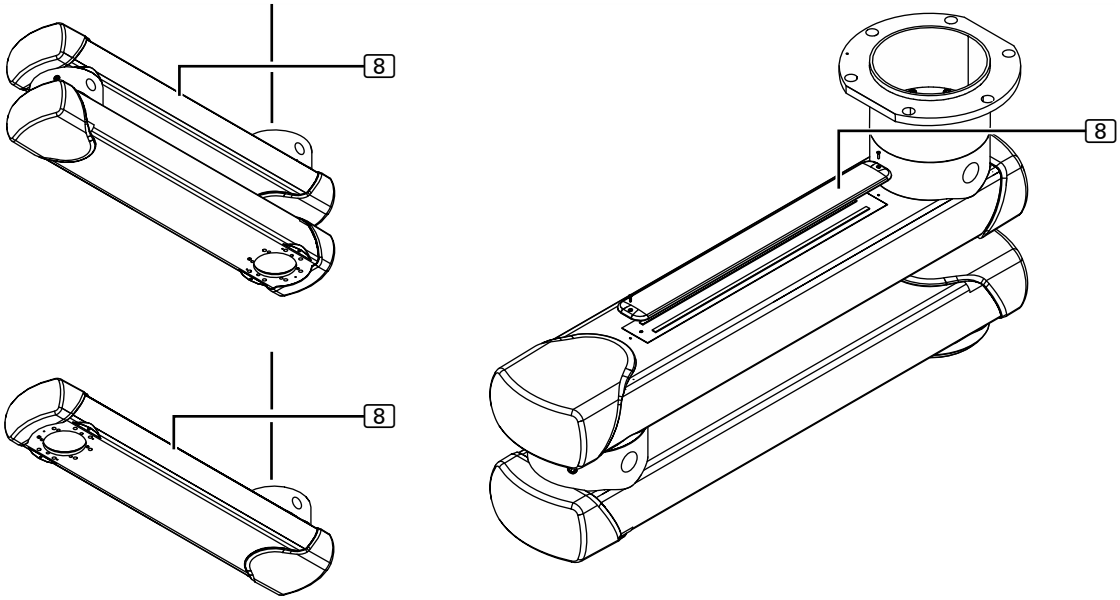


Figure 3: Scope of delivery of optional accessories

The Figure shows the pendant system Navigator ™ Air*Plus*. The optional accessories available for the pendant systems Navigator ™ Air and Navigator ™ Friction are identical.

See Figure 3: on Page 11”

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

1.6 Scope of delivery of optional accessories

8 Indirect extension arm lighting (extension arm lengths 800 and 1000 mm)
For a retrofit: Installation as described in Chapter 10, on Page 40

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

1.7 Further optional accessories

- 1 telescopic magnet pick-up tool set

2.1 Approved NUVO adaptions

Approved adaptions

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

- NUVO products as described in Chapter 20, “Approved NUVO Products”, on Page 82

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 76 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, on Page 18).

Danger of fire: warns of the improper use of oxygen (see Chapter 2.11, on Page 18).

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.

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 Graphic symbols on the device and the package

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.

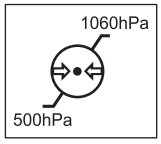
General note reminding the user to handle the pendant system with care.

Environmentally friendly disposal: warns of damage to the environment caused by improper disposal of the pendant system.

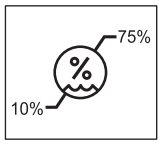
CE mark: NUVO declares that the products comply with the relevant regulations set forth in the applicable European Directives.

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.

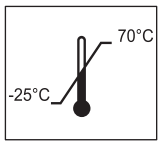
This symbol marks the product as a component approved by a "Nationally Recognized Testing Laboratory" which complies with both Canadian and US deviations from applicable standards.



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 system Navigator ™ Air, Navigator ™ Air*Plus* and Navigator ™ Friction
  - Single type – single- and dual-arm variants
  - Duo type and combinations – single- and dual-arm variants

- 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 conveying and extraction of:
- 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 76 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.

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 4)

- The Figure shows the example of the rating plate of Navigator ™ Air. The rating plate of Navigator ™ Air*Plus* and Navigator ™ Friction has an identical structure.

- The rating plate is attached to the top side of the extension arms.

Serial number

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

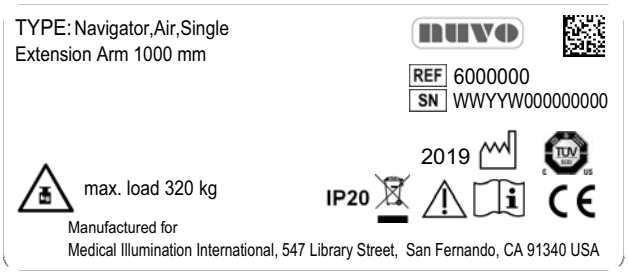
Load bearing capacity

- The value of up to 370 kg indicates the maximum permissible load bearing capacity of the extension 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 two digits indicate the week of manufacture, e.g. 11 = calendar week 11.
  – The following two 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.

Figure 4: Information on the rating plate



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

o 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 device 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 arms, adaptions and end devices.

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:

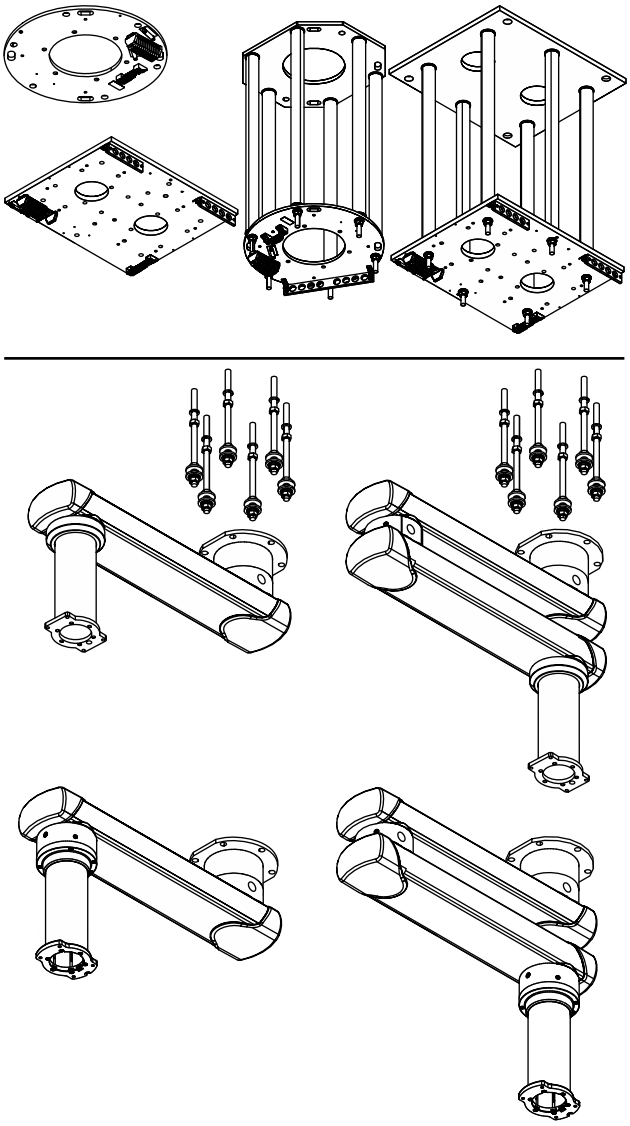
- No structural alterations are made to the pendant system. Unauthorised modifications or conversions to the pendant system are not permitted for safety reasons.
- Only genuine spare parts or accessories and those defined and approved by NUVO are used. The use of other parts may involve unknown risks 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

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 5: 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 ™ Air / Navigator ™ Air*Plus*
(Navigator ™ 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.

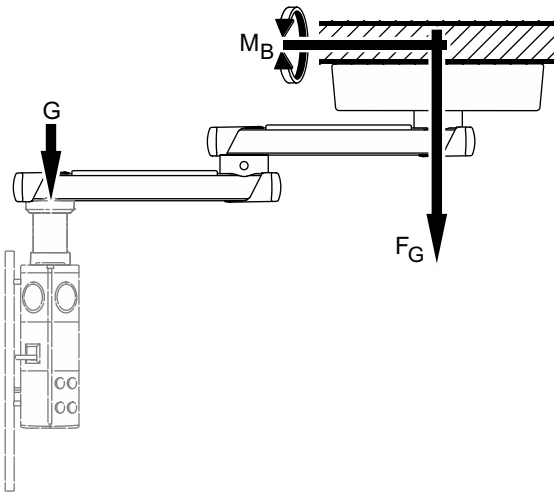
- Protective gloves

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

- 1 telescopic magnet pick-up tool set

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

Figure 6: Load data of Navigator ™ Air, Single version



5.1 Load data of Navigator ™ Air

5.1.1 Load data of the Single version

(See Figure 6)

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 Duo version can be added.

⚠WARNING

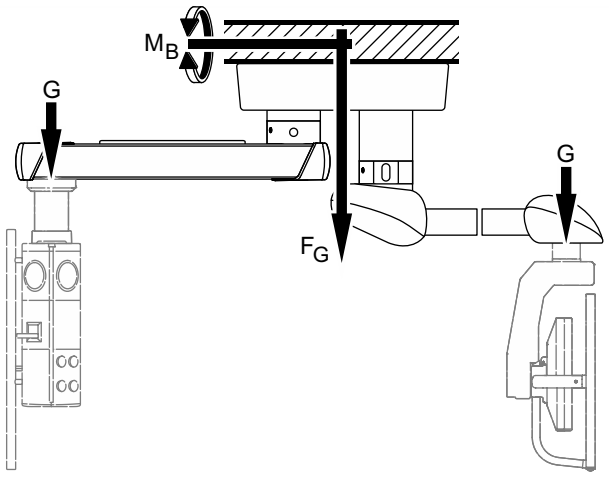
Pendant system dropping

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 pendant system Navigator ™ Air

Single arm 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	6017	1300	3457	580
Extension arm 800mm	4477	1300	3405	420
Extension arm 1000mm	3525	1300	3300	320
Dual arm 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 / 600mm	3116	1300	3286	260
Extension arm 600mm / 800mm	2753	1300	3288	220
Extension arm 800mm / 600mm	2753	1300	3322	220
Extension arm 800mm / 800mm	2391	1300	3173	180
Extension arm 600mm / 1000mm	2391	1300	3140	180
Extension arm 800mm / 1000mm	2126	1300	3050	150
1000mm / 600mm extension arm	2391	1300	3206	180
Extension arm 1000mm / 800mm	2126	1300	3083	150

Figure 7: Load data for support arm combinations (Navigator ™ Air / Navigator Lift ™ 180)



5.1.2 Load data for support arm combinations

(See Figure 7)

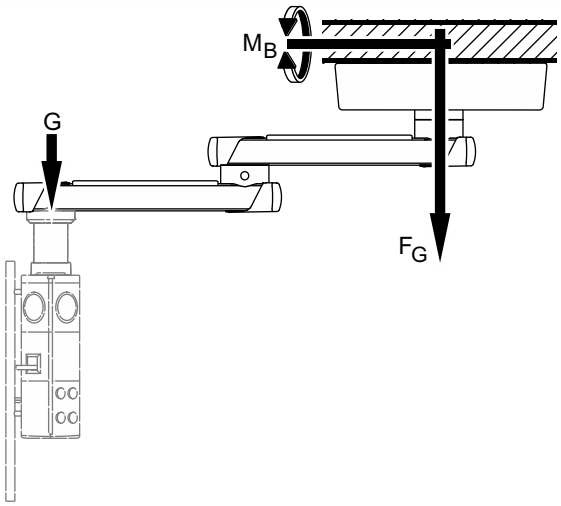
The vertical weight forces and bending moments of the various pendant systems or Duo versions can be added.

Example:
Navigator ™ Air (extension arm 1000mm) on the ceiling mount combined with
Navigator Lift ™ 180 (spring arm 1015mm)

- Sum of weight forces: 3525N + 1300N + 2578N = 7403N
- Sum of bending moments: 3300Nm + 1987Nm = 5287Nm

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

Figure 8: Load data of Navigator ™ Air*Plus*, Single version



5.2 Load data of Navigator ™ Air*Plus*

5.2.1 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 Duo version can be added.

⚠WARNING

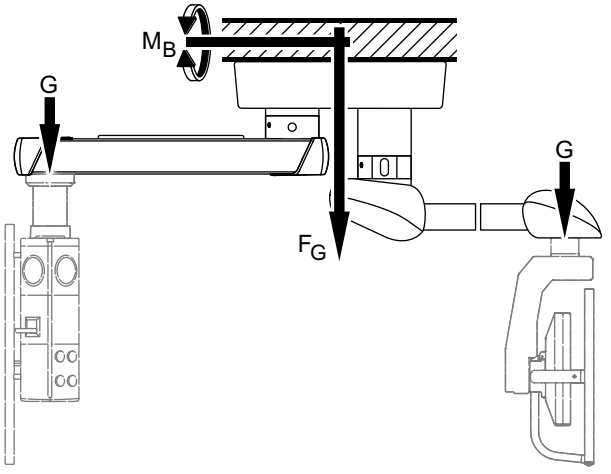
Pendant system dropping

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 pendant system Navigator ™ Air*Plus*

Single arm 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	6605	1300	3810	640
Extension arm 800mm	4967	1300	3758	470
Extension arm 1000mm	4016	1300	3790	370
Dual arm 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 / 600mm	3508	1300	3757	300
Extension arm 600mm / 800mm	3146	1300	3838	260
Extension arm 800mm / 600mm	3146	1300	3871	260
Extension arm 800mm / 800mm	2783	1300	3801	220
Extension arm 600mm / 1000mm	2783	1300	3768	220
Extension arm 800mm / 1000mm	2518	1300	3756	190
Extension arm 1000mm / 600mm	2783	1300	3834	220
Extension arm 1000mm / 800mm	2518	1300	3789	190
Extension arm 1000mm / 1000mm	2352	1300	3829	170

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



5.2.2 Load data for support arm combinations

(See Figure 9)

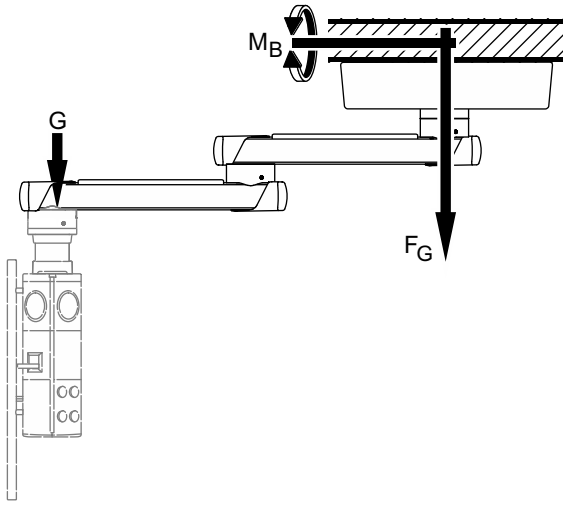
The vertical weight forces and bending moments of the various pendant systems or Duo versions can be added.

Example:
Navigator ™ Air*Plus* (extension arm 1000mm) on the ceiling mount combined with
Navigator Lift ™ 180 (spring arm 1015mm)

- Sum of weight forces: 4016N + 1300N + 2578N = 7894N
- Sum of bending moments: 3790Nm + 1987Nm = 5777Nm

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

Figure 10: Load data of Navigator ™ Friction, Single version



5.3 Load data of Navigator ™ Friction

5.3.1 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 Duo version can be added.

⚠WARNING

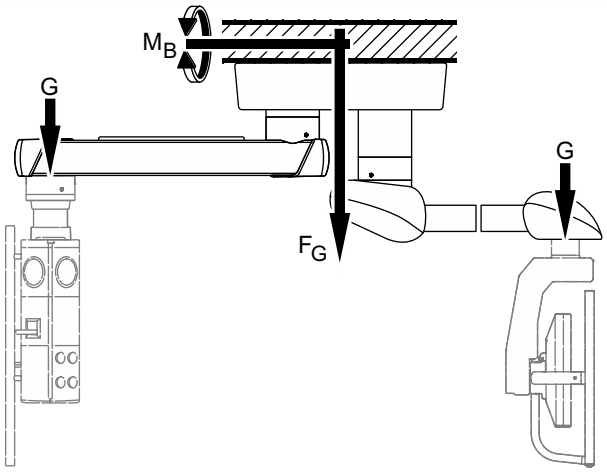
Pendant system dropping

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

Table 03: Load data of the pendant system Navigator ™ Friction

Single arm 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	6605	1300	3810	640
Extension arm 800mm	4967	1300	3758	470
Extension arm 1000mm	4016	1300	3790	370
Dual arm 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 / 600mm	3508	1300	3757	300
Extension arm 600mm / 800mm	3146	1300	3838	260
Extension arm 800mm / 600mm	3146	1300	3871	260
Extension arm 800mm / 800mm	2783	1300	3801	220
Extension arm 600mm / 1000mm	2783	1300	3768	220
Extension arm 800mm / 1000mm	2518	1300	3756	190
1000mm / 600mm extension arm	2783	1300	3834	220
Extension arm 1000mm / 800mm	2518	1300	3789	190
Extension arm 1000mm / 1000mm	2352	1300	3829	170

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



5.3.2 Load data for support arm combinations

(See Figure 11)

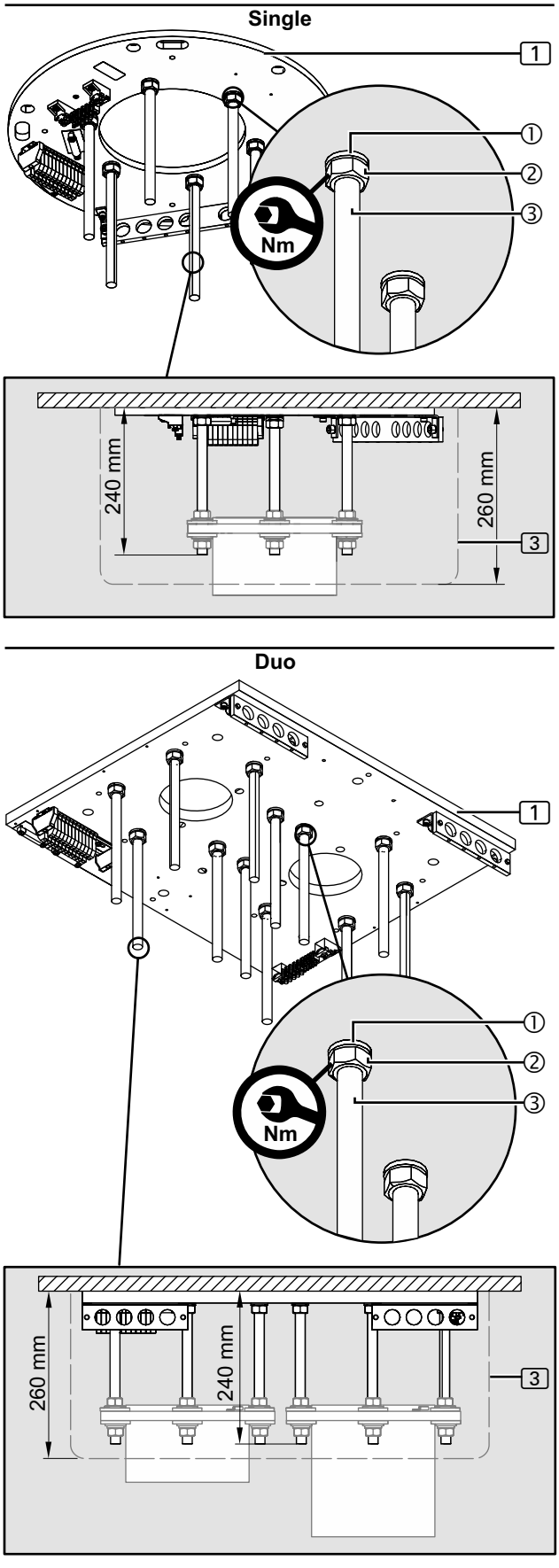
The vertical weight forces and bending moments of the various pendant systems or Duo versions can be added.

Example:
Navigator ™ Friction (extension arm 1000mm) on the ceiling mount combined with
Navigator Lift ™ 180 Friction (spring arm 1015mm)

- Sum of weight forces: 4016N + 1300N + 2578N = 7894N
- Sum of bending moments: 3790Nm + 1987Nm = 5777Nm

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

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

6.1.2 Cutting the threaded bolts to length

(See Figure 12)

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

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

6.1.3 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:

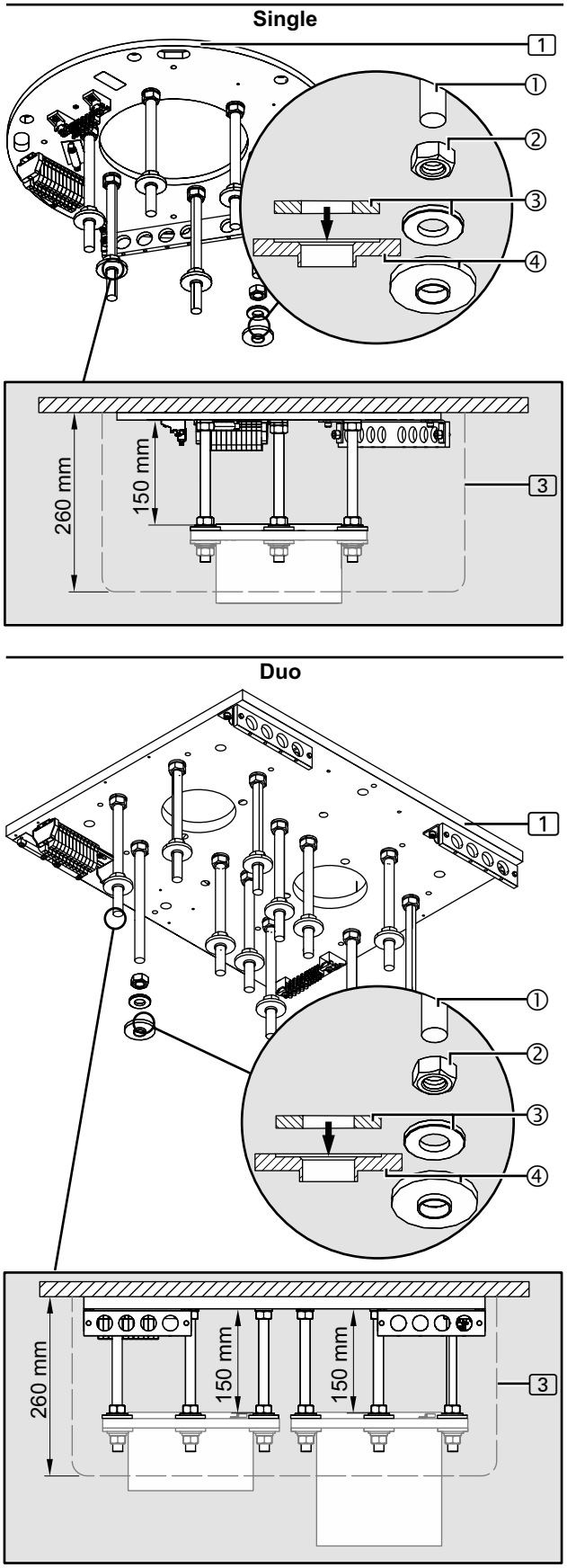
- Tighten all hexagonal nuts M16 ② with a tightening torque of 195 Nm.

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 195 Nm.

3. Continue the installation as described in Chapter 6.1.4, on Page 25.

Figure 13: Mounting the upper insulations to the threaded bolts



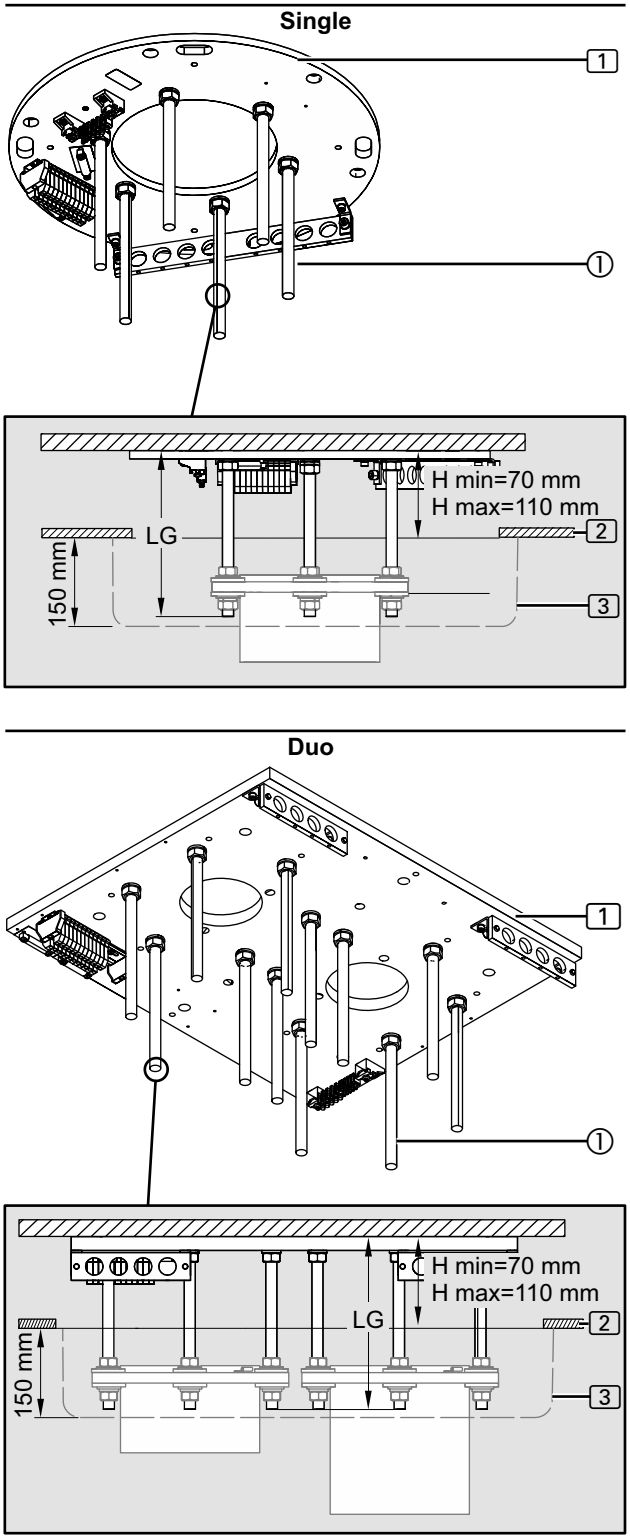
6.1.4 Mounting the upper insulations to the threaded bolts

(See Figure 13)

The 6 (Single version) or 12 (Duo version) hexagonal nuts M16 ② must be mounted to the threaded bolts M16 ① at an exact distance to each other.

1. For each threaded bolt M16 ① screw a hexagonal nut M16 ② onto the threaded bolts M16 ① .
2. Adjust the distance between the hexagonal nuts M16 ② and the interface plate [1] to 150 mm.
3. Using a digital spirit level, align the hexagonal nuts M16 ② in a horizontal position.
4. Place 1 flat washer with an external diameter of 34 mm ③ .
5. Place 1 plastic insulating disc ④ (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 ④ .
6. Using an adhesive or elastic tape, attach the plastic insulating disc ④ to the threaded bolts M16 ① .
7. Continue the installation as described in Chapter 7, on Page 31 or Chapter 8, on Page 34.

Figure 14: Cutting the threaded bolts for the Single / Duo 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)

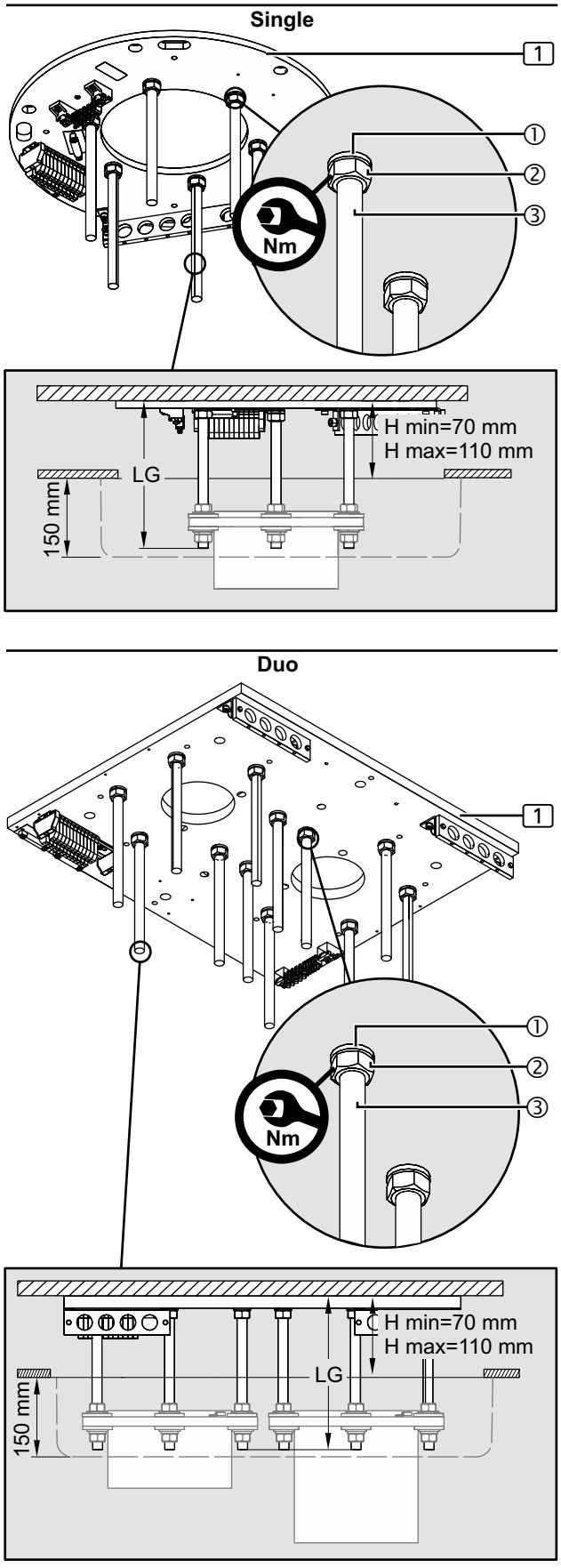
If a Single / Duo interface plate [1] is mounted to the raw ceiling with intermediate ceiling [2], the 6 (Single version) or 12 (Duo version) threaded bolts M16 x 330mm ① must be cut to length.
The Single / Duo canopy [3] to be mounted later is flush with the intermediate ceiling [2] and covers the ceiling 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, Duo 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 if you have 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 27.

Figure 15: Mounting the threaded bolts to the Single / Duo interface plate



6.2.2 Mounting the threaded bolts to the interface plate Single / Duo

(See Figure 15)

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:

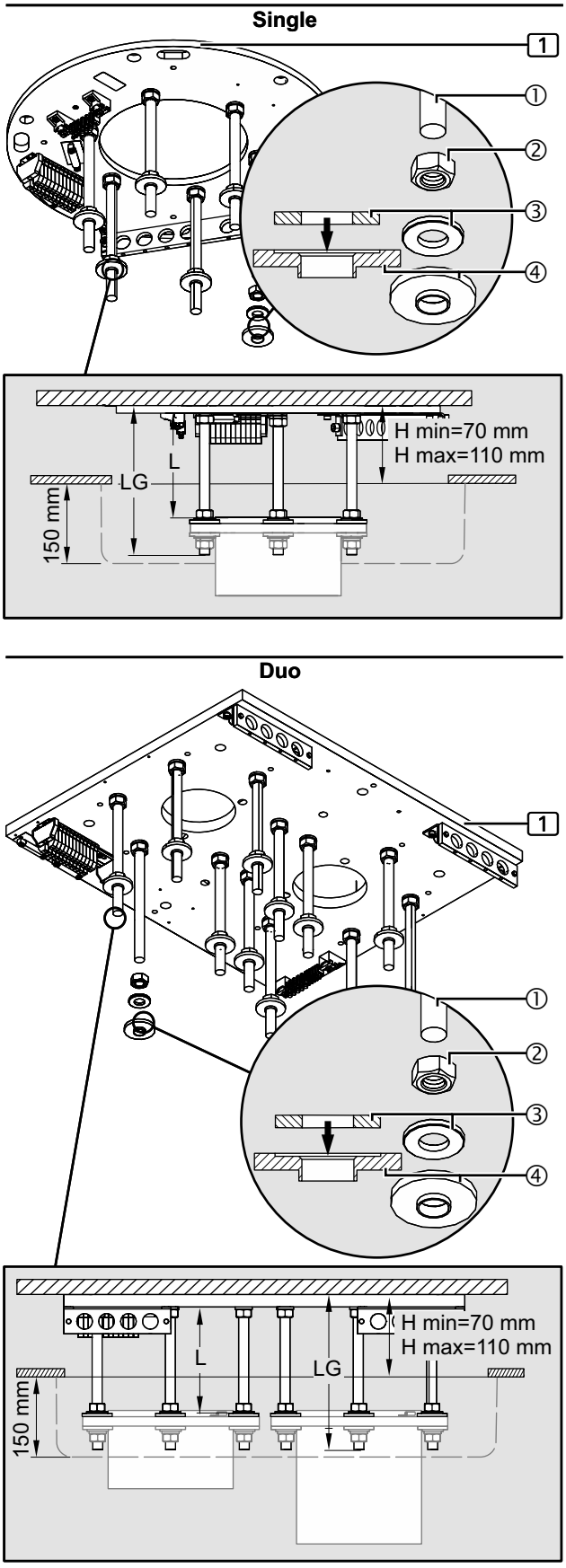
- Tighten all hexagonal nuts M16 ② with a tightening torque of 195 Nm.

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

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

3. Continue the installation as described in Chapter 6.2.3, on Page 28.

Figure 16: Mounting upper insulations to 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)

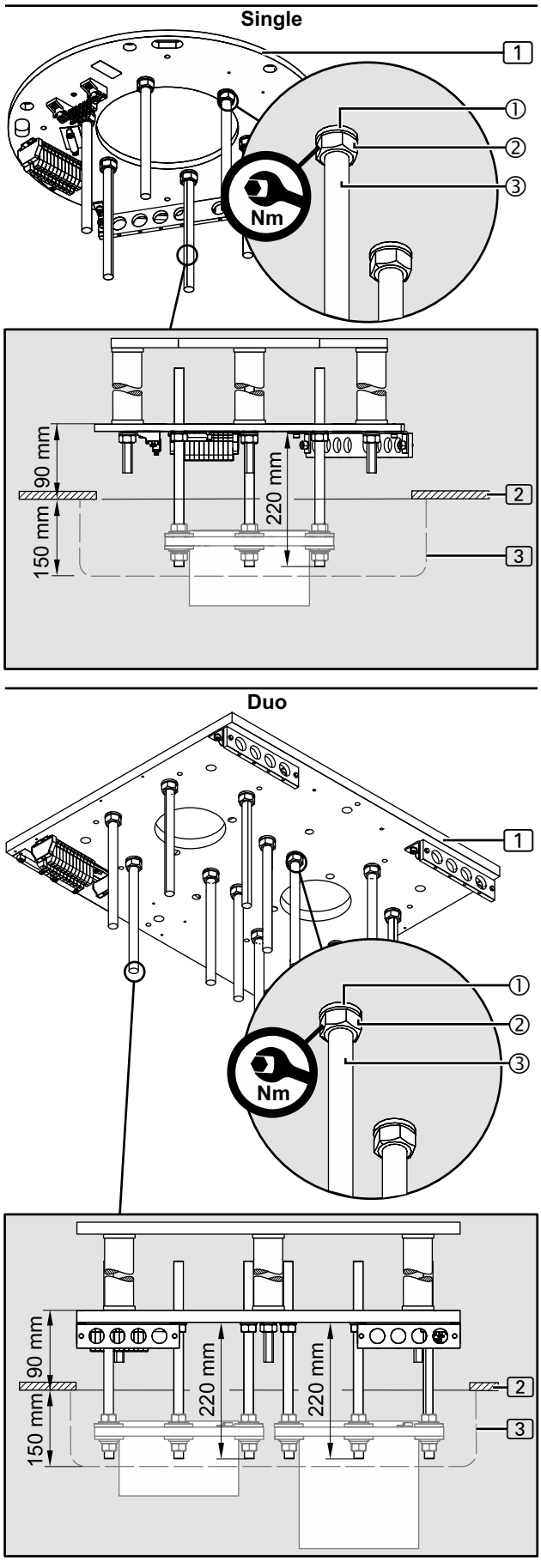
3. Screw the hexagonal nuts M16② onto the threaded bolts M16① at the calculated distance L.

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 31 or Chapter 8, on Page 34.

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 (Duo version) threaded bolts M16 x 330mm③ must protrude from the interface plate [1].
The Single / Duo 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
- Duo version = 220mm
  must protrude from the interface plate [1].

⚠WARNING

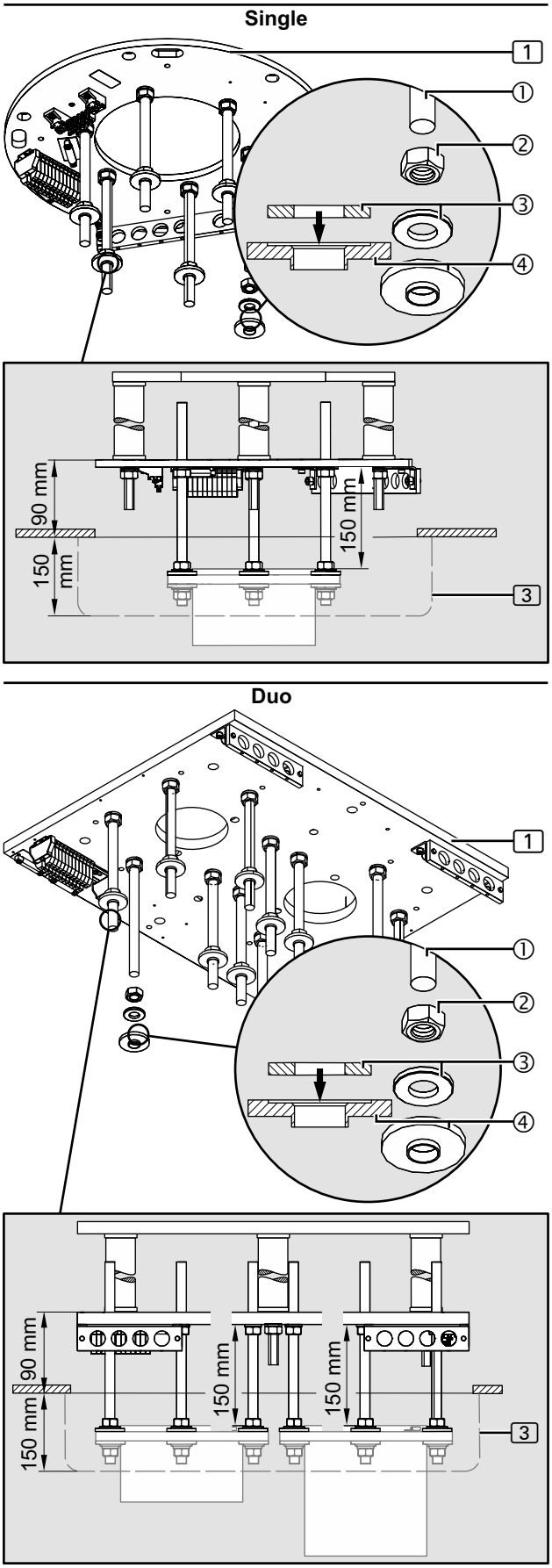
Pendant system dropping

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 Duo 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 30.

Figure 18: Mounting upper insulations to threaded bolts



6.3.2 Mounting the upper insulations to the threaded bolts

(See Figure 18)

The 6 (Single version) or 12 (Duo 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 .

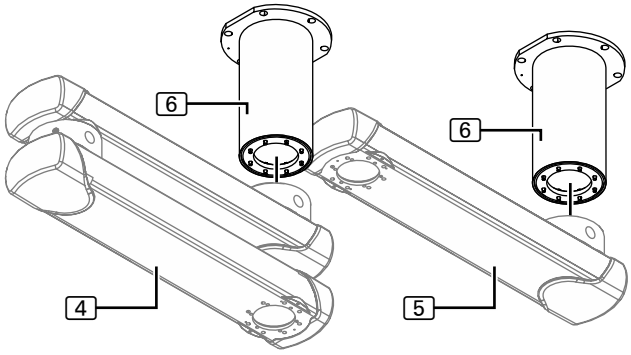
2. Adjust the distance between the hexagonal nuts M16② and the interface plate [1]:
- The distance between the hexagonal nuts M16② and the interface plate [1] must be 150mm.

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 .
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 31 or Chapter 8, on Page 34.

Figure 19: Components described in this chapter



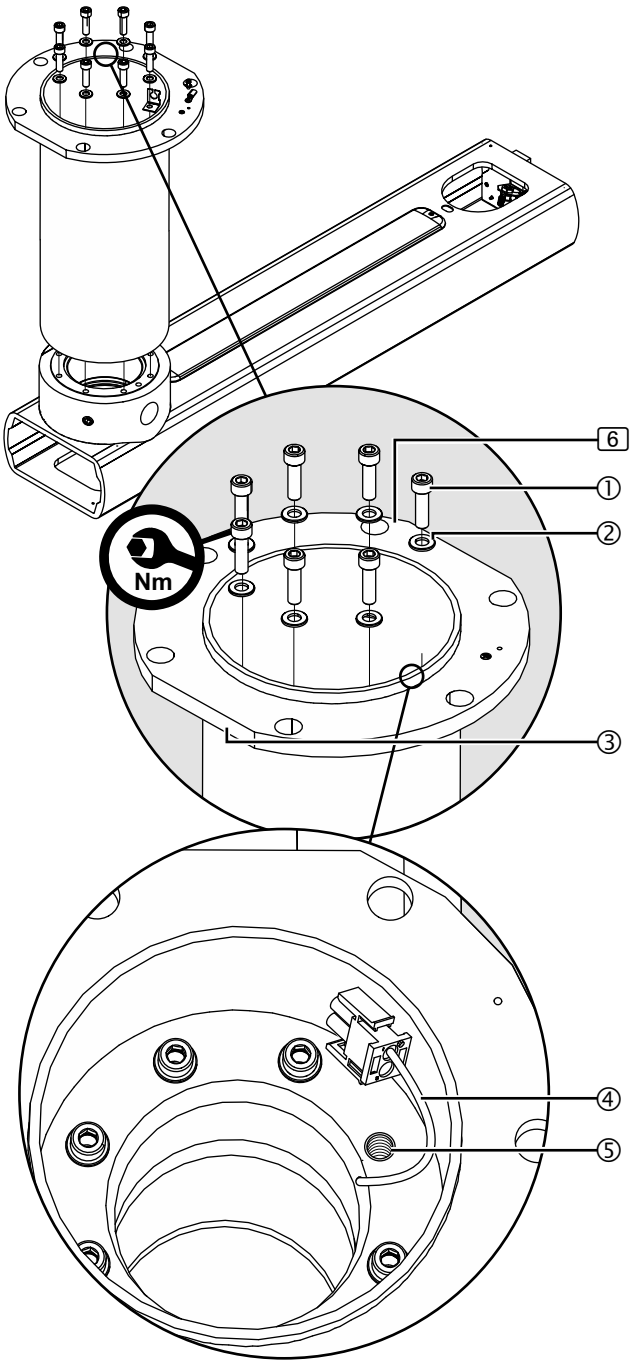
7.1 Components described in this chapter

(See Figure 19)

For the long ceiling tube variants or for the Navigator™ – Inverted, the ceiling tube [6] is included in the scope of delivery as an individual part.

- The ceiling tube [6] is mounted to the extension arms [4], [5] (dual- and single-arm variant).
- The simplified representation illustrates the extension arm without pre-assembled cables.
- The installation is described in the following chapters and identical for the different versions.

Figure 20: Mounting the ceiling tube



7.2 Mounting the loose ceiling tube incl. in the scope of delivery

7.2.1 Mounting the ceiling tube

(See Figure 20)

The simplified representation illustrates the extension arm without pre-assembled cables.

1. Place the ceiling tube [6] onto the extension arms [4], [5] and position it in such a way that the chamfered surface ③ is almost at right angles to the extension arms [4], [5] as illustrated in the Figure.
2. Fit 8 Allen cylinder screws M10 x 25mm – 8.8 ① – 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 – 8.8 ① – DIN EN ISO 4762.

4. Screw the ceiling tube [6] onto the extension arms [4], [5] using 7 Allen cylinder screws M10 x 25mm – 8.8 ① – DIN EN ISO 4762 and lock washers S10 ② .
- Use an extension tool to tighten the 7 Allen cylinder screws M10 x 25mm – 8.8 ① – DIN EN ISO 4762.

⚠ WARNING

Nm

Pendant system dropping

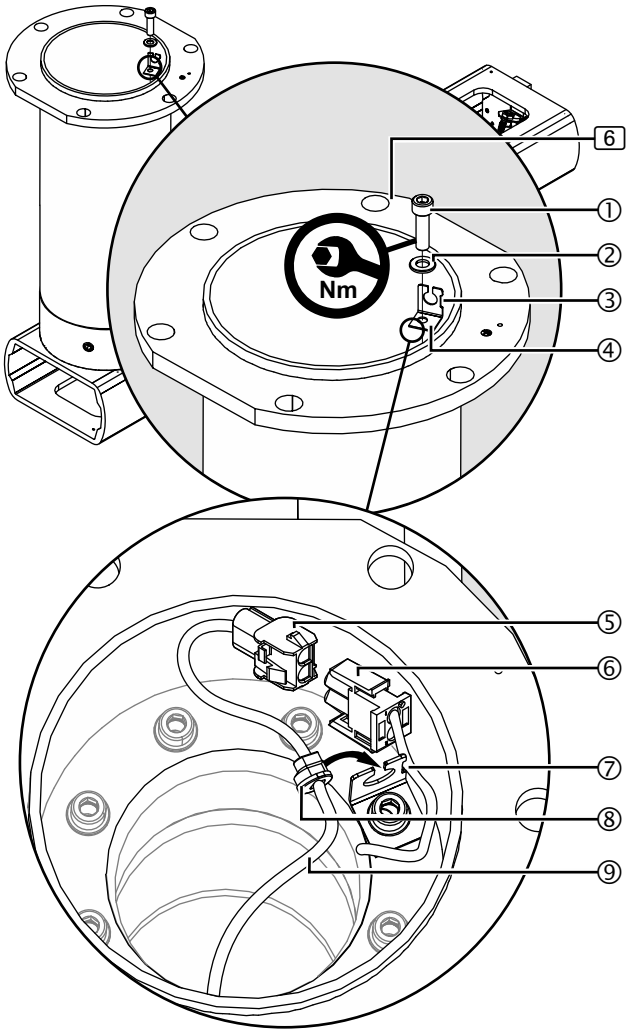
The pendant system can drop if the fixing elements have not been properly tightened:

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

5. Check that the ceiling tube [6] is securely in place on the extension arms [4], [5]:
- The ceiling tube [6] must be level with the extension arms [4], [5].
- The 7 Allen cylinder screws M10 x 25mm – 8.8 ① – DIN EN ISO 4762 must be fitted with 7 lock washers S8 ② and tightened to 40Nm.

6. Mount the strain relieving mechanism in the ceiling tube [6] as described in Chapter 7.2.2, on Page 32.

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 simplified representation illustrates the extension arm without pre-assembled cables.

1. Insert an Allen cylinder screw M10 x 25 mm – 8.8 ① – 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 extension arms [4], [5] using 1 Allen cylinder screw M10 x 25 mm – 8.8 ① – DIN EN ISO 4762 and lock washer S10 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 extension arms [4], [5] towards the control board.

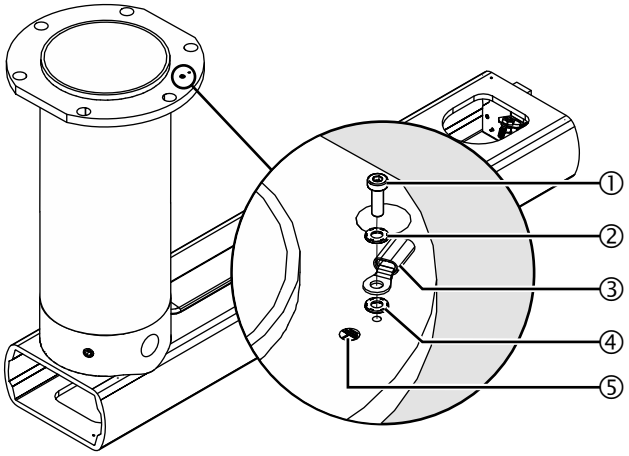
⚠WARNING

Pendant system dropping

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

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

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



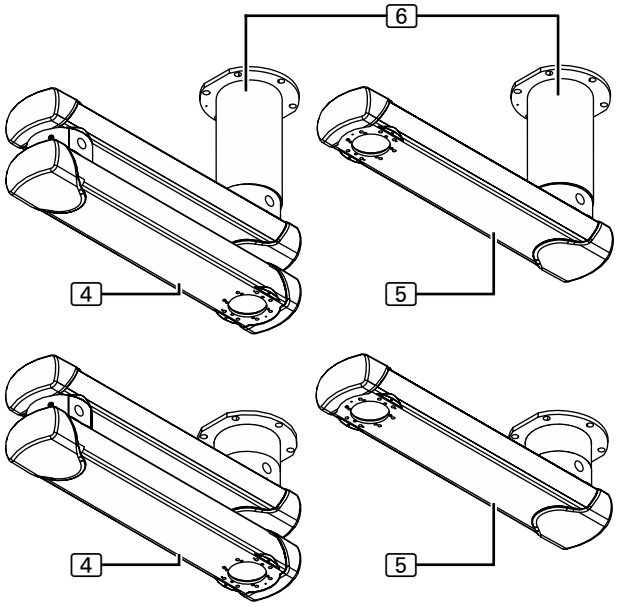
7.2.3 Subsequently mounting the earthing cable to the ceiling tube

(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 34.

Figure 23: Components described in this chapter

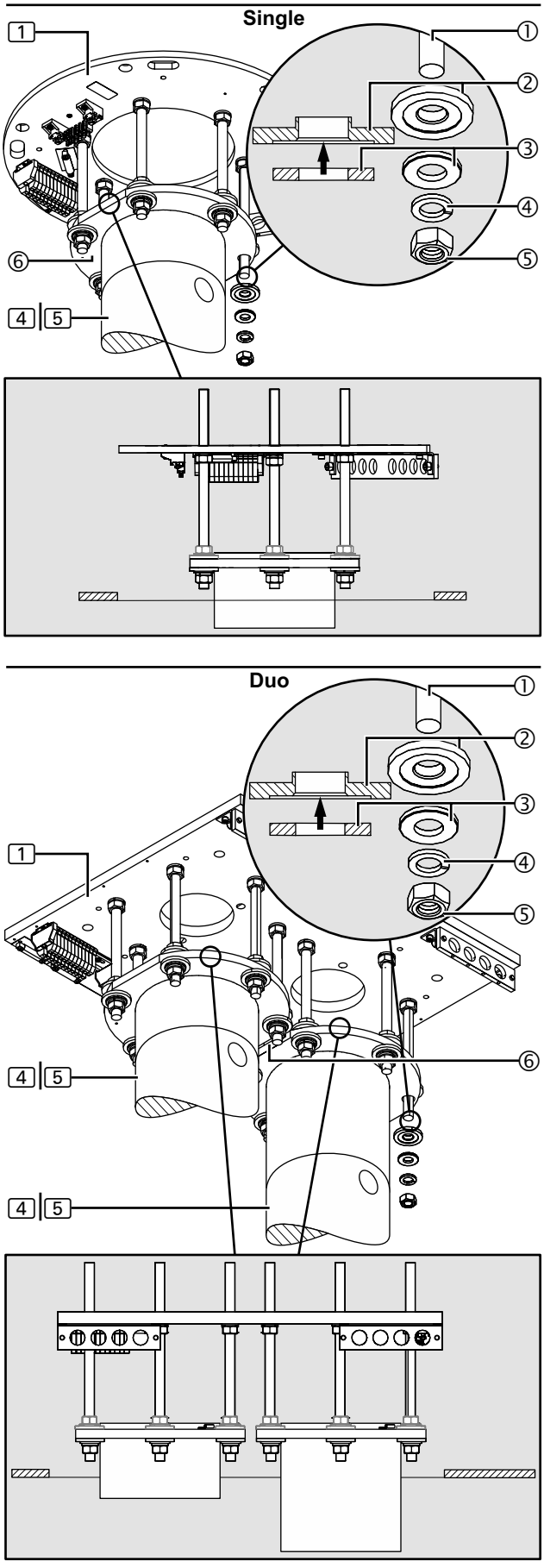


8.1 Components described in this chapter

(See Figure 23)

- The extension arms [4], [5] or the extension arms [4], [5] with an extended ceiling tube [6] for the single- or dual-arm variants is mounted to the threaded bolts of the interface plate [1].
- The Figure shows a simplified representation with only the extension arms [4], [5] without cables.
- The installation is described in the following chapters and identical for the different versions.

Figure 24: Mounting the extension arm



8.2 Mounting the extension arm

(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 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 extension arms 4, 5 o 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 Duo version

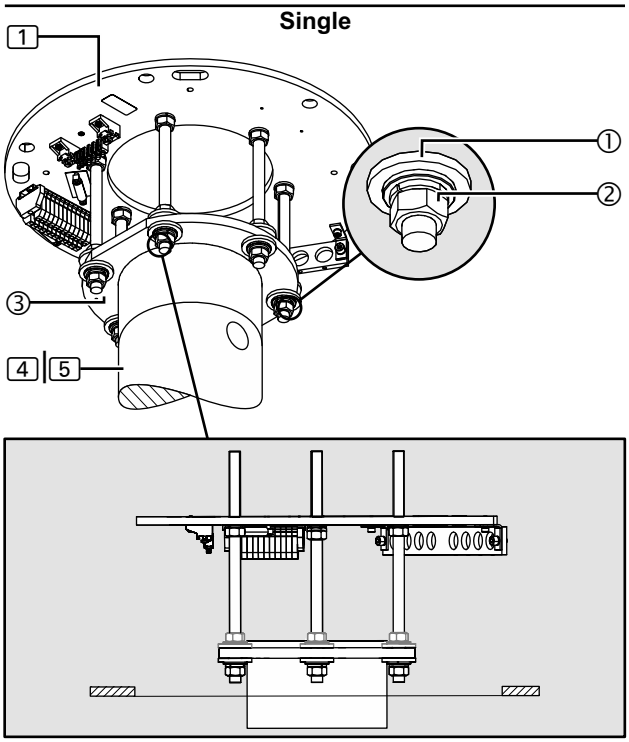
- The flanges have a chamfered surface ⑥ in order to ensure that they can be mounted at the same height.
- Mount the flanges in such a way that the chamfered surfaces ⑥ are aligned towards each other, as illustrated in the Figure.

2. Insert the ceiling tube flange ⑥ with the extension arms 4, 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 36.
- Align the Duo version as described in Chapter 8.4, on Page 37.

Figure 25: Aligning extension arm with interface plate, Single



8.3 Aligning the 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 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

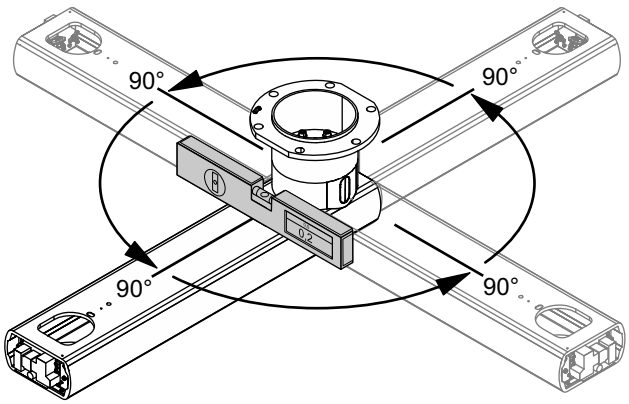
Destruction of the cables in the extension arm

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

- Do not rotate the extension arms 4, 5 more than 350 degrees.
- If required, restrict the swivel range of the extension arms 4, 5 as described in Chapter 15.3, on Page 67.

3. For the extension arm 4 – Dual arm variant, remove the transport lock (band) and dismantle the pre-assembled swivel stop as described in Chapter 15.3.4, on Page 70 if required. Next, turn the lower extension arm into the extension of the upper extension arm.

Figure 26: Checking horizontal alignment of extension arms



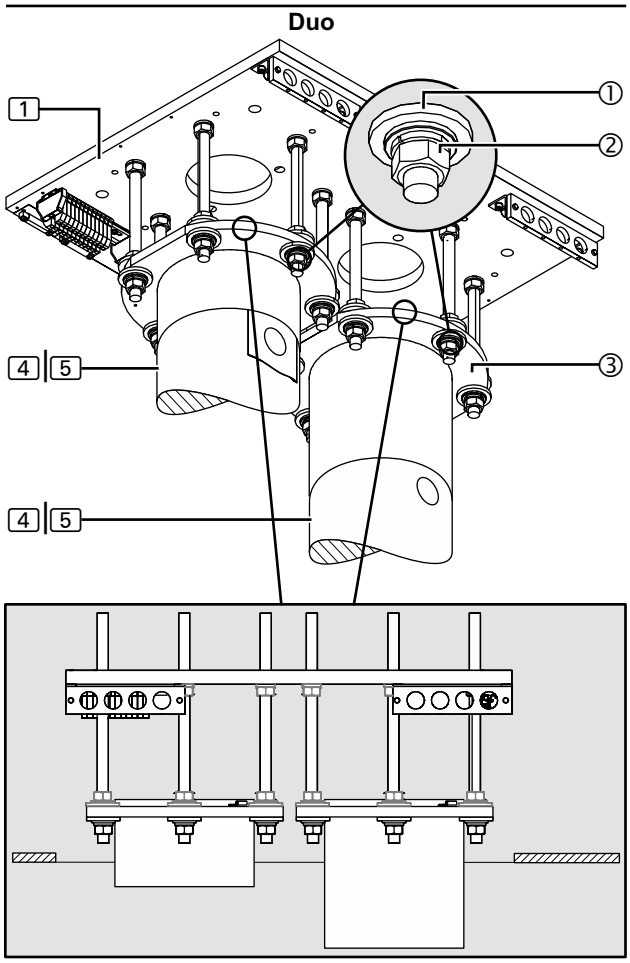
4. Check the horizontal alignment of the extension arms (see “Figure 26”):

- Place the digital spirit level at right angles to the extension arm length onto the upper extension arm (near the flange ③).
- Rotate the 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 of more than ±0.2 degrees the extension arms 4, 5 must be realigned. To do this, repeat the installation steps described above.

5. 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 extension arm with interface plate, Duo



8.4 Aligning the extension arm with the interface plate, Duo

(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 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

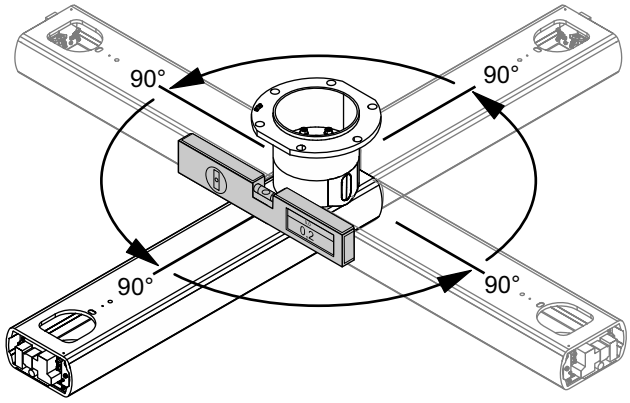
Destruction of the cables in the extension arm

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

- Do not rotate the extension arms 4, 5 more than 350 degrees.
- If required, restrict the swivel range of the extension arms 4, 5 as described in Chapter 15.3, on Page 67.

4. For the extension arm 4 – Dual arm variant, remove the transport lock (band) and dismantle the pre-assembled swivel stop as described in Chapter 15.3.4, on Page 70 if required. Next, turn the lower extension arm into the extension of the upper extension arm.

Figure 28: Checking horizontal alignment of extension arms



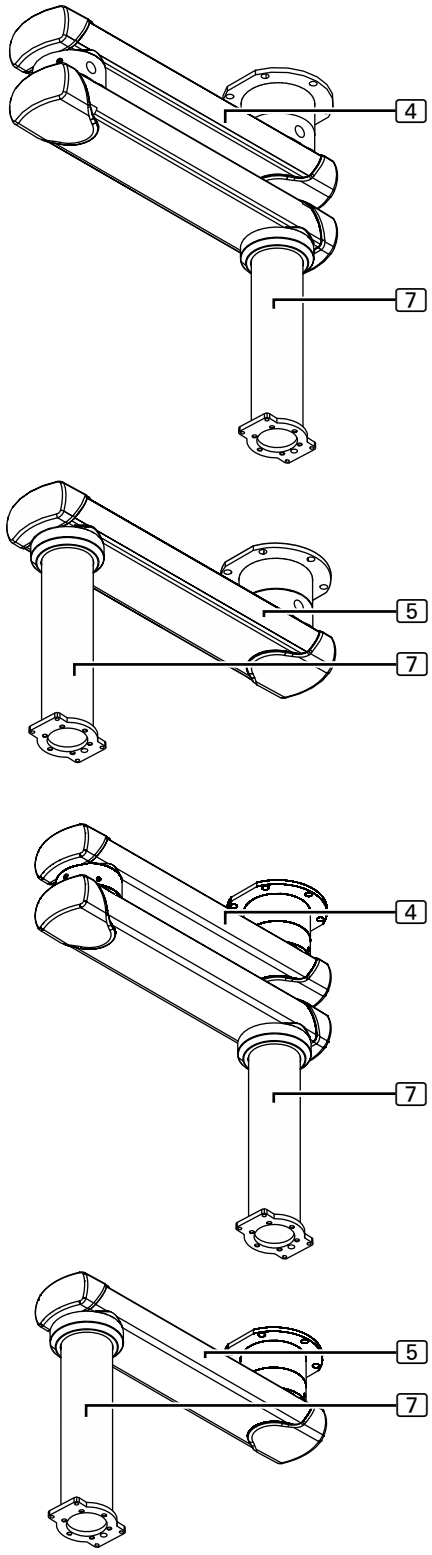
5. Check the horizontal alignment of the extension arms (see Figure 28"):

- Place the digital spirit level at right angles to the extension arm length onto the upper extension arm (near the flange ③).
- Rotate the 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 of more than ±0.2 degrees the extension arms 4, 5 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 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 in this chapter

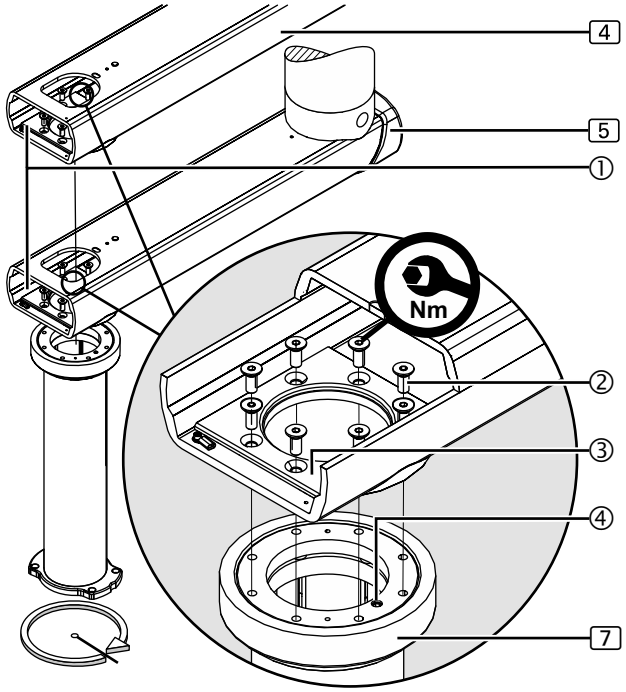


9.1 Components described in this chapter

(See Figure 29)

- The Drop tube [7] with Bearing Unit Friction (slide bearing) is mounted to the extension arms [4], [5] of the single- or dual-arm variants.
- 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 extension arms [4], [5] without pre-assembled cables.

Figure 30: Mounting the Drop tube to the extension arm



9.2 Mounting the Drop tube to the extension arm

(See Figure 30)

The Figure shows a magnified sectional view of the extension arm without its top side.

1. Push the fastening plate 8 x M10 ③ from the front side ① into the extension arms [4], [5] and position it.
2. Place the Drop tube [7] under the extension arms [4], [5] such that the end stop ④ in the Drop tube [7] points away from the extension arm side and the fixing holes fall in line.

NOTE – Defining the range of action

- In order to be able to swivel the installed device (e.g. the Navigator M6) to the left (clockwise), the Drop tube must be mounted with the end stop on the right-hand side as illustrated in the Figure.
- In order to be able to swivel the installed device to the right (counter-clockwise), the Drop tube must be rotated until the end stop ④ is on the left-hand side.

3. Route the Drop tube [7] through the fastening plate 8 x M10 ③ and then screw it
   onto the extension arms [4], [5] using 8 Allen countersunk screws M10 x 25mm – 8.8 ② – DIN EN ISO 10642.

⚠ WARNING

Pendant system dropping

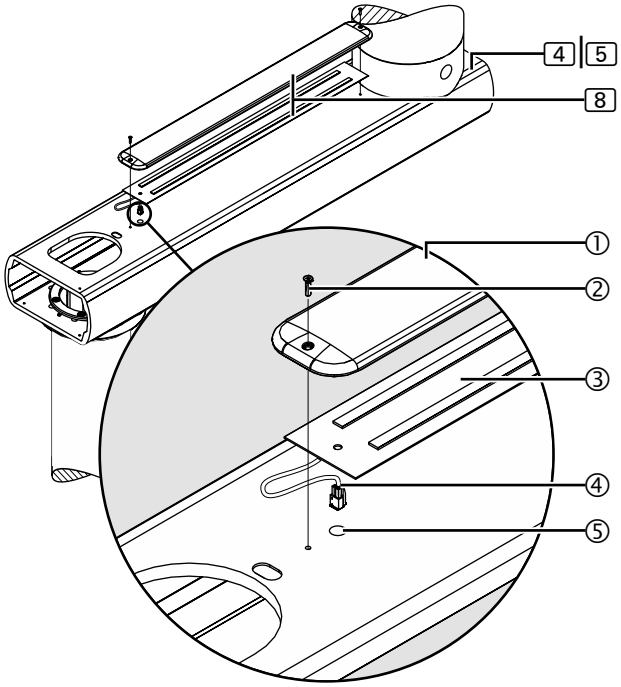
The pendant system can drop if the fixing elements have not been properly tightened:

- Tighten the 8 Allen countersunk screws M10 x 25mm – 8.8 ② – DIN EN ISO 10642 to 40Nm.

4. Check that the Drop tube [7] is securely in place:

- The Drop tube [7] must be level with the extension arms [4], [5].
- The 8 Allen countersunk screws M10 x 25mm – 8.8 ② – DIN EN ISO 10642 must be tightened to 40Nm.

Figure 31: Mounting extension arm lighting



(See Figure 31)

The Figure shows the extension arms [4], [5] of the Navigator ™ Air*Plus* system.
The steps required for the installation of the pendant systems Navigator™ Air and Navigator ™ Friction are identical.
Upon delivery of the system from the factory the following optional accessories are pre-assembled.

The indirect extension arm lighting [8] (extension arm lengths 800 mm and 1000 mm only) is mounted to the top side of the extension arms [4], [5].
The Figure shows a simplified representation with only the extension arms [4], [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 LEDs ③ through the mounting aperture ⑤ into the extension arms [4], [5].

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 arms [4], [5].
- The connecting cable ④ on the basic carrier with LEDs ③ must sit in the extension arms [4], [5].

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 the pendant system.
- 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 sheathing) 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 4 mm, 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 the cables and pipes to the support arm, dual-arm variant

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. Order-specific cables, including nurse call and phone cables, must be separately routed through the pendant system.

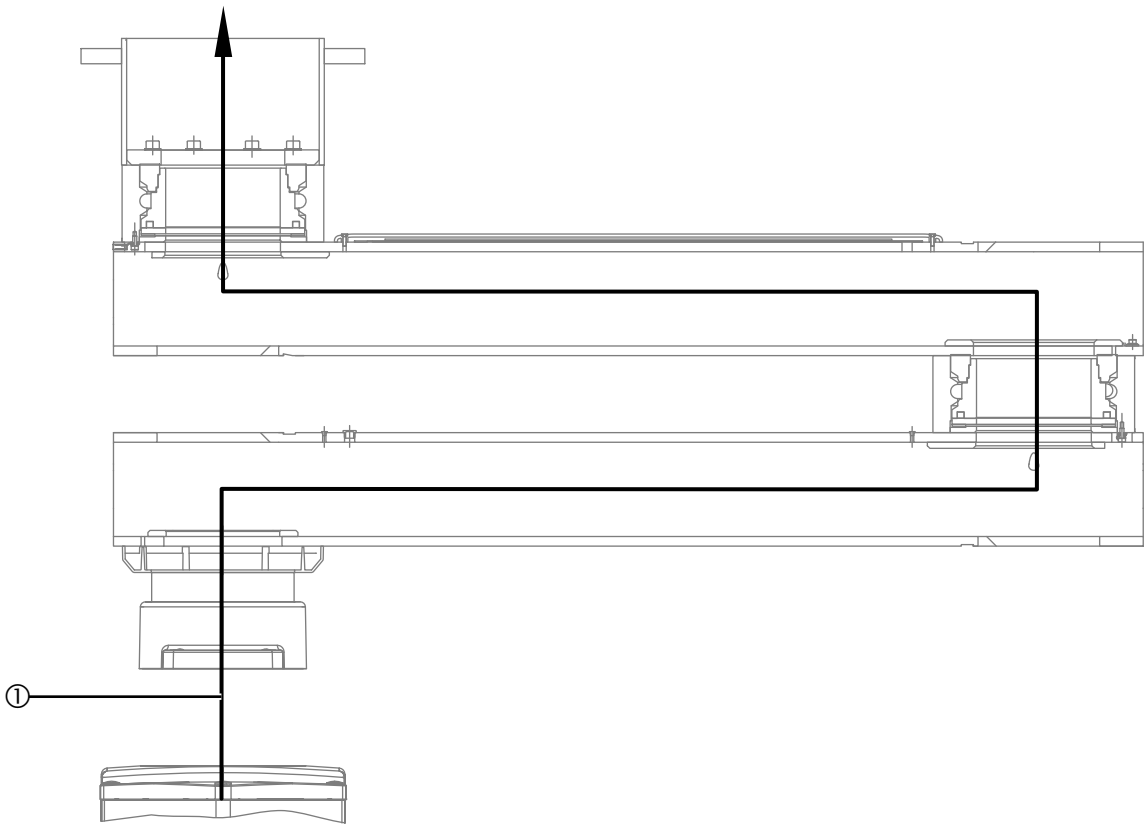
1. Observe the safety instructions in Chapter 11.1, on Page 41.

11.2.1 Routing the power cable

(See "Figure 32“)

- Route the power cable ① (in a spiral coiled tube if required) through the pendant system 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 41

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 be pressureless:

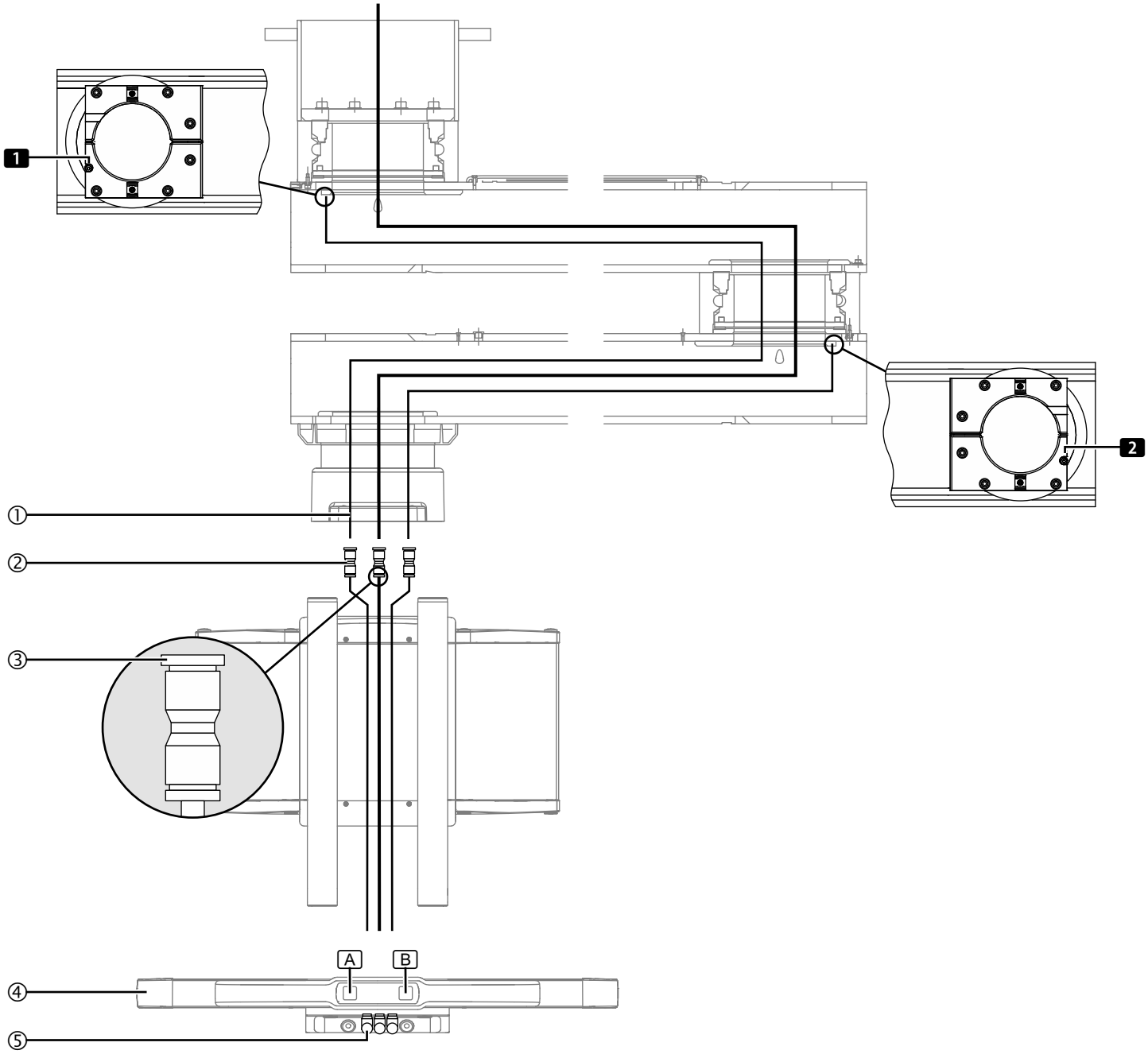
- To install the brake pipes, push them into the brake connecting point. If the brake pipe is correctly positioned, it can no longer be withdrawn from the brake connecting point.
- To disengage the brake pipes on the plug connector ② push in the unlocking mechanism ③ and then remove the brake pipes.

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

5. 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.

6. 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 extension 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 41.

2. 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.
3. Route the extension cable ③ through the extension arm and out of the Drop tube.
4. Establish the assembly connection ④ between the extension cable ③ and the control cable ⑤ routed out of the Navigator M6.

Figure 34: Connecting optional accessories to the support arm, dual-arm variant

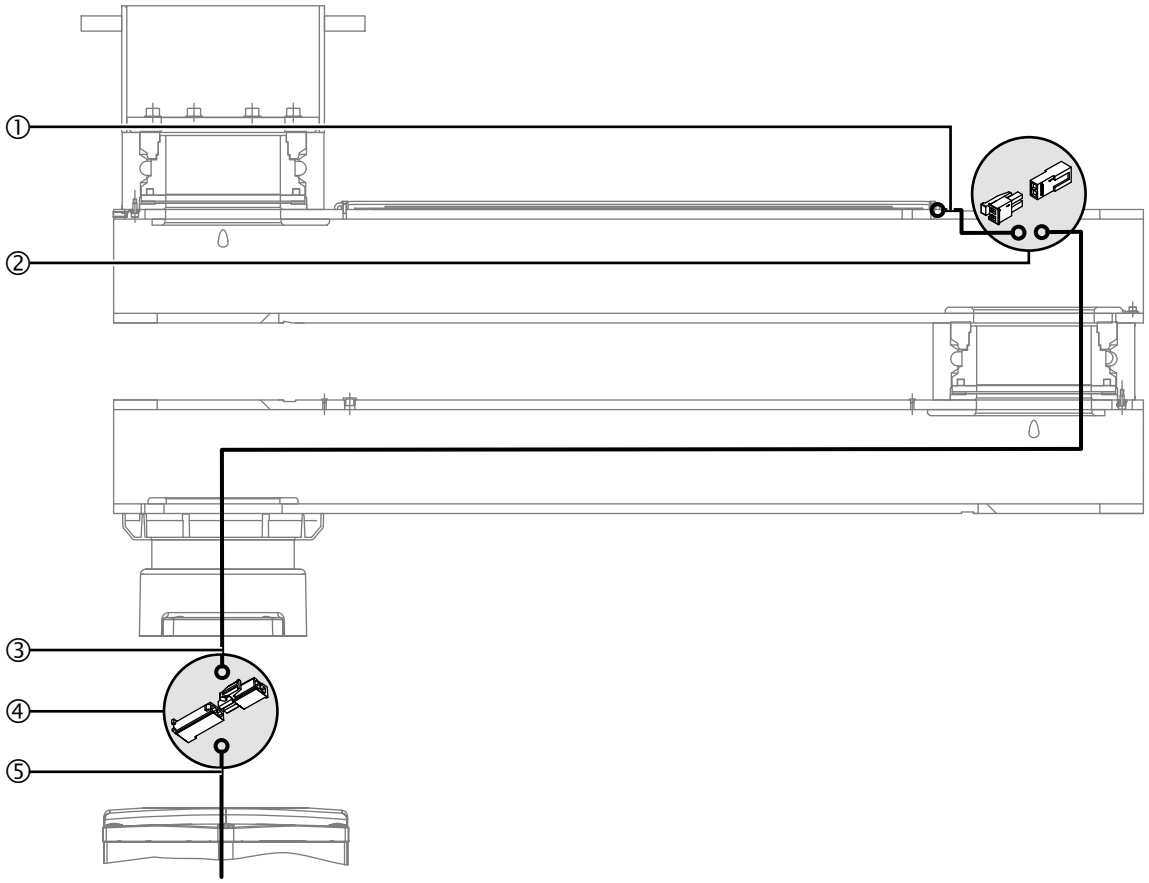


Table 04: Cable assignment of the pendant system, dual-arm variant – options

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 / Navigator M6 cable	3000	–

11.4 Connecting the earthing cables to the support arm, dual-arm variant

(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 41.

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. Route the mounted earthing cables ① from the flange along the ceiling tube towards the interface plate.
4. Route the earthing cables ② out of the Navigator M6 through the pendant system and towards the interface plate.

11.5 Routing the supply cables and hoses through the support arm, dual-arm variant

(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 41.

2. Carefully route the supply cables and hoses ① through the pendant system and towards the interface plate:
- Next, route the Navigator M6 without exerting tensile stress on the supply cables and hoses ① .
- Make sure that the laid cables are not damaged or torn off.
3. Route order-specific cables (nurse call, phone, etc.) through the pendant system.
4. 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 support arm, dual-arm variant

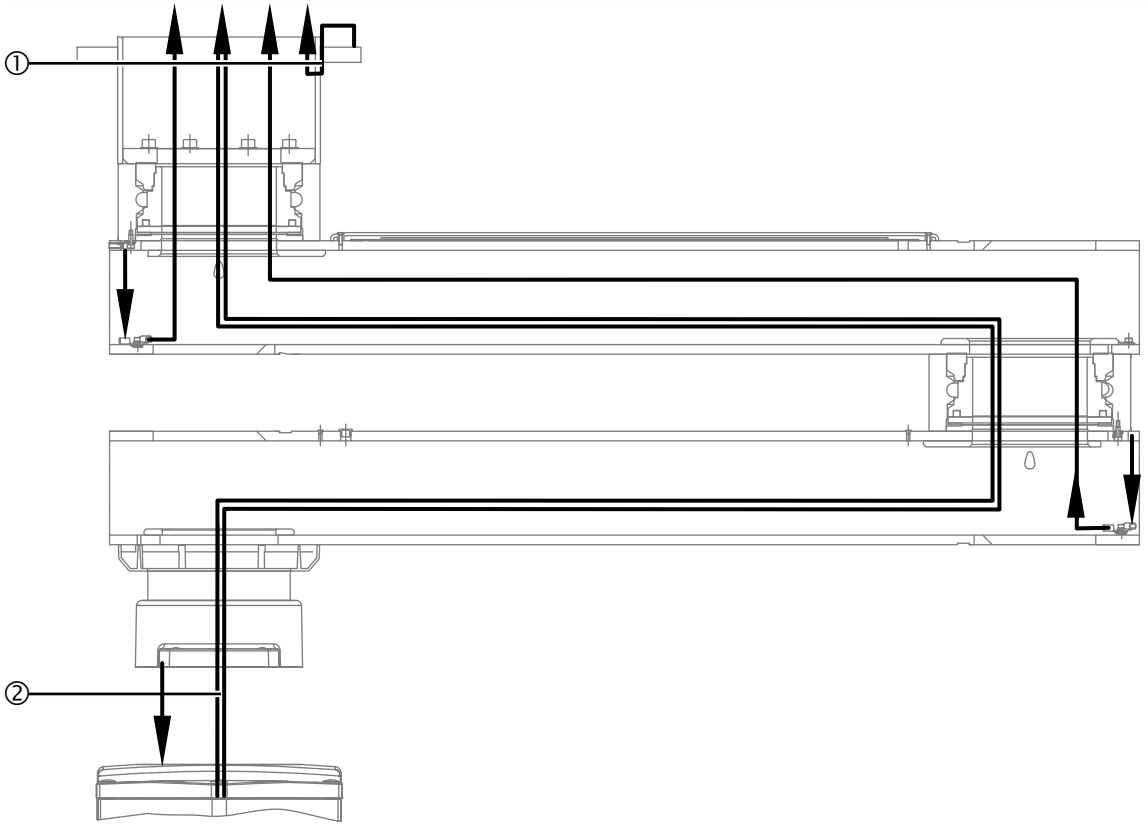
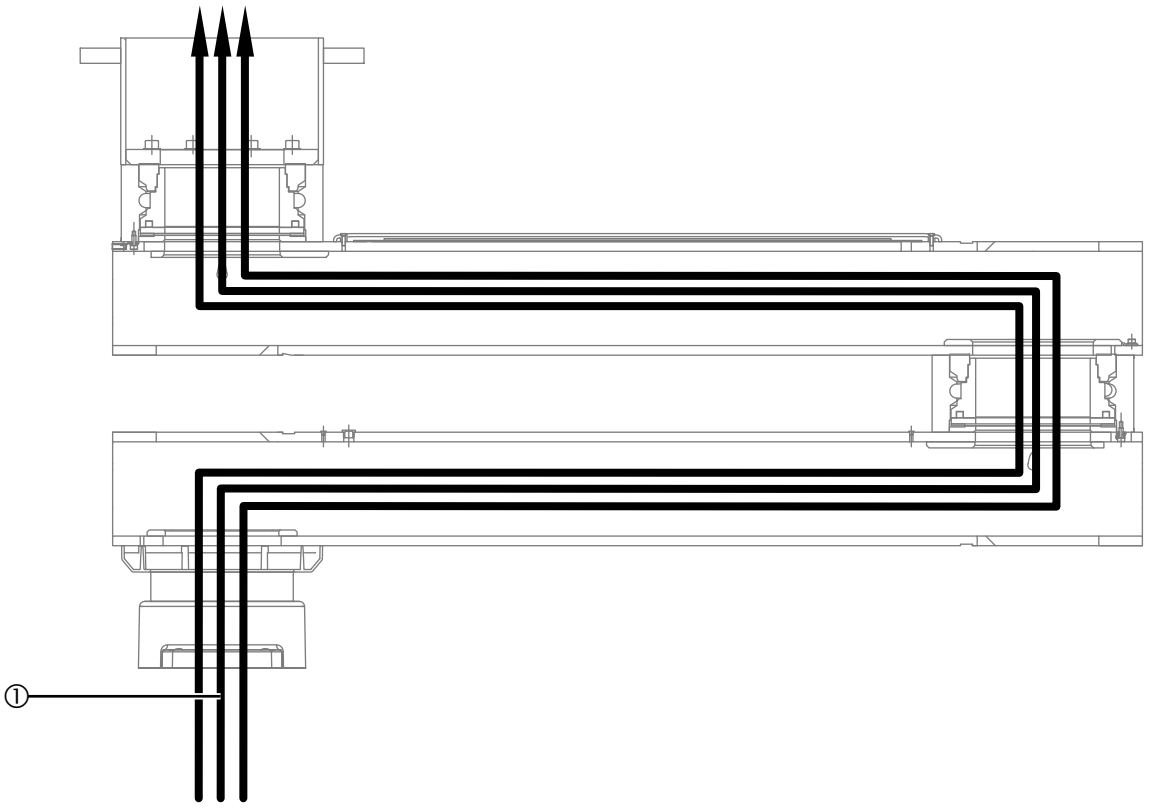


Figure 36: Routing the supply cables and hoses through the support arm, dual-arm variant



11.6 Connecting the cables and pipes to the support arm, single-arm variant

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. Order-specific cables, including nurse call and phone cables, must be separately routed through the pendant system.

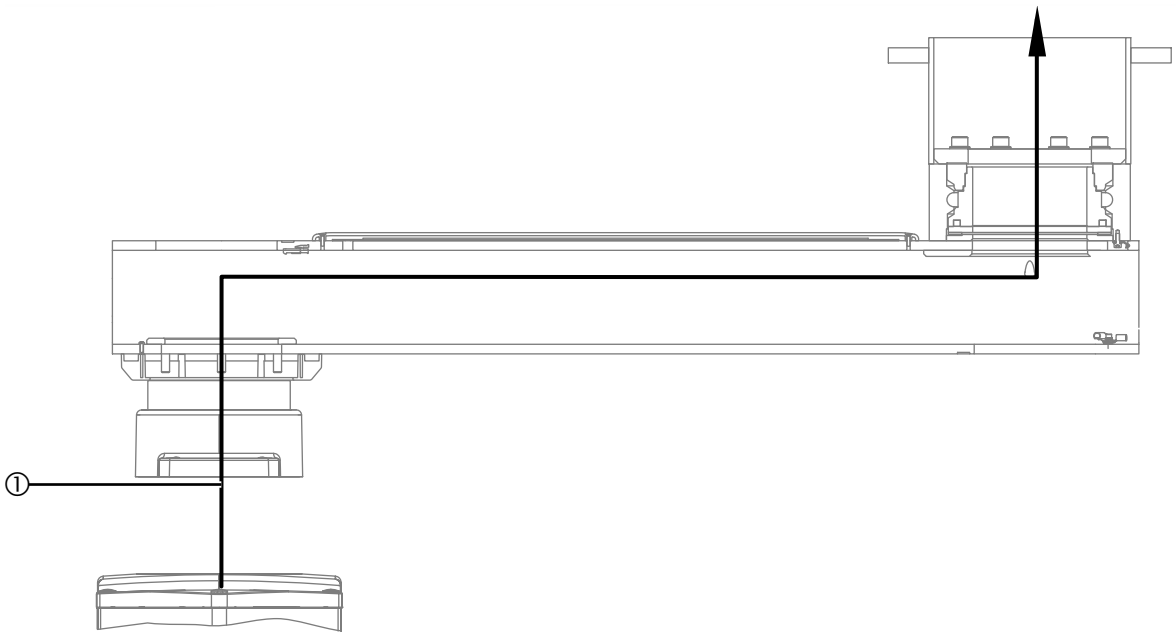
1. Observe the safety instructions in Chapter 11.1, on Page 41.

11.6.1 Routing the power cable

(See "Figure 37“)

- Route the power cable ① (in a spiral coiled tube if required) through the pendant system and towards the interface plate.

Figure 37: Routing the power cable



11.6.2 Routing and connecting pneumatic brake pipes

(See "Figure 38“)

1. Observe the safety instructions in Chapter 11.1, on Page 41.

The pneumatic brake pipes ① are pre-assembled in the pendant system and plugged onto the 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 be pressureless:

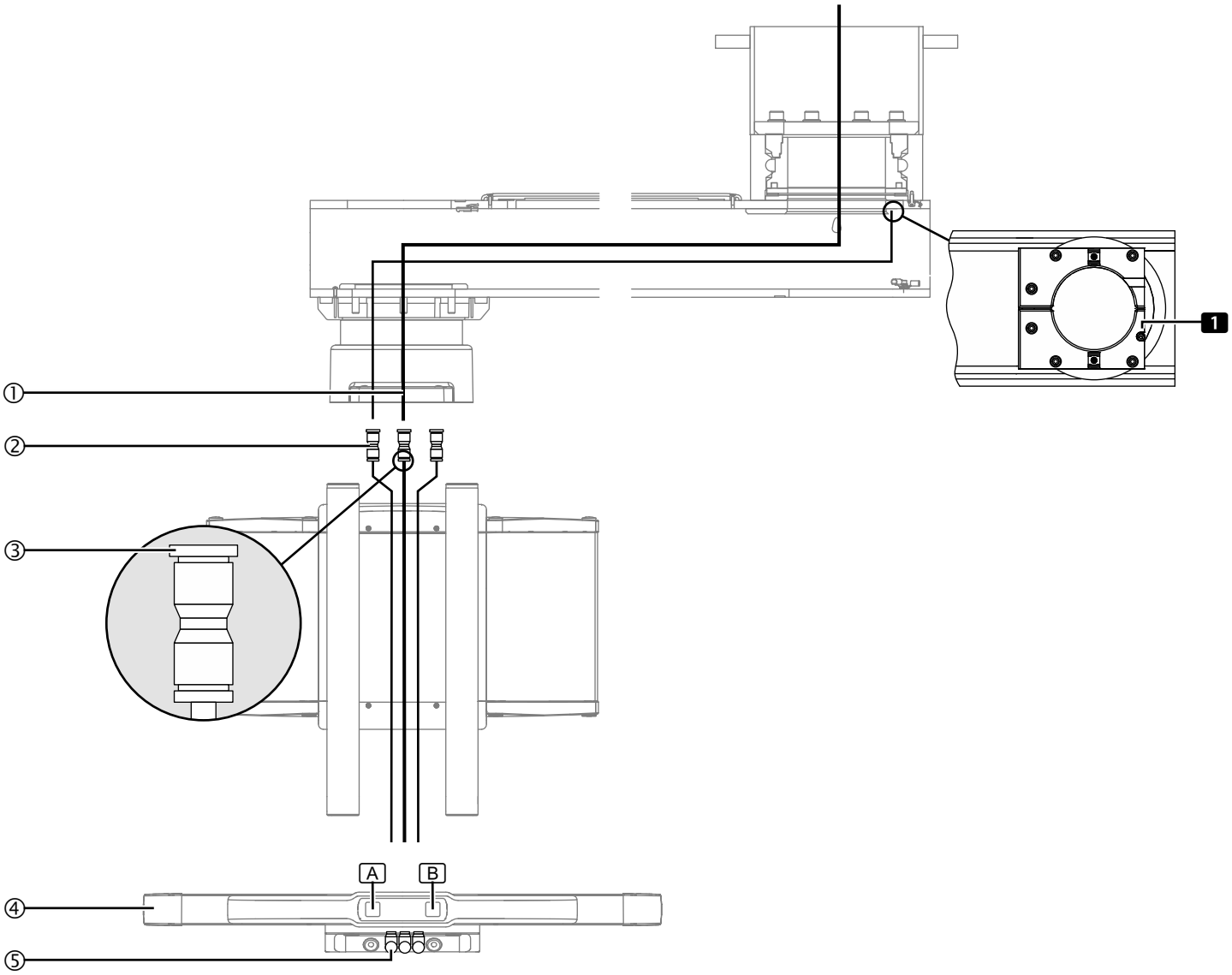
- To install the brake pipes, push them into the brake connecting point. If the brake pipe is correctly positioned, it can no longer be withdrawn from the brake connecting point.
- To disengage the brake pipes on the plug connector ② push in the unlocking mechanism ③ and then remove the brake pipes.

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

5. 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.

6. 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 extension arm must release.

Figure 38: Routing and connecting pneumatic brake pipes



11.7 Connecting the optional extension arm lighting

(See "Figure 39“)

1. Observe the safety instructions in Chapter 11.1, on Page 41.

2. 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.
3. Route the extension cable ③ through the extension arm and out of the Drop tube.
4. Establish the assembly connection ④ between the extension cable ③ and the control cable ⑤ routed out of the Navigator M6.

Figure 39: Connecting optional accessories to the support arm, single-arm variant

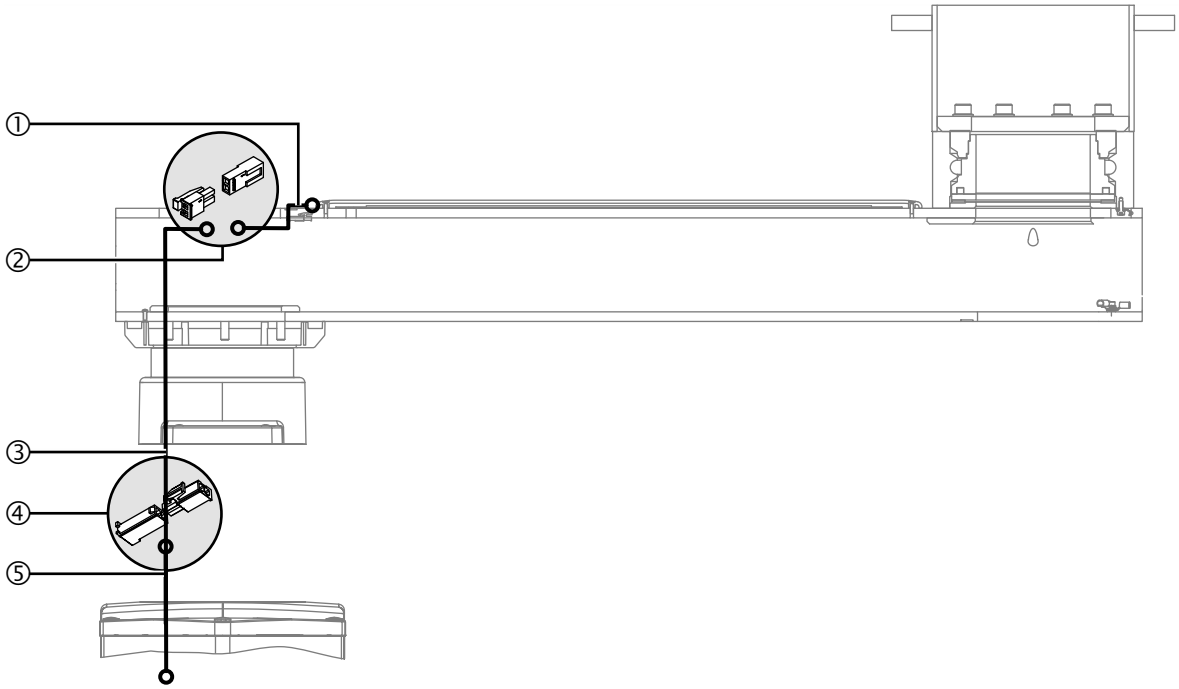


Table 05: Cable assignment of the pendant system, Single-arm variant – Options

No. in Fig. 39	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 / Navigator M6 cable	3000	–

11.8 Connecting earthing cables to the support arm, single-arm variant

(See "Figure 40“)

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 41.

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. Route the mounted earthing cables ① from the flange along the ceiling tube towards the interface plate.
4. Route the earthing cables ② out of the Navigator M6 through the pendant system and towards the interface plate.

11.9 Routing the supply cables and hoses through the pendant system, single-arm variant

(See "Figure 41“)

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 41.

2. Carefully route the supply cables and hoses ① through the pendant system and towards the interface plate:
- Next, route the Navigator M6 without exerting tensile stress on the supply cables and hoses ① .
- Make sure that the laid cables are not damaged or torn off.
3. Route order-specific cables (nurse call, phone, etc.) through the pendant system.

4. Mount the Navigator M6 onto the pendant system as described in the Installation Instructions of the Navigator M6.

Figure 40: Connecting earthing cables to the support arm, single-arm variant

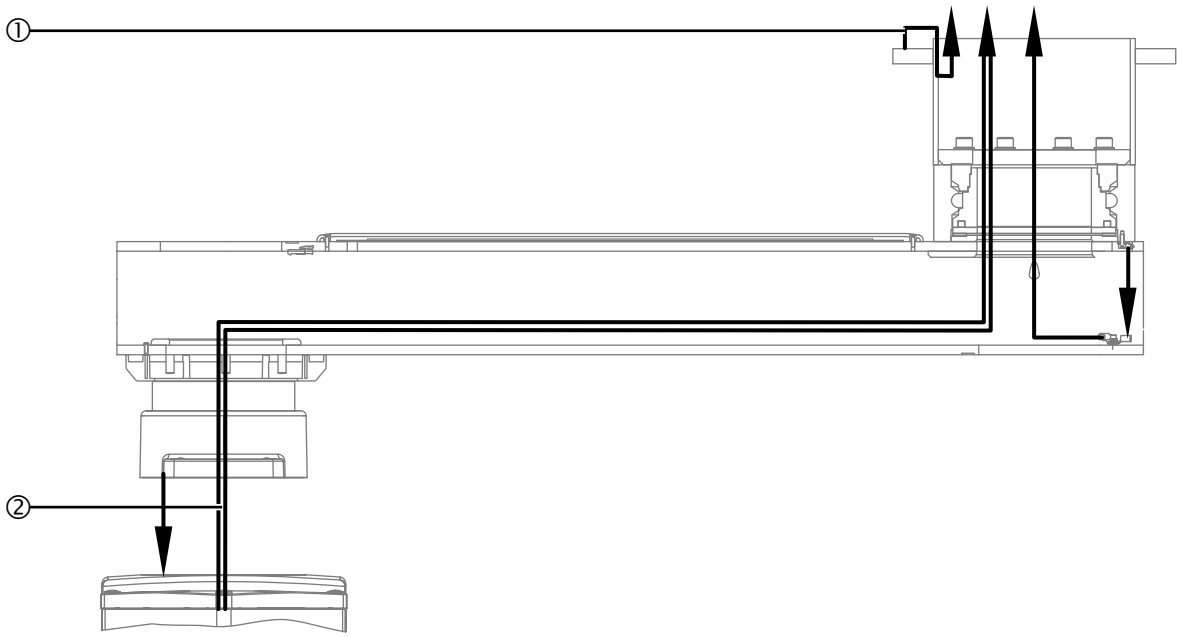
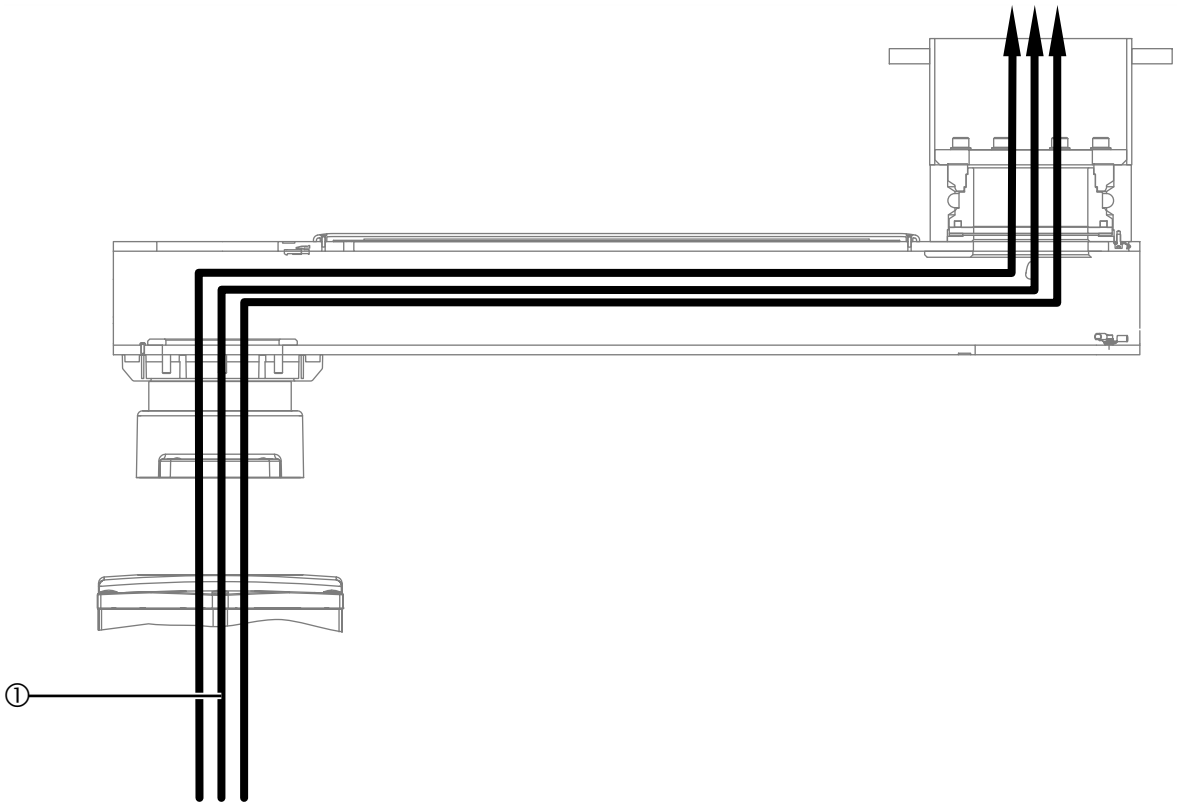


Figure 41: Routing the supply cables and hoses through the pendant system, single-arm variant



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:

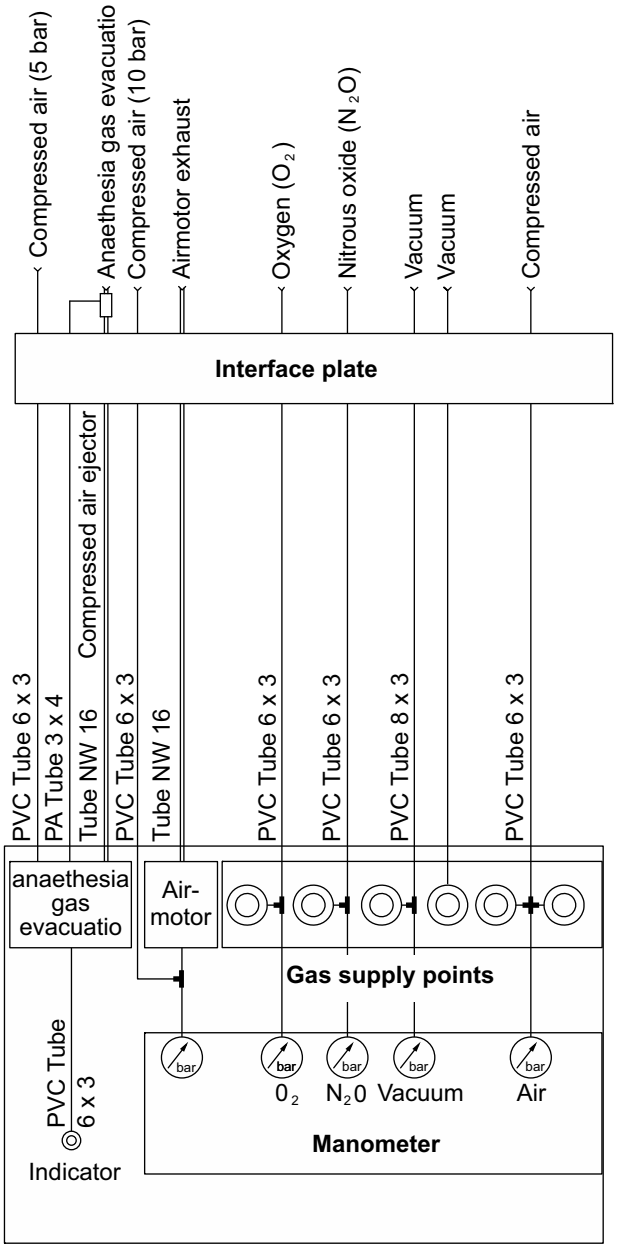
- The pendant system or the Navigator M6 can be energised if the insulation is defective:
- The power supply and earthing cables must be connected to the strain relieving mechanisms of the interface plate.

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 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 in order to prevent damage (e.g. rubbing of the sheathing) 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 42: Installing gas supply hoses and exhaust air ducts



Navigator M6

12.2 Installing gas supply hoses and exhaust air ducts

(See Figure 42)

1. Observe the safety instructions in Chapter 12.1, on Page 58.

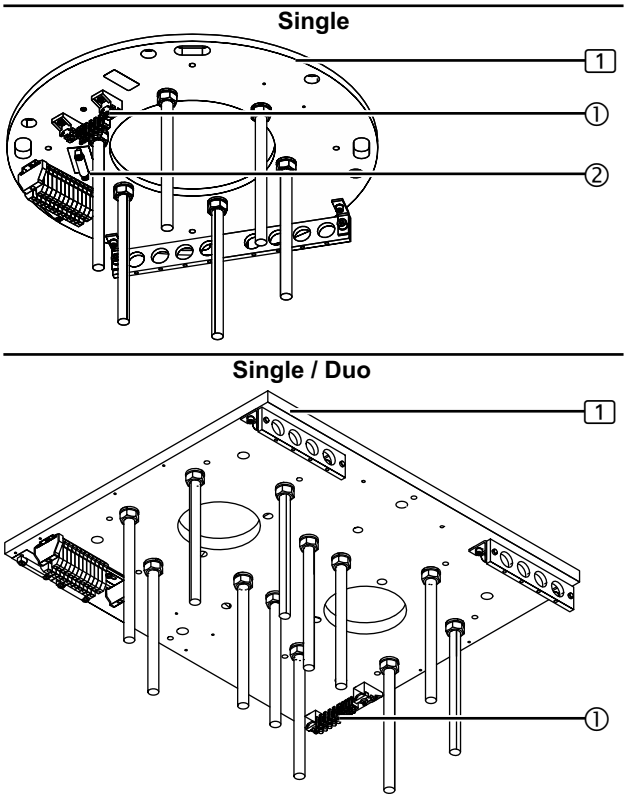
NOTE – Make sure that the gas types are correctly assigned

- 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 61.

Figure 43: Connecting the earthing cables



12.3 Connecting the earthing cables

(See Figure 43)

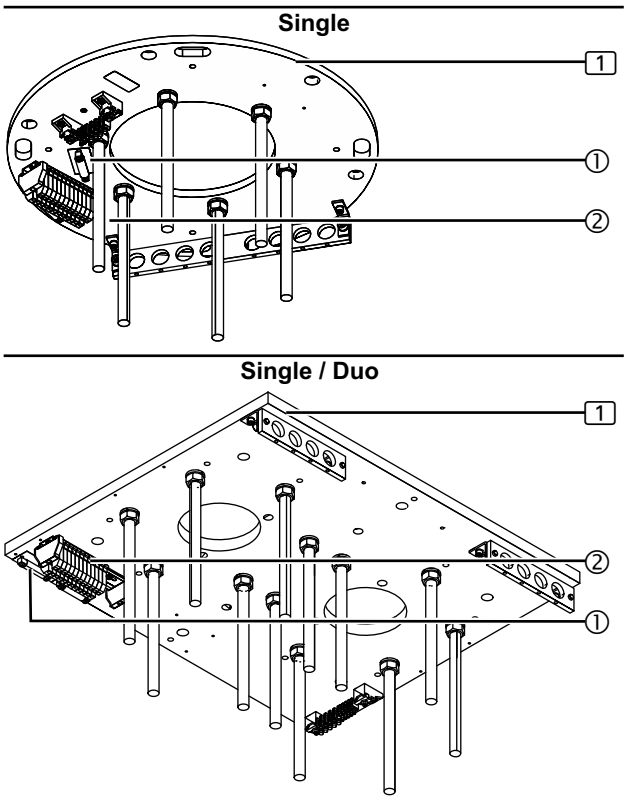
The Figure shows a simplified illustration of the interface plate [1] without extension arm and cables, etc.

1. Observe the safety instructions in Chapter 12.1, on Page 58.

2. Cut all green/yellow earthing cables (2.5 mm² and 10 mm²) to the correct length.
3. Route the earthing cables through the strain relieving mechanism and connect them to the series terminals 4 mm² or 10 mm² 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 44: Connecting power cables



12.4 Connecting power cables

(See Figure 44)

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 58.

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 are not trapped or bent during the entire rotating motion of the extension arms.

13.1 Gas inspection

1. Gas outlets and marking 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 45: Preparing the installation of the canopy

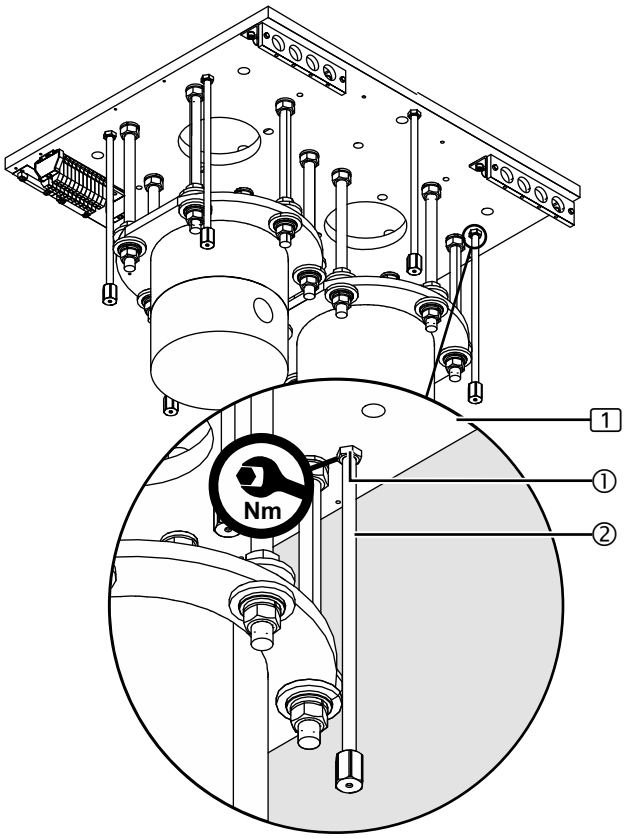
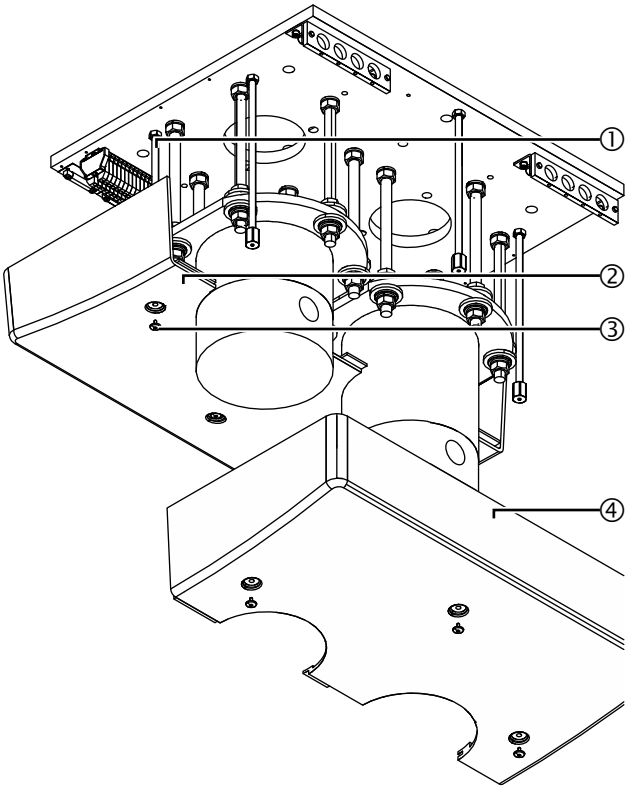


Figure 46: Mounting the canopy halves



14.1 Mounting a Single / Duo canopy

14.1.1 Preparing the installation of the canopy

(See Figure 45)

The Figure shows a simplified illustration of the interface plate without cables and without the extension 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 46)

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

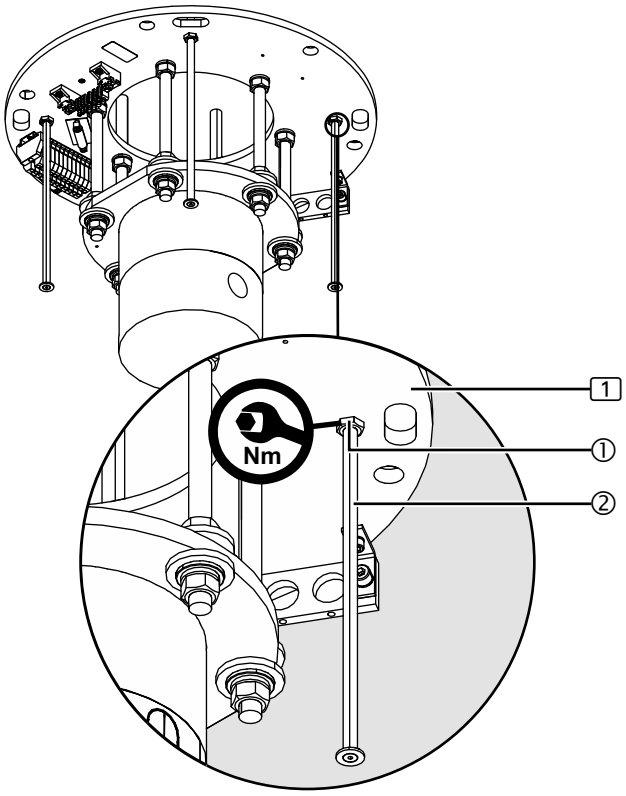
1. Place the sectional strip (not illustrated in the Figure) onto the first canopy half ② (the canopy can be optionally sealed with silicone).
2. Place the first canopy half ② onto the threaded bolts M10 x 360 mm ① and then screw in and tighten the 3 cover screws ③ .
3. Check that the canopy half ② is 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 62.

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 47: Preparing the installation of the canopy



14.2 Mounting the Single canopy (Navigator™ only)

14.2.1 Preparing the installation of the canopy

(See Figure 47)

The Figure shows a simplified illustration of the interface plate without cables and without the extension 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 30”).

- 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

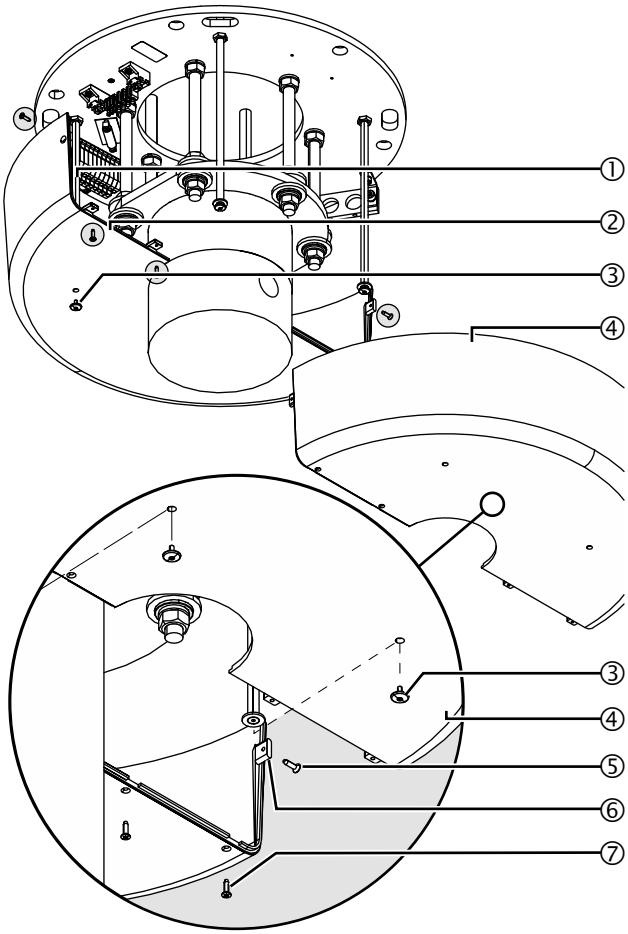
The canopy can drop if the fixing elements have not been properly tightened:

- 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.

Figure 48: Mounting the canopy halves



14.2.2 Mounting the canopy halves

(See Figure 48)

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

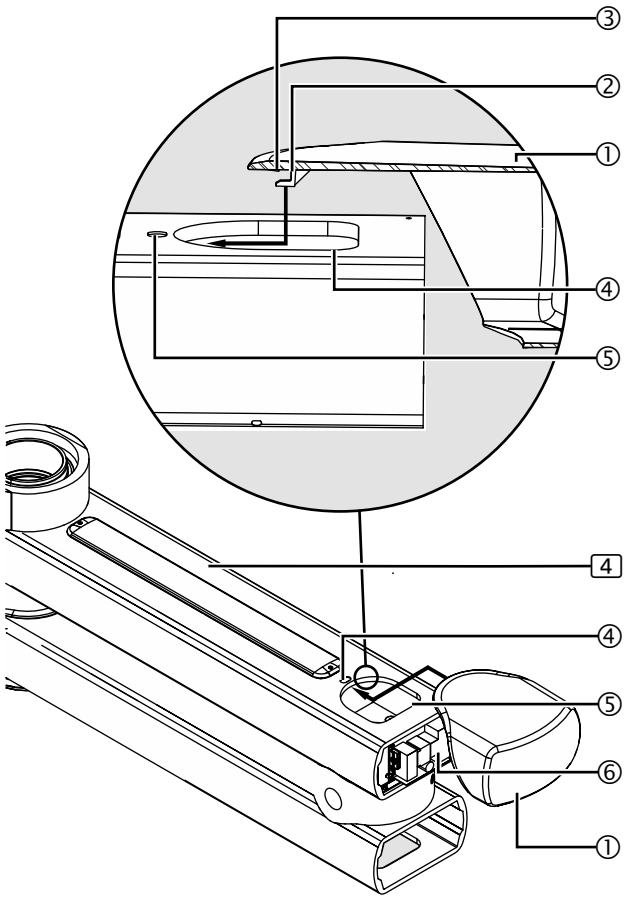
1. Place the sectional strip (not illustrated in the Figure) onto the first canopy half ② (the canopy can be optionally sealed with silicone).
2. Place the first canopy half ② onto the threaded bolts M10 x 360 mm ① and then screw in and tighten the 2 cover screws ③ .
3. Check that the canopy half ② is 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 63.

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 49: Mounting the cover caps



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

14.3.1 Mounting the cover caps

(See Figure 49)

The Figure shows a simplified illustration of the extension arms without cables. The detailed representation shows a sectional view of the cover cap ① .

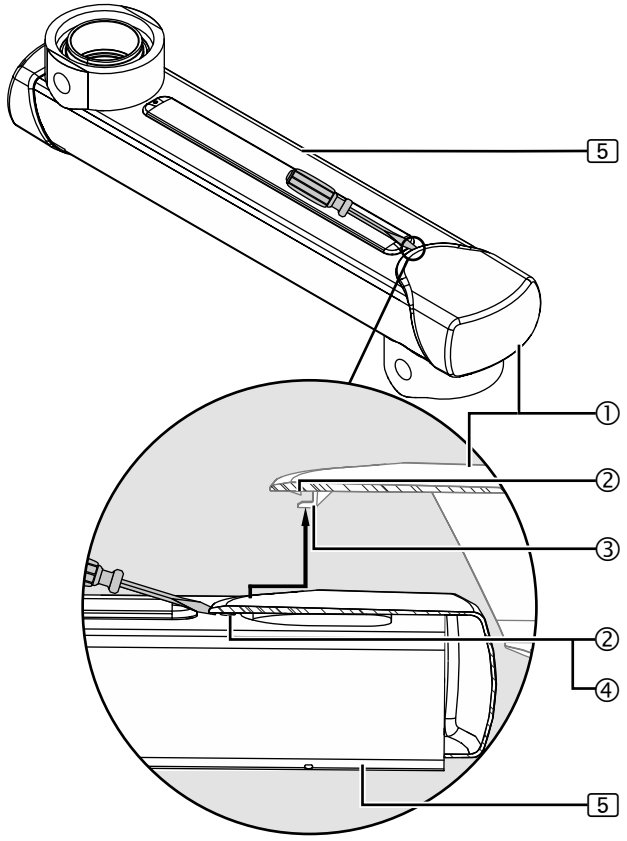
1. When placing the cover cap ① onto the extension arm end, make sure that the holding down clamp ② sits in the aperture ④ .
2. Push the cover cap ① onto the extension arms [4], [5] as far as it will go and make sure that the latch ③ snaps into place in the groove ⑤ :

- Make sure that the power pack ⑥ and the cables in the extension arms [4], [5] are not damaged.
- If properly mounted, the cover cap ① can no longer be withdrawn from the extension arms [4], [5].

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

- The cover cap ① muss be absolutely level with the contours of the extension arm [4], [5].

Figure 50: Dismantling the cover caps



14.3.2 Dismantling the cover caps

(See Figure 50)

The Figure shows a simplified illustration of the extension arms 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 arms [4], [5] and gently push the latch ② out of the groove ④ .

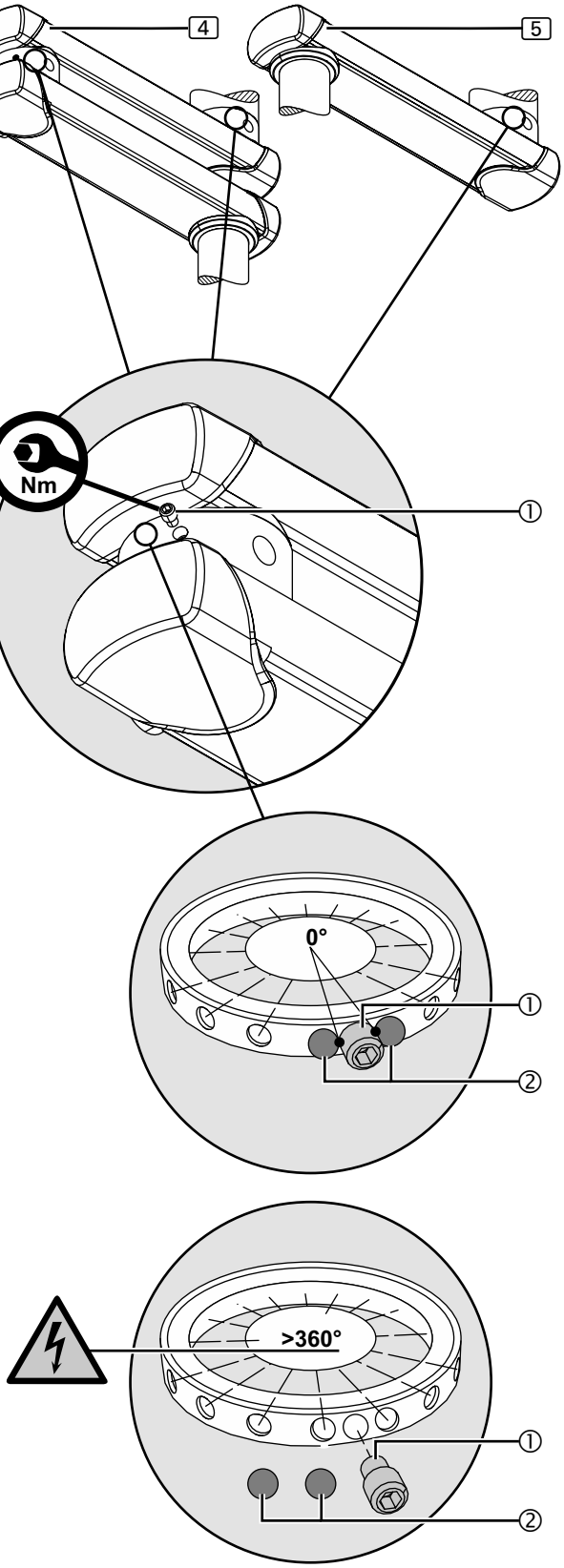
- Make sure you do not damage the latch ② .
- Make sure that the cover cap ① neither breaks nor bends.

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 51: Condition of the swivel stop on the extension arm as supplied by NUVO



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.

⚠CAUTION

Performing adjustment work

- Adjustment work may only be carried out by qualified personnel who have been authorised and instructed by the operator.

15.2 Condition of the swivel stop on the extension arm as supplied by NUVO

(See Figure 51)

The Figure shows the pendant system Navigator ™ Air / Navigator ™ Air-*Plus*. The swivel stop delivered for the pendant system Navigator ™ Friction is identical.

15.2.1 Extension arm with pre-assembled swivel stop

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

- Changing or dismantling the swivel stops as described in Chapter 15.3.4, on Page 70

15.2.2 Extension arm with pre-assembled swivel stop

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

⚠WARNING

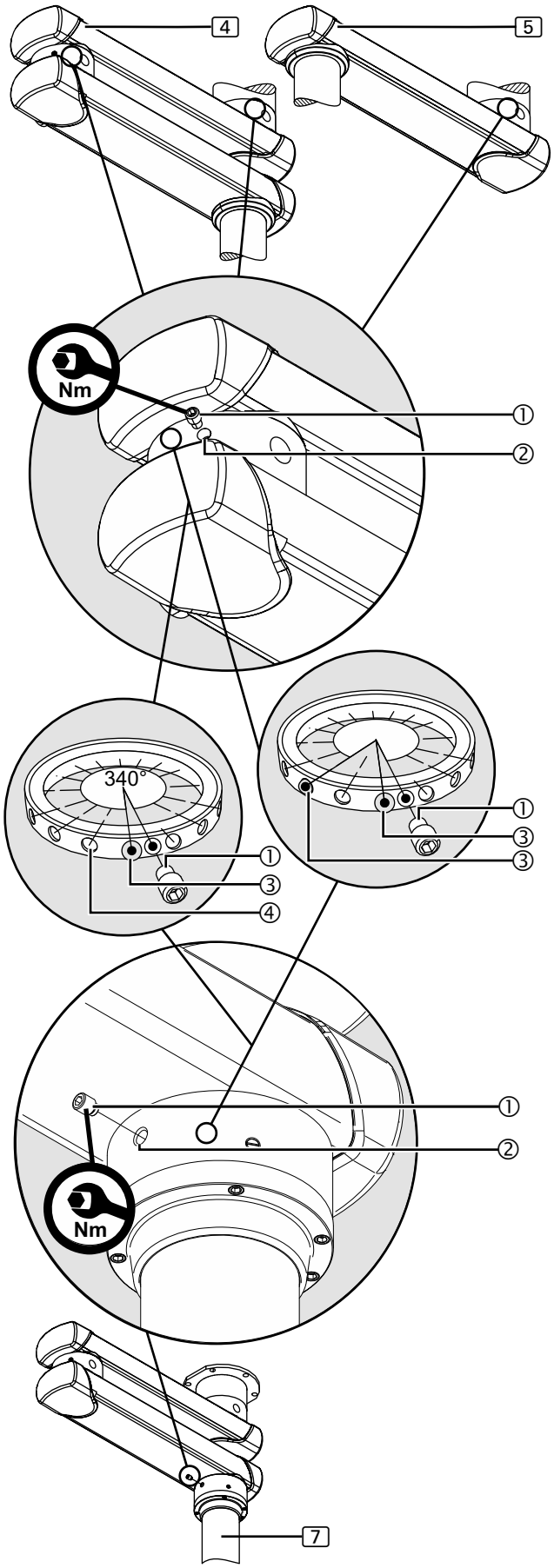
Electric shock hazard

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 must not be rotated before the swivel stops have been mounted.
- In order to restrict the angle of rotation of the extension arms to 350 degrees, at least 1 ball stop must be mounted as described in Chapter 15.3.3, on Page 69.

- Mount the swivel stops as described in Chapter 15.3.2, on Page 68 and Chapter 15.3.3, on Page 69.

Figure 52: Adjusting the swivel stop on the extension arm and the Drop tube



15.3 Adjusting the swivel stop on the extension arm and the Drop tube

(See Figure 52)

The following section describes how to adjust the end stop on the extension arm or the Drop tube of the Navigator ™ Air / Navigator ™ Air*Plus* system.
The procedure for adjusting the end stop of the pendant system Navigator ™ Friction is identical.

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 up to 340 degrees. With 2 ball stops installed, the swivel range can be restricted in graduations of 15 degrees.

⚠WARNING

Electric shock hazard

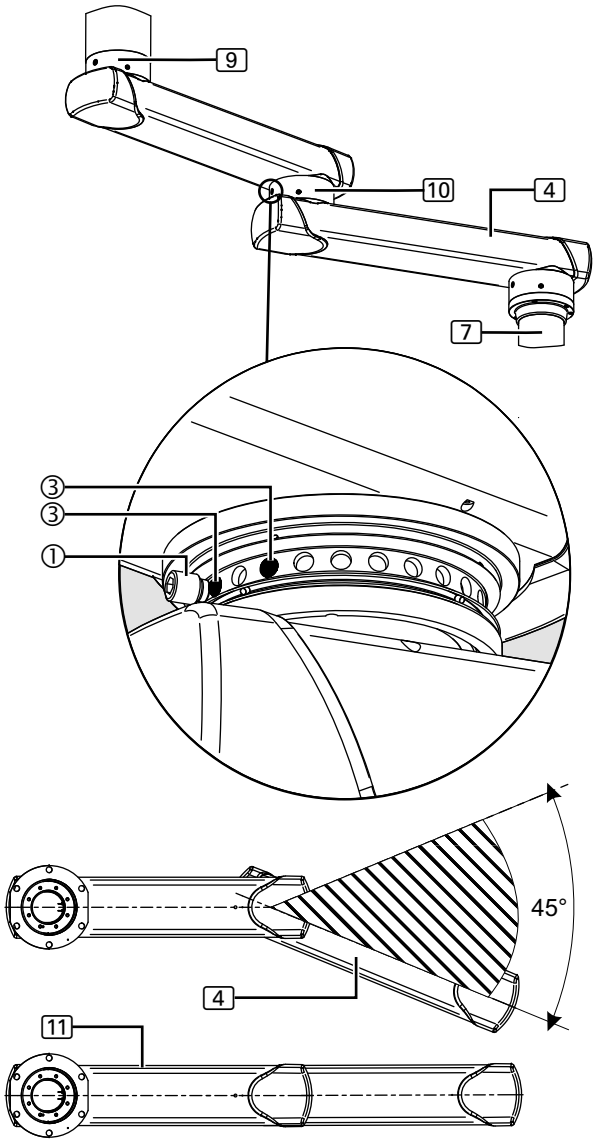
In order to prevent the internal supply cables twisting off, at least 1 ball stop must be mounted. This ball stop serves as twist protection:

- To restrict the angle of rotation of the extension arm or Drop tube to 340 degrees, mount at least 1 ball stop as described in Chapter 15.3.3, on Page 69.

15.3.1 Tool to be used

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

Figure 53: Stop recomm.: Dual-arm pendant system with Bearing Unit Friction (roller bea.)



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

(See Figure 53)

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 lower extension arm

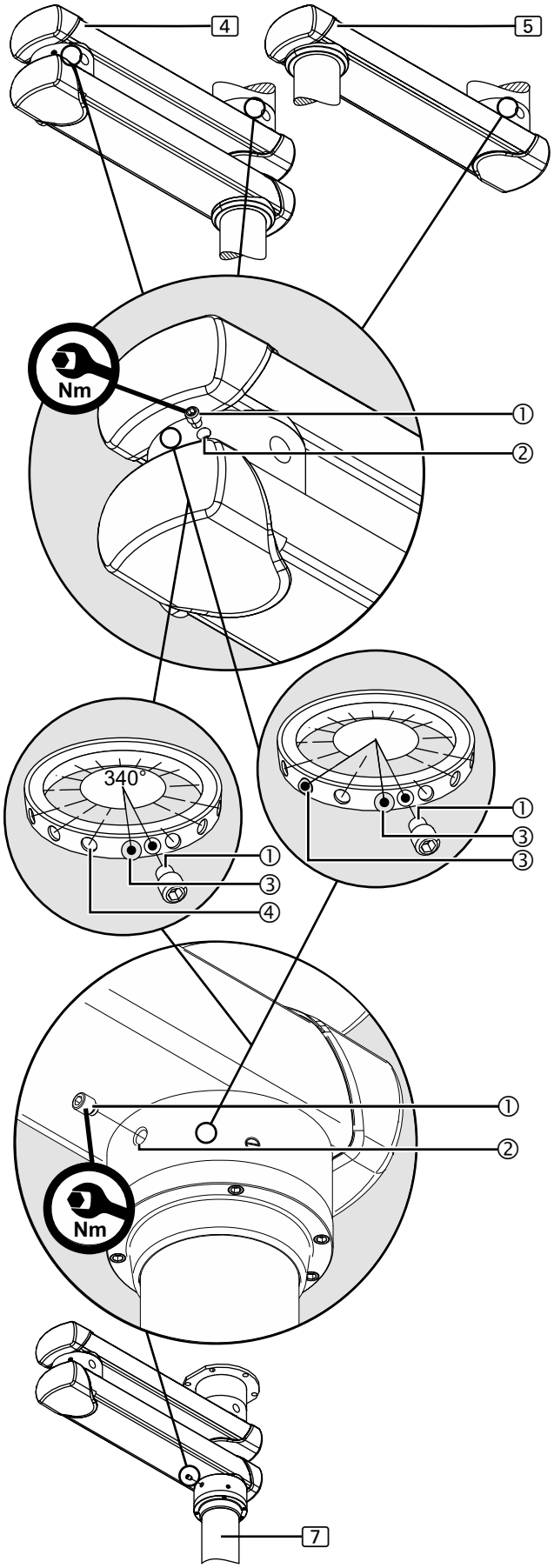
When adjusting the end stop as illustrated in Figure 53, the dead centre area is 45°. This means that the lower extension arm [4] of the dual-arm pendant system has a maximum movement range of approx. 315°.

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 Position [11] and rotate it on the intermediate bearing [10] of the lower extension arm [4].

When moving the adaption on the Drop tube [7] from the stretched Position [11] position, there is a risk that the extension arms 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 15.3.3, on Page 69.

Figure 54: Mounting the swivel stop



15.3.3 Mounting the swivel stop

(See Figure 54)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 66.

2. Rotate the extension arms [4], [5] or the Drop tube [7] towards the desired end stop position and then insert 1 ball stop ③ into the threaded hole ② in the bearing.

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

The extension arms [4], [5] or the Drop tube [7] 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 or Drop tube using a screwdriver.

3. Rotate the extension arms [4], [5] or the Drop tube [7] towards the desired second end stop position and then insert 1 additional ball stop ③ into the threaded hole ② .
4. Slightly rotate the extension arms [4], [5] or the Drop tube [7] 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 or Drop tube.

⚠ WARNING

Nm

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:

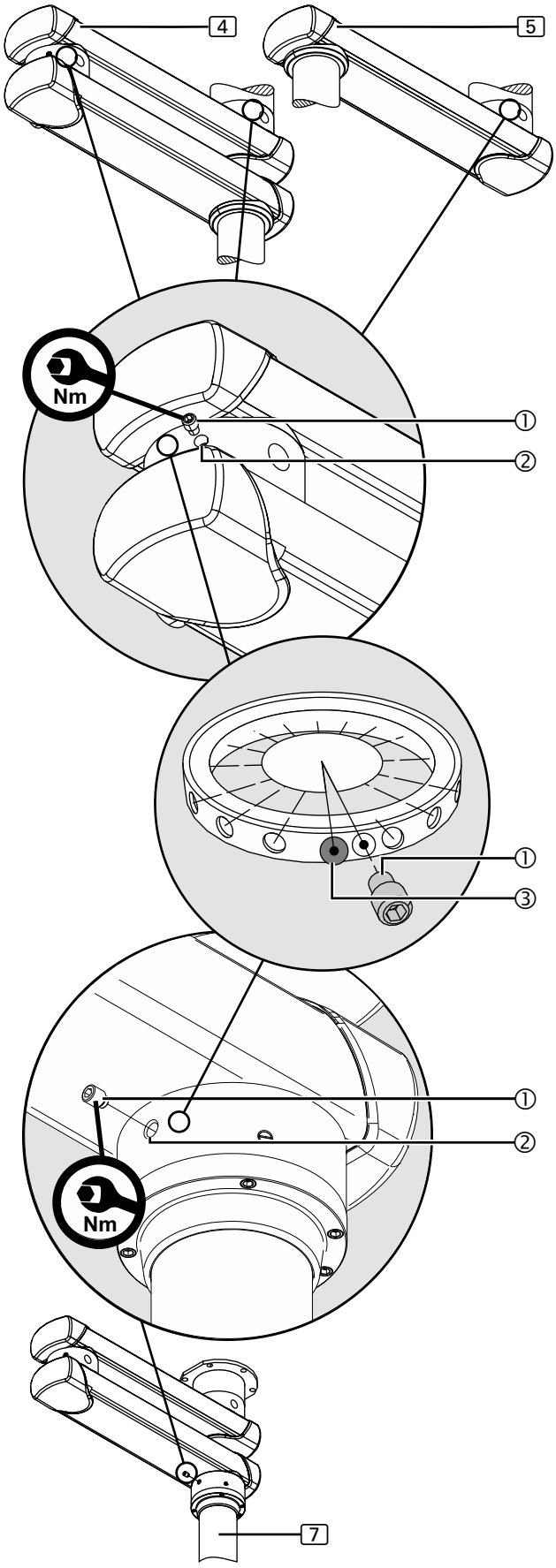
- Tighten the setscrew M16 ① to 40 Nm.

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

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

7. To change a mounted ball stop ③ , refer to Chapter 15.3.4, “Changing or dismantling the swivel stop”, on Page 70.

Figure 55: Changing or dismantling the swivel stop



15.3.4 Changing or dismantling the swivel stop

(See Figure 55)

1. Follow the general safety instructions prescribed in Chapter 15.1, on Page 66.
2. Unscrew a setscrew ① from the threaded hole ② .
3. Rotate the extension arms [4], [5] or the Drop tube [7] until the ball stop ③ in the threaded hole ② is visible.
4. Using a telescopic magnet pick-up tool, remove the ball stop ③ from the threaded hole ② and keep it in a safe place.

⚠WARNING

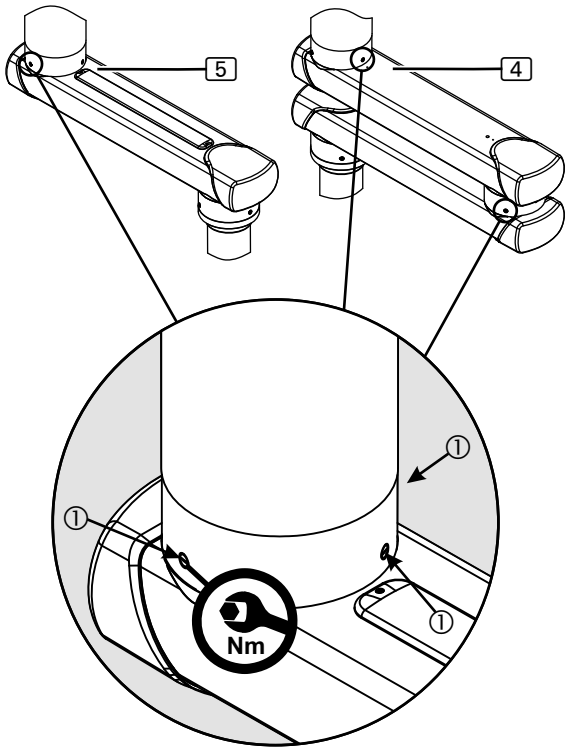
Electric shock hazard

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.
- Mount at least 1 ball stop ③ in order to restrict the angle of rotation of the extension arm or Drop tube to 340 degrees.

5. Mount the swivel stop as described in the end stop recommendation in Chapter 15.3.2, on Page 68 and in Chapter 15.3.3, on Page 69.

Figure 56: Adjusting the mechanical brake for the extension arm (Navigator ™ Friction only)



15.4 Adjusting the mechanical brake for the extension arm (Navigator ™ Friction only)

(See Figure 56)

For these pendant system versions, the mechanical brakes (friction brakes) keep the extension arms [4], [5] in any set position. Adjust the braking force in such a way that the extension arms [4], [5] remain stable in any position and can still be conveniently adjusted. If the brakes are not adjusted correctly, the extension arm can move automatically in an uncontrolled manner.

NOTE: Adjusting the brakes for the Navigator ™ Friction Dual

Observe the end stop recommendation in Chapter 15.3.2, on Page 68 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 lower extension arm. This facilitates the bending of the bottom extension arm and allows the bearing unit on the bottom extension arm to rotate freely.
Follow the general safety instructions prescribed in Chapter 15.1, on Page 66.

- 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).
  - All 3 brake screws must be tightened with the same tightening torque which, however, must not exceed 1.6 Nm.

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

- Performing a function test

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

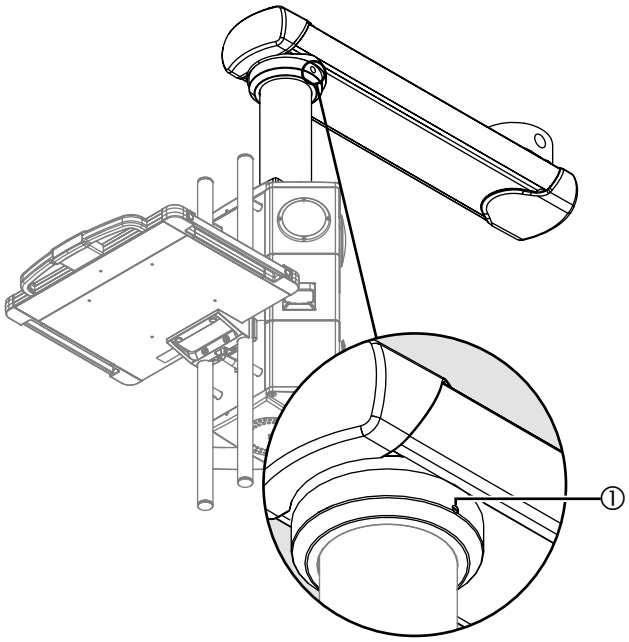
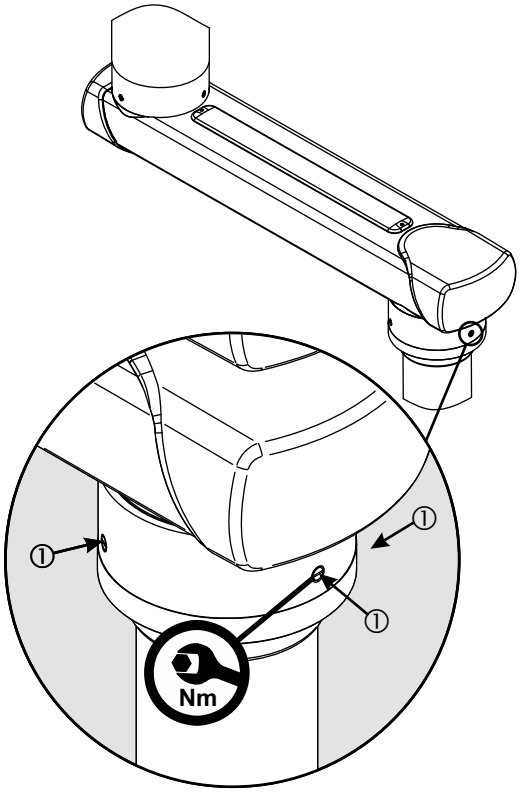


Figure 58: Adjusting the brake on the Drop tube Friction (roller bearing)



15.5 Adjusting the mechanical brake on the Drop tube Friction

15.5.1 Adjusting the brake on the Drop tube Friction (slide bearing)

(See Figure 57)

The brake screw (friction brake) is adjusted in the same way for all the different pendant system versions.
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 66.

Tool to be used
Use a suitable slotted screwdriver.

To increase the braking force
- Insert the slotted screwdriver into the brake screws ① and turn it to the right (clockwise).

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

- Perform a function test.

15.5.2 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 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 66.

- 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).
  - All 3 brake screws must be tightened with the same tightening torque which, however, must not exceed 1.6 Nm.

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

- Performing a function test

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 start-up following installation, proper initial commissioning must be carried out for the entire pendant system and the Navigator M6.

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 test report in accordance with Appendix G DIN EN 62353.

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 59: Navigator ™ Air*Plus* / Navigator ™ Air / Navigator ™ Friction – Single-arm variant

The Figure shows the pendant system Navigator ™ Air*Plus*. Please note that your pendant system configuration can differ from this illustration.

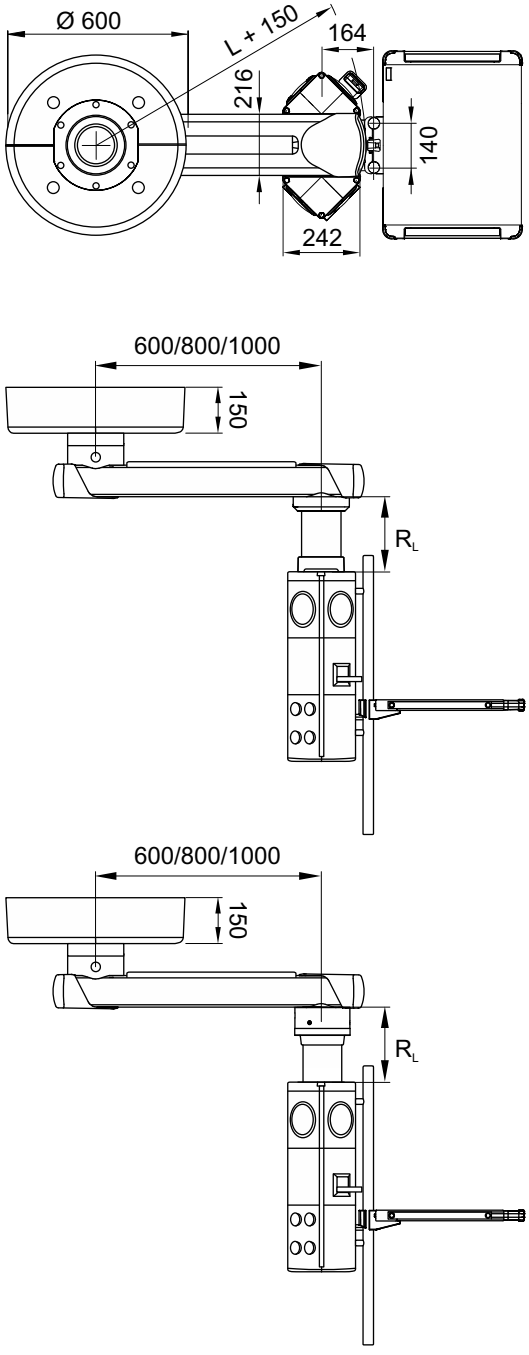
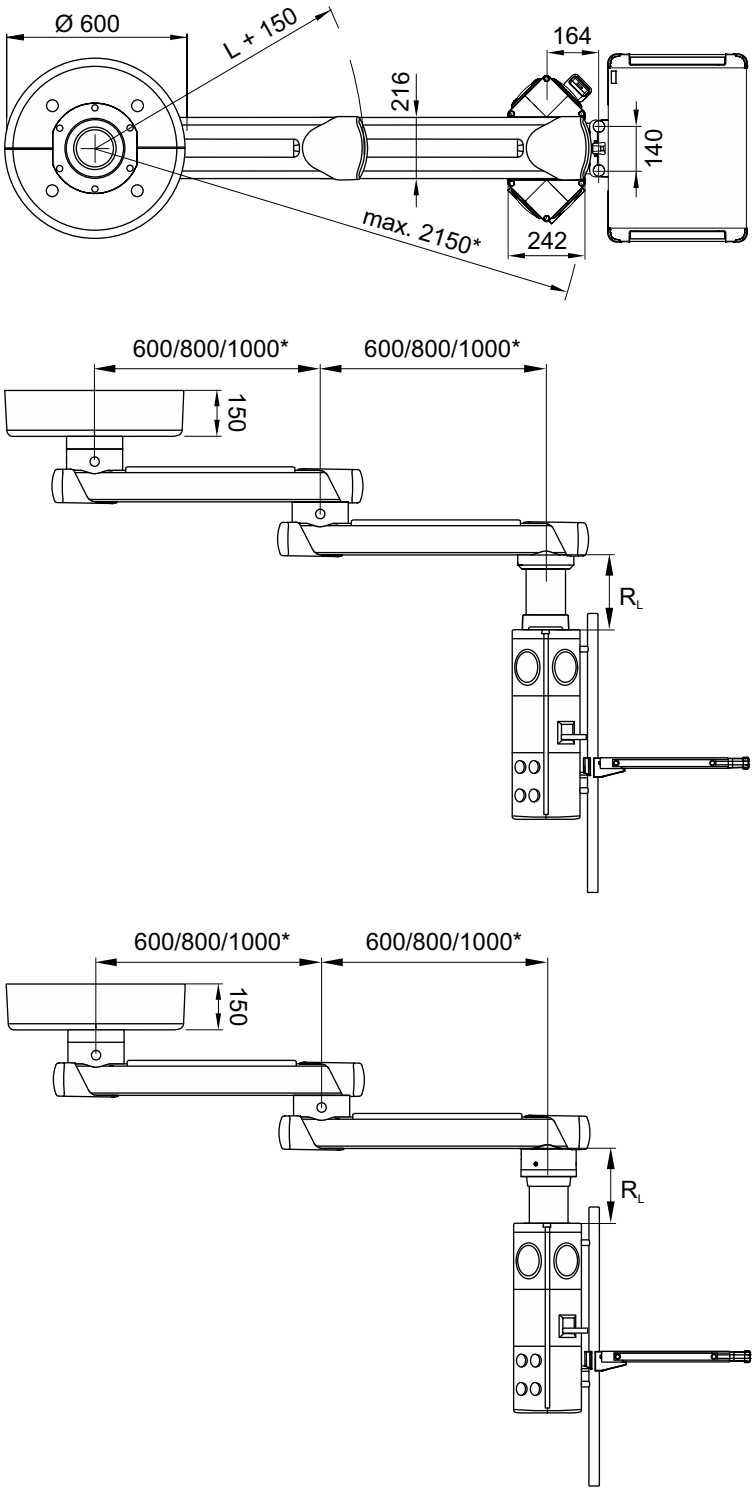


Figure 60: Navigator ™ Air*Plus* / Navigator ™ Air / Navigator ™ Friction – Dual-arm variant

The Figure shows the pendant system Navigator ™ Air*Plus*. Please note that your pendant system configuration can differ from this illustration. *max. system length: Navigator ™ Air*Plus* 2000 mm or 2150 mm. Navigator ™ Air 1800 mm or 1950 mm.



Modes of operation	• The pendant system is suitable for continuous operation.
Rating plate	• The rating plate is attached to the upper extension arm (see Chapter 2.8, on Page 16).
Dead weight of the pendant system Navigator ™ Air*, Navigator ™ Air*Plus**, Navigator ™ Friction*	Single arm version Extension arm 600 mm ..... 26.0 kg Extension arm 800 mm ..... 29.0 kg Extension arm 1000 mm ..... 32.0 kg Dual arm version Extension arm 600/600 mm ..... 50.0 kg Extension arm 600/800 mm or 800/600 ..... 53.0 kg Extension arm 800/800 mm ..... 56.0 kg Extension arm 1000/600 mm or 600/1000 mm ..... 56.0 kg Extension arm 1000/800 mm or 800/1000 mm ..... 59.0 kg Extension arm 1000/1000 mm (Navigator ™ Air*Plus* only) ..... 62.0 kg * Without gas hoses and supply cables inserted, without ceiling or Drop tube and without optional accessories.
Dead weight of the ceiling tube pendant system Navigator ™ Air*, Navigator ™ Air*Plus**, Navigator ™ Friction*	Dead weight of the ceiling tube flange ..... 6.0 kg Steel tube ..... 24 kg/m
Dead weights of the bearing units on the Drop tube	Dead weight of the Bearing Unit Friction (slide bearing) ..... 5.0 kg Bearing Unit Friction (roller bearing) ..... 13.0 kg
Dead weight of the Drop tube	Drop tube ..... 8 kg/m
Maximum permissible load bearing capacity of the pendant system	The pendant system is suitable and approved for the maximum load bearing capacity specified in Chapter 5, on Page 21. If you cannot clearly determine the maximum load bearing capacity as specified in Chapter 5, on Page 21, contact NUVO in order to prevent damage to persons or property.
Electrical data	Indirect extension arm lighting .....DC 12 V
Brakes on the extension arm and Drop tube	Extension arm Navigator ™ Air / Navigator ™ Air*Plus* ..... Pneumatic brake Extension arm Navigator ™ Friction ..... Mechanical brake Drop tube ..... Mechanical brake Maximum operating pressure of the pneumatic brake ..... 5 bar
Noise level	Sound energy level .....65 dB(A) (EN ISO 3746) not exceeded
Brake torque	Brake torque with the pneumatic brake actuated .....approx. 50 Nm Dynamic torque with the pneumatic brake released Depending on the position and payload .....3.5 to 40 Nm
Manual forces	Dynamic torque with the pneumatic 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 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) • 93/42 EEC (Medical Device Directive) • 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: • Chapter 20, “Approved NUVO Products”, on Page 82, • Chapter 21, “Optional Accessories”, on Page 82: – 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. – 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 lead to a failure or collapse of the pendant system, the maximum load bearing capacity specified in Chapter 18, “Technical Data”, on Page 76 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. – Read the Operating Instructions provided by the third-party manufacturer to obtain the information required for the operation of the end device.

19.1 Guidelines and manufacturer's declarations

19.1.1 Electromagnetic emissions

The Navigator ™ is intended for use in the ELECTROMAGNETIC ENVIRONMENT specified below. The customer or the user of the Navigator ™ 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 ™ 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 ™ 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 ™ is intended for use in the ELECTROMAGNETIC environment specified below. The customer or the user of the Navigator ™ 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 ±2kV, ±4kV, ±8kV, ±15kV air	passed
Electrical fast transients / bursts in accordance with IEC 61000-4-4	±2kV 100kHz repetition rate	passed
Surges Line-to-line in accordance with IEC 61000-4-5	±0.5kV, ±1kV	passed
Surges 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 at 0, 45, 90, 135, 180, 225, 270 and 315 degrees	passed
	0% U_T; 1 period and 70% U_T; 25/30 periods 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 50Hz or 60Hz	passed

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

Cont.

The Navigator ™ is intended for use in the ELECTROMAGNETIC environment specified below. The customer or the user of the Navigator ™ 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	3 V 0.15 MHz to 80 MHz 6 V in ISM frequency bands from 0.15 MHz to 80 MHz 80 % AM at 1 kHz	passed
High-frequency electromagnetic fields in accordance with IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz 80 % AM at 1 kHz	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 ™ is used exceeds the applicable RF compliance level above, the Navigator ™ 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 ™ .

[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™ 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.

20 Approved NUVO Products

Designation
Navigator M6 and approved end devices in accordance with the current Operating Instructions of the Navigator M6

21 Optional Accessories

Designation	Dead weight	Maximum payload
Indirect extension arm lighting	2.0 kg	---
Adapter Acrobat Swing 3p, L150*	1,6kg	10kg / 113Nm
Adapter Acrobat 2000 3p, L150*	2,9kg	30kg / 390Nm
Adapter Acrobat 2000 with stop, L150*	2,8kg	30kg / 390Nm
* The accessories can only be used if the outrigger has been ordered with preparation for adapters. This option can be selected for dual-arm variant on the upper extension arm: Navigator™ Air / Navigator™ Air*Plus* in lengths of 800mm and 1000mm		

547 Library St
San Fernando, CA 91340 USA
(818) 838-3025

No. 1568883